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Inequality in Vietnam

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Preface

This report presents the research results implemented during April 1, 2017 to March 31, 2018 of the Research Project on "Inequality in Vietnam". The project is to investigate the wage inequality in Vietnam by gender and by firms' ownership (state-owned enterprises (SOEs) and other firms) during 2002-2014.

Yamada Hiroyuki (Keio University) and I conducted analysis on the inequality along the wage distribution in Vietnam in the two important aspects using different waves of Vietnamese household survey during 2002-2014. We focus on the formal employments and further divide the sample by educational level, age profile, occupational type, and industry when necessary.

We are grateful to the Asian Growth Research Institute for its financial support for this research during this period. This work was also supported by JSPS (Japan Society for the Promotion of Science) KAKENHI Grant Number 15H01950, and a grant from the MEXT Joint Usage/Research Center at the Institute of Social and Economic Research, Osaka University. We acknowledge precious comments and suggestion from Eric D. Ramstetter, Yoko Niimi, Charles Yuji Horioka, Midori Wakabayashi, Saumik Paul, Eva Sierminska and participants from the Annual Meetings of the *Society of Economics of the Household* held in San Diego, California on June 25-26, 2017, John Strauss and participants in the *Singapore Economic Review Conference* held in Singapore on August 2–4, 2017.

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Abstract

The purpose of the study is to analyze the inequality along the wage distribution in Vietnam in two important aspects using different waves of the household survey during 2002-2014: (1) gender wage gap and (2) wage gap by firms' ownership (SOEs and non-SOEs). We focus on the formal employments and further divide the sample by educational level, age profile, occupational type, and industry when necessary.

In the first work, we find evidence of both severer inequality and improving equality. In general, the total gap appears to be persistent, mainly because of gender discrimination in the price of skills. However, the total gap is not constant throughout the distribution and is wider in the right (upper) tail. We identify several different items of evidence for a sticky floor and a glass ceiling for the total gap and price gap in particular years, but there is no consistent trend. Meanwhile, there is an increase in wage equality over time as the wage gap has tended to narrow (except in 2010). The price gap has decreased among those aged 15–35, among skilled workers, and those in the manufacturing sector, and has becomes insignificant among those aged 46–55 and those in the service sector.

In the second work, we examined the transition of SOEs from a wage perspective, by decomposing the wage distribution difference between SOE and non-SOE employees during the period 2002–2014, using four Vietnamese household surveys of the same design and the same sample selection. Although SOE employees received higher pay in 2002 as a result of the characteristics difference and residuals, the coefficients difference was minimal along the wage distribution during 2002–2014. The characteristics difference fell over time at middle and middle-to-high wage distribution groups. University graduates were the main contributor to the endowments difference. However, by 2014, the residuals difference vanished and the pay schemes between SOEs and non-SOEs had converged.

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Chapter 1. Introduction

"*To speak of a social inequality is to describe some valued attribute which can be distributed across the relevant units of a society in different quantities, where 'inequality' therefore implies that different units possess different amounts of this attribute. The units can be individuals, families, social groups, communities, nations; the attributes include such things as income, wealth, status, knowledge, power. The study of inequality then consists of explaining the determinants and consequences of the distribution of these attributes across the appropriate units*." Wright (1987).

In this study, we consider the inequality among individuals in terms of income. More exactly, we focus on the difference in earnings between men and women; and between employees in state-owned enterprises and other employees in firms of other ownerships. These two issues are important for Vietnam because *doi moi* ("open door" policy) creates both opportunity for development with higher individuals' income and risks of polarized income.

More specifically, economic growth has generally led to better employment opportunities for Vietnamese women. During the period 2002–14, Vietnam experienced average annual GDP growth in excess of 5%. At the same time, and as shown in Figure 1, there was a sharp increase in the number of private firms replacing the collapse of state-owned enterprises, which once were the most important employers in the economy. These changes, together with Vietnam's accession to the World Trade Organization in 2007, has led to fierce competition between firms for labor and more formal paid job offers. Vietnam's low total fertility rate (currently less than 1.95 children per female) and improved levels of education have also provided time and opportunity for Vietnamese women to participate in the labor force and to take up these new job offers. This is evidenced in a female labor participation rate of 73% in 2014 compared with 82% for men (UNDP, 2015), and the ratio of women to men in almost all industries increasing over time, as shown in Figure 2.

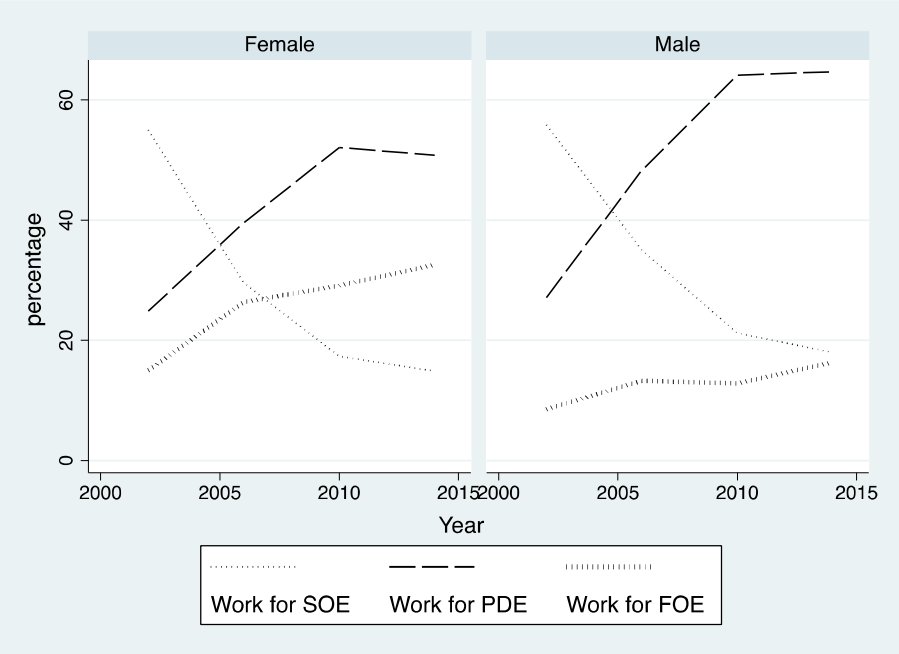

Figure 1. *Share of employees by economic sectors, gender, and year.*

Source: Authors' calculations from the Vietnamese Household Living Standard Survey 2002, 2006, 2010, and 2014. Notes: SOE: State-owned enterprises. PDE: Private domestic (non-foreign) enterprises. FOE: foreign-owned (affiliated) enterprises.

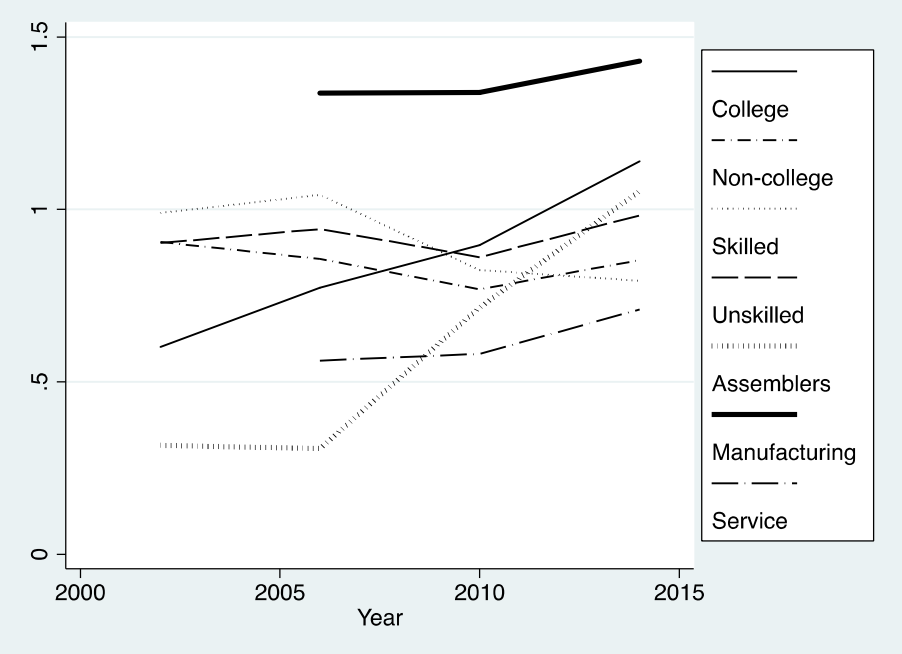

Figure 2. *Average ratio of employed females to employed males by education, job position, and industry.*

Source: Authors' calculation from the Vietnamese Household Living Standard Survey 2002, 2006, 2010, and 2014.

However, it is not known whether labour market discrimination against women has declined or become more severe along the wage distribution during this period of strong growth and improved employment opportunities. In an increasingly competitive market, firms must minimize business costs or fail. In that sense, any discrimination against gender based on the price of skills (such as education and experience) should raise firm costs. Therefore, gender-based discrimination should decline or even disappear alongside the level of competitiveness. However, gender wage equality may also vary along the wage distribution, and there is evidence that the general wage equality has both improved and worsened at various points during the period 2002–14 (ILO, 2015).

In terms of empirical evidence, Sakellariou and Fang (2014) observed a decrease in private sector wage inequality in Vietnamese households owing to the increase in the minimum wage between 1998 and 2008. Unfortunately, it is unknown whether the gender wage gap in Vietnam persisted. The demonstrated presence of a son preference (Vu, 2014) and the dominance of Confucianism in the country could also be an impediment to decreasing, and could perhaps even be increasing, the gender wage gap. Other forms of derived discrimination are so-called sticky floors and glass ceilings. These kinds of gender discrimination tend to remain severe in either the right- or left-hand tail of the income distribution, such that women are hindered in gaining access to better (and higher paid) positions or are kept in low paid positions. Thus, detecting and tracking the sticky floor and glass ceiling, especially in certain industries and job types, helps to provide valuable labour market policy implications.

Besides, for many decades, Vietnamese state-owned enterprises (SOEs) have been given top priority in terms of resource allocations in all state plans, with the aim that they would be the leading sector of the whole economy. However, both macroeconomic and microeconomic data (household and firm surveys) show that SOEs are reducing their employment shares in the Vietnamese economy. Similar to Fukase (2014) that used the Vietnamese Enterprises Survey Data for 2000–2007 and General Statistics Office (GSO) (2017a) aggregate data, our own calculations show that the share of the private sector including both domestic private firms and foreign affiliated firms was higher than that of the SOEs by 2005, as in Figure 1. In 2014, the private sector was the dominant employer providing paid jobs in Vietnam.

Human capital development and productivity improvements are important to the survival and development of firms, and the growth of the private sector has led to increasing demand for highly-productive employees. Thus, offering competitive wages and wage-related benefits to attract productive employees has become important for the private sector and, perhaps, SOEs.

Therefore, using different waves of the household survey during 2002-2014, the study is going to analyse the inequality in Vietnam in the two important aspects: (1) gender gap along the distribution of wage and (2) difference in wage distribution between employees of state-owned enterprises and employees of other firms. We focus on the formal employments and further divide the sample by educational level, age profile, occupational type, and industry when necessary.

Chapter 2. Gender wage gap

2.1 Summary

The purpose of this chapter is to decompose the gender gap along the wage distribution in Vietnam during the period 2002–14 and to search for the presence of any glass ceiling/sticky floor in women's wages. We apply a method developed by Chernozhukov, Fernandez-Val, and Melly (2013) to decompose the distribution of the gap into three components; namely, coefficients, characteristics, and residuals. We then compare the distribution of coefficient components across four waves of the Vietnamese household survey for every four-year interval between 2002 and 2014. We select individuals aged from 15 to 55 years of age with only one job and who are not students, self-employed, working for other households, or government officers. Apart from this selected sample, we further divide the data according to educational level, age profile, occupational type, and the two main industries (manufacturing and services) that absorb most paid workers.

2.2 Related literature

Although gender discrimination in wages is closely related to the first target of Goal 5 to obtain sustainable development recently set by the United Nations, the topic has attracted significant interest in many countries in the past. Extensive studies on the gender wage gap can be readily found in the literature, together with the methodological advances in estimation and decomposition methods necessary to investigate more complicated forms of discrimination over time. There are various methods available for decomposing the gender wage gap. However, all of them attempt to identify four desirable decomposed components. The first is the difference in the price of observable skills. The second is the difference in the return to unobservable characteristics. The third is the difference in the distribution of observable skills. The fourth and final component is the difference in the distribution of unobservable characteristics. However, to the best of our knowledge, there is no perfect measure for obtaining these four desired components.

In this regard, Fortin, Lemieux, and Firpo (2011) classified the major decomposition methods into: (a) mean decomposition, such as that employed by Oaxaca (1973) and Blinder (1973), and (b) beyond the mean using variance decomposition, including residual imputation as in Juhn, Murphy, and Pierce (1993), quantile regression such as

Machado and Mata (2005), inverse propensity reweighting as in DiNardo, Fortin, and Lemieux (1996), the estimation of conditional distribution, and re-entered influence function (RIF) regression (Firpo, Fortin, & Lemieux, 2009). Each method has both advantages and disadvantages, with most of the mean decomposition methods enabling detailed decomposition, while this is more limited in the approaches in (b) (with the exception of RIF regression). However, the latter group of methods do facilitate analysis of change in the wage distribution, rather than just the mean. The results obtained from decomposing the gender wage gap strongly depend on the country context, when the survey was undertaken, and the selected sample. For this reason, Katz and Autor (1999) recommend that researchers should cautiously examine the robustness of their results in relation to their selection of data source, samples, and method.

In general, the gender wage gap becomes more complex along the wage distribution and with the level of development, in both developed and developing countries. Examining 26 European countries using 2007 data, Christofides, Polycarpou, and Vrachimis (2013) show that the size of the gender wage gap differs significantly across countries and that wage discrimination can appear in either the right or the left tail of the wage distribution. However, Schober, and Winter-Ebmer (2011) find no causal effect of gender wage equality on economic growth in their meta-regression of 54 countries during the period 1975–94. The type of discrimination can also be more complicated than just the paid observable skills. Chzhen and Mumford (2011) suggest a connection between job position, such as high-skilled, white-collar, and managerial posts, and a glass ceiling for full-time workers in Britain in 2005.

In other work, Albrecht, Björklund, and Vroman (2003) identify a glass ceiling in Sweden in 1998 in the residuals (unknown factors), instead of in the differences in characteristics, sector, industry, and occupation. Similarly, Fang and Sakellariou (2015) reveal the formation of a glass ceiling in six Latin American countries, whereas sticky floor and mixed results are common in six Asian countries. Comparing the 1980s and 1990s, Autor, Katz, and Kearney (2006) suggest that the rapid employment growth in either of the two tails of the skill distribution in the US could be the source for the "polarization" of the wage structure. Coincidentally, we also observe a sharp increase in the proportion of women to men in paid jobs among college graduates and assemblers/machine operators, as shown in Figure 2.

Previous studies on wage equality in Vietnam suggest some gaps in the research. Using the method suggested by Juhn et al. (1991) to analyse two household data sets for Vietnam in 1992–93 and 1997–98, Liu (2004) identifies that the large positive gap effect overcomes the observed skill and price effects and suggests that Confucianism exerts an influence on the gender wage gap in Vietnam. In other work, Pham and Reilly (2007) find the average gender wage gap decreases during the period 1993–2002 using quantile regressions. They also suggest that there is no "glass ceiling", at least in two of the survey years examined. However, by the mid- and late- 2000s, the private sector began to dominate employment in Vietnam, and as mentioned, the Vietnamese labour market became more competitive with a larger proportion of female workers in paid employment. Therefore, whether and to what extent the gender wage gap identified in Pham and Reilly (2007) in the early 2000s still exists remains to be investigated.

Later, Sakellariou and Fang (2014) reveal evidence of a more equal gender wage distribution in the Vietnamese private sector using 1998 and 2008 household surveys. This inspires us to identify whether the spill over effect that Sakellariou and Fang (2014) identify from the private sector applies between 2002 and 2014. In addition, we also note that 2008 may be a year with unstable economic indicators. According to the International Financial Statistics (IFS) data provided by the International Monetary Fund (IMF), Vietnam experienced high consumer price inflation (CPI) in April–May (21–25%) and August–September (28%). Unfortunately, this was also when the General Statistics Office (GSO) of Vietnam conducted its household survey, and the wage figures gathered may capture noise associated with the short-lived inflationary crisis. Lastly, Fukase (2014) evaluate the wage premium for workers in foreign firms in Vietnam. The results indicate that the foreign sector absorbed more women and paid a larger wage premium for less-educated women during the period 2002–04. However, there remains a question about any spill over effect from the economy-dominating private sector and whether this has persisted over time.

In terms of background, we should point out that the Vietnamese government raised the minimum wage almost every year between 2004 and 2014. More specifically, the government raised the minimum wage per month for all firms to 290,000, 350,000, 450,000, 830,000, and 1,050,000 Vietnamese dong (VND) in January 2005 (Decree 203/2004/ND-CP), October 2005 (Decree 118/2005/ND-CP), October 2006 (Decree

94/2006/ND-CP), May 2011 (Decree 22/2011/ND-CP), and May 2012 (Decree 31/2012/ND-CP), respectively[1]. However, a different minimum wage now applies for different regions and in the public and private sectors.

In March 2006, the minimum wage was 870,000 VND for foreign firms in all regions (Decree 03/2006/ND-CP), but from 2008, the minimum wage was set by region. For instance, for foreign firms in Regions 1/2/3/4, the minimum wages were 1.20/1.08/0.95/0.92 million VND in January 2009 (Decree 111/2008/ND-CP), 1.34/1.19/1.04/1.00 million VND from January 2010 (Decree 98/2009/ND-CP), and 1.55/1.35/1.17/1.10 million from January 2011 (Decree 107/2010/ND-CP), respectively. From 2012, the minimum wage varied by region only and was the same for both foreign and domestic firms, with a minimum wage of 2.35/2.10/1.8/1.65 million VND set by Decree 103/2012/ND-CP for Regions 1 to 4 from January 2013 and 2.70/2.40/2.10/1.90 million VND in January 2014 by Decree 182/2013/ND-CP. The reasons for these dissimilar regional settings could be differences in living standards and regional CPI.

The complication of minimum wage settings and the timing of changes is a challenge to any research on impact evaluation, including whether the minimum wage is a causal factor in improving gender wage equality along the wage distribution. A minimum wage may assist women to obtain a better salary and may result in greater wage equality because women are more likely placed in lower-paid jobs. However, changes in labour market equilibriums, such as jobs lost because of the minimum wage, and changes in the pace of wages for each gender along the salary ladder, will make this argument weaker. Another complexity is that changes in the minimum wage may apply to all workers, not just those receiving less than the current minimum wage. This motivates us to perform two tests to confirm whether the minimum wage leads to greater wage equality. The first is whether the residuals contribute significantly to the gender wage gap. The second is whether the price gap declines over time among unskilled positions, which are most likely low-paid jobs, especially among those in the left (lower) tail of the wage distribution.

[1] Sakellariou & Fang (2014) conclude that the real minimum wage in Vietnam in 2006 was 1.6 times higher than that in 2002.

2.3 Data

For our analysis, we use Vietnam household living standard surveys. The GSO conducted surveys on a 2-year interval using a two-stage stratified sampling method for country representative samples. The design of the surveys follows the Living Standards Measurement Study by the World Bank. We include four-year interval waves for our analysis, thereby including the surveys conducted in 2002 (29,532 households), 2006 (9,189 households), 2010 (46,995 households), and 2014 (9,399 households). The surveys contain information on wages, age and gender, work hours per day, work days per month, work months per year, and occupational type and industry for all those with some income in the 12-month period prior to the time of the survey.

We attempt to focus on formal employment and to select only those individuals closest to the definition of the International Labour Organization (ILO) for employment (ILO, 2013). Accordingly, we select individuals from 15 to 55 years of age who are not students, not self-employed, not working for other households, and not government officers, and who have only one job at a time[2]. We trim the data by 0.1% at both ends of the income distribution[3]. Table 2.1 details the sample size and characteristics by gender in each survey wave.

As shown in Table 2.1, men are more likely than women to have a paid job. However, the participation rate of women for any of the selected samples is higher than the corresponding rate for men. In the selected sample, men are about 3–4 years older than women, although their average working hours per year are quite similar (approximately 2,198 hours).

[2] The retirement age in Vietnam is 55 years for women and 60 years for men. One outcome is that women are more likely to work part-time or in the informal labor sector after retirement. Meanwhile, those with more two jobs at the same time are more likely employed part-time or in agriculture. Therefore, our sample selection criteria are stricter than those of Pham & Reilly (2007), but this increases the chance of finding an individual of opposite gender but similar in individual characteristics and employment nature.

[3] About 75% (90%) of all individuals work more than 2,112 (1,414) hours per year or 40.6 (27.2) hours per week in 52 working weeks.

Table 2.1. *Descriptive statistics*

Variables	2002				2006				2010				2014			
	Male		Female		Male		Female		Male		Female		Male		Female	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
N. wage p.h	12463	*10083*	9526	*7178*	18561	*13247*	14288	*10351*	41311	*39105*	31035	*28027*	66025	*41709*	54278	*37501*
Real wage p.h	25049	*20266*	19145	*14426*	28843	*20586*	22202	*16085*	41311	*39105*	31035	*28027*	45964	*29037*	37786	*26107*
Log real wage p.h	2.22	*0.70*	1.99	*0.67*	2.36	*0.60*	2.14	*0.57*	2.68	*0.66*	2.44	*0.62*	2.75	*0.65*	2.55	*0.67*
Age	34.00	*9.91*	30.61	*9.83*	32.64	*10.73*	28.56	*9.58*	32.62	*9.92*	29.58	*8.85*	33.03	*9.76*	30.19	*8.75*
Work hours p.a	2198	*610*	2213	*629*	2315	*701*	2234	*701*	2296	*679*	2247	*682*	2497	*503*	2484	*458*
Primary school	0.15	*0.36*	0.22	*0.41*	0.16	*0.37*	0.21	*0.41*	0.16	*0.36*	0.18	*0.39*	0.13	*0.34*	0.16	*0.37*
Secondary school	0.24	*0.43*	0.26	*0.44*	0.29	*0.45*	0.25	*0.43*	0.26	*0.44*	0.24	*0.43*	0.24	*0.43*	0.23	*0.42*
High school	0.19	*0.39*	0.19	*0.40*	0.35	*0.48*	0.36	*0.48*	0.36	*0.48*	0.35	*0.48*	0.36	*0.48*	0.30	*0.46*
College (3 years)	0.01	*0.12*	0.02	*0.15*	0.03	*0.17*	0.05	*0.21*	0.02	*0.16*	0.04	*0.20*	0.04	*0.20*	0.07	*0.25*
University (4 years)	0.14	*0.35*	0.09	*0.28*	0.11	*0.31*	0.08	*0.27*	0.14	*0.35*	0.13	*0.34*	0.18	*0.38*	0.19	*0.39*
Vocational degree	0.19	*0.39*	0.15	*0.36*	0.30	*0.46*	0.24	*0.43*	0.30	*0.46*	0.19	*0.39*	0.28	*0.45*	0.15	*0.35*

Table 2.1. Cont.

Variables	2002				2006				2010				2014			
	Male		Female		Male		Female		Male		Female		Male		Female	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Job rank/types																
Skilled worker 1	0.07	*0.26*	0.03	*0.18*	0.08	*0.27*	0.05	*0.21*	0.12	*0.32*	0.08	*0.28*	0.14	*0.34*	0.08	*0.27*
Skilled worker 2	0.03	*0.17*	0.04	*0.20*	0.01	*0.08*	0.01	*0.11*	0.01	*0.12*	0.01	*0.10*	0.01	*0.12*	0.01	*0.09*
Skilled worker 3	0.26	*0.44*	0.34	*0.47*	0.24	*0.43*	0.34	*0.47*	0.23	*0.42*	0.26	*0.44*	0.22	*0.41*	0.21	*0.41*
Assemblers	0.14	*0.35*	0.05	*0.22*	0.14	*0.35*	0.05	*0.22*	0.23	*0.42*	0.19	*0.39*	0.23	*0.42*	0.24	*0.43*
Unskilled worker	0.26	*0.44*	0.28	*0.45*	0.27	*0.44*	0.29	*0.45*	0.16	*0.36*	0.16	*0.36*	0.15	*0.35*	0.15	*0.35*
Industries																
Manufacturing					0.41	*0.49*	0.63	*0.48*	0.40	*0.49*	0.62	*0.48*	0.42	*0.49*	0.61	*0.49*
Services																
Cat. 1					0.10	*0.30*	0.07	*0.26*	0.12	*0.33*	0.09	*0.29*	0.12	*0.33*	0.10	*0.30*
Cat. 2					0.03	*0.18*	0.04	*0.20*	0.03	*0.17*	0.04	*0.18*	0.03	*0.16*	0.03	*0.17*
Cat. 3					0.00	*0.05*	0.00	*0.04*	0.02	*0.15*	0.02	*0.13*	0.02	*0.14*	0.01	*0.12*
Cat. 4					0.01	*0.11*	0.02	*0.15*	0.02	*0.13*	0.03	*0.16*	0.02	*0.14*	0.03	*0.17*
Cat. 5					0.00	*0.00*	0.00	*0.00*	0.00	*0.07*	0.00	*0.06*	0.00	*0.06*	0.00	*0.05*
Cat. 6					0.00	*0.00*	0.00	*0.00*	0.02	*0.14*	0.01	*0.12*	0.02	*0.14*	0.02	*0.14*
Cat. 7					0.00	*0.00*	0.00	*0.00*	0.01	*0.11*	0.01	*0.11*	0.02	*0.14*	0.01	*0.11*
Selected sample size	2,407		2,044		860		751		5,243		4,448		1,181		1,164	
Any employee**	15,841		9,962		3,965		2,558		21,262		14,474		4,418		3,158	
Any nonstudent**	32,547		34,743		10,185		10,519		57,229		58,588		10,764		10,883	

Notes: Real wage based on 2010 prices using World Bank CPI: http://data.worldbank.org/indicator/FP.CPI.TOTL?end=2015&locations=VN&start=2000). **: individuals are nonstudents and between 15–55 years of age.

The wage per hour (in logarithms) is calculated using the total income from paid employment, including salary, related cash and goods in kind (comprising holiday bonuses, bonuses, and subsidies), and the total working hours for the last 12 months prior to the survey. Total working hours is derived from the average working hours per day, average days per month, and average months per year in a 12-month period. We convert the calculated log wage to 2010 base prices. Although there is already evidence of an average gender wage gap of approximately 6,000–10,000 VND per hour (2010 prices), corresponding to a gender wage gap of 21–33.1%, as shown in Figure 3, we decompose the gap using the method described in the next section.

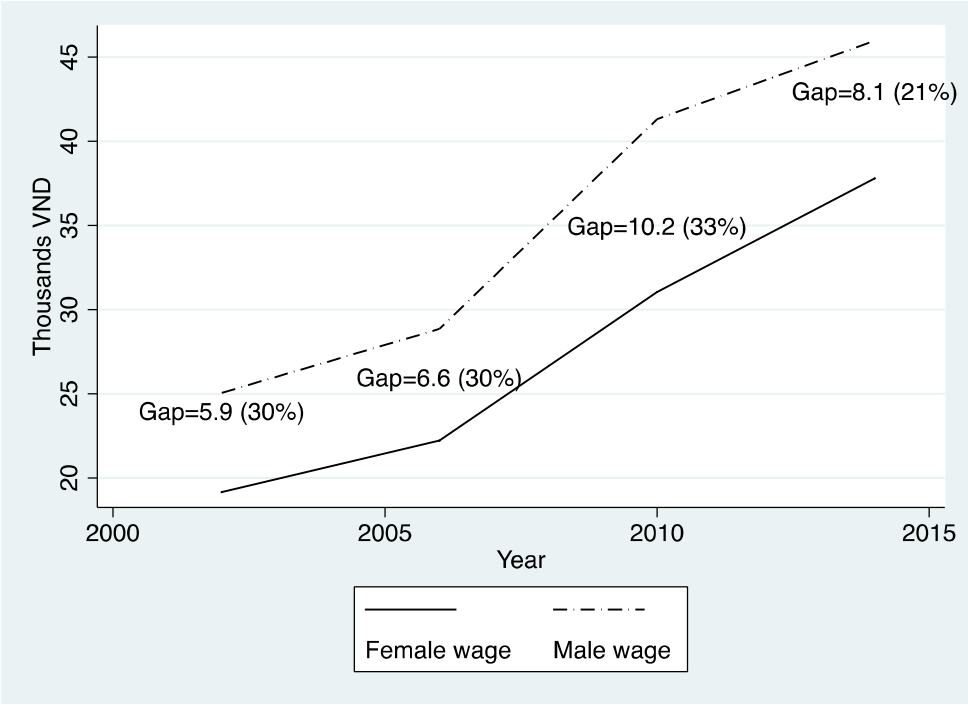

Figure 3. *Mean real wage (2010 prices).*

Source: Authors' calculation from the Vietnamese Household Living Standard Survey 2002, 2006, 2010, and 2014.
Note: Gap unit is VND 1,000.

2.4 Methods

We apply the method suggested by Chernozhukov, Fernandez-Val, and Melly (2013) (CFM hereafter)[4]. This relies on two estimated counterfactual distributions. The first is

[4] We use the user-written Stata command, 'cdeco_jmp', by Chernozhukov, Fernandez-Val, & Melly. The package is available at https://sites.google.com/site/blaisemelly/computer-programs/inference-on-counterfactual-distributions.

estimated from the characteristics distribution (the distribution of skills) for the group of men, the median (mean) coefficients (price of skills) from the group of men, and the residual distribution from the group of women. The second is from the characteristics distribution for the group of men, and the conditional distribution of the skills of women[5]. The two estimated distributions are then used to decompose the total difference into three components: coefficients, characteristics, and residuals (as suggested by Juhn et al., 1993).

More specifically, the method follows a procedure introduced by Melly (2005). Melly's (2005) suggestion is to estimate the counterfactual distribution of wages that would hold among women if their distribution of skills was the same as that for men. The quantile of the counterfactual distribution of the wage is then $\hat{q}(\hat{\beta}^f, x^m)$[6], where $\hat{\beta}^f$ is the estimated coefficient of women from a linear quantile regression suggested by Koenker and Bassett (1978) and x^m is a vector of the characteristics of men. Similarly, changes in characteristics (skills) explain the difference between $\hat{q}(\hat{\beta}^f, x^m)$ and $\hat{q}(\hat{\beta}^f, x^f)$. Next, the distribution of the wage that would hold if the median return to skills for women were the same as among males but the residuals were the same as among females is $\hat{q}\left(\hat{\beta}^{med^m, resid^f}, x^m\right)$. Changes in the coefficients explain the difference between $\hat{q}\left(\hat{\beta}^{med^m, resid^f}, x^m\right)$ and $\hat{q}(\hat{\beta}^f, x^m)$. Similarly, the gap between $\hat{q}(\hat{\beta}^m, x^m)$ and $\hat{q}\left(\hat{\beta}^{med^m, resid^f}, x^m\right)$ is explained by changes in the residuals. The total gender wage gap can be decomposed as

$$\hat{q}(\hat{\beta}^m, x^m) - \hat{q}(\hat{\beta}^f, x^f) = \left(\hat{q}(\hat{\beta}^m, x^m) - \hat{q}\left(\hat{\beta}^{med^m, resid^f}, x^m\right)\right) + \left(\hat{q}\left(\hat{\beta}^{med^m, resid^f}, x^m\right) - \hat{q}(\hat{\beta}^f, x^m)\right) + (\hat{q}(\hat{\beta}^f, x^m) - \hat{q}(\hat{\beta}^f, x^f)) \quad (1)$$

Thus, (2) can be simplified to

$$Total\ gender\ wage\ gap = difference\ in\ residuals + difference\ in\ coefficients + difference\ in\ characteristics. \quad (2)$$

[5] The linear quantile regression estimator in Koenker & Bassett (1978) and the rearrangement method in Chernozhukov, Fernandez-Val, & Galichon (2010) are used to estimate the conditional distribution.

[6] See Melly (2005) for details.

The CFM method has advantages and disadvantages. By using a form of quantile regression to estimate the distribution of the residuals, the method does not have to assume that the residuals are independent of the characteristics (skills). The method is also path independent. The results of the decomposition are then not influenced by the order in which the various components of the detailed decomposition are calculated. A joint test for the positive gender gap (the constant effect) in all percentiles is possible, which directly helps us to respond to our first research question. Unfortunately, the method is unable to provide detailed decomposition as contributed by each of the covariates.

We set the same specification for all waves. We define skills as the education and age of the individual. We use dummy variables to identify the level of education, comprising 3-year college, 4-year university, senior high school (12 years of general education), junior high school (9 years of general education), and primary school (5 years of general education) graduates[7]. We did not use the projected experience calculated from age minus years of schooling minus seven years[8]. Instead, we use age and squared age as the proximate values. Unfortunately, we do not have information on tenure or length of job, and we acknowledge this limitation. As our focus is the price of skills, we assume that other possible factors, such as the differences in occupational type and industry, reside in the residuals. We set a bootstrap of 100 repetitions in our estimation. We do not include 2002 in our analysis by industry because the classification of industries in that survey wave was too simple. In addition, to address the heterogeneity identified by Fortin and Lemieux (2016) and Grund (2015), we divide the selected sample according to highly educated professionals, age profile, occupational types, and industry, and repeat the analysis for additional insights.

We identify sticky floors/glass ceilings using the definition suggested by Arulampalam, Booth, and Bryan (2007). We define a sticky floor/glass ceiling as being present when the top-10 percentile of the corresponding tail is 2% higher than any percentile in the middle of the distribution. More specifically, a sticky floor (glass ceiling) is only when every 1^{st}–10^{th} (90^{th}–99^{th}) percentile passes at least 78 tests. The null hypothesis of each

[7] Later, we define college graduates as anyone with either a 3-year college or 4-year university degree.
[8] This is unreasonable because we find that some individuals acquired additional qualifications while working. Thus, some have negative projected experience. In addition, the available information on experience in the 2006 wave shows that the differences between projected and actual work experience are significant.

test is that the estimated difference in a percentile of the tail is 2% higher than another percentile in the 11th–89th percentile at the 95% level of confidence. Lastly, we decompose the gender wage gap using several alternative methods, including ordinary least squares estimation (OLS), the standard Oaxaca (1973) and Blinder (1973) (OB) approach, the standard JMP approach from Juhn et al. (1993), and the RIF regression from Firpo et al. (2009) for robustness.

2.5 Results

2.5.1 Full sample

We find three important pieces of evidence concerning the gender wage gap and the price gap in Vietnam. First, the total gap and the price gap remain statistically significant in all waves, as shown in Figure 4 and the test results in column T1 of Table 2.2. The results are also consistent when we apply the other methods described in Appendix A. Although more women are in paid work in 2014 than in 2002, wage discrimination persists.

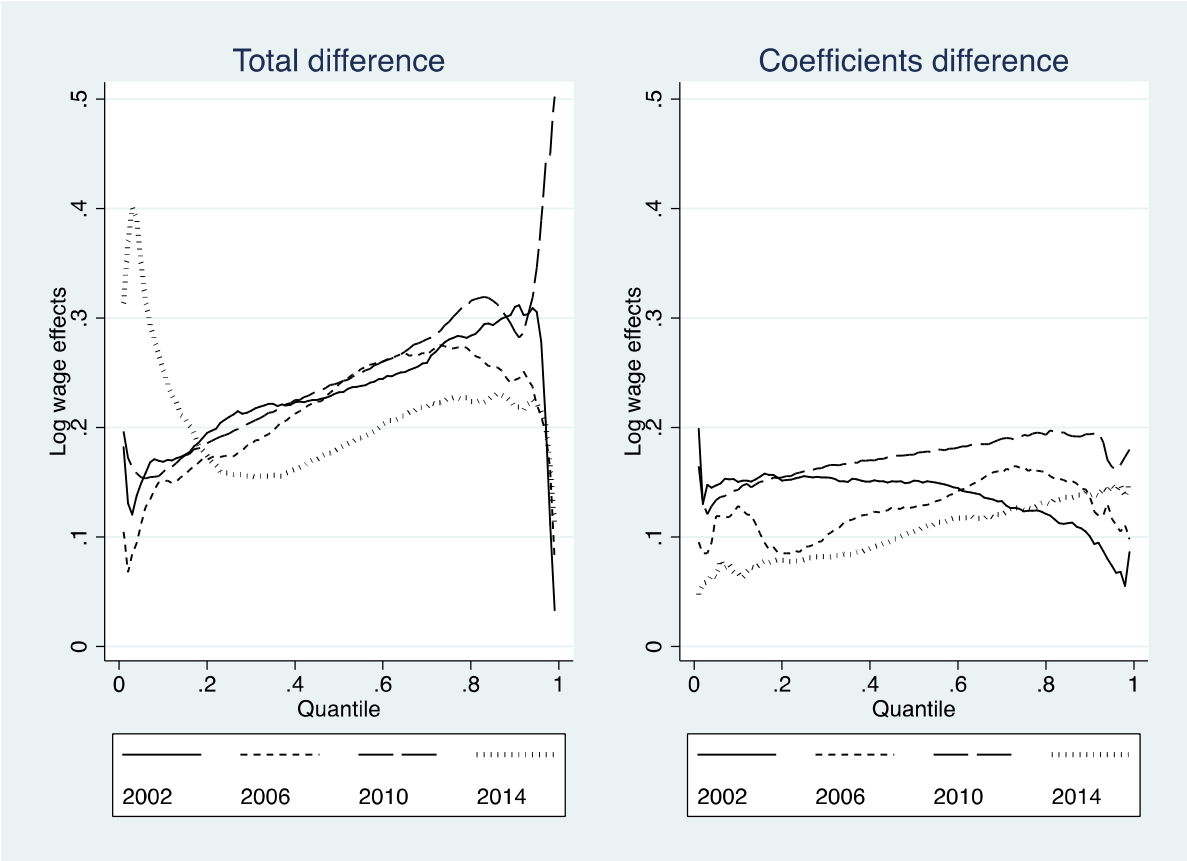

Figure 4. *Total gender gap and decomposed gap by coefficients*

Table 2.2. *Total gender gap and decomposed gaps by coefficients and residuals*

Percentile	10th		25th		50th		75th		90th		T1	T2	T3
Year	Total gap												
2002	0.17 (0.03)	*89.01*	0.21 (0.02)	*74.28*	0.23 (0.02)	*65.24*	0.28 (0.03)	*43.97*	0.31 (0.04)	*32.45*	R	A-r	
2006	0.15 (0.04)	*85.28*	0.17 (0.03)	*52.10*	0.24 (0.03)	*53.22*	0.27 (0.04)	*60.12*	0.24 (0.06)	*56.45*	R	A-r	
2010	0.16 (0.02)	*89.67*	0.19 (0.01)	*82.10*	0.24 (0.01)	*72.62*	0.30 (0.02)	*65.15*	0.29 (0.03)	*67.48*	R	A-r	
2014	0.25 (0.07)	*26.55*	0.16 (0.03)	*50.23*	0.18 (0.02)	*57.90*	0.23 (0.03)	*54.83*	0.22 (0.04)	*63.13*	R	A-r	S
Year	Decomposed gap by coefficients												
2002	0.15 (0.03)		0.16 (0.03)		0.15 (0.02)		0.12 (0.03)		0.10 (0.04)		R	A-a	
2006	0.13 (0.03)		0.09 (0.03)		0.13 (0.03)		0.16 (0.03)		0.14 (0.05)		R	A-r	
2010	0.14 (0.01)		0.16 (0.01)		0.18 (0.01)		0.19 (0.01)		0.19 (0.02)		R	A-r	
2014	0.07 (0.04)		0.08 (0.03)		0.11 (0.03)		0.12 (0.03)		0.14 (0.04)		R	A-r	
Year	Decomposed gap by residuals												
2002	–0.05 (0.03)		–0.03 (0.02)		–0.02 (0.01)		0.05 (0.02)		0.09 (0.04)		R	A-r	
2006	–0.02 (0.05)		0.02 (0.03)		0.02 (0.02)		0.00 (0.03)		0.00 (0.04)		A	A-a	
2010	–0.03 (0.02)		–0.01 (0.01)		0.00 (0.01)		0.03 (0.01)		0.02 (0.02)		R	A-r	
2014	0.07 (0.06)		0.01 (0.02)		0.00 (0.02)		0.04 (0.02)		0.02 (0.03)		A	A-a	

Notes:
Listed values are for the i^{th} percentile. However, we estimated and conducted the tests of hypotheses for all percentiles and for each percentile from 1^{st} to 99^{th}.
Pointwise standard errors in parentheses are obtained from an empirical bootstrap of 100 repetitions. We employ Cramer–von Mises–Smirnov (main reference) and Kolmogorov–Smirnov statistics to decide the test results.
T1: Test results for H0: No effect, QE(tau)=0 for all taus from 1–99. If H0 is rejected (10% level), then "R". If H0 is not rejected, then "A". This test is stronger than the absence of any mean effect.
Figures in italics are percentages of the gender wage gap contributed by coefficients.
T2: Test results for two hypotheses in the following order.
H0: Stochastic dominance: QE(tau)>0 for all taus from 1 to 99. If H0 is not rejected, then "A", otherwise "R".
H0: Constant effect: QE(tau)=QE(0.5) (10% level). If H0 is not rejected, then "a", otherwise "r".
T3: H0: Sticky floor /H0: Glass ceiling. S (G) is denoted only if all 1^{st}–10^{th} (90^{th}–99^{th}) percentiles passed at least 78 tests that the estimated difference of the percentile is 2% higher than those of 11^{th}–89^{th} percentiles (5% level).

Table 2.3. *Decomposed gender gap contributed by coefficients in subsamples*

Year	10th	25th	50th	75th	90th	T1	T2	T3	T4
	College degree								
2002	0.04 (0.10)	0.03 (0.09)	0.01 (0.08)	0.00 (0.08)	–0.02 (0.08)	A	A-a		
2006	0.24 (0.15)	0.20 (0.14)	0.13 (0.11)	0.05 (0.11)	0.04 (0.12)	A	A-a		
2010	0.20 (0.05)	0.16 (0.05)	0.15 (0.04)	0.11 (0.05)	0.10 (0.04)	R	A-a		
2014	0.15 (0.10)	0.15 (0.08)	0.12 (0.06)	0.14 (0.05)	0.13 (0.06)	R	A-a		S
	No college degree								
2002	0.16 (0.03)	0.16 (0.03)	0.16 (0.02)	0.16 (0.02)	0.15 (0.03)	R	A-a		
2006	0.10 (0.04)	0.08 (0.04)	0.13 (0.03)	0.16 (0.03)	0.17 (0.04)	R	A-r		
2010	0.14 (0.01)	0.15 (0.01)	0.17 (0.01)	0.19 (0.01)	0.22 (0.01)	R	A-r		G
2014	0.05 (0.04)	0.07 (0.03)	0.09 (0.03)	0.11 (0.03)	0.13 (0.03)	R	A-r	G	
	Age 15–25								
2002	0.16 (0.05)	0.17 (0.04)	0.17 (0.04)	0.18 (0.03)	0.16 (0.04)	R	A-a		
2006	0.10 (0.05)	0.06 (0.04)	0.11 (0.04)	0.09 (0.05)	0.10 (0.06)	R	A-a		
2010	0.09 (0.03)	0.10 (0.02)	0.11 (0.02)	0.12 (0.02)	0.16 (0.03)	R	A-a		G
2014	0.07 (0.08)	0.05 (0.07)	0.04 (0.06)	0.04 (0.05)	0.06 (0.08)	A	A-a		
	Age 26–35								
2002	0.17 (0.04)	0.16 (0.04)	0.15 (0.04)	0.13 (0.04)	0.12 (0.05)	R	A-a		
2006	0.20 (0.08)	0.20 (0.06)	0.18 (0.06)	0.21 (0.07)	0.18 (0.12)	R	A-a		
2010	0.19 (0.02)	0.20 (0.02)	0.20 (0.02)	0.19 (0.02)	0.17 (0.03)	R	A-a		
2014	0.06 (0.05)	0.08 (0.04)	0.11 (0.03)	0.10 (0.04)	0.08 (0.04)	R	A-a		
	Age 36–45								
2002	0.22 (0.05)	0.22 (0.05)	0.24 (0.04)	0.18 (0.05)	0.18 (0.05)	R	A-a		
2006	0.16 (0.15)	0.17 (0.10)	0.16 (0.11)	0.18 (0.09)	0.15 (0.11)	A	A-a		
2010	0.23 (0.03)	0.24 (0.03)	0.27 (0.03)	0.25 (0.03)	0.20 (0.04)	R	A-a		
2014	0.10 (0.07)	0.13 (0.06)	0.16 (0.06)	0.20 (0.06)	0.22 (0.10)	R	A-a		
	Age 46–55								
2002	–0.08 (0.10)	–0.01 (0.08)	–0.02 (0.07)	0.01 (0.07)	–0.05 (0.09)	A	A-a		
2006	0.10 (0.13)	0.04 (0.12)	0.15 (0.11)	0.15 (0.14)	0.11 (0.18)	A	A-a		
2010	0.11 (0.05)	0.08 (0.05)	0.06 (0.05)	–0.02 (0.05)	–0.06 (0.08)	A	A-a	S	
2014	0.13 (0.19)	0.10 (0.12)	0.17 (0.10)	0.17 (0.09)	0.26 (0.12)	A	A-a		

Notes are the same as for Table 2.2. T4 shows the conclusion on the distribution of total gap with H0: Sticky floor /H0: Glass ceiling. S (G) is denoted only if all 1st–10th (90th – 99th) percentiles passed at least 78 tests that the estimated difference of the percentile is 2% higher than those of 11th – 89th percentiles (5% level).

Second, the total gap is not constant along the distribution. All tests for a constant quantile effect are rejected (column T2 in Table 2.2). With the exception of 2014, the total gap tends to increase with the percentile. Moreover, as depicted in Figure 4, a sticky floor formed in 2014. The test for a sticky floor in column T3 of Table 2.3 confirms our visual inspection. Nevertheless, the price gap does not contribute significantly to the sticky floor in the total gap (only about 26% of the floor) in 2014. These results contrast with previous findings in Pham and Reilly (2007). Pham and Reilly (2007) found that the treatment effect was stable along the conditional wage distribution during the period 1993–2002. However, our results are similar to those identified by Duraisamy and Duraisamy (2016) in India during the period 1983–2012. Thus, our results suggest that gender inequality along the wage distribution is becoming more complicated.

Finally, other than a decrease in equality in 2010, we find that the total gap and price gap become smaller over time, as shown in both Figure 4 and Table 2.2. The price gap likely narrows in the left tail of the price gap distribution over time (see Figure 4). This result demonstrates that the decreasing gender wage gap trend first identified in Pham and Reilly (2007) continues after the period 1993–2002.

Other than this, we find little evidence to support the argument that a change in minimum wage helps to increase gender equality, at least in our selected sample[9]. Part of the market interventions, that is, the minimum wage settings, are captured in the residuals. From the decomposition of the gender wage gap, we find that the residuals play a very minor role in the total gender gap in 2006 and 2014. We are unable to reject the hypothesis that all the quantile effects of the residuals equal zero, as shown in column T1 of Table 2.2 (a visual result is in Appendix B). Other parts of the interventions may reside in the price of skills. As shown in the next subsection, this could be a reasonable candidate for explaining the gender wage gap among those who are assemblers or machine operators and not college graduates. However, this argument cannot explain the persistent price gap

[9] We acknowledge that a small proportion of individuals in our selected sample are paid around the minimum wage. The percentages of those who received less than 120% of the minimum wage in 2002 are just 1.8 and 2.3 for males and 1.4 and 2.1 for females, respectively. The corresponding figures are 1, 1.4, 1.6, and 2.1 in 2006, 1.2, 1.5, 1.4, and 1.7 in 2010, and 1.4, 2.1, 2.5 and 3.5 in 2014. However, if the salaries of those paid above the minimum wage are calculated based on the minimum wage as a unit, our tests hold.

among unskilled (worker) positions, which are most likely paid closer to the minimum wage.

2.5.2 Subsamples

After dividing the selected sample into its various subcategories, we observe complex increases and decreases in the price gap. First, we observe a different trend for college and non-college graduates. If we exclude 2010, equality increases over time among non-college graduates, as shown in Figure 5 and Table 2.3. However, the price gap tends to narrow faster in the left tail of the distribution. As the result, a glass ceiling (price gap) forms in 2014, as the test results show in column T3 of Table 2.3. Meanwhile, the price gap is more persistent after 2006 among college graduates, as shown in Table 2.3 and Figure 5. In 2002 and 2006, the hypothesis of all quantile effects being equal to zero fails to be rejected. In contrast, the quantile effects are all significant in 2010 and 2014 (see column T1 in Table 2.3). In addition, in 2014, we observe a sticky floor in the total gap distribution. Thus, among college graduates, gender wage inequality increases, even though inequality tends to be constant in all percentiles, as shown in column T2 in Table 2.3.

Second, in the decomposition results by age category, we observe similar complexities, as shown in Table 2.3 and Figure 6. The price gap is significant and is lowest in 2014 for ages 15–25 and 26–35. In contrast, the price gap for ages 46–55 is minimal. Tests for all quantile effects being zero are not rejected in any of the selected years. However, the price gap is persistent among those aged 36–45. In addition, we should note that the age profiles could exhibit generational change in that the majority of those aged 15–25 (26–35, 36–45) in 2002 turned 27–35 (38–45, 48–55) in 2014. If these were developing constantly in terms of experience with the same amount of education, the corresponding results in Table 2.3 should also show a reduction in gender inequality, with the exception of those aged 38–45 in 2014. However, we acknowledge that our results do not properly illustrate the inequality within the wage distribution for each gender separately.

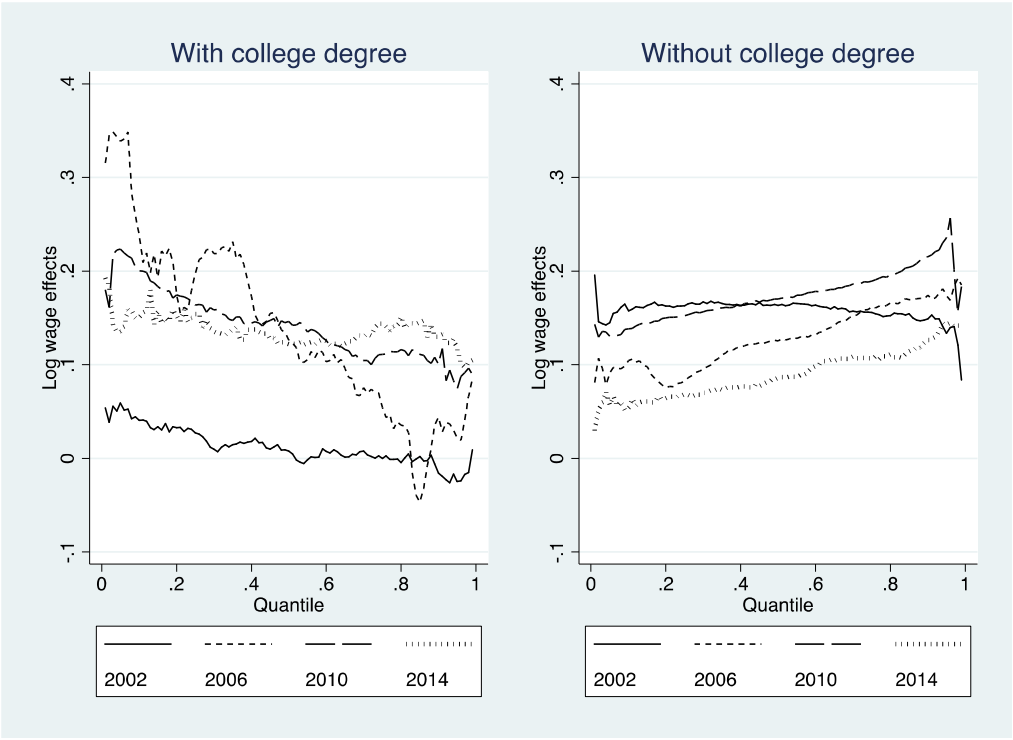

Figure 5. *Decomposed gender gap contributed by coefficients by educational achievements.*

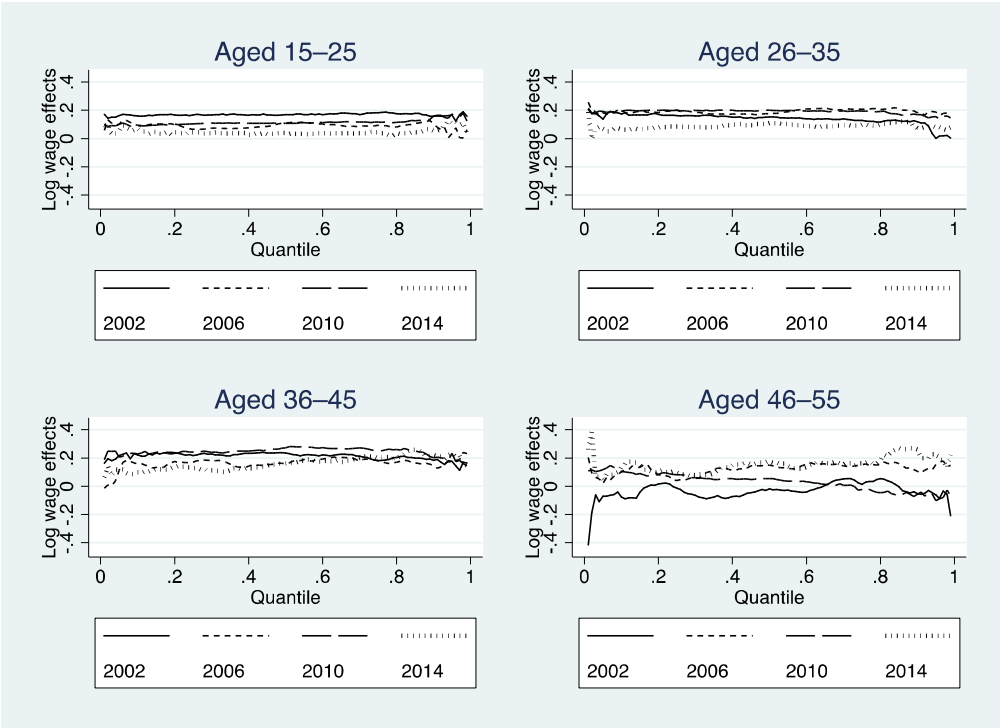

Figure 6. *Decomposed gender gap contributed by coefficients by age profiles.*

Table 2.4. *Decomposed gender wage gap by coefficients in subsamples*

Year	10th	25th	50th	75th	90th	T1	T2	T3	T4
	Skilled workers								
2002	0.18 (0.04)	0.18 (0.04)	0.17 (0.03)	0.16 (0.03)	0.16 (0.03)	R	A-a		
2006	0.10 (0.06)	0.08 (0.05)	0.07 (0.04)	0.07 (0.04)	0.09 (0.05)	A	A-a		
2010	0.15 (0.02)	0.16 (0.02)	0.17 (0.02)	0.19 (0.02)	0.20 (0.02)	R	A-a		
2014	0.07 (0.08)	0.08 (0.07)	0.11 (0.05)	0.14 (0.05)	0.13 (0.05)	R	A-a		
	Unskilled workers								
2002	0.10 (0.04)	0.11 (0.04)	0.11 (0.04)	0.12 (0.04)	0.12 (0.05)	R	A-a		
2006	0.14 (0.06)	0.15 (0.06)	0.15 (0.05)	0.15 (0.06)	0.15 (0.07)	R	A-a		
2010	0.16 (0.04)	0.15 (0.03)	0.16 (0.03)	0.16 (0.03)	0.17 (0.03)	R	A-a		
2014	0.19 (0.15)	0.11 (0.10)	0.16 (0.08)	0.14 (0.07)	0.13 (0.09)	R	A-a		
	Assemblers/Machine operators								
2002	0.09 (0.13)	0.12 (0.11)	0.15 (0.10)	0.10 (0.13)	0.02 (0.15)	A	A-a		S
2006	0.38 (0.12)	0.32 (0.13)	0.29 (0.12)	0.30 (0.13)	0.32 (0.14)	R	A-a		
2010	0.16 (0.03)	0.16 (0.03)	0.18 (0.03)	0.20 (0.03)	0.22 (0.04)	R	A-r		G
2014	0.02 (0.07)	0.03 (0.06)	0.05 (0.04)	0.06 (0.05)	0.08 (0.05)	A	A-a		G
	Manufacturing sector								
2006	0.13 (0.04)	0.12 (0.04)	0.11 (0.03)	0.12 (0.04)	0.13 (0.04)	R	A-a		
2010	0.12 (0.02)	0.13 (0.02)	0.15 (0.01)	0.17 (0.02)	0.18 (0.02)	R	A-a		G
2014	0.05 (0.05)	0.06 (0.04)	0.08 (0.03)	0.11 (0.03)	0.14 (0.04)	R	A-a		
	Service sector								
2006	0.20 (0.11)	0.19 (0.11)	0.23 (0.09)	0.16 (0.10)	–0.07 (0.16)	R	A-a		
2010	0.19 (0.04)	0.19 (0.04)	0.18 (0.04)	0.16 (0.04)	0.15 (0.05)	R	A-a		
2014	0.18 (0.10)	0.16 (0.07)	0.14 (0.07)	0.11 (0.09)	0.09 (0.10)	A	A-a		

Notes are the same as for Table 2.3.

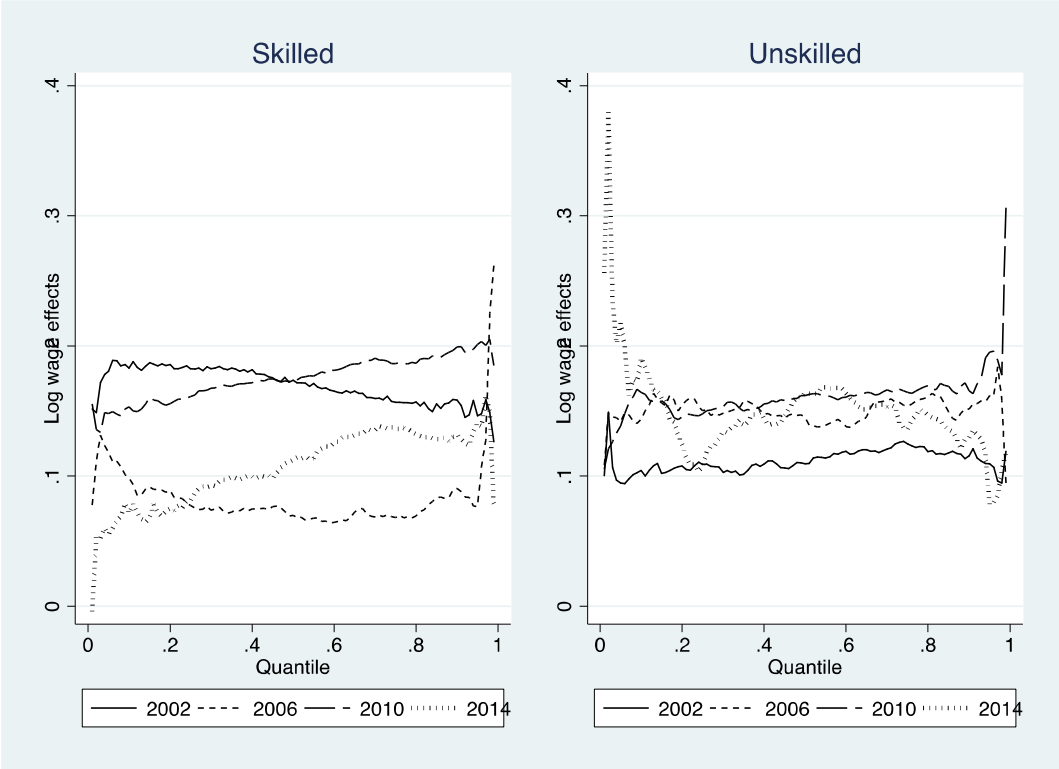

Figure 7. *Price gaps for skilled and unskilled positions.*

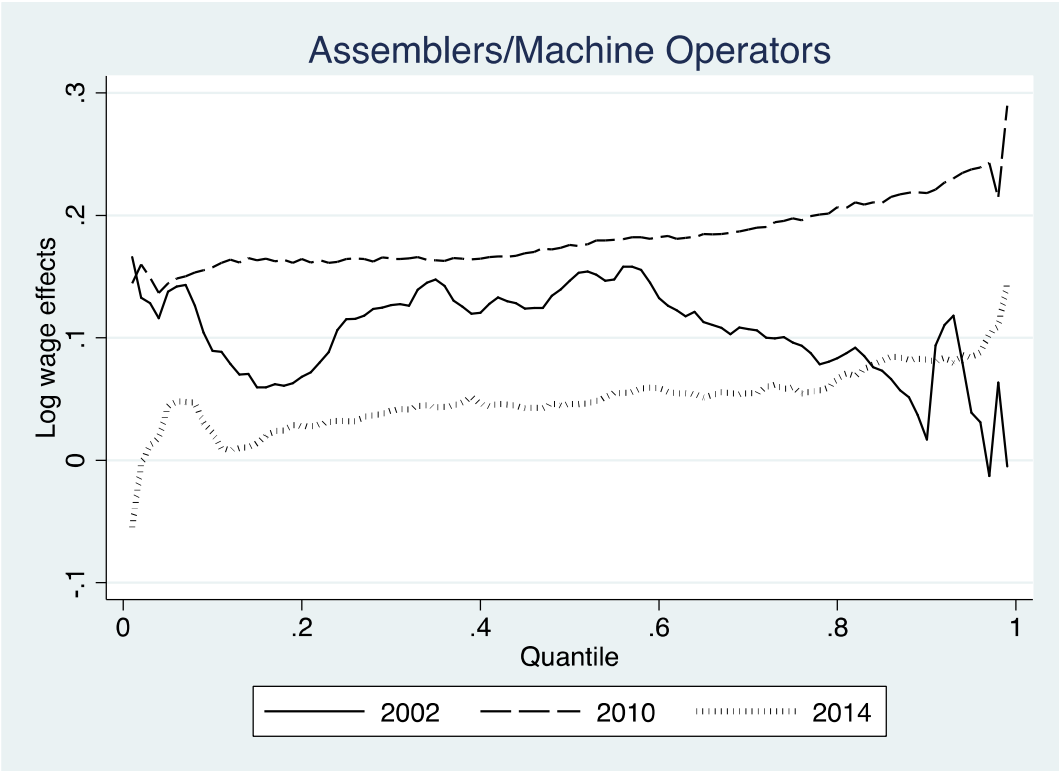

Figure 8. *Price gaps for assemblers and machine operators.*

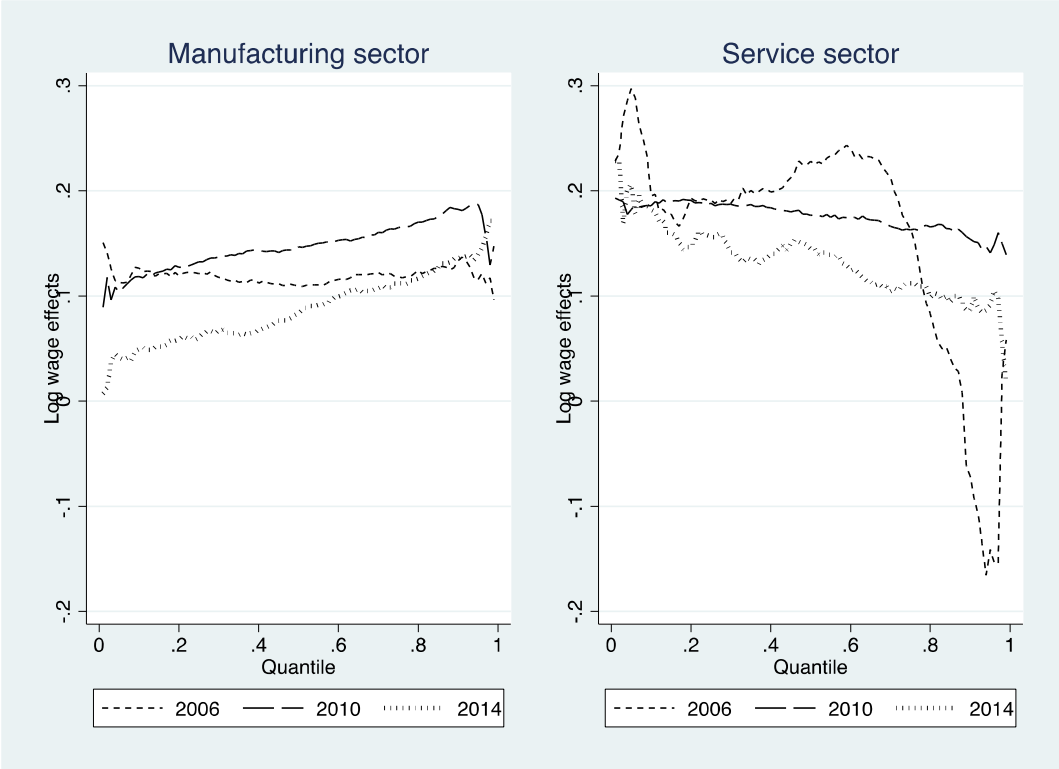

Figure 9. *Price gaps for manufacturing and service sectors.*

Finally, we identify a persistent price gap among skilled and unskilled workers. In contrast, we observe only a small price gap for assemblers/machine operators in 2014, as shown in Table 2.4 and Figures 7 and 8. Meanwhile, Table 2.4 and Figure 9 indicate an increase in wage equality in both the manufacturing and service sectors. The hypothesis that all quantile effects (the price gap) in 2014 are zero is not rejected.

Chapter 3. Wage gap between SOEs and non-SOEs

3.1 Summary

This chapter is to examine the transition of SOEs from a wage perspective by decomposing the wage gap distribution between SOE employees and other employees that offered formal employment. Our work makes some major contributions to the existing literature. First, it is one of few studies that consider differences along the wage distribution, rather than making the (strong) assumption that the difference is constant. Second, as discussed in detail below, our analysis decomposes the difference in the wage distribution into three separate components: the differences in the coefficients, the characteristics (endowments), and the residuals (interactions). Third, we are able not only to test for the significance of each decomposed component over time, but also to estimate the contribution of each covariate to each decomposed component. Our analysis provides new insights into the attractiveness of each sector to workers.

We use data from 2002 to 2014 from the Vietnamese Household Living Standard Survey (VHLSS) at four-year intervals. We focus on a formal employment threshold by selecting individuals who had only a job, and who were not students, government officers, or self-employed and did not work for other households. We apply methods suggested by Chernozhukov et al. (2013) and a recentered influence function regression by Firpo et al. (2009) to decompose the wage distribution between SOE employees and non-SOE employees.

We obtain important evidence of wage convergence between SOE employees and non-SOE employees. During the period 2002–2014, the price of skills in the two sectors converged. We find that the main difference in the wage distribution was the result of the differences in the distributions of skills and residuals during 2002–2010. The concentration of university graduates in SOEs was the main contributor to the endowments difference. However, we observe a gradual change and another important convergence in 2014: the residuals difference is vanishing at this point.

3.2 Related literature

3.2.1 Changes in SOEs and non-SOEs

In general, political will plays an important part in determining wages in the public sector, whereas the market environment has the leading role in the private sector (Gregory and Borland, 1999). However, whether SOEs in transition economies is one of the cases is not easy to identify.

Privatization among SOEs occurs in various ways in transition economies. Shi and Sun (2016) noted that privatization could occur through a voucher mechanism, such as the almost free share transfer to workers in Russia, or through cash auctions combined with public subscription, as occurred in Lithuania. SOE privatization in China commenced with the philosophy of 'keep the large, privatize the small' (Shi and Sun, 2016). From a political economy perspective, Brezis and Schnytzer (2003) argued that privatization methods can be classified into two types: 'embezzlement' (which applies to the practices of the East European countries) and 'Market-Leninism' (the method applied in China and Vietnam). The difference between the two methods is that, under the latter, certain (often higher) shares are retained by the state, which enables it to maintain control. Thus, the autonomy of SOE managers might vary because the state retains a different portion of shares in certain SOEs, especially in the case of China and Vietnam, giving it varying degrees of control.

The number of Vietnamese SOEs is falling sharply, and some of those remaining are providing offers for outsiders to buy its shares. The number of SOEs fell from 12,000 to approximately 6,000 over the period 1990–1994 (Painter, 2005). Painter (2005) suggested that Vietnamese SOE directors won greater autonomy after state subsidies were reduced or eliminated over the period 1986–1992. However, by 2004, 2,242 SOEs were equitized but the state still held 38.1 percent of the total shares. The proportion of shares owned by the state was higher than in Georgia, Kazakhstan, Kyrgyz, Moldova, Russia, and the Ukraine in 1997 (Loc, et al., 2006). This gradual transition allowed outsiders to buy shares without the state losing control of the SOEs (Brezis and Schnytzer, 2003).

Meanwhile, Vietnamese workers have a greater chance of finding jobs outside SOEs as a result of the growth of the private sector. Painter (2005) noted that by the end of 2002, there were about 56,000 newly established firms regulated under the first Laws on Enterprises in Vietnam. Besides, as seen in Figure 1, the employment share of the private

sector was the largest by 2014 while that of SOEs reduced sharply. The free trade accessions, including the US–Vietnam Bilateral Trade Agreement in 2001 and Vietnam's membership in the World Trade Organization in 2007, created more paid (formal) jobs and even the possibility of higher pay in the private sector. In Chapter 2, we calculated that the proportion of 'formal' female (male) wage earners (working for either SOEs or non-SOEs) among the non-student, female (male) population was 5.8 (7.4) percent in 2002 but rose to 10.69 (11) percent in 2014. Since the number of SOEs (non-SOEs) was reducing (increasing), the growth in formal employment would be mainly among non-SOEs. Ramstetter and Ngoc (2007) reported that foreign firms paid a higher wage premium than did SOEs in Vietnam during 2002–2006. All these facts raise questions about the wage equality between SOEs and non-SOEs in Vietnam.

In addition, differences in the regulations for SOEs and non-SOEs are declining in Vietnam. The first Laws on Enterprises became effective in 2000 and, in 2005, the updated Laws on Enterprises 2005[10] omitted the different rules based on the ownership of firms. However, other discrimination from a legal perspective continued. For example, we have noted in Chapter 2 that, until 2011, the regulations on minimum wages were treated differently between public sector and private sector, resulting in different minimum wage levels. Interestingly, the minimum wage for the private sector was higher than that for the public sector[11].

3.2.2 *The public–private wage gap in Vietnam prior to accession to the World Trade Organization in 2007*

Most of the previous studies on the public–private wage gap in Vietnam focus on the 1990s, when private-sector wage earners were not as prevalent as they became from the late 2000s and especially from the early 2010s. We find that there are many research gaps to be covered, given this changing context.

Based on analysis of the VHLSS for 1997–1998, Liu (2004) suggested that the private wage sector was underdeveloped and that wages were higher in the state sector. Defining

[10] Following that change, a further amendment was made to the Laws on Enterprises in 2015.

[11] For example, government decree 03/2006/ND-CP set the minimum wage for the foreign sector at VND 870,000 in March 2006. The minimum for other sectors was VND 350,000. In 2008, dedicated to Region 4 (detailed region classification can be found in the corresponding decree), government decree 111/2008/ND-CP set a minimum wage of VND 950,000 for the foreign sector but its preceding decree 110/2008/ND-CP regulated VND 650,000 as the minimum wage for SOEs. In 2011, the minimum wage for the private sector in Region 4 was VND 1.4 million but for other sectors, it was VND 830,000.

the government sector and SOEs as the public (state) sector, Liu (2004) suggested that there were more females in the public sector than in the private sector. However, we note that including the government sector in the definition of the public sector means that, for 1997/98, 650,000 teachers with direct teaching duties in the general education sector are included in the calculation (by 2014, there were 850,000 such teachers) (GSO, 2017b). Over 70 percent of these teachers were females (GSO, 2017c). Thus, an alternative definition is required to compare SOEs and non-SOEs, especially in the new context, as shown in Figure 1.

Comparing the situations in 1993 and 2006, Imbert (2013) suggested that the wage gap between public employees and other employees was widening because the public sector selected the best workers. Imbert (2013) also implied that public-sector employees were underpaid during the 1990s, but that wages subsequently began to equalize with those of private employees. The question of why the best workers preferred to join or remain with the SOEs, given that they were often underpaid, or at best equally paid, has not been fully explained. Imbert (2013) shared the view of Liu (2004) that women were better off in the public sector. Meanwhile, evidence from the Vietnam Enterprises Survey, presented by Fukase (2014), and our calculation in Figure 1, show more women have continued to join the private sector and, from 2007, there were more women concentrated in the private sector, especially in foreign affiliated firms.

Moreover, studies using the mean difference may not sufficiently capture the inequality in the new context. In Chapter 2, we showed that the gender wage gap was not constant along the distributions in Vietnam during the period 2002–2014. The public and private enterprise wage gap distribution may not be an exception.

3.3 Data

Similar to previous chapter, we used the Vietnam Household Living Standard Survey (VHLSS) for 2002, 2006, 2010, and 2014, conducted by the General Statistics Office (GSO) of Vietnam with the same sample selection and variables.

The descriptive statistics are provided in Table 3.1.

Table 3.1. Descriptive statistics

Variables	2002				2006				2010				2014			
	Non-SOE		SOE		Non-SOE		SOE		Non-SOE		SOE		Non-SOE		SOE	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Nominal wage rate	10,120	8,996	11,913	8,902	15,415	11,362	18,971	13,393	35,808	33,534	39,859	39,656	60,496	40,746	58,659	36,650
Real wage rate	20,340	18,080	23,943	17,891	23,954	17,656	29,480	20,812	35,808	33,534	39,859	39,656	42,115	28,366	40,836	25,515
Log wage rate	1.99	0.72	2.22	0.66	2.21	0.55	2.36	0.68	2.55	0.62	2.65	0.77	2.64	0.67	2.73	0.65
Work hours	2,200	673	2,208	572	2,283	750	2,265	590	2,303	677	2,152	685	2,530	460	2,287	532
Female	0.46	0.49	0.455	0.49	0.49	0.50	0.42	0.49	0.47	0.50	0.41	0.49	0.51	0.50	0.45	0.50
Age	29.53	9.45	34.78	9.85	28.54	9.51	35.32	10.70	30.39	9.17	34.69	10.34	30.78	8.94	35.91	10.38
5th grade	0.23	0.42	0.14	0.35	0.22	0.42	0.11	0.31	0.18	0.39	0.11	0.31	0.15	0.36	0.11	0.32
9th grade	0.29	0.45	0.22	0.41	0.29	0.45	0.23	0.42	0.26	0.44	0.21	0.41	0.25	0.43	0.17	0.38
12th grade	0.21	0.41	0.18	0.38	0.32	0.47	0.42	0.49	0.33	0.47	0.44	0.50	0.32	0.47	0.40	0.49
3-year college	0.01	0.10	0.02	0.15	0.02	0.15	0.07	0.25	0.03	0.17	0.04	0.19	0.05	0.22	0.06	0.24
University	0.08	0.27	0.15	0.36	0.07	0.26	0.14	0.35	0.12	0.33	0.18	0.38	0.17	0.38	0.23	0.42
Vocational degree	0.09	0.28	0.24	0.43	0.22	0.41	0.37	0.48	0.23	0.42	0.35	0.48	0.19	0.39	0.31	0.46
Urban	0.44	0.50	0.60	0.49	0.46	0.50	0.67	0.47	0.51	0.50	0.65	0.48	0.51	0.50	0.67	0.47
Private firms	0.58	0.49	0.00	0.00	0.65	0.48	0.00	0.00	0.73	0.45	0.00	0.00	0.69	0.46	0.00	0.00
Foreign firms	0.26	0.44	0.00	0.00	0.29	0.45	0.00	0.00	0.25	0.43	0.00	0.00	0.29	0.45	0.00	0.00
Collective	0.16	0.36	0.00	0.00	0.06	0.24	0.00	0.00	0.02	0.14	0.00	0.00	0.02	0.13	0.00	0.00
N (sample size)	1,983		2,468		1,088		523		7,809		1,882		1,960		385	

Notes: Nominal (real) wage rate unit is in Vietnamese dong (at 2010 price) per hour. Log wage rate is the logarithm of real wage rate. SOE: State-owned enterprises. Non-SOE: not state-owned enterprises. SD: standard deviation.

The descriptive statistics show some interesting trends. As seen in Table 3.1, SOE employees had a higher average real wage than non-SOE employees in 2002 (about 17 percent higher). However, in 2014, they had a 3 percent lower average real wage than non-SOE employees. When the number of work hours is considered, the mean logarithm of the real wage rate difference between SOE employees and non-SOE employees gradually reduced over time; it was 11.6 percent higher for SOE employees in 2002, fell to 6.8 percent higher in 2006, to 3.9 percent higher in 2010, and finally to only 3.4 percent higher in 2014. This is because although the average work hours of SOE employees was rather stable, those of non-SOE employees increased over time.

3.4 Methods

We apply two important methods in our analysis. The first method was suggested by Chernozhukov et al. (2013) (hereafter referred to as CFM). The second method is a recentered influence function (RIF) regression, using the unconditional quantile regression by Firpo et al. (2009). The key point of both methods is to estimate a counterfactual distribution of the first group of workers based on a component distributed as if it were the second group's and the remaining components as if they were those of the first group.

3.4.1 The CFM method

As mentioned in previous chapter, the objective of the method is to estimate two important counterfactual distributions. The method estimates the counterfactual distribution of the wages, $\hat{q}\left(\hat{\beta}^{non-SOE}, x^{SOE}\right)$, that would be received by non-SOE employees if their skill distribution was similar to those of the SOE employees. $\hat{\beta}^{non-SOE}$ are the estimated coefficients of non-SOE employees from a quantile regression by Koenker and Bassett (1978) and x^{SOE} is the characteristics vector of employees in SOEs. The characteristics difference is the difference between $\hat{q}\left(\hat{\beta}^{non-SOE}, x^{SOE}\right)$ and $\hat{q}\left(\hat{\beta}^{non-SOE}, x^{non-SOE}\right)$. The counterfactual wage distribution, if the median returns to skills for non-SOE employees were exactly the same as those of SOE employees, and if the residuals distribution were that of the non-SOE employees, is $\hat{q}\left(\hat{\beta}^{med^{SOE}, resid^{non-SOE}}, x^{SOE}\right)$. The coefficients difference is the gap between

$\hat{q}\left(\hat{\beta}^{med^{SOE},resid^{non-SOE}}, x^{SOE}\right)$ and $\hat{q}\left(\hat{\beta}^{non-SOE}, x^{SOE}\right)$. Thus, the detailed breakdown[12] is:

$$\hat{q}\left(\hat{\beta}^{SOE}, x^{SOE}\right) - \hat{q}\left(\hat{\beta}^{non-SOE}, x^{non-SOE}\right) = \left(\hat{q}\left(\hat{\beta}^{SOE}, x^{SOE}\right) - \hat{q}\left(\hat{\beta}^{med^{SOE},resid^{non-SOE}}, x^{SOE}\right)\right) + \left(\hat{q}\left(\hat{\beta}^{med^{SOE},resid^{non-SOE}}, x^{SOE}\right) - \hat{q}\left(\hat{\beta}^{non-SOE}, x^{SOE}\right)\right) + \left(\hat{q}\left(\hat{\beta}^{non-SOE}, x^{SOE}\right) - \hat{q}\left(\hat{\beta}^{non-SOE}, x^{non-SOE}\right)\right) \quad (3).$$

3.4.2 RIF regression and Oaxaca–Blinder decomposition

We apply the RIF regression suggested by Firpo et al. (2009). In this specific case (using quantiles), the RIF regression can be called an unconditional quantile regression. The recentered influence function, $RIF(lwage; q)$, is a sum of the influence function, $IF(lwage; q)$, and the distributional statistic of interest, q. $lwage$ is logarithm of the real wage rate. Then, the estimation results are used to decompose the contribution of each of the covariates using a procedure13 suggested by Oaxaca (1973) and Blinder (1973). More specifically, the difference in the logarithm of the real wage rate between the two groups at each quantile τ can be decomposed as follows:

$$\widehat{\Delta\tau} = \left(\widehat{RIF}\left(lwage_{SOE}, q_{SOE,\tau}\right)\right) - \left(\widehat{RIF}\left(lwage_{non-SOE}, q_{non-SOE,\tau}\right)\right), \text{ and} \quad (4)$$

$$\widehat{\Delta\tau} = \overline{X}_{non-SOE}\left(\hat{\delta}_{SOE,\tau} - \hat{\delta}_{non-SOE,\tau}\right) + \left(\overline{X}_{SOE} - \overline{X}_{non-SOE}\right)\hat{\delta}_{non-SOE,\tau} + \left(\overline{X}_{SOE} - \overline{X}_{non-SOE}\right)\left(\hat{\delta}_{SOE,\tau} - \hat{\delta}_{non-SOE,\tau}\right). \quad (5)$$

This can be simplified as follows:

$$Total\ gap = coefficients\ difference + endowments\ difference + interactions\ difference. \quad (6)$$

Both methods, CFM and RIF regression, have advantages and disadvantages. One of the most important advantages of the first method is that it constructs simultaneous confidence sets, which help to test the functional hypotheses, including zero influence and constant influence. The test results help us to confirm whether the difference is minor or large and whether it is constant along the distribution or polarized. However, the CFM method cannot provide detail on the contribution of each covariate to the decomposed

[12] A user-written Stata command, 'cdeco_jmp' by Chernozhukov, Fernandez-Val, and Melly eased our estimations. The command can be found at https://sites.google.com/site/blaisemelly/computer-programs/inference-on-counterfactual-distributions.

[13] As suggested by Firpo, Fortin, and Lemieux, we use another user-written Stata command, 'oaxaca8' by Jann (2008) to decompose the results from the RIF regression. The detailed guideline from Firpo, Fortin, and Lemieux for RIF regression and decompositions can be found at http://economics.ubc.ca/faculty-and-staff/nicole-fortin/.

components. In contrast, the second method provides a possible linear decomposition of each of the covariates. Thus, by using the two methods, we are able to utilize the advantages of each method.

3.5 Results

3.5.1 The total wage gap and its decomposed components

The total wage gap between SOE employees and non-SOE employees was persistent. However, the coefficients differences were minor during the period 2002-2014 and the residuals differences diminished by 2014. We have four important pieces of evidence supporting these findings.

First, both methods showed that the total wage gap between SOE workers and non-SOE workers was statistically significant, particularly for the middle and middle-to-high wage distribution groups, as seen in Table 3.2. The tests for all quantile effects equal to zero were rejected in all years (see columns T1 and T2 of Table 3.2). The persistent gap for the middle and middle-to-high wage distribution groups is consistent with the findings of Turunen (2004) for Russia. Turunen (2004) showed that white-collar workers for the state who held a university degree and a managerial position were more likely to stay in the state sector. We note that the total difference is not constant along the income distribution. Except for 2002, all test results for the constant quantile effect in the CFM estimations (see column T2) support this argument (Figure 10 also illustrates this trend).

Table 3.2. Decomposition of the public–private enterprise wage difference distribution

Year	Method	Percentiles										Tests	
		10th		25th		50th		75th		90th		T1	T2
Total gap													
2002	RIF	0.267***	(0.032)	0.232***	(0.025)	0.185***	(0.023)	0.210***	(0.027)	0.250***	(0.040)		
	CFM	0.271***	(0.034)	0.225***	(0.025)	0.200***	(0.022)	0.194***	(0.026)	0.242***	(0.040)	R	A
2006	RIF	0.119*	(0.066)	0.083*	(0.046)	0.218***	(0.043)	0.359***	(0.045)	0.356***	(0.071)		
	CFM	–0.099	(0.061)	0.076*	(0.041)	0.212***	(0.037)	0.325***	(0.044)	0.306***	(0.060)	R	R
2010	RIF	0.217***	(0.033)	0.004	(0.024)	0.186***	(0.024)	0.286***	(0.024)	0.233***	(0.034)		
	CFM	–0.211***	(0.032)	–0.000	(0.025)	0.173***	(0.022)	0.263***	(0.022)	0.231***	(0.034)	R	R
2014	RIF	0.005	(0.082)	0.024	(0.045)	0.084**	(0.040)	0.166***	(0.041)	0.052	(0.053)		
	CFM	0.063	(0.095)	0.037	(0.048)	0.105***	(0.035)	0.106***	(0.031)	0.055	(0.047)	R	R
	Coefficients												
2002	RIF	0.092**	(0.040)	0.045	(0.028)	–0.005	(0.023)	0.031	(0.025)	0.086**	(0.036)		
2006	RIF	0.195***	(0.066)	–0.167**	(0.067)	–0.122**	(0.050)	0.094**	(0.045)	0.077	(0.064)		
2010	RIF	0.288***	(0.032)	0.088***	(0.023)	–0.032	(0.025)	0.133***	(0.022)	0.087***	(0.029)		
2014	RIF	0.119	(0.081)	–0.127**	(0.054)	–0.094**	(0.043)	0.022	(0.039)	–0.053	(0.051)		
2002	CFM	0.061**	(0.029)	0.023	(0.030)	0.023	(0.028)	0.037	(0.031)	0.022	(0.043)	A	A
2006	CFM	–0.015	(0.047)	–0.014	(0.042)	0.040	(0.047)	0.024	(0.047)	0.012	(0.060)	A	A
2010	CFM	–0.073***	(0.026)	–0.016	(0.022)	0.024	(0.021)	0.045**	(0.022)	0.023	(0.027)	A	R
2014	CFM	–0.090*	(0.053)	–0.069*	(0.041)	–0.029	(0.037)	–0.023	(0.037)	0.031	(0.044)	A	A
	Endowments												
2002	RIF	0.023	(0.021)	0.066***	(0.017)	0.130***	(0.016)	0.216***	(0.020)	0.251***	(0.031)		
2006	RIF	–0.249***	(0.071)	0.108***	(0.019)	0.164***	(0.018)	0.260***	(0.027)	0.481***	(0.065)		
2010	RIF	–0.101***	(0.022)	–0.168***	(0.017)	0.124***	(0.008)	0.182***	(0.013)	0.227***	(0.022)		
2014	RIF	–0.182***	(0.053)	0.087***	(0.017)	0.091***	(0.014)	0.181***	(0.024)	0.213***	(0.035)		
	Characteristics												
2002	CFM	0.038*	(0.020)	0.080***	(0.016)	0.130	(0.016)	0.184	(0.019)	0.213***	(0.036)	R	R
2006	CFM	0.101***	(0.026)	0.157***	(0.019)	0.167***	(0.020)	0.249***	(0.032)	0.293***	(0.042)	R	R
2010	CFM	0.110***	(0.010)	0.112***	(0.009)	0.130***	(0.010)	0.155***	(0.013)	0.173***	(0.020)	R	R
2014	CFM	0.152***	(0.033)	0.110***	(0.017)	0.106***	(0.017)	0.124***	(0.018)	0.148***	(0.030)	R	A

Table 3.2 (cont.)

Year	Methods	Percentiles										Tests	
		10th		25th		50th		75th		90th		T1	T2
	Interactions												
2002	RIF	0.153***	(0.027)	0.122***	(0.020)	0.060***	(0.017)	–0.037*	(0.020)	–0.087***	(0.031)		
2006	RIF	0.174**	(0.073)	0.141***	(0.047)	0.175***	(0.037)	0.005	(0.040)	–0.202***	(0.076)		
2010	RIF	0.030	(0.022)	0.084***	(0.015)	0.093***	(0.014)	–0.028**	(0.014)	–0.080***	(0.023)		
2014	RIF	0.068	(0.057)	0.064**	(0.029)	0.088***	(0.025)	–0.037	(0.029)	–0.108**	(0.043)		
	Residuals												
2002	CFM	0.173***	(0.036)	0.122***	(0.021)	0.046***	(0.015)	–0.026	(0.025)	0.007	(0.046)	R	R
2006	CFM	–0.184***	(0.060)	–0.067**	(0.032)	0.005	(0.243)	0.052	(0.034)	0.001	0.046	A	R
2010	CFM	–0.248***	(0.026)	–0.097***	(0.017)	0.019	(0.012)	0.063***	(0.015)	0.035	(0.027)	R	R
2014	CFM	0.001	(0.079)	–0.004	(0.033)	0.028	(0.022)	0.005	(0.025)	0.062	(0.050)	A	A

Notes: The symbols ***, **, and * denote $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively. RIF is the recentered influence function regression. CFM is the method by Chernozhukov et al. (2013).
T1: Test results for H0: No effect, QE(tau) = 0 for all taus from 1–99. If H0 is rejected (at the 10 percent level), this is denoted by 'R'. If H0 is not rejected, this is denoted by 'A'. This test is stronger than the absence of any mean effect.
T2: Test results for H0: Constant effect: QE(tau) = QE(0.5) (at the 10 percent level). If H0 is not rejected, this is denoted by 'A', and otherwise by 'R'.

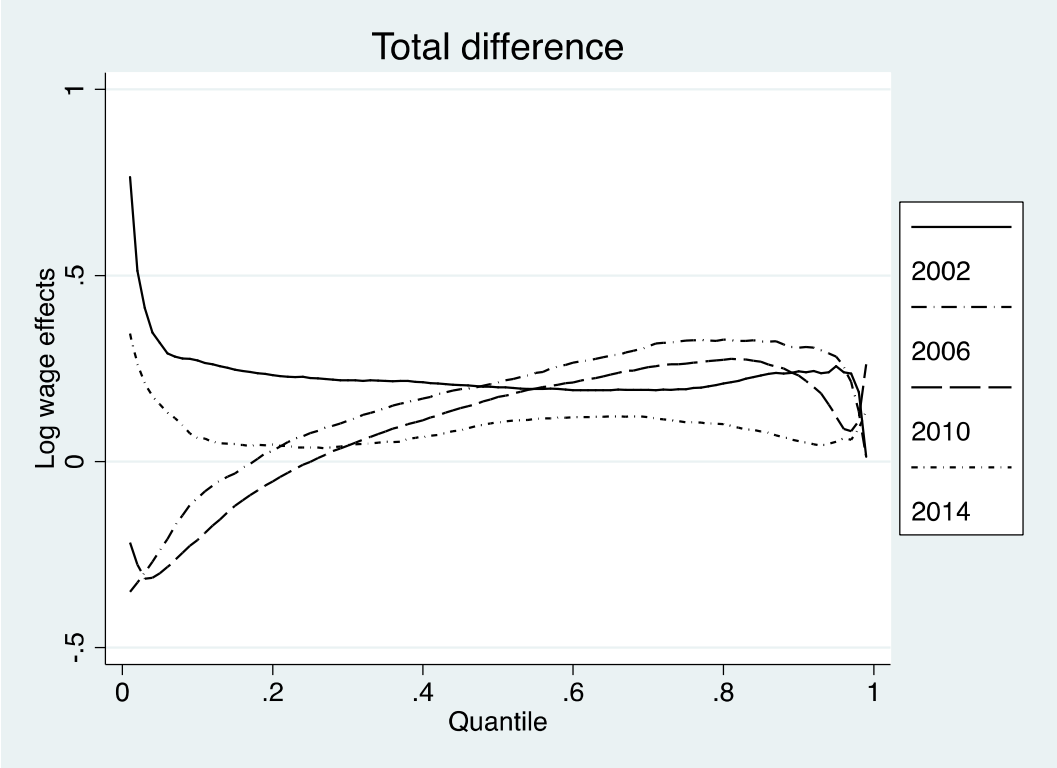

Figure 10. *Total difference*

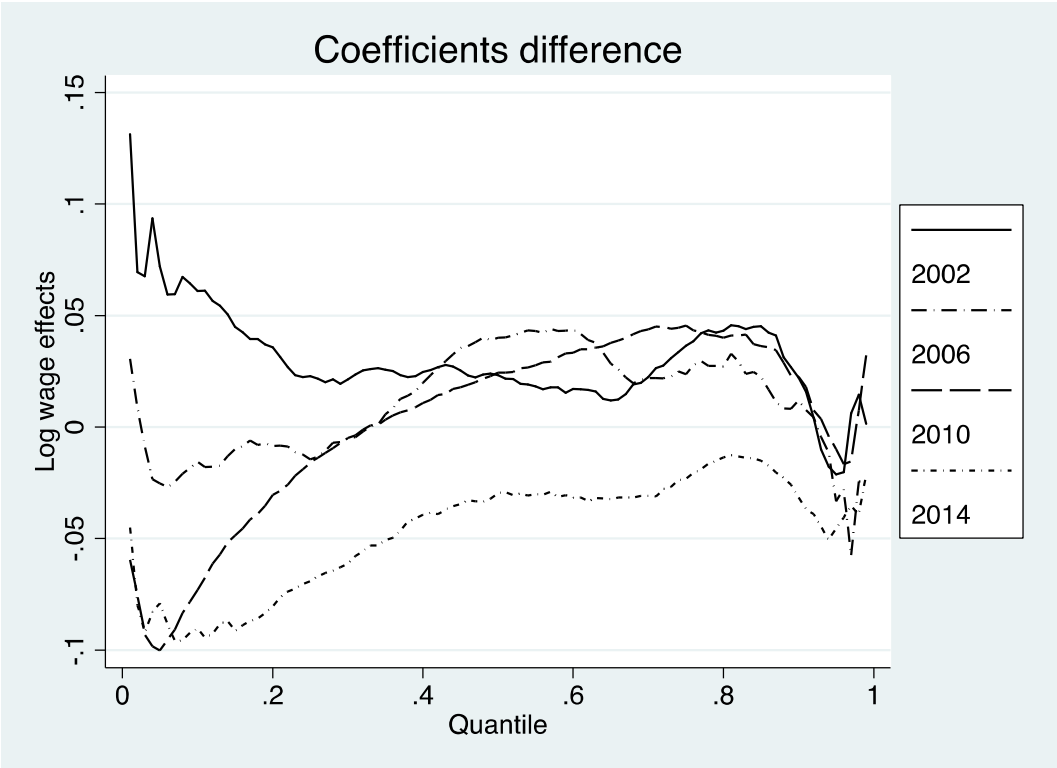

Figure 11. *Coefficients difference*

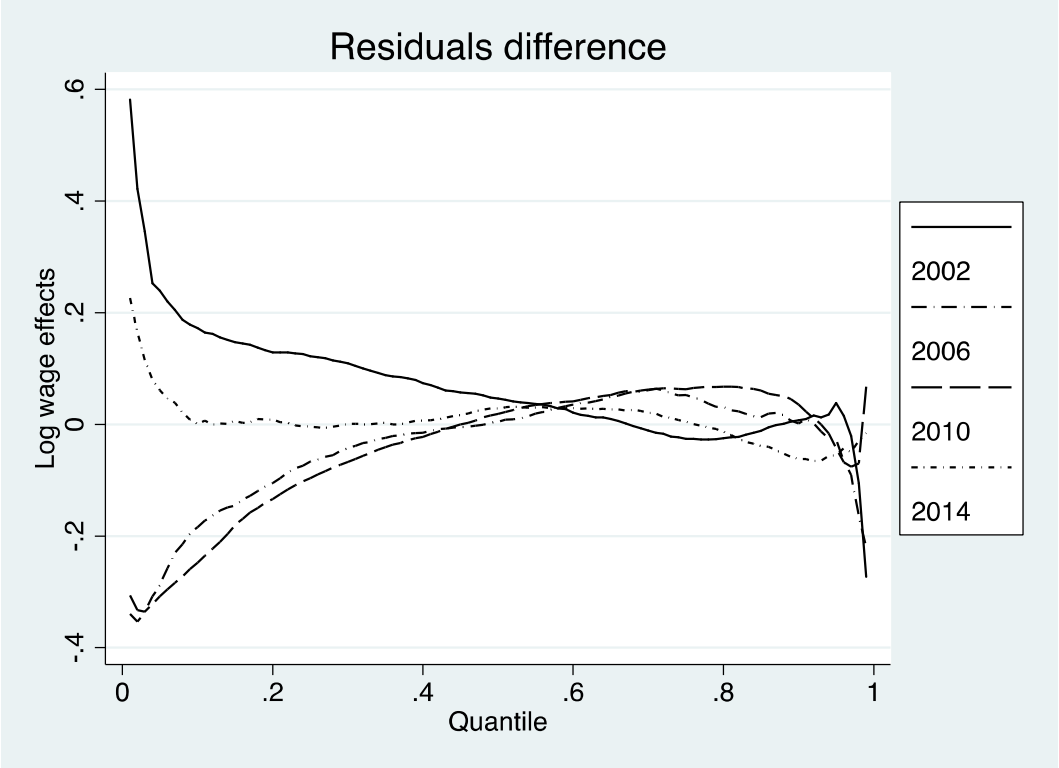

Figure 12. *Residuals difference*

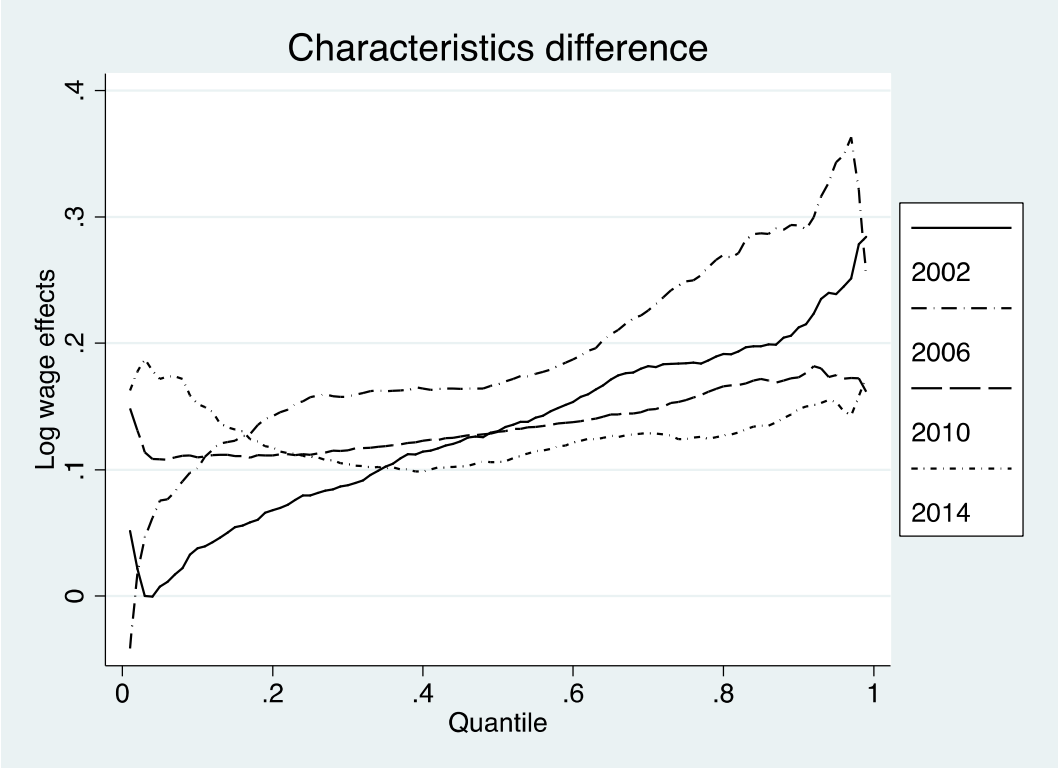

Figure 13. *Characteristics difference*

Second, we found that the coefficients difference was statistically insignificant in all selected waves. As shown in column T1 of Table 3.2, none of the test results for quantile effects different from zero were rejected. Third, the residuals difference disappeared in 2014 because the test for all corresponding quantile effects equalling zero was not rejected (see column T1 of Table 3.2).

Fourth, the main contributor to the total difference was the characteristics (endowments) distribution difference. This is clear from both estimation methods. Tests for the zero-quantile effect for the characteristics difference were all rejected, as seen in column T1 of Table 3.2. However, the characteristics difference, which was higher at the right tail of the wage difference distribution (see Figure 13), returns to being flat and, finally, becomes constant along the distribution in 2014, as the tests in column T2 of Table 3.2 show.

As the characteristics/endowments difference was the most important contributor to the total wage difference, we further break down the contribution of each characteristic using RIF regressions and the Oaxaca–Blinder decomposition.

3.5.2 University graduates and endowments difference

We found university graduates were the most important contributor to the endowments difference between SOE employees and non-SOE employees. More specifically, in 2002, university graduates were corresponding with increments of 57/38/40/52 percent (0.04/0.05/0.09/0.13 log points) of the endowments difference at 25th/50th/75th/90th percentiles, as shown in columns 4, 7, 10, and 13 of Table 3.3. This suggests university graduates were more available in SOEs at these percentiles of the endowments difference distribution in 2002. In 2006, they contributed 36/25/31/38 percent (0.04/0.04/0.08/0.18 log points) of the endowments difference at the corresponding percentiles. In 2010, they were 33/38/48 percent (0.04/0.07/0.11 log points) at 50th, 75th, 90th percentiles. In 2014, they returned to 33 percent (0.03 log points) at 25th/25th/50th/75th percentiles and 43 percent (0.09 log points) at 90th percentile.

Table 3.3. Oaxaca–Blinder linear decomposition after recentered influence function regressions

Variables	10th			25th			50th			75th			90th		
	E	C	I	E	C	I	E	C	I	E	C	I	E	C	I
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
2002															
Sex	0.00	0.01	0.00	0.00	0.00	0.00	0.00	–0.03	0.00	0.00	–0.05 **	0.00	0.00	–0.04	0.00
Age	0.54 ***	–0.14	–0.03	0.61 ***	–1.40 **	–0.25 **	0.51 ***	–1.82 ***	–0.32 ***	0.38 ***	–1.67 ***	–0.30 ***	0.17 *	–0.05	–0.01
Age^2	–0.58 ***	0.46	0.16	–0.61 ***	0.96 ***	0.34 ***	–0.47 ***	1.04 ***	0.37 ***	–0.32 ***	0.88 ***	0.32 ***	–0.09	0.01	0.00
5th grade	–0.01	0.02	–0.01	–0.02 **	–0.02	0.01	–0.01	–0.02	0.01	–0.01 **	–0.02	0.01	–0.01	–0.01	0.00
9th grade	0.01	0.11 **	–0.03 **	–0.01	0.03	–0.01	–0.01	0.00	0.00	–0.01 **	–0.01	0.00	–0.01	–0.01	0.00
12th grade	0.00	0.03	0.00	–0.01 *	–0.01	0.00	–0.01 **	–0.02	0.00	–0.01 **	–0.04 *	0.00	–0.01 *	–0.04	0.00
College	0.00	0.00	0.01	0.00	0.00	0.00	0.01 **	0.00	0.00	0.01 ***	0.00	0.00	0.02 **	–0.01	–0.01
University	0.02 ***	0.02	0.01	0.04 ***	0.00	0.00	0.05 ***	0.00	0.00	0.09 ***	–0.02 **	–0.02 **	0.13 ***	–0.06 ***	–0.06 ***
Vocational	0.04 **	0.02	0.03	0.05 ***	0.01	0.02	0.06 ***	0.00	–0.01	0.09 ***	–0.03 ***	–0.05 ***	0.04 **	–0.02	–0.03
Constant		–0.42			0.46			0.86 ***			1.00 ***			0.31	
Total	0.02	0.09 **	0.15 ***	0.07 ***	0.04	0.12 ***	0.13 ***	–0.01	0.06 ***	0.22 ***	0.03	–0.04 *	0.25 ***	0.09 **	–0.09 ***
2006															
Sex	0.00	–0.01	0.00	0.01 *	0.02	0.00	0.01 **	–0.01	0.00	0.01 *	–0.02	0.00	0.01	–0.10 *	0.01
Age	–1.11 ***	–3.81 **	0.73 *	0.38 ***	2.70 ***	0.64 **	0.48 ***	1.49 *	0.35 *	0.38 ***	0.14	0.03	0.41 **	–1.23	–0.29
Age^2	0.96 ***	1.81 *	–0.61 *	–0.33 ***	–1.03 **	–0.52 **	–0.39 ***	–0.47	–0.24	–0.28 ***	–0.03	–0.01	–0.20	0.40	0.20
5th grade	0.07	–0.04	–0.04	–0.04 ***	–0.08	0.04	–0.01 *	–0.01	0.00	–0.01	0.02	–0.01	–0.02	–0.04	0.02
9th grade	0.05	–0.14	–0.03	–0.02 *	0.00	0.00	–0.01	0.01	0.00	0.00	0.00	0.00	–0.01	–0.08	0.01
12th grade	–0.06	–0.12	0.03	0.04 ***	–0.07	–0.02	0.02 **	–0.01	0.00	0.02 **	–0.02	0.00	0.04 ***	–0.10	–0.03
College	–0.04	–0.04	0.02	0.02 **	–0.01	–0.01	0.01 **	0.00	0.00	0.03 ***	0.00	0.00	0.04 **	–0.01	–0.02
University	–0.09 **	–0.10	0.05	0.04 ***	0.01	0.01	0.04 ***	0.04 **	0.04 *	0.08 ***	0.00	0.00	0.18 ***	–0.10 ***	–0.10 **
Vocational	–0.02	–0.06	0.02	0.00	0.01	0.01	0.01 *	0.03	0.02	0.02 **	0.00	0.00	0.03	–0.02	–0.01
Constant		2.71 **			–1.73 **			–1.19 **			0.00			1.34	
Total	–0.25 ***	0.20 ***	0.17 **	0.11 ***	–0.17 **	0.14 ***	0.16 ***	–0.12 **	0.18 ***	0.26 ***	0.09 **	0.00	0.48 ***	0.08	–0.20 ***

Table 3.3 (cont.)

Variables	10th			25th			50th			75th			90th		
	E	C	I	E	C	I	E	C	I	E	C	I	E	C	I
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
2010															
Sex	–0.01 **	0.02	0.00	–0.01 ***	0.03	0.00	0.01 ***	–0.09 ***	0.01 ***	0.01 ***	–0.05 **	0.01 **	0.01 ***	–0.05 *	0.01
Age	–0.64 ***	–2.20 **	0.27 **	–0.62 ***	–2.45 ***	0.30 ***	0.30 ***	1.04 **	0.15 **	0.20 ***	0.06	0.01	0.12 **	–0.10	–0.01
Age^2	0.58 ***	1.06 **	–0.25 **	0.55 ***	1.14 ***	–0.26 ***	–0.26 ***	–0.34	–0.10	–0.14 ***	–0.05	–0.02	–0.04	–0.04	–0.01
5th grade	0.02	–0.01	0.00	0.02 *	–0.02	–0.01	–0.01 ***	0.00	0.00	–0.01 ***	–0.03 *	0.01	–0.01 **	–0.03	0.01
9th grade	0.01	0.01	0.00	0.01 *	–0.03	–0.01	–0.01 ***	0.01	0.00	–0.01 ***	–0.04	0.01	–0.01 **	–0.07 *	0.01 *
12th grade	–0.01	0.06	–0.01	–0.03 *	–0.02	0.00	0.04 ***	–0.02	–0.01	0.03 ***	–0.11 ***	–0.04 ***	0.03 ***	–0.10 **	–0.03 **
College	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	–0.02 ***	0.00	0.00	–0.02 ***	0.00
University	–0.03 **	–0.02	0.01	–0.04 ***	–0.07 ***	0.02 **	0.04 ***	0.03 **	0.01 *	0.07 ***	–0.05 ***	–0.02 ***	0.11 ***	–0.15 ***	–0.06 ***
Vocational	–0.02 *	–0.03	0.01	–0.04 ***	–0.09 ***	0.03 ***	0.01 ***	0.06 ***	0.04 ***	0.02 ***	0.02 *	0.01 *	0.01 **	0.02	0.01
Constant		1.38 **			1.60 ***			–0.72 **			0.41			0.64 *	
Total	–0.10 ***	0.29 ***	0.03	–0.17 ***	0.09 ***	0.08 ***	0.12 ***	–0.03	0.09 ***	0.18 ***	0.13 ***	–0.03 **	0.23 ***	0.09 ***	–0.08 ***
2014															
Sex	0.00	–0.11	–0.01	0.01 *	0.01	0.00	0.01 *	–0.04	0.00	0.01 *	–0.04	0.00	0.01	–0.05	0.01
Age	–0.89 ***	3.46	–0.49	0.68 ***	–0.82	–0.14	0.36 ***	0.42	0.07	0.32 ***	0.60	0.10	0.25 ***	–0.54	–0.09
Age^2	0.76 **	–1.99	0.53	–0.63 ***	0.45	0.16	–0.33 ***	–0.04	–0.01	–0.24 ***	–0.27	–0.10	–0.14	0.13	0.05
5th grade	0.04	–0.10	–0.04	0.00	0.00	0.00	0.00	0.00	0.00	–0.01 *	–0.06 **	0.02	–0.01 *	–0.06	0.02
9th grade	0.11	–0.21	–0.09	–0.02 *	0.08	–0.02	–0.01 **	0.08 *	–0.02	–0.02 ***	–0.03	0.01	–0.02 ***	–0.10	0.03
12th grade	–0.11	–0.51	0.10	0.02 **	0.12	0.03	0.01 **	0.09 *	0.02	0.03 ***	–0.07	–0.02	0.03 ***	–0.14 *	–0.04
College	–0.01	–0.10 *	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	–0.01	0.00	0.00	–0.03 **	0.00
University	–0.09	–0.27	0.07	0.03 **	0.06	0.02	0.03 **	0.06 **	0.02 *	0.06 **	–0.10 ***	–0.04 **	0.09 **	–0.19 ***	–0.07 **
Vocational	–0.01	0.00	0.00	0.01	0.02	0.01	0.02 ***	0.01	0.01	0.02 ***	–0.02	–0.01	0.01	–0.02	–0.01
Constant		–0.06			–0.07			–0.68			0.02			0.95	
Total	–0.18 ***	0.12	0.07	0.09 ***	–0.13 **	0.06 **	0.09 ***	–0.09 **	0.09 ***	0.18 ***	0.02	–0.04	0.21 ***	–0.05	–0.11 **

Notes: The symbols ***, **, and * denote $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively. E: Endowments difference; C: Coefficients difference; and I: Interactions difference.

However, during 2006-2014, at 10th percentile, university graduates were important contributor to reduce the endowments difference as the quantile effects are becoming negative (column 1 of Table 3.3). Within the scope of endowments difference, the negative coefficient of $university$ merely means SOE employees received lower income because they were less likely to have university degrees at this 10th percentile of the distribution. It may be the case that non-SOEs were attractive and appeared more accessible to fresh university graduates commencing their career.

This result does not contradict the findings that university graduates in SOEs received lower returns to $university$ in SOEs, which was found for the 75th and 90th percentiles in 2002 (columns 11 and 12 of Table 3.3), the 90th percentile (column 14) in 2006, and at the 25th, 75th, and 90th percentiles (columns 5, 11, and 14) in 2010. We would argue that precedent regulations to lay off public employees based on education is the most likely explanation. Friedman (2004) indicated that, based on a survey conducted in 2000, Vietnamese SOE workers were in higher demand for formal training than were non-SOE workers. Thus, SOE workers may have sought to upgrade their educational qualifications so as to retain their positions when they were expecting the size of SOEs to contract. Over-concentration of university graduates may have occurred because, although employees were upgrading their educational qualifications, labor productivity may not have increased.[14]

3.5.3 Convergence in 2014

We found that the pay schemes of SOEs converged with those of non-SOEs by 2014. First, the differences in coefficients were minimal in 2002, 2006, 2010, and 2014. Second, the residuals difference became statistically insignificant in 2014, as shown in column T1 of Table 3.2. Third, the characteristics differences were declining over time for the middle-to-high wage distribution groups as seen in Table 3.2. The remaining (positive) difference is the result of some component of the skills distribution. Except for 2010, when women were paid less in SOEs in terms of the average price of skills (see columns 8, 11, and 14 of Table 3.3), we found little evidence that women were paid differently by the price of skills in SOEs compared with non-SOEs in other years and percentiles. Our

[14] Friedman (2004) suggested that Vietnamese SOE workers even had lower labor productivity compared to non-SOE workers.

result differs from the results of Liu (2004), not only because of the time period difference but also because of the data selection.

Finally, we anticipate that the remaining difference between SOEs and non-SOEs will become increasingly smaller in the years to come. This is because there would be more options in the labor market for young and highly-educated workers with equivalent pay and because there would be little incentive for highly-educated workers to join SOEs, but more benefits from leaving SOEs. In 2014, the skill price was negative for most skill levels at the 75th and 90th percentiles, for SOE employees (see columns 11 and 14 of Table 3.3). At the 50th percentile, the coefficients difference was negative despite some of the education level groups being paid more by SOEs. As a possible consequence, better-educated, highly-productive workers in these segments would be likely to leave the SOEs,[15] which would lower the current endowment differences. However, we also acknowledge that those, who are relatively 'old' and self-selected to work for SOEs in the past, will remain. This is because they may have difficulty in matching their employable skills with the needs from non-SOEs at equivalent or higher wage rate.

[15] The employees may stay if they have supervisory posts, as suggested by Turunen (2004). However, SOEs cannot create enough such posts for all of these workers.

Chapter 4. Conclusions

In the first work, we decompose the wage inequality along the wage distribution by gender in Vietnam during the period 2002–14. We find evidence of both severer inequality and improving equality. In general, the total gap appears to be persistent, mainly because of gender discrimination in the price of skills. However, the total gap is not constant throughout the distribution and is wider in the right (upper) tail. We identify several different items of evidence for a sticky floor and a glass ceiling for the total gap and price gap in particular years, but there is no consistent trend. Meanwhile, there is an increase in wage equality over time as the wage gap has tended to narrow (except in 2010). The price gap has decreased among those aged 15–35, among skilled workers, and those in the manufacturing sector, and has becomes insignificant among those aged 46–55 and those in the service sector. However, we find little evidence to support the argument that the decreasing gap is because of the higher (real) minimum wage.

Our findings suggest several policy implications and directions for future research. We would suggest that any policy creating competitiveness, especially in the growth of the private sector, would also promote gender equality given that the price gap still contributes most to the gender wage gap. Pressure from rival firms would induce employers to remove any gender discrimination on the price of skills. When data from future surveys become available, we recommend re-examination of the sticky floor in the total gender wage gap that we found in 2014.

In the second work, we have examined the transition of SOEs from a wage perspective, by decomposing the wage distribution difference between SOE and non-SOE employees during the period 2002–2014, using four Vietnamese household surveys of the same design and the same sample selection. Although SOE employees received higher pay in 2002 as a result of the characteristics difference and residuals, the coefficients difference was minimal along the wage distribution during 2002–2014. The characteristics difference fell over time at middle and middle-to-high wage distribution groups. University graduates were the main contributor to the endowments difference. However, by 2014, the residuals difference vanished and the pay schemes between SOEs and non-SOEs had converged.

The convergence of pay schemes between SOEs and non-SOEs has some implications for policy and research agendas. First, the Vietnamese government should keep treating SOEs as equivalent to non-SOEs. Limiting the privileges applied to any sector creates a more

competitive environment, increases wage equality among firms with different ownership structures, and results in more efficient resource allocations. Second, unless the state wishes to support inefficiency through public budgets/assets, more autonomy for SOE managers to restructure the current pay schemes is a must. Third, as SOEs pay as much as non-SOEs, a convergence in the characteristics difference is foreseeable. High productivity employees, if receiving lower pay, might leave the SOEs. However, rather than state policies attempting to prevent this, allowing it to happen will provide incentives for SOEs to restructure their pay schemes to become more attractive to high productivity employees. If SOEs can successfully change, the demand for expensive formal training that is not necessarily linked to higher productivity would disappear. In contrast, the demand for informal training and on-the-job training to improve productivity will rise. Finally, future studies of the public–private enterprise wage gap in Vietnam should search for evidence of the disappearance of the characteristics differences. Once this has been found, any different settings to distinguish between SOEs and non-SOEs in wage-related estimations would become redundant.

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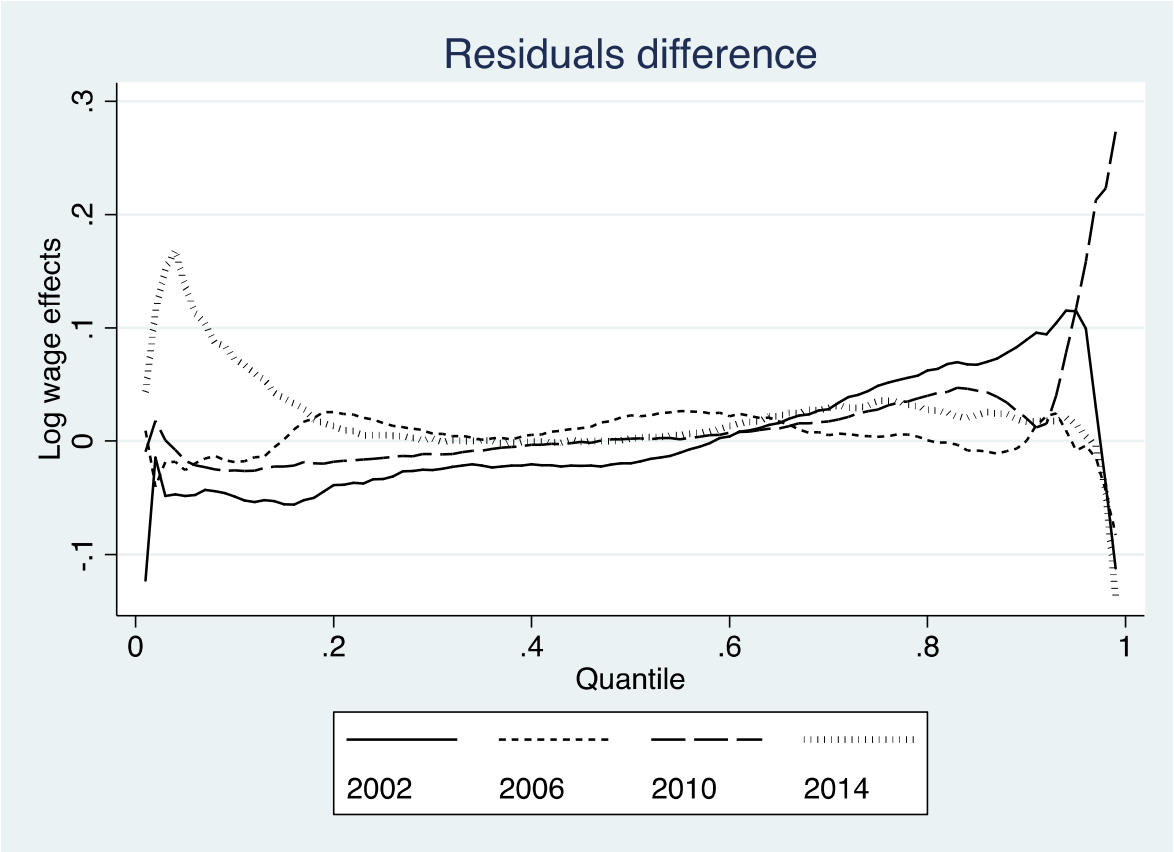
Appendix A. *Comparing gender gap in different methods of estimation*

Method	Gender wage gap	Total difference				Difference by coefficients (price)			
		2002	2006	2010	2014	2002	2006	2010	2014
OLS	Marginal effect	0.14	0.124	0.17	0.12				
O-B	Raw	0.23	0.19	0.22	0.186	58–60%	63–65%	81–77%	73–60%
JMP	At Mean	0.23	0.19	0.22	0.20	0.14	0.12	0.17	0.12
RIF	At								
	10^{th}	0.17	0.15	0.17	0.20	0.11	0.11	0.12	0.08
	25^{th}	0.21	0.17	0.19	0.15	0.13	0.11	0.13	0.09
	50^{th}	0.23	0.22	0.24	0.15	0.13	0.13	0.17	0.08
	75^{th}	0.28	0.27	0.30	0.25	0.17	0.15	0.23	0.16
	90^{th}	0.29	0.26	0.30	0.23	0.17	0.15	0.23	0.15
CFM	At								
	10^{th}	0.17	0.15	0.16	0.25	0.15 (89%)	0.13 (85%)	0.14 (90%)	0.07 (27%)
	25^{th}	0.21	0.17	0.19	0.16	0.16 (74%)	0.09 (52%)	0.16 (82%)	0.08 (50%)
	50^{th}	0.23	0.24	0.24	0.18	0.15 (65%)	0.13 (53%)	0.18 (73%)	0.11 (58%)
	75^{th}	0.28	0.27	0.30	0.23	0.12 (44%)	0.16 (60%)	0.19 (65%)	0.12 (55%)
	90^{th}	0.31	0.24	0.29	0.22	0.10 (32%)	0.14 (56%)	0.19 (67%)	0.14 (63%)

Notes: All the estimated coefficients are statistically significant except the 10^{th} percentile in 2014. OLS (Ordinary Least Squares estimation using gender as a dummy)/OB (Oaxaca–Blinder)/JMP (Juhn, Murphy, and Pierce) /RIF (Recentered Influence Function)/CFM (Chernozhukov, Fernandez-Val, & Melly, 2013) estimations use the same explanatory variables.

Appendix B. *Gender wage gap contributed by the residuals and year*



Inequality in Vietnam

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