



Convergence of public and private enterprise wages in a transition economy: Evidence from a distributional decomposition in Vietnam, 2002–2014



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ABSTRACT

We examine the transition of state-owned enterprises (SOEs) in Vietnam during the period 2002–2014 from a wage perspective by decomposing the differences in wage distributions between SOE employees and non-SOE employees. Although SOE employees received higher pay in 2002 because of differences in the characteristics and residuals, the differences in coefficients were minimal along the wage distribution during 2002–2014. The differences in characteristics decreased over time in the middle and middle-to-high wage distribution groups. University graduates were the main contributor to the difference in endowments. By 2014, the residuals difference vanished and the pay schemes between SOEs and non-SOEs converged.

1. Introduction

For many decades, Vietnamese state-owned enterprises (SOEs) have been given top priority in terms of resource allocation in all state plans, with the aim that they should remain the leading sector of the economy. However, both macroeconomic and microeconomic data (household and firm surveys) show that the share of employment by SOEs in the Vietnamese economy is decreasing. Our calculations, which are similar to those of Fukase (2014), who used the Vietnamese Enterprises Survey Data for 2000–2007 and General Statistics Office (GSO) (2017a) aggregate data, show that the share of the private sector, including both domestic private and foreign-affiliated firms, was higher than that of SOEs by 2005, as shown in Fig. 1. In 2014, the private sector was the dominant employer providing paid jobs in Vietnam.

Such changes in this transition economy raise several research questions and hypotheses. How have the wages of SOEs and non-SOEs evolved behind the dynamic changes in the share of SOEs and non-SOEs, and to what extent have SOE wages become more profit-maximizing? Specifically, at least three theoretical wage hypotheses should be investigated. The first hypothesis is whether non-competition wages are prevalent among SOEs. Public organizations might offer non-competitive wages if they have monopolistic power in setting prices for their public services (Reder, 1975). The (often higher) non-competition wages are not closely linked with the productivity and skills of workers. Therefore, if there is a greater share of SOEs with monopolistic power than of profit-

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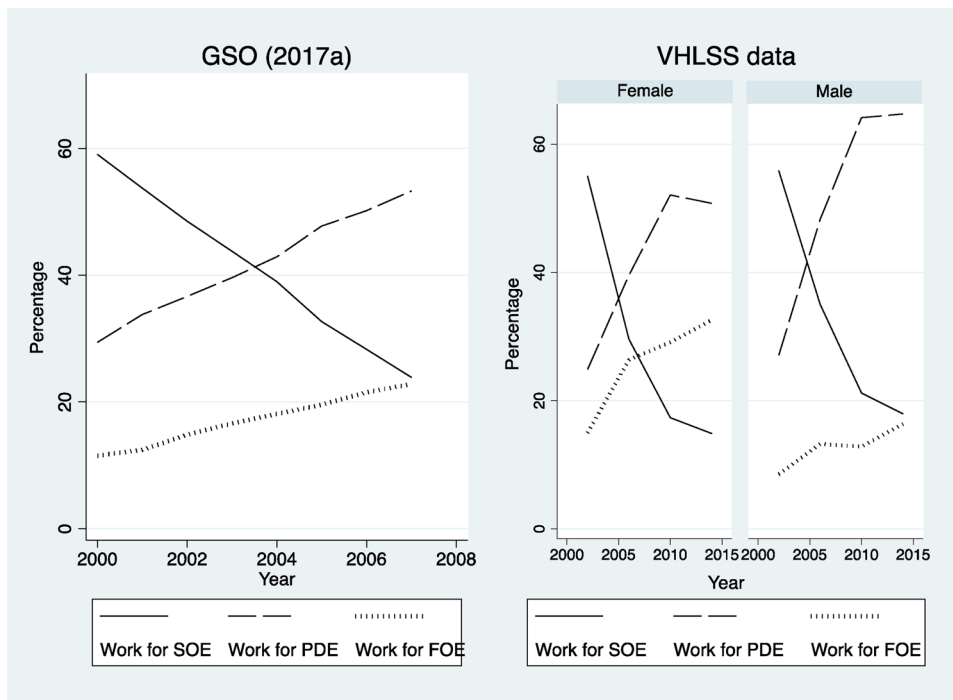


Fig. 1. Employment share by state-owned enterprises, private domestic enterprises and foreign-owned enterprises. Notes: SOE: State-owned enterprises; PDE: Private domestic (non-foreign) enterprises; FOE: foreign-owned (affiliated) enterprises. The data in the figure on the left were taken from GSO (2017a), while the figure on the right is based on the authors' calculations using Vietnamese Household Living Standard Survey (VHLSS) data.

maximizing SOEs, the wage difference between SOEs and non-SOEs cannot be explained by human capital variables. The unexplained difference falls into the residuals of the wage equation. Thus, differences in the residuals over time could provide clues to test our first hypothesis. The second hypothesis is how competitive wages between SOEs and non-SOEs, if they exist, vary over time and along the distribution of income. Both SOEs and non-SOEs compete for highly productive workers to survive. Private sector booms intensify competition. According to the efficiency wage theory¹, firms would offer higher competitive wages and wage-related benefits to attract productive employees. Those employees should maintain a good performance because higher wages encourage workers' efforts and increase the cost to employees of losing their jobs (Kruger and Summer, 1988). Thus, variations in the price of skills paid by SOEs and non-SOEs over time are the key to test the second hypothesis. The third question is how strong the effect of labor unions is. Unions might be stronger in SOEs than in non-SOEs and may prevent SOEs from dismissing workers with relatively low productivity. Thus, SOEs are more likely to have workers with low productivity/skills than non-SOEs. Differences by distribution of skills in SOEs and non-SOEs over time might riposte.

However, the aim of this study is not only to test the three hypotheses but also to examine the transition of SOEs from a wage perspective by decomposing the wage gap distribution between SOE employees and other employees who were offered formal employment. Our study makes the following major contributions to the existing literature. First, our study contributes to the general literature on the public-private wage gap by suggesting the possibility of convergence when state employees are excluded. Second, it provides a novel dimension of analysis and in-depth public-private wage decomposition in the Vietnamese context. Ours is one of only a few studies to consider differences along the wage distribution, rather than making the (strong) assumption that the difference is constant. As discussed in detail in Section 4, our analysis decomposes the difference in the wage distribution into three separate components: differences in coefficients, characteristics (endowments) and residuals (interactions). Finally, we not only test for the significance of each decomposed component over time, but also 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 4-year intervals. We focus on a formal employment threshold by selecting only individuals who had just one job, and who were not students, government officers, or self-employed and did not work for other households. We apply methods proposed by Chernozhukov et al. (2013) and a re-centered influence function regression proposed by Firpo et al. (2009). Based on appropriate counterfactuals, these methods decompose the wage distribution between SOE employees and non-SOE employees.

The rest of this paper is organized as follows. The next section discusses the relevant literature on SOEs in transition economies

¹ See Weiss (2008) for a comprehensive review and explanation of efficiency wages.

and wage differences between public and private sectors focusing on Vietnam. Section 3 presents the data and sample selection method. Section 4 provides the econometric method and model specification, which could provide new insights into wage differences. In Section 5, we report the results and in Section 6 we summarize and discuss some implications for policy and research agendas.

2. Related literature

2.1. Changes in SOEs and non-SOEs

Political will plays an important role in determining wages in the public sector, whereas the market environment plays the leading role in the private sector (Gregory and Borland, 1999). However, it is not easy to grasp how wages are determined in SOEs in transition economies.

In transition economies, SOE privatization occurs in various ways. Shi and Sun (2016) noted that privatization could occur through a voucher mechanism, such as almost free share transfers to workers in Russia or cash auctions combined with public subscription 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 East European countries, and “market Leninism,” the method applied in China and Vietnam. The difference between the two methods is that, under market Leninism, certain (often higher) shares are retained by the state to maintain control. Thus, the autonomy of SOE managers might vary, especially in China and Vietnam.

The number of Vietnamese SOEs is falling sharply and some of the remaining ones are selling their shares to outsiders. The number of SOEs fell from 12,000 to approximately 6000 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, 2242 SOEs were equitized by 2004 but the state still held 38.1 percent of the total shares. The proportion of shares owned by the state in 1997 was higher than that in Georgia, Kazakhstan, Kyrgyz, Moldova, Russia and the Ukraine (Loc et al., 2006). This gradual transition prevented the Vietnamese state from losing control of SOEs (Brezis and Schnytzer, 2003).

Private sector booms present Vietnamese workers with a greater chance of finding jobs outside SOEs. Painter (2005) noted that about 56,000 firms were newly established by the end of 2002 under the first Laws on Enterprises in Vietnam. Moreover, as seen in Fig. 1, the employment share of the private sector was the largest by 2014. By contrast, that of SOEs decreased sharply. The free trade accessions, including the US-Vietnam Bilateral Trade Agreement in 2001 and Vietnam’s membership of the World Trade Organization in 2007, created more paid (formal) jobs and even the possibility of higher pay in the private sector. Vu and Yamada (2018) 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 decreasing (increasing), the growth in formal employment was mainly among non-SOEs. Ramstetter and Ngoc (2007) reported that foreign firms paid a higher wage premium than SOEs in Vietnam during 2002–2006. This result is similar to the findings of Aitken et al. (1996) for Mexico, Venezuela and the United States², which raise questions about the wage equality between SOEs and non-SOEs in Vietnam.

Meanwhile, differences in regulations for SOEs and non-SOEs are declining in Vietnam. Before 2000, each firm type was regulated by different laws. For example, private firms (except foreign affiliated firms) were governed by the Laws on Private Firms dated December 21, 1990. SOEs were covered by the Laws on State-Owned Enterprises 39-L/CTN dated April 20, 1995. Just 3 years after the first Laws on Enterprises (13/1999/QH10 dated June 12, 1999) came into effect, new Laws on State-Owned Enterprises (14/2003/QH11) were passed on November 26, 2003. The updated Laws on Enterprises 2005 (60/2005/QH11) replaced all pre-existing laws on each firm type soon after. However, other forms of legal discrimination continued. For example, until 2011, the regulations on minimum wages for the public and private sectors were treated differently, resulting in different minimum wage levels. Interestingly, the minimum wage for the private sector was higher than that for the public sector.³

Nevertheless, Vietnamese SOEs are free to choose whom to employ and to determine the salaries of employees within some boundaries. Article 7 of the Laws on State-Owned Enterprises (39-L/CTN) dated April 20, 1995, allowed SOEs to make decisions about recruitment, salaries and bonuses for their employees. However, the laws also ranked the salaries of the board of directors the same as those of public servants. The system of payrolls for SOEs’ employees was rigid and bound by Government Decree (GD) 26-CP (dated May 23, 1993), which indicated a sophisticated wage multiplier for each occupation in each industry. The actual salary was determined by the wage multiplier and minimum wage (basic wage). There was an additional system of payrolls for SOEs’ boards of directors and important positions in the SOEs regulated by GD 110/1997/ND-CP (dated November 18, 1997). The two systems were replaced once in 2004 by GD 205/2004/ND-CP and 207/2004/ND-CP, but the tables of wage multipliers still exist. Compared with

² However, Aitken et al. (1996) did not find a spillover effect of wages in Mexico and Venezuela that raised the wages of domestic firms.

³ For example, Government Decree (GD) 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, specifically for Region 4 (a detailed regional classification is found in the corresponding decree), GD 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.

GD 110/1997/ND-CP, GD 207/2004/ND-CP determined the salaries of boards of directors and important positions based on SOEs' business performance. Several amendments were made later in an effort to bring the tables up to date and to cover every case and type of business. Thus, by law, SOEs can move freely within the regulated tables of wage multipliers and within the boundary of their business progress.

2.2. The public-private wage gap in Vietnam prior to the accession to the World Trade Organization in 2007

Most previous studies on the public-private wage gap in Vietnam have focused on the 1990s, when private sector wage earners were not prevalent. Thus, many research gaps remain.

For example, based on an 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 the government sector and SOEs as the public (state) sector, Liu (2004) suggested that there were more females in the public than in the private sector. However, when including the government sector in the definition of the public sector, the calculation includes 650,000 teachers (in 1997/98) with direct teaching duties in the general education sector. By 2014, this number had risen to 850,000 teachers (GSO, 2017b) and more than 70 percent of them were females (GSO, 2017c). In addition, SOEs are more autonomous than public administrative organizations in decision-making (especially in setting wages based on expenses). SOEs are more likely profit-oriented businesses, as GD 207/2004/ND-CP suggests. Thus, the comparability of SOEs and non-SOEs is enhanced, as both are business units. Such a comparison contributes to the literature and provides insightful policy implications.

As another example, Imbert (2013) compared the situations in 1993 and 2006 in Vietnam, and 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 equal those of private employees. However, it remains unexplained why the best workers preferred to join or remain with SOEs, given that they were often underpaid, or at best paid equally. 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 calculations in Fig. 1 show that more women continued to join the private sector. From 2007, more women were concentrated in the private sector, especially in foreign-affiliated firms.

Moreover, studies using mean differences might not sufficiently capture the difference in the new context. Vu and Yamada (2018) showed that the gender wage gap was not constant along the distributions in Vietnam during the period 2002–2014. Thus, the state-owned and private enterprise wage gap distribution might not be an exception.

3. Data

We used the VHLSS for 2002, 2006, 2010 and 2014, conducted by the GSO of Vietnam. The two-stage stratified surveys have a country representative sample with a design similar to that of the World Bank's Living Standard Measurement Study. The household sample sizes in the VHLSS were 29,532 households (2002), 9189 households (2006), 46,995 households (2010) and 9399 households (2014). The surveys provide detailed information for each individual on personal characteristics (including age, gender and education level) as well as information on paid work and wage premiums (including working hours, salary and bonuses in cash and in kind).

We aimed to analyze formal employment and limited the data to individuals who are closest to the definition of the International Labour Organization (ILO) (International Labour Organization (ILO, 2013)). We chose individuals who had just one job, and who were not students, state officers, self-employed, or working for other households. We selected age thresholds from 15 to 55 years for both genders. A selection of up to 60 years of age would capture more informal female workers, because the retirement age for women is 55 years. We note that SOEs apply the retirement age strictly.

The wage calculation is crucial. If salaries in cash were counted as the only contribution to the wage, any comparison between SOEs and non-SOEs would be biased. This is because the proportions of related income other than salaries differ. Thus, we counted any income related to the paid work to the total earned wage. Specifically, the total earned wage equals the sum of salaries, bonuses for holidays, bonuses in cash and in kind, and any other income related to the paid job within the 12 months prior to the survey. Similarly, we summed up the total working hours in the same period for each individual. The total earned wage was converted to 2010 real prices using World Bank CPI⁴ and divided by the total working hours to construct the real wage rate. Then, we transformed the real wage rate to logarithmic form. We trimmed 0.1 percent of respondents from each survey at both tails of the wage distribution prior to undertaking any analysis. The descriptive statistics are provided in Table 1.

The descriptive statistics show some interesting trends. As seen in Table 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. Although the average number of work hours among non-SOE employees increased faster than that of SOE employees⁵, the mean logarithm of the real wage rate between SOE employees and non-SOE employees decreased over time. It was 11.6

⁴ Source: <http://data.worldbank.org/indicator/FP.CPI.TOTL?end=2015&locations=VN&start=2000>

⁵ In 2002, 75 percent of SOE employees in the sample each worked 2,000 hours or more per year (40 hours per week × 50 work weeks) compared with 70 percent of non-SOE employees. However, in 2014, 83.9 percent of SOE employees in the sample each worked 2,000 hours or more per year compared with 93.3 percent of non-SOE employees.

Table 1
Descriptive statistics.

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

Notes: Nominal (real) wage unit is thousand Vietnamese dong (in 2010 prices). The log wage rate is the logarithm of real wages after division into work hours. SOE: State-owned enterprises; Non-SOE: non state-owned enterprises; SD: standard deviation.

percent higher for SOE employees in 2002, but fell by 4.8 percentage points in 2006, then by another 2.9 percentage points in 2010, and finally by another 0.5 percentage points in 2014.

4. Methods

We apply two important methods in our analysis. The first was suggested by Chernozhukov et al. (2013) (hereafter referred to as the “CFM method”). The second method is a re-centered influence function (RIF) regression, using the unconditional quantile regression of 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.

4.1. The CFM method

The core of the method is to estimate two important counterfactual distributions. The first is estimated from the distribution of characteristics for the SOE employees, the median (mean) coefficients from the SOE employees, and the residual distribution from the non-SOE employees. The second distribution is constructed from the distribution of characteristics for the SOE employees and the conditional distribution of the skills of non-SOE employees. Following the procedure suggested by Juhn et al. (1993), the total difference is decomposed into three components: coefficients, characteristics and residuals.

$$\text{Total sectoral wage gap} = \text{difference in coefficients} + \text{difference in characteristics} + \text{difference in residuals.} \tag{1}$$

Specifically, similarly to the procedure of Melly (2005), the CFM method estimates the counterfactual distribution of the wages $\hat{q}(\hat{\beta}^{non-SOE}, x^{SOE})$ that would be received by non-SOE employees if their skill distribution were similar to that of SOE employees. $\hat{\beta}^{non-SOE}$ are the estimated coefficients of non-SOE employees using the quantile regression of Koenker and Bassett (1978). x^{SOE} is the characteristics vector of SOE employees. The difference in characteristics is the gap between $\hat{q}(\hat{\beta}^{non-SOE}, x^{SOE})$ and $\hat{q}(\hat{\beta}^{non-SOE}, x^{non-SOE})$. The counterfactual wage distribution, if the median returns to skills for non-SOE employees, is exactly the same as that for SOE employees, and if the distribution of residuals is the same as that of non-SOE employees, it is $\hat{q}(\hat{\beta}^{medSOE, resid^{non-SOE}}, x^{SOE})$. The difference in coefficients is the difference between $\hat{q}(\hat{\beta}^{medSOE, resid^{non-SOE}}, x^{SOE})$ and $\hat{q}(\hat{\beta}^{non-SOE}, x^{SOE})$. Thus, the detailed breakdown of (1)⁶ is:

$$\begin{aligned} \hat{q}(\hat{\beta}^{SOE}, x^{SOE}) - \hat{q}(\hat{\beta}^{non-SOE}, x^{non-SOE}) &= (\hat{q}(\hat{\beta}^{SOE}, x^{SOE}) - \hat{q}(\hat{\beta}^{medSOE, resid^{non-SOE}}, x^{SOE})) \\ &\quad + (\hat{q}(\hat{\beta}^{medSOE, resid^{non-SOE}}, x^{SOE}) - \hat{q}(\hat{\beta}^{non-SOE}, x^{SOE})) \\ &\quad + (\hat{q}(\hat{\beta}^{non-SOE}, x^{SOE}) - \hat{q}(\hat{\beta}^{non-SOE}, x^{non-SOE})) \end{aligned} \tag{2}$$

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 is an unconditional quantile regression. The re-centered influence function, $RIF(lwage; q)$, is the sum of the influence function, $IF(lwage; q)$, and the distributional statistic of interest, q . Meanwhile, $lwage$ is the logarithm of the real wage rate. Then, the estimation results are used to decompose the contribution of each of the covariates using a procedure⁷ suggested by Oaxaca (1973) and Blinder (1973). Specifically, the difference in the logarithm of the real wage rate between the two groups at each quantile τ can be decomposed as follows:

$$\hat{\Delta}\tau = (R\hat{I}F(lwage_{SOE}, q_{SOE,\tau})) - (R\hat{I}F(lwage_{non-SOE}, q_{non-SOE,\tau})), \tag{3}$$

$$\hat{\Delta}\tau = X_{non-SOE}(\hat{\delta}_{SOE,\tau} - \hat{\delta}_{non-SOE,\tau}) + (X_{SOE} - X_{non-SOE})\hat{\delta}_{non-SOE,\tau} + (X_{SOE} - X_{non-SOE})(\hat{\delta}_{SOE,\tau} - \hat{\delta}_{non-SOE,\tau}). \tag{4}$$

This can be simplified as follows:

$$\text{Total gap} = \text{difference in coefficients} + \text{difference in endowments} + \text{difference in interactions.} \tag{5}$$

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

⁶ We use a user-written Stata command, “cdeco.jmp” by Chernozhukov et al., to aid our estimations. The command can be found at <https://sites.google.com/site/blaisemelly/home/computer-programs/inference-on-counterfactual-distributions>.

⁷ As suggested by Firpo et al., we use another user-written Stata command, ‘oaxaca8’ by Jann (2008), to decompose the results from the RIF regression. The detailed guideline from Firpo et al. for RIF regression and decompositions can be found at <http://economics.ubc.ca/faculty-and-staff/nicole-fortin/>.

decomposed components. By contrast, RIF regression provides a possible linear decomposition of each of the covariates. Thus, by using both methods, we are able to utilize the advantages of each method.

4.3. Specifications

We set the covariates as experience, based on age, and a set of educational dummies. Following the suggestion of [Vu and Yamada \(2018\)](#), we do not use projected experience (age minus years of schooling and minus 7 years). We also use the squared age. The set of dummies for highest education obtained are, for school years completed, 5 years (primary school graduates), 9 years (secondary school graduates), and 12 years (high school graduates), and, for post-school qualifications, 3-year college graduates, 4-year or more university graduates, and those with vocational degrees. This specification is the same in all datasets used. In the counterfactual distribution estimations, we set a 100-repetition bootstrap.

5. Results and discussion

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 difference in coefficients was minor during the period 2002–2014. The difference in residuals diminished by 2014. Four important pieces of evidence support these findings.

First, the estimations in 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 2](#). The tests for all quantile effects equal to zero were rejected in all years (see column T1 of [Table 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 state workers who held a university degree and a managerial position were more likely to stay in the state sector. We note that for our results, 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 ([Fig. 2](#) also illustrates this trend).

Second, we found that the difference in coefficients was statistically insignificant in all selected waves. As shown in column T1 of [Table 2](#), none of the test results for quantile effects different from zero were rejected.

Third, the difference in residuals disappeared in 2014, because the test for all corresponding quantile effects equaling zero was not rejected (see column T1 of [Table 2](#)) ([Figs. 3 and 4](#)).

Fourth, characteristics (endowments) were the main contributor to the total difference. This is clear from both estimation methods. Tests for the zero quantile effect for the difference in characteristics were all rejected, as seen in column T1 of [Table 2](#). However, the difference in characteristics, which was higher at the right tail of the wage difference distribution (see [Fig. 5](#)), returns to being flat and finally becomes constant along the distribution in 2014 (as the tests in column T2 of [Table 2](#) show).

We propose several suggestive explanations for the persistent difference. The regime to decide wages in SOEs is different from that in non-SOEs. SOEs decide the wage level heavily based on wage multipliers. Such rigid wage calculation by occupation, perhaps relying on years of experience in SOEs and education, would be an incentive for SOE workers to upgrade their formal education and make the total gap persistent. Moreover, SOE workers might maximize their own welfare rather than the profit of the firm (which may be captured in the difference of residuals), especially in monopoly industries such as utilities. Thus, a non-competitive wage might apply for 2002–2010. However, we acknowledge this can hardly explain the results in 2014, because the differences in both coefficients and residuals are insignificant. Moreover, we argue against the hypothesis on the union effect, because the difference in characteristics for SOE workers is positive along the distribution. Higher SOE wages due to the difference in (higher) characteristics implies that they are more likely to be earned by SOE employees with higher skills. However, we acknowledge that productivity is not reflected in the estimations of differences in characteristics.

As the differences in characteristics/endowments were 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.

5.2. University graduates and difference in endowments

We find that university graduates were the most important contributor to the difference in endowments between SOE and non-SOE employees. Specifically, in 2002, university graduates corresponded with increments of 57, 38, 40 and 52 percent (0.04, 0.05, 0.09 and 0.13 log points) of the differences in endowments at the 25th, 50th, 75th and 90th percentiles, as shown in columns 4, 7, 10 and 13 of [Table 3](#), respectively. This result suggests that university graduates were more available in SOEs at these percentiles of the distribution of difference in endowments in 2002. In 2006, they contributed 36, 25, 31 and 38 percent (0.04, 0.04, 0.08 and 0.18 log points) of the endowments difference at the corresponding percentiles. In 2010, they were 33, 38 and 48 percent (0.04, 0.07 and 0.11 log points) at the 50th, 75th and 90th percentiles, respectively. In 2014, they returned to 33 percent (0.03 log points) at the 25th, 25th, 50th and 75th percentiles and to 43 percent (0.09 log points) at the 90th percentile.

However, during 2006–2014, at the 10th percentile, university graduates were important contributors to reducing the difference in endowments, as the quantile effects became negative (column 1 of [Table 3](#)). Within the scope of difference in endowments, the negative coefficient of university merely means that SOE employees received lower incomes because they were less likely to have university degrees at this 10th percentile of the distribution. It is probable that non-SOEs were attractive and more accessible to fresh

Table 2
Decomposition of the public-private enterprise wage difference distribution.

Year	Methods	Percentiles									Tests		
		10 th	25 th	50 th	75 th	90 th	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
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: ***, ** and * denote $P < 0.01$, $P < 0.05$ and $P < 0.1$, respectively. RIF is the re-centered 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.”

university graduates.

This result does not contradict the findings that university graduates 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, respectively), the 90th percentile (column 14) in 2006, and at the 25th, 75th and 90th percentiles (columns 5, 11 and 14, respectively) in 2010. Precedent regulations to lay off public employees based on education could be one of the explanations. Friedman (2004) indicated that, based on a survey conducted in 2000, Vietnamese SOE workers had a higher demand for formal training than non-SOE workers. We postulate that SOE workers may have sought to upgrade their educational qualifications so as to retain their positions when they were expecting SOEs to contract. Over-concentration of university graduates may thus have occurred. Although employees were upgrading their educational qualifications, labor productivity might not have increased.⁸ The rigidity in the wage multiplier for managers and important posts in SOEs is another possible explanation for the lower returns to university education in the top income quantile. The highest wage multiplier for the highest post in SOEs was 6.72 times that of the minimum wage (for SOE directors) by GD 110/1997/ND-CP, 8.8 times (for SOE chairs) in 2007 by GD 141/2007/ND-CP, and 9.1 times (for SOE chairs) in 2013 by GD 51/2013/ND-CP. Workers in these posts are most likely university graduates. The difference in returns to university turns negative in the top income quantile, perhaps because earnings caps in SOEs might lower their earnings relative to those of their counterparts in non-SOEs.

⁸ Friedman (2004) suggested that Vietnamese SOE workers had lower labor productivity than non-SOE workers.

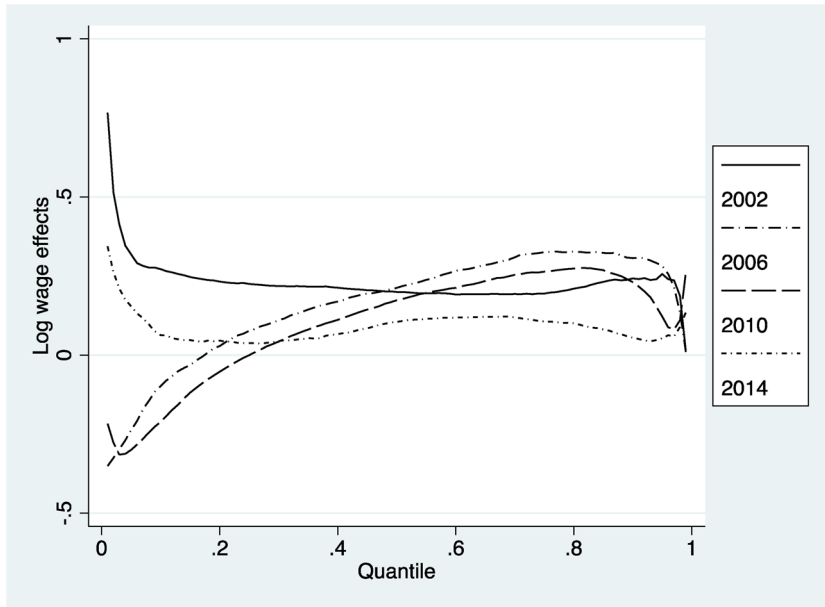


Fig. 2. Total differences.

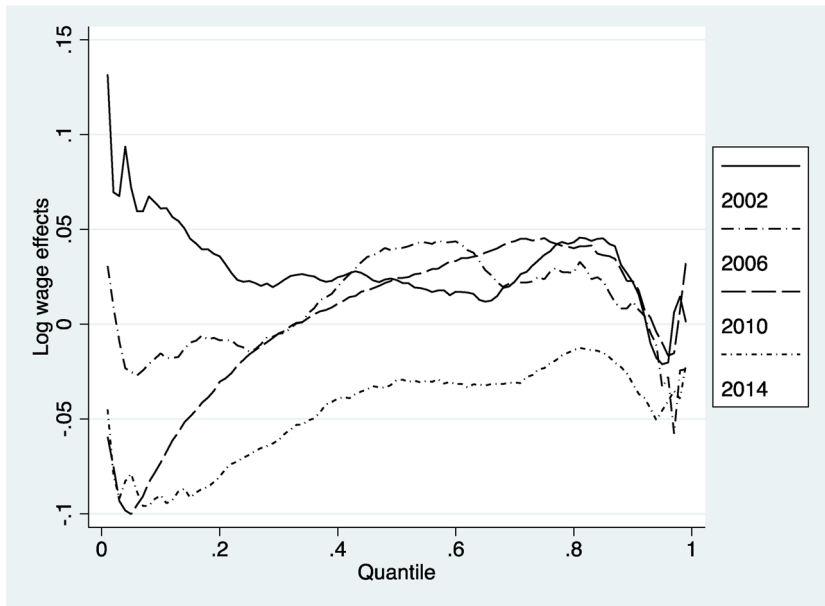


Fig. 3. Decomposed differences in coefficients.

5.3. The convergence of pay schemes between SOEs and non-SOEs in 2014

We find 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 difference in residuals became statistically insignificant in 2014, as shown in column T1 of Table 2. Third, the difference in characteristics declined over time for the middle-to-high wage distribution groups, as seen in Table 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 in Table 3), we find little evidence that women were paid differently by the price of skills in SOEs (versus non-SOEs) in other years and percentiles. Our results differ from those of Liu (2004), not only because of the difference in the time period but also because of the data selection.

We propose some suggestive explanations for the convergence in coefficients and residuals. The non-competition wage theory cannot apply in this context, because the difference by coefficients/residuals is minor in 2014. Meanwhile, the efficiency wage theory serves as the main base for our proposed explanations. Movement of labor from SOEs to non-SOEs is possible. The demand for labor is

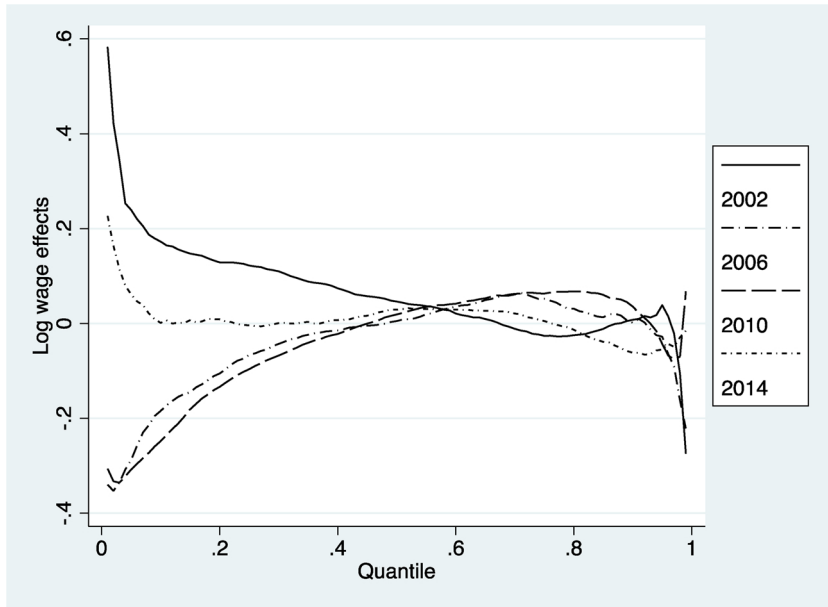


Fig. 4. Decomposed differences in residuals.

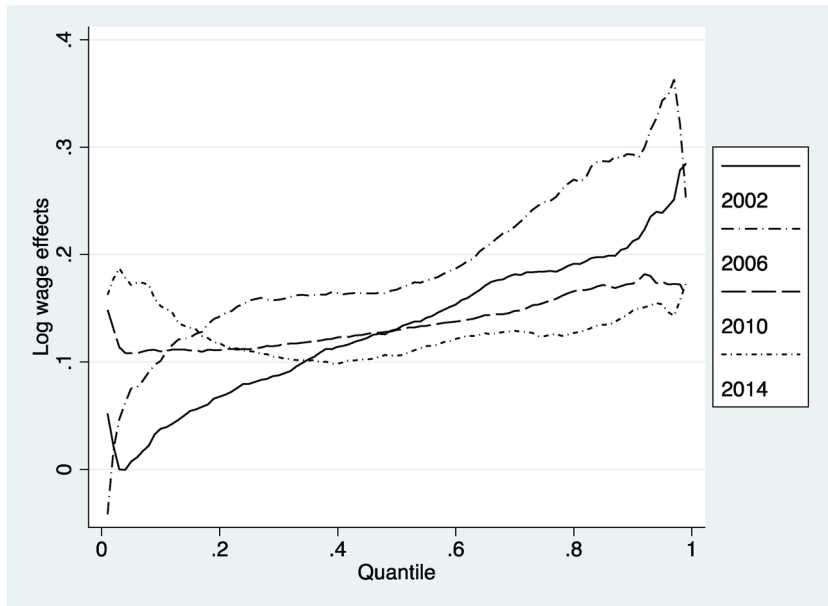


Fig. 5. Decomposed differences in characteristics.

no longer monopolized by SOEs. Therefore, non-SOEs would offer sufficient wages to attract competent workers, especially during the high inflow of foreign direct investment (FDI) to Vietnam after WTO access.⁹ This could be similar to the findings of Aitken et al. (1996) in Mexico, Venezuela and the United States. In turn, SOEs might have considered doing the same by adjusting the wage multiplier for job posts, as allowed by legal regulations. GD 207/2004/ND-CP (which attached SOE top managers' salaries to SOEs' business performance, effective from January 2005) and its sister replacement regulations (GD 86/2007/ND-CP dated May 2007, 141/2007/ND-CP dated September 2007, and 50/2013/ND-CP and 51/2013/ND-CP dated May 2013) might have induced SOEs to become profit-oriented and to provide competitive, efficient wages. The sister regulations even directed SOEs to increase wages at a

⁹The registered FDI flow almost doubled in 2007 compared with the previous year and tripled in 2008 (http://www.gso.gov.vn/default_en.aspx?tabid=471&idmid=3&ItemID=13121). Hale and Long (2011) found that foreign firms in China paid higher wages for highly skilled workers but about the same wages for unskilled workers.

Table 3
Oaxaca-Blinder linear decomposition after re-centered influence function regressions.

Variables	10 th	25 th	50 th	75 th	90 th	I	C	E	I	C	E	I	C	E	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
5 th 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
9 th 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
12 th 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	-0.01	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	*	0.09	** -0.09
2006															
Sex	0.00	-0.01	0.00	0.01	*	0.02	0.01	** -0.01	0.00	0.01	*	0.00	0.01	-0.10	*
Age	-1.11	*** -3.81	** 0.73	0.38	*** 2.70	*** 0.64	0.48	*** 1.49	*	0.38	*** 0.14	0.03	0.41	** -1.23	0.01
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
5 th 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
9 th 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
12 th 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
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	*** -0.03	-0.02	-0.04	-0.04	-0.01
5 th grade	0.02	-0.01	0.00	0.02	* -0.02	-0.01	-0.01	*** 0.00	0.00	-0.01	*** -0.05	*	-0.01	** -0.03	0.01
9 th 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
12 th 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
5 th 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
9 th 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
12 th 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

(continued on next page)

Table 3 (continued)

Variables	10 th	25 th	50 th	75 th	90 th	I	C	I	C	I	C	I	C	I	C
	E (1)	E (4)	E (7)	E (10)	E (13)	I (3)	C (5)	I (6)	E (7)	I (9)	E (10)	I (12)	C (14)	E (13)	I (15)
Vocational	-0.01	0.01	0.02	0.01	0.02	0.00	0.02	0.01	0.02	0.01	0.02	-0.01	-0.02	0.01	-0.01
Constant	-0.06	-0.07	-0.07	-0.68	-0.68	-0.06	-0.07	-0.68	-0.68	-0.68	-0.68	-0.68	-0.68	-0.68	-0.68
Total	-0.18 ***	0.09 ***	0.09 **	0.09 ***	0.18 ***	0.07	-0.13 **	0.06 **	0.09 **	0.09 ***	0.18 ***	-0.04	0.02	0.21 ***	-0.11 **

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

slower pace than productivity increased. These regulations are probably additional forces gradually pushing SOE and non-SOE wages closer to each other. As a result, the equilibrium could be reached in 2014 for the distribution difference in both coefficients and residuals.

Finally, we expect that the remaining wage difference between SOEs and non-SOEs will become increasingly smaller in the years to come. This is because more options are available in the labor market for young and highly educated workers with equivalent pay. Highly educated workers have little incentive to join SOEs and benefit more from leaving them. For SOE employees in 2014, the skill price was negative for most skill levels at the 75th and 90th percentiles (see columns 11 and 14 of Table 3, respectively). At the 50th percentile, the difference in coefficients was negative despite higher wages in SOEs for some of the education level groups. As a possible consequence, better educated, highly productive and highly skilled workers, including managers, would have left the SOEs.¹⁰ This would have lowered the current difference in endowments. However, we also acknowledge that those who are relatively old and self-selected to work for SOEs in the past will remain at the SOEs. This is because they may encounter difficulties in matching their employable skills with the needs of non-SOEs at an equivalent or higher wage rate. They may also dislike being monitored more seriously regarding performance and fluctuations in the demand for the firm's production.

6. Conclusions

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

We acknowledge several drawbacks in our analysis. First, although the omitted variables might be captured partially in the residuals (then decomposed and analyzed in CFM methods), all models still have potential issues with regard to biased coefficients in the wage equation owing to omitted variables. Similarly, linear decomposed components after RIF regression have the potential for biased coefficients. Fortin et al. (2011) clearly mentioned that it is difficult to devise credible instrumentation strategies. Thus, this issue remains an important future research agenda. Second, sample selection with more full-time employment may shrink the total wage gap between SOE and non-SOE employees, especially at the lower bound of the wage distribution. In our 2000–2014 selected samples, the proportion of non-SOE employees who each worked more than 2,000 h per year increased faster than that of similar SOE employees (see Footnote 5). However, the nature of the VHLSS questionnaires on work and wages limits us from deploying in-depth analysis. The VHLSS asked individuals about their work 12 months prior to the time of the survey but did not ask about the starting date of the job or the nature of labor contracts (e.g., full-time/part-time and seasonal/fixed time/open end contract). Therefore, we cannot distinguish between those who had been in a full-time job for only a few months and those who had seasonal jobs. Similarly, we cannot distinguish between open-end full-time contract workers and temporary/seasonal full-time contract workers.

Nevertheless, the convergence of pay schemes between SOEs and non-SOEs has implications for policy and research agendas. First, the Vietnamese government should keep treating SOEs as equivalent to non-SOEs from a legal perspective. Doing so enhances the competitive environment, wage equality among firms with different ownership structures, and efficient resource allocation. Second, unless the state wishes to support inefficiency through public budgets/assets, it should give SOE managers more autonomy to restructure their current pay schemes. Third, as SOEs pay the same wages per characteristic as non-SOEs, a convergence in the characteristics difference is foreseeable. If high productivity employees in SOEs receive lower pay, they might leave the SOEs. However, the state should avoid building more non-economic fences and regulations to prevent this possible outcome. Instead, the state should allow SOE managers to restructure pay schemes to attract high productivity employees. If SOEs could successfully change, the demand for expensive formal training that is not necessarily linked to higher productivity would disappear. By contrast, the demand for informal and on-the-job training to improve productivity would rise. Finally, future studies on the public-private enterprise wage gap in Vietnam should search for evidence of the disappearance of the differences in characteristics. 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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Declaration of Competing Interest

None.

¹⁰ The employees may stay if they have supervisory posts, as suggested by Turunen (2004). However, SOEs cannot create enough such posts for all these workers.

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References

- Aitken, B., Harrison, A., Lipsey, R.E., 1996. Wages and foreign ownership. A comparative study of Mexico, Venezuela, and the United States. *J. Int. Econ.* 40, 345–371.
- Bliner, A.S., 1973. Wage discrimination: reduced form and structural estimates. *J. Hum. Res.* 8 (4), 436–455.
- Brezis, E.S., Schnytzer, A., 2003. Why are the transition paths in China and Eastern Europe different? A political economy perspective. *Econ. Transit.* 11 (1), 3–23.
- Chernozhukov, V., Fernandez-Val, I., Melly, B., 2013. Inference on counterfactual distributions. *Economy* 81 (6), 2205–2268.
- Firpo, S., Fortin, N.M., Lemieux, T., 2009. Unconditional quantile regressions. *Economy* 77 (3), 953–973.
- Fortin, N., Lemieux, T., Firpo, S., 2011. Decomposition methods in economics. In: Ashenfelter, O., Card, D. (Eds.), *Handbook of Labor Economics*, volume 4. North Holland, Amsterdam, pp. 1–102 Chapter 1 part A.
- Friedman, J., 2004. Firm ownership and internal labour practices in a transition economy. *Econ. Transit.* 12 (2), 333–366.
- Fukase, E., 2014. Foreign wage premium, gender and education: insights from Vietnam household surveys. *World Econ.* 37 (6), 834–855.
- General Statistics Office of Vietnam, 2017a. Number of Employees in Enterprises as of December 31 by Type of Enterprise. (accessed 10 February 2017). http://www.gso.gov.vn/Modules/Doc_Download.aspx?DocID=9771.
- General Statistics Office of Vietnam, 2017b. Number of Teachers and Pupils of General Education as of 30 September. (accessed 10 March 2017). http://www.gso.gov.vn/default_en.aspx?tabid=782.
- General Statistics Office of Vietnam, 2017c. Number of Woman Teachers and Schoolgirls of General Schools as of 30 September. (accessed 10 March 2017). http://www.gso.gov.vn/default_en.aspx?tabid=782.
- Gregory, R.G., Borland, J., 1999. Recent developments in public sector labor markets. In: Ashenfelter, O.C., Card, D. (Eds.), *Handbook of Labor Economics* Vol. 3c. North Holland, The Netherlands, pp. 3573–3630.
- Hale, G., Long, C., 2011. Did foreign direct investment put an upward pressure on wages in China? *IMF Econ. Rev.* 59 (3), 404–430.
- Imbert, C., 2013. Decomposing the labor market earnings inequality: the public and private sectors in Vietnam, 1993–2006. *World Bank Econ. Rev.* 27 (1), 55–79.
- International Labour Organization (ILO), 2013. Resolution I—Resolution Concerning Statistics of Work, Employment and Labour Underutilization. (accessed 24 December 2016). http://www.ilo.org/wcmsp5/groups/public/—dgreports/—stat/documents/normativeinstrument/wcms_230304.pdf.
- Jann, B., 2008. OAXACA8: Stata Module to Compute Decompositions of Outcome Differentials. (accessed 24 December 2016). <https://ideas.repec.org/c/boc/bocode/s450604.html>.
- Juhn, C., Murphy, K.M., Pierce, B., 1993. Wage inequality and the rise in returns to skill. *J. Political Econ.* 101 (3), 410–442.
- Koenker, R., Bassett, G., 1978. Regression quantiles. *Economy* 46, 33–50.
- Kruger, A.B., Summer, L.H., 1988. Efficiency wages and the inter-industry wage structure. *Economy* 56 (2), 259–293.
- Liu, A.Y.C., 2004. Sectoral gender wage gap in Vietnam. *Oxf. Dev. Stud.* 32 (2), 225–239.
- Loc, T.D., Lanjouw, G., Lensink, R., 2006. The impact of privatization on firm performance in a transition economy. The case of Vietnam. *Econ. Transit.* 14 (2), 349–389.
- Melly, B., 2005. Decomposition of differences in distribution using quantile regression. *Labour Econ.* 12 (4), 577–590.
- Oaxaca, R., 1973. Male–female wage differentials in urban labor markets. *Int. Econ. Rev.* 14 (3), 693–709.
- Painter, M., 2005. The politics of state sector reforms in Vietnam: contested agendas and uncertain trajectories. *J. Dev. Stud.* 41 (2), 261–283.
- Ramstetter, E.D., Ngoc, P.M., 2007. Employee Compensation, Ownership, and Producer Concentration in Vietnam's Manufacturing Industries. AGI-Working Paper Series 2007–07. (accessed 10 March 2017). <http://www.agi.or.jp/workingpapers/WP2007-07.pdf>.
- Reder, M., 1975. The theory of employment and wages in the public sector. In: Hamermesh, D. (Ed.), *Labour in the Public and Nonprofit Sectors*. Princeton University Press, Princeton, NJ, pp. 1–48.
- Shi, W., Sun, J., 2016. The impact of privatization on efficiency and profitability. *Econ. Transit.* 24 (3), 393–420.
- Turunen, J., 2004. Leaving state sector employment in Russia. *Econ. Transit.* 12 (1), 129–152.
- Vu, T.M., Yamada, H., 2018. Decomposing Vietnamese gender equality in terms of wage distribution. *Pac. Econ. Rev.* 23 (5), 705–731.
- Weiss, A., 2008. Efficiency wages. *The New Palgrave Dictionary of Economics*. Palgrave Macmillan, London.