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Abstract: This paper examines the impact of trade and investment liberalization on the wage skill premium between skilled and unskilled workers in Vietnamese manufacturing. The result from an econometric analysis using a firm-level dataset reveals the important role of trade liberalization as an impetus for narrowing the skill premium. There is also evidence that foreign investment has a significant effect on widening the wage skill premium. More importantly, export-oriented foreign investment is likely to play an important role in the determination of the wage skill premium in the Vietnamese manufacturing.

Key words: Wage skill premium, tariffs, firm ownership, trade and investment liberalization.

JEL classification: F14, F16

1. Introduction

The impact of an outward-oriented development strategy on wages remains a significant focus in the ongoing debate about workers' welfare in developing countries. Opening the market to international trade and investment will affect the wage skill premium between skilled and unskilled workers (herein forth referred as to the wage premium). However, there is no unanimity in the theoretical literature on the impact of industrialization on the wage premium in the manufacturing sector in developing countries. The Lewis-Fei-Ranis model¹ does not make a distinction between skilled and unskilled labour, but it implies that the wage premium could continue to increase as long as surplus labour conditions prevail in the economy. The standard Heckscher-Ohlin-Stolper-Samuelson (HOSS) theory predicts that in a labour-abundant economy there will be a rise in manufacturing wages of unskilled workers associated with an expansion in manufacturing exports. By contrast, the Feenstra-Hanson extension (Feenstra & Hanson 1996) to the HOSS theory postulates that the engagement of developing countries in global production sharing could result in increasing the wage premium in manufacturing wages in these countries. This effect also rests on skill-biased technological change, which accounts for the increased demand for skilled workers following a rise in imports of capital goods and technology into the developing economies (Acemoglu 2003; Robbins 1996; Wood 1995).

Outward-oriented liberalization reforms in Vietnam since the early 2000s have generated special interest in how the role of international trade and investment has affected wage inequality in that country. In particular, these liberalization reforms of trade, investment and enterprise policy regimes have intensified since 2006, and should have significant effects on the wages of unskilled workers, where Vietnam's comparative advantage lies. Given the nature of these outward-oriented reforms, Vietnam provides an ideal case study of the wage skill premium in the manufacturing sector.

Despite its importance in the debate on gains from global economic integration, the issue of a wage premium has received little attention in the studies on Vietnam. Although considerable research has been devoted to analyzing wage inequality in Vietnam over the first decade of the reform in the 1990s, mainly using the Household Surveys (Brassard 2004; Gallup 2004; Liu 2001, 2004; McCarty 1999), rather less attention has been paid to the wage effect of international trade and investment. However, a little research that has been undertaken to explore the impact of liberalization reforms in explaining wage inequality the early years of 2000s is incomplete (Fukase 2013). This has led to a gap in identifying how the wage premium has been determined within a context of trade and investment liberalization in Vietnamese manufacturing over the decade up to 2009.

In this paper, we examine the determinants of the wage skill premium in relation to trade and investment liberalization in the Vietnamese manufacturing sector using a firm-level dataset derived from the Vietnam's Enterprise Surveys. The findings show that trade liberalization, in particular reductions in tariffs on inputs, through its contribution to export expansions and employment growth has served to reduce the wage premium in Vietnam. The presence of foreign invested enterprises has contributed to an increase in the wage premium. These findings make a significant contribution to the ongoing debate in the literature on whether and how trade liberalization affects wages and inequality in developing countries.

The structure of the paper is as follows. Section 2 surveys the empirical evidence of the wage premium following outward-oriented liberalization in developing countries. Section 3 establishes a model relating a wage premium to tariff variations and firm ownership in order to determine the wage premium using a cross-section of firm-level data. Section 4 discusses data compilation and econometric method. Section 5 presents and discusses the estimation results. As a comparison, the following section investigates determinants of average wage rates. The final section provides concluding remarks on the significant effect that export-oriented foreign investment has on the wage premium.

2. Trade and investment liberalization and wage skill premium: empirical issues

As with the theoretical literature, the findings of empirical studies remain inconclusive. There is significant evidence to support the narrowing wage premium between skilled and unskilled workers in labour-abundant economies in East Asia following export-oriented industrialization. Throughout the 1960s-1970s export expansion narrows the wage premium in East Asian economies (Galenson 1992; Kim & Topel 1995; Kuo 1989; Wood 1997). In Taiwanese manufacturing, the wage inequality between white-collar employees and blue-collar ones reduced over the process of industrialization (Kuo 1989). Similarly, a reduction in the wage premium was significant in South Korea during that period (Galenson 1992; Wood 1997). These findings are quite consistent with the prediction of HOSS trade models. On the contrary, the wage premium was not significantly narrowed in the Philippine manufacturing sector over the period 1980s because wages of unskilled workers in labour-intensive industries were not affected in the country with its unskilled-labour abundance (Hasan & Chen 2004). In addition, several middle-income developing countries in the Latin American region have experienced a rise in the wage premium following trade liberalization (Attanasio 2004; Davis & Mishra 2007; Esquivel & Rodriguez-Lopez 2003; Feliciano 2001; Revenga 1997).

Foreign investment coupled with technological advances is also important for affecting the relative demand for skilled workers, and has with mixed effects on the wage premium. There is evidence of a widening of the wage premium resulting from foreign investment and technical change in Mexico's *maquiladoras* (Feenstra & Hanson 1997; 1999) while the opposite has been observed in Indonesia (Suryahadi, Chen & Tyers 2001). In this country, the relative demand for unskilled labour rose while the wages of unskilled relative to skilled workers decreased in the manufacturing over the period 1970s-1980s following the trade reform. The Indonesia's finding appears consistent with the prediction of the trade models; whereas, contrary to Feenstra and Hanson (1996), foreign participation raised the relative demand for unskilled workers.

Despite its prominence in empirical works, the impact of trade and investment liberalization on the wage premium still remains a sparsely research subject of a Vietnam case study. Gallup (2004) examines the wage inequality in Vietnam over the 1990s using two rounds of the Vietnam Living Standards Survey (VLSS) between 1992/93 and 1997/98. Employing the same rounds of household-level dataset, Liu (2004) investigates the changing wage structure following the economic reform, focusing on gender wage gap and the overall wage inequality between skilled and unskilled workers. Both these studies suggest a moderate decline in wage inequality between these two time points, however, they do not take the specific characteristics of trade and investment liberalization into account such as firm ownership or tariff reduction.

The study by Fukase (2013) explores the two rounds of Vietnam Household Living Standards Survey (VHLSS) in 2002 and 2004 in order to examine the wage premium in the aftermath of the 2001 Bilateral Trade Agreement (BTA) with United States. In this study, potential endogeneity of export intensity is addressed by using the province-tariff reduction as an instrument. The findings show that increasing exports lead to growth in wages of unskilled workers in those provinces that experience more exposure to trade liberalization. This rise in wages is consistent with the East Asian economies in the process of export-oriented industrialization. A major limitation of this study is that it examines the impact of only a single trade agreement on industrial wages, without appropriately controlling for the impact of comprehensive trade and investment liberalization in the overall economy during the same period. Another limitation is that the study does not explore determinants of inter-industry variations in wages, which is important for assessing the wage outcome of the industrialization process.

3. Empirical model

There has been an increased interest in addressing the impact of international trade and investment on the wage premium in firm heterogeneity models (Goldberg & Pavcnik 2007). The Melitz model of firm heterogeneity and international trade (Melitz 2003) proposes that the labour market outcomes of trade mainly rely on the degree to which the firm is involved with globalization.² Recently, a study by Amiti and Davis (2011) explores a Melitz-type model with an incorporation of a fair wage approach (Egger & Kreckemeier 2009) and establishes a link between firm heterogeneity and the wage premium. Their key proposition is that large productive firms that tend to be involved with exporting and importing are likely to pay higher wages than other firms. In order to test this proposition, their empirical work suggests that there is a positive impact of trade liberalization on the wage premium in Indonesian manufacturing (Amami & Cameron 2012).

Based on the previous studies, we specify the following model to examine how tariff variations and firm ownership are related to the wage premium:

$$(W_s/W_u)_{ij} = \beta_0 + \beta_1 IT_{ij} + \beta_2 OT_{ij} + \beta_3 DP_{ij} + \beta_4 JVS_{ij} + \beta_5 JVP_{ij} + \beta_6 WFIE_{ij} + \beta_7 EO_{ij} + \alpha Z_{ij} + \gamma INS_{ij} + \delta REG_{ij} + \varepsilon_{ij} \quad (1)$$

where i and j denote firm and industry, respectively.

W_s	Average real wage of skilled workers (non-production workers).
W_u	Average real wage of unskilled workers (production workers).
$(W_s/W_u)_{ij}$	Wage premium in natural logarithms.
OT_{ij}	Output tariff in decimal terms.
IT_{ij}	Input tariff in decimal terms.
DP_{ij}	A dummy for domestic private firms.
JVS_{ij}	A dummy for joint ventures with SOEs.
JVP_{ij}	A dummy for joint ventures with domestic private firms.
$WFIE_{ij}$	A dummy for wholly owned FIEs.
EO_{ij}	Export orientation at the four-digit VSIC industry.
Z_{ij}	A firm's characteristics, such as real output (RQ), capital intensity (KL), gender ratio (GR) and skill share (SS). RQ and KL are all measured in natural logarithms, whereas GR and SS are in decimal terms.
INS_{ij}	A vector of industry dummy variables at a two-digit level of Vietnamese Standard Industrial Classification-VSIC (21 dummies).
REG_{ij}	A vector of three region dummies.
ε_{ij}	A stochastic error term.

The dependent variable (W_s/W_u) is the wage premium which in turn is the ratio of an average wage of skilled workers to that of unskilled workers. As is standard in many previous studies (Hanson & Harrison 1999; Pavcnik et al. 2004), non-production workers are a proxy for skilled labour and similarly, production workers for unskilled labour. Then, the ratio of the average wage of non-production workers (white-collar) and production workers (blue-collar) is used as a measure of the wage premium. Although the white-collar/blue-collar classification does not capture perfectly skill levels measured by education attainment, the usage of either measure as a dependent variable on the wage premium model brings about comparable results in many empirical studies (Krueger 1997; Slaughter 2000).

In this analysis, the prime explanatory variables are tariffs, ownership dummies, and export orientation. First, tariff variables are used to examine the effect of trade liberalization on the wage premium. Both input (*IT*) and output tariffs (*OT*) are incorporated separately because a firm's wage outcome for a specific tariff reduction depends on whether the firm has been involved in exporting or importing (Bernard et al. 2007). The reduction in output tariffs in a developing country will increase wages in export firms that have a higher proportion of unskilled workers. Meanwhile, it will reduce wages in import substitution firms, resulting in a decline in the wage premium. Put simply, these effects of output tariff reductions are in line with the standard HOSS trade theory. In a similar manner, a lower input tariff will affect wages in firms that depend on intermediate inputs because of their lower prices relative to those of domestically produced inputs. Given the higher skill-intensive production of intermediate inputs relative to those of final product production in the developing world, reducing input tariffs is likely to increase an import of intermediate inputs. As a result, firms will reallocate resources to higher unskilled-intensive production that helps to narrow the wage premium. They also will lay off skilled workers, reducing the wage premium. Moreover, the inclusion of the input tariff is very much relevant to the labour-abundant developing economy in which an export expansion of labour-intensive manufacturing is strongly reliant on imported intermediate inputs (Riedel 1975).

Second, an export-oriented strategy will stimulate firms to reallocate resources toward unskilled-labour-intensive industries, this is particularly true for a small exporting economy. Higher export orientation would be associated with increasing demand for unskilled labour, resulting in narrowing the wage gap. So the export orientation (*EO*) variable is expected to have a negative sign.

Three dummy variables (*JVS*, *JVP*, and *WFIE*) are included to capture the effect of foreign ownership on wage premium. As guided by our findings in the other studies,³ we can

identify a significant difference in wages among three investment forms of FIEs in Vietnamese manufacturing. Thus, it is important to include these three dummies, rather than one foreign ownership dummy in this analysis of the wage premium in Vietnam. This is because FIEs generally have a tendency to employ more skilled workers in Asian developing economies (Lipseý 2004; Lipsey & Sjöholm 2004; Ramstetter 2004; Ramstetter & Sjöholm 2006).

Aside from the firm ownership feature, the vector Z in Equation (1) controls for other firm characteristics. Based on the increasingly important role of firm-heterogeneity (Melitz 2003), several firm-specific factors are incorporated in the model. These include real output (RQ), capital intensity (KL), gender ratio (GR), and skill share (SS).

In addition to firm specific factors, two additional vectors are included. The first one is a variable (REG) presenting regional feature. Generally, capital-intensive industries are likely to be concentrated in a region with a high level of economic development, leading to the expansion of the relative demand for skilled workers in that region. Accordingly, the wage premium will increase. As suggested by the geographic pattern of wages, three regional dummies for the Red River Delta, the South East Area and the rest of Vietnam (a base dummy) are employed. In addition to the regional effects, a variable (INS) of 21 industry dummies at the two-digit VSIC level is incorporated to capture specific-industry effects. This controls for the possible differences of the relative supply of skilled labour across industries as well as other unobserved industry heteroskedasticity.

4. Data and variable construction

The main data in this study is the firm-level dataset compiled from the unpublished returns of the Enterprise Surveys undertaken by the General Statistical Office of Vietnam (GSO). Estimating this wage premium model using a panel dataset by pooling cross-firm and time-series data is ideal, especially when our key interest is the wage premium. Unfortunately, this preferred data is not available, given the nature of the Enterprise Surveys of Vietnam. To date, there is only one Enterprise Survey of 2009 that has comprehensive information on employment and wages by education and production – non-production workers. In that survey, workers are classified by educational attainment and non-production/production activities and wages are broken down by non-production and production workers.⁴

The Enterprise Survey of 2009 provides employment and wage data for four major occupational categories: (1) managerial workers, (2) professional, technical and supervisory workers, (3) production workers and operatives, and (4) service workers and servants.⁵ As guided by the wage premium model, the managerial and professional workers are defined as

skilled labour. Production workers are treated as unskilled labour. Owing to the data on wages classified by occupations, the wage bill used for examining the wage premium includes only regular salary and other cash payments made to employees. In other words, wages do not cover the employer's contribution to social and health insurance funds.

With regard to demographic characteristics of workers, the data provide information on gender, educational attainment, and occupation. Using the educational information on the highest completed grade, skill share (*SS*) is measured as the proportion of the total workers who completed tertiary education (college/university degree) in each firm. It is important to note that this measurement of skill share may not totally match the ratio of non-production and production workers. This is because some skilled workers are hidden in the production worker category. (It would be preferable if wages could be broken down into categories by educational attainment but this kind of data is not available). Finally, a gender ratio (*GR*) is measured by the ratio of female to male workers.

The data from Enterprise Survey, which covers all registered formal firms, have been cleaned and observations with non-positive values eliminated, along with outliers. For each firm, the survey also provides information on gross output, and capital stock and profits. All data in normal terms were converted to real term, using appropriate deflators. Additionally, the dataset has four-digit industry classification codes (VSIC) consisting of 110 manufacturing industries that allow us to match industries with the tariff data. Note that many small firms report implausible or unrealistic data due to their poor information and accounting systems. Thus, this analysis focuses on examining the wage premium among firms that employ ten or more employees. The definition and measurement of variables used in the estimation analysis are summarized in Table 1.

[Table 1 around here]

Raw tariff data for the final product in 2008 is the four-digit VSIC code level derived from the UNCTAD-TRAINS (Trade Analysis and Information System). Input tariff rates are constructed as the weighted average of published tariff rates as follows: $input\ tariff_i = \sum_{j=1}^n a_{ij} * tariff_j$, where *tariffs* are output tariff on the final product the four-digit VSIC industry and *input tariff* are those on intermediate inputs/materials.

The weights a_{ij} are based on input coefficients from the Input-Output table (I-O table) of 2007, the latest I-O table in which comprehensive information on specific intermediate inputs is available. Based on the concordance between I-O industry codes and industry classification (VSIC) provided by GSO, we obtain the input tariff for each industry. Then, both the tariffs

on final products and intermediate inputs are constructed at the four-digit VSIC level in order to merge them with the firm-level data.

5. Results

This section presents the OLS estimation results to explore the determinants of the wage premium. In order to control for any heteroskedasticity in the error terms, statistical significance of the estimated coefficients is tested using standard errors based on the robust variance-covariance matrix estimator (Wooldridge 2002). Summary statistics as well as a correlation matrix of the variables are reported in Tables 2 and 3.

[Tables 2 and 3 around here]

The results for five alternative specifications are shown in Table 4. These specifications are different from each other in the following features. The full model (Equation 1) is shown in the first column, whereas the second column reports the specification excluding a skill share variable. The third specification includes only a Red River Delta dummy, then the fourth replaces that with the South East Area dummy. The specification without control of industry dummies is presented in the last column.

[Table 4 around here]

A reduction in tariffs on intermediate inputs is likely to be associated with a narrowing of the wage premium since the coefficients of input tariff (IT) are positive and significant at conventional levels in most cases. Holding other factors unchanged, a ten-percentage point reduction in input tariff is likely to result in a reduction of seven per cent in the wage premium in the manufacturing sector. There is strong statistical evidence of an intra-industry effect on the wage premium from lowering the input tariff. This finding is well in line with recent studies (Amiti & Cameron 2012).

More interestingly, the result is also relevant to the feature of export performance in Vietnam. As in our own analysis based on the I-O tables of Vietnam,⁶ a high proportion of labour-intensive manufacturing exports in the Vietnamese economy over the period 2000-09 draws heavily on imported intermediate inputs which are viewed as more skilled labour-intensive. Lower input tariffs will stimulate a higher demand for imported inputs, leading to an expansion in demand for unskilled workers in traditional labour-intensive industries such as apparel, footwear, and furniture. For this effect, the wage premium is likely to decline.

Next, lowering output tariffs also tends to narrow the wage premium. The positive sign and significance of output tariff (*OT*) across various specifications implies that cutting output tariffs tends to narrow the wage premium. The model predicts that a ten per cent fall in the output tariff results in a three per cent decline in the wage inequality between skilled and unskilled workers, holding other factors constant. This result is highly consistent with the Heckscher-Ohlin trade model; opening up to international trade will cause each country to specialize in industries that use the country's most abundant factor more intensively. This result is especially relevant in the case of the Vietnamese economy, where a massive pool of unskilled workers has not been depleted. Trade liberalization adopted since the second half of 1990s has stimulated resources reallocation toward unskilled labour-intensive industries. Consequently, export expansion resulting from the reduction and elimination of tariffs has increased the price of unskilled labour-intensive goods, causing a rise in wages of unskilled workers. All together, the significance of both tariffs implies a synergy in the effects of trade liberalization on the wage premium.

In addition, export orientation appears to have widened the wage premium. The coefficient of an export orientation (*EO*) is statistically insignificant in many cases, suggesting that export orientation is less likely to be related to the wage premium. However, as shown in Column 5, the coefficient on the *EO* variable is highly significant with a positive sign after excluding two-digit industry dummies. Holding other effects constant, higher export expansion is possibly associated with an increase in the wage premium between skilled and unskilled labour. This finding runs counter to the prediction of the HOSS model but is consistent with the abundance of unskilled labour in Vietnam. Export production in Vietnamese manufacturing employs a large proportion of unskilled workers. As the country has been abundant in unskilled labour,⁷ thus the wage premium can increase as implied by the Lewis-Fei-Ranis model. Thus, there is the possibility that a rise in exports contributes to a widening of the wage premium.

The coefficients of ownership dummies (*JVS*, *JVP*, and *WFIE*) are significant at the one per cent level with the expected (positive) sign in all cases. The estimates suggest that the presence of FIEs, regardless of investment entry, is very much likely to be associated with a widening of the wage gap between skilled and unskilled labour. The implication of this is that on the whole, the wage premium in FIEs is higher than that of domestic enterprises, holding other factors constant. This finding, which suggests that increasing foreign investment contributes to an increase in the wage premium in Vietnamese manufacturing, is well

consistent with the widely held proposition in the model of foreign investment and relative wages (Feenstra & Hanson 1996; 1997).

Given the greater participation of FIEs in labour-intensive industries, it is likely that export-oriented foreign investment, particularly wholly owned FIEs in export-oriented manufacturing, has played a significant role in increasing the wage inequality between skilled and unskilled labour. As revealed in trade orientation in Figure 1, joint ventures with private firms and wholly owned FIEs tend to be concentrated on labour-intensive manufacturing for exports, as above 40 per cent of their output in 2009 was in export-oriented manufacturing industries. On the other hand, nearly 80 per cent of SOE total output is involved with domestically oriented industries. Within export-oriented manufacturing, one half of employment has been attributed to the wholly-owned FIEs which account for over a third of total manufacturing output in 2009 (Figure 2). In summary, export-oriented foreign investment has been the backbone for output growth and employment expansion in Vietnamese manufacturing.

[Figure 1 and Figure 2 around here]

Other determinants of wage premium such as KL , RQ , and GR are statistically significant with the expected signs. As a representation of firm's characteristics, firm output – a proxy for firm size – is positive and significant at the five per cent level or better in all cases. *Ceteris paribus*, larger firms tend to have a widening wage premium. Moreover, the coefficient of capital intensity (KL) is positive and significant at conventional levels. This result is straightforward as firms with a higher proportion of capital are likely to recruit more skilled workers. As a result, an expansion of demand for skilled workers results in a widening of the wage premium.

In regard to worker's characteristics, the coefficient of the gender ratio (GR) is highly significant with an expected (positive) sign, suggesting a higher share of female workers is likely to cause a rise in the wage premium. This is explained by the fact that a high gender ratio is associated with a higher proportion of unskilled workers, implying that they will have lower wages.

The role of skilled workers has an unexpected impact in explaining the wage premium. As shown in the first column in Table 4, the coefficient of skill share (SS) is significant but carries an unexpected (negative) sign in the full model. This result is contrary to the normal expectation that this skill ratio would contribute to the wage premium. As previously noted in the discussion on the data compilation, this unexpected finding could be the result of

measurement error. Wages for production workers – a proxy for unskilled workers – may partly include those of skilled workers in the production work, leading to a magnification of the wage for unskilled workers in the wage premium. Testing was undertaken for the possible effects of this issue on the other explanatory variables. The results in the second specification are significantly robust to the exclusion, given that it does not affect the significance level and sign of coefficients on various explanatory variables.

The coefficients of the regional dummies are highly significant in the full model. The positive coefficient of the South East Area (*Sea*) including Ho Chi Minh City implies that firms operating in that region have a higher wage premium than those located in other less urbanized regions, holding other effects constant. A similar comment also holds for those firms located in the Red River Delta (*Rrd*). A plausible reason for these effects is that these two regions have many advantages as compared to the rest of Vietnam in terms of market competition, availability of resources, and business environment. It is important to note that there is a notable difference between these two most urbanized regions. We conduct a test of the effect of that difference on the wage premium, as shown in the Columns 3 and 4. Controlling for the South East Area, the coefficient is still positive and significant while that for the Red River Delta becomes insignificant. Clearly the evidence of the higher wage premium for firms operating in the South East Area may be associated with the fact that the region has been more involved with market-based disciplines than has the North.

6. Comparison results

The preceding section provides the estimation results examining the effect of trade and investment on the wage premium. For the purpose of comparison, an estimation of the model that relates manufacturing wages to the similar explanatory variables is also undertaken. This analysis is based on the following model.

$$RW_{ij} = \beta_0 + \beta_1 IT_{ij} + \beta_2 OT_{ij} + \beta_3 DP_{ij} + \beta_4 JVS_{ij} + \beta_5 JVP_{ij} + \beta_6 WFIE_{ij} + \beta_7 EO_{ij} + \alpha Z_{ij} + \gamma INS_{ij} + \delta REG_{ij} + \varepsilon_{ij} \quad (2)$$

where i and j index firms and industries. The dependent variable is a firm's average real wage in logarithm value. All explanatory variables are defined as the same to those in Equation 1.

Table 5 shows OLS estimated results of this model in the first column. The two last columns report the results controlling for the Red River Delta and the South East Area, alternatively. Wages of unskilled workers are strongly associated with the tariff reduction, given the tendency that employment creation is mainly reliant on unskilled labour-intensive manufacturing industries. The coefficient of the output tariff is negative with high

significance. Thus, the result is consistent with the widely held perception that trade liberalization increases the returns to workers, (who are mostly unskilled) despite the insignificant coefficient of the input tariff. In relation to unskilled worker wages, the result suggests that there is a three per cent increase in unskilled worker wages for a ten per cent fall in output tariff. By contrast, after taking into account the skilled worker share in total employment, the same amount of output tariff reduction is likely to be associated with a five per cent decrease in skilled worker wages. Thus, the output tariff effect on wages stands in a sharp contrast for skilled and unskilled workers, helping to further explain its effect on narrowing the wage skill premium as revealed previously. It becomes clear that the effect of trade liberalization on the wage premium can be delineated into its effect on average wages in Vietnamese manufacturing.

As regards the export impact on wages, an increase in exports has an inverse impact on manufacturing wages in Vietnam. This is because the coefficient of export orientation is negative and significant at standard levels in all cases. Thus, there is statistical evidence supporting for the proposition that export expansion has not resulted in a rise in wages of unskilled workers. In a similar manner, export intensity is likely to increase the wages of skilled workers after controlling for skill share.

Concerning the effect of foreign direct investment on wages, firm ownership plays an important role in explaining wage differentials among firms. The coefficients of *JVS*, *JVP* and *WFIE* are positive and significant in all cases. Generally, the wages of unskilled workers from FIEs, regardless of investment entry, are higher than, those in domestic firms. Holding other effects constant, wages of unskilled workers in wholly owned FIEs, on average, are about eight per cent higher than those in domestic firms. However, this foreign wage premium is even larger for skilled workers given the positive sign and significance of a skill share variable (*SS*) in all cases. This implies, all else held constant, that wages in firms with a large share of skilled workers in total employment, are higher than wages in firms having a low skill share. Hence, the estimated effect of FIEs on skilled-worker wages is much larger compared to the effect on unskilled-worker wages. Although FIEs tend to concentrate on labour-intensive industries for exports, these firms pay higher wages for both unskilled and skilled workers as compared to domestic firms but the foreign wage premium is higher for skilled workers. All in all, there is strong statistical support for the proposition that increasing foreign investment is strongly associated with a rise in the wage premium.

As regard firm characteristics, these factors such as capital intensity (*KL*), real output (*RQ*), skill share (*SS*), and gender ratio (*GR*) have played a significant role in explaining

average wages. As the economies of scale effect reveals, wages in large-sized firms are higher than those in small-sized ones. Capital-intensive firms also tend to pay higher wages than labour intensive firms, given the positive coefficient and significance of *KL*. Additionally, the coefficient of skill share is positive and significant at a high level, implying a higher share of skilled workers is likely to be associated with higher wages. Thus, this factor plays a significant role in explaining the determinants of manufacturing wages despite its insignificance in explaining the wage premium as revealed in the previous section. Furthermore, gender ratio contributes to an explanation of wage differentials among firms. On average, firms with a high proportion of female/male workers have lower wages than those firms with a low proportion of female/male workers.

From another perspective, average manufacturing wages in the Red River Delta are typically lower than in the rest of Vietnam, including the South East Area, because of the negative and significant coefficient of the region dummy in the regression when there is a control for only that region (Column 2). Firms in the South East Area tend to pay higher wages than do firms in other regions of Vietnam, holding other factors constant (Column 3).

7. Conclusions

This paper has examined determinants of wage premium in Vietnamese manufacturing using firm-level data. An examination of the wage premium was explored in association with conventional factors explaining manufacturing wages and special characteristics of the outward-oriented liberalization in terms of tariff reduction and firm ownership types.

The results from a cross-section estimation of the wage premium are, by and large, consistent with our prior expectation. The findings consistently point to the important role of trade liberalization as an impetus for narrowing the skill premium. Tariff reduction seems to contribute to narrowing the wage gap between skilled and unskilled workers. A reduction of input tariff was found to have a greater effect on reducing intra-industry skill premium than it did a reduction in output tariff. This finding is consistent ⁸with the fact in Vietnam the most labour-intensive manufacturing exports have a higher proportion of import content. These findings make a significant contribution to the ongoing debate in the literature review on how trade liberalization affects worker's welfare in developing countries.

The study shows that the presence of foreign investment, in particularly export-oriented FIEs, has widened the wage premium between skilled and unskilled workers, which has contributed to an increased income inequality in the country. However, this seems to be an unavoidable outcome at the early stage of export-oriented industrialization with multinational

companies' participation. The findings relating to the widening of the wage premium makes a strong case for policies to improve the human capital base of the economy in order to achieve a more equitable growth outcome in the future.

Footnotes

¹ Key references, which provide theoretical framework of this model, include Fei and Ranis (1964,1997), Lewis (1954, 1972).

² Recent theories have incorporated firm heterogeneity on models of trade and labour market. See, for example, Egger & Kreickemeier (2009); Helpman, Itskhoki & Redding (2010); Yeaple (2005).

³ The work is available from the author on request.

⁴ The Enterprise Surveys in some other years such as 2007 contain only information on workers by educational attainment.

⁵ This worker group is likely to be problematic when treating it as either skilled or unskilled labour. Thus, this group is excluded altogether.

⁶ In our own calculation, for manufacturing exports the import content of exports represents over 50 per cent of the total.

⁷ As in our findings, the labour surplus conditions in Vietnam have been persisted until 2010.

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Table 1: Definition and measurement of variables

Variable	Measurement
W_s	Average real wage of skilled workers (non-production workers)
W_u	Average real wage of unskilled workers (production workers)
W_s/W_u	Wage skill premium
OT	Output tariff
IT	Input tariff
RQ	Real output
KL	Capital intensity
GR	Gender ratio
SS	Skill share
EO	Export orientation
DP	Domestic private firm
$WFIE$	Wholly owned foreign invested enterprise (FIE)
JVS	Joint venture FIE with state enterprises
JVP	Joint venture FIE with private enterprises
Rrd	Red River Delta
Sea	South East Area

Table 2: Statistical summary of the variables

Variables	Mean	SD	Min	Max
W_s/W_u (wage skill premium)	2.57	0.72	-1.75	7.66
IT (input tariff)	0.07	0.03	0.02	0.20
OT (output tariff)	0.19	0.13	0.00	0.81
RQ (real output)	8.70	1.99	1.05	17.21
KL (capital intensity)	3.25	1.38	0.00	8.29
GR (gender ratio)	1.62	4.25	-1.41	164.67
SS (skill share)	0.12	0.15	0.00	1.00
EO (export orientation)	0.32	0.30	0.00	1.41
DP	0.76	0.43	0.00	1.00
JVS	0.01	0.10	0.00	1.00
JVP	0.01	0.11	0.00	1.00
$WFIE$	0.18	0.39	0.00	1.00
Rrd (Red River Delta)	0.30	0.46	0.00	1.00
Sea (South East Area)	0.37	0.48	0.00	1.00

Notes: Mean = single average, SD = standard deviation, Min = minimum, and Max = Maximum. (W_s/W_u), RQ , and KL are the logarithmic transformation of their value.

Source: Compiled from the data sources described in the text.

Table 3: Correlation matrix of the variables

	W_s/W_u	IT	OT	RQ	KL	GR	SS	EO	DP	JVS	JVP	$WFIE$	Rrd	Sea	INS
W_s/W_u	1														
IT	0.01	1													
OT	0.03	0.41	1												
RQ	0.11	0.11	-0.04	1											
KL	0.08	0	-0.07	0.32	1										
GR	0.11	0.09	0.05	0.03	-0.15	1									
SS	-0.04	-0.05	-0.13	0.13	0.2	-0.11	1								
EO	0.07	0.16	0.04	-0.02	-0.2	0.22	-0.17	1							
DP	-0.25	0	0.02	-0.37	-0.28	-0.13	-0.1	-0.04	1						
JVS	0.04	0.01	0	0.13	0.07	-0.01	0.11	-0.03	-0.17	1					
JVP	0.04	0	0.01	0.06	0.05	0	0.04	0	-0.2	-0.01	1				
$WFIE$	0.27	-0.02	-0.02	0.27	0.25	0.16	0.02	0.09	-0.84	-0.05	-0.05	1			
Rrd	-0.03	-0.08	-0.04	-0.04	0.01	0.05	0.18	-0.09	0.09	0.02	0	-0.12	1		
Sea	0.14	-0.04	-0.02	0.22	0.05	-0.01	-0.04	0.06	-0.29	0.01	0.03	0.33	-0.5	1	
INS	0.01	-0.47	-0.03	0.01	0.03	-0.13	0.1	-0.09	-0.09	0.03	-0.01	0.1	0.09	0.07	1

Source: Compiled from the data sources described in the text.

Table 4: Wage premium in manufacturing: OLS estimates, Vietnam, 2009*Dependent variable: logarithm of firms' wage premium*

Explanatory variables	(1)	(2)	(3)	(4)	(5)
<i>IT</i> (input tariff)	0.747** (0.294)	0.697** (0.294)	0.756*** (0.293)	0.750** (0.293)	-0.227 (0.166)
<i>OT</i> (output tariff)	0.276*** (0.050)	0.294*** (0.050)	0.291*** (0.050)	0.286*** (0.050)	0.182*** (0.038)
<i>EO</i> (export orientation)	-0.020 (0.023)	-0.011 (0.023)	-0.026 (0.023)	-0.025 (0.023)	0.069*** (0.017)
<i>DP</i> (domestic private firms)	0.003 (0.021)	0.015 (0.021)	0.010 (0.021)	0.005 (0.021)	0.017 (0.020)
<i>JVS</i> (joint ventures with SOEs)	0.316*** (0.051)	0.301*** (0.051)	0.326*** (0.051)	0.318*** (0.051)	0.328*** (0.053)
<i>JVP</i> (joint ventures with domestic private firms)	0.302*** (0.049)	0.305*** (0.049)	0.317*** (0.049)	0.304*** (0.049)	0.316*** (0.048)
<i>WFIE</i> (wholly owned FIEs)	0.380*** (0.025)	0.392*** (0.025)	0.405*** (0.024)	0.382*** (0.025)	0.400*** (0.024)
<i>RQ</i> (output)	0.007** (0.003)	0.007** (0.003)	0.010*** (0.003)	0.008*** (0.003)	0.007*** (0.003)
<i>KL</i> (capital intensity)	0.013*** (0.004)	0.010*** (0.004)	0.012*** (0.004)	0.013*** (0.004)	0.015*** (0.004)
<i>GR</i> (gender ratio)	0.008*** (0.002)	0.009*** (0.002)	0.008*** (0.002)	0.009*** (0.002)	0.010*** (0.002)
<i>SS</i> (skill share)	-0.191*** (0.032)		-0.186*** (0.032)	-0.172*** (0.032)	-0.193*** (0.031)
<i>Rrd</i> (Red River Delta including Ha Noi)	0.045*** (0.011)	0.033*** (0.011)	0.005 (0.010)		0.050*** (0.011)
<i>Sea</i> (South East Area including Ho Chi Minh city)	0.075*** (0.012)	0.073*** (0.012)		0.052*** (0.011)	0.086*** (0.012)
Constant	4.760*** (0.047)	4.741*** (0.047)	4.751*** (0.047)	4.762*** (0.047)	4.847*** (0.036)
Industry dummies	Yes	Yes	Yes	Yes	No
F-test	47.98	47.68	47.50	48.90	105.18
Observations	18,178	18,178	18,178	18,178	18,178
R ²	0.102	0.100	0.100	0.101	0.093

Notes: ***, ** and * Denote significance at the 1%, 5% and 10% levels, respectively.

(a) Standard errors adjusted for arbitrary heteroskedasticity are given in brackets.

(b) For brevity, the coefficients of industry dummies are not reported here.

Table 5: Determinants of manufacturing wages: OLS estimates, Vietnam, 2009*Dependent variable: logarithm of firms' average wage rates (RW)*

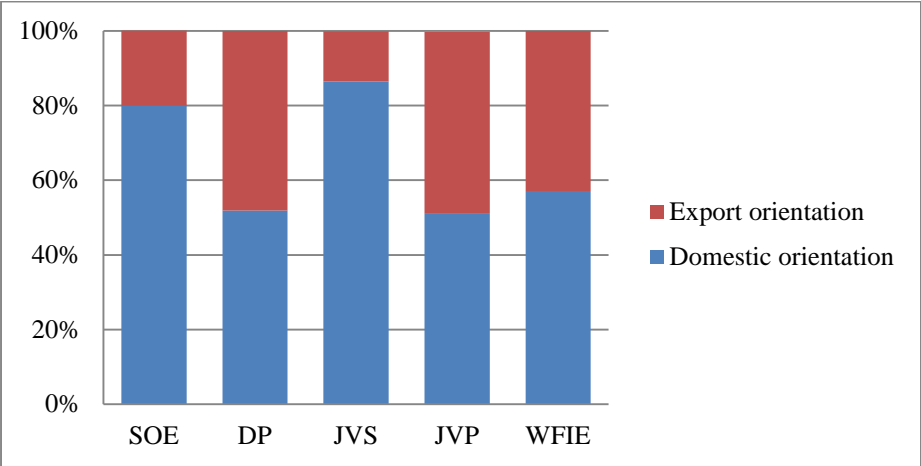
Explanatory variables	(1)	(2)	(3)
<i>IT</i> (input tariff)	-0.086 (0.253)	-0.058 (0.258)	-0.087 (0.253)
<i>OT</i> (output tariff)	-0.313*** (0.043)	-0.268*** (0.044)	-0.317*** (0.043)
<i>EO</i> (export orientation)	-0.036* (0.020)	-0.055*** (0.020)	-0.034* (0.020)
<i>DP</i> (domestic private firms)	-0.121*** (0.019)	-0.101*** (0.019)	-0.122*** (0.019)
<i>JVS</i> (joint ventures with SOEs)	0.253*** (0.038)	0.285*** (0.039)	0.253*** (0.038)
<i>JVP</i> (joint ventures with domestic private firms)	0.074** (0.035)	0.120*** (0.035)	0.073** (0.035)
<i>WFIE</i> (wholly owned FIEs)	0.077*** (0.020)	0.155*** (0.021)	0.076*** (0.020)
<i>RQ</i> (output)	0.130*** (0.003)	0.139*** (0.003)	0.130*** (0.003)
<i>KL</i> (capital intensity)	-0.000 (0.003)	-0.004 (0.003)	-0.000 (0.003)
<i>GR</i> (gender ratio)	-0.013*** (0.001)	-0.015*** (0.001)	-0.013*** (0.001)
<i>SS</i> (skill share)	0.842*** (0.033)	0.858*** (0.034)	0.834*** (0.033)
<i>Rrd</i> (Red River Delta including Ha Noi)	-0.019* (0.010)	-0.142*** (0.009)	
<i>Sea</i> (South East Area including Ho Chi Minh city)	0.232*** (0.010)		0.242*** (0.008)
Constant	1.919*** (0.042)	1.890*** (0.043)	1.919*** (0.042)
Industry dummies	Yes	Yes	Yes
F-test	295.68	278.74	304.25
Observations	18,204	18,204	18,204
R-squared	0.397	0.379	0.397

Notes: ***, ** and * Denote significance at the 1%, 5% and 10% levels, respectively.

(a) Standard errors adjusted for arbitrary heteroskedasticity are given in brackets.

(b) For brevity, the coefficients of industry dummies are not reported here.

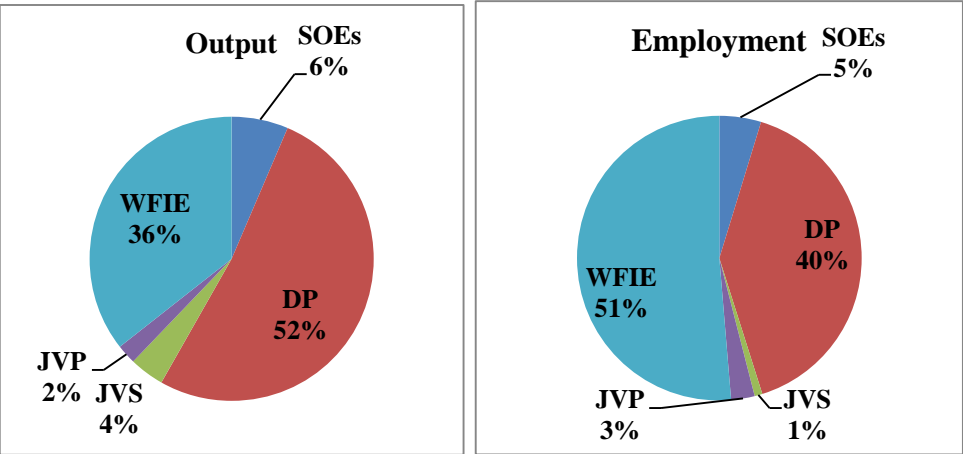
Figure 1: Pattern of output orientation by ownership group in 2009 (in %)



Notes: SOE - State-owned enterprises; DP - Domestic private firms; JVS - FIE joint ventures with state enterprises; JVP: FIE joint ventures with private firms; and WFIE - wholly owned FIEs.

Source: Compiled from the unpublished returns to the *GSO Enterprise Survey* of 2009.

Figure 2: Ownership pattern in export-oriented manufacturing (in%)



Notes: SOE - State-owned enterprises; DP - Domestic private firms; JVS - FIE joint ventures with state enterprises; JVP: FIE joint ventures with private firms; and WFIE - wholly owned FIEs.

Source: Compiled from the unpublished returns to the *GSO Enterprise Survey* of 2009.

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