Does export participation affect wages and employment quality? the case of Vietnamese SMEs

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Does Export Participation Affect Wages and Employment Quality? The Case of Vietnam

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***Abstract*:** Based on a unique matched firm-worker panel dataset between 2007 and 2009, empirical results show that export participation has a positive impact on wages when taking account of firm characteristics alone. However, exporter wage premium completely vanishes when both firm and worker characteristics are added simultaneously. This finding is also confirmed when controlling for time-invariant unobservable factors by spell fixed effect estimations. Furthermore, using a firm level balanced panel dataset in the same periods, the hypothesis of the positive role of export status on employment quality is rejected when it has a positive effect on the share of casual workers. However, this result is not robust across sectors and locations. Export participation continues to yield a positive impact on the share of casual worker in low tech sectors. However, a negative effect on employment quality is observed in high tech industries. The findings suggest that policies encouraging and supporting exporting should not only focus on the amount of employment created but also on the quality of employment, especially for low technology industries.

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1. Introduction

The paper considers whether the higher productivity advantages of exporters may be converted into benefits for workers in the forms of higher wages and better employment quality[2]. Firstly, the question of the role of export decision on wage has been investigated widely in both developing and developed countries. Empirical observations across most studies based on firm-level data demonstrate that export status has a positive impact on the wage of employees (see Schank, Schnabel, & Wagner, 2007 for a review)**.** However, these results may suffer from a potential bias by failing to control for worker-characteristics when considering wage differentials (Schank et al., 2007). Although the next wave of studies used the approach of applying matched employer-employee data, which is much more suitable for investigating the export wage premium, the empirical evidence of the wage premium in exporters is small and focuses only on a few countries (Wagner, 2011). Furthermore, these empirical results often vary in different contexts, and therefore, it seems inappropriate to apply the result of one country to another. Based on a unique linked firm-worker panel dataset of SMEs, our study aims to extend the literature by investigating what determines individual wages and whether export participation does have an impact on wage differences in the Vietnamese context.

Another important contribution that differentiates this study from the previous research is our focus on the linkage between export status and employment. While there are numerous empirical studies of exporter wage premium, the role of export participation on quantity and quality of employment remains largely unexplored, possibly due to the limitation in the available datasets. Among the few existing studies, findings about the relationship are inconclusive. For instance, Greenaway, Hine, and Wright (1999) show a negative relationship between export status and the employment in England. However, using fixed effect panel data estimations, a more recent study indicates that there is a positive but negligible impact from export participation on the share of casual workers in Kenya (Were, 2011).

[2] As indicated by Rand and Torm (2011, p. 1) "an improvement in employment quality is measured by a decrease in the use of casual worker (an increase in the share of workers with formal contract)"

The lack of clarity around the nexus between export participation and employment is the motivation for this study to examine such linkage in the Vietnamese context. It is believed that there is a positive relationship between export activities and jobs created because Vietnam is a labour-intensive exporting country. More specifically, Kien and Heo (2009) indicate that increasing export in manufacturing sectors has led to a significant increase in the demand for labour. However, these appear to have been little interest in considering whether export participation may be a driving force in improving the employment quality. By doing so, to the best of our knowledge, this research is among the first studies contributing empirical evidence about the impact of export participation on employment quality at the firm level. In terms of policy implications, clarifying our understanding about the impact of export participation on contract status of employees is of much importance. A popular belief among policy makers in Vietnam is that export promotion is important for the economy, and therefore export led growth policies are at the heart of policy programmes (Nadvi et al., 2004). Nevertheless, given that a positive linkage between export activities and the share of casual workers exists, export oriented and supported policies need to focus not only on the amount of employment created but also on employment quality.

The paper is structured as follows: Section 2 briefly summarises theoretical mechanism through which export participation affects wages and employment outcomes. In addition, this section also provides empirical evidence relating to wages, the quality of employment and export participation. Section 3 displays data sources and the methodology used in this study. The empirical results and discussion follow in section 4, and the last section provides summary and policy implications.

2. Theoretical and empirical review

a. Wage premiums and export status

There are some main theoretical mechanisms to explain differences in wages as a result of increased export activity. The first originated from the spirit of Stolper-Samuel theorem in the Heckscher-Ohlin model framework. The fundamental content is that greater international trade integration of a country will lead to a rise in the returns to relatively abundant factors of production and a fall in the returns of factors that are used less intensively in the production process (Samuelson, 1948; Stolper & Samuelson, 1941). For example, a developing country exports goods that are intensive in un-skilled labours, and a developed country exports skilled labour intensive goods. The theorem implies that an expansion in international trade will result in a high demand for un-skilled labours in developing countries that leads to wage improvement of un-skilled labours and a fall in the wages of skilled employees. In contrast, the skilled labour used most intensively in developed countries, which in turn these employees are paid higher, and this lowers the wages of un-skilled labours (Breau & Rigby, 2010)

More recently, Verhoogen (2008) argues that the above mechanism only partly explained wage inequality in the labour market in developing countries. As a result, a new approach has been adapted when investigating the links between export activities and wage differentials in the developing countries. The author argued that quality improvement of goods is the main reason for wage premiums between exporters and non-exporters. The author explain that as a requirement of quality of goods, the plants in developing countries need to upgrade the product quality when exporting to developed countries. In order to produce higher-quality products, the plants need higher quality employees, and these employees must be paid higher wage.

A further explanation is provided by Helpman, Itskhoki, and Redding (2010) who argue that the high productivity firms self-select into the exporting markets and exporting participation helps these enterprises gain higher revenue than their non-exporting counterparts. Consequently, the higher revenue encourages exporters to scrutinise their workforce and exclude low ability workers. Hence, employees in exporting enterprises often have a higher average ability and are paid higher than those in non-exporters.

While theoretical predictions are well understood, the empirical findings on the role of export status on wage difference are inconclusive. Many studies have been conducted in both developed and developing countries. For example, studies in the United States (Bernard & Jensen, 1995, 1999), Bernard and Wagner (1997) for Germany and Greenaway and Yu (2004) for England have found that export wage premium varies in the range from 2% to 15 %. In addition, a positive correlation between export activity and wage differences is also confirmed in other empirical findings in the context of developing countries (e.g., Liu, Tsou, and Hammitt (1999) for Taiwan, and Van Biesebroeck (2005) for African countries). The studies also show that the effects are permitted to vary across different types of skills and occupations. For instance, Bernard and Wagner (1997) indicate that while there is no export wage premiums among production workers, the role of export activities on wage premiums is 3.3% among non-production staff. Moreover, in an analysis of the effects of export participation on the wages of Taiwanese manufacturing firms, Tsou, Liu, and Huang (2006) used plant level data for the period 1991- 1996 to investigate the impact of export status on wages of exporting and non-exporting enterprises. Their results reveal that the effect of export on wages is generally positive for skilled workers but negative for unskilled workers.

The above studies have only relied on firm-level data to test the export status-wage premium relationship which may create biased results and overstate the role of export on wage differentials (Schank et al., 2007). A more recent approach used the employer-employee matched dataset combining both employer-employee characteristics when considering the link between the export status and wage difference. Among pioneering studies, Milner and Tandrayen (2007) indicate a positive linkage between export participation and wage in a study of African countries when controlling both firm and individual characteristics. Similarly, Schank et al. (2007) in a study of German firms, and Breau and Brown (2011) in the Canadian context reached consensus. Their results show that workers in exporters are paid higher wage than those in non-exporters but these wage premiums are smaller after controlling individual level characteristics.

In contrast, in a study of the United States**,** Breau and Rigby (2006) investigate the effect of exporting on wages in exporting and non-exporting firms using longitudinal firm level data in the period 1990-2000. They find that there is a significant difference in wage payment between exporting and non-exporting with controlling variables at firm-

characteristic level. However, the results completely disappear when worker characteristics are taken into account. Furthermore, Munch and Skaksen (2008) test for wage differentials in the Danish manufacturing firms and find a negative association between exportation status and wage differences in enterprises when using a worker-firm dataset in the period of 1995-2002. However, they indicate that an interaction between export intensity and skill intensity has a positive impact on the wages differences. These results imply that exporting itself does not improve the wage of workers and an export wage premium exists at firms with a sufficiently high skill level of workforce. More recently, employing a German longitudinal matched employee-employer dataset to test the causality between export status and wage, Schank, Schnabel, and Wagner (2010) show that the role of export status on wage is overstated and that higher wage in exporters is due to self-selection of higher productivity firms rather than the export activities of firms.

b, Employment outcome and export status

There are various views on considering how export status affects the employment outcomes. On the one hand, Helpman et al. (2010) indicate that the average quality of human capital of exporters is higher than that of non-exporters. Intuitionally, casual workers often have lower skills and ability than regular workers. Combined together, we can expect that export participation of firms would lead to a decrease in the share of casual worker.

On the other hand, other research (e.g., Aw, Chung, & Roberts, 2000; Isgut, 2001) often argue that when firms participate in exporting markets they face higher competition than domestic markets. Increase in cost-cutting measures may help firms to overcome high competition (Were, 2011). As a result, exporters try to find much efficient ways to use their resources (Feder, 1983). Usage of non-regular or temporary workers can be one method to cut costs since casual workers often are paid lower than regular employees. Hence, it is hypothesized that export participation and the share of casual workers is positively associated.

Empirical investigation about the nexus between export participation and employment are limited. While Greenaway et al. (1999) found that export and import activities have a negative impact on employment expansion in English industries, Milner and Wright (1998) indicated a statistically insignificant relationship between export and employment growth in

Mauritian manufacturing sectors. However, a limitation of these studies is that they considers employment outcome as an aggregated index. A more recent contribution to the literature is a study conducted in Kenya, in which Were (2011) considers the impact of export participation on each component of the workforce. By using a fixed effect approach with the 1994-1995 panel dataset, the study results show that export participation has a positive impact on the share of casual workers. However, if using only cross-sectional dataset in 2003, an insignificant effect of export decision on the share of causal workers is observed. Combined together, this study indicates that there is no strong evidence of the impact of export participation on the ration of casual workers. Beyond this, other studies also considers the determinants of composition of employment outcome (e.g., Mangan & Williams, 1999; Simpson, Dawkins, & Madden, 1997). However, these studies ignore to consider the role of the exporting and importing activities related factors for the ratio of casual workers.

In Vietnam, investigation of the relationship between wage and export participation at the plant level is severely limited. In a pioneering effort, Hiep and Ohta (2009) show that export activities do not have an impact on wage differentials. Nevertheless, when considering such relationship, their conclusions may be biased since the regression results controlled only plant-level characteristics (Schank et al., 2007). In addition, their findings are based on data that surveyed on a retrospective basis, and this raises the worries of high measurement error in the data. A more recent study of the determinant of wages has been conducted by Larsen, Rand, and Torm (2011). However, a shortcoming of their study is that they use cross-sectional data that do not allow controlling unobservable factors. In addition, this study focuses on the impact of social networks on wage, and does not consider the influence of trade related variables on wages.

With regard to the association between export activities and the employment outcome, while empirical evidence of the role of export activities on the amount of employment created seem obvious, few empirical studies considers the employment quality determination. Among the first studies, Rand and Torm (2011) investigated the impact of the formalization of firms on the component of workforce. Their studies reveal that formalization of firms improves the employment quality of workers in terms of a decrease in the ratio of casual workers and an increase in share of regular workers. This study, however, leaves out the impact of export status on the employment outcome.

In summary, based on different employer-employee datasets from various countries, existing empirical works about the wage premium and export status has not reached consensus. In addition, while a few studies show that export activities boost employment generation, the empirical evidence of linkage between export status and employment quality is severely restricted. All in all, it is necessary to investigate further the topics in the new context.

3. Data Sources and Methodology

3.1 Data Sources

The data source for this study comes from the SMEs surveys conducted by the ministry of Labor, Invalid and Social Affairs (MOLISA) in cooperation with Copenhagen University. The surveys were conducted in 10 provinces including 3 urban cities: Ho Chi Minh, Ha Noi, and Hai Phong and 7 rural provinces: Long An, Ha Tay, Quang Nam, Phu Tho, Nge An, Khanh Hoa and Lam Dong. The sample was stratified by ownership that included all types of non-stated firms (see Coung, Rand, Silva, Tam, & Tarp, 2010 for details of the da source).

The panel dataset for two years 2007 and 2009 were used for considering the impact of export participation on wage differentials because only these surveys included two separate modules of firm and worker characteristics. The enterprise module provides the detailed firm-level data including firm characteristics (e.g., firm size, age, export status) and economic indicators, while the employee module is a set of separate questionnaires of workers. It contains information about each worker in surveyed enterprises, including age, sex, educational level, and occupation of workers in enterprises. It also includes the number of hours worked and wages of each individual. More specifically, the employee module was conducted in 581 firms with 1043 workers surveyed, and 1444 workers of 577 firms surveyed in 2007 and 2009, respectively. After cleaning the dataset, excluding missing information and outliers, a combination between these modules created a unique employer-employee unbalanced panel data set with 1725 workers covering 586 firms. The data source provides uniquely valuable information on both plant-level and individual characteristics for this study.

Two quantitative surveys about firm level data in 2007 and 2009 were also chosen to consider the effect of export participation on the employment quality. One of the

requirements of fractional probit panel estimates is that they need to be based on a balanced panel dataset on all covariates in every year for each enterprise. After cleaning data and excluding missing values as well as outliers, we are left a balanced panel data of 2988 observations in both years from around 2600 firms in each survey.

A common problem with time variant data is that it is often expressed in current prices. Therefore, our data on current variables are deflated to 1994 prices using the GDP deflators to avoid biases that might arise because of inflation. More specifically about the dataset, statistical description of the main variables in our regression estimations are displayed and explained in the methodology section of this study.

3.2 Methodology

3.2.1. The impact of export participation on wage

3.2.1.1 Model specification

In order to consider the impact of export activities on wage premium, a basic specification with controlling only firm characteristics is expressed below.

$$\ln(w_{it}) = \varphi_0 + \varphi_1 X_{1it} + \varphi_3 EX_{it} + u_{it} (1)$$

where the dependent variable is the real monthly wage (w_{it}). As shown in table 4.1, the average wage is 682 thousand VND when converted into 1994 prices. This proportion tends to increase slightly during the period 2007 to 2009. Among controlled variables, export status (EX_{it}) is considered as the variable of main interest. It is captured in the model by a dummy variable for the export participation or the ratio of export intensity. In our sample, the average export participation is 4.5 % and this ratio has increased slightly from 4 % in 2007 to 5 % in 2009.

Regarding firm level factors (X_{1it}), this study closely follows the model specification of Bernard and Jensen (1995). Firstly, firm size is expected to have a positive relationship with wage premium because workers in larger firms are paid the higher wages (Oi & Idson, 1999). Capital intensity is also shown to have an impact on wages (Schank et al., 2007), and therefore, this variable is considered in the model in terms of the ratio of capital over total employment. Table 4.1 shows that whereas firm size experienced a slight increase, capital intensity witnessed a decrease in the period of 2007-2009. Furthermore, the share of women in the workforce has been included as an explanatory variable in the regression based on findings that an increase in the share of women leads to a decrease in the wage premium

(Larsen et al., 2011). According to summary statistics in Table 4.1, this share is nearly constant through the research period.

In an extended specification, we add individual characteristics keeping the same firm characteristics in the model (1). As a consequence, model (1) can be written as follows:

$$\ln(w_{it}) = \varphi_0 + \varphi_1 X_{1it} + \varphi_2 X_{2it} + \varphi_3 EX_{it} + u_{it} \quad (2)$$

Among individual characteristics (X_{2it}), employees with higher educational level are expected to gain higher wages (Mincer, 1974). Hence, the impact of education on wage has been captured by dummy variables in the model. As shown in statistical summary of table 4.1, nearly 20% of the employees have a university education but this ratio tends to decrease slightly from 22% to 18% in the period 2007-2009. In the contrary to the high ratio in the workers holding university degree, the number of people in the workforce without education is negligible (less than 2%).

Beyond this, occupations of employees also are added in the model since it is found that there is a difference in pay for workers among various occupations (Milner & Tandrayen, 2007). Table 4.1 reveals that while the ratio of production workers is over 50 %. of the total sample, employees in managing positions are just over 10%. The share of production workers increases from 2007 to 2009 but the share of mangers seems to be constant.

Other individual characteristics such as tenure and age are controlled in the model of wage based on expectation that the more experience workers gain higher wage (Mincer, 1974). The statistic descriptions show that the average years of working experience per worker is over 5 years, and the average age of workers is over 30 years. Both indexes reflect the experience of workers in firms and the numbers are nearly constant between 2007 and 2009.

Finally, the linkage between export participation and wage difference may be affected by other factors such as industrial characteristics and locations (Breau & Brown, 2011). High-tech companies are expected to pay higher wages than firms in low tech industries, while rural firms may pay lower wages than urban firms due to differences in the standards of living among regions. Hence, a high technology sector dummy variable and an urban dummy variable have been used to capture such effects in the model.

3.2.1.2 Estimation method

The ordinary least squares (OLS) method is used to estimate models (1) and (2). When using of a matched employer-employee dataset, it is necessary to control the potential association of error terms across employees of enterprises (Breau & Rigby, 2006). As a consequence, cluster robust standard errors at firm level are reported in our regression results**.** Furthermore, when considering the linkage between export participation and wage premium, the regression results also may be biased due to unobserved factors. To overcome this problem, spell[3] fixed effect panel data estimations has been employed. With the availability of matched employee-employer dataset, the advantage of this specification may control unobservable time-invariant factors of both firm and worker characteristics. This is the most preferable method and has been applied in the previous studies about exporter wage premium (e.g., Munch & Skaksen, 2008; Schank et al., 2007).

Table 4.1: Summary Statistics for Variables in Wage model[4]

Dependent variables	**Total**		**2007**		**2009**	
	Mean	SD	Mean	SD	Mean	SD
Real Monthly Wage (VND)	681.98	345.46	667.52	371.0	692.5	325.3
Explanatory variables						
Exporter	0.13	0.34	0.13	0.34	0.132	0.34
Export intensity					0.046	0.17
Individual characteristics						
Age	32.97	9.81	33.12	10.31	32.86	9.44
Tenure	5.43	5.07	5.42	5.17	5.43	4.99
Gender	0.59	0.49	0.59	0.49	0.59	0.49
Worker permanent status	0.97	0.15	0.96	0.18	0.98	0.11
Education						
No education	0.017	0.12	0.019	0.13	0.015	0.12
Primary school	0.059	0.23	0.055	0.23	0.063	0.24
Secondary school	0.26	0.43	0.26	0.44	0.26	0.44
High school	0.27	0.44	0.207	0.405	0.31	0.46
Technical certificate/ Elementary worker	0.048	0.21	0.063	0.24	0.038	0.19
Technical worker without certificate	0.038	0.19	0.041	0.20	0.037	0.19
Technical worker/ professional secondary	0.12	0.33	0.14	0.347	0.11	0.31
University	0.18	0.38	0.21	0.40	0.16	0.36
Occupation						
Manager	0.11	0.31	0.11	0.31	0.10	0.31

[3] Each unique employee-employer combination

[4] Definitions and measurements of variables in the regression analysis are displayed in Appendix

Professional worker	0.11	0.32	0.14	0.34	0.09	0.29
Office worker	0.09	0.30	0.11	0.31	0.09	0.28
Sales worker	0.08	0.27	0.10	0.30	0.07	0.25
Service worker	0.05	0.22	0.06	0.24	0.04	0.20
Production worker	0.55	0.49	0.48	0.50	0.60	0.49
Plant characteristics						
Firm size	32.4	40.3	32.8	39.8	32.3	40.74
Capital intensity	26.45	49.46	23.76	28.6	28.41	60.21
Female share in the workforce	0.37	0.25	0.38	0.25	0.37	0.259
Urban location	0.52	0.49	0.55	0.497	0.51	0.50
Hight tech sector	0.12	0.33	0.14	0.347	0.113	0.31
Total observations	1725		727		998	

Note: VND stands for Vietnamese Dong, 1USD=16,010 (31/12/2007) and 18,465 (31/12/2009)

3.3 The impact of export participation on the share of casual employment

3.3.1 Model Specification

Following Greenaway et al. (1999), and Milner and Wright (1998), the model specification of the impact of export status on employment begins by using a simple Cobb-Douglas production function for firm i at time t:

$$Q_{it} = A^{\lambda} K_{it}^{\alpha} L_{it}^{\beta} (1)$$

where Q_{it}= real output, and two input factors, K_{it}= capital and L_{it}= labour.

$$\frac{\partial Q_{it}}{\partial K_{it}} = \alpha A^{\lambda} K_{it}^{\alpha-1} L_{it}^{\beta} (2) \qquad \frac{\partial Q_{it}}{\partial L_{it}} = \beta A^{\lambda} K_{it}^{\alpha} L_{it}^{\beta-1} (3)$$

,

A firm following a profit maximizing strategy will choose the level of labour and capital where marginal revenue of labour ($MRP_{L)}$ is equal to wage (w) and the marginal revenue of capital (MRP_K) is equal to the cost (c).

Multiply (2) to unit price (P): $MRP_L = p\beta A^{\lambda} K_{it}^{\alpha} L_{it}^{\beta-1} = w (4)$

And (3) to unit price (P): $MRP_K = p\alpha A^{\lambda} K_{it}^{\alpha-1} L_{it}^{\beta} = c (5)$

From equation (4): $K_{it}^{\alpha} = \frac{w}{p\beta A^{\lambda} L_{it}^{\beta-1}} (6)$

From equation (5): $K_{it}^{\alpha-1} = \frac{c}{p\alpha A^{\lambda} L_{it}^{\beta}} (7)$

From equation (7): $K_{it}^{\alpha} = \frac{cK_{it}}{p\alpha A^{\lambda} L_{it}^{\beta}}$ (8)

But equation (6) = equation (8), solving for K : $K_{it} = \frac{w\alpha}{c\beta}.L_{it}$ (9)

Substituting K_{it} in equation (9) into equation (1): $Q_{it} = A^{\lambda}\left(\frac{w\alpha}{c\beta}.L_{it}\right)^{\alpha} L_{it}^{\beta}$ (10)

From equation (10): $Q_{it} = A^{\lambda} w^{\alpha} L_{it}^{\alpha} L_{it}^{\beta} c^{-\alpha} \beta^{-\alpha}$ (11)

Taking logarithms and rearranging the terms in the right side of equation (11): $\ln L_{it} = \varphi_0 + \varphi_1 \ln(\frac{w}{c}) + \varphi_2 \ln(Q_{it})$ (12)

Where: $\varphi_0 = -(\lambda \ln A + \alpha \ln \alpha - \alpha \ln \beta)/(\alpha + \beta)$

$\varphi_1 = -\alpha/(\alpha + \beta)$, $\varphi_2 = 1/(\alpha + \beta)$

According to Greenaway et al. (1999), A is assumed to change with export status (EX_{it}). Therefore, equation (12) is written as follows:

$\ln L_{it} = \phi_0 + \phi_1 \ln(w/c) + \phi_2 \ln(Q_{it}) + \phi_3 EX_{it}$ (13)

Instead of considering labour as a homogeneous factor of production, our study also uses the composition of workforce (the share of casual workers and the proportion of permanent workers) to define labour (Were, 2011). In equation (13), dependent variables are changes in the employment composition. As the statistical summary in table 4.2 shows that the average share of casual worker is 9 %, the ratio doubling in the period 2007-2009, while the proportion of permanent workers experiences a decreasing trend from 94 % to 88 % in the same period.

With regards to independent variables, export participation is the variable of interest in examining the determinants of the share of casual workers. This average export participation is 6.8 %; this index increases in the period of 2007-2009. In addition, both average wage and total production output witness a slight increase in the research period. While output is

expected to have a positive impact on the share of casual workers, wage is hypothesized to have a negative association with the ratio of irregular employees.

Attention is also given to other controlled variables. Formal status of firms has been added as an explanatory variable since it is found to have a negative effect on the share of casual workers (Rand & Torm, 2011). According to Rand and Torm (2011), a firm is defined to be formal if it has a tax code. In our sample, the average proportion of formal firms is high and it increases from 72% in 2007 to 78% in 2009. In addition, the share of workers in trade unions and the proportion of females in the workforce are added based on the argument that they impact significantly on the change in ratio of irregular workers (Simpson et al., 1997). While an increase in the percentage of employees in trade union is expected to improve employment quality, a greater female share in the workforce is hypothesized to impact negatively on the share of casually employed workers. Summary statistics in table 4.2 show that the proportion is nearly constant in the research period. Furthermore, as discussed by Mangan and Williams (1999), small firms often use casual workers as a means to solve shortages of employment, and hence, firm size as measured by total employment is controlled for in our model. Beyond this, firms tend to use more part-time workers when they face higher competition (Were, 2011). This index has been added in the model by a dummy variable. Last but not least, use of casual workers can be different among various industries and locations. As a consequence, fixed effects of location and sectors are captured by dummy variables in the empirical models.

With justifications of selected covariates, equation (13) may be rewritten as follow:

$$Y_{it} = \beta_0 + \beta_1 \ln(w_{it}) + \beta_2 \ln(Q_{it}) + \beta_3 EX_{it} + \beta_4 X_{it} + \beta_5 F + u_{it} \quad (14)$$

where: Y_{it} is the share of casual wokers, w_{it} is average wage in log, Q_{it} is total production output in log, EX_{it} is export status of firms, and X is a vector of firm characteristics (size, female share, tax code, percentage employees in the trade union, level of competition, and dummies of locations and industries)

Table 4.2: Summary Statistics for the variables in the model of the share of casual workers [5]

Dependent variables	**Total**		**2007**		**2009**	
	Mean	SD	Mean	SD	Mean	SD
Casual worker share	0.091	0.186	0.07	0.166	0.11	0.201
Permanent worker share	0.896	0.194	0.93	0.166	0.86	0.21
Explanatory variables						
Exporter	0.068	0.25	0.063	0.24	0.072	0.26

[5] Definitions and measurements of variables in the regression analysis consider in Appendix

Size	20.1	31.29	20.3	32.52	19.81	30.0
Output in log	5.98	1.43	5.95	1.43	6.01	1.44
Female share	0.33	0.26	0.33	0.267	0.33	0.259
Tax code	0.753	0.43	0.72	0.44	0.78	0.41
Union percent	0.083	0.25	0.083	0.25	0.084	0.259
Average wage in log	1.45	0.67	1.38	0.63	1.53	0.707
Level of competition	0.92	0.25	0.93	0.24	0.92	0.26
Urban location	0.49	0.49	0.49	0.5	0.49	0.5
Number of observations	2988		1494		1494	

3.3.2 Estimation method

The ratio of casual employment to total employment is a continuous but censored variable. More specifically, the ratio is zero for a substantial fraction of sample population, but a continuous positive value for the rest of the sample population. In this case, the Tobit model is an appropriate strategy (Verbeek, 2004). However, Wagner (2001) indicates that a fractional logit or probit model is more suitable than Tobit because this model by definition considers the possibility of observing values of dependent variable between one and zero at the boundaries instead of as a result of censoring. In addition, in framework of model fractional panel probit estimates, Papke and Wooldridge (2008) point out that unobserved time-invariant heterogeneity is controlled by adding time averages of all explained covariates in a balanced panel dataset. More specifically, the form of fractional Probit is proposed as below:

$$Y_{it} = f(W_{it}, Q_{it}, EX_{it}, X_{it}, \overline{F}) \quad (14)$$

Where Y_{it} is the ratio of non-regular worker to total employees, $W_{it,}$ Q_{it}, EX_{it}, and X_{it} are defined as in model (13), export status of firms, X_{it} is a vector of controlled variables that is displayed in table 5.2, $\overline{F}$ is a set of time averages of explained variables to control unobserved effects. The above equation is estimated with GLM (generalized linear models) command. In applying this syntax, as indicated by Papke and Wooldridge (2008), the estimation with "cluster" option is a good way to correct standard errors that allows to face potential correlation among error terms of firms across districts. Therefore, cluster robust standard errors at district level are reported in our estimation results.

The fractional probit panel model has been applied in several empirical studies in the field of exporting activities (e.g., Eickelpasch & Vogel, 2011; Wagner, 2010). Furthermore, Papke and Wooldridge (2008) show that this model may be appropriate with short panel dataset

(with large cross-sectional dimension and only few time periods). As a consequence, it is also employed to consider in our regressions.

4. Empirical results and discussion

There are two parts in the empirical results between export participation and wage differences. Part 1 considers the effect of export participation on wage outcome under basic and extended specification, while part 2 is sensitivity analysis. These results are followed by a discussion of the impact of export participation on employment quality. The last section re-examines the linkage between export participation and the share of casual workers from different locations and sectors separately.

Table 4.3: The impact of Export Status on Wage Differential

VARIABLES	Dependent variable: log of real monthly wage[6]			
	Pooled (2007-2009)	Pooled (2007-2009)	Spell fixed effect (2007-2009)	Cross-sectional (2009)
	(1)	(2)	(3)	(4)
Export	0.095+	0.075	0.042	
	(0.056)	(0.055)	(0.123)	
Export intensity				-0.062
				(0.107)
Size in log	0.086**	0.040*	0.077	0.055**
	(0.015)	(0.017)	(0.083)	(0.018)
Capital intensity in log	0.021	0.009	-0.012	-0.000
	(0.014)	(0.013)	(0.028)	(0.017)
Woman share	-0.243**	-0.140*	-0.424	-0.152+
	(0.062)	(0.063)	(0.263)	(0.082)
Urban dummy	0.175**	0.136**		0.112**
	(0.030)	(0.029)		(0.036)
High tech sector	-0.009	-0.023	-0.106	0.034
	(0.044)	(0.044)	(0.157)	(0.056)
Permanent worker		0.112	0.061	-0.019
		(0.081)	(0.147)	(0.071)
Worker age		0.004**	0.007*	0.005*
		(0.001)	(0.003)	(0.002)
Tenure		-0.000	0.004	0.004
		(0.003)	(0.008)	(0.004)
Worker male		0.147**	0.227**	0.140**
		(0.022)	(0.047)	(0.029)
No education		-0.357**	-0.388*	-0.234*
		(0.085)	(0.155)	(0.118)
Primary school		-0.311**	-0.041	-0.344**
		(0.068)	(0.098)	(0.084)
Secondary school		-0.246**	-0.023	-0.256**
		(0.051)	(0.114)	(0.066)
High school		-0.187**	-0.060	-0.181**

[6] As reported by appendix (3), VIF is less than 10, this implies that the model does not suffer from the multicolinearity problem.

		(0.047)	(0.082)	(0.060)
Technical certificate/		-0.041	-0.093	-0.030
Elementary worker		(0.056)	(0.126)	(0.071)
Technical worker without		-0.197*	-0.091	-0.275*
certificate		(0.086)	(0.120)	(0.125)
Technical worker/ professional		-0.055	-0.032	-0.049
secondary		(0.037)	(0.059)	(0.050)
Manager		0.393**	0.416**	0.326**
		(0.041)	(0.106)	(0.047)
Professional worker		0.105*	0.190*	0.106+
		(0.046)	(0.080)	(0.060)
Office worker		0.020	0.110	0.027
		(0.041)	(0.097)	(0.048)
Sales worker		0.099*	0.142	0.036
		(0.040)	(0.095)	(0.052)
Service worker		-0.088*	-0.184+	-0.065
		(0.042)	(0.104)	(0.063)
Year dummy2	0.068**	0.086**	-0.019	
	(0.025)	(0.024)	(0.044)	
Constant	6.076**	5.988**	5.921**	6.164**
	(0.049)	(0.100)	(0.293)	(0.120)
Observations	1,725	1,725	1,725	998
R-squared	0.142	0.329	0.295	0.320

Cluster robust standard errors at firm level in parentheses, ** p<0.01, * p<0.05, + p<0.1, column (1) and (2) present the estimation results of pooled data with different specifications, while column (3) show the results of fixed effect estimation

The wage equations with employing various specifications are reported in the Table 4.3. Using firm characteristics only, the findings in column 1 suggest that export participation has a positive and statistically significant effect on wage level. More specifically, employees on average working in exporting plants are paid 9.5% higher than those in non-exporting firms. Interestingly, as reported in column 2, once firm characteristics and worker characteristics are simultaneously controlled for, a significant impact of export participation on wages completely vanishes. This finding confirms the results of Breau and Rigby (2006), who found an insignificant relationship between export decision and wage differentials after controlling both firm and worker characteristics.

In the other estimation, when time-invariant unobservable factors are controlled by using spell fixed effect specification, the estimated coefficient of impact of export participation on wage is smaller but remains statistically insignificant. Furthermore, when export intensity is used instead of export status as a dummy, column four of table 1 continues to report an insignificant effect of export intensity on wages.

Regarding the role of firm-level explanatory covariates in determining wage, pooled data estimations reveal that firm size and the share of women in the workforce have a

statistically significant influence on wages. However, while there is a positive nexus between firm size and wages, the share of women in the workforce impacts negatively on wage differences. However, these results change completely when invariant-time unobservable factors are controlled by using spell fixed effects estimation. Both the estimated coefficients on the share of woman share and firm size are statistically insignificant. The results imply that there are unobservable time-invariant factors affecting these relationships. In addition, among other firm-level variables, whereas urban firms tend to pay higher wage than rural firms, capital intensity does not impact on wage differentials through all estimations. However, the urban dummy variable is dropped automatically from fixed effect estimations since it is constant through this period.

With regards to the impact of educational level, results in column 2 Table 4.3 show that the majority of estimated coefficients reveal a statistically significant and negative effect on wage differences when university educational level is considered as reference category. This implies that stronger wage growth has a close link with a higher educational level. However, the findings from spell fixed effects estimations indicate that a statistically significant difference is in fact found between employees without education and university graduates, while the influence of other educational categories on wage is statistically insignificant. These results show the importance of controlling unobservable characteristics. These findings may also reflect the fact that skill level requirements in wage payment is higher in the Vietnamese context when teaching seems out of date to the realistic development. This finding only partly agrees with empirical results of Larsen et al. (2011). This may be because they fail to control unobservable factors in their estimations.

In terms of other aspects of human capital, while the permanent status of workers impacts positively and insignificantly on wages, employees with more experience gain higher wages. In addition, the role of occupation in determining the wages indicate clearly whether unobservable time-invariant factors are controlled or not. The majority of estimated coefficient of impact of different occupations on wages is positive since the base category is production workers. More specifically, managers gain 41.6 % higher wage premium than production workers at the significance of 1 percentage.

Finally, the difference in gender is another factor having an effect on wage. On average, male workers are paid around 15% to 23% higher than their female counterparts

depending on the specification model. This finding is in accordance with numerous empirical results of gender pay gap (e.g., Larsen et al., 2011; Milner & Tandrayen, 2007). On the one hand, this wage gap between sexes may reflect a fact that male workers are more productive than their female counterparts (Hægeland & Klette, 1997)**.** On the other hand, based on a study of Vietnamese context, it could be explained as a discrimination against women in wage payment (Liu, 2004).

4.2 Sensitivity analysis

Table 4.4: Spell Fixed Effect regression

VARIABLES	Dependent variable: log of real monthly wage[7]			
	(1)	(2)	(3)	(4)
	Urban	Rural	Production	Non-production
Export	0.109	-0.033	0.025	0.038
	(0.251)	(0.148)	(0.034)	(0.159)
Size in log	0.027	0.168+	0.070**	0.109
	(0.138)	(0.089)	(0.023)	(0.095)
Capital intensity in log	-0.019	0.040	0.076**	0.016
	(0.032)	(0.085)	(0.009)	(0.028)
Woman share	-0.214	-0.767*	-0.864**	-0.585*
	(0.433)	(0.326)	(0.079)	(0.255)
Year dummy	-0.044	0.072	0.100**	-0.019
	(0.051)	(0.129)	(0.021)	(0.051)
Employee characteristics	Yes	Yes	Yes	Yes
Constant	5.971**	5.898**	4.340**	6.020**
	(0.378)	(0.456)	(0.105)	(0.439)
Observations	913	812	954	771
R-squared	0.319	0.498	0.979	0.278

Cluster robust standard errors at firm level in parentheses, employee characteristics include tenure, age, education, firm characteristics include firm size in log, and capital intensity in log ** p<0.01, * p<0.05, + p<0.1

In order to explore further the wage differentials between exporters and non-exporters, the dataset has been divided into various sub-groups. Firstly, as indicated by Bernard and Wagner (1997), the impact of export participation on wage differs between the various occupations of worker. As a result, our dataset is divided into production and non-production workers to examine export wage differences in each group. As pointed out in column 1 of Table 4.4, when controlling both firm and individual characteristics export participation does not create the statistically significant differences in wages between production workers. Furthermore, as found by Breau and Brown (2011), the effect of export participation on wage level may be different among various regions. The above specification of model is estimated again for rural and urban areas separately. As can be seen from Table

[7] An statistically insignificant effect of export participation on wage differences is also seen when the sample is divided into low tech, medium tech and high tech sector according to classification of General Statistics Office of Vietnam (see appendix 4)

4.4, export participation does not have an influence on wage inequality either rural areas or urban regions. Obviously, these findings indicate that the impact of export participation on wage differentials among employees is not sensitive across different occupations and regions.

4.4 The impact of export participation on the share of casual workers

Table 4.5: Fractional Probit Model (2007-2009)

Dependent variable: **share of casual workers**[8]		
VARIABLES	Pooled	Fixed effect[9]
	(1)	(2)
Export	0.051**	0.072**
	(0.015)	(0.033)
Size	0.000**	0.001**
	(0.000)	(0.000)
Output in log	0.018**	0.013
	(0.004)	(0.008)
Woman share	0.002	-0.051+
	(0.015)	(0.03)
Tax code	-0.02	-0.023+
	(0.012)	(0.013)
Average wage in log	-0.08**	-0.082**
	(0.007)	(0.01)
Competition level	-0.003	-0.013
	(0.014)	(0.018)
Urban dummy	0.001	0.000
	(0.01)	(0.011)
Union percentage	-0.068**	-0.044
	(0.017)	(0.028)
Medium tech sector	0.002	0.044
	(0.007)	(0.028)
High tech sector	0.019	0.043
	(0.016)	(0.031)
Time dummy	0.051**	0.052**
	(0.011)	(0.01)
Observations	2,988	2,988

Cluster robust standard errors at the district level in parentheses, Fixed effects model include the time averages of all explanatory variables. ** p<0.01, * p<0.05, + p<0.1, marginal effects are reported in the results.

Another main purpose of this paper considers the relationship between export participation and the proportion of non-regular workers. As shown in the Table 4.5, with regard to the role of export status on the ratio of casual workers, both models reach consensus. More specifically, export participation impacts positively and significantly on

[8] If using dependent variable is the share of permanent workers, the export participation has a negative impact on the share of permanent workers; the results are presented in appendix (2).
[9] As indicated by appendix (4), VIF is less than 10, this implies that the model does not suffer from the multicolinearity problem.

causal employment share and exporters use casual employment around 7% higher than non-exporting counterparts. On the one hand, this phenomenon implies that export decision of firms may help to solve labour abundance, especially in rural areas. In fact, generating extra income from casual work is a way in which households gain a higher standard of living (Van de Walle & Cratty, 2004). On the other hand, as indicated by Rand and Torm (2011), the labour contract status in which a worker hold represents the "empowerment" of employees. In this aspect, the export activities of firms do not improve the empowerment of workers.

With regards to the effect of formalization on the contract status of employees, the pooled model indicates a statistically insignificant impact of official registration of firms on the share of casual workers. However, the results change completely when unobservable factors are controlled in the regression. As presented in column 2 of Table 4.5, formality of firms has a negative and statistically significant effect on the share of casual workers. On average, the formalization results in a decrease of 2.3 percentage points in share of casual workers. This result is in line with findings of Rand and Torm (2011) about the role of formally registered status of firms on the improvement in the quality of employment. Becoming officially registered may encourage firms to be more committed to laws' regulations and ready to invest in human capital for their long term development (Rand & Torm, 2011).

Regarding of the role of trade unions in improving the employment quality**,** the pooled estimated results seem to reflect a positive role of trade unions when an increase in the fraction of workers who are members of a union organization results in a reduction in the ratio of non-regular workers. However, the absence of statistically significant influence of these coefficients after controlling time-invariant unobserved factors may reflect the fact that the role of trade union organization of Vietnamese SMEs is extremely limited in improving the status of employment contracts. The inefficient role of union trade organization may be due to union officers being staff who hold management positions in private firms (Rand & Tarp, 2011).

Lastly, as reported in column 2 of table 4.5, there are other factors causing the change in the ratio of non-regular workers. For instance, a decrease in female share would lead to an improvement in the proportion of casual workers. In addition, while larger firms tend to employ more casual employment, firms with higher average wages tend to employ fewer than

employees on casual contracts. Furthermore, in terms of the spatial effects, a positive but statistically insignificant link between the rate of casual workers and location dummy is also observed. Specifically, there is no difference in employing casual worker between firms in urban or rural regions. Beyond this, firms facing competition seem to use fewer casual workers than those who not face competition. However, the difference is in fact insignificant.

4.5 Sensitivity analysis

Table 4.6: Fractional Probit Model (2007-2009)

Dependent variable: the share of casual employees					
VARIABLES	Urban	Rural	Low technology	Medium technology	High technology
	Fixed effect	Fixed effect	Fixed effect	Fixed effect	Fixed effect
	(1)	(2)	(3)	(4)	(5)
Export	0.028	0.147**	0.098**	0.099	-0.045*
	(0.03)	(0.041)	(0.039)	0.10	(0.015)
Size	0.000+	0.001**	0.000*	0.001*	0.003*
	(0.000)	(0.000)	(0.000)	0.006	(0.001)
Output in log	-0.001	0.033*	0.019+	0.004	0.015
	(0.006)	(0.014)	(0.01)	(0.013)	(0.017)
Woman	0.018	-0.113*	-0.054+	-0.019	-0.118
share7	(0.027)	(0.050)	(0.027)	(0.06)	(0.117)
Tax code	-0.004	-0.031*	-0.014	-0.029	-0.025
	(0.02)	(0.015)	(0.023)	(0.023)	(0.034)
Average	-0.064**	-0.103**	-0.089**	-0.064**	-0.108**
wage in log	(0.012)	(0.017)	(0.012)	(0.013)	(0.025)
Competition	-0.015	-0.016	-0.022	0.015	-0.076
level	(0.024)	(0.029)	(0.038)	(0.025)	(0.047)
Union	-0.056*	0.05	-0.066+	-0.052	0.024
percentage	(0.023)	(0.048)	(0.035)	(0.039)	(0.063)
Medium tech	0.045	-0.017			
sector	(0.031)	(0.04)			
High tech	0.015	0.058			
sector	(0.027)	(0.039)			
Urban			0.007	0.008	-0.039*
dummy			(0.015)	(0.015)	(0.016)
Time dummy	0.048**	0.057**	0.05**	0.05	0.052*
	(0.012)	(0.017)	(0.012)	(0.009)	(0.019)
Observations	1,466	1,522	1,516	1,065	407

Cluster robust standard errors at district level in parentheses, Fixed effects model include the time averages of all explanatory variables. ** p<0.01, * p<0.05, + p<0.1, marginal effects are reported in the results.

Considering the data in full sample may conceal the impact of export participation on the share of casual workers through types of technology, and therefore, in order to investigate further the above analysis, the dataset is decomposed into low technology, medium technology and high technology sectors based on the classification of the Vietnamese General Statistics Office (see appendix 5). As can be seen from table 4.6, firms in industries with

medium technology do not experience a significant relationship between export participation and the share of casual workers. This seems reflect the fact that Vietnam is a net importer for the majority of medium-tech products (MoIT & UNIDO, 2011). Interestingly, whereas there is a positive association between the share of casual workers and export participation in low technology industries, the export participation has a negative and statistically significant effect on the share of casual employees in the high tech sectors. This may be because export participation help firms expand market (Van Biesebroeck, 2005). Consequently, this expansion may allow firms to enlarge scale of production and have a higher demand for labour. However, according to a report on Vietnam Industrial competiveness (2011) indicate that development of skills, learning sophisticated technology and gaining necessary experience for workforce take a long time for high tech industries . However, it may need a shorter time to learn skills and meet the requirement of jobs in low technology sectors such as textiles, clothing, food and beverages. Combined together, various characteristics among industries lead to various employment hiring behaviours toward casual workers.

Table 4.6 also presents the results of impact of export participation on the share of casual workers in different regions. The sample is divided into urban and rural regions. The results indicate a positive and statistically significant relationship between export participation and the share of worker in rural areas, while an insignificant relationship is observed in the rural areas.

Conclusion and policy implications:

Unlike previous studies, this study considers not only the linkage between the export participation-wage difference but also the relationship between export participation and the employment quality. Firstly, the empirical results show that employees in exporting firms are paid higher than those in non-exporting enterprises when only firm characteristics are considered. However, the significant impact of export participation on wages completely disappears when both firm characteristics and worker characteristics are controlled. The finding is robust when time-invariant unobservable factors are controlled. The results imply that the role of export status on wage may be exaggerated when worker characteristics are not controlled.

Secondly, the empirical findings in the export wage premiums suggest that workers with more experience, higher education and occupation are paid higher. Combined together, the our empirical results reflect that worker attributes such as education, experience, gender and occupation determine wage premium, and a change from working for a non-exporters to exporters cannot explain the difference in earnings.

Thirdly, the other main contribution of this study is the investigation of the impact of export participation on the employment status of workers. Our findings show that export activities lead to an increase the share of non-regular workers. However, the link between export participation and employment quality varies across sectors and location. While a positive and statistically significant impact of export participation on the share of causal workers is found in the low technology sector, an insignificant relationship is witnessed in medium technology industries. For high tech sectors, the estimated coefficient of export participation has a negative and statistically impact on the share of casual worker.

The above results imply that although several previous studies indicate that Viet Nam has been successful in creating jobs with export-led growth strategies, a positive link between export participation and the share of casual workers raises the demand to adjust policies that not only focus on job generation but also pay attention to the employment quality. An increase in labour regulations is important, when an increase in the group of vulnerable groups of workers is associated with a change in exporting decision of firms.

Although the spell fixed effect estimation may control time invariant unobserved factors, it cannot capture unobserved time variant factor. Therefore, further study may find suitable instrumental variables to overcome these shortcomings. In addition, a limitation in the dataset is that export intensity in 2007 is unavailable. In addition, although this index is available in 2009 the value is much mass at zero (e.g., only 105 firms over 2655 firms reporting export intensity in 2009). Therefore, this hinders us from considering other proxies for export status.

Appendix

Appendix 1: Definition and measurement of variables in the model of wages

Variables	Definition	Measurement
Dependant variable		
Real wage	The monthly wage of workers is converted to price of 1994	Numbers
Explanatory variables		
Exporter	1 if firms participate in exporting market	Dummy variable
Export intensity		Ratio
Plant characteristics		
Size	Total employment	Numbers
Capital intensity	The ratio of capital per total employment	Ratio
Woman share	The share woman in workforce	
Individual characteristics		
Age	The age of worker	Numbers
Worker permanent status	1 if worker has permanent labour contract, 0 otherwise	Dummy variable
Tenure	The number of years that workers worked for current firm	Numbers
Gender	1 if the gender of workers is male, 0 otherwise	Dummy variable
Education		
No education	1 if worker has no education, 0 otherwise	Dummy variable
Primary school	1 if worker has primary education, 0 otherwise	Dummy variable
Secondary school	1 if worker has graduated secondary education, 0 otherwise	Dummy variable
High school	1 if worker has graduated high school, 0 otherwise	Dummy variable
Technical certificate/ Elementary worker	1 if worker has completed technical education with elementary level, 0 otherwise	Dummy variable
Technical worker without certificate	1 if worker has completed technical education without certificate, 0 otherwise	Dummy variable
Technical worker/ professional secondary	1 if worker has completed professional secondary education, 0 otherwise	Dummy variable
University	1 if worker has graduated from university, 0 otherwise	Dummy variable
Occupation		
Manager	1 if worker is a manager, 0 otherwise	Dummy variable
Professional worker	1 if worker is a professional technican, 0 otherwise	Dummy variable
Office worker	1 if worker is office staff, 0 otherwise	Dummy variable
Sales worker	1 if worker is a sale staff, 0 otherwise	Dummy variable
Service worker	1 if worker is a service staff, 0 otherwise	Dummy variable
Other controlled variables		
High tech sector		Dummy variable
Time dummy		Dummy variable
Urban dummy		Dummy variable

Appendix2: Definition and measurement of variables in the model of casual/ permanent employment

Variables	Definition	Measurement
Dependent variables		
Share of casual workers	The ratio of total casual workers to total employment	Ratio
Share of permanent	The ratio of total regular workers to total	Ratio

workers	employment	
Explanatory variables		
Exporter	1 if firms participate in exporting market, 0 otherwise	Dummy variable
Firm size	The number of full time employment	Numbers
Production output		
Female share	Proportion of workforce are women	Ratio
Formality status of firms	1 if firms have a tax code, 0 otherwise	Dummy variable
Union percentage	The proportion of employees are union members	Ratio
Average wage	The ratio of total wage to total employees	Ratio
Level of competition of firms	1 whether firms face competition in operation, 0 otherwise	Dummy variable
High tech sector	1 if firm in high technology sector, 0 otherwise	Dummy variable
Medium tech sector	1 if firm in medium technology sector, 0 otherwise	Dummy variable
Low tech sector	1 if firm in low technology sector, 0 otherwise	Dummy variable
Urban dummy	1 whether firms operate in Hanoi, Haiphong and HoChiMinh , 0 otherwise	Dummy variable
Time dummy	1 whether year is 2009, 0 otherwise	Dummy variable

Table 4.6: The impact of export participation on the share of permanent workers

Variables	Dependent variable: share of permanent workers	
	Pooled	Fixed effect
	(1)	(2)
Export	-0.058**	-0.076**
	(0.016)	(0.026)
Size	-0.001**	-0.002**
	(0.000)	(0.001)
Output in log	-0.020**	-0.013
	(0.005)	(0.010)
Woman share7	0.001	0.091*
	(0.019)	(0.035)
Tax code	0.026	0.025
	(0.016)	(0.016)
Average wage in log	0.124**	0.127**
	(0.011)	(0.018)
Competition level	0.005	0.015
	(0.020)	(0.021)
Urban dummy	-0.006	
	(0.010)	
Union percentage	0.074**	0.047
	(0.017)	(0.028)
Time dummy	-0.085**	-0.086**
	(0.015)	(0.015)
Medium tech sector	0.005	-0.046+
	(0.007)	(0.025)
High tech sector	-0.016	-0.045
	(0.016)	(0.031)
Constant	0.873**	0.830**

	(0.026)	(0.056)
Observations	2,988	2,988
R-squared	0.194	0.224

Appendix3: Collinearity diagnostics for variables in the model of the impact of export participation on wage premium

Variable	VIF	1/VIF
Secondary school	3.96	0.25266
High school	3.47	0.288073
Professional worker	2.33	0.428539
Primary school	1.93	0.51771
Technical worker	1.81	0.552735
Size in log	1.71	0.585423
Office worker	1.69	0.59297
Elementary worker	1.65	0.607051
Manager	1.61	0.622782
Worker age	1.5	0.666394
Tenure	1.47	0.680156
Technical worker without certificate	1.43	0.701506
Worker gender	1.36	0.737871
Female share in the workforce	1.33	0.752961
Export	1.28	0.783718
Sales worker	1.27	0.786715
No education	1.26	0.792377
Service worker	1.19	0.839149
Urban dummy	1.16	0.858824
Capital intensity in log	1.15	0.870462
High tech	1.08	0.924455
Year dummy	1.04	0.960298
Permanent worker	1.02	0.980894
Mean VIF	1.64	

Note: As indicated in appendix3, all the VIF values are much less than 10, which indicates that this regression results does not encounter the problem of multicollinearity (Gujarati & Porter, 2009)

Appendix4: Collinearity diagnostics for variables in the model of the impact of export participation on the share of casual/permanent worker

Variable	VIF	1/VIF
Output in log	2.85	0.351109
Size	2.05	0.487193
Average wage in log	1.74	0.573685
Union percentage	1.38	0.726187
Woman share	1.32	0.757473
Tax code	1.3	0.76651
Medium tech	1.27	0.788821
Urban	1.24	0.803364
High-tech	1.22	0.817882

Export	1.22	0.819185
Competition level	1.03	0.96945
Time dummy	1.02	0.980317
Mean VIF	1.47	

Note: As indicated in appendix4, all the VIF values are much less than 10, which indicates that this regression results does not encounter the problem of multicollinearity (Gujarati & Porter, 2009)

Appendix5: List of the industries in terms of the level of technology.

Group 1: Low technology
D15: Food and beverages
D16: Cigarettes and tobacco
D17: Textile products
D18: Wearing apparel, dressing and dying of fur
D19: Leather and products of leather; leather substitutes; footwear.
D20: Wood and wood products, excluding furniture
D21: Paper and paper products
D22: Printing, publishing, and reproduction of recorded media
D23: Coke and refined petroleum products and nuclear fuel
D36: Furniture and other products not classified elsewhere
D37: Recycles products
Group 2: Medium technology
D24: Chemicals and chemical products
D25: Rubber and plastic products
D26: Other non-metallic mineral products
D27: Iron, steel and non-ferrous metal basic industries
D28: Fabricated metal products, except machinery and equipment
Group 3: High technology
D29: Machinery and equipment
D30: Computer and office equipment
D31: Electrical machinery apparatus, appliances and supplies
D32: Radios, television and telecommunication devices
D33: Medical equipment, optical instruments
D34: Motor vehicles and trailers
D35: Other transport equipment

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