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# Firm Exporting and Employee Benefits:

# First Evidence from Vietnam Manufacturing SMEs

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## Abstract

This study examines linkages between the export participation of firms and employee benefits in terms of wages and employment quality. Based on a uniquely matched firm-worker panel dataset for 2007 and 2009, we find evidence that export participation by firms in Vietnam has a positive impact on wages when taking into account firm characteristics alone. However, the exporter wage premium falls when both firm and worker characteristics are controlled for, and it decreases further when controlling for time-invariant unobservable factors by spell fixed effect estimation. While there are many studies on the export wage premium, the role of export participation on the quality of employment remains largely unexplored. By using a firm-level balanced panel dataset for the same period, our results suggest that export participation has a negative effect on employment quality. Nevertheless, the impact of export participation on both wages and employment quality vary greatly with respect to levels of technology.



## Keywords

exporting

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## 1. Introduction

This paper considers whether the higher productivity advantages of exporters may be converted into benefits for workers in the form of higher wages and better employment quality.[1] The role of export decision on wages has been investigated widely in both developing and developed countries (e.g., Breau & Rigby, 2006; Milner & Tandrayen, 2007). Although empirical studies based on firm-level data demonstrate that export status has a positive impact on the wage of employees, these results may suffer from a potential bias by failing to control for worker-characteristics when considering wage differentials (Schank, Schnabel, & Wagner, 2007). Another direction of research uses matched employer-employee data, which is much more suitable for investigating the export wage premium (Wagner, 2011). Nevertheless, the empirical evidence of the wage premium is still limited. Furthermore, these empirical results often vary greatly across different contexts, making it hard to make generalised inferences. Some studies indicate a positive linkage between export participation and wages (e.g., Milner & Tandrayen, 2007). Other researchers find negative impacts of the presence of firms in exporting markets on wages (Munch & Skaksen, 2008). Finally, other scholars suggest that the exporter wage premium does not exist when controlling for both firm and worker characteristics (Breau & Rigby, 2006). Based on a unique linked firm-worker panel dataset of manufacturing small and medium enterprises (SMEs), our study extends the literature by investigating whether export participation has an impact on wage differences in Vietnam's manufacturing SMEs. Our results indicate that export participation has a positive and significant impact on wages when controlling for firm characteristics alone. However, the export wage premium falls when we consider the observed heterogeneity of worker-firm matches, and it decreases further when considering unobserved heterogeneity.

Another important contribution that differentiates this study from the previous research is our focus on the linkage between export status and employment quality. The motivation to do so originates from two main concerns. First, while there are a few empirical studies of the impact of export activities on employment created, the role of export participation on the quality of employment is barely observed, possibly due to the unavailability of data. Among the few studies of this topic, Were (2011) is considered as the pioneering study of the impact of export participation on employment quality. However, the results are mixed. A positive impact is observed when using a panel data fixed effects approach for Kenya in 1994-5, but this is not the case for 2003 using cross-sectional data. Second, 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 exports in manufacturing has led to a significant increase in the demand for labour. However, there appears to have been little research that considers whether export participation may be a driving force in improving employment quality. To the best of our knowledge, our research is the first study of the impact of export participation on employment quality at the firm level in Vietnam. We find

[1] As indicated by Rand and Tom (2011), employment quality is defined as worker contract status and 'an improvement in employment quality as measured by a decrease in the use of casual worker (an increase in the share of workers with formal labour contracts)'. In Vietnam, the majority of casual workers do not gain social benefits (e.g., social insurance, health insurance, sick leave and annual leave) because they are often employed without written contracts.

that participation in exporting leads to a decrease in employment quality. Nevertheless, this impact is heterogeneous with respect to various technology levels.

The remainder of the paper is structured as follows: Section 2 briefly summarises the theoretical background on how export participation affects wages and employment outcomes. Section 3 explains data sources and the methodology used in this study. The empirical results and discussion follow in section 4. The last section provides a summary and policy implications.

## 2. Data Sources and Methodology

### 2.1 Data Sources

The data for this study come from the SME surveys conducted by the Ministry of Labour, Invalid and Social Affairs (MOLISA) in cooperation with Copenhagen University for the years 2005, 2007 and 2009. 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 data source).

A panel dataset for 2007 and 2009 was constructed to examine the impact of export participation on wage rates, because only these surveys included two separate modules for firm and worker-level 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 provides information about each worker such as age, sex, educational level, and occupation of workers in enterprises. It also offers the number of hours worked and the wage rate of each individual worker. More specifically, the employee module was conducted using 581 firms covering 1043 workers in 2007, and 577 firms covering 1444 workers in 2009. We excluded cases where there are missing observations and outliers. The combined firm and employee modules provide a unique employer-employee unbalanced panel data set covering 1725 observations. The data source provides information on both firm-level and worker individual characteristics for this study.

Two firm surveys in 2007 and 2009 were also chosen to investigate the effect of export participation on employment quality. One of the requirements of fractional probit panel estimates is that they need to be based on balanced panel data on all covariates. After cleaning the data and excluding missing values as well as outliers, we are left with 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 they are often expressed in current prices. Therefore, our data on current variables are deflated to 1994 prices using the GDP deflator to avoid biases that might arise because of inflation. A statistical description of the main variables in our regressions is displayed and explained in the appendix section of this study.

### 2.2 Model Specification and Estimation Methods

#### 2.2.1 The Impact of Export Participation on Wages

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

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

where the dependent variable is the real monthly wage ($w_{it}$). As shown in Appendix 3, the average wage is 682 thousand VND at 1994 prices. This proportion tends to increase slightly during the period 2007 to 2009. Export participation ($EX_{it}$) is the main variable of interest. A dummy variable is used for two reasons. First, as indicated by Stampini and Davis (2009), a dummy variable allows us to consider the effect of average treatment and minimize the biases due to measurement errors. In addition, export intensity in 2007 is unavailable, and this hinders us from considering the panel data estimation between export intensity and wages.

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 the wage premium because workers in larger firms are paid higher wages (Oi & Idson, 1999). Capital intensity, the ratio of capital over total employment, is expected to have a positive impact on wages (Schank et al., 2007). Furthermore, the share of women is included as an explanatory variable based on the finding that an increase in this index reduces the wage premium (Larsen, Rand, & Torm, 2011).

In an extended specification, we further control for worker characteristics. Model (1) now can be rewritten as follows: [2]

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

Among individual characteristics ($X_{2it}$), employees with higher educational levels are expected to gain higher wages (Mincer, 1974). Beyond this, the occupations of employees are also added in the model since it is found that there is a difference in pay for workers among various occupations (Milner & Tandrayen, 2007). Other individual characteristics such as tenure and age are controlled in the model of wages based on expectation that the more experienced workers gain higher wages (Mincer, 1974).

Finally, the linkage between export participation and wage difference may be affected by other factors such as industrial characteristics and location (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.

Ordinary least squares (OLS) is used to estimate models (1) and (2). When using 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 result, cluster robust standard errors at the firm level are reported in our regression results**.** Furthermore, when considering the linkage between export participation and the wage premium, the regression results may also be biased due to unobserved factors. To overcome this problem, spell fixed effect regression analysis has been employed following estimation procedure by Andrews, Schank, and Upward (2006). [3] The advantage of this model is that it can control for unobservable time-invariant factors of both firm and worker characteristics. Hence, it can be the most preferred method (e.g., Munch & Skaksen, 2008; Schank et al., 2007).

[2] Definitions and statistical description of variables are displayed in Appendices 2 and 3.

[3] Each spell is a unique employee-employer combination.

### 2.2.2 The Impact of Export Participation on the Share of Casual Employment

To examine the role of export participation on the share of casual employment, our empirical specification is kept as close as possible with the work of Were (2011) and is presented as follows: [4]

$$Y_{it} = \beta_0 + \beta_1 \ln(w) + \beta_2 \ln(Q_{it}) + \beta_3 EX_{it} + \beta_4 X_{it} + u_{it} \quad (3)$$

where the dependent variable ($Y_{it}$) is the share of casual workers. Among the independent variables, according to Were (2011), gross production output ($Q_{it}$) is expected to have a positive impact on the share of casual workers, average wage ($w_{it}$) is hypothesized to have a negative association with the ratio of irregular employees. Export participation is the variable of main interest that is captured by a dummy covariate**.** Attention is also given to other explanatory variables ($X_{it}$). Firstly, the formal status of firms has been added as an explanatory variable since it has been found to have a negative effect on the share of casual workers (Rand & Torm, 2011). As indicated by Rand and Torm (2011), a firm is defined to be formal if it has a tax code. 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 the ratio of irregular workers (Simpson, Dawkins, & Madden, 1997). Furthermore, as discussed by Mangan and Williams (1999), small firms are likely to use more casual workers as a means to solve shortages of employment; 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). Finally, the use of casual workers can be different across industries and locations; therefore, location and industry are controlled for in our empirical models.

The ratio of casual employment to total employment is a continuous variable, but censored at zero and one. In this case, the Tobit model is an appropriate method (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 a dependent variable between one and zero. In addition, in the framework of fractional panel Probit estimates, Papke and Wooldridge (2008) point out that unobserved time-invariant heterogeneity is controlled by adding time averages of all explanatory covariates in a balanced panel dataset. Equation 1 can be rewritten as follows:[5]

$$Y_{it} = f(W_{it}, Q_{it}, EX_{it}, X_{it}, \overline{F}) \quad (4)$$

where $\overline{F}$ is a set of time averages of explanatory variables to control unobserved effects. Using STATA, the above equation is estimated with GLM (generalized linear models) command by applying the 'cluster' option to correct standard errors. Furthermore, this model may be appropriate for a short panel dataset (Papke and Wooldridge (2008).

[4] The foundation of the theoretical model is seen in Appendix 1.
[5] Definitions and statistical description of variables are displayed in Appendices 4 and 5.

## 3. Empirical Results

This section offers two sets of estimation results. Sub-section 3.1 considers the effect of export participation on wage rates, starting with the basic model and then the extended specification model. Sub-section 3.2 presents the impact of export participation on employment quality.

### 3.1. The Effect of Export Participation on Wage Rates

The results are reported in Table 1. When only firm characteristics are controlled for, the results in column 1 suggest that export participation has a positive and statistically significant effect on wages. Employees in exporting firms are paid 9.5% more than those in non-exporting firms. Once both firm and worker characteristics are controlled for, the significant impact of export participation on wages becomes smaller and statistically insignificant. This finding confirms the results of Breau and Rigby (2006), who found an insignificant relationship between exporting and wage differentials after controlling for both firm and worker characteristics. When time-invariant unobservable factors are further controlled by using the spell fixed effect model, the estimated coefficient of impact of export participation on wages remains positive, but falls further.

Regarding the role of firm-level explanatory covariates in determining wages, 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 when invariant-time unobservable factors are controlled for in the spell fixed effects estimation. Both the estimated coefficients on female workforce share and firm size are statistically insignificant.

In terms of human capital, while more experienced and the permanent workers are paid higher wages, the educational level (column 2, Table 1) also has a close link with wage rates. In addition, occupation has a role in determining the wage rate whether unobservable time-invariant factors are controlled for or not, e.g. managers gain a 41.6 percentage higher wage premium than production workers.

Finally, the difference in gender is another factor having an effect on wages. 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 the gender wage gap (e.g., Milner & Tandrayen, 2007). As explained by Larsen et al. (2011), on the one hand, this wage gap between gender may reflect male workers being more productive than their female counterparts (Hægeland & Klette, 1997). On the other hand, based on a study in the Vietnamese context, it could be due to gender discrimination in wage payment (Liu, 2004).

Bernard and Wagner (1997) show that the impact of export participation on wages varies across occupations, and such effects may also be different in various industry sectors (Breau & Brown, 2011). We therefore further explore the wage differential between exporters and non-exporters across workers' occupations and levels of technology. Columns 1 and 2 of Table 2, which control for firm and worker characteristics, indicate that export participation does not have a statistically significant impact on wages. However, there is a strong effect on wages in the medium and high technology industries. This suggests that pooling data in Table 1 has clouded the impact as the opposite (even statistically insignificant) impact on wage in low technology industries has cancelled out the overall effect. We thus could argue that local treatment effect is more appropriate than the average treatment effect because firm heterogeneity often exists.

## Table 1: Impact of Exporting on Wage Differentials

| Variables | Dependent variable: log of real monthly wage | | |
|---|---|---|---|
| | Pooled (2007-2009) | Pooled (2007-2009) | Spell fixed effect (2007-2009) |
| Export (yes=1) | 0.095+ | 0.075 | 0.042 |
| | (0.056) | (0.055) | (0.123) |
| Size in log | 0.086** | 0.040* | 0.077 |
| | (0.015) | (0.017) | (0.083) |
| Capital intensity in log | 0.021 | 0.009 | -0.012 |
| | (0.014) | (0.013) | (0.028) |
| Female share | -0.243** | -0.140* | -0.424 |
| | (0.062) | (0.063) | (0.263) |
| Urban (yes=1) | 0.175** | 0.136** | |
| | (0.030) | (0.029) | |
| High tech sector (yes=1) | -0.009 | -0.023 | -0.106 |
| | (0.044) | (0.044) | (0.157) |
| Permanent worker | | 0.112 | 0.061 |
| | | (0.081) | (0.147) |
| Worker age | | 0.004** | 0.007* |
| | | (0.001) | (0.003) |
| Worker tenure | | -0.000 | 0.004 |
| | | (0.003) | (0.008) |
| Worker's gender | | 0.147** | 0.227** |
| | | (0.022) | (0.047) |
| No education | | -0.357** | -0.388* |
| | | (0.085) | (0.155) |
| Primary education | | -0.311** | -0.041 |
| | | (0.068) | (0.098) |
| Secondary schooled | | -0.246** | -0.023 |
| | | (0.051) | (0.114) |
| High school | | -0.187** | -0.060 |
| | | (0.047) | (0.082) |
| Technical certificate | | -0.041 | -0.093 |
| | | (0.056) | (0.126) |
| Technical worker without certificate | | -0.197* | -0.091 |
| | | (0.086) | (0.120) |
| Technical worker with professional secondary | | -0.055 | -0.032 |
| | | (0.037) | (0.059) |
| Manager | | 0.393** | 0.416** |
| | | (0.041) | (0.106) |
| Professional worker | | 0.105* | 0.190* |
| | | (0.046) | (0.080) |
| Office worker | | 0.020 | 0.110 |
| | | (0.041) | (0.097) |
| Sales worker | | 0.099* | 0.142 |
| | | (0.040) | (0.095) |
| Service worker | | -0.088* | -0.184+ |
| | | (0.042) | (0.104) |
| Year 2009 | 0.068** | 0.086** | -0.019 |
| | (0.025) | (0.024) | (0.044) |
| Constant | 6.076** | 5.988** | 5.921** |
| | (0.049) | (0.100) | (0.293) |
| Observations | 1,725 | 1,725 | 1,725 |
| R-squared | 0.142 | 0.329 | 0.295 |

*Notes: Cluster robust standard errors at firm level in parentheses, ** p<0.01, * p<0.05, + p<0.1. The base categories for education levels and occupations are university education and production workers respectively.*

**Table 2: Spell Fixed Effect Regression**

| Variables | Dependent variable: log of real monthly wage | | | |
|---|---|---|---|---|
| | Production | Non-production | Low tech industries | Medium & high tech industries |
| Export (yes=1) | 0.025 | 0.038 | -0.069 | 0.317* |
| | (0.034) | (0.159) | (0.145) | (0.144) |
| Size in log | 0.070** | 0.109 | 0.033 | 0.292** |
| | (0.023) | (0.095) | (0.119) | (0.103) |
| Capital intensity in log | 0.076** | 0.016 | -0.007 | -0.029 |
| | (0.009) | (0.028) | (0.050) | (0.029) |
| Female share | -0.864** | -0.585* | -0.456 | 0.002 |
| | (0.079) | (0.255) | (0.393) | (0.194) |
| Year 2009 | 0.100** | -0.019 | -0.036 | -0.046 |
| | (0.021) | (0.051) | (0.091) | (0.051) |
| Constant | 4.340** | 6.020** | 6.153** | 5.325** |
| | (0.105) | (0.439) | (0.394) | (0.363) |
| Observations | 954 | 771 | 952 | 773 |
| R-squared | 0.979 | 0.278 | 0.329 | 0.386 |

*Notes:*
*Cluster robust standard errors at firm level in parentheses; models in columns 2 and 3 controlled for permanent worker, age, tenure, gender, education and urban dummy; models in columns 3 and 4 controlled for permanent worker, age, tenure, gender, education, occupation and urban dummy.*

### 3.2 The Impact of Export Participation on the Share of Casual Workers

The second focus of this paper is to consider the relationship between export participation and the proportion of casual workers. Table 3 shows consistent results of the positive effect of exports on the share of casual workers regardless of model choices. This effect of exports may imply that exporting helps to solve labour surplus and unemployment problems. But Rand and Torm (2011) argue that the labour contract status, which a worker holds, represents the 'empowerment' of employees. In this aspect, the export activities of firms do not immediately improve the empowerment of workers.

The pooled model results indicate a statistically insignificant impact of official registration of firms (tax code) on the share of casual workers (column 1, Table 3). However, the impact is slightly improved when unobservable factors are controlled for (column 2, Table 3). This result is in line with findings of Rand and Torm (2011) on the role of formally registered status of firms on the improvement in the quality of employment. Becoming officially registered may encourage firms to comply with laws and regulations, particularly the labour code, and to invest more in human capital for their longer term development (Rand & Torm, 2011).

Considering the data in the full sample may conceal the impact of export participation on the share of casual workers. Therefore, to further investigate the impact of exporting on the different technology level sectors, we decompose the data into low, medium and high technology sectors based on the classification by the Vietnam General Statistics Office.[6] As can be seen from Table 4, firms in the medium technology sector do not experience a significant impact from export participation on the share of casual workers. This seems to reflect the fact that Vietnam is a net importer for the majority of medium-tech products

[6] See Appendix 6.

(Ministry of Industry and Trade of Vietnam & United Nations Industrial Development Organisation, 2011). Interestingly, a positive association between export participation and the share of casual workers is observed in low technology industries, but there is a negative association in the high technology industries. This may be because export participation may help firms expand their markets (Van Biesebroeck, 2005), and then firms need more labourers to meet the expansion in market demand. However, firms at different levels of technology are characterised by different behaviour in the labour market. According to a report on Vietnam's industrial competiveness (2011), the development of skills, learning sophisticated technology and gaining necessary experience for workforce takes a long time for high technology industries. Hence, permanent or long term contracts with employees may be the preferred choice for high technology firms. However, learning simple skills may need a shorter time to meet the requirement of jobs in low technology sectors such as textiles, clothing, food and beverages, and thus casual workers are hired more easily when firms need to meet an increasing demand from exporting markets.

**Table 3: Marginal effects - Fractional Probit Model (2007-2009)**

| Dependent variable: share of casual workers | | |
|---|---|---|
| Variables | Pooled | Fixed effect |
| Export (yes=1) | 0.051** | 0.072** |
| | (0.015) | (0.033) |
| Firm size | 0.0005** | 0.001** |
| | (0.000) | (0.000) |
| Output in log | 0.018** | 0.013 |
| | (0.004) | (0.008) |
| Female share | 0.002 | -0.051+ |
| | (0.015) | (0.03) |
| Formal status of firms (yes=1) | -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 (yes=1) | 0.001 | 0.000 |
| | (0.01) | (0.011) |
| Union percentage | -0.068** | -0.044 |
| | (0.017) | (0.028) |
| Medium technology sector | 0.002 | 0.044 |
| | (0.007) | (0.028) |
| High technology sector | 0.019 | 0.043 |
| | (0.016) | (0.031) |
| Year 2009 | 0.051** | 0.052** |
| | (0.011) | (0.01) |
| Observations | 2,988 | 2,988 |

*Notes:*
*Cluster robust standard errors at the district level in parentheses. The fixed effects model includes the time averages of all explanatory variables. ** p<0.01, * p<0.05, + p<0.1.*

**Table 4: Fractional Probit Model - Marginal Effects (2007-2009)**

| Dependent variable: the share of casual employees | | | |
|---|---|---|---|
| Variables | Low technology | Medium technology | High technology |
| | Fixed effect | Fixed effect | Fixed effect |
| | (3) | (4) | (5) |
| Export | 0.098** | 0.099 | -0.045* |
| | (0.039) | 0.10 | (0.015) |
| Firm size | 0.0007* | 0.001* | 0.003* |
| | (0.000) | 0.006 | (0.001) |
| Output in log | 0.019+ | 0.004 | 0.015 |
| | (0.01) | (0.013) | (0.017) |
| Female share | -0.054+ | -0.019 | -0.118 |
| | (0.027) | (0.06) | (0.117) |
| Formal status of firms | -0.014 | -0.029 | -0.025 |
| | (0.023) | (0.023) | (0.034) |
| Average wage in log | -0.089** | -0.064** | -0.108** |
| | (0.012) | (0.013) | (0.025) |
| Competition level | -0.022 | 0.015 | -0.076 |
| | (0.038) | (0.025) | (0.047) |
| Union percentage | -0.066+ | -0.052 | 0.024 |
| | (0.035) | (0.039) | (0.063) |
| Urban dummy | 0.007 | 0.008 | -0.039* |
| | (0.015) | (0.015) | (0.016) |
| Year 2009 | 0.05** | 0.05 | 0.052* |
| | (0.012) | (0.009) | (0.019) |
| Observations | 1,516 | 1,065 | 407 |

*Notes:*
*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*

## 4. Conclusions

Unlike previous studies, this study considers not only the linkage between the export participation and wage rates, but also the relationship between export participation and employment quality (contract status). The study provides some key findings as follows.

Firstly, employees in exporting firms are paid higher than those in non-exporting enterprises when only firm characteristics are controlled for, but the wage differential decreases when both firm characteristics and worker characteristics are controlled for. This effect decreases further when controlling for unobserved heterogeneity. The results imply that the role of export status on wages may be upward-biased when worker characteristics and unobserved characteristics were not controlled for in the previous studies. Moreover, we do observe the impact of export participation on wage rates in medium and high tech sectors, suggesting that the impact is heterogeneous across sectors.

Secondly, export activities affect the share of casual workers in the labour force of firms. However, the link between export participation and employment quality varies greatly across the different technology levels. While export participation leads to employing more causal workers in the low technology industries, high tech industries tend to employ more permanent employees in the labour force.

Although several previous studies have indicated that Vietnam has been successful in creating jobs with export-led growth strategies, a positive link between export participation and the share of casual workers suggests that policymakers should pay more attention to improving the employment contract status in order to protect workers from uncertainty of employment contract, especially for low technology sectors. This in turn helps the low skilled workers who are vulnerable to income shocks if they lose their jobs due to unsecure employment contracts.

# Appendices

## Appendix 1
## Theoretical Model of the Impact of Export Status on Employment

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

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

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

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

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

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

And multiplying (2) by unit price (P): $MRP_K = p\alpha A^{\lambda} K_{it}^{\alpha-1} L_{it}^{\beta} = c$ (4)

And Multiplying (3) by unit price (P): $MRP_L = p\beta A^{\lambda} K_{it}^{\alpha} L_{it}^{\beta-1} = w$ (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-hand side of equation (11):

$$\ln L_{it} = \varphi_0 + \varphi_1 \ln(\frac{w}{c}) + \varphi_2 \ln(Q_{it}) \quad (12)$$

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 exports ($EX_{it}$). Therefore, equation (12) is written as follows:

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

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).

## Appendix 2
## Definition of Variables in the Model of Wage

| Variables | Definition |
|---|---|
| **Dependant variable** | |
| Real monthly wage | The monthly wage of workers is converted to price of 1994 |
| **Explanatory variables** | |
| Export | 1 if firms participate in exporting market, 0 otherwise |
| **Firm characteristics** | |
| Size | Total employment |
| Capital intensity | The ratio of capital per total employment |
| Female share | The share of woman in workforce |
| **Employee characteristics** | |
| Age | The age of worker |
| Permanent worker | 1 if worker has permanent labour contract, 0 otherwise |
| Tenure | The number of years that workers worked for current firm |
| Gender | 1 if the gender of workers is male, 0 otherwise |
| ***Education*** | |
| No education | 1 if worker has no education, 0 otherwise |
| Primary education | 1 if worker has primary education, 0 otherwise |
| Secondary education | 1 if worker has graduated secondary education, 0 otherwise |
| High school | 1 if worker has graduated high school, 0 otherwise |
| Technical certificate | 1 if worker has completed technical education with elementary level, 0 otherwise |
| Technical worker without certificate | 1 if worker has completed technical education without certificate, 0 otherwise |
| Technical worker with professional secondary | 1 if worker has completed professional secondary education, 0 otherwise |
| University | 1 if worker has graduated from university, 0 otherwise |
| ***Occupation*** | |
| Manager | 1 if worker is a manager, 0 otherwise |
| Professional worker | 1 if worker is a professional technician, 0 otherwise |
| Office worker | 1 if worker is office staff, 0 otherwise |
| Sales worker | 1 if worker is a sale staff, 0 otherwise |
| Service worker | 1 if worker is a service staff, 0 otherwise |

## Appendix 3
## Summary Statistics for Variables in the Model of Wage

| 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 |
| Exporter | 0.13 | 0.34 | 0.13 | 0.34 | 0.132 | 0.34 |
| 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 |
| Permanent Worker | 0.97 | 0.15 | 0.96 | 0.18 | 0.98 | 0.11 |
| 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 |
| 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 with 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 |
| 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 dummy | 0.52 | 0.49 | 0.55 | 0.497 | 0.51 | 0.50 |
| High 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)

## Appendix 4
## Definition of Variables in the Model of the Share of Casual Workers

| Variables | Definition |
|---|---|
| **Dependent variables** | |
| Share of casual workers | The ratio of total casual workers to total employment |
| **Explanatory variables** | |
| Export | 1 if firms participate in exporting market, 0 otherwise |
| Firm size | Total employment |
| Output | The value of manufactured output |
| Female share | The share of woman in workforce |
| Formal status of firms | 1 if firms have a tax code, 0 otherwise |
| Union percentage | The proportion of employees are union members |
| Average wage | The ratio of total wage to total employees |
| Competition level | 1 whether firms face competition in operation, 0 otherwise |
| High tech sector | 1 if firm in high technology sector, 0 otherwise |
| Medium tech sector | 1 if firm in medium technology sector, 0 otherwise |
| Low tech sector | 1 if firm in low technology sector, 0 otherwise |
| Urban dummy | 1 whether firms operate in Hanoi, Haiphong and HoChiMinh, 0 otherwise |
| Year 2009 | 1 whether year is 2009, 0 otherwise |

## Appendix 5
## Summary Statistics for the Variables in the Model of the Share of Casual Workers

| 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 |
| Exporter | 0.068 | 0.25 | 0.063 | 0.24 | 0.072 | 0.26 |
| 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 |
| Formal status of firms | 0.753 | 0.43 | 0.72 | 0.44 | 0.78 | 0.41 |
| Union percentage | 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 | |

## Appendix 6: Technological Level Classification

### 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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