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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 some 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 and becomes insignificant 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.

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

[1] As indicated by Rand and Torm (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.

The remainder of the paper is structured as follows: Section 2 explains data sources and the methodology used in this study. The empirical results and discussion follow in section 3. 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. [2] More specifically, the employee module was conducted using 581 firms covering 1043 workers in 2007, and 577 firms covering 1444 workers in 2009. On average, we have 2-3 workers that are sampled in each firm. We excluded cases where there are missing observations, outliers and those firms that are not SMEs, or do not belong to the manufacturing sector or do not have non-stated ownership. The combined firm and employee modules provide a unique employer-employee unbalanced panel data set covering 1725 observations: 727 workers for 385 firms in 2007 and 998 workers for 394 firms in 2009. The data source provides information on both firm-level and worker individual characteristics for this study. However, when using two time-period panel dataset, some worker-firm combinations occur only once.

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] As indicated by Larsen, Rand and Torm (2011), the employees interviewed in our sample covered nearly all various occupation categories (managers, professionals, office workers, sales workers, services workers and production workers). In addition, these employees were randomly sampled from random sub-samples of firms (Torm, 2012**)**. Hence, they can be regarded as representative.

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 as 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 wage 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 as we expect larger firms are paid higher wages (Oi & Idson, 1999). In addition, capital intensity and the share of women are included as an explanatory variables based on the findings of previous studies about the linkage between these indexes and wages (Schank et al. 2007, Larsen, Rand, & Torm, 2011).

In an extended specification, we further control for worker characteristics. Model (1) now can be rewritten as follows: [3]

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

Among individual characteristics (X_{2it}), the human capital theory suggests to control for educational levels, the occupations of employees, tenure, experience workers' age are controlled in the model of wages (Mincer, 1974; Milner & Tandrayen, 2007).

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 since learning sophisticated technology and gaining necessary experience for workforce in high-tech sectors need a long time. In addition, rural firms may pay lower wages than urban firms because cities often attract employees with higher observed skills as well as unmeasured capabilities (Yankow, 2006). 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 correlation of error terms across employees within an enterprise (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 is employed following the estimation procedure by Andrews, Schank, and Upward (2006).[4] 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).

[3] Definitions and statistical description of variables are displayed in Appendices 2 and 3.
[4] 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:[5]

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

where the dependent variable (Y_{it}) is the share of casual workers. Among the independent variables, gross production output (Q_{it}) is expected to have a positive impact on the share of casual workers (Were, 2011). One may wonder that average wage (w_{it}) may be endogenous. However, we included this variable in the model as the previous specification with purposing to create comparable results. In addition, we are interested in the ceteris paribus effect of exporting on the share of casual 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), in the Vietnamese context, 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:[6]

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

where $\overline{F}_i$ is a set of time averages of explanatory variables to control for 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).

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.

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

3.1. The effect of export participation on wage rates

Table 1: Impact of exporting on wage differentials

Dependent Variables / Controlled Variables	Log of average firm-level real monthly wage	Log of individual level real monthly wage[7]		
	Pooled (2007-2009)	Pooled (2007-2009)	Pooled (2007-2009)	Spell fixed effect (2007-2009)
Export (yes=1)	0.2218*	0.095+	0.075	0.042
	(0.104)	(0.056)	(0.055)	(0.123)
Size in log	0.1914**	0.086**	0.040*	0.077
	(0.037)	(0.015)	(0.017)	(0.083)
Capital intensity in log	0.1462**	0.021	0.009	-0.012
	(0.029)	(0.014)	(0.013)	(0.028)
Female share	-0.1846	-0.243**	-0.140*	-0.424
	(0.162)	(0.062)	(0.063)	(0.263)
Urban (yes=1)	0.2516**	0.175**	0.136**	
	(0.072)	(0.030)	(0.029)	
High tech sector (yes=1)	-0.0422	-0.009	-0.023	-0.106
	(0.104)	(0.044)	(0.044)	(0.157)
Permanent worker			0.112	0.061
			(0.081)	(0.147)
Worker's 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	-0.1122+	0.068**	0.086**	-0.019
	(0.068)	(0.025)	(0.024)	(0.044)
Constant	5.1639**	6.076**	5.988**	5.921**
	(0.117)	(0.049)	(0.100)	(0.293)
Observations	910	1,725	1,725	1,725
R-squared	0.113	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.*

[7] The urban dummy is dropped (column 4) since it does not vary within each spell (Andrews et.al, 2006).

The results are reported in Table 1. We find some evidence of export participation having a positive effect on wages when only firm characteristics are controlled for. The results in columns 1 and 2 suggest that employees in exporting firms are paid from 9.5% to 22.18% more than those in non-exporting firms depending on model specification. However, once both firm and worker characteristics are controlled for, the significant impact of export participation on wages becomes smaller and statistically insignificant (column 3). This finding is consistent with 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 for by using the spell fixed effect model (column 4), the estimated coefficient of export participation on wages remains positive, but falls further and become less statistically significant. This may imply that the unobserved factors that conventional models fail to control for play an important role in considering the linkage between export participation and wages.

Regarding the role of firm-level explanatory covariates in determining wages, the pooled data estimates 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 permanent workers are paid higher wages, the educational level (column 3, Table 1) also has a close link with wage rates as the wider literature suggests. 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 percent 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 according to different model specifications. 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).

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. However, columns 1 and 2 of Table 2 reveal that export participation does not have a significant influence on wage inequality either rural areas or urban regions. In addition, Bernard and Wagner (1997) show an impact of export participation on wages varies across occupations. Furthermore, the role of export on wages may also be different in various industry sectors originates from the fact that behaviour of exports of firms in various levels of technology is much different in Vietnam (Ministry of Industry and Trade of Vietnam & United Nations Industrial Development Organisation, 2011). We therefore further explore the wage differential between exporters and non-exporters across workers' occupations and levels of technology. Columns 3, 4 and 5 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 an 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 the local treatment effect is more appropriate than the average treatment effect because firm heterogeneity often exists.

Table 2: Spell fixed effect regression

Controlled Variables	Dependent variable: log of individual level real monthly wage					
	Urban	Rural	Production	Non-production	Low tech industries	Medium & high tech industries
Export (yes=1)	0.109	-0.033	0.025	0.038	-0.069	0.317*
	(0.251)	(0.148)	(0.034)	(0.159)	(0.145)	(0.144)
Size in log	0.027	0.168+	0.070**	0.109	0.033	0.292**
	(0.138)	(0.089)	(0.023)	(0.095)	(0.119)	(0.103)
Capital intensity in log	-0.019	0.040	0.076**	0.016	-0.007	-0.029
	(0.032)	(0.085)	(0.009)	(0.028)	(0.050)	(0.029)
Female share	-0.214	-0.767*	-0.864**	-0.585*	-0.456	0.002
	(0.433)	(0.326)	(0.079)	(0.255)	(0.393)	(0.194)
Year 2009	-0.044	0.072	0.100**	-0.019	-0.036	-0.046
	(0.051)	(0.129)	(0.021)	(0.051)	(0.091)	(0.051)
Constant	5.971**	5.898**	4.340**	6.020**	6.153**	5.325**
	(0.378)	(0.456)	(0.105)	(0.439)	(0.394)	(0.363)
Observations	913	812	954	771	952	773
R-squared	0.319	0.498	0.979	0.278	0.329	0.386

Notes: Cluster robust standard errors at firm level in parentheses; models in columns 1 and 2 controlled for permanent worker, age, tenure, gender, education, occupation and high tech; models in columns 3 and 4 controlled for permanent worker, age, tenure, gender, education, urban dummy and high tech; models in columns 5 and 6 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

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

Dependent variable: share of casual workers[8]		
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.*

[8] As a robustness check, we try different scenarios with the whole and sub-samples. First, firm size in squared forms is added in the specification. Second, firm size is replaced by log firm size. Third, log of average wages is omitted from the specification. Finally, the above specification is re-estimated by least squares methods. However, qualitatively similar results are yielded in all cases, and they are available on requests.

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).

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

*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*

As discussed previously, in Vietnam the behaviour of export is much different among various technology levels**,** and 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.[9] 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

[9] See Appendix 6

products (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.[10] 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.

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 wages 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.

[10] To explore this issue, we ran a specification in which the log of employment is a dependent variable regressed on independent covariates that include export status, output, female share, formal status of firms, average wage, competition level, union percentage, an urban dummy, a dummy for high tech sectors, a dummy for medium tech sectors and a dummy for the year 2009. Using this formulation, a positive effect of export participation on the numbers employed was found. These results are available on request.

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*:

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

where Q_{it} denotes real output, K_{it} denotes capital and L_{it} denotes labour.

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

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

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).

$$MRP_K = p\alpha A^{\lambda} K_{it}^{\alpha-1} L_{it}^{\beta} = c \tag{4}$$

$$MRP_L = p\beta A^{\lambda} K_{it}^{\alpha} L_{it}^{\beta-1} = w \tag{5}$$

After some transformation, we have:

$$K_{it} = \frac{w\alpha}{c\beta} L_{it} \ . \tag{6}$$

$$Q_{it} = A^{\lambda} \left(\frac{w\alpha}{c\beta} L_{it} \right)^{\alpha} L_{it}^{\beta} \tag{7}$$

$$\ln L_{it} = \varphi_0 + \varphi_1 \ln(\frac{\mathrm{w}}{\mathrm{c}}) + \varphi_2 \ln(\mathrm{Q_{it}}) \tag{8}$$

where $\varphi_0 = -(\lambda \ln A + \alpha \ln \alpha - \alpha \ln \beta)/(\alpha + \beta)$, $\varphi_1 = -\alpha/(\alpha + \beta)$ and $\varphi_2 = 1/(\alpha + \beta)$.

According to Greenaway et al. (1999), A is assumed to change with exports (EX_{it}). Therefore, equation (8) is written as follows:

$$\ln L_{it} = \phi_0 + \phi_1 \ln(w/c) + \phi_2 \ln(Q_{it}) + \phi_3 EX_{it} \tag{9}$$

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)

Appendix4: 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

Appendix5: 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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