

**EXPORT INTENSITY AND IMPACTS FROM FIRM CHARACTERISTICS,  
DOMESTIC COMPETITION AND DOMESTIC CONSTRAINTS IN VIETNAM:  
A MICRO-DATA ANALYSIS**

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***Abstract***

*This study examines how a firm's characteristics, perceived competition intensity and constraints in the domestic market affect the intensity of its exports in a transition country that is pursuing export-led growth strategies. Specifically, we employ a cross-sectional micro-data set derived from the World Bank's survey on productivity and investment climate in Vietnam in 2005 in an empirical analysis that properly controls for possible sample selection and endogeneity. Besides observing that those firms that have acquired some level of integration and taken advantage of labor-abundant economy have higher export intensity, we can also find that perceived competition in the domestic market induces firms to intensify their sales in foreign markets relative to that in the domestic one. Furthermore, it is interesting to find that even in a developing country like Vietnam, it is not constraints in domestic physical infrastructure and factor markets that hinder firms from increasing their intensity of exports, but obstacles in policy, administration and social environments that do matter. These findings support the implication that it is reasonable and feasible in the context of recent global crisis that priorities should be set for reforms in "soft" infrastructure in order to help firms boost exports.*

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## I. INTRODUCTION

After twelve years of rushing for membership of the World Trade Organization (WTO), Vietnam finally became the organization's 150<sup>th</sup> member in January 2007. This event reflects the great efforts that Vietnam has made in its strategic approach of actively engaging in international economic integration for development after a long time stuck in stagnant centrally planned economy. Since early 1990s, exports have been considered an engine for growth and hence extensively fostered via various measures<sup>1</sup>. Export sales increased at an annual average rate of more than 21 percent while GDP at more than 7 percent in the period from 1986 to 2005. The proportion of exports in GDP also increased steadily, from around 20 percent in the period of 1986-1990 to 54 percent in 2001-2005 (GSO, 2006). The increases in export sales and exports/GDP share in this high-growth period hint that exporting is a significant channel for economic growth in Vietnam. Although this argument is supported by the study of Thang and Ngoc (2004), there are other studies at the macro-data level that found exports not a growth engine in the country as expected despite the high export performance. Ngoc et al. (2003) find no while Anh (2008) find very small impact of exports on Vietnam's growth. Hiep and Ohta (2009) attribute the fact of mixed findings to the irrelevance of using aggregate data in the analysis of this issue<sup>2</sup>. They argue that exports are actually driven by firms and affect the economy via different channels whose magnitudes are different. Therefore, micro-data analysis using establishment- or firm-level data<sup>3</sup> is more appropriate for examining the relationship between exports and growth. Following this approach, they find that the country is actually benefiting from two important channels of export effects. Exports induced better use of resources via appropriately inducing resource reallocation between industries in the country. Besides, exports also helped firms improve themselves via learning-by-exporting effects. Exporting makes firms yield higher growth of total factor productivity (TFP), sales and employment as compared to those of non-exporters. Moreover, the more intense firms export the higher TFP and sales growth they experience. However, these benefits are adversely affected by negative effects in the third channel where the process of self-selection of firms into exporting so far does not operate in a favorable way for the country to yield from intra-industry reallocation of national resources. These three forces might have acted in such different magnitudes that the recent contribution of exports to the country's growth could not be found significant as some macro studies have raised.

With the above-mentioned evidence, fostering exports while controlling better the process of export entry and exit of firms must be an appropriate approach for a faster economic growth. To firms, boosting exports includes not only enhancing their chances to sell abroad but also intensifying their export activities. Therefore, knowing which factors affecting firm's decision of whether to export or not (export propensity) and which ones affecting the decision of how much of total sales set for exports (export intensity) must be implicatively interesting. The determinants of export propensity of firms in

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<sup>1</sup> This can be found in the country's Socio-Economic Development Strategies for the period of 1991-2000 as well as in those of the period of 2001-2010.

<sup>2</sup> See, for example, Isgut (2001) for more details on this argument.

<sup>3</sup> Hereafter mentioned as firm-level data

Vietnam are examined in a considerable detail by Hiep and Ohta (2008), with an emphasis on those from firm's own characteristics. In this study, we focus on the analysis of export intensity, with an examination of the effects of not only firm characteristics but also factors from business environment.

Although there are many studies in the literature of determinants of export behaviors of firms, most of them are concerned about export propensity while separate analysis of export intensity is of very little examination. In economic field, our review of over ninety micro-data studies of export decision making reveals that just about ten percent of them deal with export intensity<sup>4</sup>. The reason behind this may be that researchers might consider the decision to export or not to export to be made simultaneously with the decision of how much to export. However, recent papers such as Helpman et al. (2008) or Lawless and Whelan (2008) find that although the two decisions are interdependent, they are different and the impact magnitudes of each factor on the two decisions are heterogeneous. This supports the argument for separate examination of these behaviors. Besides, it is worth doing so because relevant studies of export intensity still find mixed results. As far as firm characteristics are concerned, productivity, size, age and innovation activities of firms are of the most interest. Theoretically, productivity, used as a proxy for efficiency, is considered the key factor that determines the difference in export behaviors of firms<sup>5</sup>. Empirically, productivity is found in many studies having significant effect on the propensity of firms' export. However, it is not the case with export intensity. Liu et al. (1999) and Castellani (2001) find labor productivity, defined as value added per employee, has no statistically significant effects on export intensity of firms in Taiwan and Italy, respectively. Farinas and Martin-Marcos (2007) observe no clear patterns of the effects of labor productivity in Spain, with different effect directions found in different industries. About the effect of firm size, Wagner (2001) finds an inverse U-shape pattern of the effect in Germany while Pla-Barber and Alegre (2007) find no significant evidence for the effect in the biotechnology industry of France. However, these two studies find significant effects of innovation on export intensity of firms, in line with what Lachenmaier and Wößmann (2006) observe in German manufacturing sector. Majocchi et al. (2005) and Fryges (2006) find different effect of firms' age on their export intensity. The former finds positive effect of firm age in Italy but the latter finds the opposite when examining German and British technology-oriented firms.

In studies analyzing impacts from external factors, more attention is paid to characteristics of industries and export markets while little concern is about those from domestic markets<sup>6</sup>. We also observe mixed findings in these studies. In reviewing competition determinants of export decision making, Morgan (1999) sees that although business theories suggest the intensity of competition in a market is negatively associated with the market attractiveness, empirical findings show no significant evidence of the relationship between perceived competitive intensity in the domestic market and export strategy development. He finds three papers that reported a positive relationship between intense domestic market competition and greater export involvement. However, he also finds other three papers that reported non-significant results. A more recent paper of Cloughety and Zhang (2008) finds a

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<sup>4</sup> This is also observed by Lawless and Whelan (2008).

<sup>5</sup> See, for example, Roberts and Tybout (1997) or Melitz (2003).

<sup>6</sup> See Zou and Stan (1998) for a review.

positive relationship between domestic rivalry and international performance in the world airline industry. As far as other domestic constraints are concerned, Yoshino (2008) finds that infrastructure and customs constraints have negative effects on export intensity of African firms, especially with those exporting to regional markets. However, Correa et al. (2007) find no significant evidence of negative effects from infrastructure constraints in Ecuador but positive effects of the ease of financing access.

Different empirical findings observed above support the argument of Roberts and Tybout (1997) that different idiosyncratic forces at work determine export behaviors of firms in different countries. It is therefore inappropriate to apply findings in a country in explaining export behaviors of firms in another. For export intensity of firms in Vietnam, to our best knowledge, there are no studies except that of Estrin et al. (2008). However, Estrin and colleagues examine export intensity of only subsidiaries of multinational enterprises, and not exclusively for Vietnam but six emerging economies including Vietnam. Although they find no significant evidence for the effect of economic freedom level in host countries on export propensity of subsidiaries, the effect of that on export intensity is found significantly negative, emphasizing the importance of institutional factors. To explore this issue in Vietnam more intensively, we examine in this study how Vietnamese firms' characteristics, perceived competition intensity and constraints in the domestic markets affect their decision on export intensity. To do so, we employ a cross-sectional micro-data set derived from the World Bank's survey on productivity and investment climate in Vietnam in 2005, where we can have specific information of not only firms' exports and other firm-specific characteristics but also their perception of domestic competition and various domestic constraints. Empirical framework in this study is properly chosen to control for possible sample selection and endogeneity. We expect to have a better insight of the impacts of internal and external factors on export intensity of firms in Vietnam, a transition country so far pursuing export-led growth strategies, setting some hints for implications in boosting firm exports.

This paper is outlined as follows. The next section, Section II, elaborates theoretical framework for the analysis in this study. It also describes the data set used and explains the construction of variables employed in estimations. Section III specifies empirical specifications. Results from the estimations will be reported and discussed in section IV, and Section V raises some concluding remarks.

## **II. THEORETICAL FRAMEWORK, DATA DESCRIPTION AND VARIABLES CONSTRUCTION**

### **Theoretical framework**

Economic theoretical background of export behaviors of firms is based on heterogeneous-firm trade theories. Firms in these theories are considered different in terms of efficiency. Besides, they incur different fixed and variable costs when involved in trade. The heterogeneity in firm-specific efficiency and trade costs determines the difference in export behaviors among firms. Hence, any factors that affect efficiency levels and trade costs of firms will be possible determinants of their export decisions. Roberts and Tybout (1997) is among the first who examine the role of efficiency in the decision to export or not to export of firms in partial equilibrium analysis while study of Melitz (2003) is frequently cited as a tractable analysis of the decision in general equilibrium framework. The spirit of these papers

is that more efficient firms are more likely to export and export more than the less efficient firms, given the existence of variable and fixed trade costs that are assumed invariant among firms. However, two firms in the same country and exporting to the same set of countries will have the same export intensity, independent of difference in their efficiency. Bernard et al. (2003) predict that more efficient firms can export to more markets than the less one because potential export markets have different conditions that make the threshold level of efficiency for export entrance to each market different. Combined with findings of Melitz (2003), this argument implies that the more efficient firms have higher levels of export intensity. This prediction is then confirmed by others such as Helpman et al. (2008) and Yoshino (2008). Helpman et al. (2008), Yoshino (2008) and Lawless and Whelan (2008) also relax the assumption of the same trade costs incurred by different firms and examine the effects of firm-specific and market-specific trade costs on export propensity and export intensity of firms. They theoretically argue that export sales, and hence export intensity, are negatively related to trade costs. In summary, economic theories support the argument that firm's attributes and business environment characterize export intensity via affecting efficiency and firm-specific trade costs. Our analysis in this paper is mainly based on this argument<sup>7</sup>.

In addition, theories in business management also reveal a different channel via which firm characteristics and external business conditions affect export performance. Cavusgil and Zou (1994) propose a conceptual framework of export marketing strategy and performance that is widely accepted by business theorists. They argue that exporting can be conceptualized as a strategic response by management to the interplay of firms' internal and external forces. Besides affecting export performance of firms directly, the internal and external factors also indirectly influence export performance via their impacts on export marketing strategy of the firms such as market selection, market segmentation or markup determination. Therefore, factors such as domestic competition intensity and domestic constraints may shape exporting strategy of the firms, besides affecting firm's efficiency and costs. Especially, Cloughety and Zang (2008) summarize two rationales that relate domestic competition and export involvement. National-champion rationale argues that firms who have large domestic operations can take advantage of economies, which allow them to earn large shares and profits in export markets. When domestic competition gets more intense, they will face deterioration in this advantage and therefore decrease in export sales. In contrast, rivalry-rationale supports the idea that domestic rivalry provides firms with vigorous and real pressures to improve themselves as well as to find new markets, including overseas ones. The first rationale implies that more intense domestic competition will reduce firms' exports while the second implies perceived competition enhances firms' export involvement. Market competition also influences executive behaviors. Hermalin (1992) finds that income effect (reduced income due to contracted market segment) and risk adjustment effect (more risks) of market competition may lead executives to change their behaviors in involving different markets. With all the arguments cited above, it is necessary in the analysis of export behaviors to examine external factors that affect firm's efficiency, trade costs as well as export-related strategic management, in addition to firm's characteristics themselves.

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<sup>7</sup> For specific mathematical treatment of this framework, see papers such as Yoshino (2008) and Lawless and Whelan (2008).

### **Data description and variables construction**

For the purpose of this study, we employ a data set derived from “Productivity and the Investment Climate Enterprise Survey of Vietnam” (Vietnam PICS) conducted by the World Bank with the coordination of Asian Development Bank in 2005. This survey records information of 1,150 firms in the manufacturing sector of the country in 2004, following random sampling methodology. It involves face-to-face interviews with managing directors, accountants, human resource managers and other company staff, giving a reliable and comprehensive coverage of firm’s characteristics, perception of firms about domestic market competition conditions as well as various types of constraints. The sample is about 5.6 percent of 20.5 thousands manufacturing firms in Vietnam in 2004 (GSO, 2005).

With the availability of this data set, we can choose various variables for our analysis. Definition and summary statistics of these variables are listed in Tables 1.1-1.3. We are interested in efficiency levels of firms as an important attribute of firms in their decision of export intensity. However, due to limitation of the data set, we cannot properly calculate any measures of underlying technological efficiency such as total factor productivity. Instead, we use a measured productivity in the form of value added per employee, as many other studies do. Although we employ this measure as a proxy for difference in efficiency among firms, we do that with caution. As Bernard et al. (2003) specify, value added per factor input does not always have something to do with underlying efficiency. As we know from heterogeneous-firm trade theories with monopolistic competition, a firm’s sales level is negatively related to price. The higher the price it charges, the lower revenue it can get from sales. The price in turn depends on efficiency level, markup of price over cost and unit factor costs. Efficiency level is the quantity of output produced from using one (combined) unit of factors, while the markup multiplied by unit factor costs are valued added per (combined) factor input. To charge lower price, the firm must have higher efficiency level. It can also choose to charge lower markup or pay less factor unit costs, implying having lower value added per factor input. If there are no links between efficiency and markup, or efficiency and input unit costs, efficiency level has no relationship with value added per factor input. The latter is then not a good proxy for the former in empirical analysis of export behavior. In this case, difference in value added per employee only reflects difference in markups of price over cost or that in factor input unit cost structure. If, for instance, all firms in a country employ inputs in the same proportion at the same cost, under perfect competition without markup, or under monopolistic competition with a common markup, firms would all appear equally productive in terms of value added per employee in spite of any differences in efficiency. The use of value added per employee as an appropriate proxy for efficiency is supported by the finding by Bernard et al. (2003) that there is a positive link between efficiency level and markups in the setting of monopolistic competition with variable markups. Firms with higher efficiency levels charge higher markups. In this case, besides direct negative relationship, efficiency level has indirect but positive relationship with price level via higher markups, which is in turn reflected in higher value added per employee. Therefore, when considering the relationship between value added per employee and export intensity, we can not interpret the relationship as the only effect from efficiency via the above-mentioned indirect link. The relationship must also be explained by the behavior of firms in setting their markups as well as factor costs and cost structure.

Besides value added per employee, we also use firm size, firm age, capital intensity, website use, foreign ownership and input import propensity as variables representing firm characteristics. It is argued in trade literature that larger firms may have production and trade cost advantage over smaller ones and hence are more likely to export as well as export a larger share of their sales. However, there are also arguments that smaller firms may have higher export intensity because it is strategically better for them to put the focus of their limited resources on some foreign markets that they find more important than the domestic one<sup>8</sup>. The same reasoning may be applied to firm age. Long-established firms may have some experience or advantages in exports. However, newly-born firms may have higher export intensity than older ones because they have strategies of going globally from birth. We use capital intensity to account for difference in technology use among firms. Website use may represent the level of firms' commitment in export activities, while foreign ownership and input import propensity reflect the level of international integration. The more firms commit and engage in other cross-border activities, the more likely they may involve in exporting.

*[Table 1.1 is about here]*

*[Table 1.2 is about here]*

As per conditions of domestic competition intensity, we use response of firms to a question in the survey about the degree of competition intensity firms face for their main products. There are four levels of the competition intensity that firms report: having no competitors, having some competition but not a major concern, having intense competition from a few important competitors, and facing intense competition from many competitors. This response reflects firm-specific level of competition intensity in the domestic market that they are facing.

For the analysis of the effects of constraints in domestic business environment, we use the judgment of firms on the severity of various constraints. These constraints are classified into six groups: infrastructure, policy and administration, political environment, social environment, labor market and financing market. These measures illustrate the perception of firms on the obstacles of domestic business conditions that are specific to their operation. These factors may affect the efficiency levels, trade costs as well as export management strategies of firms, which in turn influence their export intensity.

*[Table 1.3 is about here]*

### III. EMPIRICAL SPECIFICATIONS

Based on the theoretical framework in the preceding section, we will estimate the following equation to examine impacts of various factors on export intensity of firms:

$$EI_i = \begin{cases} 1 & \text{if } 1 \leq EI_i^* \\ EI_i^* & \text{if } 0 < EI_i^* < 1 \\ 0 & \text{if } EI_i^* \leq 0 \end{cases} \quad (1)$$

$$EI_i^* = \beta_{10} + \beta_{1X}X_{li} + \beta_{1Y}Y_{li} + \beta_{1Z}Z_{li} + \beta_{1T}R_{li} + \beta_{1I}I_{li} + u_{li}$$

where  $EI_i$  is observed export intensity of firm  $i$ , measured as the ratio of export sales to total sales;

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<sup>8</sup> See, for instance, Wagner (2001) for detailed argument.

$EI_i^*$  is latent export intensity of firm  $i$ ;  $X_{1i}, Y_{1i}$ , and  $Z_{1i}$  are vectors of variables indicating firm-specific characteristics, domestic competition intensity and domestic constraints that determine the latent export intensity, respectively;  $R_{1i}$  and  $I_{1i}$  are regional location and industry dummies; and  $u_{1i}$  is the error term. Specifically,  $X_{1i}$  comprises of value added per employee, firm size, firm age, firm age squared, capital intensity, website use, foreign ownership and input importer.  $Y_{1i}$  includes three dummies of domestic competition intensity with the group of firms who reports having no competitors taken as reference. The interaction terms between these dummies and the firm size are also included in  $Y_{1i}$  to examine the impact of domestic competition across firms of different size. Elements of  $Z_{1i}$  are eighteen variables of domestic constraints listed in Table 1.3.  $R_{1i}$  is the vector of four regional location dummies with Northern Central region as reference group, and  $I_{1i}$  is the vector of twelve industry dummies with Other industries as reference group. These dummies are listed in Table 1.2.

In estimating this equation, we see two possible problems that may lead to improper estimation results and hence need correcting. The first problem is related to the censored characteristic of the dependent variable. Data of export intensity is bounded at the lower limit of zero as well as at the upper limit of one. Because we have both exporters and non-exporters in our data set, we can only observe positive export intensity of those firms who export. For the firms who do not export, the values of their export intensity are zero. Many zeros are observed for the dependent variable in the data set because there are many firms who do not export. Failing to take this censoring into account may lead to the problem of sample selection bias. Besides, the censoring process is not random. Heterogeneous-firm trade theories suggest that firm do self-select into exporting, and exporters and non-exporters are systematically different via a selection process. To correct for this bias, we choose to estimate the above equation in the Heckman selection model, a framework considered as appropriate for dealing with non-random censoring problem. Specifically, we follow two-stage procedure. In the first stage, we estimate the selection equation as follows:

$$EP_i = \begin{cases} 0 & \text{if } EP_i^* \leq 0 \\ 1 & \text{if } EP_i^* > 0 \end{cases} \quad (2)$$

$$EP_i^* = \beta_{20} + \beta_{2X}X_{2i} + \beta_{2Y}Y_{2i} + \beta_{2Z}Z_{2i} + \beta_{2R}R_{2i} + \beta_{2I}I_{2i} + u_{2i}$$

where  $EP_i$  is observed export propensity of firm  $i$ , being 1 if the firm is an exporter and 0 otherwise;

$EP_i^*$  is latent variable that represents the profitability of firm  $i$ ;  $X_{2i}, Y_{2i}$ , and  $Z_{2i}$  are vectors of variables indicating firm-specific characteristics, domestic competition intensity and domestic constraints that determine this latent variable, respectively;  $R_{2i}$  and  $I_{2i}$  are regional location and industry dummies; and  $u_{2i}$  is the error term. Then, we calculate inverse Mills ratios (IMR) from the estimation in this stage. In the second stage, we insert these IMRs into the latent export intensity equation as an independent variable and estimate the outcome equation (1). If the coefficient of this variable is significantly different from zero, it is more likely that the sample selection problem does exist and therefore results for estimations in Heckman selection model are properly corrected for sample selection bias. As usually done, the selection equation is estimated in the probit model, with the independent variables being the same as those of the export intensity equation except the variable

website use is replaced by the variable email use for identification condition to be satisfied. We believe that email use is important for the decision to export or not but not for the intensity, while website use may reflect the orientation of firms in involving more intensively into export activities<sup>9</sup>. Besides using Heckman selection model, we also employ the Tobit model in estimating the outcome equation for controlling further the censoring problem, especially with the truncation at the upper limit of one.

The second possible problem is endogeneity bias. The first source of this bias is from the endogeneity of the variable value added per employee. Value added per employee may have impacts on export intensity of firms via the self-selection effect as suggested by heterogeneous-firm trade theories. However, the level of export intensity of firms may have a counter effect on the value added per employee, due to the argument of learning-by-exporting: the more firms involve in serving foreign markets, the more they can learn from these activities and therefore improve their operational performance. To deal with bias from this source, we employ an instrumental-variables (IV) model in estimating the outcome equation in the second stage. We use share of skilled workers in total employees and average wage as two possible instruments for value added per employee. Because these instrumental variables are related to the use of labor of the firms and are specific to the production process of firms, they are believed to be correlated to value added per employee of firms but have theoretically nothing to do with export intensity of firms. We will also test for the endogeneity of the variable value added per employee as well as the relevance and exogeneity of the instruments in our estimations to assure the appropriateness of the treatment. The second source of endogeneity bias is the use of data of constraints in domestic business environment that reflect the perception of firms about the severity of these constraints. There is concern that firms who have more operational activities, including more intense export activities, and therefore have to deal more frequently with domestic business environment, may have different perceptions about the severity of domestic constraints. In other words, the intensity of exporting activities may influence the level of obstacle severity, besides the reserve. If it is the case, estimating the outcome equation without controlling for this endogeneity source may result in biased estimates of these constraints variables. To control for this kind of possible bias, we also use IV estimation. Domestic constraints variables will be included in the estimation one by one and are instrumented by their mean value averaged across industry and region, following Clarke (2005) and Yoshino (2008)<sup>10</sup>. The endogeneity of each variable of domestic constraints will be tested, and the results from IV estimations are only interpreted if the variable is tested to be endogenous. In this case, the relevance and exogeneity of instruments will be tested. If the test of endogeneity shows that there is no significant evidence that a constraint variable is endogenous, we treat it as an exogenous variable.

#### **IV. ESTIMATION RESULTS AND DISCUSSION**

We report the estimation results in Tables 2 and 3. In Table 2, we list the results from estimating the

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<sup>9</sup> This argument is supported in the theoretical framework of firm-specific trade costs such as in Lawless and Whelan (2008).

<sup>10</sup> Note that although we state that a certain variable is instrumented by one or some excluded variables, in our estimation, we can not tell apart which excluded variables instrument for which endogenous variable when a domestic constraint and value added per employee are both treated as endogenous. In this case, all the instruments are treated as a group of instruments for the two endogenous variables.

export intensity equation in the second stage with all the variables of interest included except those of domestic constraints. The estimation is carried out in three different IV specifications with value added per employee is the only endogenous variable<sup>11</sup>. The 2SGMM-IV column reports estimated coefficients and statistics of the estimation with two-step efficient generalized method of moments (GMM) estimator. Using this estimator generates more efficient estimates of the coefficients as well as consistent estimates of the standard errors than estimating with traditional IV/2SLS estimator. The FULL column reports results from employing a limited information maximum likelihood (LIML) estimator in Fuller's modification (Fuller, 1977). This modification aims to reduce the finite-sample bias inherent in this IV model by using a user-specified positive constant known as Fuller parameter alpha<sup>12</sup>. Results from this estimation are therefore expected to be more robust to finite-sample bias. The last column in Table 2 lists the results from estimation in IV Tobit model using conditional maximum-likelihood estimator with two limits. Statistics from various tests are also listed in the lower part of the table. We can see that the coefficients for inverse Mills ratio are significant in our estimations, implying that there must be sample selection problem and our use of Heckman selection model is justified. When testing the endogeneity of value added per employee, we find significant evidence to reject the null hypothesis that this variable is exogenous, supporting our treating it as endogenous and our use of instrumental-variables model. In testing instrument relevance (i.e., testing whether the instruments and the endogenous variable value added per employee are sufficiently correlated once all exogenous variables have been netted out), we find that the value of first-stage F-statistic is sufficiently high, implying that the instruments are relevant. This is confirmed by looking at other statistics such as Shea partial R-squared (Shea, 1997) or LM statistic for underidentification test. Besides, we can also find that weak instrument problem is not present in our estimations, with the weak identification test statistic sufficiently higher than the Stock-Yoko weak identification test critical values (Stock and Yoko, 2004). The test of Moreira's conditional likelihood ratio (Moreira's CLR) (Moreira, 2003) also confirms this. For testing the exogeneity of instruments, we report Hansen J-statistic (Hansen, 1982). Because we do not have statistically significant evidence to reject the null hypothesis that the instruments are valid, i.e. uncorrelated with the error term of and are correctly excluded from the estimated equation, the overidentification restrictions are satisfied. We also test for the disturbance homoskedasticity. This test is rejected, and hence we report robust p-values for all the coefficients. All the above-mentioned tests support our argument that the estimated coefficients are reliable.

*[Table 2 is about here]*

We now turn to interpreting the estimation results reported in this table. Different from findings in other studies cited in the section of introduction that value added per employee has no or positive effect on export intensity, we find that this variable is negatively related to export intensity of Vietnamese firms in the sample. It seems counter-intuitive when thinking of value added per employee as an indicator of efficiency. However, as we discussed in the preceding section, the link between export intensity and

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<sup>11</sup> The results do not change in nature when domestic constraints are included, either as endogenous or exogenous.

<sup>12</sup> Fuller parameter alpha chosen in this estimation is four, as suggested by Hahn et al. (2004).

value added per employee is determined by not only efficiency level but also by other attributes that are related to markups and factor costs. The negative relationship between value added per employee and export intensity is probably because of the domination of effects of lower markups induced by intense price competition in export activities over effects of higher markups due to higher efficiency. As Vietnam is a labor-abundant country who has comparative advantage in exporting labor-intensive commodities, higher export prices due to higher markups induced by higher efficiency may also be offset by lower labor costs, which implies lower value added per employee. In the regional and global value chain, Vietnam is posited in a small and low value added section (Giroud, 2002). Most exporting sectors of Vietnam face fierce competition from other developing countries, especially those in Asia that have the same export structure and therefore in the same tier of the value chain. In order to compete successfully in export markets with others in this small, low value added section, those firms in Vietnam that want to intensify their exports must have to set lower export price, accepting lower markups or using labor-intensive technology to take advantage of labor abundance of the country. These practices result in lower value added per employee<sup>13</sup>. Labor costs in Vietnam are low, even compared with those of China (McCarty et al., 2005). Evidence for the advantage of labor-intensive producers in exports can be seen from our estimation results reported in Table 2, with the statistically significant and negative coefficient of capital intensity variable. In addition, we can observe from our estimation that firms in industries such as foods and beverage, textiles, garments, leathers, and wood and wood products have higher export intensity<sup>14</sup>. These industries are said to be labor-intensive and to have advantage over others in labor-abundant countries like Vietnam. All of these support our argument about the negative impact of value added per employee mentioned above.

About other firm attributes, we find that larger firms have higher ratios of exports over total sales, reflecting the size advantage of firms in exporting. Coefficients of the firm size variable are positive in all specifications and statistically significant at one percent level. Besides, firms having foreign ownership or input imports are also found to have higher export intensity, showing that experience in international integration helps intensify export involvement of firms in Vietnam. Estimated effects of firm age and website use are found not statistically significant. As for the effects of domestic competition intensity, what we find support the rivalry rationale. Coefficients of all three variables of competition intensity are positive and statistically significant at one percent level, implying that domestic competition pressure may have forced firms to sell more of their production abroad. However, larger firms may have less pressure than the smaller ones, implied from the significant but negative coefficients of the variables of competition interacted with firm size.

*[Table 3 is about here]*

We also have interesting observations in examining effects of domestic constraints on export intensity of firms in Vietnam. Table 3 reports our estimation of these effects. In estimating, we do

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<sup>13</sup> Export prices and value added are often found to be positively correlated. See, for instance, Lebedys (2004).

<sup>14</sup> Estimated coefficients of these industry dummies (not reported due to space limitation) are statistically significant and positive.

separate estimation for each variable with each of them are one by one added into the estimation equation in the second stage we did before. We first treat them as endogenous and then do the endogeneity test in the IV specifications. In these estimations, the domestic constraint of interest and value added per employee are two endogenous variables. For those estimations showing that the variable of interest is in fact endogenous<sup>15</sup>, we step further to test for the relevance and exogeneity of instruments used. Out of 18 variables of interests, six are in fact endogenous. Our tests suggest that instruments we used for these variables are relevant and exogenous. Therefore, estimated results are reliable and we use these results to interpret their effects. For those variables whose exogeneity is not rejected at 10 percent confidence level, we estimate their coefficients in specifications where they are included in the estimation equation as exogenous. The coefficients from these specifications are used to interpret their effects on export intensity. We can observe from Table 3 that there is no significant evidence of effects of constraints in “hard” infrastructure. Obstacles in telecommunication, electricity, transportation and land access have no statistically significant effects on export intensity of firms. However, we find six variables of “soft” infrastructure that have significant negative effects. Policy uncertainty, taxes, macroeconomic policy and corruption are obstacles in policy and administration environment that show to be severe constraints on export expansion of firms. Social environment has also negative impacts, with both factors of concern having statistically significant and negative coefficients. Although constraints in labor and financing markets, together with that political environment, have also negative coefficients, none of them are statistically significant at conventional levels. Although Vietnamese government has recently tried with many measures to improve the country’s business environment, especially in its efforts to join WTO, the favorability of the environment is still low, even when compared to those of other countries in the region<sup>16</sup>. The fact that we can observe significant negative impacts of major policy constraints on exports/sales ratio, one of strategic behaviors of firms, implies that there is still room for Vietnamese government to reform to make the country’s economy a sound business environment for business.

## V. CONCLUDING REMARKS

Exports are set in the development strategies of Vietnam as a growth engine and actually have shown having positive impacts on performance of firms in the country. For the success of this export-led growth strategy, it is important for Vietnam to pave a smoother way for firms in their efforts of reaching the global markets. Knowing the factors that affect firms on this route must be of sound implications. This study is among these efforts. Specifically, we examine the impacts of a firm’s characteristics, perceived competition intensity and constraints in the domestic market on the intensity of its exports in Vietnam. To do so, we employ in our empirical analysis a cross-sectional micro-data set derived from the World Bank’s survey on productivity and investment climate in Vietnam in 2005. To properly control for sample selection and endogeneity, we apply the Heckman’s selection model and IV

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<sup>15</sup> More appropriately, we consider as endogenous variables where we have significant evidence to reject the null hypothesis that it is exogenous.

<sup>16</sup> For instance, Vietnam is ranked very low in the ranking of some professional entities such as that of Forbes.com.

specifications. One of our findings that are different from others in this literature is the statistically significant but negative correlation between value added per employee and export intensity of firms. We attribute this fact to the competition strategies and advantages of firms in a labor-abundant economy that compete to export labor-intensive commodities in the low value added section of global value chain. Besides observing that firms having larger size or acquiring some level of integration can have higher export intensity, we can also find that perceived competition in the domestic market induces firms to intensify their sales in foreign markets relative to that in the domestic one. Furthermore, it is interesting to find that even in a developing country like Vietnam, it is not constraints in domestic physical infrastructure and factor markets that hinder firms from increasing their intensity of exports, but obstacles in policy, administration and social environments that do matter. These findings support the implication that it is reasonable and feasible in the context of recent global crisis that priorities should be set for reforms in “soft” infrastructure in order to help firms boost exports.

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## TABLES

**Table 1-1. Definition and Summary Statistics of Continuous Variables**

Variables	Definition	Obs.	Mean	Std. Dev.	Min	Max
Export intensity	Share of direct exports in the total sales	949	0.24	0.38	0	1
Value added per employee	Value added divided by total workers. Value added is the total sales minus the total inventory at the end of the previous year, plus the total inventory at the end of the year, minus the total purchases of materials, and minus energy cost in the year. Total workers are the sum of total adjusted permanent workers and adjusted temporary workers. Total adjusted permanent workers are the sum of permanent full-time workers and permanent part-time workers adjusted by their working hours. Total adjusted temporary workers are the total number of short-term workers multiplied by the average length of employment for each worker then divided by the average length of employment of permanent workers. This variable is in logarithm.	949	3.57	0.99	-0.89	7.78
Share of skilled workers	Share of skilled permanent production workers in the total permanent production workers.	949	0.64	0.34	0	1
Average Wage	Total compensation of permanent and temporary workers over total adjusted number of workers. This variable is in logarithm.	949	2.56	0.56	-0.30	5.43
Firm size	Netbook value of total fixed assets in 2004. This variable is in logarithm.	949	8.61	1.71	3.22	14.10
Capital Intensity	Total netbook value of machinery and equipment over total permanent production workers	949	55.95	90.76	0.17	1004.8 3
Age	2004 minus the year of establishment	949	11.92	13.15	0	114
Age Squared	Square of age	949	314.88	776.67	0	12996

**Table 1.2. Definition and Summary Statistics of Dummy Variables**

<b>Variables</b>	<b>Definition</b>	<b>Obs.</b>	<b>Var=1</b>	<b>%</b>
Exporter	Having direct exports in 2004	949	362	38.15
Input Importer	Having direct imports of inputs in 2004	949	199	20.96
Email Use	Regularly use emails in interaction with clients and suppliers	949	622	65.54
Website Use	Regularly use emails in interaction with clients and suppliers	949	280	29.50
Foreign Owned	Having at least 10% of capital owned by foreigners	949	93	9.80
Competition Intensity 1	Facing no competitors for main products	949	32	3.37
Competition Intensity 2	Facing some competition, but not a major concern	949	231	24.34
Competition Intensity 3	Facing intense competition from a few important competitors	949	234	24.66
Competition Intensity 4	Facing intense competition from many for main products	949	452	47.63
Industry Dummies		949		
	Foods & Beverage		155	16.33
	Textiles		64	6.74
	Garments		64	6.74
	Leather Products		17	1.79
	Wood & Wood Products		122	12.86
	Paper		57	6.01
	Chemical & Chemical Products		55	5.80
	Rubber, Plastic & Non-metallic Products		57	6.01
	Metals & Metal Products		97	10.22
	Machinery, Equipment & Electrical Products		63	6.64
	Electronics		15	1.58
	Construction Materials		80	8.43
	Others		103	10.85
Region Dummies		949		
	Red River Delta		287	30.24
	South East		127	13.38
	Southern Central Coastal		317	33.40
	Mekong River Delta		94	9.91
	Northern Central		124	13.07

**Table 1.3. Summary Statistics of Domestic Constraints Variables**

Variables	Obs.	Mean	Std. Dev.	Min	Max
<b>Infrastructure</b>					
Telecommunications	940	0.6319	0.9518	0	4
Electricity	948	1.2500	1.1515	0	4
Transportation	946	1.3806	1.2811	0	4
Land Access	927	1.3312	1.4942	0	4
<b>Policy and Administration</b>					
Regulatory Policy Uncertainty	901	1.0122	1.1892	0	4
Tax Rates	933	1.0364	1.1768	0	4
Customs and Trade Regulations	700	0.9300	1.1569	0	4
Business Licensing & Operating Permits	929	0.2056	0.6226	0	4
Macroeconomic Policy	848	1.0637	1.2257	0	4
Corruption	820	0.9500	1.1803	0	4
Conflict Resolution	847	0.4427	0.8945	0	4
Environmental Regulations	887	0.5434	0.9431	0	4
<b>Political Environment</b>					
Political Stability	872	0.0608	0.3550	0	4
<b>Social Environment</b>					
Crime, Theft & Disorder	884	0.4344	0.8265	0	4
Anti-competitive or Informal Practices	864	0.7361	1.1340	0	4
<b>Labor Market</b>					
Skills & Education of Available Workers	943	1.4189	1.2507	0	4
<b>Financing Market</b>					
Access to Financing	911	1.8364	1.5121	0	4
Cost of Financing	875	1.3246	1.2746	0	4

**Note:** The values of these variables represent the judge of firms on the severity of corresponding constraints, based on a five-point scale where 0=no obstacle, 1=minor; 2=moderate;3=major; and 4=very severe.

**Table 2. Firm Characteristics, Domestic Competition and Export Intensity**

<b>Dependent Variable: Export Intensity</b>	<b>2SGMM-IV</b>	<b>FULL</b>	<b>IVTOBIT</b>
Value added per employee (log)	-0.0871 *** (0.0005)	-0.0849 *** (0.0004)	-0.2164 *** (0.0013)
Input Importer (dummy)	0.1969 *** (0.0000)	0.1960 *** (0.0000)	0.3867 *** (0.0000)
Firm Size (log)	0.1233 *** (0.0000)	0.1232 *** (0.0000)	0.3035 *** (0.0000)
Capital Intensity	-0.0008 *** (0.0000)	-0.0008 *** (0.0000)	-0.0018 *** (0.0000)
Age	0.0013 (0.2150)	0.0013 (0.2160)	0.0019 (0.4352)
Age Squared	-0.00003 ** (0.0490)	-0.00003 * (0.0510)	-0.00003 (0.3228)
Website Use (dummy)	0.0260 (0.1946)	0.0257 (0.1994)	0.0944 ** (0.0250)
Foreign Owned (dummy)	0.2528 *** (0.0000)	0.2517 *** (0.0000)	0.4073 *** (0.0000)
Competition Intensity 2 (dummy)	0.4593 *** (0.0088)	0.4610 *** (0.0085)	1.3068 *** (0.0000)
Competition Intensity 3 (dummy)	0.4822 *** (0.0079)	0.4847 *** (0.0075)	1.0410 *** (0.0014)
Competition Intensity 4 (dummy)	0.4182 ** (0.0163)	0.4205 ** (0.0156)	0.9669 *** (0.0014)
Competition Intensity 2 * Firm Size	-0.0585 *** (0.0042)	-0.0587 *** (0.0041)	-0.1559 *** (0.0000)
Competition Intensity 3 * Firm Size	-0.0636 *** (0.0023)	-0.0638 *** (0.0022)	-0.1295 *** (0.0001)
Competition Intensity 4 * Firm Size	-0.0586 *** (0.0038)	-0.0588 *** (0.0036)	-0.1319 *** (0.0000)
Industry dummies	included	included	included
Regional dummies	included	included	included
Constant	-0.5899 *** (0.0012)	-0.5965 *** (0.0009)	-2.2900 *** (0.0000)
Inverse Mills Ratio	0.2943 *** (0.0000)	0.2942 *** (0.0000)	0.7268 *** (0.0000)
Endogeneity Test (Ch2 statistic)	4.7990 (0.0285) **	4.7990 (0.0285) **	5.3300 ** (0.0209)
Shea Partial R2	0.1143	0.1143	
First-stage F statistic	32.19 *** (0.0000)	32.19 *** (0.0000)	
Underidentification test (Kleibergen-Paap rk LM stat.)	73.39 *** (0.0000)	73.39 *** (0.0000)	
Weak ident. test (Kleibergen-Paap rk Wald F stat.)	32.19	32.19	
Stock-Yogo weak ID test critical values (10%)	19.93	10.89	
Moreira's CLR	[-.14, -.036] (0.0000)		
Overidentification test (Hansen J statistic)	0.26 (0.6080)	0.26 (0.6075)	0.03 (0.8560)
Overall F statistic	57.38 *** (0.0000)	57.19 *** (0.0000)	
R2	0.6603	0.6613	
Log pseudolikelihood			-1191.59
Wald chi2			1196.87
Observations	949	949	949

**Note:** \*, \*\* and \*\*\* denote significance at 10%, 5% and 1%, respectively; Amemiya-Lee-Newey minimum Chi-sq statistic for overidentification test in IVTOBIT; Robust p-value in parentheses (test of homoskedastic disturbance rejected).

**Table 3. Export Intensity and Domestic Constraints**

Domestic Constraints	Constraints as Endogenous									Constraints as Exogenous				Obs.	
	GMM2S	F-stat	Ivtobit	Wald Ch2	Endo. test	First stage F	Under. Test stat.	Weak IV test	Overid.t est	GMM2S	F-stat.	Ivtobit	Wald Ch2		
<b>Infrastructure</b>															
Telecommunications	-0.0014 (0.9689)	54.82 (0.0000)	-0.1167 (0.2952)	438.66 (0.0000)	0.038 (0.8457)						0.0056 (0.5217)	54.77 (0.0000)	0.0163 (0.4569)	446.02 (0.0000)	940
Electricity	-0.0251 (0.3381)	55.49 (0.0000)	-0.0786 (0.3156)	450.11 (0.0000)	0.429 (0.5124)						-0.0082 (0.2199)	55.83 (0.0000)	-0.0212 (0.2639)	452.31 (0.0000)	948
Transportation	-0.0172 (0.5030)	54.70 (0.0000)	-0.0270 (0.7371)	442.64 (0.0000)	0.858 (0.3543)						0.0065 (0.2818)	55.30 (0.0000)	0.0264 (0.1393)	445.21 (0.0000)	946
Land Access	-0.0482 (0.1009)	51.12 (0.0000)	-0.2034 (0.6129)	418.07 (0.0000)	3.482 * (0.0620)	11.86 (0.0000)	30.678 (0.0000)	11.48 13.43	0.328 (0.5670)		0.0040 (0.4321)	54.89 (0.0000)	0.0065 (0.6941)	451.42 (0.0000)	927
<b>Policy &amp; Administration</b>															
Regulatory Policy Uncertainty	-0.0887 ** (0.0285)	43.60 (0.0000)	-0.2112 * (0.0635)	411.95 (0.0000)	5.000 ** (0.0253)	12.51 (0.0000)	25.132 (0.0000)	9.65 13.43	0.042 (0.8379)		-0.0004 (0.9560)	51.80 (0.0000)	0.0054 (0.7821)	428.53 (0.0000)	901
Tax Rates	-0.1108 *** (0.0007)	49.75 (0.0000)	-0.2414 *** (0.0043)	440.75 (0.0000)	6.718 (0.0095) ***	23.06 (0.0000)	22.136 (0.0000)	21.22 13.43	0.007 (0.9317)		-0.0203 *** (0.0015)	56.51 (0.0000)	-0.0395 * (0.0549)	456.51 (0.0000)	933
Customs & Trade Regulations	0.0254 (0.4856)	52.24 (0.0000)	-0.0064 (0.9406)	396.74 (0.0000)	0.476 (0.4902)						0.0024 (0.7936)	52.14 (0.0000)	0.0071 (0.7333)	397.37 (0.0000)	700
Business Licensing & Permits	-0.0652 (0.2175)	54.39 (0.0000)	0.0990 (0.4294)	441.92 (0.0000)	1.22100 (0.2691)						-0.0122 (0.3080)	55.52 (0.0000)	-0.0024 (0.9462)	443.74 (0.0000)	929
Macroeconomic Policy	-0.0303 (0.1743)	46.46 (0.0000)	-0.0950 (0.1558)	408.92 (0.0000)	0.699 (0.4031)						-0.0119 * (0.0786)	47.47 (0.0000)	-0.0424 ** (0.0255)	410.82 (0.0000)	848
Corruption	-0.0548 ** (0.0406)	45.20 (0.0000)	-0.1903 ** (0.0201)	393.14 (0.0000)	3.263 * (0.0708)	15.7900 (0.0000)	29.525 (0.0000)	15.32 13.43	0.26 (0.6101)		-0.0065 (0.3683)	48.76 (0.0000)	-0.0056 (0.7835)	402.47 (0.0000)	820
Conflict Resolution	-0.0378 (0.1971)	50.11 (0.0000)	-0.1734 (0.1170)	411.59 (0.0000)	1.205 (0.2723)						-0.0054 (0.5504)	50.91 (0.0000)	-0.0198 (0.4359)	413.85 (0.0000)	847
Environmental Regulations	-0.0317 (0.3311)	52.92 (0.0000)	-0.1259 (0.1745)	423.61 (0.0000)	0.956 (0.3282)						0.0001 (0.9872)	53.24 (0.0000)	-0.0014 (0.9544)	428.56 (0.0000)	887
<b>Political Environment</b>															
Political Stability	-0.0272 (0.6074)	52.41 (0.0000)	-0.0126 (0.9226)	417.22 (0.0000)	0.207 (0.6493)						0.0115 (0.5036)	53.30 (0.0000)	0.0005 (0.9925)	417.42 (0.0000)	872
<b>Social Environment</b>															
Crime, Theft & Disorder	-0.1085 *** (0.0095)	50.07 (0.0000)	-0.2809 ** (0.0197)	409.84 (0.0000)	4.900 ** (0.0269)	12.97 (0.0000)	26.716 (0.0000)	12.35 13.43	0.354 (0.5518)		-0.0211 ** (0.0189)	54.80 (0.0000)	-0.0300 (0.2480)	423.80 (0.0000)	884
Anti-Competitive & Informal Practices	-0.0778 *** (0.0097)	47.81 (0.0000)	-0.1823 ** (0.0389)	422.21 (0.0000)	4.425 ** (0.0354)	14.0200 (0.0000)	26.227 (0.0000)	11.61 13.43	0.986 (0.3208)		-0.0194 *** (0.0054)	50.81 (0.0000)	-0.0448 ** (0.0360)	427.09 (0.0000)	864
<b>Labor Market</b>															
Skills & Education of Available Workers	-0.0013 (0.9542)	54.77 (0.0000)	-0.0880 (0.3262)	441.57 (0.0000)	0.000 (0.9835)						-0.0018 (0.7778)	55.09 (0.0000)	-0.0130 (0.4748)	446.66 (0.0000)	943
<b>Financing Market</b>															
Access to Financing	-0.0066 (0.8094)	50.35 (0.0000)	-0.0338 (0.6663)	426.50 (0.0000)	0.018 (0.8934)						-0.0031 (0.5739)	50.46 (0.0000)	-0.0110 (0.5066)	428.28 (0.0000)	911
Cost of Financing	-0.0313 (0.2411)	46.38 (0.0000)	-0.1129 (0.1638)	410.27 (0.0000)	1.234 (0.2666)						-0.0012 (0.8481)	47.36 (0.0000)	-0.0003 (0.9890)	418.74 (0.0000)	875

**Note:** \*, \*\* and \*\*\* denote significance at 10%, 5% and 1%, respectively; Robust p-values in parentheses (homoskedastic disturbance test rejected at 1%); Hansen J statistic for overidentification test; Kleibergen-Paap rk LM statistic for underidentification test; Kleibergen-Paap rk Wald F statistic for weak identification test; Instrument weakness tests of two variables in social environment are significant with FULL specification with 10% maximal Stock-Yogo weak ID test critical values of 8.96.