Chapter 4

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CHAPTER 4

Innovation and Choice of Exporting Modes under Globalization*

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Theoretical model by Melitz (2003) suggests that most productive enterprises export. But empirical evidences show that not highly productive enterprises export also. These enterprises resort to intermediaries to access foreign markets and avoid burdensome fixed cost of exporting. There is hence more than one mode of exporting used by enterprises under the globalization process. A unique feature of this paper is to consider SMEs' decision both on export involvement and export modes at the same time, i.e. export directly, indirectly or both. The relevant of this approach is carefully tested by applying the test of pooling states (Cramer and Ridder, 1991). By applying the test the paper avoids bias due to miss-specification committed by previous studies which include only two choices of exporting in analysis. The paper shows that innovation by its all types influences significantly probability to choose different exporting modes. Therefore to promote exports by SMEs, the government can use indirect approach by supporting not only product innovation, process innovation but also product modification.

Keywords: international trade, intermediation, innovation, exporting modes
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1. Introduction

Since its economic reform known as “doi moi” in 1986, Vietnam economy has become one of the fastest growing economies in the world with the average GDP growth rate of over 7 percent per annum. During its transition to a more market-based economy, Vietnam has achieved a rapid economic growth and the expansion of the external sector (Belser 2000, Dollar & Kraay 2004). The growth rate of the export sector is about 20 percent per year.

Vietnam's development strategy aims to achieve an effective economic growth. Its success depends to a large degree on the development of the private sector, which consists mainly of small and medium enterprises (SMEs) and given the importance of export growth, a key question naturally faced by policy makers is how to improve the competitiveness of these SMEs in order to sustain its export growth.

In the face of Vietnam's increased integration into the world market and particularly after the country's entry into the WTO by the end of 2006, the SMEs are having a great opportunity to expand by exporting to other markets and at the same time they are also facing tough competition at their door step. The major problem is that the Vietnamese private enterprises are mostly of small and medium sizes and therefore may not be sufficiently competitive to enter foreign markets. Vietnamese exporters (mostly small and medium size) may find the start-up challenges to be too formidable, because they involve nontrivial up-front costs of establishing in-house channels and developing a knowledge base of overseas markets. This is not to mention the costs associated with writing contracts and developing trust and credibility with foreign customers.

There is an option for SMEs in Vietnam to access foreign markets that is to use intermediaries. They can involve in both direct export and using intermediaries at the same time. In such interdependent world due to the globalization, an important question to ask is what are the strategies available for Vietnamese SMEs to deal with the increased competition and complexity of doing international business. This study will explore the question what are determinants of exporting strategies that Vietnamese SMEs utilize. Moreover, the paper examines the role of innovation as a determinant of exporting strategies applied by SMEs.

The practice of resorting to export intermediaries is quite common in some countries. According to Peng & Illinitch (1998) export intermediaries in Korea and handle about half of total exports. Through export intermediaries, exporters gain access to international markets while not having to incur the up-front costs associated with searching for new markets, negotiating contracts, and monitoring those contracts to ensure performance. Given the large number of SMEs in Vietnam and their roles in the economy, in this research, we would like to investigate the dynamics involved in the decision made by the SMEs in their decision to export in the face of increased competition as a result of globalization process undertaken by the government of Vietnam.

2. Literature Review

The seminal paper by Melitz (2003) enlightens that the main determinant of exporting activities by enterprises is productivity. In Melitz model, enterprises choosing to serve only domestic market are least productive, while foreign markets are served by the most productive ones. The literature on international trade has mostly focused on productivity and firm characteristics, and hence on differences between exporting and non-exporting firms. (e.g. Bernard & Jensen (1995, 1999); Roberts & Tybout (1997), and the large literature has grown). However, empirical studies show that not highly productive enterprises also export. Most productive enterprises have to overcome the fixed cost and variable cost of exporting, while not highly productive enterprises pay for exporting fee to intermediaries. The intermediaries are seen to lower the average fixed cost of exporting by exercising their activities across many goods for pooled enterprises in a specific country or industry.

According to Schroder *et al*. (2005), the theory of trade intermediation is still in the early stage of development. It was only recently that attention shifted to the differences existing among trading firms and the role of intermediaries as an important institution in economic systems, helping to match buyers and sellers

indirectly (Bernard *et al*. 2010; Ahn *et al.* 2011).[1] These papers point out that there exist both manufacturers that organize the production and distribution of their goods abroad as well as intermediaries that specialize in distribution. According to Spulber (1998), intermediaries can gain advantages over direct exchange in a number of ways, especially by pooling and diversifying risk, reducing transaction costs, and lowering costs of matching and searching.

There has been a growing literature (international business studies) on the role as well as performance of trade intermediaries. For example, Peng & York (2001) investigated the determinants of performance of intermediaries in export trade. They argued that export intermediaries assist inexperienced exporters in breaking into overseas markets and experienced exporters (including multinational corporations) in entering unfamiliar countries. Indirect paths to internationalization are those "whereby small firms are involved in exporting, sourcing or distribution agreements with intermediary companies who manage, on their behalf, the transaction, sale or service with overseas companies" (Fletcher, 2004). Export intermediaries play an important "middleman" role in international trade, "linking individuals and organizations that would otherwise not have been connected" (Peng & York, 2001).

This emerging literature relies on the so-called Resource-Based Theory, which suggests that a firm's competitive advantage is a function of its valuable, rare, and inimitable resources (Barney, 1991, 1997). Such resources are often intangible, embedded, and knowledge-based. In the case of export intermediaries, such skills as market knowledge and negotiation ability may play an important role in minimizing the search and negotiation costs associated with export transactions. Additionally, some firms may have unique financial resources which allow them to more successfully bond clients by taking title to goods and thus reducing client risk. On the other hand, firms may hire export intermediaries because they perform certain functions related to exporting better or at lower costs than the firm itself could, for example because they possess country-specific knowledge that the firm lacks (Li, 2004). In summary, this theory suggests that the performance of export intermediaries depends on whether they can acquire and deploy resources in a way that cannot be easily imitated. Otherwise, manufacturers may attempt to develop export capabilities in-house. In comparison to large multinational firms, small and medium sized

[1]Such indirect matching may be required for transactions to take place or to be successful (Trabold, 2002).

enterprises (SMEs) are typically regarded as resource-constrained, lacking the market power, knowledge and resources to operate viably in international markets (Fujita, 1995; Coviello & McAuley, 1999; Knight, 2000; Hollenstein, 2005). As a consequence, export intermediaries may prove to be a good choice available for the exporting SMEs.

Antras & Costinot (2010) argue that the benefit of economic integration may differ under the presence of trade intermediaries. They analyze the effect of intermediaries on welfare in a highly stylized Ricardian model of trade and find that Walrasian integration between centralized markets improves welfare. However the degree of market integration arising from the use of intermediaries may reduce welfare and has the potential for adverse effects on the aggregate level of trade (arising from the relocation of traders and the resulting imperfect loss in rents as a result of imperfect bargaining arrangements).

In a multi-agent, multi-country environment with transaction costs, there are a number of factors that still provide strong motivations for both firms and intermediaries to seek new opportunities and markets. There is a growing body of literature on the determinants of the decision to engage intermediaries. In a study for the US firms Felbermayr & Jung (2011) relate the relative prevalence of trade intermediaries to destination country characteristics as well as to the dispersion of firm size across industries. They find that industries with firms of many different sizes exhibit a significantly lower relative prevalence of trade intermediaries. In a study for the Chinese firms, Ahn *et al*. (2011) report an inverted U-shaped relationship between firm size and the fraction of indirect exports in total sales for a sample of both exporters and purely domestic firm.

Analyzing survey data of German and British firms, Fryges (2007) identifies the factors that drive firms to switch between different export modes and finds that firm size has a significantly positive effect on the probability to change from indirect exports to direct exports. Most recently, there is a study by Dung & Janssen (2011) on the mode of exporting for Vietnamese firms. This study focuses on the choices made by firms between (i) exporting directly and (ii) exporting indirectly (i.e. through intermediary) conditional on having decided to export. Although this is interesting, the paper (as are a number of previous studies reviewed above) is limited in such a way that the choice set is focused to two or three choices while in reality it may consist of more than that. Our data for analysis show that the choice set may include

four alternatives: (i) not exporting; (ii) exporting directly only; (iii) exporting directly and indirectly; and (iv) exporting indirectly only.[2] Instead of limiting the choice set to only two alternatives (three in Dung & Janssen (2011)), our study employs a statistical technique to identify the appropriate choice set that an exporting firm faces (i.e the test for pooling states in the multinomial logit model as proposed by Cramer and Ridder 1991).

Before conducting our analysis of the four modes in the Vietnam context, the following section surveys findings from various empirical studies. The first mode considers the critical juncture for most firms, asking what conditions are necessary for a firm to choose to enter new markets. There is strong evidence concludes that exporters are larger, more productive, more capital- and technology-intensive. However, this does not automatically imply the absence of these characteristics is what necessarily withholds firms from export. More specifically, we must distinguish whether these characteristics are necessary conditions for firms to export or whether these advantages are acquired only as a consequence of exporting.

Unsurprisingly, Bernard & Jensen (1995) find that high-performing firms (those who satisfy the above characteristics ex-ante) will export but they did not find conclusive results for causality. Export activity may not necessarily improve outcomes for the firm with productivity gains no faster and at times, slower than that of non-exporters. This suggests that there may be considerable downside risk for firms and policy that encourage firms into foreign markets if they are not export ready. This is supported by results that show firms transitioning in and out of exporting over a longer timeframe. Their US results conform to similar studies in Morocco, Mexico and Columbia.

Psychic Distance Theory supposes that the distance of a market, both psychologically (education system, complicated market structure, unfamiliar experiences) or geographically determines the extent to which firms will pursue opportunities there directly. Firms would transfer what are perceived to be large transactional costs to an intermediary for whom these costs are considerably less. The Theory of Planned Behaviour can also be applied to predict choice of export mode. The real (actual) and perceived (confidence in soft skills) resources that entrepreneurs

[2] See the section on data for analysis for more detailed discussion and description of the exporting modes used by Vietnamese SMEs.

have to operate in a new environment is believed to influence the inclination to engage in direct exports.

Dung & Janssen (2011) study of Vietnam enterprises contradicts the propositions of both theories mentioned above. They do not find that psychic distance is a major influence on the decision to take up overseas opportunities and that international experience is not significant in determining the use of an indirect export mode. Dow (2000) and Dow & Larimo (2009) find that as a firms' international experience the impact of psychic distance on the firm's mode choice diminishes. They do find that younger entrepreneurs more comfortable with the advantages of technological connectivity, are more inclined to export directly and take risks.

In addition to the use of facilitating intermediaries, indirect entry modes could also include firms partnering more directly with a company in the host country. Though a more capital-intensive option, this strategy could be a better fit with the firm's corporate structure or investment strategy, or help mitigate the risks in entry to markets that demonstrate more challenging country, industrial characteristics. Hayakawa *et al*. (2010) surveyed a range of empirical studies that considered firm entry into foreign markets through wholly owned greenfield investments, joint ventures or other collaborative operational structures. They found given the range of approaches taken it was difficult to conclude precisely what conditions need to be met to determine particular choice of entry for multinational corporations.

The literature on export determinants includes also the studies on the influence of innovation to propensity to export. Using a sample of UK firms, controlling for firm size Wakelin (1998) concludes that non-innovative firms are more likely to export than innovative firms. However past innovation has positive impact on the probability of an innovative firm exporting. Other studies on innovation and firm performance document positive and significant influence of innovation and productivity of firms (e.g. Huergo & Jaumadreu, 2004, Griffth, *et al.*, 2010). As productivity is the main determinant of export, innovation thus is the root of self-selection of more productive firm into exports (Roper & Love, 2002, Casiman & Golovko, 2010). The literature therefore is splited on the association of innovation and export. The issue will be explored in this paper.

3. Econometric Modeling and Estimation Strategy

SMEs may pursue a variety of foreign market entry modes which vary significantly with respect to benefits and costs (Sharma & Erramilli, 2004). When deciding whether to engage in a foreign market, manufacturers essentially have a number of options: (1) no export; (2) indirect export through intermediaries, (3) both indirect and direct export and (4) direct export. Following Robert & Tybout (1997) and Bernard & Jensen (1999), we assume that the decision to export is made by rational and profit maximizing firm.

$$U_{ij} = V_{ij} + \varepsilon_{ij} = \mathbf{x}_i'\boldsymbol{\beta}_j + \varepsilon_{ij} \qquad (1)$$

With profit maximization andindividual firm facing J mutually exclusive alternatives (indexed $j=0,..., J$), the alternative that yields the highest profit is chosen. The probability that an individual exporter will choose alternative k is:

$$\begin{aligned} \Pr(y = k) &= \Pr(U_k > U_j \ \ for\ all\ j \neq k) \qquad (2) \\ &= \Pr(\varepsilon_{ik} - \varepsilon_{ij} < V_{ij} - V_{ik}) \end{aligned}$$

A very popular model which results from this model is the familiar multinomial logit model. McFadden (1976) noted that the multinomial logit model is particularly appealing in two aspects. First is the computational ease of the multinomial logit model. Secondly, the model is derived from the random utility model which makes it consistent with the classical theory of profit maximization.[3] McFadden (1976) shows that the multinomial logit model results if we assume all the ε_{ij} of the J choices are independent and identically distributed with the extreme value distribution of the form $F(\varepsilon) = \exp[-\exp(-\varepsilon)]$. The probability of alternative k being chosen can then be written as:

$$\Pr(y_i = k) = \frac{\exp(\mathbf{x}_i'\boldsymbol{\beta}_k)}{\sum_{j=0}^{J}\exp(\mathbf{x}_i'\boldsymbol{\beta}_j)} \qquad (3)$$

The multinomial logit model can be estimated using standard maximum likelihood estimation procedure. The model can be estimated by:

[3] It is well known that the estimates from the multinomial logit model are difficult to interpret. An alternative to the interpretationof the odds ratios is to calculate the marginal effects associated with the covariates as suggested by Greene (2003).

$$y^* = \beta_0 + \beta_1 I_i + \beta_2 X_i + \beta_2 N_i + \beta_3 K_i + \varepsilon_i \qquad (4)$$

with *Ii*, the measure for innovation activities (product/process introduction, product modification), X_i is a vector of firm-specific characteristics (age of firm, firm's productivity, firm's capital intensive product, type of product), N_i is a vector of the owner characteristics (age and gender of manager/director), K_i, a vector of environmental factors (difficulty in getting a loan and location).[4] [5] The error term ε_i is assumed to be *iid*~N(0; σ_u). The export measure y^* cannot be observed completely. The observed model is given by:

$$y = \begin{cases} 0 & NO\ EXPORT \\ 1 & EXPORT\ \ DIRECTLY\ ONLY \\ 2 & EXPORT\ INDIRECTLY\ ONLY \\ 3 & EXPORTING\ \ DIRECTLY\ \&\ INDIRECTLY \end{cases} \qquad (5)$$

As discussed above, the previous literature often specifies a binary choice logit model (i.e. exporting directly and exporting indirectly) and hence runs the risk of model misspecification. In our study, instead of arbitrarily specifying a particular model, we will test for the most appropriate model specification. This can be made possible by using the pooling states specification test proposed by Cramer & Ridder (1991). The issue of pooling states/alternatives arises when two alternatives *j* and *k* are indistinguishable with respect to explanatory variables in the model (e.g. whether choice 2 and choice 3 in equation (1) above are distinguishable). That is, the vector of explanatory variables $\mathbf{x}_i$ does not affect the odds of outcome *j* versus alternative *k* (Long, 1997). Therefore when two alternatives are indistinguishable it may be appropriate to re-group them as one alternative. This can also be seen as an informal test of exporting mode model.

The test of pooling states of the multinomial logit model proposed by Cramer & Ridder (1991) is basically a test of the difference between the likelihood of an

[4] For the list of variables used in the empirical analysis, please see table 3 in the Appendix.

[5] To account for the dynamic impact of exporting modes in the previous year to the choice of exporting mode in the year of analysis, lagged variables are used which are exporting modes of the enterprise in the previous survey.

aggregated model in which different states are pooled together and a disaggregated model in which different states are modelled separately.[6] The test statistic is given by

$$LR = 2\{Log\ L_U - Log\ L_R\}$$

where $Log\,L_U$ is the maximum loglikelihood of the full model and $Log\,L_R$ the maximum log-likelihood of the restricted model where the estimates are constrained to satisfy the null hypothesis that the full model and the restricted model 'have the same regressor coefficients apart from the intercept' (Cramer & Ridder 1991, p. 269). This test is then shown asymptotically to have a chi-squared distribution with *k* degrees of freedom where *k* is the number of restrictions. The $Log\,L_U$ is obtained directly from the full model. But the $Log\,L_R$ is obtained by

$$LogL_R = \sum_j n_{sj} Logn_{sj} - n_s Logn_s + LogL_A$$

where $Log\,L_A$ is the unconstrained maximum log-likelihood of the pooled model, *s* refers to the pooled state, *j* refers to the separate states within *s*, n_s is the number of sample observations in the pooled state *s*, n_{sj} is the number of the sample observations in each of the separate states *j*, and the sum of the number of observations in all separate states equal the number of observations in the pooled state, i.e. $\sum_j n_{sj} = n_s$.

To take into account the endogeneity of exporting and innovation decisions we consider an instrumental variable (IV) approach in the line of previous studies (Zhao & Li, 1997 and Smith *et al*., 2002). In particular our empirical strategy consists of a two-stage procedure. In the first stage we estimate the following innovation equation:

$$I_i^* = \gamma_0 + \gamma_1 X_i + \gamma_2 Z_i + \gamma_3 N_i + \gamma_4 K_i + \upsilon_i \qquad (6)$$

$$I_i = 1 \text{ if } I_i^* > 0;\ I_i = 0 \text{ if } I_i^* \leq 0$$

where Z is the vector of instruments, i.e. variables that are strongly correlated with innovation but uncorrelated with the error term in the export equation (4); and X, N and K is a set of exogenous variables.

[6] The multinomial logit model is well known for its proliferation of parameters, in empirical analysis we usually attempt to search for a more parsimonious specification.

To identify the model, the vector Z_i in the innovation equation (6) must contain at least one variable not included in equation (4). In this study, the excluded variables reflect the businesses' investment strategy, which include investment for raising capacity, investment for replacing old equipment, investment for improving productivity, investment for improving quality, investment for producing new product and investment for other purposes). The key element in this identification strategy is the availability of valid instruments (Z_i), i.e. variables that influence innovation and its effect on the export decision must operate solely through its indirect effect on innovation. The instruments in this study were chosen on the basis that they were strongly related to innovation activities (as shown in the first stage estimates presented) but not significant in determining whether the business exported.

In the second stage, the innovation variable (I_i) in the export equation (4) is then replaced with the predicted probabilities from the estimation of model (6) (see Maddala, 1983). This generates unbiased estimates of the impact of innovation on exports (Wooldridge, 2002). Similar simultaneous approaches have been employed in several empirical studies treating innovation and exports as inextricably interdependent (Hughes, 1986; Zhao & Li, 1997; Smith *et al.*, 2002; Cassiman & Martinez-Ros, 2006; Lachenmaier & Wößmann, 2006 and Nguyen *et al*., 2008).

4. Dataset and Analysis

In this study we use the Small and Medium Scale Enterprise (SME) Survey in Vietnam that has been conducted consistently since 2005 through 2007 and 2009 by the Ministry of Labour, Invalid and Social Affairs (MOLISA) and the Stockholm School of Economics. The surveys focused on medium and small enterprises in Vietnam. The surveys provide rich information about private sector SMEs. They focused on non-state and manufacturing SMEs, while conducted in various provinces and cities. Sample of surveys was stratified according to industries, ownership, sizes and other characteristics to present the structure of SMEs in Vietnam. This dataset is designed and implemented to track firms a number years. The study will employ the unique longitudinal SME survey data to look at the dynamic of exporting choice behavior.

Table 1 below shows the evolution of exporting behavior for Vietnamese SMEs during the last three surveys from 2005 to 2007 and 2009. Interestingly, the practice of using export intermediaries is quite common among Vietnamese SME exporters. Among exporting enterprises, the number of enterprises indirectly exporting accounts for 32 percent in 2005, reduced to 13 percent in 2007 and recovering to 18.7% in 2009.

Table 1: Export Choice and Export Modes for SMEs

	2005	**2007**	**2009**
Not export	2,640	2,481	2,504
	93.6%	94.2%	94.2%
Export	181	154	155
	6.4%	5.8%	5.8%
Directly	72	91	78
	39.8%	59.1%	50.3%
Indirectly	58	20	29
	32.0%	13.0%	18.7%
Both	51	43	48
	28.2%	27.9%	31.0%

Source: Vietnam SME survey 2005, 2007 and 2009

The table 2 below presents some of the characteristics of enterprises that involve in different exporting modes.[7] It shows that over the years enterprises accessed to foreign markets have consistently higher ratios of innovation activities. Exporting enterprises are also more capital intensive compared to non-exporting ones, with the exception of enterprises that do both indirect and direct exporting. As documented in the literature the dataset shows that labour productivity of exporting enterprises is significantly higher than non-exporting ones. Another characteristics of exporting enterprises is that they are younger than non-exporting enterprises and the youngest ones commit in direct export, why older ones use safer approach resorting to intermediaries. The statistics shows that enterprises involve in exporting activities report higher level of difficulty in accessing to credit. It may be the fact that to overcome higher capital requirement of exporting activities they are more active in finding credit and therefore expose more to credit requirements and issues. The table 2 also shows that owner of exporting enterprises is little younger than non-exporting

[7] More summary statistics of varibles used in analysis are presented in table 13 and 14 in the Appendix.

enterprise owner and the ratio that a female owns an exporting enterprises is very much the same as the one owning a non-exporting enterprise.

Table 2: Summary Statistics of Enterprises in Different Modes of Export

	NO EXPORT	INDIRECT EXPORT	BOTH EXPORT	DIRECT EXPORT
2005				
New product innovation (yes/no)	0.38	0.69	0.71	0.62
New process innovation (yes/no)	0.28	0.52	0.75	0.45
Product modification innovation (yes/no)	0.58	0.86	0.80	0.78
Capital – labour ratio (thousand VND per labour)	132,276	229,430	112,909	179,808
Labour productivity (thousand VND)	25,034	41,880	32,721	29,093
Firm age (year)	11.72	9.37	8.57	8.93
Difficulty in accessing credit (yes/no)	0.07	0.11	0.16	0.09
Owner is female (yes/no)	0.31	0.31	0.27	0.31
Age of SMEs owner (year)	44.77	43.97	43.71	43.72
2007				
New product innovation (yes/no)	0.41	0.63	0.90	0.73
New process innovation (yes/no)	0.14	0.26	0.40	0.35
Product modification innovation (yes/no)	0.42	0.67	0.65	0.71
Capital – labour ratio (thousand VND per labour)	222,612	273,143	201,916	562,104
Labour productivity (thousand VND)	32,391	80,208	59,402	66,974
Firm age (year)	13.61	14.23	9.40	9.31
Difficulty in accessing credit (yes/no)	0.07	0.19	0.20	0.25
Owner is female (yes/no)	0.33	0.30	0.35	0.40
Age of SMEs owner (year)	45.33	46.58	49.65	43.05
2009				
New product innovation (yes/no)	0.34	0.58	0.72	0.65
New process innovation (yes/no)	0.13	0.31	0.55	0.31
Product modification innovation (yes/no)	0.39	0.71	0.72	0.64
Capital – labour ratio (thousand VND per labour)	294,427	385,415	256,409	405,397
Labour productivity (thousand VND)	57,612	72,821	84,109	98,090
Firm age (year)	14.70	12.38	11.76	10.92
Difficulty in accessing credit (yes/no)	0.08	0.17	0.21	0.19
Owner is female (yes/no)	0.34	0.35	0.41	0.42
Age of SMEs owner (year)	45.80	42.63	43.48	44.95

Source: Vietnam SME survey 2005, 2007 and 2009.

The dynamics of changing exporting modes is shown in the table 3 below. It presents that percentage of enterprises joining exporting sector increasing over time. Of non-exporting enterprises in 2005, by 2007 only 2,35 percent enters exporting sectors with different exporting modes. The figure increases in the period 2007-2009, where nearly 3 percent of non-exporting enterprises in 2007 enter exporting sectors by 2009. The matrices also show that the most frequent mode of exporting used by Vietnamese SMEs when they export for the first time is indirect export. In 2007, among SMEs newly entering exporting sector, 61.1 percent chooses to start with indirect exporting, 7.3 percent with both direct and indirect exporting and 31.6 percent with direct export. In 2009, 40.4 percent of enterprises entering exporting sector starts by indirect exporting, 25 percent by both direct and indirect exporting, and 34.6 percent with direct export.

Table 3. Transition Matrices

(%)	**2007**			
	No export	***Direct export***	***Direct and indirect export***	***Indirect export***
2005				
No export	97.65	0.74	0.17	1.43
Direct export	28.12	65.62	6.25	0
Direct and indirect export	33.33	40	20	6.67
Indirect export	73.68	5.26	5.26	15.79
	2009			
	No export	***Direct export***	***Direct and indirect export***	***Indirect export***
2007				
No export	97.03	1.03	0.74	1.2
Direct export	27.08	52.08	16.67	4.17
Direct and indirect export	30.77	38.46	23.08	7.69
Indirect export	66.67	6.06	0	27.27

Source: Vietnam SME survey 2005, 2007 and 2009.

The transition matrices gives clear result over the two periods that more SMEs conducting direct exporting remained in their mode of export than others. The figure shows that of direct exporting enterprises in 2005, by 2007 65.6 percent remained in direct exporting mode; 28 percent was out of exporting sector; 6.25 percent added indirect exporting modes as a method of internationalization; and zero percent moved

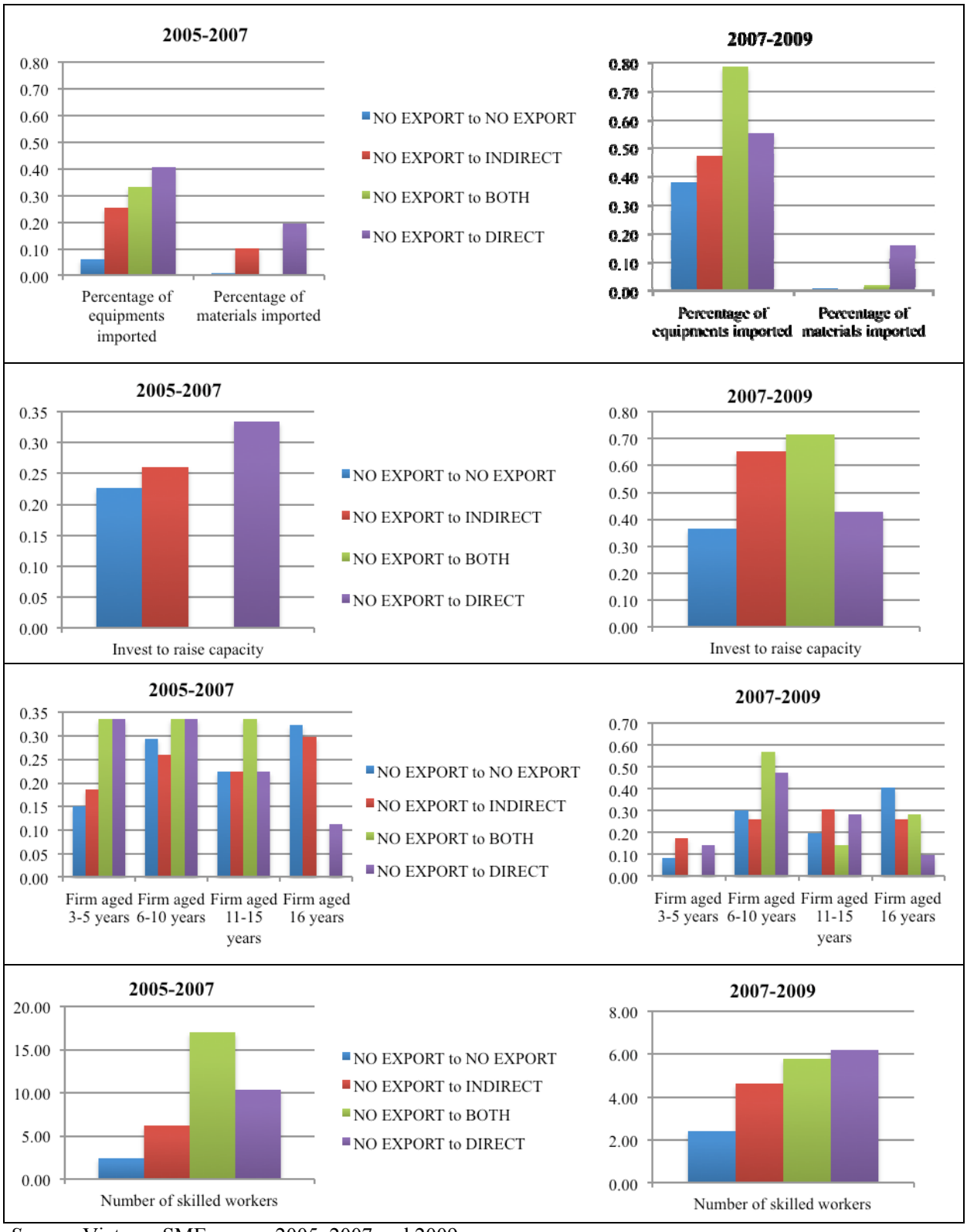
to indirect export. By 2009, the situation for direct exporting enterprises worsens with only 52 percent enterprises remained direct exporting mode. However, the percentage of direct exporting enterprises in 2007 quit exporting activities remained the same in 2009 (27 percent compared with 28.1 percent in 2007). Mostly enterprises moved to use both direct and indirect exporting mode (16.6 percent). Interestingly, percentage of enterprises move from direct exporting to indirect exporting increased to 4.1 percent. This might be explained by the fact that the countries on over the world were affected by the global financial crisis.

The two most unstable modes of exporting are indirect and both indirect and direct exporting. As expected, the number of enterprises quit exporting activities is most observed in indirect exporting mode. The percentage of enterprises moved from indirect exporting mode to using both direct and indirect exporting mode was reducing over time and reached zero percent in the period 2007-2009, while percentage of indirect exporting enterprises remained in their exporting mode increased over time.

Characteristics of enterprises involved in changing from non-exporting to exporting of different modes as showed below points to some policy implications. The figure 1 shows that among transitional enterprises from non-exporting mode during the period 2005-2007 and 2007-2009, enterprises moving to direct exporting have highest percentage of imported materials. It is also clear that enterprises start to export import higher percentage of equipment why enterprises remain as non-exporting do not invested in imported capital as much.

This is consistent with the figure on investment by transitional enterprises. In both periods, there are more enterprises transitioning to exporting spending to raise their production capacity while the number of enterprises remaining in their no-exporting mode invest to raise their capacity is lower. Figures on ages of transitional enterprises show that enterprises that are active in moving from non-exporting to direct exporting and combining mode of exporting directly and indirectly are less than 10 years of age. The percentage of enterprises staying in non-exporting mode is higher when they are more than 10 years of age. Another characteristics of enterprises that change to exporting mode is that they have more skilled workers (see figure 1 for details).

Figure 1: Transition from Non-exporting Mode: Enterprise Characteristics

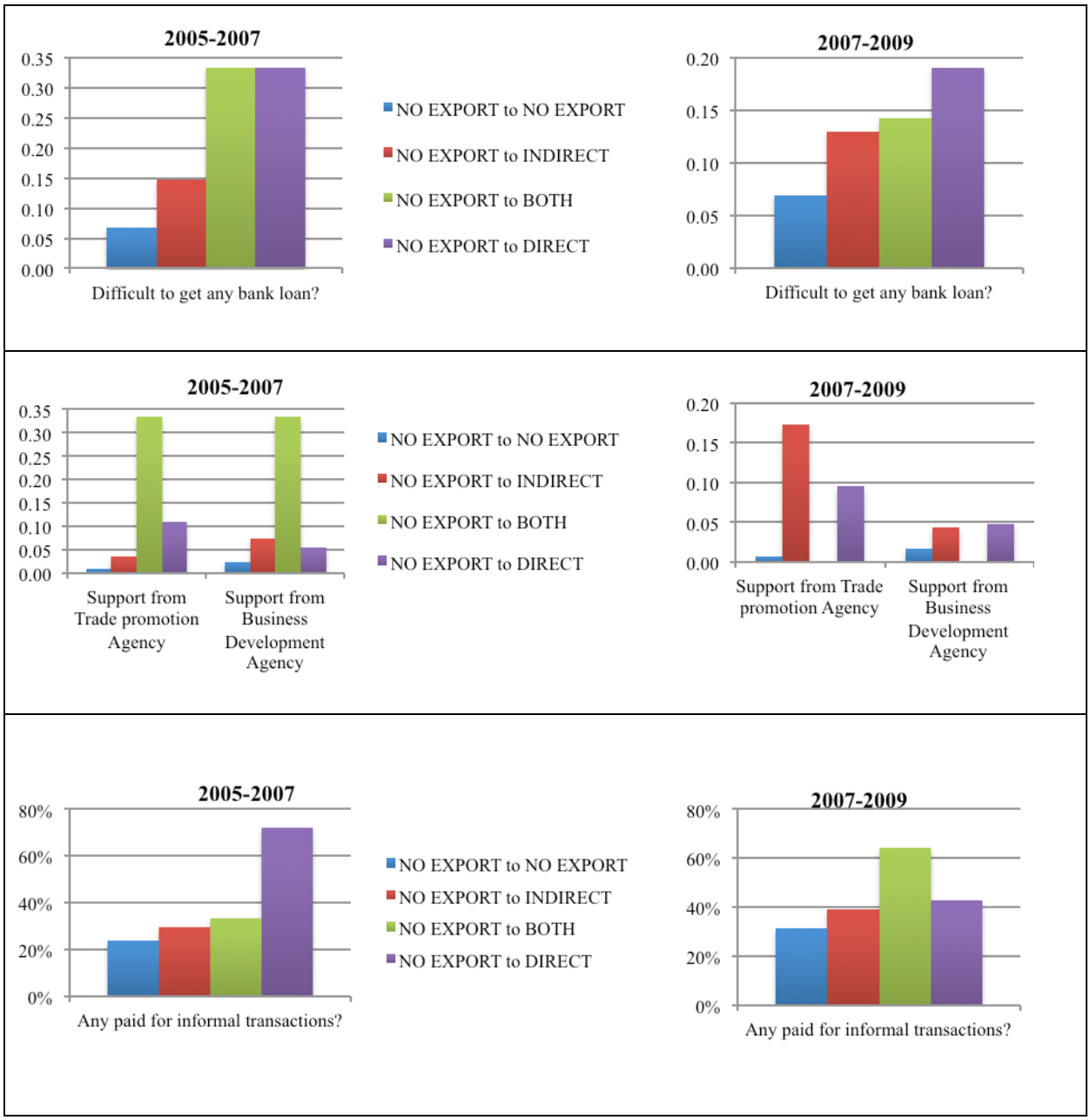


Source: Vietnam SME survey 2005, 2007 and 2009

The SMEs surveys include questions related to government policies which enable the discussion on policy issues in connection with transitional enterprises. Figure 2

below shows the fact that enterprises that change from non-exporting to exporting modes more often to face difficulties accessing credit in comparison with enterprises that remain non-exporting. These enterprises also often pay for informal payment to authorities. It does not surprise that transitional enterprises are often supported by trade promotion agency and business development agency (see figure 2 for details).

Figure 2: Transition from Non-exporting Mode: Policy Issues



Source: Vietnam SME survey 2005, 2007 and 2009

The above descriptive analysis of the dataset shows some interesting characteristics of Vietnamese SMEs and their strategies as well as determinants of their transition from non-exporting to exporting mode. Regression analysis in the

following section will provide more understanding of the behaviour of Vietnamese SMEs in choosing their modes of export.

5. Estimation Results

A specification issue that must be addressed is the pooling of export modes in the multinomial logit model. This issue arises since an obvious question is whether our specification of a four-way multinomial logit model is justified or whether a more parsimonious specification is adequate. In this paper we use the pooling states test developed by Cramer & Ridder (1991) to classify the possibility to combine export modes in analysis. Table 5 presents test statistics for pooling states in our four-way multinomial logit model. We report all groupings of choices, including a binary logit model and a three-way multinomial logit model, which are the standard ones found in the literature. Almost these poolings are rejected at one percent significant level in favour of our unrestricted four-way multinomial logit model, except for the case combining both export and direct export in each individual years. Pooling sample gives more significant test results and enables us to analyze the full choices of exporting mode. The test shows that previous regression studies that use only two choices of exporting and are not aware of different choices face the risk of miss specification.

The results of multinomial logit regressions of equation (4) are presented in table 6, 7, and 8 where coefficient, marginal effects, and odds ratio forms of regression are reported. The baseline comparison in all multinomial logit regressions are "no export". The results show that among the more fundamental determinants of the probability of choosing export modes in Vietnamese SMEs is the decision to undertake product innovation. In comparison with the baseline, other factors kept unchanged, the application to product innovation increases the exportation probability, whatever direct exports or via intermediates. Specifically, given product innovation being taken, the probability of choosing "indirect export" would be 2.05 times more likely than when other factors are held constant. Product innovation is also associated significantly with higher probability to choose of direct export, or both indirect and direct export. The probability of choosing direct export or both indirect and direct

export mode will increase by 4.56 and 2.41 times more likely if enterprises pursue product innovation (*ceteris paribus*).

Regarding other controls, an enterprise experienced direct and/or indirect export in the past tends to increase their exportation probability. The export mode transition can be recognized via the previous exportation experience. For example, a SME experienced indirect export is more likely to be involved in indirect export while a SME experienced both direct and indirect export is more prone to continue with this type of export. *Ceteris paribus,* higher productivity increases the exportation probability. Meanwhile enterprises which are capital intensive are less likely to export using indirect mode or using both indirect and direct mode. The impact on direct export mode is not clear in this case. Also if enterprises are older than 15 years of age they are less likely to take direct exporting mode.

Table 7 and 8 replicates the analysis presented in Table 6, but focuses on process innovation and product improvement. Again, process innovation and product improvement is strongly related to exporting, across all the export models. Table 7 and 8 highlight the existence of important complementarities regarding the innovation activities of Vietnamese SMEs. Particularly, it was observed that the majority of companies undertaking product innovation were simultaneously introducing new processes and/or improving products. Given this, and the fact that the innovation variable is dichotomous, it is possible that the results presented in Tables 7 for process innovation and/or Table 8 for product improvement could be picking up the effect of these complementarities, and in particular the impact of product innovation on exporting.

We, therefore, extend the analysis presented in Tables 7 and 8, by determining the relative importance of product and process innovation/improvement in explaining the probability of a firm being an exporter. These results, presented in Table 9, suggest that once one controls for the effect of product innovation, there is no or very small significant additional effect for process innovation. The effect of product improvement is more important in the cases of indirect export and direct export. This again provides important information for policy makers. In addition to the introduction of new products into the market, it is clear that variables that are highly correlated with success, such as use of new technology, well-qualified management and a competitive environment, are also correlated with exporting. This highlights the

types of firms that could be targeted for interventions in terms of boosting exporting in small firms.

Multinomial logit estimations rely on the assumption of identical independent error terms. If these assumptions are not meet in the data, a violation of the independence of irrelevant alternatives (IIA) property will lead to biased estimates. IIA implies that adding another alternative does not affect the relative odds between two alternatives considered. IIA holds when the estimated coefficients of the full model are statistically similar to those of the restricted one. If the test statistic is significant, the assumption of IIA is rejected, and the conclusion is that the multinomial logit model is inappropriate. The most commonly used tests are Suest-based Hausman test, Hausman test, and Small-Hsiao test, which are frequently discussed in econometrics texts (e.g., Greene 2003) and can be easily computed using standard software (Zhang & Hoffman 1993). Model-based tests are computed by estimating a more general model that does not impose the IIA assumption and testing constraints that lead to IIA. The robustness of our results depends upon the appropriateness of the IIA assumption.

The results of these tests of IIA are set out in Table 10. The HM test shows very small or negative chi-squared test statistics. Such negative test statistics are common (Long & Freese, 2006, p. 244-5) and indicate that the IIA property is not violated (Hausman & McFadden 1984, p. 1226). The results are further supported by the Suest-based Hausman tests, where all the test statistics are insignificant, giving further evidence that the IIA property holds.[8] The results of Small-Hsiao test are very contradictory. However, this test, in particular, produces different results every time this test is run, as it is based on splitting the sample into two halves (Long & Freese 2006, pp. 243-246).

The tests results suggest no IIA problem, indicating that the MNL model suits the data in hand. The tests also indicate that the unobserved factors can be assumed to be independent across alternatives, implying that the alternatives are dissimilar (Amemiya, 1985, p. 298).

An important issue that should be taken into consideration is the simultaneity of exporting and innovation decisions. As outlined in the section on estimation strategy,

[8] Hausman test also produces different results depending on what category is the base category and often doesn't work either. Therefore, Suest-based Hausman test should be applied when evaluating this assumption (Long and Freese, 2001).

it is avoided by using IV regression in which probabilities to conduct innovation predicted from the estimation of model (6) will be used in the IV estimation of equation (6). The results of probit regressions for predicted probabilities of innovation are presented in table 12. Tables 11 reports the simultaneous estimation results for the exporting and product and process innovation respectively. Columns (2), (4) and (6) in Table 11 present the results from the simultaneous IV equations while Table 11 includes the results for the first-stage innovation equation. Comparing the IV results with the results from Table 6, 7, 8 shows that the changes in the estimated coefficients are very small and the significance is unaffected.

6. Conclusion and Policy Implications

In this paper, we use Cramer & Ridder (1991) test to arrive the proper model of analysis on determinants of exporting modes. Our result show that previous studies that based on only two choices of exporting mode will face the risk of miss-specification problem. Our test confirms that all the four modes of exporting, i.e. (i) not exporting; (ii) exporting directly only; (iii) exporting directly and indirectly; and (iv) exporting indirectly only, should be used in analysis of possible choices of exporting.

Also, in this paper we use three measures of innovation, namely product innovation, process innovation and product modification of existing product in examining the impact of innovation on the probability of choosing different exporting modes. This is new analysis in the literature of trade intermediation. To deal with the endogeneity of innovation and exporting modes we employ instrumental variable approach. Our results indicate that all three measures of innovation significantly influence the probability to choose different exporting modes.

Our analysis of the enterprises in the sample shows that policies should be taken into consideration to promote international trade involvement by SMEs. Given the commitments by WTO, direct supports for export promotion are prohibited. Our analysis shows that by applying innovation promotion strategy, exporting activities by SMEs will be beneficial. More importantly the government can consider to support not only a strict type of innovation but also product modification. The analysis on

transition from non-exporting to exporting mode also suggests several policy options to promote export by SMEs. Import of equipment should definitely be eased with the fact that more SMEs which transit from non-exporting mode to exporting mode involve in importing of equipment. Credit access by SMEs should also be facilitated since enterprises that do exporting of all types are more likely to face difficulties in getting bank loan. At the same time they are investing more to raise their capacity in response to exporting requirement.

Business environment are also need to be improve since there are more SMEs transforming from being non-exporter to exporter report about informal fee they have to pay for authority agencies and officials. Education and training is another strategy which the government should support. In average enterprises that export employ more skilled worker. Operation of business and trade promotion agencies should be strengthened since it is clear from the analysis that more exporting transitional enterprises resort to the supports by these agencies. Last but not least, supports for SMEs to promote export should aim at young SMEs. These enterprises are relatively more active in looking for the chance to access foreign markets than older ones.

References

Acs, Z.J. & Terjesen, S. (2007), 'Born Local: Two Avenue of Internationalization', *Jena Economic Research Papers 2007-022*, Friedrich-Schiller-University Jena.

Ahn J. B., Khandelwal K. A., Wei S. J. (2011), 'The Role of Intermediaries in Facilitating Trade', *Journal of International Economics*, 84(1), pp. 73-85.

Amemiya, T. (1985), *Advanced Econometrics*, Oxford: Basil Blackwell.

Anderson, James E., and Eric van Wincoop (2004), 'Trade Costs'. *Journal of Economic Literature* 42(3),pp.691-751.

Antrás, Pol, and Arnaud Costinot (2010), 'Intermediation and Economic Integration', *American Economic Review*, 100(2),pp.424–28.

Barney, J. B. (1991), 'Firm Resources and Sustained Competitive Advantage,' *Journal of Management*, 17(1), pp. 99-120.

Barney, J. B. (1997), 'Gaining and Sustaining Competitive Advantage', Don Mills, Ontario: Addison-Wesley Publishing Company.

Basker, Emek, and Pham Hoang Van (2010),'Imports "Я" Us: Retail Chains as Platforms for Developing-Country Imports', *American Economic Review*, 100(2), pp.414–18.

Belser P. (2000), 'Vietnam: on the road to labor-intensive growth?' Background paper for the Vietnam Development Report 2000, *Vietnam: Attacking Poverty*, Joint Report of the Government of Vietnam –Donor- NGO Poverty Working Group.

Bernard, A.B., Jensen, J.B., (1995), 'Exporters, jobs, and wages in U.S. Manufacturing, 1976–1987', *Bookings Papers on Economic Activity*, Microeconomics. Washington DC.

Bernard, Andrew B. and J. Bradford Jensen (1999), 'Exceptional Exporter Performance: Cause, Effect or Both?', *Journal of International Economics* Vol. 47(1), pp 1-25.

Bernard, Andrew B., J. Bradford Jensen, Stephen J. Redding, and Peter K. Schott (2010), 'Wholesalers and Retailers in US Trade', *American Economic Review*, 100(2), pp.408–13.

Blum, Bernardo S., Sebastian Claro, and Ignatius Horstmann (2010), 'Facts and Figures on Intermediated Trade', *American Economic Review*, 100(2),pp.419–23.

Casiman, B., and Golovko, E. (2010), 'Innovation and internationalization through exports', *Journal of International Business Studies*, 41(1), pp.56-75

Cassiman, B. and E. Martinez-Ros (2006), 'Product Innovation and Exports: Evidence from Spanish Manufacturing', *IESE Working Paper*.

Coviello, N.E. and McAuley, A. (1999), 'Internationalisation and the Smaller Firm: A Review of Contemporary Empirical Research', *Management International Review*, 39(3), pp.223-256.

Cramer, J. S. and Ridder, G. (1991), 'Pooling states in the multinomial logit model', *Journal of Econometrics,* Vol. 47(2-3), pp. 267-272.

Dollar, D. and A., Kraay (2004), 'Trade, Growth, and Poverty,' *The Economic Journal*, 114 (493), pp.22–49.

Dow, D. (2000). 'A Note on Psychological Distance and Export Market Selection', *Journal of International Marketing*, 8(1), pp.51-64.

Dow, D. and J. Larimo (2009), 'Challenging the Conceptualization and Measurement of Distance and International Experience in Entry Mode Choice Research', *Journal of International Marketing*, 17(2), pp.74-98.

Felbermayr G. and B Jung (2007), 'Endogenous Export Modes', *mimeo*, Eberhard Karls University, T¨ubingen, Germany.

Fletcher, D. (2004), 'International Entrepreneurship and The Small Business', *Entrepreneurship and Regional Development*, 16, pp.289–305.

Fryges, H. (2007), 'The Change of Sales Modes in International Markets: Empirical Results for German and British High-Tech Firms', *Progress in International Business Research,* 1, pp.139-185.

Fujita, M. (1995), 'Small and Medium Sized Transnational Corporations: Trends and Patterns of Foreign Direct Investment,' *Small Business Economics*, 7(3), pp.183-204.

Gabriel R.G. Benito, Torben Pedersena,y and Bent Petersen (2005), 'Export channel dynamics: an empirical investigation,' *Managerial and Decision Economics*, Vol. 26, pp. 159–173.

Gabriel Felbermayr and Benjamin Jung (2011), 'Trade Intermediation and the Organization of Exporters,' *Review of International Economics*, Volume 19(4), pp.634–648.

Greene, W. (2003), *Econometric Analysis*, New Jersey, USA: Prentice Hall.

Griffth, R., Huergo, E., Mairesse, J., and Peeters, B. (2010), 'Innovation and productivity across four European countries,' *NBER Working paper W127222*, National Bureau of Economic Research.

Hausman, J., and McFadden, D. (1984), 'Specification Tests for the Multinomial Logit Model', *Econometrica*, Vol. 52(5), pp. 1219-1240.

Hayakawa, K., F. Kimura, T. Machikita (2010), 'Firm-level Analysis of Globalization: A Survey of the Eight Literatures', *ERIA Discussion Paper Series*, ERIA-DP-2010-05.

Hollenstein, H. (2005), 'Determinants of International Activities: Are SMEs Different?,' *Small Business Economics,* 24(5), pp.431-450.

Huergo, E. and Jaumandreu, J., (2004), 'Firms' age, processinnovation and productivity growth.' *International Journal of Industrial Organization*, 22(4), pp.541-559

Hughes, K. (1986), *Exports and Technology*, Cambridge: Cambridge University Press.

Knight, G. (2000), 'Entrepreneurship and Marketing Strategy: The SME Under Globalization,' *Journal of International Marketing*, 8(2), pp.12-32.

Lachenmaier, S. and L. Wößmann (2006), 'Does Innovation Cause Exports? Evidence from Exogenous Innovation Impulses and Obstacles using German Micro data', *Oxford Economics Papers*, 582, pp.317–350.

Li, L. (2004), 'Research Note: The Internet's Impact on Export Channel Structure', *Thunderbird International Business Review*, 46(4): 443-463.

Long J. S. (1997), *Regression Models for Categorical and Limited Dependent Variables,* Thousand Oaks: Sage Publications.

Long, J. S. and Freese, J. (2001), *Regression models for categorical dependent variables using Stata*. Texas: Stata Press.

Long, J. S. and Freese, J. (2006), *Regression models for categorical dependent variables using Stata*. 2nd ed., Texas: Stata Press.

Maddala, G. S. (1983), *Limited Dependent and Qualitative Variables in Econometrics.* Cambridge: Cambridge University Press.

McFadden, D., (1976), 'A Comment on Discriminant Analysis "Versus" Logit Analysi', NBER Chapters, in: *Annals of Economic and Social Measurement*, 5(4), pp.511-523 National Bureau of Economic Research, Inc.

Ngô Vi Dũng and Janssen (2011), 'The influence of the entrepreneur's actual behavioral control and psychic distance stimuli on the export mode choice of Vietnamese SMEs' (http://www.icsb2011.org/download/18.62efe22412f41132d41800011352/365.pdf)

Nguyen Ngoc Anh, Pham Quang Ngoc, Nguyen Dinh Chuc and Nguyen Duc Nhat (2008), 'Innovation and exports in Vietnam's SME sector', *The European Journal of Development Research* 20(2), pp.262–280

Melitz, Marc J., (2003), 'The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity', *Econometrica*, Econometric Society,71(6), pp.1695-1725.

Peng M. and A. Ilinitch (1998), 'Export intermediary firms: A note on export development research', *Journal of International Business Studies* 29(3), pp. 609-620.

Peng, M. W. and A. S. York (2001), 'Behind Intermediary Performance inExport Trade: Transactions, Agents, and Resources', *Journal Of International Business Studies* 32(2), pp. 327–346

Roberts, M. J. & J. R. Tybout (1997), 'The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs', *American Economic Review* 87(4), pp.545-64.

Roper, S. and J. H. Love (2002), 'Innovation and Export Performance: Evidence from UK and German Manufacturing Plants', *Research Policy,* 31, pp.1087-1102.

Schroder, P., H. Trabold and P. Trubswetter (2005), 'Intermediation in Foreign Trade: When do Exporters Rely on Intermediaries?', *Applied Economics Quarterly* 51(3), pp.567-588.

Sharma, V. M. and M. K. Erramilli (2004), 'Resource-based explanation of entry mode choice', *Journal of Marketing Theory and Practice*, 12(1), pp.1-18.

Small, K.A. and Hsiao, C. (1985), 'Multinomial Logit Specification Tests', *International Economic Review* 26(3), pp. 619-627.

Smith, V., E. S. Madsen and M. Dilling-Hansen (2002), 'Export Performance and Investment in R&D', *Aarhus: The Danish Institute for Studies in Research and Research Policy,* Working Paper 2002/4.

Spulber, D. (1998), *Market Microstructure: Intermediaries and The Theory of the Frm*, Cambridge: Cambridge University Press.

Trabold, Harald (2002), 'Export Intermediation. An Empirical Test of Peng and Ilinitch', *Journal of International Business Studies* 33(2), pp.327–344.

Wakelin, K. (1998), 'Innovation and Export Behavior at the Firm Level,' *Research Policy,* 26, pp.829–841.

Wooldridge, J. M. (2002), *Econometric Analysis of Cross Section and Panel Data*, MA: The MIT Press.

Zhao, H. and H. Li (1997), 'R&D and exports: An empirical analysis of Chinese manufacturing firms', *Journal of High Technology Management Research* 8(1), pp.89–105.

Zhang, J. and Hoffman, S. D. (1993), 'Discrete-Choice Logit Models: Testing the IIA property', *Sociological Methods & Research* 22(2), pp.193-213.

Appendix

Table 4:Variable description

Variable name	Descriptions
exportmode	= 0 if no export, = 1 if indirect export, = 2 if both indirect and direct export, = 3 if direct export
newproduct	Introduced/plan to introduce new products
newprocess	Applied new production process/technology
modiproduct	Significantly improved firm's products
indirectexport_1	= 1 if firm experienced indirect export last 2 years.
bothexport_1	= 1 if firm experienced both indirect and direct export last 2 years
directexport_1	= 1 if firm experienced direct export in last 2 years
lklratio_1	Ln (total asset/number of full-time employees) in the previous year
lnprodt_1	Ln(Value added/number of full-time employees) in the previous year
year16	= 1 if Firm's age is above 15 years
creditdif	=1 if Firm faced difficulties to get a loan
female	= 1 if Firm's manager/director is female
lownerage	Ln(age of firm's manager/director)
textile	=1 if Firm's main product is textile
HCM	= 1 if firm is located in HCM City
d_2007	= 1 if year = 2007

Table 5.: Pooling LR Tests

Export	2007			2009			2007_2009		
Mode	chi2	df	p	chi2	df	p	chi2	df	p
Product introduction									
0/1,2/3	30.99	12	0.002	21.91	12	0.038	39.55	13	0.000
0/1,3/2	56.03	12	0.000	41.24	12	0.000	83.25	13	0.000
0,1/2/3	62.60	12	0.000	79.95	12	0.000	133.78	13	0.000
0/1/2,3	22.38	12	0.033	17.10	12	0.146	29.59	13	0.005
0,2/1/3	133.22	12	0.000	100.88	12	0.000	223.24	13	0.000
0,3/1/2	379.71	12	0.000	262.68	12	0.000	637.65	13	0.000
0/1/2,3	505.65	24	0.000	175.32	24	0.000	663.27	24	0.000
0/1/3,2	332.72	24	0.000	333.33	24	0.000	653.60	24	0.000
0/2/3,1	513.85	24	0.000	338.74	24	0.000	838.08	26	0.000
0,1/2/3	141.85	26	0.000	55.84	26	0.000	174.81	26	0.000
Process introduction									
0/1,2/3	28.49	12	0.005	24.48	12	0.017	40.13	13	0.000
0/1,3/2	55.46	12	0.000	41.32	12	0.000	82.76	13	0.000
0,1/2/3	61.08	12	0.000	80.06	12	0.000	133.47	13	0.000
0/1/2,3	20.04	12	0.066	21.55	12	0.043	31.66	13	0.003
0,2/1/3	128.12	12	0.000	112.51	12	0.000	227.36	13	0.000
0,3/1/2	378.20	12	0.000	259.73	12	0.000	633.40	13	0.000
0/1/2,3	499.04	24	0.000	186.32	24	0.000	665.66	24	0.000
0/1/3,2	329.62	24	0.000	330.85	24	0.000	649.00	24	0.000
0/2/3,1	507.44	24	0.000	347.14	24	0.000	837.48	26	0.000
0,1/2/3	138.04	26	0.000	60.63	26	0.000	176.00	26	0.000
Product improvement									
0/1,2/3	27.52	12	0.006	21.46	12	0.044	36.63	13	0.000
0/1,3/2	56.33	12	0.000	42.03	12	0.000	83.69	13	0.000
0,1/2/3	66.07	12	0.000	82.17	12	0.000	140.94	13	0.000
0/1/2,3	19.21	12	0.084	17.11	12	0.146	27.16	13	0.012
0,2/1/3	123.83	12	0.000	101.07	12	0.000	213.68	13	0.000
0,3/1/2	378.92	12	0.000	263.12	12	0.000	638.05	13	0.000
0/1/2,3	500.04	24	0.000	177.72	24	0.000	330.26	24	0.000
0/1/3,2	335.72	24	0.000	335.93	24	0.000	436.70	24	0.000
0/2/3,1	505.44	24	0.000	339.14	24	0.000	524.68	26	0.000
0,1/2/3	137.84	26	0.000	56.23	26	0.000	-415.3	26	-

Note: a) LR tests for combining outcome categories: 0 = No export; 1 = Indirect export; 2 = Both indirect and direct export, 3 = Direct export

b) Ho: All coefficients except intercepts associated with a given pair of outcomes are zero (i.e., categories can be collapsed)

c) ",": Pool. Eg, 1/2: pool 1 with 2.

Table 6: The Effect of Product Innovation on Export Modes: Multinomial Logit Regression

	Coefficient	Marginal effects	Odds ratio	Coefficient	Marginal effects	Odds ratio	Coefficient	Marginal effects	Odds ratio
		Indirect Export			Direct and Indirect Export			Direct Export	
newproduct	0.717***	0.00806***	2.049	1.519***	0.00396***	4.567	0.880***	0.00711***	2.411
indirectexport_1	2.801***	0.122***	16.45	2.360***	0.0147	10.59	2.371***	0.0532**	10.71
bothexport_1	2.625***	0.0529*	13.80	5.007***	0.127***	149.4	4.776***	0.359***	118.7
directexport_1	1.731***	0.0175	5.647	4.218***	0.0587***	67.89	4.936***	0.430***	139.2
lklratio_1	-0.151	-0.00156	0.860	-0.368**	-0.000748**	0.692	0.0583	0.000439	1.060
lnprodt_1	0.753***	0.00774***	2.123	1.214***	0.00245***	3.368	0.634***	0.00451***	1.885
year16	-0.0228	-0.000173	0.977	-0.621	-0.00116	0.537	-0.734**	-0.00486***	0.480
creditdif	0.845***	0.0124*	2.328	0.590	0.00147	1.804	1.107***	0.0130**	3.026
female	-0.201	-0.00201	0.818	-0.299	-0.000578	0.741	-0.0378	-0.000253	0.963
lownerage	0.118	0.00119	1.126	0.451	0.000910	1.570	0.421	0.00303	1.524
textile	0.960***	0.0151**	2.611	1.278***	0.00462*	3.589	0.400	0.00323	1.492
HCM	0.0662	0.000646	1.068	-0.455	-0.000838	0.634	0.651***	0.00569**	1.918
d_2007	-0.0222	-0.000218	0.978	-0.698*	-0.00147*	0.498	0.0456	0.000343	1.047
N	4392								
ll	-780.5								
chi2	909.2								
p	0.000								
r2_p	0.368								

* $p< 0.105$, ** $p< 0.055$, *** $p< 0.015$

Note: Not showing constant
Baseline comparison: "No export"

Table 7: The Effect of Process Innovation on Export Modes: Multinomial Logit Regression

	Coefficient	Marginal effects	Odds ratio	Coefficient	Marginal effects	Odds ratio	Coefficient	Marginal effects	Odds ratio
		Indirect Export			Direct and Indirect Export			Direct Export	
newproduct	0.767***	0.0105**	2.153	1.584***	0.00680**	4.876	0.792***	0.00792**	2.207
indirectexport_1	2.793***	0.122***	16.34	2.201***	0.0135	9.033	2.408***	0.0580**	11.11
bothexport_1	2.646***	0.0527*	14.10	4.938***	0.126***	139.5	4.810***	0.377***	122.8
directexport_1	1.746***	0.0170	5.731	4.201***	0.0613***	66.74	4.965***	0.446***	143.3
lklratio_1	-0.160	-0.00169	0.852	-0.396**	-0.000892**	0.673	0.0534	0.000427	1.055
lnprodt_1	0.781***	0.00816***	2.183	1.219***	0.00272***	3.384	0.665***	0.00499***	1.945
year16	-0.0502	-0.000455	0.951	-0.692	-0.00142	0.501	-0.749**	-0.00521***	0.473
creditdif	0.936***	0.0146**	2.551	0.747*	0.00222	2.111	1.205***	0.0156***	3.337
female	-0.197	-0.00201	0.821	-0.193	-0.000418	0.824	-0.0346	-0.000243	0.966
lownerage	0.105	0.00106	1.110	0.400	0.000892	1.491	0.408	0.00309	1.504
textile	1.013***	0.0165**	2.753	1.421***	0.00612**	4.142	0.447	0.00387	1.563
HCM	0.00454	0.00000694	1.005	-0.568	-0.00112	0.567	0.550**	0.00492*	1.733
d_2007	0.0148	0.000159	1.015	-0.561	-0.00130	0.571	0.125	0.000960	1.133
N	4392								
ll	-781.5								
chi2	907.4								
p	4.80e-165								
r2_p	0.367								

* $p<0.105$, ** $p<0.055$, *** $p<0.015$

Note: Not showing constant
Baseline comparison: "No export"

Table 8: The Effect of Product Modification on Export Modes: Multinomial Logit Regression

	Coefficient	Marginal effects	Odds ratio	Coefficient	Marginal effects	Odds ratio	Coefficient	Marginal effects	Odds ratio
		Indirect Export			Direct and Indirect Export			Direct Export	
newproduct	1.003***	0.0109***	2.728	0.923***	0.00247**	2.518	0.883***	0.00674***	2.419
indirectexport_1	2.835***	0.118***	17.04	2.428***	0.0190	11.34	2.461***	0.0566**	11.71
bothexport_1	2.590***	0.0467	13.33	5.031***	0.154***	153.1	4.789***	0.346***	120.2
directexport_1	1.820***	0.0175	6.169	4.282***	0.0721***	72.38	5.033***	0.437***	153.4
lklratio_1	-0.139	-0.00135	0.870	-0.323**	-0.000790*	0.724	0.0880	0.000633	1.092
lnprodt_1	0.738***	0.00713***	2.092	1.226***	0.00298***	3.407	0.649***	0.00448***	1.913
year16	-0.0625	-0.000537	0.939	-0.721	-0.00161*	0.486	-0.815***	-0.00519***	0.443
creditdif	0.911***	0.0130**	2.488	0.754*	0.00246	2.124	1.212***	0.0145***	3.361
female	-0.166	-0.00157	0.847	-0.214	-0.000505	0.807	0.0116	0.0000966	1.012
lownerage	0.167	0.00158	1.182	0.512	0.00124	1.669	0.494	0.00345	1.639
textile	0.854***	0.0120*	2.349	1.220***	0.00518*	3.386	0.339	0.00258	1.403
HCM	0.0126	0.0000885	1.013	-0.574	-0.00123	0.563	0.571**	0.00473**	1.770
d_2007	-0.00602	-0.0000484	0.994	-0.601*	-0.00152	0.548	0.0676	0.000485	1.070
N	4392								
ll	-781.0								
chi2	908.4								
p	3.00e-165								
r2_p	0.368								

* $p< 0.105$, ** $p< 0.055$, *** $p< 0.015$

Note: Not showing constant
Baseline comparison: "No export"

Table 9: The Effect of Innovation on Export Modes

	Marginal effects	Standard errors
No_export		
newproduct	-0.0115***	(0.00396)
newprocess	-0.0112**	(0.00523)
modiproduct	-0.0129***	(0.00402)
Indirect_export		
newproduct	0.00440	(0.00286)
newprocess	0.00435	(0.00361)
modiproduct	0.00815***	(0.00318)
Direct_and_indirect_export		
newproduct	0.00254**	(0.00119)
newprocess	0.00364*	(0.00199)
modiproduct	0.000436	(0.000759)
Direct_export		
newproduct	0.00452**	(0.00213)
newprocess	0.00317	(0.00252)
modiproduct	0.00430**	(0.00203)

Standard errors in parentheses
* $p< 0.105$, ** $p< 0.055$, *** $p< 0.015$

Table 10: IIA test

Omitted catergories	Suest-based Hausman			Hausman			Small-Hsiao		
	chi2	df	p	chi2	df	p	chi2	df	p
				2007					
				Product innovation					
indirect	9.70	26	0.998	-3.56	26	-	32.50	26	0.177
both	10.75	26	0.996	0.37	26	1.000	91.96	26	0.000
direct	14.80	26	0.961	6.10	26	1.000	90.91	26	0.000
				Process innovation					
indirect	9.69	26	0.998	-6.64	26	-	19.88	26	0.797
both	10.98	26	0.996	-0.82	26	-	63.31	26	0.000
direct	14.23	26	0.970	0.22	25	1.000	65.87	26	0.000
				Product modification					
indirect	10.23	26	0.998	2.76	25	1.000	205.6	26	0.000
both	11.29	26	0.995	-0.68	26	-	217.3	26	0.000
direct	11.60	26	0.993	-1.17	25	-	381.8	26	0.000
				2009					
				Product innovation					
indirect	17.52	26	0.892	4.21	25	1.000	246.8	26	0.000
both	13.68	26	0.977	-2.04	26	-	114.7	26	0.000
direct	11.10	26	0.995	-10.25	26	-	152.5	26	0.000
				Process innovation					
indirect	19.20	26	0.828	-1.63	26	-	63.01	26	0.000
both	12.23	26	0.990	-0.21	26	-	77.03	26	0.000
direct	12.84	26	0.985	0.70	26	1.000	132.7	26	0.000
				Product modification					
indirect	15.48	26	0.948	7.94	26	1.000	300.8	26	0.000
both	11.11	26	0.995	-1.18	26	-	337.9	26	0.000
direct	13.48	26	0.979	1.20	26	1.000	80.09	26	0.000
				2007-2009					
				Product innovation					
indirect	16.67	28	0.955	0.12	28	1.000	16.90	28	0.950
both	22.52	28	0.757	1.35	27	1.000	19.69	28	0.875
direct	16.99	28	0.949	3.58	27	1.000	23.60	28	0.702
				Process innovation					
indirect	16.50	28	0.958	-1.32	28	-	52.98	28	0.003
both	19.61	28	0.878	-4.91	28	-	44.37	28	0.026
direct	16.42	28	0.959	2.98	28	1.000	63.06	28	0.000
				Product modification					
indirect	17.14	28	0.946	4.37	28	1.000	33.64	28	0.213
both	21.21	28	0.816	6.21	28	1.000	20.43	28	0.848
direct	15.87	28	0.968	9.98	28	0.999	30.61	28	0.335

Table 11: IV Multinomial Logit models -Marginal effects

	Product innovation	Product Innovation - IV	Process innovation	Process innovation - IV	Product Improvement	Product Improvement - IV
	(1)	(2)	(3)	(4)	(5)	(6)
			No_export			
newproduct	-0.0191***	-0.0180***	-0.0253***	-0.0229***	-0.0201***	-0.0184***
	(0.00448)	(0.00446)	(0.00718)	(0.00702)	(0.00425)	(0.00419)
			Indirect_export			
newproduct	0.00806***	0.00784**	0.0105**	0.00940**	0.0109***	0.0101***
	(0.00323)	(0.00327)	(0.00495)	(0.00484)	(0.00323)	(0.00324)
			Direct_and_indirect_export			
newproduct	0.00396***	0.00302**	0.00680**	0.00541**	0.00247**	0.00120
	(0.00149)	(0.00127)	(0.00284)	(0.00246)	(0.00119)	(0.000868)
			Direct_export			
newproduct	0.00711***	0.00709***	0.00792**	0.00813**	0.00674***	0.00716***
	(0.00238)	(0.00244)	(0.00348)	(0.00361)	(0.00214)	(0.00224)

Standard errors in parentheses
* $p< 0.105$, ** $p< 0.055$, *** $p< 0.015$

Table 12: Probit models -Marginal Effects

	Product innovation	Process innovation	Product Improvement
	(1)	(2)	(3)
inv_cap	0.195***	0.191***	0.177***
	(0.0189)	(0.0159)	(0.0188)
inv_rep	0.149***	0.157***	0.212***
	(0.0287)	(0.0276)	(0.0276)
inv_prod	0.280***	0.221***	0.136***
	(0.0413)	(0.0440)	(0.0430)
inv_qua	0.182***	0.427***	0.312***
	(0.0622)	(0.0630)	(0.0541)
inv_new	0.364***	0.346***	0.196***
	(0.0547)	(0.0675)	(0.0624)
inv_othr	0.224***	0.0963***	0.00492
	(0.0370)	(0.0339)	(0.0376)
indirectexport_1	0.170***	0.135***	0.0902
	(0.0572)	(0.0459)	(0.0564)
bothexport_1	0.226***	0.129**	0.237***
	(0.0710)	(0.0548)	(0.0687)
directexport_1	0.147***	0.0664*	0.0232
	(0.0515)	(0.0350)	(0.0496)
lklratio_1	0.0131*	0.0153***	0.00756
	(0.00691)	(0.00445)	(0.00696)
lnprodt_1	0.0963***	0.0327***	0.0981***
	(0.0117)	(0.00727)	(0.0118)
year16	-0.0872***	-0.0289***	-0.0396**
	(0.0166)	(0.0104)	(0.0170)
creditdif	0.142***	0.0122	0.0567**
	(0.0298)	(0.0170)	(0.0293)
female	-0.0467***	-0.00411	-0.0849***
	(0.0164)	(0.0103)	(0.0163)
lownerage	-0.120***	-0.0289	-0.152***
	(0.0349)	(0.0215)	(0.0352)
textile	0.0522*	-0.00803	0.140***
	(0.0290)	(0.0167)	(0.0290)
HCM	-0.0811***	0.0368***	0.0221
	(0.0194)	(0.0138)	(0.0204)
d_2007	0.153***	0.0667***	0.0911***
	(0.0159)	(0.0100)	(0.0161)
N	4392	4392	4392
ll	-2636.8	-1562.6	-2755.1
chi2	590.0	450.4	456.5
p	1.11e-113	2.62e-84	1.41e-85
r2_p	0.101	0.126	0.0765

Standard errors in parentheses
* $p<0.105$, ** $p<0.055$, *** $p<0.015$

Table 13: Means of Variables

Variable	2007	2009
newprocess	0.155	0.126
newproduct	0.427	0.345
modiproduct	0.434	0.399
inv_cap	0.236	0.378
inv_rep	0.096	0.083
inv_prod	0.025	0.044
inv_qua	0.016	0.016
inv_new	0.012	0.018
inv_othr	0.042	0.054
indirectex~1	0.022	0.018
bothexport_1	0.020	0.007
directexpo~1	0.022	0.028
lklratio_1	11.515	11.895
lnprodt_1	10.093	10.462
year16	0.309	0.394
creditdif	0.079	0.076
female	0.331	0.333
lownerage	3.791	3.814
textile	0.081	0.080
HCM	0.236	0.226
Observations	2283	2109

Table 14: Exports and Innovations

Export modes	Innovation	2007	2009
No_export	Product Innovation	0.145	0.110
	Process Innovation	0.409	0.325
	Product Improvement	0.417	0.383
Indirect_export	Product Innovation	0.263	0.361
	Process Innovation	0.632	0.639
	Product Improvement	0.711	0.722
Direct_and_indirect_export	Product Innovation	0.421	0.577
	Process Innovation	0.895	0.731
	Product Improvement	0.684	0.731
Direct_export	Product Innovation	0.325	0.328
	Process Innovation	0.714	0.639
	Product Improvement	0.701	0.590