The Determinants of Vietnamese Export Flows: Static and Dynamic Panel Gravity Approaches

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Abstract

While the gravity model has been one of the most successful applications in empirical trade, various attempts are still made to improve its regression results. One of the recent developments in the econometric technique is to extend the gravity model to a panel data framework and take into consideration the existence of dynamic effects. In this paper, we apply these new techniques to examine the important factors which have effects on the Vietnamese export flows.

Regressing both static and dynamic gravity models, we find that there is a strong correlation between the Vietnamese contemporary export flows and those of the previous year, and the dynamic model fits the data better than the static one. Vietnamese export growth generally has a positive correlation with Vietnam's and trading partner income growth. In addition, transport costs have significant effects on Vietnamese export performance. Other important factors include the exchange rate and the ASEAN membership of trading partners.

Keywords: Export, transport costs, gravity model, Vietnam

1. Introduction

Vietnam launched the *Doi Moi* (renovation) policy in 1986, marking a new period of transition to the market mechanism and integration into the world economy. One of the most important components of the *Doi Moi* policy is to pursue an open economy and actively participate in the globalization process. As a result, Vietnam's trade regime has been gradually liberalized and openness has sharply increased. Total exports and imports of goods grew on average by 21 percent per annum during the 1995-2006 period, substantially faster than the gross domestic product growth. In fact, an export-oriented development strategy implemented by the Vietnamese government plays an important part in boosting the domestic economy.

Along with an increase in overall trade volume resulting from the trade liberalization, the geographical pattern of Vietnam's exports has also undergone a dramatic change. As can be seen from Figure 1, the 15 key trading partners of Vietnam (listed in Section 3.2) absorbed only approximately 25 percent of Vietnamese exports in 1980s. However, since 1990, they have been increasingly important, taking over the role played by the rest of Vietnam's export markets. On average, the 15 largest destination markets accounted for about 88 percent of Vietnam's exports from 1991 through 2006.

In addition, the Vietnamese export market structure has also witnessed growing importance of the Association of Southeast Asian Nations (ASEAN) members as destinations for Vietnamese exports. This change has been brought about by strong commitments to deepening Vietnam's integration into the regional economy. In fact, only until recently Vietnam has been more involved in intra-regional trade, due to its late ASEAN accession (in 1995). Even so, non-ASEAN markets remain major destinations for Vietnamese exports.

Why is there such a rapid change in Vietnam's export market structure? Why does Vietnam trade more with one country while it does less with another? Does the ASEAN membership have a positive effect on Vietnam's external trade? What factors affect Vietnamese export performance? It is the purpose of this paper to examine the determinants of the Vietnamese export flows in a panel framework based on static and dynamic gravity models.

The paper proceeds as follows: Section 2 reviews related literature. Section 3 describes the econometric methodology and data used for the empirical analysis. Section 4 presents and interprets the main regression results, and finally some concluding remarks are drawn in Section 5.

2. Literature Review

One of the most successful empirical approaches in trade is the gravity model. The gravity model was first applied to examine international trade flows by Tinbergen (1962). It is based on the Newton's law in physics, which equates

the gravitational attraction between two objects to the product of their masses divided by the distance between them. The simplest form of gravity model in international trade is expressed as follows:

$$X_{ij} = \varphi (Y_i * Y_j / D_{ij}) \quad (1)$$

In which, X_{ij} indicates the exports from country i to country j. Y_i and Y_j are the Gross Domestic Product (GDP) of countries i and j. D_{ij} measures the distance between country i and country j; and φ is a constant of proportionality.

The gravity model assumes that there is a positive relationship between the bilateral trade and the size of a trading partner. A country tends to trade more with a larger partner, holding all other factors constant. The distance between partners is negatively linked to the bilateral trade. The greater the distance, the bigger the resistance to trade. While the gravity model has long been criticized for lack of theoretical underpinnings, since late 1970s, various attempts have been made to fill the theoretical gap (For example, Anderson 1979, Helpman 1987 and Bergstrand 1989). Recently, Deardorff (1995) has showed that the gravity model can be justified from traditional trade theories. Besides, Anderson and Wincoop (2003) successfully derived an operational gravity model from the Constant Elasticity of Substitution (CES) system.

Two recent gravity papers, namely McCallum (1995) and Harris and Mátyás (1998) are particularly linked to our study. McCallum (1995) studied the border trade flows in the United States (US) and Canada using 1988 data for all 10 provinces in Canada and for 30 states in the US. Econometrically, he regressed the following equation:

$$\ln x_{ij} = \alpha_1 + \alpha_2 \ln y_i + \alpha_3 \ln y_j + \alpha_4 \ln d_{ij} + \alpha_5 \delta_{ij} + \varepsilon_{ij} \quad (2)$$

Where x_{ij} is the exports from region i to region j, y_i indicates the gross domestic product in region i, y_j indicates the gross domestic product in region j, d_{ij} measures the distance between region i and region j and δ_{ij} is a dummy variable equal to one for inter-provincial trade and zero for state-province trade.

McCallum found that due to the US-Canadian border effects, the domestic trade between the Canadian provinces is 22 times larger than the cross-border trade between the Canadian provinces and the US states. He also showed that transport costs play an importance role in explaining trade patterns.

Harris and Mátyás (1998) on the other hand, made a formal attempt to improve the basic gravity model. In fact, they showed that the basic model disregards some important explanatory variables such as exchange rates, foreign currency reserves. They also found that current export flows were strongly related to those of the previous year. In the next section, we design our model with close reference to both McCallum (1995) and Harris and Mátyás (1998).

3. Data and Methodology

3.1 Methodology

Our econometric model draws on McCallum's (1995) gravity equation with some modifications made to this equation based on Harris and Mátyás (1998) to derive a more proper specification. Specifically, we estimate static and dynamic models as follows:

3.1.1 Static gravity model

$$\text{Ln EXPO}_{it} = \Phi_1 + \Phi_2 \ln \text{INC}_t + \Phi_3 \ln \text{PINC}_{it} + \Phi_4 \ln \text{REMOT}_i + \Phi_5 \text{ASEAN}_{it} + \Phi_6 \text{EXCH}_{it} + \varepsilon_{it} \quad (3)$$

Where EXPO_{it} measures the Vietnamese exports to country i in the year t; INC_t is the Vietnamese income measured by the gross domestic product (GDP) in the year t; PINC_{it} is the partner country i' s income measured by its own GDP in the year t; REMOT_i measures the distance between Ho Chi Minh city and the largest economic center of country i; ASEAN_{it} is a dummy variable equal to 1 if country i is an Association of Southeast Asian Nations (ASEAN) member and 0 if not (ASEAN in this paper refers to the five founding member nations, including Malaysia, Thailand, Indonesia, Singapore and the Philippines); EXCH_{it} indicates the average real exchange rate between the Vietnamese dong and country i' s currency; and $\Phi_1 \ldots \Phi_6$ are the parameters to be estimated.

It is important to note that while different versions of the gravity model use GDP per capita as a measure of income or sometimes add population as an explanatory variable, we choose GDP, instead. This selection partly reflects the fact that our study draws on McCallum's (1995), but another important reason is that the present paper sets aside import flows. Including population as an independent variable might hardly explain the fact that Vietnam's exports were larger to Singapore than to China, especially in early years of our sample, though the latter outnumbers the former in terms of population.

3.1.2 Static dynamic model

$$\text{Ln EXPO}_{it} = \gamma_1 + \gamma_2 \ln \text{EXPO}_{it-1} + \gamma_3 \ln \text{INC}_t + \gamma_4 \ln \text{PINC}_{it} + \gamma_5 \ln \text{REMOT}_i + \gamma_6 \text{ASEAN}_{it} + \gamma_7 \text{EXCH}_{it} + \varepsilon_{it} \quad (4)$$

Where all the variables are the same as in model (3) except $EXPO_{it-1}$ which indicates the Vietnamese exports to country i in the year t-1. $\gamma_{1...}$ γ_7 are the parameters to be estimated.

It is notable that while McCallum's model took into account both domestic and cross-border trade flows, our models focus only on foreign trading activities between Vietnam and other countries. In other words, domestic trade flows between localities inside the country are out of the scope of the study. As a result, exports and gross domestic products used for our models are national series, not those of an administrative section or a specific industry. Furthermore, McCallum's model used a dummy variable which equals to 1 for interstate trade and 0 for state-province trade. However, we use a dummy variable which proxies the free trade agreement among the ASEAN countries. This dummy variable equals to 1 if a trading partner belongs to ASEAN, and 0 if not.

In addition to the differences above, we also extend McCallum (1995)'s model in some aspects:

Firstly, McCallum's model was estimated using the year 1988 data for all 10 provinces in Canada and for 30 states in the US. In other words, McCallum investigated the gravity model with single year cross-sectional data. This method, as pointed out by Cheng and Wall (2005), may cause the problem of misspecifications and result in biased estimates of the volume of bilateral trade because there is no controlling for heterogeneity. Egger (2002) suggested using panel data in the gravity model because panel data is a general case of cross sectional data and time series data. For this reason, our paper uses panel data. The data are collected from 1986 to 2006 for both Vietnam itself and trading partners. Annual time series data (1986-2006) are pooled across export markets to obtain more observations for regressions. As the panel data offer more variability, more degree of freedom and reduce the multicollinearity among explanatory variables, they improve the reliability of the regression results.

Secondly, we augment the McCallum gravity model with the exchange rate variable. There are two reasons for this inclusion. The first one is that the link between exports and the exchange rate is well recognized in economics and supported by abundant empirical evidence. Sharma (2003), for example, showed that a 10 percent appreciation of the rupee reduces the Indian export demand by 3.4 percent. The second reason is that the exchange rate is found to be an important explanatory variable in a number of gravity papers, such as Harris and Mátyás (1998).

Thirdly, in addition to a static model, we also estimate a dynamic gravity model as export series are often highly persistent. In fact, initial investments or sunk costs borne by exporters to establish new distribution and service networks often generate persistency in exported goods through consumption habits and distribution channels newly established in the foreign market. As a result, export performance achieved in the previous year provides a basis for the exporting activities in the current year. A static gravity model which ignores the fact that lagged trade affects current trade may lead to an incorrect inference.

Concerning the effects of the explanatory variables in the models (3) and (4) on the Vietnamese exports, we expect the coefficients on the local and destination income variables (Φ_2, Φ_3, γ_3 and γ_4) to be positive. The economic growth in either Vietnam's or partner country is expected to increase either the supply of or demand for Vietnamese exports respectively. Similarly, the coefficients Φ_6 and γ_7 are expected to bear a positive sign under the assumption that a depreciation of the Vietnamese dong makes exported goods cheaper relative to foreign goods, and therefore raises the quantity demanded for the Vietnamese exports.

We expect that Vietnam tends to trade more with a country of lower transport costs; and the more expensive transport costs a country involves, the less trading activity is expected. In our models, the geographical distance is used as a proxy for transport costs under the assumption that a longer distance results in higher transport costs and proximity makes transportations cheaper. Therefore, Φ_4 and γ_5 are expected to have a negative sign.

In reality, there may be a particular case where a close distance may not save costs if the geographical conditions limit the choice of goods delivery. For example, the transport costs from Vietnam to its common border country of Lao PDR may be higher than to Singapore because traded goods are transported by seaway to Singapore by convenient cargo ships while it may be more expensive to transport goods by lorry to Lao PDR in underdeveloped infrastructure conditions. However, in the generalized case, we expect our assumption about the relationship between transport cost and distance to hold true.

Lastly, we expect a negative sign for the coefficients on the ASEAN dummy variable (Φ_5 and γ_6) because by our definition, this variable equals to 1 for an ASEAN country and 0 for a non-ASEAN country, and in fact the non-ASEAN countries absorb more Vietnamese exports than the ASEAN countries.

3.2 Data

This paper selects 15 largest trading partners of Vietnam including Australia, Canada, China, industrial Europe, Hong Kong, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan, Thailand and the United States (US). In which, industrial Europe is comprised of 18 industrial countries, including Austria, Belgium,

Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, the United Kingdom, Iceland, Norway and Switzerland.

The 15 key trading partners altogether absorb almost 88 percent of the Vietnamese exports. Annual data for the years 1986 through 2006 about Vietnam and the trading partners are collected from the following sources: Vietnamese GDP and the 15 partners' GDP are collected from International Monetary Fund's *International Financial Statistics* database. Vietnam's bilateral exports are from the International Centre for the Study of East Asian Development (http://www.icsead.or.jp).

The distances between cities are from the website http://www.indo.com/distance/. The exchange rates are gathered from the State Bank of Vietnam. As the bilateral exchange rates between the Vietnamese dong (VND) and trading partner's currencies are not available, they are calculated through the US dollar (USD) by multiplying the value of foreign currencies per US dollar with the VND/USD exchange rate.

4. Results and Interpretation

4.1 Hausman test

Our paper uses a panel data framework. The advantage of the panel data is that time series and cross-section observations are combined to increase the sample size, give more variability and reduce the multicollinearity among variables.

However, in fact there may be some time-invariant factors characterized by trading partners affecting the Vietnamese export flows. If ignored, the regressions may suffer from an omitted variable problem and consequently produce inconsistent and biased coefficients. We overcome this problem by controlling for unobserved individual effects in either the fixed effects model (FEM) or the random effects model (REM).

Whether the FEM or REM is appropriate depends on the potential correlation of explanatory variables with the unobserved effects. If the unobserved effects are uncorrelated with all the explanatory variables, it is better to use the REM while the FEM is more appropriate when there is a correlation between the regressors and the unobserved effects. We use the Hausman test (1978) to choose between the two models.

As can be seen from Table 1, with respect to both static and dynamic models, the Hausman test shows that we cannot reject the null hypothesis that there is no misspecification for the REM at even the 10 percent level. In other words, the REM is more appropriate for the data. Accordingly, we only report and discuss the random effect estimations for both static and dynamic models.

4.2 Random Effects estimation

4.2.1 Static Gravity model

Regressing the static gravity model (3) yields the results reported in Table 2. According to these regression results, all the coefficients are statistically significant at the 5 percent level. The coefficients on the Vietnamese income, partner income and exchange rate variables have a positive sign while the coefficients on the distance and ASEAN variables bear a negative sign.

In other words, either the Vietnamese or partner economic growth has a positive effect on the Vietnamese export flows. Likewise, a depreciation of the exchange rate results in an expansion in the Vietnamese exports. However, an increase in transport costs worsens Vietnamese export performance. A negative relationship is what we expect about the effect of transport costs; but seeking a plausible explanation for the minus sign of the ASEAN variable might be a little tricky. In our view, this negative sign is mainly due to a smaller market share of ASEAN vis-à-vis non-ASEAN countries in Vietnamese exports. This will be better illustrated by our concrete calculations in Section 4.2.2. Another reason for the negative sign could be that Vietnam has become more integrated with the global economic system and has been less involved in intra-regional trade until the recent past. This could also mean that exports of Vietnam to ASEAN are basically underexploited.

Generally speaking, the signs of the coefficients are consistent with typical gravity findings. The only caveat raised with respect to the regression results for the static gravity model is that the explanatory variables altogether can only explain 53 percent of the variations in the Vietnamese exports. We then turn to the dynamic gravity model in a search for a more proper specification.

4.2.2 Dynamic gravity model

The regression results for the dynamic model (4) are presented in Table 3. Like the static model, all the coefficients yielded by the dynamic model are statistically significant at the 5 percent level of significance. They have the same signs as before. However, their values change considerably. By adding the lagged endogenous variable as an

exogenous variable, the model seems to fit the data better. Specifically, the coefficient of determination (R^2) increases from 0.529 to 0.894, but more importantly the sharp rise in the adjusted coefficient of determination (adjusted R^2) from 0.521 to 0.892 seems to justify the inclusion of the lagged variable.

The coefficient on the distance variable (γ_5) bears a negative sign as expected. In other words, transport costs have a negative effect on the Vietnamese exports. The more expensive the transport costs, the less the Vietnamese exports are. Based on the dynamic model results, on average, a 1 percent increase in transport costs leads to a 0.56 percent decrease in the Vietnamese exports, holding all other factors constant.

A positive sign of γ_2 indicates that the growth in Vietnamese exports in the previous year has a positive effect on the current year's export performance. This result appears to be acceptable in the real world for the fact that the achievements achieved in the previous year such as newly established business relationships with foreign importers provide a basis for Vietnamese companies to expand their export activities in the subsequent year. Similarly, as economic growth leads to an increase in the supply of exports, a positive sign for γ_3 seems reasonable.

As showed by the regression results, γ_4 is significant and bears a plus sign. In other words, there is a positive correlation between the destination countries' economic growth and the Vietnamese export flows. The faster the destination economies grow the higher the Vietnamese export growth is. This may be explained by the fact that an increase in foreign incomes results in higher foreign demands for Vietnamese goods.

Interestingly, the coefficient on the ASEAN variable (γ_6) takes a negative sign and is statistically significant at the 1 percent level. In other words, whether a trading partner is an ASEAN member or not does have effects on the Vietnamese export flows. By replacing the explanatory variables in the model (4) with the regression results in Table 3 for the two values of the ASEAN dummy variable and making a subtraction, we have:

$$\text{Ln}(\text{EXPO}_{\text{ASEAN}}) - \text{Ln}(\text{EXPO}_{\text{non-ASEAN}}) = -0.318.$$

Exponentiating this equation and subtracting one from both its sides gives:

$$(\text{EXPO}_{\text{ASEAN}} - \text{EXPO}_{\text{non-ASEAN}})/\text{EXPO}_{\text{non-ASEAN}} = -0.316.$$

This result implies that the Vietnamese exports to ASEAN is, on average, 31.6 percent below the Vietnamese exports to non-ASEAN countries in the 1986-2006 period, holding other factors constant. Obviously, a smaller market share of the ASEAN vis-à-vis non-ASEAN members in Vietnam's exports is plausible because non-ASEAN countries are much larger than ASEAN countries in terms of the gross domestic product and market size.

The effect of exchange rate variable on bilateral trade between Vietnam and a foreign partner is positive as expected. An increase in exchange rate, or a depreciation of the Vietnamese dong, makes Vietnamese goods cheaper and more competitive, leading to an expansion in Vietnamese exports. However, the effect is rather small.

4.3 Robustness

In addition to our baseline estimation, we also carry out alternative regressions to check the robustness of our results. Since the Vietnamese economy was affected by the Asian financial crisis in the 1997-1998 period, we want to test if there is any difference between the pre-crisis and post-crisis periods. Specifically, we divide the study period into two smaller samples with the pre-crisis sample including those observations from 1986 to1998 and the post-crisis sample ranging from 1999 to 2006. The regression results are presented in Table 4 and Table 5.

All the coefficients in the pre-crisis period have the same signs as in the full sample results and remain statistically significant at the 5 percent significance level, except the coefficient on the Vietnamese income variable which are statistically insignificant even at the 10 percent level.

In the post-crisis period, the constant and the coefficient on the ASEAN dummy variable are not significant at the 10 percent level. Of particular note is that the coefficient on the ASEAN dummy variable turns positive. This sign change may be explained by the fact that Vietnam was a latecomer to the ASEAN Free Trade Area (AFTA), joining the agreement in 1995. Its trade ties with ASEAN began to deepen only after the Asian financial crisis. In addition, as a result of recent stronger trade reforms, Vietnam plays an increasingly important role in the region's production networks through the exports of light manufacturing industries.

Interestingly, the coefficients on partner income (γ_4) and remoteness (γ_5) are still statistically significant in both periods. The coefficient γ_4 decreases from 0.26 to 0.16 while γ_5 declines from 0.85 to 0.16 in its absolute value. The decrease in γ_4 and γ_5 shows that Vietnamese exports become less dependent on the importing countries' growth and proximity factors in the post-crisis than the pre-crisis period.

This seems acceptable given that as Vietnam accelerates its integration into the economic globalization process, the Vietnamese goods have more chances to penetrate to new markets and improve their image internationally. Vietnamese exporters, who used to rely heavily on neighboring markets, now learn new skills and establish new

distribution networks in the fresh foreign markets. New bilateral and multilateral trade agreements open opportunities for Vietnam goods to be accessible to new customers.

According to the International Monetary Fund (IMF, 2006), in 1992, Japan and Singapore accounted for 29 percent and 14 percent of Vietnam's export markets, but they have become less important as destinations for Vietnam's exports over time. In 2002, the exported goods to Japan and Singapore represented only 15 percent and 6 percent of Vietnam's total exports, respectively. Instead, the European Union (EU) and US have become major markets for Vietnamese goods.

Furthermore, the merchandise structure of Vietnamese exports has become increasingly diversified. The manufactures increased from 6 percent in 1992 to almost 33 percent in 2002 while the share of agricultural and raw exports declined gradually. Due to an increase in the quality and competitiveness of the exported goods, it is likely that the hindrance to Vietnamese export flows created by the distance barriers becomes smaller over time.

5. Concluding Remarks

Since the gravity model was employed in economics, different extensions have been suggested to the basic model to obtain more reliable estimates of international trade flows. This paper takes into account the recent developments in the gravity estimation technique to investigate the determinants of Vietnamese export performance in a panel data framework. It shows strong evidence that Vietnamese exports are autoregressive. By adding the lagged endogenous variable as a regressor in a dynamic model, the regression results improve greatly. Accordingly, the application of a simple gravity model to Vietnamese exports may produce inconsistent and biased coefficients by omitting the lagged regressand as an important explanatory variable.

Our results demonstrate that the gravitational attraction between the local and destination economies, transport costs and exchange rate are the important factors which affect the Vietnamese exports. Besides, ASEAN membership seems also to have been linked to Vietnam's export flows, especially since it started to deepen its integration into the regional economy in recent years.

Transport costs play a significant part in Vietnamese export performance. Higher transport costs hinder export activities and conversely, reduced transport costs support Vietnamese exports. However, the effect of transport costs on the Vietnamese exports tends to decrease over time. The dependence of Vietnamese exports on transport costs implies that besides emphasizing large economies in the world as the major destination markets for Vietnamese exports, the government needs also to pay adequate attention to destination markets with cheaper transport costs. Access to such markets should be facilitated by relevant policies to take advantage of the geographical location in strengthening Vietnamese exports' competitiveness.

References

Anderson, J. E. (1979). A theoretical foundation for the gravity equation. *American Economic Review*, *69*, 106-116.

Anderson, J. E. & Wincoop, E.V. (2003). Gravity with gravitas: A solution to the border puzzle. *American Economic Review*, *93*(1), 170-192.

Bergstrand, J. H. (1989). The generalised gravity equation, monopolistic competition, and the factor-proportions theory in international trade. *The Review of Economics and Statistics*, *71*, 143-153.

Cheng. I.H., & Wall (2005). Controlling for heterogeneity in gravity models of trade integration, *Federal Reserve Bank of St. Louis Review*, *87*(1), 49-63

Deardorff, A. V. (1995). *Determinants of bilateral trade: Does gravity work in a neo-classic world?* National Bureau for Economic ResearchWorking Paper 5377.

Egger, P. (2002). An econometric view on the estimation of gravity models and calculation of trade potentials, *World Economy, 25*(2), 297-312.

Harris, M., & Mátyás, L. (1998). *The econometrics of gravity models*. Melbourne Institute WP5/98.

Helpman, E. (1987). Imperfect competition and international trade: Evidence from fourteen industrial countries. *Journal of the Japanese and International Economies*, *1*(1), 62-81.

International Monetary Fund (2006). *Vietnam: Selected issues*, Country Report No.06/422.

McCallum, J. (1995). National borders matter: Canada-U.S. regional trade patterns. *American Economic Review, 85*(3), 615-623.

Sharma, K. (2003). Factors determining India's export performance. *Journal of Asian Economics*, *14*, 435-446.

Tinbergen, J. (1962). *Shaping the world economy: Suggestions for an international economic policy*. New York: The Twentieth Century Fund.

Table 1. Cross-section Random Effects - Hausman Test

Null Hypothesis: There is no misspecification for random effects model

Test Summary	χ^2 Statistic	χ^2 d.f.	P-value
Cross-section random			
Static model	3.72	3	0.29
Dynamic model	6.59	4	0.16

Table 2.Static Gravity Model, 1986-2006

Dependent variable: $EXPO_{it}$

Independent Variable	Coefficient	Standard Error	t-Statistic	Probability
Constant	18.39**	3.45	5.33	0.00
INC_t	1.61**	0.16	10.18	0.00
$PINC_{it}$	1.44**	0.17	8.66	0.00
$REMOT_i$	-3.44**	0.42	-8.27	0.00
$ASEAN_{it}$	-1.52*	0.76	-1.99	0.05
$EXCH_{it}$	0.003**	0.00	6.43	0.00
Observations	295			
R^2	0.529			
Adjusted R^2	0.521			

Notes: Coefficients with "*" and "**"are statistically significant at the 5% and 1% level, respectively.

Table 3. Dynamic Gravity Model, 1986-2006

Dependent variable: $EXPO_{it}$

Independent Variable	Coefficient	Standard Error	t-Statistic	Probability
Constant	4.06**	0.91	4.48	0.00
$EXPO_{it-1}$	0.72**	0.03	27.52	0.00
INC_t	0.22**	0.09	2.29	0.02
$PINC_{it}$	0.23**	0.05	5.03	0.00
$REMOT_i$	-0.56**	0.12	-4.54	0.00
$ASEAN_{it}$	-0.38**	0.17	-2.23	0.03
$EXCH_{it}$	0.004**	0.00	2.77	0.01
Observations	280			
R^2	0.894			
Adjusted R^2	0.892			

Notes: Coefficients with "*" and "**"are statistically significant at the 5% and 1% level, respectively.

Table 4. Dynamic Gravity Model, 1986-1998

Dependent variable: $EXPO_{it}$

Independent Variable	Coefficient	Standard Error	t-Statistic	Probability
Constant	6.35**	1.60	3.97	0.00
$EXPO_{it-1}$	0.68**	0.04	15.49	0.00
INC_t	0.13	0.19	0.69	0.49
$PINC_{it}$	0.26**	0.08	3.16	0.00
$REMOT_i$	-0.80**	0.22	-3.65	0.00
$ASEAN_{it}$	-0.73**	0.30	-2.48	0.01
$EXCH_{it}$	0.001**	0.00	2.02	0.04
Observations	160			
R^2	0.834			
Adjusted R^2	0.827			

Notes: Coefficients with "*" and "**"are statistically significant at the 5% and 1% level, respectively.

Table 5. Dynamic Gravity Model, 1999-2006

Dependent variable: $EXPO_{it}$

Independent Variable	Coefficient	Standard Error	t-Statistic	Probability
Constant	0.51	0.68	0.74	0.46
$EXPO_{it-1}$	0.84**	0.04	21.26	0.00
INC_t	0.25**	0.10	2.66	0.01
$PINC_{it}$	0.16**	0.04	3.80	0.00
$REMOT_i$	-0.16**	0.08	-2.12	0.04
$ASEAN_{it}$	0.06	0.09	0.67	0.50
$EXCH_{it}$	0.002#	0.00	1.64	0.10
Observations	120			
R^2	0.958			
Adjusted R^2	0.956			

Notes: Coefficients with "#", "*" and "**"are statistically significant at the 10%, 5% and 1% level, respectively.

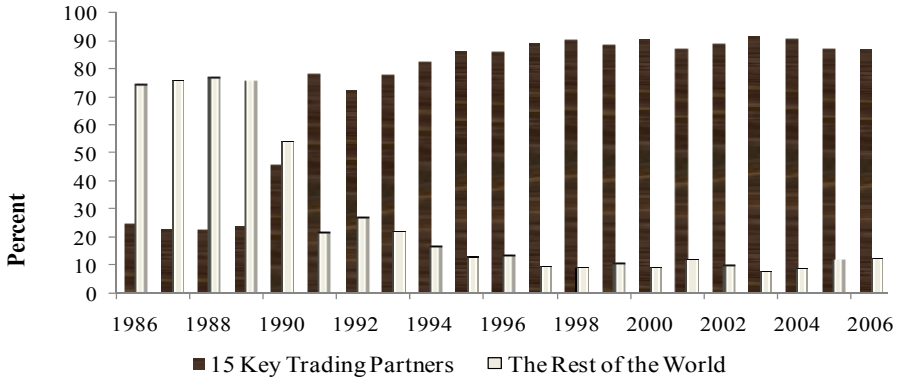

Figure 1. Structure of Vietnamese Export Market