Journal of Economics and Development, Vol.18, No.1, April 2016, pp. 5-18 ISSN 1859 0020 | DOI: 10.33301/2016.18.01.01

Determinants of Intra-Industry Trade for Vietnam's Manufacturing Industry

Tran Nhuan Kien
Thai Nguyen University of Economics and Business Administration, Vietnam
Email: tnkien@tueba.edu.vn

Tran Thi Phuong Thao
Thai Nguyen University of Economics and Business Administration, Vietnam
Email: thaonguyenx.ftu@gmail.com

Received: 18 September 2015 | Revised: 24 December 2015 | Accepted: 11 January 2016

Abstract

This study focuses on identifying the country-specific determinants of intra-industry trade in the manufacturing sector between Vietnam and major trading partners using random effects estimation. The results indicate that the extent of Vietnam's intra-industry trade is positively correlated with average country size and average income levels, while it is negatively correlated with income inequality, distance, and trade imbalance. Those factors affect horizontal intra-industry trade (HIIT) and vertical intra-industry trade (VIIT) in the same way except for the effect of income inequality (DPCI) on VIIT with an unexpectedly statistically insignificant impact. The coefficient of FTA is unexpectedly insignificant in three estimations, indicating an ambiguous effect of the participation in regional economic integration schemes on the share of IIT, HIIT and VIIT.

Keywords: Vietnam; manufacturing sector; IIT; HIIT; VIIT.

1. Introduction

Over the past half century, the world economy has witnessed a sharp growth in global trade volume. Most of this growth has been captured by intra-industry trade (IIT), the simultaneous import and export of commodities within the same industry. To investigate the causes of inter-industry trade, traditional David Ricardo theory and Heckscher-Ohlin theory used a static production-based approach. These models, based on assumptions of constant returns to scale, perfect competition, identical and homogenous preferences appeared not to be in accordance with the characteristics of the new phenomenon. Recent studies have developed demand-based trade models and employed other dynamic determinants to explain the IIT.

Studies on IIT sought to find answers to three major questions: how to measure the extent of IIT? What are the causes of IIT? And subsequently,what are the measures for improving IIT between investigated countries? Despite the fact that there have been a large number of empirical studies devoted to identifying the determinants of IIT, most of them have focused on the IIT of developed countries, whereas the number of studies dedicated to developing countries remains modest. In investigating determinants of IIT, several studies in the literature are inclined to country-specific determinants, while others paid attention to industry-specific factors, and many tend to test both types. In order to obtain a thorough understanding on this subject, recent researches seek to simultaneously figure out determinants of IIT together with horizontal IIT (HIIT) and vertical IIT (VIIT).

The purpose of this study is therefore to examine the patterns and the determinants of Vietnam's IIT in the manufacturing industry. More specifically, it aims to measure the extent of Vietnam's IIT; to identify the determinants and their impacts on Vietnam's IIT, HIIT, VIIT. Despite an increasing number of researches on developing countries' IIT, there has been little attention paid to the IIT of Vietnam. Accord-

Table 1: The extent of IIT between Vietnam and major trading partners

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Indonesia	0.23	0.29	0.29	0.35	0.49	0.47	0.54	0.57	0.52	0.45
Malaysia	0.24	0.32	0.35	0.36	0.36	0.35	0.45	0.52	0.57	0.58
Philippines	0.25	0.29	0.28	0.31	0.41	0.41	0.45	0.48	0.40	0.37
Singapore	0.19	0.16	0.17	0.19	0.30	0.39	0.47	0.50	0.40	0.28
Thailand	0.19	0.20	0.20	0.37	0.27	0.24	0.29	0.33	0.41	0.37
Japan	0.52	0.51	0.52	0.51	0.54	0.51	0.53	0.53	0.55	0.55
China	0.16	0.16	0.15	0.13	0.16	0.18	0.27	0.29	0.32	0.31
Hong Kong	0.30	0.28	0.35	0.33	0.45	0.30	0.26	0.20	0.17	0.14
India	0.10	0.13	0.14	0.20	0.34	0.41	0.38	0.40	0.33	0.24
Pakistan	0.06	0.16	0.34	0.25	0.16	0.45	0.39	0.45	0.38	0.34

Source: Author's calculation based on data from UNCOMTRADE 2015

ingly, this study seeks to make some contribution to the stock of research on Vietnam's IIT in manufactures.

2. An overview of Vietnam's intra-industry trade

The most frequent intra-industry trade occurs between highly developed countries that are similar both in levels of economic development and in size. Vietnam, a developing country, has been at the first stage of industrialization with a comparative advantage dominating in labor-intensive, low-technology products. The country, therefore, is faced with a low degree of intra-industry trade in the manufacturing industry. Among major trading partners, Vietnam has obtained the highest levels of IIT mainly with developed countries within the Asian region, yet, the indices are not at a high level (Table 1).

One of the most fundamental causes of underdeveloped intra-industry trade would be the constraint of advanced technology in production which is embodied in factor endowment. With obsolete techniques, Vietnam is incapable of enhancing the quality of manufactured products and thus the value of exports. The majority of the country's exports are either primary or labor-intensive, low added value commodities (Tran Nhuan Kien and Yoon Heo, 2014). Consequently, Vietnam's level of development is left far behind other nations in the region.

Accordingly, the extent of HIIT and that of VIIT have been at a low level. Table 2 gives the indices of HIIT and VIIT between Vietnam and some major trading partners as typical examples.

Overall, the extent of VIIT is higher than that of HIIT between Vietnam and her trading part-

Table 2: The extent of HIIT and VIIT between Vietnam and typical trading partners

Trading partners	Year / Indices	2006	2007	2008	2009	2010	2011	2012	2013
Indonesia	HIIT	0.161	0.153	0.193	0.19	0.21	0.228	0.23	0.22
	VIIT	0.131	0.198	0.295	0.284	0.33	0.34	0.28	0.23
Malaysia	HIIT	0.171	0.177	0.182	0.18	0.21	0.236	0.26	0.32
	VIIT	0.181	0.181	0.175	0.165	0.24	0.289	0.30	0.26
Singapore	HIIT	0.142	0.151	0.175	0.178	0.22	0.211	0.22	0.17
	VIIT	0.027	0.034	0.121	0.216	0.25	0.286	0.18	0.11
The U.S.	HIIT	0.036	0.044	0.046	0.058	0.07	0.064	0.06	0.06
	VIIT	0.076	0.070	0.071	0.082	0.09	0.112	0.11	0.10
UK	HIIT	0.030	0.031	0.037	0.048	0.04	0.053	0.03	0.03
	VIIT	0.051	0.048	0.061	0.065	0.08	0.089	0.05	0.05
Mexico	HIIT	0.004	0.006	0.009	0.033	0.04	0.042	0.06	0.07
	VIIT	0.046	0.044	0.058	0.121	0.15	0.145	0.17	0.09
Netherlands	HIIT	0.032	0.037	0.036	0.045	0.04	0.043	0.05	0.05
	VIIT	0.064	0.080	0.087	0.110	0.08	0.076	0.06	0.08
Sri Lanka	HIIT	0.070	0.046	0.063	0.093	0.11	0.045	0.03	0.04
	VIIT	0.223	0.227	0.293	0.288	0.24	0.094	0.07	0.13

Source: Author's calculation based on data from UNCOMTRADE 2015

ners during the investigated time. This trend can be clearly observed through the HIIT and VIIT indices between Vietnam and some developed countries such as Mexico, the Netherlands, Sri Lanka, the United States and the United Kingdom... This means that for the case of Vietnam, trade in varieties of a product characterized by different qualities occurs more often than trade in similar but differentiated products. An explanation for this tendency could be the difference in economic development between Vietnam and other developed nations.

3. Literature review

Over the past half century, economists have paid more attention to the new trade pattern defined as intra-industry trade rather than inter-industry trade. Particularly, since Balassa (1966) pointed out the rapid growth of intra-industry specialization in the years following the European Economic Community formation, a vast majority of the literature has been devoted to the explanation of the phenomenon.

According to Greenaway et al. (1994), Balassa and Bauwens (1987) and Greenaway and Milner (1986), determinants of intra-industry trade can empirically be categorized into two groups: country-specific and industry-specific factors. The former investigates the correlation between IIT and common and specific country characteristics including average per capita income, income differences, average country size differences, distance, common borders, average trade orientation, participation in economic integration schemes and common language. The latter is related to individual industries' characteristics such as product differentiation, marketing costs, variability of profit rates, scale of economy, industrial concentration, foreign investment, foreign affiliates, tariff dispersion, and offshore assembly.

Theoretically, IIT is decomposed into two parts including horizontal IIT and vertical IIT. Horizontal IIT (HIIT) refers to the simultaneous export and import of similar but differentiated products. Following the definition by Grubel and Lloyd (1975), vertical IIT (VIIT) is trade in varieties of a product characterized by different qualities[1].

Linder (1961) affirmed that the demand structure is determined by per capita income, and trade in manufactured goods is more likely to take place between countries with similar levels of incomes. We would expect consumers with similar incomes to demand similar but differentiated products. Therefore, HIIT arises when there is a higher extent of income overlap between trading partners. In pioneering works in intra-industry trade, Krugman (1979), and Lancaster (1980) consider that products are horizontally differentiated and consumers always prefer to have as many different varieties of a given product as possible (favorite variety approach). In these models, each variety is produced under decreasing costs and when the countries open to trade, the similarity of the demands leads to intra-industry trade. Horizontal IIT is more likely between countries with similar factor endowments and to some extent, identical factor intensity.

On the other side, Falvey and Kierzkowski (1987) and Flam and Helpman (1987) generally accepted that VIIT can be explained by the theory of comparative advantage. Accordingly, capital abundant countries would then specialize in, and export, high-quality products while labor abundant countries would specialize in,

and export, low quality products. Martin-Montaner and Rios (2002) figured out the positive relationship between differences in factor endowments measured by differences in per capita income and the extent of VIIT. The same result is found by Blanes and Martin (2000).

In investigating determinants of IIT, Zhang and Li (2006) decomposed it into horizontal and vertical intra-industry trade by utilizing the generalized least square (GLS) estimation. The results show the same direction of the impact of geographical distance, economic size, and trade orientation on the extent of not only IIT but also VIIT and HIIT. Besides, FDI is found to be an important trade driving force with negative impacts on VIIT and positive impacts on IIT and HIIT. VIIT appears to have a positive correlation with differences in consumer patterns, whereas HIIT is negatively related to these elements. The disentanglement of IIT into HIIT vis-à-vis VIIT is found in numerous studies (Gullstrand, 2000; Ekanayake et al., 2009; Faustino and Leitão, 2012) which give a more detailed explanation for IIT determinants.

To date, there have been numerous studies testing driving forces of IIT, HIIT, VIIT not only in the manufacturing industry but also in the agricultural and services industry for a variety of developed as well as developing countries. Empirical findings of those studies reinforce the importance of factors that have significant impacts on the extent of a country's IIT. Moreover, there have been various methods introduced to estimate the models related to the subject concerned. The OLS on the logarithm transformation of the logistic model was employed in dynamic panel data analysis by Caves (1981), Greenaway and Torstenson (1997) and Leitão and Faustino (2008). Besides, many others applied the generalized method of moment (GMM) (Ekanayake, 2001; Kandogan, 2003). Pooled OLS, fixed effects (FE) and random effects (RE) estimators are also utilized in static panel data models (Hummels and Levinsohn, 1995; Clark and Stanley, 1999). This study will apply RE method for the whole estimation of the models to identify determinants of Vietnam's IIT.

4. Determinants of IIT in Vietnam

4.1. Model specification

Using the theoretical framework proposed by Loertscher and Wolter (1980), the IIT model is specified as follows:

$$\ln(IIT_{ij}) = \beta_0 + \beta_1 \ln AGDP_{ij} + \beta_2 \ln APCI_{ij} + \beta_3 DPCI_{ij} + \beta_4 \ln DIST_{ij} + \beta_5 TIMBij + \beta_6 FTA + \varepsilon_{ijt}$$

Where: $\ln IIT_{ij}$ is the index or share of IIT (total, vertical, horizontal) between Vietnam and country j, which is in the form of lnIITij = ln (IIT/(1-IIT)). All variables except DPCI, TIMB, FTA are in the form of natural logarithm.

- $AGDP_j$ is the average gross domestic product of Vietnam and country j
- $APCI_{ij}$ is the average per capita income of Vietnam and country j
- $DPCI_{ij}$ is the difference in per capita income between Vietnam and country j
- $DIST_j$ is the geographical distance (measured as the crow flies) between the capital of Vietnam and that of country *j*
- $TIMB_{ij}$ is the trade imbalance between Vietnam and other trading partners
- FTA is a dummy variable, taking the value

of 1 if there is a free trade agreement between Vietnam and other individual country and 0 otherwise.

The extent of intra-industry trade is commonly measured by the Grubel-Lloyd (G-L) index. The intra–industry trade index is defined as follows.

$$IIT_i = 1 - \frac{\left| X^i_{jk} - M^i_{jk} \right|}{X^i_{jk} + M^i_{jk}}$$

Where X^i_{jk} and M^i_{jk} are country j's exports to and imports from country k of industry i, respectively. This measure takes values between 0 and 1. The closer the value to 1, the higher the degree of intra-industry trade.

The G-L index is constructed to fall between 0 and 1. Using this index as the dependent variable in a regression violates the assumption that the error term will follow a normal distribution function. One way to handle this problem is to transform the original data so that the error term follows a normal distribution. Consequently, this study applies a logit transformation to IIT, HIIT, and VIIT as in Hummels and Levinsohn (1995).

$\text{Ln IIT}_{ij} = \ln (\text{IIT}_{ij} / (1 - \text{IIT}))$

For the purpose of decomposing IIT into its parts, "ratio of unit values of exports" has frequently been used. This method, however, has been criticized by the randomness in the choice of threshold ratio for determining vertical or horizontal IIT. Thus, this study will use a newer method proposed by Kandogan (2003), utilizing values of exports and imports at two different levels of aggregation. The higher level of aggregation defines industries (2-digit SITC rev. 3), and the lower level of aggregation defines different products in each industry (4-digit SITC rev. 3). The total amount of IIT in each industry is computed by finding the amount of exports matched by imports at a higher level of aggregation, following Grubel-Lloyd (1975). Then, the amount of matched trade in each product of an industry (HIIT) is computed using data at the lower level aggregation. The rest of the IIT in this industry is VIIT (Kandogan, 2003).

4.2. Hypotheses

Drawing on previous empirical evidence, this study aims to investigate the following hypotheses related to the country-specific factors:

Hypothesis 1: The higher the average country size, the greater the IIT

As pointed out by Lancaster (1980), Helpman and Krugman (1985), Balassa and Bauwens (1987), in a large market, there will be greater opportunities for producers to ensure production on a large scale of a variety of differentiated products under conditions of economies of scale. Following Stone and Lee (1995), and Ekanayake (2001), the economy size will be measured as the average gross domestic product (AGDP) of two trading partners. The average country size is expected to be positively correlated with the share of IIT, and its horizontal and vertical parts.

Hypothesis 2: The higher the level of per capita income, the greater the IIT

Differences in per capita incomes, on the demand side, indicate differences in demand structures (Linder, 1961). People in countries with low per capita incomes may wish to consume simple and standardized products; customers in countries with much higher income

levels will be generally larger, more complex and sophisticated with respect to product characteristics. Thus, there would be less overlap in the demand structures between low and high income countries, which in turn affects the volume of HIIT and IIT.

On the supply side, there is a potential for VIIT between countries at different levels of per capita income (Falvey and Kierzkowski, 1987). Higher-quality, capital-intensive goods will be produced in higher income, relatively capital-abundant countries. At the same time, lower-quality goods which are produced using relatively labor-intensive techniques will be manufactured in low income, relatively labor-abundant countries. This provides the basis for bilateral trade in products different in price and quality. Thus, the difference in per capita income is predicted to positively correlate with the share of VIIT and negatively correlate with the share of IIT and HIIT.

In this study the difference in per capita income is represented by DPCI. Instead of taking the absolute values of inter-country differences in per capita income, a measure indicating relative differences shown by Balassa and Bouwens (1987) is utilized.

$$DPCIij = 1 + \frac{[w\ln(w) + (1-w)\ln(1-w)]}{\ln 2}$$

Where: w is calculated by equation (1) for *DPCIij*

$$w = \frac{Vietnam'sPCI}{Vietnam'sPCI + Country_j'sPCI} \quad (1)$$

It is clear that when w takes 1/2, DPCI reaches 0, alternatively, the degree of difference is 0. When w approaches a value closer to either 0 or 1, DPCI will approach a value closer to unit and the difference reaches an extreme level. This measurement is symmetrical, DPCI will follow the same pattern with changes of w ranging from 0 to 1.

Hypothesis 3: The greater the geographical distance, the lower the IIT

Physical distance acts as a natural impediment to international trade as it represents trade costs such as transportation and transaction costs reducing incentives to trade between countries. As proposed by Balassa (1986), Grubel and Lloyd (1975), geographical adjacency encourages the volume of IIT. Geographical closeness results in psychological and cultural similarities creating similar consumption patterns and increasing trade in differentiated products. The same finding was expressed by numerous researches, including (Loertscher and Wolter (1980), Balassa and Bauwens (1987), Stone and Lee (1995),) Kandogan (2003) and Krugman (1979)). Thus, it is expected that countries sharing common borders will record a larger share in IIT, HIIT and VIIT than those located far away. In this study, distance (DISTij) is measured in terms of absolute value – kilometers between the centers of geographical gravity of Vietnam and that of its trading partners. Hence, the variable DISTij is held constant over time for each pair of countries.

Hypothesis 4: The greater the trade imbalance, the lower the IIT

The G-L index – unadjusted IIT index used to measure IIT becomes smaller as the size of the trade imbalance increases. Trade imbalance was introduced as an additional explanatory variable in some studies by Lee and Lee (1993), Stone and Lee (1995), and Ekanayake (2001).

Following Ekanayake (2001), this study includes the trade imbalance $TIMB_{ij}$ as a control for bias in estimation of IIT, and it is defined as:

$$TIMBij = \frac{\left|X_{ij} - M_{ij}\right|}{(Xij + Mij)}$$

Where X_{ij} is Vietnam's exports to country j, and M_{ij} is Vietnam's imports from country j. The $TIMB_{ij}$ is expected to be negatively correlated with all IIT, HIIT, and VIIT.

Hypothesis 5: The extent of IIT will be positively correlated with the participation in regional economic integration schemes

The participation in regional economic integration schemes implies the possibilities of raising the IIT extent. Because of the abolishment of trade barriers, trade creation will increase trade flows. Additionally, since producers are able to take advantage of economies of scale and produce more differentiated products within the integration area, the overall trade volume is expected to increase more in the integration area than in trade with the World. The empirical results of Balassa and Bauwens (1987) have been explicit evidence for this postulation. The findings show a positive sign of dummy variables standing for the participation in the European Common Market (EEC), the European Free Trade Association (EFTA), and the Latin American Free Trade Area (LAFTA) by the trading partners. It is, therefore, expected that there will be a positive correlation between the FTA and IIT.

4.3. Method of estimation and data sources

In this study, the RE method estimated by Generalized Least Squares (GLS) was chosen to eliminate a potential source of heteroskedasticity among observations and to correct a possible correlation between the independent variables and error terms. It allows the inclusion of time invariant variables (such as DIST in this model) while in the FE model these variables are absorbed by the intercept. GLS appears to be efficient in the estimation of Clark and Stanley (1999), this method was not in accordance with the model by Leitão (2011).

This study is based on 2-digit and 4-digit SITC levels of aggregation of SITC rev3. The sample contains 40 countries as major trading partners of Vietnam. Trade data are obtained from the United Nation's COMTRADE. In order to measure the extent of IIT in manufactures, the bilateral trade data in the manufacturing industry at the 2-digit SITC level of aggregation between Vietnam and its trading partners are collected for 14 years, from 2000 to 2013. As for HIIT and VIIT, the same data at the 4-digit SITC level of aggregation are used. Geographical distances between Vietnam and every trading partner are derived from the website timeanddate.com[2]. Additional information on trade or countries' characteristics such as country income (GDP), per capita GDP values and population are obtained from IMF World Economic Outlook Database, and the Worldbank. For several missing values encountered in calculating IIT, VIIT and HIIT for some countries, the value in the following year of those countries will be borrowed to substitute. Moreover, data from existing academic articles may be employed as references.

4.4. Empirical results and discussion

Factors having an effect on IIT, HIIT and VIIT are presented in Table 3. The positive relationship between the average gross domes-

tic product (AGDP) and IIT is apparent in this study. The result confirms the prediction that penetrating into larger markets allows producers to take advantage of economies of scale, which induces the improvement of IIT. This result is consistent with the other findings such as Stone and Lee (1995), Clark and Stanley (1999) and Ekanayake (2001).

The empirical results are unambiguous in supporting the hypothesis that higher per capita income will contribute to a higher IIT share. This denotes that the expansion of income levels leads to diversification in demand patterns. The increase in consumption tastes of differentiated products has fostered IIT among countries.

A negative relationship between the difference in per capita income (DPCI) and intra-industry trade is distinguished in this study. The result suggests that IIT will be reduced by greater inequality in income levels between a high and a low-income country. The dissimilarity in per capita income results in differences in preference and factor endowment, driving down the extent of IIT between less developed countries and wealthy ones.

Geographical distance, a proxy of transportation cost and information cost, has a negative coefficient, suggesting that the transportation cost and information cost are key barriers to IIT. This is consistent with the expectation that countries sharing a common border have a chance to reduce these costs and thus raise the IIT extent. Moreover, close proximity enhances the likelihood of sharing a similar market structure and culture, encouraging IIT between neighbors (Stone and Lee, 1995).

Another burden facing the IIT of Vietnam is trade imbalance with a negative coefficient. It is understandable that a country suffering from a long-term trade deficit with others will seek to restrain its imports and improve its export position. By doing this, two-way trade flows will be distorted as every country pursues a surplus in balance of payment. Hence, trade imbalances will dramatically reduce the volume of intra-industry trade. This result is consistent with the finding of Li et al. (2003).

The result for the FTA variable expected to produce a positive impact on the share of IIT turns out statistically insignificant. A possible explanation for this might be that for any bilateral FTA between Vietnam and its trading partners, it will require a roadmap to accomplish the whole tariff concessions committed by the two sides. At the time of this study, Vietnam's tariff reduction is not significant enough to have explicit effects on the volume of intra-industry trade.

Four factors affect HIIT and VIIT in the same way. One is average economic size, which has a significant and positive impact on both HIIT and VIIT. Vietnamese HIIT and VIIT are more likely to take place with large economies than with small ones. Another common factor is average per capita income with a positive influence on both HIIT and VIIT, indicating diversification in demand structure in high income countries. The other common factor is geographical distance producing a significant and negative impact on both HIIT and VIIT. This result supports the argument that transportation cost and information cost do deter two components of intra-industry trade (including VIIT and HIIT). The last factor is trade imbalance generating a significantly negative impact on

Table 3: Determinants of Vietnam's intra-industry trade in the manufacturing industry

Variables	IIT	HIIT	VIIT
CONST	-1.182	-1.649	-2.719**
	(-1.05)	(-1.38)	(-2.43)
$lnAGDP_{ij}$	0.208**	0.347***	0.161**
	(2.53)	(4.03)	(2.11)
$ln\ APCI_{ij}$	0.416***	0.493***	0.323*
	(4.09)	(4.39)	(1.92)
$Ln\ DPCI_{ij}$	-1.252***	-1.201***	-1.133
	(-3.21)	(-2.72)	(-1.47)
$ln\ DIST_{ij}$	-0.681***	-1.090***	-0.409***
	(-5.13)	(-7.79)	(-3.28)
TIMBij	-1.155***	-1.201***	-1.062***
	(-6.95)	(-6.05)	(-4.27)
FTA	-0.154	-0.040	-0.292
	(-1.14)	(-0.25)	(-1.43)
No. of observation	560	560	560

*Notes: * significant at the 0.1 level; ** significant at the 0.05 level; *** significant at 0.01 level; z-statistics are in parenthesis.*

HIIT and VIIT. This result reinforces the negative correlation between trade imbalance and total intra-industry.

As demonstrated by the result, DPCI produces a negative effect on HIIT as expected. This confirms the Linder hypothesis that "potential trade in manufactures is most intensive among countries with similar demand structures, countries with about the same per capita income levels" (Linder, 1961, pp. 107). However, in the estimation of VIIT, DPCI is statistically insignificant, specifying an ambiguous effect on the extent of VIIT. This is because the differences in per capita income represent differences in factor endowment. Developed, relatively capital-abundant countries are assumed to specialize in high-quality products in high-technology industries. In contrast, less developed, relatively labor-abundant countries would specialize in low-technology commodities in low-technology industries. Consequently, inter-industry trade rather than intra-industry trade is generated due to the greater gap in levels of development between the poorer and the richer countries. As the case of IIT, the coefficient of FTA is negative but insignificant, generating an ambiguous effect on HIIT and VIIT, possibly due to lack of data and small sample size.

5. Conclusion

This study analyzes the determinants of intra-industry trade in the manufacturing industry between Vietnam and its major trading partners over the period 2000-2013. The regression model was estimated using panel data and applying the RE method. The following hypotheses capture factors identified as the key determinants of IIT in manufactures: the average economic size, the average per capita income, the difference in income levels, distance, trade imbalance, and free trade agreements. The em-

pirical results support most of the hypotheses, which can be summarized as follows:

The positive sign of the AGDP coefficient illustrates that the effect of the economic size on the intensity of IIT, HIIT and VIIT is significant. It once again confirms the importance of economies of scale in improving the share of intra-industry trade. The variable APCI is a proxy of demand structure that positively correlates with IIT, HIIT and VIIT. The difference in preference and factor endowment of trading partners is embodied by the difference in per capita income – DPCI shows negative impacts on IIT, HIIT and an ambiguous effect on VIIT. The negative sign of DIST coefficient proves the important role of transportation cost in international trade. The result suggests that the closer the two economies, the larger the share of IIT. A negative correlation is also found in the relationship between TIMB and IIT. The coefficient of FTA is unexpectedly insignificant in the estimations of IIT, HIIT and VII, illustrating its ambiguous effect on the extent of intra-industry trade in both vertical and horizontal parts.

6. Policy implications

One of the most fundamental causes of underdeveloped intra-industry trade would be the constraint of advanced technology in production which is embodied in factor endowments. With obsolete techniques, Vietnam is incapable of enhancing the quality of manufactured products and thus the value of exports. Theoretically, FDI enterprises were supposed to transfer technologies to Vietnamese indigeneous firms, however, the benefits were not as high as Vietnamese authorities expected. Foreign investors always claimed that domestic companies are incapable of making simple parts and accessories such as screws, forcing foreign investors to import parts and components from subcontractors in their home markets. Also, foreign investors seek to maximize their profits by creating a perfect supply chain in the host country. For example, the construction of automobile factories such as Toyota, Honda and Yamaha by Japanese investors is accompanied by the operation of paint companies like Nippon, and Kansai from Japan. Eventually, the local content contributing to made-in-Vietnam products is only labor productivity. Only when domestic companies become major suppliers of inputs, would the attraction of foreign investment bring us real economic efficiency.

This is the time for the government to pay attention to supporting industries related to providing intermediate inputs (parts, components, and tools to produce these parts and components) for assembly-type or processing industries. A strong supporting industry will create momentum for the growth of the manufacturing sector and promote intra-industry trade in manufactures. The country can adjust experiences of other countries to the current economic situation. For example, local content regulations used by Taiwan and Korea in the 1960s and 1980s to absorb technologies from foreign companies can no longer be applied due to the rules of the WTO. Instead, the country should pay more attention to development of SMEs because most part and component suppliers are small, medium enterprises (SMEs).

Although many financial supporting policies aiming at improving competitiveness of SMEs in industrial sector have been proposed in every meeting of the National Congress, the

achievements have not been adequate to date. The problem is that domestic companies were not evenly treated as foreign-invested companies, exacerbating a shortage of capital among the former.

Thus, the first measure addressing financial difficulties should be the lowering of the inequality between domestic and foreign investors. Particularly, Vietnamese manufacturing firms in supporting industry should be granted corporate income tax exemptions for the first 4 years of operation and this period could be extended if the business runs well. Similar to an FDI company, an efficient domestic one could be entitled to a fifty percent reduction of corporate income tax for 9 years more. In reality, many FDI firms have been bestowed these exclusive rights which was not listed in any legal documents. Additionally, while FDI enterprises enjoy the advantages of renting and choosing location, domestic firms are in trouble to even access the land for factory construction. SMEs that are vulnerable to competition from foreign giants should be given more convenient conditions in the domestic market.

Another possible solution to upgrade SMEs' internal capability is to attract foreign investors in a selective way. For 25 years, there have been only 605 technology transfer agreements being implemented. This number, compared with more than 14 thousand projects invested in Vietnam, is negligible. Most foreign investors have brought medium technologies to FDI projects implemented in Vietnam, indicating that investors primarily take advantage of low labor cost in the home country to construct factories with assembly lines. Consequently, Vietnamese companies can only create low added value, deterring their participation in the global production network. Therefore, the government should only give preferential treatment to: projects invested in high technology sectors, with ensured commitment to transfer technology; and projects invested in a supporting industry, surely committing to transfer technology. Normal projects would be given 2 years of tax exemption, and a maximum 5 years of tax reduction, while encouraged projects should be given 5 years or more of tax exemption if they transfer technology as outlined in the roadmap.

These solutions are expected to produce significant impacts on the manufacturing industry. Only when there is cooperation between comprehensive management of the government and creative implementation of domestic enterprises, can such measures reach a good result.

Notes:

1. As for another approach, VIIT is defined as simultaneous export and import of products in the same industry but at different stages of production (Kandogan, 2003).
2. http://www.timeanddate.com/worldclock/distance.html

References

Balassa, B, and L. Bauwens, (1987), 'Intra-Industry Trade Specialization in a Multi Country and Multi-Industry Framework', *Economic Journal,* 97(388), 923-939.

Balassa, B., (1966), 'Tariff Reductions and Trade in Manufactures among the Industrial Countries', *American Economic Review,* 56 (3), 466-473.

Balassa, B., (1986), 'Intra-industry Specialization: A Cross-Country Analysis', *European Economic Review*, 30 (1), 27-42.

Blanes. J.V., and C. Martin, (2000), 'The Nature and Causes of Intra-Industry Trade: Back to the Comparative Advantage Explanation? The Case of Spain', *Weltwirtschaftliches Archiv*, 136 (3), 423-441.

Caves, R. E. (1981), 'Intra-industry trade and market structure in the industrial countries', *Oxford Economic Papers,* 33, 203–223.

Clark, D. and D. Stanley, (1999), 'Determinants of Intra-industry Trade between developing countries and the United States', *Journal of Economic Development*, 24 (2), 79-95.

Ekanayake E. M, V. Bala and M. Carlos, (2009), 'Vertical and horizontal intra-industry trade between the U.S. and NAFTA partners', *Revista de Análisis Económico*, 24 (1), 21-42.

Ekanayake E.M., (2001), 'Determinants of Intra-industry trade: The Case of México', *the International Trade Journal*, XV (1), 89-112.

Falvey, D. and H. Kierzkowski, (1987), 'Product Quality, Intra-Industry Trade and (Im) Perfect Competition', In H. Kierzkowski (Ed.), Protection and Competition in International Trade: *Essays in Honor of W.M. Corden. Oxford*.

Faustino, HC., N.C. Leitão, (2012), 'Country-specific determinants of intra-industry trade: Evidence from Portugal', *Actual Problems of Economics*, 135,: 531-541.

Flam, H. and E. Helpman, (1987), 'Vertical Product Differentiation and North-South Trade', *American Economic Review*, 77, 810-22.

Greenaway, D. and C. Milner, (1986), *The Economics of Intra-Industry Trade*, New York: Basil Blackwell Ltd.

Greenaway, D. and J. Torstensson, (1997), 'Back to the Future: Taking Stock on Intra-Industry Trade', *Weltwirtschaftliches Archiv*, 133, 249-269.

Greenaway, D., R. Hine, and C. Milner, (1994) 'Country-Specific Factors and the Pattern of Horizontal and Vertical Intra-Industry Trade in the UK', *Weltwirtschaftliches Archiv*, 130 (1), 77-100.

Grubel, H.G., and P.J. Lloyd, (1975), *Intra-industry trade: the theory and measurement of international trade in differentiated products*, McMillan: London.

Gullstrand, J. (2000), 'Country-Specific Determinants of Vertical Intra-Industry Trade With Application to Trade between Poland and EU', In B. Wawrzynjak (Ed.), *Globalisation and Change – Ways to Future, Leon Kozminski Academy of Enterpreneurship and Management, Warsaw.*

Helpman, E. and P. Krugman, (1985), *Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition and the International Economy*, 1st ed; *London: MIT Press*.

Hummels, E. and J. Levinsohn, (1995), 'Monopolistic Competition and International Trade: Reconsidering the Evidence', *Quarterly Journal of Economics*, 110 (3), 799-836.

Kandogan, Y., (2003), 'Intra-Industry Trade of Transition Countries: Trends and Determinants'*, Emerging Markets Review*, 4 (3), 272-286.

Krugman, P., (1979), 'Increasing returns, monopolistic competition and international trade', *Journal of International Economics*, 9 (4), 469-479.

Lancaster, K., (1980), 'Intra-industry trade under perfect monopolistic competition', *Journal of International Economics*, 10 (2), 151-175.

Lee, H. and Y. Lee, (1993), 'Intra-industry Trade in Manufactures: The case of Korea', *Weltwirtschaftliches Archiv*, 129, 159- 171.

Leitão N. C. and H. Faustino, (2008), 'Intra-Industry Trade in the Food Processing Sector: The Portuguese

Case', *Journal of Global Business and Technology,* 4 (1), 49-58.

Leitão N. C., (2011) 'Intra-Industry Trade in the Automobile sector: The Portugese Experience', *Argumenta Oeconomica*, 2 (27), 1 -12.

Li, Donghui, F. Moshirian and A. Sim, (2003) 'The Determinants of Intra-Industry Trade in Insurance Services', *The Journal of Risk and Insurance*, 2 (70), 269-287.

Linder, S. (1961), *An Essay on Trade and Transformation*, New York: John Wiley.

Loertscher, R. and F. Wolter, (1980), 'Determinants of intra-industry trade among countries and across industries', *Review of World Economics*, 116 (2), 280-293.

Martin-Montaner, J. A. and V. O. Rios, (2002), 'Vertical Specialization and Intra Industry Trade: The Role of Factor Endowments', *Review of World Economics,* 138, 340-365.

Stone, J. and H. Lee, (1995), 'Determinants of Intra-Industry Trade: A Longitudinal, Cross-Country Analysis', *Weltwirtschaftliches Archiv*, 131(1), 67-85.

Tran Nhuan Kien and Y. Heo, (2014), 'Technology, Factor Proportion and Complementary: Trade Relations between Korea and Vietnam', *Journal of International Logistics and Trade*, 12, 23-43.

Zhang, Z. and C. Li, (2006), 'Country-specific factors and the pattern of intra-industry trade in China's manufacturing', *Journal of International Development*, 18, 1137-1149.