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The Impact of Neighborhood on Iran's Intra-Industry Trade (A Spatial Panel Econometric Approach)

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Abstract

The main purpose of this research is to answer the question that "How neighborhood of Iran's trading partners will have an effect on Iran intra-industry trade? For this purpose, the impact of spatial neighborhood effects of 23 major trade partners on Iran's intra-industry trade for the period of 1995-2014, has been investigated through Spatial Panel Econometric and Maximum Likelihood Estimator (ML). By using the Spatial Autoregressive (SAR) Model and Geographic Distance Matrix, neighborhood effects have been investigated. The results gained from spatial neighborhood effects estimates showed that the neighborhood of Iran trade partner countries had a negative effect on Iran's intra-industry trade. It was also found that differences in market size, exchange rate volatility, trade orientation, and geographical concentration had a negative effect and economic growth, Linder Effect, exchange rate, and volume per capita trade had a positive effect on intra-industry trade. Accordingly, it is recommended that Iran has more trade with Belgium, India, Korea, Netherlands, Iraq, Saudi Arabia, and Singapore.

Keywords: Intra-industry Trade, Geographic Neighborhood, Spatial Panel Econometric, Iran.

JEL Classification: F12, F14, C21, C33.

1. Introduction

The classical international trade theories place emphasis on the difference between the absolute and comparative advantage, and resource endowment for the purpose of exporting and importing goods and services. In these theories, countries import or export specific goods in the framework of inter-industry trade. In other words, based

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on the theories of classical and neoclassical trade, ranging from Ricardian comparative advantage models (Ricardo, 1817) and Heckscher- Ohlin (1919-1924) and Samuelson (1949) resource endowment (Feenstra, 2015) to the "overlapping demand" of Linder (Linder, 1961), they all focus on the differences between regions. Therefore, they cannot predict or explain intra-industry trade, since in such models there will be no reason to trade similar products for countries.

Since the late 1970s, new trade theories were presented by (Krugman, 1979; 1980), (Lancaster, 1980) and (Helpman, 1981), whose purpose was to explain the phenomenon of intra-industry trade in advanced industrialized countries. New theories of commerce generally have three main distinguishing aspects with old (classical and neoclassical) ones: first, economies of scale, second, imperfect markets, and third, product differentiation. According to these theories, the intra-industry trade emerges because of product differentiation in imperfect competition markets as well as the existence of economies of scale. Based on this theory, even if two countries are comparable in terms of comparative advantage, it is better for them to specialize in the production of a commodity since the specialization in each country enables them to take better advantage of the opportunity for economies of scale in production, and it reduces the cost of producing goods and thus expands the scope of profitable trade. The same logic has led to greater use of the economies of scale in intra-industry trade because as each country becomes more specialized in a particular commodity or piece of goods, it will lead to benefit more from scale economies. Therefore, the price competitiveness of goods in this perspective requires the use of potential savings, which itself requires specialization in the export of goods or components of goods. Thus, despite the similarity of demand in an open economy, products with a decreasing production cost lead to intra-industry trade. Hence, horizontal intra-industrial trade takes place between countries with the same production factors potential, which cannot be explained by traditional trade theories (Helpman, 1990).

A large part of international trade is made up of intra-industry trade (UNCTAD, 2010). Studies show that because of their specialized trade, developed countries have a larger share of intra-industry trade. Considering that in Iran, trade is mainly for intermediate goods and the share of trade for industrial goods is small, it seems that the share of Iran intra-industry trade is small. On the other hand, Iran's trading partners are also low in diversity. The geographical variation of trade partners is also a factor in increasing intra-industry trade. Certainly, the proximity of relations between Iran's trading partners can affect the level of Iran's trade and intra-industry trade with partners. Hence, this study answers to these questions "Which major trading partners have a major role in Iran's intra-industry trade?", "What factors are effective on intra-industry trade?", “Is the neighborhood of Iran's trading partners is effective on intra-industry trade?”; Therefore, the main objective of this research is to investigate the effect of spatial neighborhood effects of 23 major trading partners on Iranian intra-industrial trade for the period 1995-2014 by spatial panel econometrics and the maximum likelihood estimation (ML) method. Furthermore, the neighboring effects are evaluated using the geographic distance matrix.

2. Literature Review

Early research on the role of geography and its role in trade opened up a new topic in trade. Early research was conducted by Ullman (1957), Smith (1964), Rodgers (1971), Tobler (1975, 1981 and 1987), and Knudsen (1988) on the spatial dimensions of trade (Rodgers, 1973; Smith, 1964; W. Tobler, 1975; W. R. Tobler, 1981, 1987; Ullman, 1957). Ulman (1957) explored the spatial pattern of commodity flow in US domestic and foreign trade, which is mainly through railways, to explain spatial communication in the American economy. In this context, he states that the trade flow is determined by complementarity, intervening opportunity, and transferability. Knudsen (1988) has also used Ulman’s complementary concept to analyze the pattern of trade partners in interstate commodity flows during the period from 1972 to 1981, and showed that trade partners despite the rapid changes in the volume of flows, were often stable over time. Accordingly, more attention was paid to the spatial and geographical dimensions of trade, and also, to the factors focused on the amount and type of goods transported between the regions. When the production of firms enjoys economies of scale in different locations and transport intermediate goods at different stages of the production chain for different regions before delivery to final consumers, it will result in "vertical intra-industry" (Hummels, Rapoport, & Yi, June 1998). In addition, Falvey (1981), Shaked and Sutton (1984) and Helpman (1981) by offering "Vertical Diversity" model concluded that products that are vertically diverse are produced in two countries, and one of them has a comparative advantage in higher qualitative diversity, while the other has a comparative advantage in lower qualitative diversity (Falvey, 1981; Helpman, 1981; Shaked & Sutton, 1984). In these models, it is generally accepted that vertical intra-industry trade can be explained by traditional theories of comparative advantage. The main and conventional concept presented for all justifications is that the production process, traditionally integrated into one company or in an area, is vertically split into separate parts that can be located in several locations in one country or in different countries, which have a specific production intensity factor. In this framework, the regions specialized at a certain level of a production process will increase the "vertical" intra-industrial trade by increasing production (Jones & Kierzkowski, 1988). Accordingly, the differentiation in a commodity is divided into horizontal differentiation, i.e. the difference due to properties, the difference due to quality and technological differentiation; and vertical differentiation due to the multiplicity of production in different spaces and places.

Clark and Stanley (1999) have addressed the determinants of intra-industrial trade between the United States and developing countries. Research results show that IIT varies by being non-standardized, order-based manufacturing, vertical differentiation, and product sensitivity to the workforce (Clark & Stanley, 1999). Blanes and Martin (2000) considered the difference in the human and physical capital stock between Spain and the sample countries as a determinant of trade flows between industries. The findings revealed a significant effect of this factor on vertical trading flow. Therefore, they concluded that, contrary to the traditional basic theory of international trade (Heckscher-Ohlin's theory), differences in resource endowment would aggravate vertical trade flows or cross-trading flows between countries (Blanes & Martín, 2000). Oguro (2008) have proceeded to examine the effect of exchange rate volatility on Chinese intra-industry trade for 38 trade partners based on panel data. In this research, the gap between production costs is considered as a key factor. The results of the study showed that exchange rate volatility could reduce intra-industry trade (Oguro, 2008). Dausa (2009) examines the effects of exchange rate shocks on Malaysian exports and imports for the period of 1999-2006 using the method of vector error correction. The results of the study confirm the positive and incomplete significance of exchange rate shocks on Malaysian exports and imports (Duasa, 2009). Turkcan and Ates (2010) have examined the determinants of car intra-industry trade for the United States. The results of their research show that intra-industry trade has a positive relationship with the difference in per capita income and US foreign investment in the automotive industry and a negative relationship with geographical distance and bilateral exchange rate (Turkcan & Ates, 2010). Okabe and Urata (2014) have studied the effect of the formation of AFTA on the intra-industrial trade of these countries. Based on the gravity model, they concluded that reducing tariffs for various products had positive effects on intra-industry trade in these countries. The result also showed that the susceptibility of newcomers was higher than that of the old member states of free trade (Okabe & Urata, 2014). Doruk (2015) has addressed the impact of research and development costs on Turkey's intra-industry trade with 14 trading partners in the period 1990-2010. The research results show that R&D spending has increased domestic trade in the Turkish industry by one lag (Doruk, 2015).

3. Factors Affecting Intra-industry Trade

There are many factors that affect intra-industry trade, among which the most important ones are economic growth, the difference in market size, exchange rate, Linder variable, Trade barriers, and trade imbalances and foreign direct investment (FDI).

Economic Growth

Although in the theoretical models of intra-industry trade, economic growth and development have not been explicitly indicated as a decisive factor, a proper level of growth and development is necessary for the emergence and expansion of intra-industry trade. On the demand side, the level of growth and development indicate more potential demand of countries for differentiated products (Balassa & Bauwens, 1987). In addition, developed countries, despite the relatively high demand for differentiated products, have the potential to exploit economies of scale (Loertscher & Wolter, 1980).

The Difference in Market Size

According to Adam Smith, the main reason for the increasing returns with regard to the factory sector scale is related to the division of labor, and the process of division of labor depends on the size of the market. Therefore, the market size will have a direct impact on economies of scale. Krugman (1980) argues that larger countries have a higher power to produce products with the feature of increasing returns to scale and can produce more distinct products (Krugman, 1980). Also, Lancaster (1980) shows that there is a direct relationship between the average size of the market and the intra-industry trade of the two countries. If countries are identical in all respects, including the size of the market, then intra-industry trade will certainly be formed between them (Lancaster, 1980). Similar levels of market size indicate similar functionality in the production of similar products, and therefore, intra-industry trade will be higher (Helpman, 1981). Therefore, the lower difference in the market size of the two countries, the higher intra-industry trade between the two countries and, conversely, the expansion of the size difference between the two markets will reduce intra-industry trade.

Exchange Rate

The devaluation of the national currency against foreign currency will lead to a reduction in the price of exported goods for foreigners, and consequently, the demand for export goods will increase. The devaluation of the national currency will also increase domestic prices because the initial effect of the devaluation of the national currency is the increase in the price of imported goods. The exchange rate volatility leads to increased uncertainty, which leads to an increase in the risk of trade activities and ultimately a reduction in trade volumes (Côté, 1994). Grauwe (1988) believes that the increase in risk has two effects: income and substitution effects, which they work in different directions. As risk increases, the substitution effect causes a substitution of other low-risk activities with high-risk ones, which it will be considered as a reduction in expected utility of trade activity. On the other hand, firms will increase their activity to offset this decline in income. The outcome of both income and substitution effects depends on their utility functions (De Grauwe, 1988).

Linder Variable

The Liner variable refers to the difference in the per capita income of two trading countries. This variable shows, on the supply side, the difference in per capita income between the two countries (Linder variable) and the difference in resource endowment of production, and on the demand side, shows the difference in demand structure and consumer preferences of both countries. Based on Krugman's (1979 and 1981) and Helpman's (1981) models, the difference in resource endowment leads to a reduction in intra-industry trade and an increase in inter-industries trade (Helpman, 1981; Krugman, 1979, 1981). On the other hand, by reducing the difference in per capita income of countries, the similarity of their resource endowment will increase. By designing a testable hypothesis, Helpman evaluates the relationship between the absolute value of per capita income (assuming higher per capita income represents a higher capital to work ratio) and a negative indicator of intra-industry trade. On the other hand, according to the Liner's hypothesis, countries with similar income structures will have similar (but distinct) demand structures. Also, the level of trade in these countries will be relatively broad. In general, this variable is expected to have a positive relationship with the intra-industry trade index (Andresen, 2003).

Trade Barriers

Trade barriers can be divided into two parts: natural barriers and trade policies (Clark & Stanley, 1999). Transportation costs are considered as a natural barrier and tariff and non-tariff barriers are considered as the barriers resulting from trade policy. In Intra-industry trade theories, transportation costs have a negative effect on it (Krugman, 1980). However, it should be noted that advances in the international transportation and marketing system have dramatically reduced the shipping cost and time required to ship the products. In addition, the importance of tariff and non-tariff barriers has diminished dramatically due to robust business-economic groups such as the European Economic Union, ASEAN and NAFTA, and the accession of the majority of countries to the World Trade Organization. Therefore, in sum, the negative effects of transportation costs and tariff and non-tariff barriers on intra-industry trade have decreased (Clark & Stanley, 1999).

4. Research Methodology

4.1 Model Specification

In total, there are three general approaches to considering spatial effects through spatial lag operations on dependent, independent variables and error terms (Anselin, 2013; LeSage & Pace, 2009). A generalized cross-sectional model that defines all possible spatial effects in the standard model is as follows:

$$\begin{aligned} y &= \rho W y + \alpha I_n + X\beta + WX\lambda + \varepsilon \\ \varepsilon &= \theta W\varepsilon + u \end{aligned} \qquad (1)$$

Where ρ is a spatial autoregressive coefficient, θ is spatial autocorrelation coefficient, and λ similar to β represents a K×1 vector of constant and unknown parameters to be estimated, and W is a N×N spatial matrix. Therefore, in this equation, Wy refers to the endogenous interactions among dependent variables, WX refers to exogenous interactions between independent variables and $W\varepsilon$ refers to endogenous interactions of error sentences in different units. This model is called the General Nested Spatial Model (GNSM). Accordingly, the OLS model can be expanded more generally such as a model with spatial lag, which is a kind of spatial Autoregressive (SAR) model and includes a spatially lagged dependent variable, or a lagged independent variable model (SLX) or a spatial error model (SEM) which includes terms of spatial disturbance. Also, by combining the models, a generic model can be achieved. These models can be defined in the framework of the fixed- and random-effects combinational model (Elhorst, 2014).

4.2 Introduction of Data and Model Variables

In order to investigate the objectives and hypotheses of the research, using the background of studies and investigating the factors affecting on intra-industry trade, the following statistics and information within the period 1997-2014 and for the 23 major Iran's trading partners including: Azerbaijan, Belgium, Brazil, China, France, Germany, India, Iraq, Italy, Japan, Korea, Netherlands, Pakistan, Russia, Saudi Arabia, Singapore, Spain, Switzerland, Thailand, Turkey, United Arab Emirates, United Kingdom, United States of America, are derived from United Nations Conference on Trade and Development (UNCTAD) and the International Monetary Fund (IMF). Accordingly, the variables used in this research are defined as follows:

***The dependent variable*:**

Intra-industry trade based on (Grubel & Lloyd, 1975), which is calculated as follows:

$$IIT = 1 - \frac{\sum_{i=1}^{n} \left| X_{ikt} - M_{ikt} \right|}{\sum_{i=1}^{n} (X_{ikt} + M_{ikt})} \tag{2}$$

Where X is the rate of exports of goods and services classified by the Three-digit United Nations Standard Code (UNSPSC); M is the rate of import of goods and services classified by the 3-digit United Nations Standard Code (UNSPSC) for goods i in the country k in time t.

***Independent variables*:**

- Economic Growth as a Percentage of growth in Gross Domestic Product denoted as GY;
- The difference in the size of the market as the difference in Iran's GDP from major trading partners in million dollars with the abbreviation DY;
- The logarithm of a bilateral nominal (official) exchange rate with the abbreviated name of LBEX
- Exchange rate volatility as a coefficient of exchange rate variance for a period of 3 to 5 years (the coefficient of variation

is a division of standard deviation of the period from 3 to 5 years by average), with the abbreviation INS (Perry and Steinhur, 1989).

- The geographical concentration index, which by the relation $w_{ij} = \frac{T_{ij}}{\sum_{\substack{i=1 \\ j=1}}^{n} T_{ij}}$ is the trade share of the country i (Iran) from trade with the country j (partner), where T_{ij} is the total amount of trade of the country i (Iran) with country j; with the abbreviation WTR;
- The difference in per capita income of countries. The fixed price of the year 2005 to million people, known as the Linder variable, using the Balassa Inequality index is as follows:

$$INQ\_IP = \ln\left[1 - \left(\frac{IP_i}{IP_i + IP_j} + \frac{IP_j}{IP_i + IP_j}\right)\right] \quad (3)$$

Where IP is per capita income of the country, i for Iran and j for other countries (partner) with the abbreviation INQ_IP ;

- Freedom of trade is obtained as the ratio of total trade to a gross domestic product, with abbreviation TRY ;
- Trade Orientation, which is the variable of remainders of trade per capita regression over per capita income and population (Clark and Stanley, 1999), abbreviated with TRO ;
- The volume of trade per capita in dollars, which is an indicator for assessing intra-industry trade (classical), abbreviated with TRP .

Spatial weights matrix

In this research, the spatial matrix of geographical distance (W) has been used to investigate spatial effects. For computational simplicity and helping to the interpretation of spatial variables, weights are standardized, so that the sum of elements in each row is equal to 1 or in the other words. $w_{ij}^{s} = \frac{w_{ij}}{\sum_j w_{ij}}$

Given the research, the focus will be on the study of spatial effects affecting intra-industry trade, the model used will be of SAR type. The specification of the SAR model is as follows, where y refers to the dependent variable and x is the vector of independent variables.

$$y = rWy + aI_n + Xb + e$$
$$x = \{DY, GY, INQ\_IP, INS, LBEX, TRA, TRP, TRY, WTR\} \tag{4}$$

5. Model Estimation and Data Analysis

5.1 Measurement of Iran Intra-Industry Trade (IIT)

Iran's intra-industry trade with 23 major trading partners in 1995-2014 is shown in Table1.

Table 1: The Amount of Intra-industry Trade with Major Trading Partners (Percentages) Over Five-Year Periods

year	Average 1995-1999	Average 2000-2004	Average 2005-2009	Average 2010-2014
Azerbaijan	2.69	11.19	23.72	11.82
Belgium	0.27	0.08	0.28	0.13
Brazil	2.62	3.23	2.92	2.07
China	1.08	2.07	2.06	2.55
France	1.4	1.99	3.31	3.38
Germany	2.75	9.74	9.68	4.21
India	2.19	6.7	0.9	0.51
Iraq	1.01	1.39	2.01	2.82
Italia	0.29	0.13	0.15	0.19
Japan	1.19	1.63	1.43	1.21
Netherlands	1.74	1.9	4.66	6.19
Pakistan	2.71	2.23	2.68	1.62
Russian	11.07	7.25	22.12	8.03
Saudi Arabia	4.76	27.34	24.12	11.2
Singapore	0.86	3.39	3.06	1.54
South Korea	5.45	4.35	4.38	2.71
Spain	1.09	1.77	2.52	1.61
Swiss	0.67	3.96	1.52	2.83
Thailand	3.29	5.55	5.29	8.21
Turkey	10.63	13.16	11.12	10.47
UAE	9.53	3.68	5.92	4.76
UK	0.28	0.41	0.5	0.17
USA	4.23	8.64	7.74	6.72

Source: Research results

As is noted in this table, the amount of intra-industry trade with the major trading partners in the understudied period follows a different trend. Such that it is evident that Iran's intra-industry trade level averaged for the mentioned period with Italy, Belgium, Britain, Japan, Spain, Iraq, and China is very low, so for many years, Iran's domestic trade with these countries is very low and is calculated near zero. Also, the most important countries that have had intra-industry trade with Iran are including Saudi Arabia, Azerbaijan, Russia, Turkey, the United States, Germany, and the UAE.

5.2 Stationary Test

According to research results, if the variable is not unit root and the spatial weight matrix is symmetric, the spatial variable is reliable; therefore, the estimated coefficients are valid. Therefore, if the neighborhood matrix is asymmetric, then it is necessary to examine the convergence of the column and row of the matrix. (Elhorst, 2014) For this reason, since the matrix used is symmetric, the study of the main variables is sufficient on its own. Accordingly, we have used the Im, Pesaran, and Shin (IPS) and Augmented Dickey-Fuller (ADF) tests. The results of these tests are presented in Table (2).

Table 2: Results of Reliability Test of the Research Variables

Tests		IPS*	$(Prob)_{IPS}$	ADF	$(Prob)_{ADF}$
Variable	IIT	-6.8	0.00	129	0.00
	GY	-9.0	0.00	162	0.00
	DY	2.2	0.02	63.6	0.04
	LBEX	-2.3	0.00	62.0	0.00
	INS	----	----	82	0.00
	WTR	-3.3	0.00	82	0.00
	INQ_IP	----	----	62	0.00
	TRY	-3.0	0.00	86	0.00
	TRO	----	----	100	0.00
	TRP	-5.5	0.00	75	0.00

Source: Research results

Note: *The IPS reliability test does not have a statistic if the relation is verified without an ordinate and trend.

The P-Value for all variables is less than 5%, so the null hypothesis is rejected based on the existence of a unit root at a 95% confidence level. The Estimation of the spatial model:

Step 1: Check presence or absence of spatial effects

In order to detect the presence or absence of spatial effects, the Pesaran's (2004) cross-sectional correlation CD test and Lagrange coefficient test (*LM_SAR*) are used. The importance of CD testing is that, if cross-section autocorrelation is confirmed, the probability that this autocorrelation is due to spatial effects will be strengthened. Based on this test, the null hypothesis refers to the absence of cross-sectional autocorrelation. Also, the null hypothesis in the LM test is the absence of spatial dependence, which if the null hypothesis is rejected, the model based on spatial effects are confirmed. Table 3 shows the results of examining these tests on the Pooled model, Cross-section fixed effect, Time Period Fixed Effect, Cross-section and Time Period Fixed Effect, and Time Period Fixed Effect and cross-section Random-effect.

Table 3: The Results of Cross-sectional Autocorrelation Tests and the Existence of Spatial Effects in Panel (Non-spatial) Models

	Tests	Pooled	Cross-section fixed effect	Time Period Fixed Effect	Cross-section and Time Period Fixed Effect	Time Period Fixed Effect and cross-section Random-effect
Cross Section Correlation	Pesaran CD	9.9 (0.00)	7.5 (0.00)	6.4 (0.00)	6.2 (0.00)	7.3 (0.00)
Examination of the presence or absence of spatial effects	LM_SAR $(prob)$	295 (0.00)	310 (0.00)	4.2 (0.04)	4.0 (0.05)	2.9 (0.1)

Source: Research results

As can be seen from the table above, the results confirm the autocorrelation between cross-sections. Also, based on these results, apart from the fixed effect and cross-section random effect, the existence of spatial effects for all models has been confirmed. Therefore, due to the fact that for fixed effect and cross-section random effect models, the spatial effects of dependent variables are not confirmed, so this model is not estimated, and therefore Hausman's test will not be performed.

Step 2: Determine the Fixed Effect Model

The main objective of this step is to obtain the best model for all types of panel spatial SAR models. For this purpose, the Lagrange coefficient (LR) test is chosen between the fixed-effects and no-effect models. Table 4 shows the results of testing this hypothesis.

Table 4: The Results of Testing the Hypotheses to Determine the Type of Spatial Fixed Effect Model

	Hypothesis test H_0 Ú H_1	LR Test	Result
1	Pooled vs Spatial Fixed effects	LR=28.4 Prob=0.2	Pooled
2	Pooled vs Time Period Fixed effects	LR=97 Prob=0.0	Time Period Fixed effects
3	Pooled vs Spatial and Time Period Fixed effects	LR=130 Prob=0.0	Spatial and Time Period Fixed effects
4	Spatial Fixed effects vs Time Period Fixed effects	LR=69 Prob=0.0	Time Period Fixed effects
5	Spatial Fixed effects vs spatial and Time Period Fixed effects	LR=102 Prob=0.0	spatial and Time Period Fixed effects
6	Time Period Fixed effects vs spatial and Time Period Fixed effects	LR=33 Prob=0.08	Time Period Fixed effects

Source: Research results

Based on the results shown, the SAR model of Time Period Fixed effects will be selected.

Step 3: Estimation of the Fixed Effects SAR model

able 5 shows the results of the estimation of the fixed-effect SAR model based on the maximum likelihood (ML) method.

The results of the research indicate the appropriate significance of the selected model variables and, except for trade freedom; other variables are significant to the level of 10%. Based on these results, the significant and negative spatial lag coefficients have been obtained. This means that the neighborhood of Iran's trading partner countries has had a negative impact on the Iranian intra-industry trade. This result reflects a very important consequence, the fact that the first-degree neighborhoods in Iran's partner countries have been a priority for Iran's neighbors with these countries. Accordingly, as Balassa and Bauwens (1987) states, geographic proximity has been effective in reducing the costs of transport and communications, creating close production factors and cultural commonalities, trade integration and barriers to trade, and vertical and horizontal intra-industrial trade.

Table 5: Results of Estimation of Various Panel Spatial SAR Model

$\mathbf{y = \rho Wy + \alpha I_n + X\beta + \varepsilon}$

$\mathbf{x = \{DY, GY, INQ\_IP, INS, LBEX, TRA, TRP, TRY, WTR\}}$

Independent Variable: IIT

Dependent Variable	Coefficient	t-Statistic	Prob
$W * IIT$	-0.77	-4.2	0.00
DY	-0.32	-1.93	0.05
GY	4.87	2.6	0.00
INQ_IP	5.5	7.5	0.00
INS	-3.2	-2.5	0.01
$LBEX$	.560	3.4	0.00
TRO	-0.01	-1.9	0.06
TRP	0.01	3.3	0.00
TRY	0.08	-1.6	0.1
WTR	-0.14	-1.7	0.09
R^2		0.53	
$LogL$		-1190	
sigma^2		18.7	

Source: Research results

The study of the effect of other variables also shows that the variables of the difference in market size, exchange rate volatility, trade orientation, and geographic concentration have a negative effect on Iran's intra-industry trade, and economic growth variables, Linder effect, exchange rate, trade freedom, and Per capita trade volume have had a positive impact on intra-industry trade in Iran. Based on these results, it seems that the size of the market in Iran’s trade partner countries has a significant distance. In general, this has been at the expense of the intra-industrial trade of Iran. The effect of the volatility of the exchange rate, as expected, has been to reduce intra-industry trade. The variable of trade orientation, unlike Clark and Stanley's (1999) research, has been negative. It means that trade orientation may be accompanied by increased inter-industry trade and reduced intra-industry trade. The geographic concentration shows that Iran's intra-industry trade is done mostly with which country or countries. According to the studies of Krugman (1981), the more diversified the partner countries, the more intra-industry trade will be. Since this effect has been estimated as negative, it indicates that Iran's trading partners are of low diversity.

Rising economic growth, as Balassa and Bauwens (1987) have shown, would increase intra-industry trade by an increase in economies of scale. The exchange rate shows a direct relationship with intra-industry trade. Given the fact that the increase in the exchange rate has a positive effect on exports and a negative one on imports, in the case of prevailing Marshall Lerner's condition, it will increase the total intra-industry trade. The effect of Linder's variable is confirmed, which means that there are similar consumer preferences between Iran and its trade partners, and then there is an overlapping demand in terms of goods that are produced and consumed jointly. Also, the positive impact of the volume of per capita trade suggests that by increasing trade as a whole, one can also increase intra-industry trade.

6. Conclusions

In this research, the impact of spatial neighborhood effects of 23 major trade partners from the geographic distance matrix on Iran's intra-industry trade over the period 1995-1995 was studied through panel spatial econometric method and maximum likelihood estimation method (ML). Iran's intra-industrial trade with 23 major trading partners showed that Iran on average had the highest intra-industry trade with Saudi Arabia, Azerbaijan, Russia, Turkey, the United States, Germany, and the UAE. The results of estimating the spatial neighborhood effects indicated that the spatial lag coefficient was significant and negative. This means that the neighborhood of Iran's trading partner countries has had a negative impact on Iran's intra-industrial trade. The study of other factors affecting intra-industry trade showed that the variables of difference in market size, exchange rate volatility, trade orientation, and geographic concentration had a negative effect on Iran's intra-industry trade, and economic growth variables, Linder effect, exchange rate, and per capita trade volume have had a positive impact on it.

According to the results of this research, it is recommended to that politicians and planners consider geographical neighborhood as one of the factors lowering intra-industry trade, and trade parties should be selected in such a way that, in addition to having features such as similarity in market size, similarity in consumer preferences, and increased trade freedom, they be considered as geographically neighborhoods as far as possible. Accordingly, it is recommended that Iran has more trade with Belgium, India, Korea, Netherlands, Iraq, Saudi Arabia, and Singapore.

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