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Intra-Industry Trade and United States' Immigration

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Abstract: This paper examines the relationship between intra-industry trade and immigration flows using gravity model for the period 1995-2008 between United Sates and NAFTA, European Union and ASEAN. Our results show that the stock of immigration has a positive effect on intra-industry trade. We conclude that the immigration contributes to decrease the costs of transport costs and this promotes the IIT. We examine this topic with static and dynamic panel data approach to test country –specific characteristics.

Key words: Immigration · Intra-industry trade · Monopolistic Competition · United States · Panel Data

INTRODUCTION

When economic geography was born in 1990's some authors as in Krugman [1] explained the relationship between the North and South considering the mobility between the regions. This process involves the phenomena of migration. With globalization many nations have liberalized their trade barriers. The transaction costs decreased and the immigration contributed to increase international trade, in special intra-industry trade (IIT). The IIT is explained by product differentiated, economies of scales and monopolistic competition. Some studies as in Blanes [2], Faustino and Leitão [3], Leitão *et al*. [4], White [5] consider that, the immigrants can influence the intra-industry trade. Girma and Yu [6] defends that immigrants are positively correlated with the bilateral trade for two reasons. The first it is associated with the idea that the immigrants bring with them a preference for home-country products. The second expresses the idea that immigration can reduce transaction costs between home and host country. In this manuscript we analyse the impact of immigration in U.S intra-industry trade. Our study uses a static and dynamic panel data approach between United States and its partners for the period 1995-2008. The paper is organized as follows: the next section presents the mechanisms of immigration links. In the third section, we present the methodology and the econometric model. The fourth section analyses the results. Finally, we make our concluding remarks in the fifth section.

Mechanisms of Immigration Links: The cultural, historical and geographic proximity can also reduce the transaction costs. Some authors as in Gould [7], Head and Ries [8], Dunlevy and Hutchninson [9] found a positive impact between immigration and bilateral trade. The study of Hye and Siddiqui [10] shows that imports cannot cause exports but in contrast the exports cause imports. With imperfect competition if the immigrants have a legal situation, we have more information about their preferences and the transaction costs decrease. In the medium or long run, when the immigrants turned citizens of host country the transaction also decrease and we have a phenomenon of acculturation.

Econometric Model: The dependent variable used is the IIT Grubel and Lloyd index [11]. The data for explanatory variables are sourced from World Bank, World Development Indicators (2010) and OECD Migration database. The source used for dependent variable was STAN bilateral trade database at five-digit level of Standard International Trade Classification (SITC) between United States and NAFTA, European Union and ASEAN for the period between 1995 and 2008 are constructed from the OECD at the five-digit level. In our study we apply the arguments of gravity model as in the study of Khan *et al*. [12].

We use a panel data approach. In panel data, pooled OLS, fixed effects (FE) and random-effects (RE) estimators are used in this type of study. The RE estimator was excluded because our sample is not random. Furthermore, the Hausman test rejects the null hypothesis RE versus

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FE. We also introduced Tobit model to evaluate the expected signs. With the dynamic panel data we used (GMM-SYS) estimator. This estimator permits the researchers to solve the problems of serial correlation, heteroskedasticity and endogeneity of some explanatory variables.

The study of Din *et al.* [13] apply the Modified Variation of Parameters Method (MVPM) for solving second order integro-differential equations.

These econometric problems were resolved by Arellano and Bond [14], Arellano and Bover [15] and Blundell and Bond [16, 17], who developed the first-differenced GMM (GMM-DIF) estimator and the GMM system (GMM-SYS) estimator.

Dependent Variable

Grubel and Lloyd [11] define IIT as the difference between the trade balance of industry *i* and the total trade of this same industry. In order to make comparisons easier between industries or countries, the index is presented as a ratio, where the denominator is total trade.

$$IIT_{it} = 1 - \frac{|X_i - M_i|}{(X_i + M_i)} \quad (1)$$

The index is equal to 1 if all trade is intra-industry trade. If IIT_{it} is equal 0 all trade is inter-industry trade. X_i, M_i are the exports and imports of the industry i.

Explanatory Variables: The manuscript uses the following explanatory variables in logs:

Economic Differences Between Countries (DGDP): This is the absolute difference in GDP per capita (PPP, in current international dollars) between US and trade partner. Greenaway *et al.* [18] and Hummels and Levinshon [19] provide empirical support for a negative relationship between difference in per capita income and IIT. Faustino and Leitão [3] found a positive sign.

DIM: This is the average of GDP per capita between U.S and the partner country. According to Gross and Helpman [20], White [5] and Leitão *et al.* [4], is expected a positive sign. The economic size is important to differentiated products.

Immigration: This is the legal data of U.S immigrants from OECD database. Blanes [2], Blanes and Montanner [21], White [5] and Leitão *et al.*. [4] found a positive sign.

TIMB (Trade Imbalance): The study considers the trade imbalance as a control variable. According to Leitão [18],Shahabadi and Sheyhaghaee [22] is expected a negative sign.

DIST (Geographical Distance): This is the geographical distance between United States and partner country. According to theoretical literature we expected a negative sign. Sharify *et al.* [23] also consider a negative sign.

Model Specification:

$$IITit = \beta_0 + \beta_1 X_{it} + \delta_t + \eta_i + \varepsilon_{it} \quad (2)$$

Where IIT_{it} is the intra-industry trade (IIT_{it}), X is a set of explanatory variables. All variables are in the logarithm form; ηi is the unobserved time-invariant specific effects; δt captures a common deterministic trend; ε_{it} is a random disturbance assumed to be normal and identical distributed (IID) with E (ε_{it})=0; Var (ε_{it})= $\sigma^2 \succ 0$.

The model can be rewritten in the following dynamic representation:

$$IIT_{it} = IIT_{it-1} + \beta_1 X_{it} - \rho\beta_1 X_{it-1} + \delta_t + \eta_i + \varepsilon_{it} \quad (3)$$

RESULTS AND DISCUSION

The OLS estimator with time dummies is reported in table 1. Our analysis pretends to evaluate the signs of the coefficients and their significances. This equation was introduced as an explanatory variable of IIT and their relationship with immigration. The model present four statistically significant variables: (LogDGDP at 1%), average of GDP (LogDIM, at 1%), stock of immigration (Logimmigration at 1%) and trade imbalance (LogTIMB, at 1%) validate the hypothesis formulated.

The economic differences between countries (LogDGDP) are statistically significant, with an expected negative sign. These results are according to previous studies (Helpman and Krugman, [24]. As expected, the variable economic dimension (LogDIM) has significant and positive effect on IIT. This result confirms the importance of economies scales and product differentiated. The results are consistent with the hypothesis of the positive correlation between immigration and intra-industry trade. The studies of Blanes [2], Blanes and Montaner [18], Faustino and Leitão [3], White [5] and Leitão *et al.* [4] found a positive sign.

As expected, the variable trade imbalance (LogTIMB) has significant and negative effect on IIT.

Table 1: Determinants of intra-industry trade: OLS estimator with time dummies

Variables	OLS with time dummies
LogDGDP	-4.513 (-3.435)***
LogDIM	5.935 (3.802)***
Log Immigration	0.143 (6.546)***
LogTIMB	-0.203 (-2.970)***
LogDIST	-0.037 (-0.623)
C	-0.171 (-0.092)
$\overline{R^2}$	0.36
Observations	252

T-statistics (heteroskedasticity corrected) are in round brackets.
***- statistically significant, respectively at the 1%, level.

Table 2: Determinants of intra-industry trade: Tobit model

Variables	Tobit
LogDGDP	-4.513 (-4.485)***
LogDIM	5.935 (5.032)***
LogImmigration	0.143 (7.613)***
LogTIMB	-0.203 (-2.976)***
LogDIST	-0.037 (-0.393)
C	-4.513 (-0.119)
SIGMA	0.443 (22.449)***
Observations	252
Log likelihood	-152.807

T-statistics (heteroskedasticity corrected) are in round brackets.
***- statistically significant, respectively at the 1%, level.

Table 3: The Determinants of intra-industry trade: GMM-System estimator

Variables	GMM-SYS
$LogIIT_{t-1}$	0.014 (0.245)
LogDGDP	-0.025 (-3.02)***
LogDIM	0.002 (3.02)***
LogImmigration	0.29 (5.39)***
LogDIST	-7.739 (-1.96)*
LogTIMB	-0.038 (-4.06)***
C	0.011 (2.19)**
M1	-1.289 [0.198]
M2	-0.5530 [0.580]
Sargan	2.506 [1.000]
Observations	216

T-statistics (heteroskedasticity corrected) are in round brackets. The null hypothesis that each coefficient is equal to zero is tested using second -step robust standard error. T-statistics (heteroskedasticity corrected) are in round brackets. ***/**/*indicates statistically significance, respectively at the 1%, 5% and 10% level.

In table 2 we can observe the determinants of IIT using Tobit model. All explanatory variables are significant: (LogDGDP, at 1%, LogDIM, at 1%, LogImmigration and LogTIMB at 1%) with exception LogDIST.

The difference between per capita incomes, (LogDGDP) presents a negative sign, this results is according to the hypothesis formulated. A positive effect of economic size (LogDIM) on bilateral IIT was expected and the results confirm this. The coefficient of immigration (LogImmigration) is positive with significant. So we can conclude that the immigrants can influence the bilateral trade flows. The variable trade imbalance (LogTIMB) has also the expected sign.

As table 3 shows, the equation presents consistent estimates, with no serial correlation (m1, m2 statistics).The specification Sargan test show that there are no problems with the validity of instruments used. The GMM system estimator is consistent if there is no second-order serial correlation in the residuals (m2 statistics). The dynamic panel data are valid. We used the criterion of Windmeijer (2005) to small sample correction. The instruments in levels used are $LogIIT_{t-1}$(3,4), LogDGDP (3,4), LogDIM (3,6) and LogImmigration(3,6) for first differences. For levels equations, the instruments used are first differences of all variables t-2.

The IIT model presents five significant variables (LogDGDP, LogDIM, LogImmigration, LogDIST and LogTIMB). The results confirming the theoretical forecast proposed by the literature

P-values are in square brackets. Year dummies are included in all specifications (this is equivalent to transforming the variables into deviations from time means, i.e. the mean across the fourteen countries for each period). M1 and M2 are tests for first-order and second–order.

Our results show that United Sates IIT is negatively correlated with factor endowment (LogDGDP) and trade imbalance (LogTIMB). We can conclude that trade partners have similar demands and preferences.

The study includes a proxy to evaluate the relative size effects. A positive effect of economic size on bilateral IIT was expected and the results confirm this, underlining the importance of economies scale and product differentiation for all trade.

The coefficient of immigration (LogImmigration) is positive with significant. So we can conclude that immigration ca reduce transaction costs between home and host country.

CONCLUSION

This paper investigates the relationship between immigration and intra-industry trade. The empirical results indicate that immigration is an important player in

the determinants of trade. Our findings suggest that immigration made the reduction of trade transaction cost and intra-industry trade increase.

The proxy used for the economic dimension (DIM) is according to the literature, i.e. the market size influences the volume of trade.

This study has some limitations. In the future, other control variables, i.e. language, cultural and religious similarity, human capital might be included in the model.

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