The Impact of Foreign Direct Investment on International Trade: An Empirical Study of China

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Abstract

This paper investigates the impact of inward FDI (Foreign Direct Investment) on international trade of China empirically on the country level by using panel data from 1984 to 2007. Two separate transformed models which are based on the gravity equation and refer to the econometric models of some previous studies, are used in this paper to estimate the effect of FDI inflows on exports and imports respectively. The estimation results confirmed the complementary relationship between FDI inflows and trade of China both on exports and imports, which has also been supported by previous empirical studies.

Key words: FDI, exports, imports, transformed gravity model, panel data
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1 Introduction

The aim of this paper is to investigate the impact of inward FDI (Foreign Direct Investment) on international trade of China empirically on the country level by using panel data from 1984 to 2007. Up to now, many literatures have focused on the study of the relationship between FDI and international trade. Generally, previous studies found that there is either complementary (positive) or substitutionary (negative) relationship between FDI and international trade, but still with no unambiguous conclusion because of the complexity of the issue. Studies show that the type of FDI, aggregation level of research, the choice of specific country and some other factors will all have influence on the final result. (See Fontagne 1999)

Globalization is a significant trend of world economic development. As stated by Fontagne (1999), “The interaction between trade and foreign direct investment (FDI) is a main feature of globalization.” (Fontagne 1999, p. 5) And according to Graham (1997), “FDI is, by definition, the equity held by investors in one nation (usually these investors are corporations) in business activities in other nations where the investors hold managerial control.” (Graham 1997, p. 29) Furthermore, international trade and FDI have been playing more and more important role in world economy. For China, the effect of trade and FDI on economy is more significant. High degree of international trade dependence and high flow of inward FDI is the two of the main features of China’s rapid economic growth. According to data from World Development Indicators of The World Bank, the share of exports and imports of goods and service of China is 37.3% and 31.7% of China’s GDP in 2005, compared with the statistics of the world of 26.98% and 27.2% respectively in the same year. And the FDI net inflows of China is 3.53% of China’s GDP in 2005, at the same year the number of the world is 2.37%. Therefore, the study of the relationship between FDI and trade is important for China’s economic development and could further
provide some implications that could be helpful for China’s future economic policies’ adjustments.

Panel data between China and ten investing countries/regions from 1984 to 2007 will be used to estimate the relationship in this paper. The econometric estimator will be chosen after conducting the necessary statistical tests.

Although this paper conducts empirical research based on data of the country level, actually different industries have definitely different profiles in relationship between FDI and trade. So does specific profile of individual multinational enterprise. To study the relationship further in different aggregation level will help us better understand the relationship between FDI and trade.

This paper is organized as follows. The second section gives an overall view of status and development of international trade and inward FDI of China since 1980. Section 3 introduces previous theoretical and empirical researching results. Section 4 is econometric analysis part, which focuses on empirical model, data, choice of estimator, final estimation results and results’ interpretation. Conclusions are given in section 5.

2 Overview of China’s International Trade and Inward FDI

China has witnessed an impressive economic growth since 1978 when China began to implement economic reforms. In the past 30 years, China’s economic system has gradually transformed from central planning to free markets. Developing foreign trade and attracting inward FDI have been the focus the reforms. Figure 1 below shows the share of China’s exports/imports of goods and services and FDI net inflows in China’s GDP from 1980 to 2005.
Figure 1 China’s Exports/Imports of Goods and Services and FDI Net Inflows - Percentage of China’s GDP - 1980-2005

Data Source: World Development Indicators – The world Bank

The share of China’s trade and FDI net inflows in China’s GDP are increasing steadily from 1980, especially at a higher speed since 1990’s. In 2005, China’s exports of goods and services accounts for 37.3% of China’s GDP – almost accounting for two fifths of total GDP of China that year.

After China’s entering into the WTO (World Trade Organization) in 2001, according to World Development Indicators of The World Bank, merchandise exports of China have increased from 266.1 billion U.S. Dollars of 2001 to 1217.9 billion U.S. Dollars of 2007 (current U.S. Dollars). Figure 2 below shows the comparison of annual growth rate for exports of goods and services from 1990 to 2006 between China and the world.
Figure 2 Annual Growth Rate of Exports of Goods and Services (%)

Data Source: World Development Indicators – The world Bank

“Notes: Data of China prior to 1997 are deflated using world average prices.” (Notes are from World Development Indicators – The world Bank)

According to China Statistical Yearbook 2007, manufactured goods accounts for 95% of exports and 76% of imports of China respectively in 2006. From the perspective of detailed merchandise, Machinery and Transport Equipment occupies the largest proportion of exports and imports, accounting for 47% and 45% respectively. Processing trade has been the main trade mode in China’s foreign trade sector, which accounts for 52.7% and 40.6% of the total exports and imports in 2006 respectively.

According to the table from the website of US-China Business Council, China’s top ten trade partners in 2007 are shown in Table 1 in Appendix A. United States is the largest trade partners and the export destination of China in 2007. Trade volume with Russia has increased by 44.3% in 2007 over 2006.

Since 1990’s, China’s FDI inflows also increases at a high speed, especially two sharp jumps in 1993 and 2005. (See Figure 3 below) According to China Foreign-Funded Enterprises Investment Report 2007, 57.69% of inward FDI goes to manufacturing sectors in 2006, which occupies the biggest share of the total FDI inflows that year.
According to China Foreign-Funded Enterprises Investment Report 2006, till the end of 2005, the top ten origins of countries/regions from the perspective of inward FDI stocks are Hong Kong, Taiwan, the United States, Japan, Korea Republic of, Singapore, UK, Germany, France, Netherlands. (See Table 2 in Appendix B) The inward FDI from the top ten countries/regions account for 89.71% of the total inward FDI stocks till the end of 2005 of China.

3 Literature review

3.1 Theoretical studies

The study of relationship between FDI and trade has been in debate for many years. Either positive or negative relationship has been shown in the previous studies based on different data and purposes of research. Fontagne (1999) points that “The three approaches to analyzing the relationship between foreign direct investment and international trade correspond to levels of aggregation: the microeconomic or firm
level, the macroeconomic or economy-wide level, and the sectoral or industry level.” (Fontagne, 1999, p. 13)

The studies start from the framework of trade theory. The neoclassical trade theory explains trade patterns under the assumptions of perfect competition, constant return to scale, and homogenous products. The representative research is lead by Mundell (1957) on the basis of the Heckscher - Ohlin - Samuelson (HOS) model by assuming that both commodity and factors (capital and labor) can move trans-nationally and proves theoretically that commodity and factor develop divergently, concluding of the negative relationship between FDI and trade.

Starting from 1980’s, new trade theory has dominated in international trade theories, which is under the assumptions of imperfect competition, increasing return to scale, and differentiated products. The representative scholars are Helpman, Markusen, Venables, Brainnard and etc. In the studies based on new trade theory, multinational activities are divided into horizontal FDI and vertical FDI.

Horizontal and vertical FDI are important notions in the study of relationship between FDI and trade. According to Glass A.J. (2008), “Horizontal FDI, where multi-plant firms duplicate roughly the same activities in multiple countries, has been distinguished from vertical FDI, where firms locate different stages of production in different countries.” (Glass, 2008) The different type of FDI may lead to totally opposite impact on trade.

Under the framework of new trade theory, Helpman (1984), Markusen (1984), Markusen and Venables (1998) introduce the choice of location by enterprises and explain why enterprises choose to manage plants overseas in their separate models. At the same time, researchers began to study “firm-specific activities” versus “plant-specific activities” of MNEs (Multinational Enterprises). (See Markusen 1984)

Markusen (1984) argues that “joint input” increases technical efficiency and can make MNEs to centralize “firm-specific activities” and decentralize “plant-specific activities” for efficiency and profits, as a result “if factors are then permitted to move internationally, factors will flow in a manner that increases the degree of international specification and the volume of commodity trade.” (Markusen 1984 p.224) And “direct investment, unlike portfolio capital movements, can act as a complement rather than as a substitute to commodity trade.” (Markusen 1984 p.224)

In the recent studies, many scholars study the relationship of FDI and trade upon balance of costs of “firm-specific activities”, “plant-specific activities” and trade based on horizontal FDI. Markusen and Venables (1998) believe that countries with similar economic backgrounds will invest to each other more. They point, in fact, horizontal FDI dominates investments among developed countries and they find that when cost of “firm-specific activities” and trade is high, enterprises tend to invest more in the host countries. A substitutionary effect between horizontal FDI and trade is found in their studies. Brainard (1993) points out the choice of horizontal FDI or trade is the balanced result by weighing “trade-off between proximity and concentration”. He points if costs from concentration exceed that from proximity, enterprises should choose multinational activities and vice versa. Brainard argues a general substitutionary effect of horizontal FDI on trade. Helpman et al. (2004) furthers the study of horizontal FDI but they introduce productivity differences of enterprises in their model. They argue that productivity differences combine with
“trade-off between proximity and concentration”, which deciding activities by enterprises. They conclude that the more productive of an enterprise is, the more multinational it will be and gets the result that horizontal FDI will substitute trade when proximity gains prevail.

Most previous studies examine the effect of outward FDI on exports of investing countries, however, Fontagne (1999) points that host countries may have the opposite impact from this FDI compared to investing countries. He also argues that there is not an unified conclusion about whether FDI complements or substitutes trade or not. He believes that the relationship is complicated and dynamic depending upon the aggregation of research, the type of FDI, country characteristics, the time impact, the spillovers caused by FDI, and etc.

3.2 Empirical studies

Empirical studies are based on data from the real world and could more reflect the complexity of real economies compared with pure theoretical researches with strict assumptions. In the empirical studies, the results of complementary relationship between FDI and trade has dominated the previous researches.

On country level research, Clausing (2000) uses panel data to examine the relationship not only between US outward FDI and exports but also between US inward FDI and imports from 1977 to 1994. The research finds that both inward and outward FDI will boost trade. Zhang and Li (2007) also study the effect of inward FDI flows on total trade volume of China based on panel data with 14 investing countries from 1980 to 2004. A positive relationship is found in their paper. Magalhaes and Africano (2007) also find a complementary effect of inward FDI stock on both exports and imports of Portugal respectively by using panel data with 28 countries from 1995 to 2000, but with no significant effect of outward FDI stock.
On firm level, Lipsey and Weiss (1984) conduct a research of US firms and show that a firm’s outward FDI will increase exports both of intermediate goods and final goods.

4 Empirical analysis

4.1 Empirical model

The gravity model is usually used to measure the determinants of impact on bilateral trade flows in international economics. It stems from the law of gravity but was introduced to explain bilateral trade flows. And abundant subsequent empirical researches have proved it efficient in explaining international trade flows. According to Anderson (1979), “The gravity equation ordinarily is specified as

\[ M_{ijk} = \alpha_k Y_i^{\beta_k} Y_j^{\gamma_k} N_i^{\delta_k} N_j^{\epsilon_k} d_{ij}^{\mu_k} U_{ijk} \] (1)

Where \( M_{ijk} \) is the dollar flow of good or factor k from country or region i to country or region j, \( Y_i \) and \( Y_j \) are incomes in i and j, \( N_i \) and \( N_j \) are population in i and j, and \( d_{ij} \) is the distance between countries (regions) i and j. The \( U_{ijk} \) is a lognormally distributed error term with \( E(\ln U_{ijk}) = 0 \).” (Anderson 1979, p. 106)

The gravity equation is usually represented in logarithmic form except for dummy variables in empirically econometric analysis in order to get the regressed coefficient who stands for the elasticity of explanatory variable to dependent variable. In fact, previous studies show that there are more factors that will influence bilateral trade besides factors included in equation (1). According to Bergstrand (1985) “Typically, the log-linear equation specifies that a flow from origin i to destination j can be explained by economic forces at the flow’s origin, economic forces at the flow’s destination, and economic forces either aiding or resisting the flow’s movement from
origin to destination.” (Bergstrand 1985, p. 474) Researchers usually augment the gravity model with some variables, and sometimes they will also take out some relatively unimportant variables, in order to give prominence to the emphasis of their studying purposes. According to the previous studies, it is obviously that FDI has impact on bilateral trade both from the theoretical and empirical perspectives. The study of Brun et al. (2005) shows that “the bilateral real exchange rate should be introduced to the gravity equation to capture the effects of changes in relative prices of the countries when using panel data” and their evidence estimation results have proved this assertion. (Brun et al. 2005, p. 108)

The methodology models used in this paper are transformed versions based on the gravity equation and referring to the econometric models of Magalhaes and Africano (2007), Zhang and Li (2007), Zhang and Song (2000). The models use two equations (2) and (3) as below to estimate the relationship between FDI and trade from the perspective of exports and imports respectively.

\[
\ln(\text{EXP}_i) = \beta_0 + \beta_1 \ln(CNGDP_i) + \beta_2 \ln(GDP_d) + \beta_3 \ln(Dis_i) + \beta_4 \ln(FDI_d) + \beta_5 \ln(Re_{ex_i}) + \beta_6 Lan_i + \beta_7 Bor_i + u_{it}
\]

(2)

\[
\ln(\text{IMP}_i) = \beta_0 + \beta_1 \ln(CNGDP_i) + \beta_2 \ln(GDP_d) + \beta_3 \ln(Dis_i) + \beta_4 \ln(FDI_d) + \beta_5 \ln(Re_{ex_i}) + \beta_6 Lan_i + \beta_7 Bor_i + u_{it}
\]

(3)

4.2 Explanation of the variables

\text{EXP}_i : \text{bilateral exports flows from China to country/region } i \text{ in year } t \text{ in real terms}

\text{IMP}_i : \text{bilateral imports flows to China from country/region } i \text{ in year } t \text{ in real terms}

\text{CNGDP}_i : \text{Real Gross Domestic Products of China in year } t
\( \text{GDP}_i \) : Real Gross Domestic Products of country/region i in year t
\( \text{Dis}_i \) : the great circle distance between capital of China and capital of country/region i
\( \text{FDI}_i \) : FDI inflows from country/region i to China in year t in real terms
\( \text{Reex}_i \) : Real exchange rate of local currency of country/region i per Chinese Yuan in year t
\( \text{Lan}_i \) : dummy variable which takes the value one if Chinese is as one of official languages in country/region i
\( \text{Bor}_i \) : dummy variable which takes the value one when China and country/region i have common border in land
\( u_{it} \) : error terms

GDP is used to measure the economic size of China and country/region i. Distance could be regarded as a proxy for transport costs between China and country/region i. All of variables except for distance and dummy variables are measured in real terms being transferred by GDP deflator (base year 2000) of correlative country/region. From the results of empirical studies by using the gravity model in international trade, such as Burgstrand (1985) and Brun et al. (2005), expectations could be made that GDP of China and GDP of country/region i will have positive effect on bilateral trade, while an increase in distance will decrease volume of exports or imports. And based on a large number of empirical studies concerning inward FDI and trade of China, such as Zhang and Li (2007), Zhang and Song (2000), distinct complementary effect between them will be expected.

The real exchange rate of local currency of country/region i per Chinese Yuan in year t is calculated by equation (4) as below.

\[
\text{Reex}_{i/CNY} = \frac{\text{Exch}_{i/USD}}{\text{Exch}_{CNY/USD}} \cdot \frac{\text{GDPdeflator}_{cn}}{\text{GDPdeflator}_i} \tag{4}
\]
An increase in the real exchange rate means Chinese Yuan’s appreciation relative to the currency of country/region i. That means merchandise produced by China will be relatively more expensive than before for country/region i, which decreasing exports volume to that country/region. Therefore, a negative relationship will be expected between the real exchange rate and exports. However, Chinese Yuan’s appreciation will promote purchasing power of China. That will mean merchandise produced by country/region i will be comparatively less expensive than before for China. There will be more imports from country/region i. Then a positive effect of the real exchange rate exists on imports.

Language and border dummy variable will be expected to have positive effect on bilateral trade between China and country/region i.

4.3 Data

In this paper, panel data will be used to estimate the relationship between trade and inward FDI flows of China with the ten selected investing countries/regions from year 1984 to 2007. And the selected investing countries/regions are the top ten origins of countries/regions from the perspective of inward FDI stocks till the end of 2005. See table 2 in Appendix B.

The data of bilateral merchandise exports/imports and inward FDI flows is from the China Foreign Economy and Trade Yearbook (1984-1995) and China Statistical
Yearbook (1996-2008). But the inward FDI flows from Hong Kong is mixed with Macao from year 1984 to 1986. Because the inward FDI flows from Macao is relatively small that that of Hong Kong from year 1984 to 1986. The mixed data will be used for the proxy of inward FDI flows from Hong Kong. However, Korea Republic of and Taiwan began to recover economic activities with China from the beginning the 1990’s. Therefore, bilateral exports/imports between Korea Republic of , Taiwan and China from 1984 to 1990 are missing, so are the inward FDI flows from Korea Republic of and Taiwan to China from 1984 to 1991. The GDP of all investing countries/regions and China are from the database of International Monetary Fund. All of these above mentioned data are measured or transferred to be measured by unit of 10,000 U.S. Dollars in this paper. Besides, GDP deflators (base year 2000) of correlated country/region will be used to transfer them into constant price of year 2000 to eliminate the effects of inflation. The data of GDP deflator of the ten investing countries/regions and China is from the United States Department of Agriculture.

Exchange rate of the researched countries/regions is measured averagely in the local currency per U.S. Dollar every year. Data from 1984 to 2006 is from Penn World Table, the UN Common Database and Central bank of Taiwan. For year 2007, I calculate the average exchange rate based on daily rate from the data of Bank of Canada. To get exchange rate of local currency of country/region i per Chinese Yuan in year t in real terms, the equation (4) as mentioned in section 4.2 will be used.

In this paper, distance of two countries/regions is measured in kilometers by great circle distance between the capital of China and the capital of investing countries/regions i. The great circle distance is calculated based on the respective longitudes and latitudes of the two cities. The data is from Time and Date.com.
Language and border are dummy variable. If country/region i has the same language or border with China, the value is 1 otherwise is 0.

4.4 Choice of Estimation Model

Generally, three models can be used for estimation for panel data: PEM (Pooled Estimation Model), FEM (Fixed Effects Model) and REM (Random Effects Model), resting upon the assumptions of individual effects of data. A set of statistical tests that will be done for choosing among the three models.

(1) FEM versus PEM
F test will be used to choose between FEM and PEM, i.e., to test if there is fixed effects in data. The results for models of equation (2) and (3) are shown in Table 3 in Appendix C. The F-Statistics show that null hypothesis of no fixed effects will be rejected for both models of equation (2) and (3) and mean that the fixed effects are significant. Then PEM results are biased in estimation while FEM will be more efficient than PEM.

(2) REM versus PEM
Breusch and Pagan Lagrangian Multiplier Test is used to test for random effects. Table 4 in Appendix D display the statistics results. Apparently, null hypothesis of no random effects will be rejected for both models. Compared to PEM, REM will show more efficiency.

(3) REM versus FEM
From the tests for fixed effects and random effects, PEM is rejected. Then Hausman test will be used to choose between FEM and REM. The statistics results are shown in Table 5 in Appendix E. From the statistics results, the null hypothesis that individual effects are independent with other explanatory variables can not be rejected, which is
the basic assumption for REM. Therefore, REM will be selected for estimation of both models of equation (2) and (3).

4.5 Estimation Results

Exports

The results of the relationship between exports and inward FDI flows of China with the ten investing countries/regions are shown below in Table 6.

| Variables | Coefficient | P>|Z| |
|-----------|-------------|-----|
| CNGD      | 1.67321     | 0.000 |
| GDP       | 0.4664682   | 0.000 |
| Dis       | -1.300209   | 0.000 |
| FDI       | 0.2105448   | 0.000 |
| Reex      | -0.3309192  | 0.000 |
| Lan       | -0.2251022  | 0.690 |
| Bor       | 1.417611    | 0.039 |

Number of Observations: 223

R-sq: Within = 0.8789  
Between = 0.7496  
Overall = 0.8256

The signs of coefficients except for language dummy variable meet expectations as discussed in section 4.2. But from the P-values, the dummy variable of language is not significantly related to exports from China to the ten investing countries/regions. The other regressors are statistically significant. Furthermore, GDP of China has a very strong effect on China’s exports. GDP of China increases by 1%, exports of China to the ten investing countries/regions will increase by about 1.67% on average. GDP of
investing country/region also has distinct effect on exports of China. If GDP of
investing country/region i increases by 1%, exports of China to the ten investing
countries/regions will increase by 0.47% averagely.

Distance has a powerful negative effect on exports and testifies transport costs still
strongly influence on China’s exports to the ten investing countries/regions. An
increase by 1% in distance, that will lead to about 1.3% on average of decrease in
exports from China to the ten investing countries/regions. The coefficient of real
exchange rate shows Chinese Yuan’s appreciation decreases China’s exports, but
decreasing by only average 0.33% upon 1% of Chinese Yuan’s appreciation. With
regard to the dummy variable of border, if China shares the common border with
country/region i, exports from China to the country/region will increase about 14,200
U.S. Dollars averagely.

FDI inflows has positive effect on exports of China, as expected. The coefficient tells
that if FDI inflows from country/region i increase by 1%, exports of China to the ten
investing countries/regions will increase by about 0.21% on average. That means the
inward FDI flows boost China’s exports and there exists complementary relationship.
But surprisingly, the magnitude of coefficient of FDI inflows is not that large, the
impact of inward FDI on China’s exports is not that powerful as expected. From the
perspective of investing countries/regions, the increase in outward FDI flows will
boost their imports, also a positive effect.

**Imports**

Table 7 below shows the estimation results for imports of China from the ten
investing countries/regions.

From the estimation results for imports, the unexpected sign appear in the coefficient
of dummy variable of border. However, from the P-values, the dummy variable of
border and the variable of real exchange rate are not significantly related to imports of China from the ten investing countries/regions. The other regressors are statistically significant. When GDP of China and GDP of country/region i increase by 1%, imports of China from the ten investing countries/regions will increase by about 1.13% and 0.73% respectively on average.

<table>
<thead>
<tr>
<th>TABLE 7 ESTIMATION RESULTS FOR IMPORTS BY REM</th>
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<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>CNGDP</td>
</tr>
<tr>
<td>GDP</td>
</tr>
<tr>
<td>Dis</td>
</tr>
<tr>
<td>FDI</td>
</tr>
<tr>
<td>Reex</td>
</tr>
<tr>
<td>Lan</td>
</tr>
<tr>
<td>Bor</td>
</tr>
<tr>
<td>Number of Observations: 223</td>
</tr>
<tr>
<td>R-sq: Within = 0.7939</td>
</tr>
<tr>
<td>Between = 0.9507</td>
</tr>
<tr>
<td>Overall = 0.8902</td>
</tr>
</tbody>
</table>

When distance increases 1%, imports of China from the ten investing countries/regions will decrease about 0.85% averagely. Distance has smaller effect on imports that on exports of China. If country/region i regards Chinese as one of their official languages, imports of China from the country/region will increase about 13,700 U.S. Dollars averagely.

When inward FDI flows increases by 1%, imports of China will increase by about 0.18% on average. The complementary relationship is same as expectations. From the perspective of China, the more inward FDI flows will generate more imports. From
the perspective of investing countries/regions, outward FDI flows boost exports., which is theoretically and empirically supported by many previous studies.

4.6 Implications

In summary, inward FDI flows bring positive effect on both exports and imports of China with the ten investing countries/regions, but the effect is not that powerful as that of market sizes measured by GDP of China and GDP of investing countries/regions.

According to the statistics of China Foreign-Funded Enterprises Investment Report 2007, foreign-funded enterprises’ exports and imports account for 58.18% and 59.7% of the total volume of exports and imports of China in 2006 respectively. The large share of foreign-funded enterprises’ trade in China’s total trade volume could explain the fact that complementary relationship between both of exports and imports and FDI inflows of China, which has been testified by this paper.

Distance has a strong negative influence both on exports and imports of China with the ten investing countries/regions. But the effect on exports is more distinct. The signs of the coefficient of real exchange rate are consistent with the results of previous studies, but only proved significant in model for exports. The reason may also could be found from trade and investing facts of China. According to China Foreign-Funded Enterprises Investment Report 2007, 57.69% of inward FDI goes to manufacturing sectors in 2006. From these statistics, a fact could be found that China is regarded as export-processing platform by foreign investors and a large amount of inward FDI is attracted by China’s relatively low factors’ prices. The plenty of imports including intermediate goods by foreign-funded enterprises is in service for final goods for exports. As a result, the relative fluctuation in exchange rate could not make big influence on imports by foreign-funded enterprises. Another, the low magnitude of
coefficient of real exchange rate in model for exports could also be explained by the stable exchange rate policy of Chinese Yuan. However, the dummy variable of border is only proved to be related to exports of China to the ten investing countries/regions while the dummy variable of language only has impact on imports of China from the ten investing countries/regions.

5 Conclusions

This paper investigates the relationship between FDI inflows and trade of China by using two separate transformed models which are based on the gravity equation and refer to the econometric models of some previous studies to test effect of inward FDI flows on exports and imports respectively between China and ten investing countries/regions resting upon panel data from 1984 to 2007. By running the necessary statistical tests, the empirical models of this paper are estimated by Random Effect Model. The estimated results meet the expectations that inward FDI flows have positive impact on both exports and imports of China significantly. And the findings show that the positive effect of FDI on trade is not that powerful as that of market sizes measured by GDP of China and GDP of the investing countries/regions.

Although the paper conducts empirical research based on data of the country level, actually different industries have definitely different profiles in relationship between FDI and trade. So does specific profile of individual multinational enterprise. To study the relationship further in different aggregation level will help us better understand the relationship between FDI and trade.
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Appendix

A

“TABLE 1: CHINA'S TOP TRADE PARTNERS IN 2007 ($ BILLION)”

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country/Region</th>
<th>Volume</th>
<th>% Change*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>United States</td>
<td>302.1</td>
<td>15.0</td>
</tr>
<tr>
<td>2</td>
<td>Japan</td>
<td>236.0</td>
<td>13.9</td>
</tr>
<tr>
<td>3</td>
<td>Hong Kong, China</td>
<td>197.2</td>
<td>18.8</td>
</tr>
<tr>
<td>4</td>
<td>South Korea, Republic of</td>
<td>159.9</td>
<td>19.1</td>
</tr>
<tr>
<td>5</td>
<td>Taipei, Chinese</td>
<td>124.5</td>
<td>15.4</td>
</tr>
<tr>
<td>6</td>
<td>Germany</td>
<td>94.1</td>
<td>20.4</td>
</tr>
<tr>
<td>7</td>
<td>Russia</td>
<td>48.2</td>
<td>44.3</td>
</tr>
<tr>
<td>8</td>
<td>Singapore</td>
<td>47.2</td>
<td>15.4</td>
</tr>
<tr>
<td>9</td>
<td>Malaysia</td>
<td>46.4</td>
<td>25.0</td>
</tr>
<tr>
<td>10</td>
<td>The Netherlands</td>
<td>46.3</td>
<td>34.3</td>
</tr>
</tbody>
</table>

*Percent change over 2006

Source: PRC General Administration of Customs, China's Customs Statistics

Notes: Table 1 is from the US-China Business Council: http://www.uschina.org/statistics/tradetable.html.

B

TABLE 2 - TOP 10 ORIGIN COUNTRIES/ REGIONS OF INWARD FDI STOCKS TILL THE END OF 2005

<table>
<thead>
<tr>
<th>Country</th>
<th>Inward FDI flows (USD 100 Million)</th>
<th>Share of the Total Inward FDI Stocks (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong, China</td>
<td>2889.48</td>
<td>46.42%</td>
</tr>
<tr>
<td>Taiwan, China</td>
<td>621.19</td>
<td>9.98%</td>
</tr>
<tr>
<td>the United States</td>
<td>543.85</td>
<td>8.74%</td>
</tr>
<tr>
<td>Country</td>
<td>Value</td>
<td>Percentage</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>Japan</td>
<td>534.45</td>
<td>8.59%</td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>313.18</td>
<td>5.03%</td>
</tr>
<tr>
<td>Singapore</td>
<td>289.56</td>
<td>4.65%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>132.87</td>
<td>2.13%</td>
</tr>
<tr>
<td>Germany</td>
<td>115.17</td>
<td>1.85%</td>
</tr>
<tr>
<td>France</td>
<td>74.7</td>
<td>1.20%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>69.67</td>
<td>1.12%</td>
</tr>
</tbody>
</table>

Source: China Foreign-Funded Enterprises Investment Report 2006

### TABLE 3 F-STATISTICS FOR FIXED EFFECTS

<table>
<thead>
<tr>
<th>Model</th>
<th>F(9,209)</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model for Exports</td>
<td>34.04</td>
<td>0.0000</td>
</tr>
<tr>
<td>Model for Imports</td>
<td>10.23</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

### TABLE 4 BREUSCH AND PAGAN LAGRANGIAN MULTIPLIER TEST FOR RANDOM EFFECTS

<table>
<thead>
<tr>
<th>Model</th>
<th>chi2(1)</th>
<th>Prob &gt; chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model for Exports</td>
<td>650.2</td>
<td>0.0000</td>
</tr>
<tr>
<td>Model for Imports</td>
<td>187.82</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

### TABLE 5 HAUSMAN TEST

<table>
<thead>
<tr>
<th>Model</th>
<th>chi2(4)</th>
<th>Prob &gt; chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model for Exports</td>
<td>0.18</td>
<td>0.9962</td>
</tr>
<tr>
<td>Model for Imports</td>
<td>1.61</td>
<td>0.8068</td>
</tr>
</tbody>
</table>