

# Does WTO Membership Has Effects on the Trade Linkages of Inward and Outward FDI: Evidence from China

William Sheng Liu\*

Research Centre for International Trade and Economics / Institute for Africa Studies  
Guangdong University of Foreign Studies  
Guangzhou, China  
wsl\_economics@126.com

**Abstract**—The study contributes to the FDI-trade literature by making a first attempt at assessing the dynamics of FDI and WTO membership linkages with trade in China. Utilizing a country-level panel trade data spanning the period 2003 to 2016, we found that both FDI inflows and outflows have been trade-enhancing. Results also indicate that China's accession to WTO would change FDI-trade relationships. We argue that as China trades with a non-WTO member country, outward FDI does have a significant positive impact on China's exports and imports.

**Keywords**—Foreign direct investment; foreign trade; China; WTO

## I. INTRODUCTION

To sustain foreign trade, China actively pursued the policy of enhancing business environment internationally. One of the actions was to join the World Trade Organization (WTO). Another was to attract inward foreign direct investment (FDI). An increasing share of China's trade was contributed by multinational enterprises' (MNEs) intra-firm trade [1]. The third was to promote 'going abroad'. Although researchers claimed that WTO accession and inward FDI yielded effects on China's foreign trade and a main motivation behind its outbound investment was to seek for markets [2], few studies examined FDI flows and WTO membership in jointly affecting China's international trade.

## II. THE FDI-TRADE LINKAGE MODEL FOR CHINA

To examine the FDI-trade linkage in China, this study adopts the international trade model with MNEs developed by Helpman [3]. The model examines a two-sector version of international trade in two kinds of homogenous goods between two countries where preferences are assumed to be identical. The good is produced by a standard linear homogenous production function using all inputs, namely labor and materials, in the same location due to immobility of production factors across national borders. Assuming increasing-return-to-scale and no impediments to trade, a firm in a country is willing to concentrate production in a single

plant and export its products to the other country. Thus, in the standard Heckscher-Ohlin model, a country produces differentiated varieties of a good based on its factor endowments and exports the good to the other country. So, before the emergence of FDI, the volume of trade, denoted by  $V$ , between the two countries is:

$$V = 2pxs^1s^2M \quad (1)$$

where  $p$  presents the price of every variety of the two kinds of goods,  $x$  is the units of a variety of a good and measures the output level,  $s^1s^2$  measures the income level of these two trading countries, and  $M = M^1 + M^2$  presents the number of varieties of the goods produced in the world and measures the relative size of the two countries.

The conditions in Equation (1) will change when FDI takes place. When producers possess firm-specific assets which serve product lines in plants, because the production factors cannot move internationally, they are likely to shift activities to the cheapest location to exploit cross-country differences in factor prices. In this set, arm's length trade in services becomes an inferior organizational form to a firm and MNEs emerge. Hence, Equation (1) can be rewritten as:

$$V = 2pxs^1s^2(M - y + u) \quad (2)$$

where  $y$  measures the declined varieties of a good as a result of reduced facilities by integrated MNEs in both home and host countries through production reorganization.  $u$  presents the increased varieties in services and intermediate inputs brought about by infra-firm trade of MNEs. Whether a MNE employs export or FDI depends on additional fixed costs to establish a new plant and saved costs associated with trade impediments. To examine the impact of FDI on international trade between China and others, Eq. (2) is transformed into the empirical model. To further examine the impact on different trade patterns, we divide the international trade into export and import and specify two empirical models.

$$\begin{aligned} \text{Import}_{it} &= \beta_0 + \beta_1 \text{IFDI}_{it} + \beta_2 \text{OFDI}_{it} + \beta_3 \text{TC}_{it} + \beta_4 \text{WTO}_{it} + \beta_5 Y_{ct} Y_{it} \\ &\quad + \beta_6 \text{ER}_{it} + \beta_7 P_{ct} P_{it} + e_{it} \quad (3) \\ \text{Export}_{it} &= \beta_0 + \beta_1 \text{IFDI}_{it} + \beta_2 \text{OFDI}_{it} + \beta_3 \text{TC}_{it} + \beta_4 \text{WTO}_{it} + \beta_5 Y_{ct} Y_{it} \end{aligned}$$

$$+\beta_6 ER_{it} + \beta_7 P_{ct} P_{it} + \varepsilon_{it} \quad (4)$$

where  $\text{Import (Export)}_{it}$  denotes China's trade with a foreign country  $i$  in a year  $t$ . Definitions of the variables are summarized in Table I.

We employ balanced annual country-level panel data spanning the period 2003 to 2016 and covering 182 trade partners of China. All values are adjusted for inflation using a GDP deflator and then transformed into logarithm. Prior to estimation, we investigate the time-series properties of the data series employed in the analyses because failure to do so would result in spurious regression results [4]. We estimated the trade model using panel least squares (PLS), estimated generalized least squares (EGLS) and two-stage least squares (TSLS), and used 1-year lag of the explanatory variables as instruments in TSLS. To overcome heteroscedasticity, we employ the White diagonal method [1].

### III. EMPIRICAL RESULTS

Before presenting the estimation results, we conduct preliminary analysis involving the choice of functional form. The likelihood ratio test and Hausman test lead to the favour of the fixed-effect model. Because a dummy is included, we employ the period fixed-effect model in the analysis only.

#### A. Basic Model

Table II shows that inward FDI has a positive relationship with import growth in China. After the WTO accession, China adjusted its policies to further extend economic liberalization. The Chinese government deregulated to meet the criteria of the WTO, including streamlining administration, increasing information transparency, reducing export refund and import duties, and simplifying investment approval procedures, etc. Meanwhile, China adjusted FDI policies to encourage foreign investment in high-tech fields and R&D. As a result, a large quantity of materials especially technology were imported by foreign firms. The estimated coefficients of inward FDI is also found to be positively related to export growth, statistically significantly at a 1% level. This provides empirical evidence to indicate that even though China could enjoy more favourable terms in international trade after the WTO accession in 2002, inward FDI is still capable of yielding effects on promoting exports.

Outward FDI has a positive relationship with import growth. As seeking strategic resources is a main motivation behind Chinese firms to invest overseas [2], this implies that overseas investments may be an effective channel through which foreign resources could be transferred to China, leading to an increase in imports. Outward FDI is positively connected with export growth in China, supporting the argument made in the trade-oriented model of export-enhancing overseas investment. GDP per capita and population trade are positive, supporting that an increase in relative income level and market size would enhance bilateral trade flows. Transportation cost for international trade are negative, meaning that an increase in cost deteriorates sale profits and reduces the incentive to sell overseas. The exchange rate is negatively related to import growth, confirming that appreciation of a country's currency would reduce the price competitiveness. Another finding relates to the positive impact of WTO membership on export and import. This means that the more favourable trade terms obtained with the WTO membership greatly encouraged Chinese firms' international trade.

#### B. WTO Membership Grouping

To further investigate WTO membership and FDI-trade linkages, we group the data into two sub-samples with the TSLS results summarized in Table III. Outward FDI yields positive impacts on import and export growth in both WTO member and non-member countries, confirming overseas investment's trade-enhancing effect found in the previous tables. The outward FDI produces more trade-enhancing effects in non-WTO member countries than in those nations which possess WTO membership. This implies that overseas investment may help China to circumvent trade barriers which can be overcome under the WTO rules, thus promoting its business relationship with those countries which do not join the WTO.

Inward FDI has a positive relationship with export growth in China when doing businesses with both WTO member and non-member countries. In terms of the coefficient magnitude, FDI inflows could produce more export- promotion effects in the non-WTO member sample. This further confirms the function of FDI flows in circumventing trade barriers, especially doing business with those countries which do not join an international organization to follow generally accepted trade rules.

TABLE I. DEFINITION OF THE VARIABLES EMPLOYED IN THE EMPIRICAL ANALYSES

| Variables           | Measurement  | Data source      |
|---------------------|--|------------------|
| Import              | Yearly imports from country $i$ to China.  | CSY              |
| Export              | Yearly exports from China to country $i$ .   | CSY              |
| Inward FDI          | China's foreign capital registered by country $i$ 's firms.  | CTESY            |
| Outward FDI         | The stock of China's outbound FDI in country $i$ .   | SBCFDI           |
| Transportation cost | The multiplication of yearly average oil price per barrel and the distance between the capitals of China and country $i$ . | USEIA and Google |
| WTO membership      | A dummy that takes value 1 if the country $i$ has WTO membership.  | WTO              |
| GDP per capita      | GDP per capita in country $i$ and China.   | WDI              |
| Exchange rate       | The rate of one country $i$ 's currency against RMB.   | IMF              |
| Population          | The number of residence in country $i$ and China.  | WDI              |

<sup>a</sup> Notes: CSY, CTESY and SBCFDI denote China Statistical Yearbook, China Trade and Economic Statistical Yearbook, Statistical Bulletin of China's Foreign Direct Investment, respectively, published by National Bureau of Statistics of China; USEIA denotes U.S. Energy Information Administration; WDI denotes World Development Indicator; IMF denotes International Monetary Fund.

**TABLE II. THE IMPACT OF FDI ON CHINA'S IMPORT AND EXPORT GROWTH**

| Variables                     | Import growth model |           |           | Export growth model |           |           |
|-------------------------------|---------------------|-----------|-----------|---------------------|-----------|-----------|
|                               | PLS                 | EGLS      | TSLs      | PLS                 | EGLS      | TSLs      |
| Constant                      | -19.05***           | -19.05*** | -18.73*** | -1.506              | -2.813*** | -2.322*** |
| Inward FDI                    | 0.109***            | 0.109***  | 0.092***  | 0.109***            | 0.063***  | 0.100***  |
| Outward FDI                   | 0.082***            | 0.082***  | 0.083***  | 0.055***            | 0.049***  | 0.056***  |
| Transportation cost           | -0.696***           | -0.696*** | -0.763*** | -0.607***           | -0.600*** | -0.567*** |
| WTO                           | 0.594***            | 0.594***  | 0.588***  | 0.244***            | 0.145***  | 0.214***  |
| GDP per capita                | 1.180***            | 1.180***  | 1.235***  | 0.476***            | 0.573***  | 0.538***  |
| Exchange rate                 | -0.116***           | -0.116*** | -0.128*** | 0.018               | 0.013     | 0.006     |
| Population                    | 1.438***            | 1.438***  | 1.438***  | 0.685***            | 0.746***  | 0.693***  |
| R <sup>2</sup> -Adjusted      | 0.522               | 0.522     | 0.538     | 0.628               | 0.709     | 0.642     |
| F-statistics                  | 312.9***            | 312.9***  | 286.3***  | 199.8***            | 287.6***  | 195.4***  |
| X <sup>2</sup> (Hausman test) | 3.508               |           |           | 43.92***            |           |           |
| F (likelihood ratio test)     | 9.321               |           |           | 56.53***            |           |           |

<sup>b</sup> Note: \*, \*\* and \*\*\* denote significance at 10%, 5% and 1%.

**TABLE III. FDI IMPACTS ON CHINA'S IMPORT AND EXPORT GROWTH: GROUPING STUDY**

| Variables                     | Import growth model |                        | Export growth model |                      |
|-------------------------------|---------------------|------------------------|---------------------|----------------------|
|                               | from WTO countries  | from non-WTO countries | to WTO countries    | to non-WTO countries |
| Constant                      | -14.464***          | -24.944***             | -3.872***           | -0.884               |
| Inward FDI                    | 0.057***            | 0.132***               | 0.023***            | 0.096***             |
| Outward FDI                   | 0.055***            | 0.132***               | 0.020***            | 0.108***             |
| Transportation cost           | -0.808***           | -1.163***              | -0.616***           | -0.653***            |
| GDP per capita                | 1.157***            | 1.754***               | 0.637***            | 0.566***             |
| Exchange rate                 | -0.169***           | 0.033                  | 0.043***            | -0.011               |
| Population                    | 1.293***            | 1.800***               | 0.832***            | 0.616***             |
| R <sup>2</sup> -Adjusted      | 0.615               | 0.468                  | 0.850               | 0.608                |
| F-statistics                  | 298.9***            | 83.00***               | 477.0***            | 64.81***             |
| X <sup>2</sup> (Hausman test) | 5.560               | 3.678                  | 99.67***            | 15.46**              |
| F (likelihood ratio test)     | 6.144               | 5.638                  | 98.34***            | 16.49*               |

<sup>c</sup> Note: see note in Table II.

The exchange rate has a negative relationship with import, but positive relationship with export when conducting trade with WTO members. This confirms that currency depreciation would encourage a country to export/import. However, the coefficient of exchange rate becomes insignificant when we regress the models using the non-WTO sample, suggesting that lack of rules that trading sides accept would impede trade flows between China and non-WTO members. That is, this finding may further support Chinese firms to utilize overseas investment to circumvent international trade barriers.

- [3] E. Helpman, "A simple theory of international trade with multinational enterprises," *J. Poli. Econ.* 1984, vol. 92, pp. 451–471.
- [4] R. Engle, C. Granger, "Co-integration and error correction: representation, estimation and testing," *Econ.* 1987, vol. 55, pp. 251–76.

#### ACKNOWLEDGEMENT

This research was financially supported by Institute for Africa Studies, Guangdong University of Foreign Studies.

#### REFERENCES

- [1] W.S. Liu, F. Agbola, "Regional analysis of the impact of inward foreign direct investment on economic growth in the Chinese electronic industry," *Appl. Econ.* 2014, vol. 46, pp. 2576-92.
- [2] P. Deng, "Investing for strategic resources and its rationale: the case of outward FDI from Chinese companies," *Busi. Hori.* 2007, vol. 5, pp. 71-81.