

An Analysis of the Interaction of Trade and Foreign Direct Investment between South Korea and India

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This paper investigates the interaction of foreign direct investment (FDI) and trade between S. Korea and India from 1983 to 2012. To examine the relationship between trade and FDI, we established multivariate estimations for trade and FDI, including Gross National Income and effective exchange rate. We applied impulse response analysis using the Vector Error Correction Model to determine the effect of a shock emanating from an endogenous variable on other variables. One finding is that a unidirectional link exists between trade and FDI, but not vice versa. The export of S. Korea to India positively affects the growth of the outward FDI of S. Korea into India. This finding indicated that the relationship between trade and FDI of S. Korea to India is unidirectional. Both trade and FDI also do not affect either the income of the two countries or their effective exchange rate. The main reason for this result is that the amount of FDI and/or trade is considerably small to generate any dynamic spillover effect.

Keywords: India, Korea, Trade, FDI, Vector Error Correction Model, Impulse Response Analysis

JEL Classification: F14, F23, L22, O24

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I. Introduction

The trade amount of S. Korea has been increasing for the past 50 years. In 1961, S. Korean trade only amounted to 357 million US dollars, of which exports comprised 13 percent of the total trade. The trade amount increased to 1,068 billion US dollars in 2012, and the imports of S. Korea were overwhelmed by its exports. Similarly, the foreign direct investment (FDI) of S. Korea noticeably increased after the 1988 Seoul Olympic Games. Since then, many S. Korean multi-national enterprises (MNEs) have participated in international trade as well as in direct investment worldwide. The amount of FDI that S. Korea obtained was not huge, but spillover effects were generated even to those who were not directly involved over time. Since the late 1980s, S. Korea has largely invested in China where MNEs have mainly used cheap labor forces for export-oriented production purposes. The amount of outward FDI of S. Korea to China experienced a semi-peak in the mid-1990s. According to Lee (1994), the motivation and pattern of direct foreign investment of S. Korea into China differed from those of Western Europe and North America.¹ At that time, the purpose of the investment of S. Korea in the ASEAN changed from labor-oriented to local market-oriented production due to more affordable labor forces in China. Lee and Lee (1992) explained that the economy of S. Korea was losing a comparative advantage in terms of labor-intensive industries, thus the country has attempted to obtain a relative advantage in capital and/or knowledge-intensive industries by expanding FDI to China. Kim (2000) confirmed that S. Korea was previously a net importer of direct investment in the 1980s, and then became a net exporter of FDI after the year 1990. The peak of S. Korean investments in China was in the mid-2000s. However, the increase in wage and competition in the Chinese market discouraged many foreign investors. As a result, FDI headed to India where both labor-intensive and knowledge-intensive production is provided for MNEs.

Recently, S. Korea has expanded its outward FDI in India, one of the BRICS countries.² The FDI of South Korea in India is mainly focused on the manufacturing industry. However, this focus diversified after the

¹ Some studies, including Lee (1994), describe "Direct Foreign Investment" as having the same meaning as "Foreign Direct Investment."

² BRICS is the acronym for an association of five major emerging national economies: Brazil, Russia, India, China, and South Africa (<http://en.wikipedia.org/wiki/BRICS>).

Comprehensive Economic Partnership Agreement (CEPA) between Korea and India. CEPA is a broader version of the Free Trade Agreement that aims to reduce or eliminate tariffs, import quotas, and preferences on many (if not all) goods and services being traded between countries.³ From the creation of CEPA, FDI of S. Korea into India has undergone several changes. In particular, investment in Indian infrastructure is expanding, investment partnerships with MNEs are increasing, and investments of S. Korean middle-sized firms are becoming larger. Therefore, this study can be related to previous studies that analyzed the outward FDI of S. Korea (Lee and Lee 1992; Lee 1994; Kim 2000; Lee and Huh 2009; Jang and Hyun 2012). Some previous studies empirically examined if the outward FDI of S. Korea had a positive effect on export, while others focused on the interaction of trade and FDI between S. Korea and India, such as Lee and Song (2012) who compared the competitiveness of pharmaceutical industries in both countries.⁴ The main purpose of the current study is to investigate if any relationship exists between trade and FDI of the two countries. In this regard, this research contributes to the literature associated with S. Korean trade and FDI, as well as provides a more rigorous methodology for analysis because the data sets used are more updated and the techniques employed are more sophisticated than those in previous literature.⁵

The remainder of this paper is organized as follows. The succeeding section describes the economic interaction between S. Korea and India in terms of products and industries. Section III provides a brief review of earlier literature on the relationship between trade and FDI. In Section IV, we present relevant data and outline the empirical model. We also discuss our findings on the long-term relationship between trade and FDI in the two countries. Concluding remarks and recommendations for future research are presented in Section V.

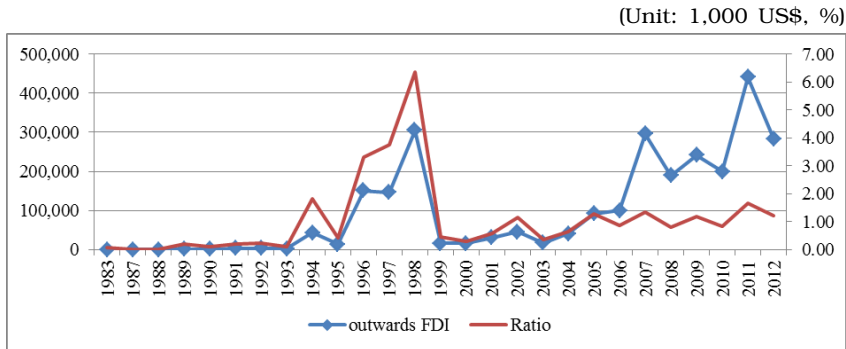
II. The economic interaction between S. Korea and India

At the end of March 2013, India became the 19th recipient of FDI of S. Korea, while S. Korea is the 13th country to provide FDI inflow into India. The FDI of S. Korea into India amounted to 25,000 US dollars in

³ Wikipedia, http://en.wikipedia.org/wiki/Free_trade_agreement.

⁴ Wilson (2000) analyzed exchange rates and the trade balance in S. Korea.

⁵ Kim (2012) analyzed trade balance and real exchange rate using a stationary VAR form of Error Correction Model Approach.



Source: S. Korea EXIM Bank.

FIGURE 1
FDI OF S. KOREA INTO INDIA

1988.⁶ This FDI sizably increased to 305 million US dollars in 1998, which was the highest share (6.37%) by S. Korea into India. Another peak year for the FDI of S. Korea into India was in 2011, which was after the implementation of CEPA. However, in 2012, the FDI of S. Korea decreased to 286 million US dollars.

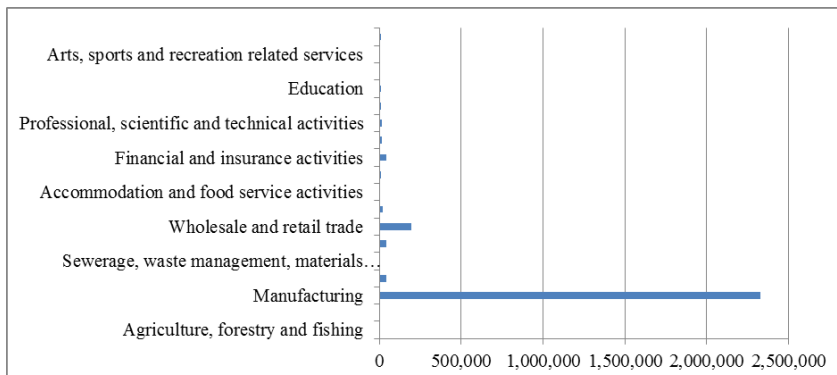
The portion of the FDI of S. Korea into India accounted for only 2.2% of the total outward FDI. Regarding inward FDI, the share of the FDI of S. Korea into India was 1.2% in 2012, which was very low, considering that the market of India has expanded.

The FDI of S. Korea into India is a success, especially in the automobile and electronic sectors in terms of vertical FDI. One feature of the FDI of S. Korea into India is in the manufacturing industry, accounting for 212 million US dollars, which was 74.2% of the total outward FDI into India in 2012. Meanwhile, the portion of FDI in other industries was very small, such as wholesale and retail trade that accounted for less than 10%.

As shown in the Table 1, the FDI of S. Korea into the Indian manufacturing consists of 22 sub-industries. The largest portion comprises the manufacturing of motor vehicles, trailers, and semi-trailers at approximately 46%. The second largest portion is the manufacturing of basic metal products. Other sub-industries reflected a less than 10% investment share.

⁶ The relevant data are available from 1988.

(Unit: 1,000 US\$, %)



Source: S. Korea EXIM bank.

FIGURE 2
FDI OF S. KOREA INTO INDIA BY INDUSTRY

Another feature of the FDI of S. Korea into India was that 80% of the total FDI is performed by large S. Korean firms. Middle-sized firms comprised 18% of the FDI, and the remaining portion was by individuals and non-profit organizations.

According to the survey by the S. Korea EXIM bank, the purposes of investment in India are diverse and include “Export,” “No-Barriers,” “Low Wage,” “Market-Seeking,” “Third Countries,” and so on. Table 2 shows that the main motive for the outward FDI of S. Korea into India is “Market-Seeking,” accounting for 58.4% of the investment motives in 2009. After the implementation of CEPA, the rate for “Market-Seeking” increased to 79.5% in 2012, whereas the “No-Barriers” motive decreased from 0.96% in 2009 to 0.13% in 2012. Interestingly, the “Export” motive was also shown to decrease by 1.5% points.

The FDI of India into S. Korea amounted to approximately 100,000 US dollars in 1981. The amount did not increase significantly before 2010 when FDI peaked at 371 million US dollars. In the succeeding year, FDI decreased to 4.3 million US dollars. Thus, the FDI of India into S. Korea is evidently lesser than that of S. Korea into India.

The volume of trade between S. Korea and India is not as large as their trading volumes with other countries. India is ranked the ninth highest country to receive S. Korean exports and 18th of S. Korea’s imports. S. Korean exports to India accounted for 2.2% of the total ex-

TABLE 1
THE OUTWARD FDI OF S. KOREA IN THE INDIAN MANUFACTURING
INDUSTRY

| Manufacturing | Investment Amount | Share |
|--|----------------------|---------|
| Total | 2,326,695 | |
| Manufacturing of Food Products | 109,844 | 4.72 |
| Manufacturing of Textiles, except Apparel | 19,292 | 0.83 |
| Manufacturing of Worn Apparel, Clothing Accessories, and Fur Articles | 520 | 0.02 |
| Tanning and Dressing of Leather, Manufacturing of Luggage and Footwear | 500 | 0.02 |
| Manufacturing of Wood Products (Wood and Cork), except Furniture | 101 | 0.00004 |
| Manufacturing of Pulp, Paper, and Paper Products | 30 | 0.00001 |
| Printing and Reproduction of Recorded Media | 124 | 0.01 |
| Manufacturing of Coke, Hard-coal and Lignite Fuel Briquettes, and Refined Petroleum Products | 1,900 | 0.08 |
| Manufacturing of Chemicals and Chemical Products, except Pharmaceuticals and medicinal chemicals | 42,024 | 1.81 |
| Manufacturing of Pharmaceuticals, Medicinal Chemicals, and Botanical Products | 17,129 | 0.74 |
| Manufacturing of Rubber and Plastic Products | 62,315 | 2.68 |
| Manufacturing of Other Non-metallic Mineral Products | 15,166 | 0.65 |
| Manufacturing of Basic Metal Products | 557,445 | 23.96 |
| Manufacturing of Fabricated Metal Products, except Machinery and Furniture | 155,373 | 6.68 |
| Manufacturing of Electronic Components, Computer, Radio, Television, and Communication Equipment and Apparatuses | 68,530 | 2.95 |
| Manufacturing of Medical, Precision and Optical Instruments, Watches, and Clocks | 4,065 | 0.17 |
| Manufacturing of Electrical Equipment | 44,568 | 1.92 |
| Manufacturing of Other Machinery and Equipment | 128,506 | 5.52 |
| Manufacturing of Motor Vehicles, Trailers, and Semi-trailers | 1,070,688 | 46.02 |
| Manufacturing of Other Transport Equipment | 5,644 | 0.24 |
| Manufacturing of Furniture | 11,600 | 0.5 |
| Other Manufacturing Activities | 11,331 | 0.49 |

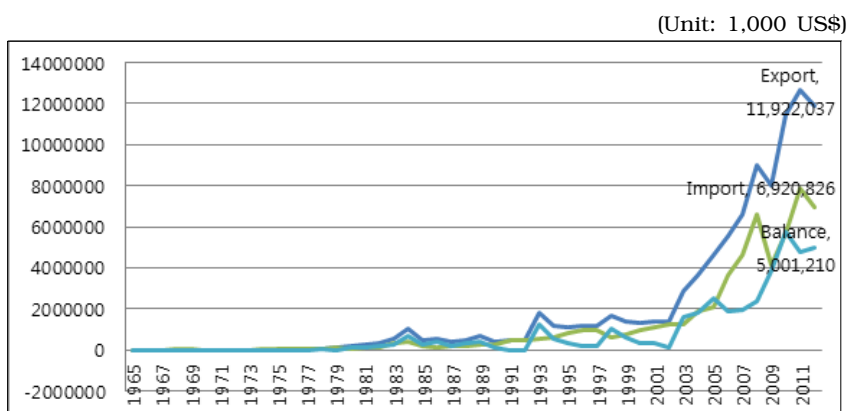
Source: S. Korea EXIM bank

TABLE 2
MOTIVES OF FDI OF S. KOREA INTO INDIA

(Unit: %)

| Year | Export | No- Barriers | Low Wage | Technology | Others | Market- Seeking | 3 rd Countries |
|------|--------|-----------------|-------------|------------|--------|--------------------|------------------------------|
| 2009 | 13.36 | 0.96 | 5.77 | - | 21.45 | 58.39 | 0.06 |
| 2010 | 13.68 | 0.25 | 5.80 | - | 1.86 | 78.27 | 0.14 |
| 2011 | 7.85 | 0.68 | 2.30 | - | 15.19 | 73.94 | 0.04 |
| 2012 | 11.84 | 0.13 | 7.71 | 0.31 | 0.54 | 79.48 | - |

Source: S. Korea EXIM bank.



Source: www.kita.net

FIGURE 3
THE TREND OF S. KOREAN EXPORT AND IMPORT TO/FROM INDIA

ports in 2012, while the imports were 1.3%. In the same year, S. Korea ranked as the 20th country to receive Indian exports and 13th for Indian imports, indicating shares of 1.4% and 2.7% in the Indian export and import markets, respectively. The amount of S. Korean trade was approximately from 20 to 30 billion US dollars. In 1980, the amount of S. Korean exports to India was only 172 million US dollars. However, this amount increased to 11,922 million US dollars in 2012, two years after the implementation of CEPA. The amount of imports to S. Korea from India was 53 million US dollars in 1980, which sizably increased to 6,920 million dollars in 2012. Overall, the trade imbalance between the

TABLE 3
THE TOP 10 PRODUCTS OF EXPORT AND IMPORT TO/FROM INDIA
(Unit: 1,000 US\$, %)

| Rank | Export | Amount | Import | Amount |
|------|--------------------------------|----------------------|------------------------------------|----------------------|
| | Total | 11,922,037 | Total | 6,920,826 |
| 1 | petrochemicals | 2,162,280 (18.14) | mineral fuels | 3,779,704 (54.61) |
| 2 | transport materials | 2,037,952 (17.09) | agricultural products/farm produce | 638,133 (9.22) |
| 3 | articles of iron or steel | 1,884,005 (15.80) | articles of iron or steel | 421,271 (6.09) |
| 4 | special machine | 754,348 (6.33) | nonferrous metal products | 398,101 (5.75) |
| 5 | mineral fuels | 725,766 (6.09) | precision chemistry | 396,074 (5.72) |
| 6 | general machine | 547,154 (4.59) | petrochemicals | 226,739 (3.28) |
| 7 | industrial electronic articles | 503,867 (4.23) | yarn | 203,318 (2.94) |
| 8 | electronic components | 454,254 (3.81) | metal ore | 202,991 (2.93) |
| 9 | precision chemistry | 368,859 (3.09) | man-made textiles | 71,134 (1.03) |
| 10 | heavy electric equipment | 364,545 (3.06) | transporter | 54,831 (7.9) |

Source: www.kita.net

two countries accounted for approximately 5 billion dollars in 2012. Regardless of these findings, much potential remains for trade expansion.

Table 3 lists the exported products from Korea to India that include petrochemicals (18.14%), transport and its parts (17.09%), and articles of iron or steel (15.8%), as well as imported products from India that include mineral fuels (54.61%), agro products (9.22%), and articles of iron or steel (6.09%). The share of the top 10 export products from S. Korea to India at the level of MTI 2 was 82.22%, while the share of the top 10 import products from S. Korea to India was 92.36%.⁷ Thus, the

⁷ MTI stands for the Ministry of Trade and Industry.

trade between both countries is mainly focused on very specific items.

This study therefore examines if a bi-directional relationship exists between trade and FDI of the two countries. Trade and FDI appear to be mutually reinforcing for both countries.

III. Literature review

A large body of literature has been devoted to the relationship between trade and FDI. While economic growth associated with FDI and/or trade had been examined in many studies, our literature review is focused on the relationship between trade and FDI.

Whether the relationship between trade and FDI is substitutive or complementary remains a controversy. According to Marchant, Cornell, and Koo (2002), a substitutive relationship means that an increase in FDI results in a decrease in exports to foreign countries and vice versa, while a complementary relationship indicates that FDI and exports move in the same direction. Theoretically, the effect of trade on FDI should be different. For example, countries at different stages of development react differently with various types of FDI and trade (Aizenmana and Noy 2006).

In a similar vein, a substitutive or complementary relationship between trade and FDI depends on whether FDI is horizontal or vertical. Amiti and Greenaway (2000) indicated that horizontal FDI replaces trade, and instead of exporting, firms establish a subsidiary in the foreign country, which trades off lower trade costs against higher fixed costs (Horstmann and Markusen 1992). By contrast, vertical FDI divides the production process into segments, according to the relative intensiveness of different factors of production in the country (Helpman 1984). Pontes (2005) suggested that FDI and trade costs have a non-monotonic relationship, which is positive for high trade cost values, where FDI and trade behave as complements. However, this relationship becomes negative for low trade cost values, where FDI and trade interact as substitutes.

The available empirical evidence on the relationship between trade and FDI is mixed (Jayachandran and Seilan 2010). Varying empirical results regarding the relationship between trade and FDI had been presented, such as unidirectional, bidirectional, or no causality (Pramadhani *et al.* 2007).⁸ Pacheco and Lopez (2005) revealed that the relationship

⁸ Pontes (2005) wrote: "predictions about the relationship between FDI and trade crucially depend on whether FDI is vertical or horizontal: theories on hori-

between FDI and exports and FDI and imports in Mexico is two-way, after performing a Granger causality test. Using data from China, Liu *et al.* (2001) presented the inter linkages between FDI, exports, and imports and suggested that import growth results in the growth of FDI inflows and export growth results in the growth of FDI. Meanwhile, Zhang and Felmingham (2001) studied the causal relationship between inward FDI and export performance from 1986 to 1999. Their result exhibited a two-way causality between inward FDI and exports at a national level. Similar results indicating a bi-directional causal relationship were also demonstrated in the coastal region and western China (Jayachandran and Seilan 2010).

Empirical evidence on whether FDI and trade volumes are complements or substitutes remain contradictory. Empirical results depend traditionally on whether FDI is horizontal or vertical. FDI substitutes trade when FDI is horizontal, and FDI complements trade when it is vertical (Amiti and Greenaway 2000). Gopinath, Pick, and Vasavada (1999) suggested that the relationship between FDI and exports among developed countries is substitutive.⁹ The empirical result of Liu *et al.* (2001) implied that international trade involves an indirect exchange of production factors between countries. However, the relationship between developed and developing countries is complementary (Bolling and Somwaru 2000; Carter and Yilmaz 1999; Malanoski, Handy, and Henderson 1997; Marchant, Saghaian, and Vickner 1999). Oberhofer and Pfaffermayr (2008) proved the complementary relationship at the firm level. The result of the study by Marchant, Cornell, and Koo (2002) indicated that the relationship between American FDI and processed food exports into S. Korea is complementary.

Dasgupta (2007) presented the effects of international trade and investment-related macroeconomic variables, namely, exports, imports, and FDI inflows and outflows from India from 1970 to 2005. He found a unidirectional Granger causality from export and import to FDI outflows, but no such causality existed in the opposite direction. Jayachandran and Seilan (2010) validated the long-term equilibrium relationship between trade, FDI, and economic growth for India and suggested that FDI and trade are mutually reinforcing under the open-door policy.

zonal FDI predict a negative relationship whereas theories on vertical FDI predict a positive relationship. As there is no way of separating the two types of FDI in the data, empirical tests have not been formally based on any theoretical framework and have generally adopted an ad hoc approach.”

⁹ Marchant, Cornell, and Koo (2002).

Several motivations have been highlighted from the perspective of the outward FDI of S. Korea (Lee and Lee 1992; Lee 1994; Kim 2000; Kim and Rhe 2009; Jang and Hyun 2012). Kim and Rhe (2009) argued that location is an important factor for FDI. In a similar line of research, Jang and Hyun (2012) investigated on the comparative advantage of the effects of outward FDI on domestic productivity. In addition, Lee and Huh (2009) analyzed the relationship between FDI and exports of S. Korea. However, few empirical studies had examined the economic relationship between India and S. Korea, particularly in terms of FDI and trade volume. Therefore, in the next section, we detail our study on the relationship between trade and FDI in India and S. Korea from 1987 to 2012, with the use of the Vector Error Correction Model (VECM).

IV. Empirical Analysis

To examine the relationship between trade and FDI, we establish multivariate estimations by positing a linear structure for trade volume, including the two variables described below.¹⁰

$$EX_t = \alpha_0 + \alpha_1 FDI_t + \alpha_2 GNI_t + \alpha_3 RE_t + \varepsilon_t \quad (1)$$

$$IM_t = \beta_0 + \beta_1 FDI_t + \beta_2 GNIK_t + \beta_3 RE_t + \nu_t \quad (2)$$

where EX_t represents exports of S. Korea to India, IM_t represents imports of S. Korea from India, FDI_t represents FDI of S. Korea into India in manufacturing, GNI_t represents the per capita of India, $GNIK_t$ represents the per capita of S. Korea, RE_t represents the effective exchange rate (S. Korean Won/Indian Rupee), and ε_t and ν_t are error terms. All variables are measured in natural logs.

A. Data

We obtain the data on export and import between S. Korea and India from the database of the S. Korea Trade Association. Data on the FDI of S. Korea into India are obtained from the S. Korea EXIM Bank. The descriptive statistics of these data are shown in Table 4. All variables are real values adjusted using CPI.¹¹

¹⁰ Our model is an application of the Birkerdike-Robinson-Metzler model, which is a widely used in analyzing the relationship between trade and exchange rates.

¹¹ CPI (2005=100) is applied to convert the nominal term of variables into the real term.

TABLE 4
SUMMARY OF DATA

| Variables | Obs | Mean | Std. Dev. | Min | Max |
|---------------|-----|----------|-----------|-----------|----------|
| <i>lnFDI</i> | 26 | 5.359725 | 3.110092 | -6.041453 | 8.149251 |
| <i>lnEX</i> | 26 | 10.11849 | 0.846303 | 8.894855 | 11.55989 |
| <i>lnIM</i> | 26 | 9.595081 | 0.8414545 | 8.236291 | 11.08796 |
| <i>lnGNII</i> | 26 | 2.032505 | 0.2686611 | 1.663482 | 2.561357 |
| <i>lnGNIK</i> | 26 | 4.939304 | 0.2372928 | 4.368853 | 5.306555 |
| <i>lnRE</i> | 26 | 3.239091 | 0.1919652 | 2.891129 | 3.72102 |

TABLE 5
CORRELATION OF THE VARIABLES

| | <i>lnFDI</i> | <i>lnEX</i> | <i>lnIM</i> | <i>lnGNII</i> | <i>lnGNIK</i> | <i>lnRE</i> |
|---------------|--------------|-------------|-------------|---------------|---------------|-------------|
| <i>lnFDI</i> | 1.0000 | | | | | |
| <i>lnEX</i> | 0.5988 | 1.0000 | | | | |
| <i>lnIM</i> | 0.6803 | 0.9214 | 1.0000 | | | |
| <i>lnGNII</i> | -0.4880 | -0.0350 | -0.1237 | 1.0000 | | |
| <i>lnGNIK</i> | 0.8090 | 0.7772 | 0.8806 | -0.2169 | 1.0000 | |
| <i>lnRE</i> | -0.3013 | 0.1808 | 0.1179 | 0.4320 | -0.2256 | 1.0000 |

Table 5 presents the correlation coefficient between the variables. The signs of most variables are shown as expected.

B. Methodology

In our study, VECM is adopted to examine the data obtained from 1987 to 2012. Variables of interest are initially tested for their unit roots. Subsequently, the co-integrating relationship between independent variables and the dependent variable is tested.

Non-stationary time series variables have undesirable properties that result in plausible economic relations by spurious regression. These empirical results can be unreliable or incorrect and can cause the forecast to be biased and/or inefficient. To address these problems, variables of interest are checked for unit roots using the Augmented Dickey-Fuller (ADF) test. Table 6 presents the results of the ADF tests, which prove the hypothesis that the series is integrated for order one without a time trend. The test results indicate the non-rejection of the null hypothesis that the level variables have a unit root. Thus, all variables are first-differentiated. With the rejection of the null hypothesis, the first-differentiated variables can be used for the estimation.

TABLE 6
RESULTS OF THE UNIT ROOT TEST

| Variables | At Level | At first Difference |
|----------------|----------------------|-------------------------|
| <i>ln</i> FDI | -.0431899 (0.523) | -1.029562*** (0.000) |
| <i>ln</i> EX | .0086711 (0.249) | -1.243517*** (0.000) |
| <i>ln</i> IM | .0099941* (0.080) | -1.039605*** (0.000) |
| <i>ln</i> GNII | -.0099923 (0.226) | -.3452873** (0.040) |
| <i>ln</i> GNIK | .0064245 (0.132) | -.5838002*** (0.003) |
| <i>ln</i> RE | -.0059631 (0.522) | -1.024965*** (0.000) |

Note: 1) The number in parenthesis () is P-value.
2) ***, **, * indicate significance at 1%, 5%, and 10%, respectively.

TABLE 7
JOHANSEN CO-INTEGRATION TEST FOR EXPORT (TO INDIA) AND FDI

| Max. Rank | Eigenvalue | Trace Statistic Value | 5% Critical Value | Eigenvalue | Max Statistic Value | 5% Critical Value |
|-----------|------------|-----------------------|-------------------|------------|---------------------|-------------------|
| 0 | . | 60.3022 | 47.21 | . | 36.2612 | 27.07 |
| 1 | 0.77928 | 24.0410* | 29.68 | 0.77928 | 15.2260 | 20.97 |
| 2 | 0.46976 | 8.8150 | 15.41 | 0.46976 | 7.9543 | 14.07 |
| 3 | 0.28210 | 0.8607 | 3.76 | 0.28210 | 0.8607 | 3.76 |
| 4 | 0.03523 | | | 0.03523 | | |

To test for co-integrating relations among the variables, Johansen co-integration tests are conducted using two ranks and five lags. The test result implies that at least two co-integration relations exist among the variables.

As performed previously, the Johansen co-integration test for imports and FDI is conducted for the variables. The test confirms at least two co-integrating relationships among the variables.

VECM is used to investigate the interaction between the trade and FDI of S. Korea into India. After performing unit root and co-integration

TABLE 8
JOHANSEN CO-INTEGRATION TEST FOR IMPORT (FROM INDIA) AND FDI

| Max. Rank | Eigenvalue | Trace Statistic Value | 5% Critical Value | Eigenvalue | Max Statistic Value | 5% Critical Value |
|-----------|------------|-----------------------|-------------------|------------|---------------------|-------------------|
| 0 | . | 60.4526 | 47.21 | . | 36.4221 | 27.07 |
| 1 | 0.78076 | 24.0305* | 29.68 | 0.88478 | 13.8110 | 20.97 |
| 2 | 0.43755 | 10.2195 | 15.41 | 0.64651 | 9.8615 | 14.07 |
| 3 | 0.33694 | 0.3580 | 3.76 | 0.40720 | 0.3580 | 3.76 |
| 4 | 0.01481 | | | 0.03447 | | |

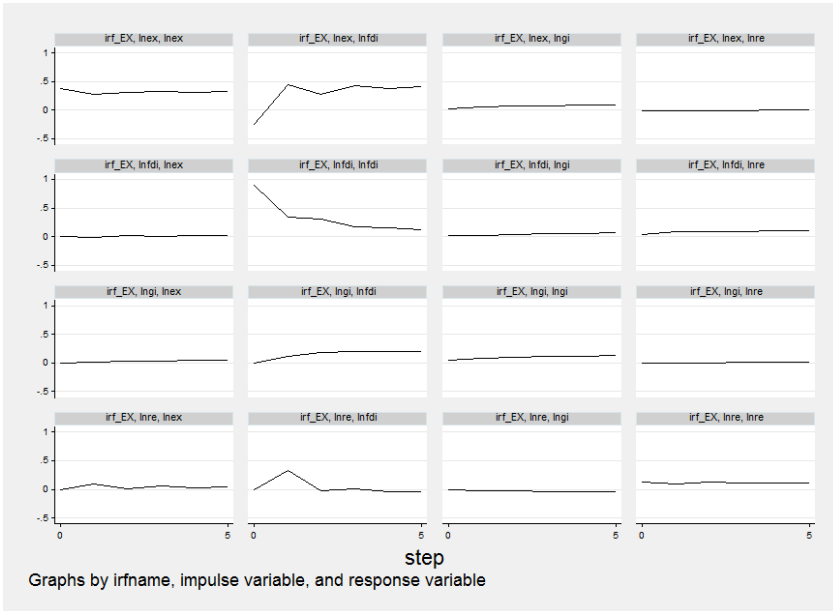


FIGURE 4
RESPONSE OF THE VARIABLES TO
ONE PERCENT SHOCK USING EQUATION (1)

tests, the empirical results of VECM are obtained. Using the VECM estimation results, we apply impulse response analysis. Impulse response functions trace the effect of a shock emanating from an endogenous variable to other variables. Figure 4 provides the results of the impulse response of the variables using Equation (1) that explains the relationship between FDI and export of S. Korea to India.

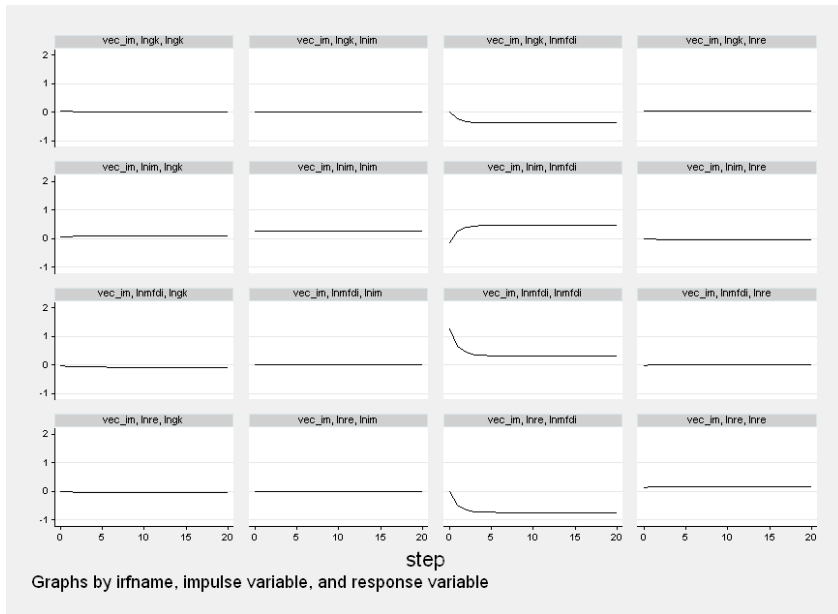


FIGURE 5
 RESPONSE OF THE VARIABLES TO
 ONE PERCENT SHOCK USING EQUATION (2)

Figure 4 shows the responses of $\ln EX$, $\ln FDI$, $\ln GNII$, and $\ln RE$ to one percent shock in each variable for five years. The response of $\ln FDI$ to one percent shock in $\ln EX$ is shown as positive, which implies that the relationship between the two variables is unidirectional. However, any effect of $\ln EX$ is not shown in $\ln GNII$ and $\ln RE$. A shock in $\ln FDI$ does not have any effect on the other variables. One percent shock in $\ln GNII$ positively affects $\ln FDI$. However, no effect is shown on the other variables. $\ln RE$ is displayed to have one period positive effect on $\ln FDI$, which gradually disappears.

In summary, the exports of S. Korea to India induce FDI, but not vice versa. Neither exports nor the FDI of S. Korea influence the national income of India and the effective exchange rate. These results are mainly because the FDI and export of S. Korea have small percentages in the total inward FDI and import of India.

The results of the interplay between FDI and imports of S. Korea and India are displayed in Figure 5. Any response other than $\ln FDI$ does not appear by a shock in each variable. Particularly, the effect of a shock in

\ln GNIK on \ln IM is negative during the entire period. In the case of a shock in \ln IM, \ln FDI increases in the first year and then converges approximately at a positive number. A shock in \ln FDI positively affects itself, but the effect of a shock gradually decreases to zero. The effect of \ln RE on \ln FDI is shown as negative. Interestingly, \ln GNIK is seen as unrelated to \ln RE. Therefore, the GNI of S. Korea is not correlated with effective exchange rate because the volume of FDI and trade are not sufficiently large to affect the relationship between the two variables.

V. Concluding Remarks

In this paper, we investigated FDI of S. Korea into India and the relationship between the growth of FDI and trade of the two countries. Specifically, we examined the interaction between trade and FDI of S. Korea into India from 1987 to 2012, using VECM. The FDI of S. Korea into India focuses on both capital-intensive and low technologies, such as basic metals, and capital-intensive and high technologies, such as automobiles. According to Lee and Lee (1992), FDIs differed from the types of outward FDI in transition countries, and they provided a theoretical background in which the purpose of the outward FDI of the transition country into labor-abundant developing countries is so labor-intensive industries can utilize the comparative advantage of low labor cost, whereas the outward FDI into developed countries is focused on capital- and knowledge-intensive industries that will help acquire the comparative advantage of technology, knowledge, and/or ownership. Interestingly, the FDI of S. Korea into India is concentrated on capital-intensive and high-technology industries, such as automobiles and its related basic metals, although India is still a developing country. Thus, the FDI of S. Korea into India cannot be categorized in the types of outward FDI that Lee and Lee (1992) suggested. Further studies are necessary to explain ad hoc FDI patterns such as those of the FDI of S. Korea into India.

The empirical results of the relationship between trade and FDI are summarized as follows. A unidirectional link exists between trade and FDI. An increase in S. Korean exports to India increases the FDI of S. Korea into India. However, no link exists in the opposite direction. Therefore, FDIs of S. Korean MNEs are dependent on their investment motives in different countries. Another finding suggests that both FDI and trade do not affect the income of the two countries or their effective exchange

rate because the amount of FDI and/or trade for both countries is considerably small to generate any dynamic spillover effect on income and effective exchange rate. Therefore, S. Korean exports to India can influence the growth of outward FDI of S. Korea into India.

This paper has some limitations that can be studied in further research. One is the relationship between FDI and trade of S. Korea at the industry level. This study was only able to clarify the bidirectional causal link of FDI and trade between the two countries. Another limitation of this paper is that the relationship between the FDI of India into S. Korea and trade was not examined because the relevant data set was unavailable. Thus, a future study can be performed if the data become available. These studies will help in understanding the interaction between the trade and FDI of the two countries.

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