[Field Research]

An Empirical Study on the Export and Import Effects of Foreign Direct Investment on the Blue Economic Zone of the Shandong Peninsula in China*

Sung-Joon Lee**, Shuai Zhai***

Abstract

Purpose - During a reform period lasting 30 years, the Blue Economic Zone (BEZ) in the Shandong Peninsula has made progress in attracting foreign investment, and has acquired the foreign direct investment (FDI) essential for economic growth. It is therefore important to conduct a proactive and systematic study of FDI in the BEZ.

Research design, data, methodology - This dissertation discusses the contribution of FDI on economic growth, from both a theoretical and empirical perspective. Taking seven core cities for study, statistics and econometrics are used, and panel data are used to validate FDI contribution to import and export in the BEZ.

Results- FDI was found to exert both positive and negative influences on the imports and exports of the BEZ. In other words, the research findings are consistent with Trade Generated and Inverse Trade Generated theories put forward by Kojima and Mundell, among other researchers mentioned earlier in this paper. Further, FDI has greatly increased imports and exports for the BEZ.

Conclusions - According to the results of this empirical study on local investment environment optimization, FDI plays an important role in foreign trade. This dissertation puts forward recommendations on using FDI to better promote economic growth in the BEZ.

Keywords : Economics in Shandong Peninsula, Blue Economic Zone, Foreign Direct Investment, Economic Effects.

JEL Classification : C23, F12, F18, F43.

1. Introduction

A great contribution to the development of China's economy, China's Foreign Direct Investment Foreign Direct Investment (FDI)

continues to increase since the 1978 governmental reforms and in 2001 surpassed the United States the largest recipient of FDI in the world. The Investment Promotion Bureau of the Shandong Province plays an important role in attracting FDI into China. Shandong Province is located in the Yellow River on the Eastern China coastal area. Due to the geographic proximity to the ocean, Shandong is Korea's major investment destination for transportation and infrastructure in China. The GDP in Shandong Province was 225.45 billion yuan in 1978, 2.20 trillion yuan in 1992, and exploded to 45.43 trillion yuan in 2011. Exports in 2011 amounted to 1.26 trillion dollars and imports were 1.10 trillion dollars. The Shandong Peninsula Blue Economic Zone (BEZ) has an excellent industry that fosters the development of the marine economy and the scientific development of marine resources with the Chinese government's decision to develop in April 2009 and October 2009 on the basis of the "Shandong Province Shandong Peninsula Blue Economic Zone Development Plan." This plan focuses on key economic zones in China to create a major growth engine for future economic marine economies.

In this paper, we analyze the FDI and the combined impact of the Shandong Peninsula BEZ on the FDI and the effect of the Shandong Peninsula BEZ. The aim of this study is the analysis of each city's FDI Performance Index and Potential Index and FDI on the international balance of payments in the Shandong Peninsula BEZ. Such analysis and the suggestions pave the way for future investment strategies in the region. BEZ's Shandong Peninsula cities use the FDI during 2002 to 2011 Performance Index and Potential Index, depends on the purpose of such studies and analysis, by city, by year, and any differences are compared and the factors analyzed. In this paper, the basic data used for analysis come from the Statistical Yearbook of the Shandong Province, the Shandong Peninsula, and the seven cities of BEZ Bureau of Statistics since 1992, announced in December 2011.

2. Theoretical Study of FDI and Previous Studies

2.1. Economic Effects of FDI

The FDI concept was first introduced by Hymer' sin 1976. The concept of FDI is to exercise control over corporate governance and is distinct from the concept of foreign direct investment. This is characterized by a variety of resource management strategies, such as products, technology, patents, management skills and capital, as well as the

---
* This paper is summarized and modified from Zhai Shuai's Doctoral Dissertation which supervised by professor Lee Sung-Joon.

** Professor, Department of International Management, Woosong University, Korea. Tel: +82-10-5438-0803. E-mail: vangawer@hanmail.net.

*** Corresponding Author, Researcher, Asia Research Center, Woosong University, Korea.
Tel: +82-10-8646-8306. E-mail: zsronny@solbridge.ac.kr.

process of production and shipment. While issues with and proposals regarding the development of FDI since the Second World War have been raised, a dominant theory has yet to be established. However, in discussions of this topic, the typically divided into indirect investment and FDI, with the FDI discussed in terms of direct participation investment in the target company's management for the purpose of the type of management, capital and manpower resources as well as intangible management resources on the management of experience and knowledge, know-how, technology, etc. with a combination of factors of production overseas business activities. From the perspective of the local nation, FDI and foreign capital can be obtained as a stable form of investment--unlike additional debt burden without the pure financial nature of portfolio investment.

2.2. FDI Inward Performance Index

Inward FDI Performance Index is the nation's ability to attract FDI compared to the size of the country's economic output. The ratio is calculated by dividing the nation's share of the global FDI by their share of the global GDP. According to Aitken(1999) and UNCTAD (2002), FDI inflow performance indicators (Inward FDI Performance Index), due to problems such as collection of data of FDI inward, compared with the exchange rate are obtained by calculating the index as a necessary precaution. A specific country's bureau of FDI inflow performance index is calculated using GDP ratio for the FDI inward worldwide.

2.3. FDI inward Potential Index

FDI inward potential index is an index that represents the awareness of investors about the investment environment with indicators as a means to attract investment in the future. UNCTAD (2006) FDI inflow index has potential. UNCTAD's FDI inward potential index obtained a score of 12 structural elements affecting FDI inward. GDP real growth rate, per capita GDP, GDP compared to exports ratio, 1,000 population phone times players and mobile phone penetration, GDP compared to R&D expenditure ratio, total population, compared to higher education population ratio, per capita commercial energy consumption, country risk etc. variables have a value between 0 and 1.

2.4. Effect of FDI to Import & Export

Exports and imports contribute to the development of FDI. Kojima (1978) raised the theory of complements between FDI and international trade. He speculated what factors may contribute to the decisions of FDI investorsin particular industry sector specific companies in the same industry as the Investment Promotion Bureau developments. That accompanying FDI and advanced technology, as well as companies in Investment Promotion, Investment Promotion Bureau of the workers and managers of learning through technology and management know-how, will be passed. Therefore, the Domestic Investment Promotion production technology and management skills will promote

the development of the import & export of both countries and elevate the competitiveness of domestic firms.

The issue has been discussed in terms of the relationship of quantum general, complementing to the FDI and effects on export-import. Mundell (1967) analyzed the FDI in the form of net trade-oriented and anti-trade oriented.

Effects of FDI on the host country economy, according to scholars, is contrary to Stephen (2002) in that he has suggested that the negative effects of market dominance appeared to be the import substitution for Latin American countries in the analysis of FDI foster industrial purposes, or for the preservation of the international balance of payments deficit, with increases in exports and economic growth, rather than foreign companies.

Hong's (1993) case study of Korean company'sin Shandong Province revealed a variety of issues: the management of the Chinese government interference, government protection of the domestic market in China, and Chinese companies, and price competition, strengthening of the foreign exchange deposits and withdrawals transactions control, energy conservation and environmental regulations, FDI between Korea and China and between exporters and importers from analysis revealed a total of nine issues can be strengthened, deriving from the lack of understanding of China's investment environment, import & export, labor-intensive industries concentrated area of labor management problems, such as the presence of a complementary relationship between FDI and the export-imports.

3. International Economic Relations and Resin Trends of BEZ

3.1. Economic Relations in Shandong Province

The current GDP of Shandong Province was, in 2011 45,429 billion yuan (10.9 percent increase from last year) in Guangdong Province, Jiangsu Province, China was ranked third, followed a per capita GDP of $7317 (all over China an average of $5,414), and 1st, 2nd, 3rd industries composed of 8.8%, 52.9%, and 38.3%, respectively. In addition, the investment aggregate fiscal revenues (local) in fixed assets were 26,770.7 billion yuan (21.8 percent increase), and retail sales of social consumer goods were 16,675.9 billion yuan (17.3 percent increase), and 3455.7 billionyuan (25.7 percent increase).

<Table 1> Shandong Annual GDP Changes (Unit: 100million yuan)

Division	2000	2005	2008	2009	2010	2011
GDP	8,337.5	18,516.9	31,072	33,805	39,416	45,429
%	10.28	15.24	12.1	11.9	12.5	10.9

Source: Statistical Yearbook of Shandong, published by the Shandong Statistical Bureau(2011).

As shown inTable2, 2,359.9 billion (from last year: 24.8% increase), and in 2011, the total import & export 1,257.9 billion (20.7% in-

crease), income 1,102.0 billion (29.8% increase), and the 155.9 billion balance of trade surplus (previous year, compared to a surplus of 20.3% reduction) was recorded.

<Table 2> Annual import & export of Shandong Province (Unit: billion dollars)

Division	2000	2005	2008	2009	2010	2011(%)
Total IM/EX	249.9	768.9	1,581.4	1,386.0	1,889.5	2,359.9(24.8%)
Export	155.3	462.5	931.7	795.6	1,042.5	1,257.9(20.7%)
Import	94.6	306.4	649.7	590.4	847	1,102.0(29.8%)
Balance	60.7	156.1	282	205.2	195.5	155.9(-20.3%)

Source: Statistical Yearbook of Shandong, published by the Shandong Statistical Bureau(2011).

Table 3 shows the year amount to substantial FDI table is processed. In the table, except for a decrease of 2.3% when the Asian financial crisis in 2008, shows that the amount of 111.6 billion FDI in 2011 is an increase of 21.7%.

<Table 3> Shandong Province by Year foreign investment (Unit: billion)

Division	2000	2005	2008	2009	2010	2011(%)
Amount	38.1	110.1	80.1	82.0	91.7	111.6
%	1.8	12.2	-2.3	10.2	14.5	21.7

Source: Statistical Yearbook of Shandong, published by the Shandong Statistical Bureau(2011).

3.2. Development Strategy of BEZ

The Shandong Peninsula and BEZ marine coastal areas were announced as one part of the in 2003 sustainable economic development strategy. Additionally, Shandong Province is part of the "China National Offshore development syllabus" that was announced in April 2009.These efforts represent important initiatives by the Chinese government to foster the scientific development of marine resources and the marine industry, and the construction of the Shandong Peninsula BEZ components.

With the "Shandong Peninsula Blue Economic Zone Development Plan" passed by the State Council of China, Jan. 4, 2011, the Shandong Peninsula has emerged within China's national development

strategy, and the BEZ, Shandong Provincial Government of Shandong Peninsula Blue Economic Zone was factored into the 2011 budget, 10 billion yuan for the construction business, economic construction and actively supported the project. The BEZ development plan for now is progress in respective performance plans with a gradual increase of the budget for the construction of BEZ from 2011 to 2020. Similarly, from 2011-2020, all waters of the Shandong Province, and Qingdao, donging, Yantai, Weifang,Weihai, Rizhao, Binzhou areas, Wuli, and Zhanhuahave a total area of 22 3,500㎢ for the development extends the total area of the peninsula to the sea area of 159,500 ㎢, and land area 64,000 ㎢.

Targets for 2015, 202 to promote the comprehensive development of the marine economy have been set. By 2015 marine industries will build and modernizea system, with the ability to significantly increase the overall economic development mode of transition and economic restructuring, and substantially improve the overall efficiency of the marine economy. Ultimately, this creative system of marine science and technology and the geographic formation itself will greatly improve the ability to develop and implement future plans.Incorporated into these plans are strict controls on the total emissions of major pollutants resulting in continued improvement of the marine ecological environment with resultant improvements in the lives of the people. In economic terms, the ocean's GDP is anticipated to grow by an annual average of 12% to 13 million yuan, and the level of urbanization and per capita income to increase by 70 percent.

With the many sea and land projects, ecological design and construction, as well as pollution reduction, such as reducing the total emissions of major pollutants, will significantly improve the quality of the marine environment, and improve people's lives. These elements are essential to the Chinese government's ambitious plans to raise the region to the next level of a "Well-off Society." Also, BEZ plans for 2020 include a harmonious construction of human and resources to optimize the industrial structure, the development of the marine economy, planning, and plans to implement the modernization of society are set.

3.3. Economy and Import & Export Trends in BEZ

As shown in <Table 4> in the 16 years from 1995 to 2011, China's FDI inward compared to China's territory and population, the
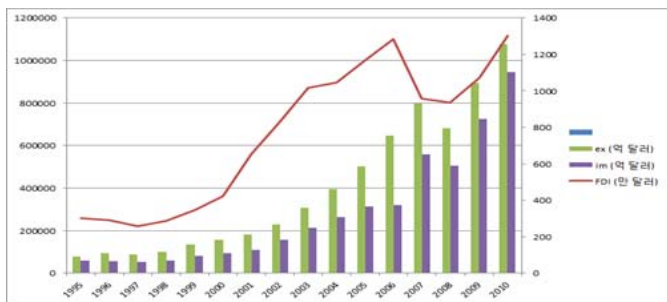

<Figure 1> Map of BEZ of Shandong Peninsula

amount is very small. Performance to attract FDI increased significantly from 1995 to 2011, and the Shandong BEZ the annual average FDI inflow growth rate reached about 50%.

<Table 4> Major Economic Indicators of the Shandong Peninsula BEZ by Year

Year	Rate (US $/RMB)	FDI (in thousands $)	Exports (in hundreds of millions $)	Imports (in hundreds of millions $)
1995	8.34	260,719.00	81.61	57.89
1996	8.33	259,041.00	91.83	69.81
1997	8.31	250,044.00	108.59	66.77
1998	8.28	222,262.00	103.47	62.70
1999	8.28	246,878.00	115.79	66.92
2000	8.28	297,119.00	155.79	94.61
2001	8.28	362,093.00	181.29	108.34
2002	8.28	558,603.00	211.15	128.27
2003	8.28	709,371.00	265.73	180.85
2004	8.28	870,064.00	358.73	249.09
2005	8.08	897,072.00	462.51	306.38
2006	7.82	1,000,069.00	586.50	366.40
2007	7.37	1,101,200.00	752.40	373.70
2008	6.85	820,255.00	931.75	649.70
2009	6.83	801,077.00	795.65	590.38
2010	6.65	916,836.00	1,042.47	847.04
2011	6.40	1,116,040.00	1,257.90	1102.00

Source: Statistical Yearbook of Shandong, published by the Shandong Statistical Bureau(1995-2011). Recited from Zhai(2012).

By 2011, using data from 1995 in order to look at how FDI and exports and imports affect the relationships in Figure 2.

Source: Statistical Yearbook of Shandong, published by the Shandong Statistical Bureau(1995-2011). Recited from Zhai(2012).

<Figure 2> Yearly FDI and Import & Export Trends of BEZ

1995-2011 BEZ Shandong Peninsula, as seen in Figure 2, shows the trend of a steadily growing total import & export. Prior to 2001, the import & export amount shows modest growth and since 2002, faster growth. Also after accession to the WTO by China in 2001, the FDI investment is growing steadily. Immediate increase in FDI from the point without showing its effects after 1, 2 years are displayed, which are the same as those shown in Figure 2, as well as effects of the import & export FDI.

4. FDI Import & Export Effects Analysis for Shandong Peninsula BEZ

There are increases in FDI to increases in the trade of multinational corporations, and trade within the enterprise. As a result, the FDI investor countries and between imports and exports will increase. It is hard to see trade enterprises estimated increases of the country's total imports and exports. FDI through local production companies already exporting may be substituted. However, according to the empirical results, increases by developed countries in exports and imports as a whole typically appear. The effects of FDI on trade divided into static effects and dynamic effects can be considered. First, static effects of overseas subsidiaries which trade patterns and export-induced effects, and export substitution effect, transition effects, the reciprocal effect, income are divided.

Export-induced effects from the importation of capital goods, intermediate goods and parts required in the production of overseas subsidiaries, and parent companies or domestic companies to increase exports are explained. Demand of re-investment facilities for the establishment of a factory in the early stages of the FDI and high dependence on the parent company and the investor's position in the export-induced effect are greater. However, as time elapsed, the production and sales of overseas subsidiaries begins in earnest, along with significant independence from the parent company in the sales and production, export-induced will be reduced. If you just reduce labor costs, or going out on the overseas markets in order to secure FDI, parts from the parent company and by importing intermediate goods steadily continues to lead the export-induced effects can be expected.

The export substitution effect is the investment destination and the goods and services produced in overseas subsidiaries in third-country markets is replaced by the effect of reducing the investor's export such goods and services of investor competition.

These effects are greatest when there is a rise in home production overseas subsidiaries. In the case of the FDI for securing market seems to be to replace the exports of the foreign investor, will cause an even greater effect. Depending on the product configuration and the product of the production process, export-induced effects and export substitution effects between the larger works would appear differently.

Reciprocal effect is the effect that occurs when the investor exports the products produced by overseas subsidiaries. The effect is great when parts or raw materials procurement to reduce costs for the FDI are in place.

Income transition effect explains the income reduction because of moving overseas production base in the production of raw materials and capital goods. Overseas production due to the won/subsidiary of the demand for imports will be greatly reduced. The intermediate goods imports propensity is long-term and if structural, the subsidiary will sustain the intermediate goods imports. Therefore, in order to solve these problems, the position of the host country will regulate the import of intermediate goods regulations by local procurement ratio limits.

4.1. FDI Inflow Performance Indicators and Analysis of the Effects of FDI Inward

4.1.1. FDI Inflow Performance Index

In this paper, UNCTAD's FDI inflow performance index is measured by FDI and GDP data from 2002 to 2011, and how the Shandong Peninsula BEZ 7 cities' FDI inflow performance indicators below were measured.

$$IN\, D_i = (FDI_i / FDI_T) / (GDP_i / GDP_T)$$

If the FDI inflow performance index of 1, the proportion of cities' FDI inflow from the index greater than 1 indicates the proportion of the city's GDP in total GDP in the Shandong Province, and is equal to the share of FDI inflow in the city from the mountain city GDP, meaning that it is relatively greater than the proportion of total GDP. In addition, the index less than 1, the city has a relatively weak attractive FDI competitiveness.

<Table 5> shows that the 2002-2006 Qingdao, Yantai and Weihai performance index is greater than 1 and have highs of 1.8527, its lowest level with Dongying at 0.2690, making the difference between the high and low by six times. Also, 4 cities in the 2007-2011 performance indexis greater than 1, the greatest change in the city Rizhao, which in the 2002-2006 Index had a 0.4783 to 1.1532 significant growth. From 2007 to 2011 Qingdao was 1.6764, about 0.18 better than the 2002-2006 but the low peak of 2002-2006 was 0.2865 in Binzhou, about 0.017 better than 0.2690 from 2002-2006 in Dongying.

4.1.2. FDI Inward Potential Index

FDI inward shows the Potential Index is an index that represents the awareness of investors about the investment environment, as meaningful indicators to gauge the possibility to attract investments in the future.

UNCTAD's FDI inward potential index affecting FDIinward in total score is obtained. The 12 structural elements are GDP real growth rate, per capita GDP, GDP compared to exports ratio, phone calls per 1,000 people and mobile phone penetration, GDP compared to R&D expenditure ratio, total population, higher education population ratio, per capita commercial energy consumption, country risk etc.. These variables have value between 0 and 1.

FDI Potential Index=
$$(Score_{GDP} + Score_{FDI} + Score_{ex/GDP} + Score_{electric} +$$
$$Score_{RND} + Score_{cellphone} + Score_{GDP/P}) / 7$$
$$\text{Here:} Score = (V_i - V_{min}) / (V_{max} - V_{min})$$

Grouped by 5 years before and after 2006, the effects of FDI inward were analyzed based comparisons to identify the Shandong Peninsula. FDI index quoted by the BEZ inward of FDI Potential Index what was shown in Table 6 and Table 7. The table shows Shandong Peninsula BEZ in each city's per capita GDP, FDI growth, exports in GDP proportion of, research and development (R&D) of the total investment compared to GDP of specific gravity, GDP growth, per capita electricity consumption and per capita cell phone's usage.

As shown in <Table 6> and <Table 7>, Potential Index in 2002-2006 and the analysis period of 2007 to 2011 show the 1st and 2nd rank of Qingdao and Weihai. In the 2002-2006 high with .663 is Qingdao, and the low is .269 in Rizhao, amounting to three times the difference. From 2007 to 2011, the highest was a .599 in Qingdao and the low was .180 in Weifang that about three times the difference.

In the Potential Index from 2007 to 2011, both the highs and lows decreased from 2002 to 2006 with no outstanding changes. Rizhao grew from 7th in 2002 to 2006 to 3rd in2007-2011, while Dongying maintained number1. Yantai fell from 3r din 2002-2006 to 5th in 2007-2011 and Weifang from 5th in 2002-2006 to 7th in 2007-2011. Also, because of the relationship of each city's per capital GDP and FDI potential, The high potential and GDP per capita rankings remain the same.

<Table 5> FDI Inflow Performance Index of the Shandong Peninsula

Area	2002-2006 FDI inflow performance index	Rank	Area	2007-2011 FDI inflow performance index	Rank
Qingdao	1.8527	1	Qingdao	1.6764	1
Yantai	1.4548	2	Yanta	1.0737	4
Weihai	1.1761	3	Weihai	1.2240	2
Weifang	0.7322	4	Weihai	0.5719	5
Rizhao	0.4783	5	Rizhao	1.1532	3
Binzhou	0.3542	6	Binzhou	0.2865	7
Dongying	0.2690	7	Dongying	0.3023	6
BEZ	1.5526		BEZ	1.5780	

<Table 6> 2002-2006 Potential Index of the Shandong Peninsula, BEZ

City	per capita GDP	FDI Growth	export/GDP ratio	R&D/GDP ratio	GDP growth	electricity usage	cell phone usage	potential index
Qingdao	0.513	0.228	1	0.645	0.473	1	0.785	0.663
Weihai	0.784	0.354	0.472	1	0.201	0.649	0.763	0.587
Yantai	0.458	1	0.385	0.428	0.557	0.397	0.651	0.570
Dongying	1	0	0	0.051	1	0.749	1	0.543
Weifang	0.202	0.382	0.168	0.499	0.230	0.391	0.578	0.350
Binzhou	0.261	0.116	0.164	0	0.887	0	0.674	0.300
Rizhao	0	0.462	0.305	0.344	0	0.772	0	0.269

<Table 7> 2007-2011 Potential of the Shandong Peninsula Blue Economic Zone

City	per capita GDP	FDI Growth	export/GDP ratio	R&D/GDP ratio	GDP growth	electricity usage	cell phone usage	potential index
Qingdao	0.395	0.121	0.291	1	0.636	1	0.756	0.599
Weihai	0.425	1	0.146	0.671	0.318	0.411	1	0.567
Dongying	1	0.282	0.088	0.427	0.136	0.212	0.626	0.365
Rizhao	0.047	0.161	1	0.514	1	0	0	0.389
Yantai	0.335	0.038	0.213	0.770	0.182	0.405	0.428	0.338
Binzhou	0.086	0.167	0.082	0	0.591	0.064	0.523	0.216
Weifang	0	0	0	0.466	0	0.328	0.466	0.180

<Table 9> Exponential Analysis of the Shandong Peninsula BEZ

City	2002-2006			2007-2011		
	FDI inflow performance index	FDIinward potential index	Evaluation	FDI inflow performance index	FDI inward potential index	Evaluation
Qindao	1.8527	0.663	front-runners	1.6764	0.599	front-runners
Yantai	1.4548	0.458	front-runners	1.0737	0.338	above-potential
Weihai	1.1761	0.587	front-runners	1.2240	0.567	front-runners
Weifang	0.7322	0.202	above-potential	0.5719	0.180	below-potential
Rizhao	0.4783	0269	under-performer	1.1532	0.369	above-potential
Binzhou	0.3542	0.300	under-performer	0.2865	0.167	below-potential
Dongying	0.2690	0.543	below-potential	0.3023	0.365	under-performer
Average	0.6881	0.431		0.8982	0.176	

Potential FDI inward statistical index, does not explain the FDI inward but the combination of the inflow region of the performance index and the FDI inward, FDI inward can be classified into four types as shown in <Table 8>.

<Table 8> Performance Index and Potential Index combination of four classifications

Performance Index	above-potential economies	front-runners
	under-performers	below-potential economies

Potential Index

Analyzing <Table 5>, <Table 6> and <Table 7>, <Table 9> and <Table 10> were created. As shown in <Table 9> and <Table 10>, Qingdao and Weihai are the leading cities with no changes, and Binzhou falls below average. Rizhao was below average from 2002 to 2006, but from 2007 to 2011, the city had the potential to exceed while Dongyingwent from low potential in 2002 to 2006, to low average in 2007-2011. Weifang went from potential to exceed to low potential and has a FDI lack of management.

<Table 10> 2002-2006 FDI city styles of BEZ

Performance Index	Weifang	Qingdao Yantai Weihai
	Binzhou Rizhao	Dongying

Potential Index

<Table 11> 2007-2011 FDI city styles of BEZ

Performance Index	Rizhao Yantai	Qingdao Weihai
	Binzhou Dongying	Weifang

Potential Index

4.2. Analysis of the Effects of FDI on the Import & Export of BEZ

As described earlier, the Vector Autoregressive Vector Auto-regression (VAR) model is used in most studies to analyze the effects of FDI in imports and exports. Nickell (1981) analysis was carried out

using the vector auto-regressive model with variables such as exports, imports and the FDI model on the basis of time-series stability of a unit root (Unit Root) test and Granger (Granger) cause and effect. The results of the analysis showed that the stimulatory effect of FDI in the export. Smagulova(2012), Li(2010) and Liu (2011) analyzed the effects of FDI in the import & export through the vector auto-regressive model. The results of the analysis showed the export industry as a substitution effect and the reciprocal effect.

Therefore, in this paper, in order to analyze the effect on the import & export FDI of Shandong Peninsula, BEZ we uesed the vector auto-regressive model and taking exchange rate factor into the equation as follows.

$$\ln(ex_{ti}) = c_i + \lambda_1 \ln(EX_t) + \lambda_2 \ln(FDI_{ti}) + \epsilon_{ti}$$
$$\ln(im_{ti}) = c_i + \lambda_1 \ln(EX_t) + \lambda_2 \ln(FDI_{ti}) + \epsilon_{ti}$$

In the equation above where the amount of the export is 'EX', 'EX' is the US/China exchange rate, 'im' the value of imports, 'FDI' is foreign investments, ϵ_t is random, i is the city, and t is the year.

In order to estimate the model, FDI exports and imports of the Shandong Peninsula BEZ data is needed. Variables such as FDI, the amount of exports and imports of materials are time series data. Thus, first, in order to test the stability of the variables unit root test using the Augmented Dickey-Fuller techniques was conducted. Second, if the unit root test results variables pass, using the OLS (Ordinary Least Square) regression technique, progress and regression analysis were done and if found unstable Cointegration (Cointegration) test was conducted in order to determine the long-term stable relationship of variables. Cointegration test, the causal relationships among variables technique was verified. On the other hand, if the Cointegration relationship between variables does not exist, Granger causality was assessed through a transition to stable variables.

The Eviews 6.0 program was used to analyze the stability of the parameters for the time-series variance ADF tests. As you can see from the <Table 12> results, the original time series seem to be unstable, but after the first round the differences were all stable.

Now let's see the model stability using cointegration techniques. The stability test for the model is the Engle-Granger (1987) cointegration technique. The EG cointegration techniques shows a stable process with a linear combination of two series and even if unstable, co-

integration can be generally expressed as two time series and the Xt and Yt, which have a cointegration relationship.

$$X_t = a + Y_t + u_t$$

The cointegration tests is just for testing time series Xt and Yt. The two variables verify a unit root in the estimated residuals from the co-integrating regression. If the unit root does not exist the theXt and Yt series will not cointegrate. The following equation is named the DF test which just used as regression analysis .

$$\widehat{Du_t} = \delta \widehat{u_{t-1}} + e_t$$

Here, if the e_t is statistically significantly less than zero, then co-integration occurs. DF test assumes that the first round parallax model is accurate. Therefore, the ADF verification from the DF regression analysis the white noise error (WHITE NOISE) is within the following equation.

$$\widehat{Du_t} = \delta \widehat{u_{t-1}} + \sum_{i=1}^{p} \theta_i \widehat{Du_{t-1}} + e_t$$

Here, the $\widehat{u_{t-1}}$'s θ is statistically significantly smaller if the co-integration relationship exists .

<Table 13> shows the results of the Granger cause test. In exports, the exchange rate at 5%, the export versus FDI versus exports, imports, currency exchange rates versus income versus FDI, rejects the hypothesis that the model is unstable and could not confirm the stability of the model in the FDI versus imports versus exports, the exchange rate, export success vs. failure.

<Table 13> Import & export Granger cause test

Hypothesis	Statistic	P value	Result
$\ln ex_t$ is not the $\ln EX_t$ Granger cause	1.4768	0.5575	O
$\ln EX_t$ is not the $\ln ex_t$ Granger cause	2.9937	0.0082	X
$\ln ex_t$ is not the $\ln FDI$ Granger cause	0.1973	0.8519	O
$\ln FDI$ is not the $\ln ex_t$ Granger cause	1.1151	0.0341	X
$\ln im_t$ is not the $\ln EX_t$ Granger cause	2.9937	0.3677	O
$\ln EX_t$ is not the $\ln im_t$ Granger cause	1.4768	0.0263	X
$\ln im_t$ is not the $\ln FDI$ Granger cause	1.1151	0.0188	X
$\ln FDI$ is not the $\ln im_t$ Granger cause	0.1973	0.0469	X

Using Eviews 6.0 program to analysis empirical results of impact of FDI on exports and are summarized as follows.

<Table 12> Export and import unit root ADF test

Variables	Statistic	test	Mackinnon Threshold			p value
$\ln FDI_t$	-2.173329	(c t 5)	-3.5899***	-2.0896**	-1.1742*	0.0000
$\ln EX_t$	-2.055996	(c t 2)	-4.7184***	-3.9738**	-2.0861*	0.0003
$\ln ex_t$	-3.217661	(c t 2)	-4.8870***	-3.8217**	-3.3556*	0.0000
$\ln im_t$	-3.287016	(c t 2)	-3.1759***	-2.6643**	-2.1964*	0.0000
$\Delta \ln FDI_t$	-7.173329	(c t 5)	-7.4622***	-5.7790**	-4.7859*	0.0002
$\Delta \ln EX_t$	-8.055996	(c t 2)	-6.5344***	-3.5932**	-3.4438*	0.0021
$\Delta \ln ex_t$	-4.217661	(c t 2)	-4.9691***	-4.0764**	-3.9014*	0.0000
$\Delta \ln im_t$	-5.287016	(c t 2)	-5.3885***	-4.5453**	-3.8577*	0.0035

$$\ln(ex_{ti}) = 0.147 - 0.702^*\ln(EX_t) + 1.327\ln(FDI_{ti})$$
$$(2.56^*) \qquad (-11.43^{**}) \qquad (0.27^{***})$$

R^2=0.678237	Adjusted R^2=0.664756
F statistic=172.443760	D.W.=1.7204397

Note: ( ) shows the t-statistic.
* shows 10% of significance.** shows 5% of significance. *** shows 1% of significance.

R^2 and the adjusted R^2 were greater than 0.6 in the above equation. Therefore, the explanatory power in the model is greater. D.W. value is 1.7204397. The FDI output elasticity indicates 1.327. 1% growth in FDI and the 'ex' of the Shandong Peninsula BEZ would growth 1.327% following. So the FDI to promote and influence the export of Shandong Peninsula BEZ was analyzed.

Empirical analysis of the impact of FDI on imports results are summarized as follows.

$$\ln(im_{ti}) = 0.652 + 0.172\ln(EX_t) + 1.829\ln(FDI_{ti})$$
$$(0.43^{**}) \qquad (2.83^{***}) \qquad (3.59^{**})$$

R^2=0.770636	Adjusted R^2=0.766075
F statistic=231.4492	D.W.=1.842185

Note: ( ) shows the t-statistic.
* shows 10% of significance.** shows 5% of significance. *** shows 1% of significance.

Because the R^2 and the adjusted R^2 were greater than 0.7 in the above equation, a greater explanatory power of the model can be seen.

With the D.W. value of 1.842185, there is no self-correlation in the model. If the FDI income elasticity increases by 1%, it means 'im' of the Shandong Peninsula BEZ growth would increase 1.829% following.

If we summarize the Granger causality analysis summary from before, the imports and exports and FDI of Shandong Peninsula, BEZ has a long-term equilibrium relationship. FDI can facilitate the development of the import & export. As exports increase, there is an increase influx of foreign raw materials and income is increased as technology is transferred. Thus it showed a match to the export induced effects theory explained previously.

Following the earlier analysis, the export elasticity income elasticity is 1.829 and 1.327, respectively. Therefore, it is able to explain that the impact of FDI on imports of Shandong Peninsula, BEZ is greater than the impact of FDI on the exports. When the major investor of the Shandong Peninsula BEZ, South Korea, provides capital, it is because the technology, the production of raw materials and knowledge is believed to be a massive influx.

5. Conclusion

In order to obtain a better understanding of the relationship between the economic growth of BEZ of Shandong Peninsula and FDI, a though analysis was conducted and the findings of analysis are listed below:

First, it is obliged to attract FDI in order to expand the scale of FDI utilization and to improve the rate of FDI utilization. The analysis results indicate that Qinqdao and Weihai don't change their positions as the Front-Runners, while Binzhou turns out to be the Under-Performer based on the analysis. Although Rizhao was the city of Under-Performer from 2002 to 2006, it becomes the city of Above-Potential Economics from 2007 to 2011. From 2002 to 2006, Dongying was the city of Below-Potential Economy; however, it has become the city of Under-Performer from 2007 to 2011. Weifang changes to the city of Below-Potential Economy from Above-Potential Economy. The research findings above suggest that it is of a great importance to understand how to utilize FDI by realizing its positive effects while eliminating its negative effects at the same time.

Second, based on the analysis, FDI exerted both positive and negative effects on the imports and exports of BEZ of Shandong Peninsula. In other words, the research findings are consistent with the research theories of Trade Generated and Inverse Trade Generated, put forward by Kojima and Mundell and other researchers, which are mentioned in the previous part of this paper. Moreover, research findings show that the long-term relationship between the imports and exports and BEZ's FDI of Shandong Peninsula has been balanced, and FDI has improved the development of imports and exports. The analysis results also show that if the volume of FDI increased, the raw materials from overseas would also increase, and the technology transfer would expand as well. It is obliged to utilize FDI well in order to increase exports.

Third, FDI has greatly improved the imports and exports of BEZ of Shandong Peninsula. According to the results of this empirical study, the optimization of local investment environment, and the scale expansion of FDI and fund-raising have contributed greatly to the accumulation of domestic capital of FDI and the optimization of industrial structure, which lead to the increase of imports and exports of FDI in the BEZ of Shandong Peninsula.

Based on the research findings of this paper, the practical implications are listed below:

First, for the development of the Shandong Peninsula, BEZ, the local government policy should support the domestic export enterprises. The government of each city of the Shandong Peninsula BEZ should raise the national brand through support by adjusting the corporate tax rate to a reasonable level so that you can recover the cost competitiveness of enterprises and that the effect of increasing exports by FDI does not lose discussion in industrial enhancement.

We should not just maintain the Shandong Provincial Government and sustained economic growth in order to actively encourage and attract the FDI but also problems in government policies should also be made aware. Without restrictions in the past, the attraction of foreign investment with a quantitative growth strategy is changing to a qualitative growth investment strategy that selectively attracts according to

the plan of the Shandong Peninsula BEZ.

Second, the competitive local business development and technology transfer requirements should be strengthened. The "Made in BEZ" image should be raised through at the same time to enhance the national image to ease the burden of the company's logistics through the expansion of the industrial infrastructure of the Shandong Peninsula BEZ. In addition, through the nurturing of the core parts industry, we should strive for the FDI simultaneously and rapidly progressing to the advancement of an independent industry with growth potential and expansion. Also, encourage innovation in regulatory and tax firm's investment and R&D, institutionalization, such as IT, finance, retail, and service industries through the development of competitive local companies needs to be strengthened.

Third, we will break from the foreign firms taking advantage of the cheap labor of labor-intensive manufacturing center and focus more aggressively in high-tech industries with high value-added and trade in services industries. Law alleviation and related institutions regarding FDI induced scientific and systematic investment plans also need to be considered. For the parent company to focus on applications and new technology items, composite technology items, design and brands, it is necessary to minimize the adverse effects of FDI according to the increase and raise the positive effects of FDI by the production system innovation -overseas production bases in China, such as the simple technology items, mass-produced items, items with high trade barriers.

In this study, there remains the unanalyzed limitations in the FDI amount in Shandong Peninsula BEZ's, using the simplest foreign companies, and the Shandong Peninsula, BEZ's major investors in import & export reciprocal effects.

To predict the direction of future development, it will be necessary that the future tasks' will be to analyze the regressive and regional differences within a period of 20 years (1992-2012) for further research or calculate the amount of Shandong Peninsula, BEZ's FDI and the amount of major investor's FDI. In addition, the national FDI data will be collected and analyzed for the reciprocal effects.

References

Aitken, B. and Harrison , A. (1999), "Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela", *The American Economic Review*, 89(3), 605-618.

Engle R. and Granger C.W. (1987) Cointegration and Error Correction: Representation, Estimate, and Testing, *Econometrica*, 55(2), 251 –276.

Helpman, E. (1984), "A simple theory of international trade with multinational corporations",*Journal of Political Economy*, 11(4), 92.

Helpman,, E. and Krugman, P. (1985), *Market Structure and International Trade*, MIT Press, Cambridge, 342

Hong, Seong-bae (1993), "Decomposition of Inflation Uncertainty and Effects of Various Uncertainties on the Real Macroeconomic Variables", Chonnam University Doctor Degree Paper, 56.

Hymer, S.H. (1976), *The International Operations of National Firms: A Study of Direct Foreign Investment*, MIT Press, Cambridge, 132.

Kiyoshi, K. (1978), *Direct Foreign Investment: A Japanese Model of Multi-National Business Operations*, Routledge Library Editions,39- 47.

Lee, Dong-hae (2012), "The effects of APEC on the intra-trade of members: An Empirical Study", in Proceedings of 2012 Winter International Conference of KODISA, 51-57.

Liu, Hongbin (2011), "How construct BEZ − Focus on Qingdao", *Review of Qingdao Development*, 11(4), 49-41.

Liu, Yongsheng (2010), "Study on ECIRM Model of BEZ", *Decisions for Shangdong,* 4(8), 122-125.

Mundell, R. (1967), "International Disequilibrium and Adjustment Progress", *Capital Movement and Economics Development*, 39(11), 112-118.

Nickell, Stephen (1981), "Biases in Dynamic Models with Fixed Effects, "*Econometrica and Econometric Society*, 49(6), 1417-26

Shandong Statistical Bureau (2011), *Statistical Yearbook of Shandong*, Jinan, China: China Business Publishing, 185-207.

Stephen, Jin (2002), "FDI in South America - data from 1980-2000", *Economics,* 38(7),129.

Smagulova, Sholpan and Mukasheva, Saltanat (2012), "The Contribution of Innovation Activity to the Output Growth of Emerging Economies: The Case of Kazakhstan", *Journal of Distribution Science*, 10(7), 33-41.

UNCTAD (2002), "Transnational Corporations and the Internationalization of R&D", World Investment Report, Geneva: United Nations.

UNCTAD (2006), "FDI from Developing and Transition Economies: Implications for Development", World Investment Report, Geneva: United Nations.

Zhai, Shuai (2012), "An Empirical Study on the Economic Effects of Foreign Direct Investment to Blue Economic Zone of Shandong Penisula in China", Deajeon Korea: Thesis for Doctorate in Woosong University.