

The Effectiveness of North Korea and South Koreas' Exchange on Multiple

Sources of South Korea's Economic Risk Analysis

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Abstract: This paper focuses on the importance of trade and personnel exchange between North and South Korea, substantiated by studies of Gaeseong Industrial Complex (GIC) and inter-Korean exchange on gross national product, composite stock price index, current account, and FDI (Foreign Direct Investment). In correlation analyses, it was revealed that the aggregate volume of inter-Korea exchange, personnel exchange, and admission of North Korean defectors had highly significant positive relationship with GDP and composite stock price index, current account and GDP per capita, the resulting values ranging from 0.600 to 0.933. In other words, it is evident that the support to North Korea including Gaeseong Industrial Complex brought an extremely positive effect on our GDP. The significance of this paper is in the fact that it analyzed the country risk of South Korea, and for the first time, exploiting a range of data and materials on inter-Korean exchange, empirically analyzed its correlation with various economic variables including GDP.

Key words: Inter-Korean exchange; GDP; foreign direct investment; North Korea Gaeseong industrial complex

JEL codes: C4, F2

1. Introduction

In February 2014, it was on the news everyday that there are disturbance in the Kim Jung Un regime. Toward the end of 2013, Kim Jung Un's execution of his uncle on charges of economic crimes including bribery was broadcasted around the world. Because Kim Jung Un is the third son of Kim Jong II, there have been many questions regarding his lineage, and not only Korea but US, Japan, Russia and China had been relentlessly monitoring movements of North Korea. From South Korean viewpoint, North Korea is a part of our nation, yet responsible for Korean War. South Korea is spending 35.7057 trillion won¹, about 10% of our national budget of

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357 trillion won, as national defense expenditure and preparing for war. This amount constitutes about 6 or 7 national defense expenditure in the world. If the Koreas are to reunite, significant portion o f national defense expenditure can be conserved. Many expert reports anticipate that after reunification and increased population up to 70 million, Korea will undergo rapid economic growth by combining inexpensive labor force of North Korea and advanced technology of South Korea. Especially, there was a report from Goldman Sachs explicating that according to economic growth, the GDP of South Korea will surpass that of Japan by the year 2029. Materials pertinent to inter-Korean exchanges are being collected and reported by Ministry of Unification. In fact, inter-Korean exchange began in 1974 with NIS, National Intelligence Service. Soon followed by presidents Daejung Kim and Moohyeon Noh, initiation of Gaeseong Industrial Complex (GIC), opening and closing of Geumgangsan tour, Warship Cheon'an shooting, bombing of Yeonpyeongdo and many other events influenced the relationship between North and South Korea.

This paper is to study the impact on GDP, composite stock price index, current account, and foreign direct investment, using materials provided by the government including the aggregate value of inter-Korea economic exchange, personnel exchange and immigration of North Korean defectors. The result reveals that inter-Korea exchange, personnel exchange and admission of North Korean defectors play critical roles in our economy. In correlation analyses, it was revealed that the aggregate value of inter-Korea exchange, personnel exchange, and admission of North Korean defectors had highly significant positive relationship with GDP and composite stock price index, current account and GDP per capita, the resulting values ranging from 0.600 to 0.933. Even though there was much criticism regarding our support to North Korea as being nothing more than a futile donation, it is shown that our support is actually bringing highly positive effect to our economy. The significance of this paper is in the fact that it analyzed the country risk of South Korean, and for the first time, exploiting a range of data and materials on inter-Korean exchange, empirically analyzed its correlation with various economic variables including GDP. As mentioned before, the main subject of this paper is correlation analysis between major economic variables including GDP and inter-Korea exchange and cooperation. In 2000's, there had been 2 (two) separate accounts, North Korean nuclear testing and bombing of Yeonpyeongdo, when a war was imminent on the Korean peninsula. The purpose of this study is to understand how much our unusual circumstance is influencing GDP, composite stock price index, current account balance, foreign exchange reserves and FDI. There are quite a lot of determinants of economic growth and FDI, but outstanding talents and infrastructure, high internet penetration rate, location cost, protection of intellectual property rights and technical maturity are considered some of advantages of South Korea.

On the other hand, high tax rate, dominant labor union, country risk, language barrier and foreign children education are some of the problems to economic growth and FDI. This paper is to understand the impact of country risk on various economic variables and vice versa. In general, the term country risk involves political stability, foreign exchange reserves and rate, interest rate differential (IRD), inflation rate, and GDP growth. Foreign investment can take one of the two forms, direct and indirect. FDI, foreign direct investment, refers to foreign corporations building plants in Korea and investing their capital and technology to produce goods and services, which creates jobs for us.

Indirect investment includes stock and bond investments. In other words, they do not build plants or

¹ National budget for 2014 was 357.7 trillion won, which was 4.6% increase from 2013. National defense expenditure was 35.7057 trillion won, which was 4% increase from 2013. Jan. 13, 2014, KookbangIlbo.

manufacture goods, but mainly make financial investments. Such type of investment more often than not triggers adverse criticism of "eat and run" as the investors invest, make profit and withdraw. Also, indirect investments tend to cause foreign exchange emergency as the investors make investment and withdrawal in short periods of time, especially during times of economic crisis. Unlike a direct investment which is stable and long-term basis, an indirect investment is temporary and profit-oriented venture. As such, all countries prefer direct investments rather than indirect ones. As shown before, direct investments hire our people and build plants on our soil. It is stable and long-term basis and play significant role in creating jobs. However, we are only successful in attracting 1% of all direct investments made worldwide every year.

2. Literary Research

In *Do We Really that the WTO Increase Trade*? Andrew K. Rose (2004) examines whether multinational trade expansions, in fact, expanded the entire international trading. He included both advanced and developing nations as well as WTO, GATT and GSP, using 50 years of panel data of 175 nations. In his paper, Rose discovered that, through trading, WTO and GATT played significant roles in welfare and GDP.

In his study, Significance of Business Environment on Making of Investment Decisions for Direct Investing Corporations: Centering on FDI Corporations in Chungcheongnamdo², Yeongseok Lee (2011) surveyed for determinants of investment decisions for FDI corporations who make investments in Chungcheongnamdo. In Determinants of Foreign Direct Investments of Eastern European Regime Change Nations and Their Implications on North Korea, Hanhee Lee (2013) analyzed the factors that influenced direct investments made by Eastern European nations and drew implications on North Korea. In Study of Strategic Countermeasure to Country Risk for Foreign Direct Investments, Gyuchang Lee and JunseokSeo examined on theoretical approach to country risk, strategic countermeasures and evaluation methods of financial institutions.

In Study of Designation of Free Economic Zones in North Korea for Revitalization of North and South Korean Economy, Taeho Kim scrutinized on method of fund delivery for free economic zones, improvement of national law and systems and efficient construction of promotion system, establishment of rational labor management system, attraction of foreign capital, and introduction of environmental friendly development approaches. In *Inter-Korea Economic Cooperation and How to Enter North Korea for SMEs*, Jaegi Lee indicated major tasks to achieve effective economic cooperation between the Koreas and approach for which SMEs to enter North Korea, in policy thesis format. In *Effect of South Korea's FDI on Exportation: Comparison between China and US*, Oigu Park and Namgi Chung focused on whether FDI would reduce or expand exportation.

In Prior Tasks of Korean Corporation to Enter Gaeseong Industrial Complex, Uicheon Jeon analyzed current status and economic effects of GIC and suggested prior tasks for Korean corporations such as progressive approach to entry, sufficient business feasibility study and system improvements for inter-Korea economic cooperation.

According to Gyuchang Kim, environmental risk analysis is performed by quantitatively analyzing the actual possibility of environmental risks and their influence on projects. He performed analysis by assigning <Extremely High>, <High>, <Low>, and <None>.

 $^{^2}$ In 2009, the proportion of exportation by FDI corporation is 12.7%, which for many corporations is higher than domestic demand. Lee claims that attraction of foreign investment facilitates stabilization of supply of foreign exchange, job creation, technology transfer, introduction of management techniques, and strengthening of domestic industries.

3. Model

In this paper, gravity model was employed to analyze the impact of inter-Korea trading on gross domestic product.

 $GDP = F(FDI \text{ volume, composite stock price index, current account balance, foreign exchange reserves, GDP per capita, national income, number of internet users, inter-Korea trading volume, inter-Korea personnel exchange, number of North Korean defectors) + Dummy variable$

In Y= β 0+ β 1InFdI+ β 2InKospi + β 3InProfit+ β 4InFor+ β 5InInter+ β 6InSNexch+ β 7InSNpeo+ β 8InSNpop + β 9InPergdp+ ϵ i

Y: GDP;

FdI: Volume of foreign direct investment;

Kospi: Composite stock price index;

Profit: Current account balance;

For: Foreign exchange reserves;

Pergdp: GDP per capita;

Inter: Number of internet users;

SNexch: Volume of inter-Korea trading;

SNpeoe: Inter-Korea personnel exchange;

SNpop: Number of North Korean defectors

In the equation above, there are probably dozens of factors influencing GDP. In this paper, total volume of inter-Korea exchange, personnel exchange, the number of defectors and others were added as variables and analyzed whether they are statistically significant with GDP. The sum of volume of trade between the two Koreas and production in GIC is mere 1.9 billion dollars, but it conveys a greater significance. Stable maintenance of inter-Korea trading prevents military collision and leads to reduced country risk, ultimately inducing FDI and increasing GDP.

The multiple regression analysis employed in this paper is as follows. If residuals ε t are correlated, they can be expressed in ARIMA model. The general form of multiple regression model with dependent variable Y and k number of independent variables including constant term 1 is as follows.

 $Yt = \beta 1 + \beta 2 X2 + \dots b.kX.k + \epsilon i^{3}$

In the equation above, Yt is a dependent variable, and X1t through Xk, *t* illustrate K number of explanatory variables. In other words, Yt is in primary functional causal relation with K number of explanatory variables.

Below is a basic model from macroeconomics.⁴ As shown, determinants of GDP include *Solow Economic Growth Model*. In Solow model, supply of goods depends on production function that relies on production, capital and labor force. In total supply and GNP model below, GNP consists of consumption, investment, government spending and net export, i.e., export minus import. In other words, export minus import is Korea's ordinary income and largely contributes to GNP. This is especially important for Korea as 82% of total GDP comes from import and export.

Y = C(Y-T)+I(r)+G+NX(e): IS market balance

M/P = L(I, Y) LM: Currency market balance

³ Junwoo Nam, Hansik Lee, Quantitative Economics, page 123, General Form of Multiple Regression Model.

⁴ Byeongrak Lee, *Macroeconomics* (7th ed.).

NXE= CF(r-r*) Foreign exchange market balance

i= r+E π Relation between real and nominal interest rates

 $\varepsilon = eP/P^*$ Relation between real and nominal exchange rates

 $Y = \hat{Y} + \alpha(P - EP)$ Aggregate supply

 $\hat{Y}=F(K, L^*E)$ Natural production output

 $\Delta k = sf(k) - (\delta + n + g)k$

Y: Production output

Ŷ: Natural production output

I: Nominal interest rate

r: Real interest rate

r*: World real interest rate

- y: GDP per capita
- ε: Real exchange rate

e: Nominal exchange rate

p: Price level

p*: World price level

E: Technological progress and labor efficiency

δ: Labor-argumenting technological progress

k: Efficient capital per worker

nk: Supply of capital to new worker

gk: Supply of capital to efficient worker by technological progress

Statistical evaluation method and model for the country risk of inter-Korea relations is as follows.

 $z=\!\beta^1 X 1 +\!\beta^2 X^2 \dots \beta^n X^n$

z: Discriminant

- β : Weight for each index
- X: Various indices

In the study by Gyuchang Kim, government and financial institutions of US gave scores in their discriminant analysis of country risks and divided countries into groups of good and bad. As shown in the discriminant function above, estimating discriminant assumed weight for each index as β . In country risk, there are political and economic elements. This paper is to analyze correlation with North Korea in terms of GDP, using materials of inter-Korea exchange. The most critical determinant of our country risk is very closely related to the tension between North Korea. There are also other problems including the gap between rich and poor, religion, rigidity of political power structure and corruption.

4. Data and Statistics

Data and materials used for the analysis are from Bank of Korea, Statistics Korea and Ministry of Unification, dating from 2000 to 2012. There are data and materials involving GDP, composite stock price index, foreign exchange reserves, and FDI from 1960s, but those involving inter-Korea exchange begin in 2000.

Table 1 illustrates that our GDP in 2000 was 603.236 trillion won and 1,272 trillion won in 2012, roughly increasing by 110.9%. The volume of FDI in 2000 was 15.2 billion dollars and 16.2 billion dollars in 2012, barely

making 6.6% growth.

Composite stock price index in 2000 was 734 points and 1,930 points in 2012, increasing by 162.9%. Foreign exchange reserve in 2000 was 96.1 billion dollars and 326.2 billion dollars in 2012, increasing by 239.4%. GDP per capita in 2000 was 12.77 million won and 25.59 million won in 2012, increasing by 100.4%. The total volume of inter-Korea exchange was 425.14 million dollars and 1,971.1 million dollars in 2012, rapidly increasing by 363.6%. As for personnel exchange between the Koreas, the number of 7,986 persons in 2000 and 123,360 in 2012, increasing by 54.8% .The number of defectors from North Korea increased by 58.6% from 947 in 2000 to 1,502 in 2012.

Year	GDP, KRW 100M	FDI, Million Dollars	KOSPI	Current Account Balance, Million Dollars	Foreign Exchange Reserve,1,000 Dollars	GDP per capita, KRW 10,000	Number of Internet Users, 10,000 Persons	Inter-Korea Exchange, 1,000 Dollars	Personnel Exchange, Persons	Number of North Korean Defectors, Persons
2000	6,032,360.00	15,256	734.22	14,802.90	96,198,117	1,277	1904	425,148	7,986	947
2001	6,514,153.00	11,286	572.80	8,428.10	102,821,378	1,372	2438	402,957	8,742	2013
2002	7,205,390.00	9,093	757.00	7,541.90	121,412,508	1,514	2627	641,730	13,877	1142
2003	7,671,137.00	6,469	679.80	15,584.30	155,352,365	1,604	2922	724,217	16,303	1285
2004	8,268,927.00	12,786	832.90	32,312.40	199,066,133	1,726	3158	697,040	26,534	1898
2005	8,652,409.00	11,563	1,073.60	18,606.50	210,390,703	1,796	3301	1,055,751	88,341	1384
2006	9,087,438.00	11,233	1,352.22	14,083.20	238,956,116	1,882	3491	1,349,740	101,708	2028
2007	9,750,130.00	10,509	1,712.46	21,769.70	262,224,070	2,010	3559	1,797,897	159,214	2554
2008	10,264,518.00	11,712	1,529.49	3,197.50	201,223,413	2,113	3619	1,820,366	186,775	2803
2009	10,650,368.00	11,484	1,429.04	32,790.50	269,994,736	2,175	3658	1,679,082	120,862	2914
2010	11,732,749.00	13,071	1,764.99	29,393.50	291,570,661	2,378	3701	1,912,249	130,251	2402
2011	12,351,605.00	13,673	1,983.42	26,068.20	306,402,488	2,488	3718	1,713,855	116,061	2706
2012	12,724,595.00	16,286	1,930.37	48,082.30	326,968,393	2,559	3812	1,971,105	123,360	1502

 Table 1
 GDP and Major Variables

Table 2 illustrates the transition of inter-Korean exchange. "Inflow" indicates items imported to South Korea from North Korea and 'Outflow' indicates items exported to North Korea from South Korea. Since the initiation of GIC in 2008, the inflow began to outgrow outflow. The operation of GIC was shortly discontinued on a few occasions following the bombing of Yeonpyeongdo and the episode of Warship Cheon'an, but the plants continued to operate. GIC is the touchstone of tension between the Koreas. Some degree of reconciliation is evident since the resumption of reunion of separated families in Feb. 2014, but it is still murky.

Major incidents between the Koreas are as follows. North and South Korea Summit in 2000, commencement of construction ceremony of GIC in 2003, the second North and South Korea Summit in October 2007, the shooting of Geumgangsan in July 2008, the second nuclear testing in May 2009, Warship Cheon'an incident in May 2010, long-range missile testing in May 2012, and the third nuclear testing in February 2012.

Direct investment made by South Korea was 16.2 billion dollars in 2012 and 13.6 billion dollars in 2011. In the past, investment made in 1999 and 2000 were fairly high at 15.5 billion and 15.2 billion dollars, respectively, due to the summits. It was the lowest in 2003 at 0.64 billion dollars. The amount increased a bit in 2004 to 12.7 billion dollars after holding commencement ceremony of construction of GIC. When nuclear testing took place in 2009, investment in manufacture decreased and increased by little in service section. We were conservative in

The Effectiveness of North Korea and South Koreas' Exchange on Multiple Sources of South Korea's Economic Risk Analysis

areas with difficult withdrawals such as manufacture, but less so in areas like services where withdrawal is relatively easier. The impact is more evident in terms of arrival amount. North Korea tested nuclear missile in 2009. Investment decreased rapidly by 20% compared to the year before. In 2000 and 2007 when the summits took place, FDI was more stable than other years. Especially in 2004 when GIC began its construction, the volume of FDI jumped up by 81%. However, as seen before, FDI only increased in service sections during the Myeongbak Lee administration as confrontations come to pass on Warship Cheon'an and in Yeonpyeongdo.

	(Unit: 1,000 Dollars)												
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Inflow	152,373	176,170	271,575	289,252	258,039	340,279	519,542	765,345	932,250	934,251	1,043,928	913,663	1,073,952
Outflow	272,775	226,787	370,155	434,965	439,001	715,472	830,198	1,032,552	888,117	744,830	868,321	800,192	897,153
Total	425,148	402,957	641,730	724,217	697,040	1,055,751	1,349,740	1,797,897	1,820,366	1,679,082	1,912,249	1,713,855	1,971,105

Note: * Real trade account balance is composed of general and processing trade volumes. Aids (private and government), construction of light water reactor, KEDO crude petroleum, and economic cooperative businesses including GIC, Geumgangsan, and social-cultural events are not included. Source: Ministry of Unification (Internal administrative documents)



Figure 1 Volume of Inter-Korea Exchange

Note: * Total Volume of Inter-Korea Exchange, *반입:Inflow

*반출:Outflow*계:Total*Country Index

Source: Ministry of Unification (Internal administrative documents)

Table 3 illustrates that visits from North Korea to South Korea decreases rapidly since 2008, and activation of GIC encouraged visits to North Korea since 2005.

	(Unit: Persons)													
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	-
Total From	7,986	8,742	13,877	16,303	26,534	88,341	101,708	159,214	186,775	120,862	130,251	116,061	123,360	-
South Korea From	7,280	8,551	12,825	15,280	26,213	87,028	100,838	158,170	186,443	120,616	130,119	116,047	120,360	
North Korea	706	191	1,052	1,023	321	1,313	870	1,044	332	246	132	14	0	

Table 3	Transition	of Inter-Korea	Personnel	Exchange
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Source: Ministry of Unification (Internal administrative documents)



Figure 2 Inter-Korea Personnel Exchange Note: *Visitors to Geumgangsan and Gaeseong not included *Personnel Exchange, *Visitors to GIC Source: Ministry of Unification (Internal administrative documents)

Since 2010 to the end of 2012, the volume of inter-Korea exchange steadily remains at 1.9 billion dollars, but this is an astonishing progress compared to 2009. This piece of information explains continued trading of SMEs in GIC even after most exchange activities have discontinued. Yearly account of exchanges in 2012 almost reaches 81,000.

The ground behind the rather static exchange volume is the mutual promise between the Koreas that under no circumstances, political or otherwise, should operation of GIC be discontinued. In 2013 under Geunhye Park administration, North Korea closed down GIC and completely ended all exchange activities. It was North Korea's means to discipline the Park administration early in its regime. However, the Park administration strongly fought back by shutting down GIC, and North Korea could not abandon the 100 million dollar profit from operating GIC. Soon, North Korea renounced and drew an agreement stipulating that under no circumstances should GIC be shut down. Economic exchange in GIC is lively. The total volume of trading in 1991 was 403 million dollars but increased to 1.056 billion dollars in 2005. It reached 1.808 billion dollars in 2008 in which GIC constitutes 808 million dollars, about 44% of the total volume. The financial crisis in 2007 that began from US real estate sector struck Korea by 2009. The volume of exchange stopped at 1.679 billion dollars. The number of exchange activities and items increased rapidly as well. There were 7,394 counts of exchange activities and 578 items in 2000, but they increased to 78,600 counts and 822 items by 2009 and 84,202 and 795 in 2010.

Hyundai Asan began Geumgangsan tour project in 1998, and Hyundai Asan and Korea Land Corporation began construction of GIC on June 2003. Companies began operations by December 2004. As larger SMEs began to enter GIC, the economic relationship between the Koreas hit a new stage. Currently, there are 123 companies operating in GIC. As we have seen so far, inter-Korea exchange transformed progressively from general trade and processing trade to direct investment. Inter-Korea exchange not only trades in commerce, but also trades in much

The Effectiveness of North Korea and South Koreas' Exchange on Multiple Sources of South Korea's Economic Risk Analysis

non-commercial fashion, including humanitarian support and socio-cultural cooperation.

In 2012, GIC was responsible for about 74% of all inter-Korea exchange. From 1991 to March 2011, the number of economic cooperative projects totaled at 546. Inter-Korea economic cooperative businesses have been deregulated since July 31, 2009, where projects valued at less than 500 thousand dollars were changed from approval system to declaration system. Inter-Korea economic cooperation began in 2004 after incoming of corporations. The number of declared cooperative projects in GIC was 17 in 2004 and continued to increase to 26 in 2005, 163 in 2006, and 291 now. Since the deregulation in 2009, there have been a total of 26 declarations in GIC alone. The number of approvals in social-cultural sector began at 2 from 1991 to 1996 to 1 in 1997 and 47 in 2005. As of March 2011, a total of 155 social-cultural cooperative projects have been approved. If we did not have economic cooperation in GIC, most of those efforts were probably lost to China. After discontinuation of Geumgangsan tour, North Korea granted China to resume the tour on behalf of Hyundai Asan. Also, North Korea is cultivating a new tour and travel product where visitors can drive into North Korea on land from China. If it wasn't for the efforts and struggles of our SMEs in GIC, most of North Korean economy would be under Chinese control. The ground for inter-Korea economic cooperation is just that. Expansion of economic cooperation mitigates military tension and prevents conflicts. According to the 2008 statements made by Korea Resources Corporation and Goldman Sachs, mineral resources in North Korea may worth up to 3 quadrillion dollars. The quantity of underground resources in North Korea is truly remarkable, and if we can link them with our economic infrastructure, the synergy effect will be immeasurable As we have seen so far, inter-Korea exchange transformed progressively from general trade and processing trade to direct investment. Inter-Korea exchange not only trades in commerce, but also trades in much non-commercial fashion, including humanitarian support and socio-cultural cooperation. In 2012, GIC was responsible for about 74% of all inter-Korea exchange. From 1991 to March 2011, the number of economic cooperative projects totaled at 546. Inter-Korea economic cooperative businesses have been deregulated since July 31, 2009, where projects valued at less than 500 thousand dollars were changed from approval system to declaration system. Inter-Korea economic cooperation began in 2004 after incoming of corporations. The number of declared cooperative projects in GIC was 17 in 2004 and continued to increase to 26 in 2005, 163 in 2006, and 291 now. Since the deregulation in 2009, there have been a total of 26 declarations in GIC alone. The number of approvals in social-cultural sector began at 2 from 1991 to 1996 to 1 in 1997 and 47 in 2005. As of March 2011, a total of 155 social-cultural cooperative projects have been approved. With the synergy effect from our economic cooperation, our GDP per capita should reach US\$30,000 before the 2018 Pyeongchang Winter Olympics. Goldman Sachs had announced that a combination of strong economic infrastructure from South Korea and inexpensive labor force from North Korea allow Korea to leap to the domain of advanced nations. Another prospect puts Korea ahead of Japan in 20 years. Even with such bright forecasts, SMEs in GIC are suffering due to a range of political problems, especially after the incidents of Warship Cheon'an and Yeonpycongdo when GIC operation nearly terminated. However, since 2014, there is more vitality in the SMEs in GIC. This paper carries out correlation analysis among the economic variables such as GDP and current account balance and inter-Korea exchange including the SMEs in GIC, the last resolve of our economic exchange and cooperation.

Table 4 illustrates summary of max, min and average values and standard deviation of each major variable. The average value for GNP is 930 trillion dollars. The average FDI is 11.8 billion dollars with max value of 16.286 billion dollars.

The Effectiveness of North Korea and South Koreas' Exchange on Multiple Sources of South Korea's Economic Risk Analysis

	Table 4 Summarized Statistics										
	Min.	Max.	Avg.	Std. Deviation							
GNP, KRW 100M	6032360	12724595	9300444.54	2177947.877							
FDI, USD 1M	6469	16286	11878.54	2520.702							
KOSPI	572.80	1983.42	1257.8700	508.06833							
Current Account Balance, USD 1M	3197.5	48082.3	20973.923	12498.5509							
Foreign Exchange Reserve, USD1000	96198117	326968393	214044698.54	77486711.318							
GDP per capita, KRW10,000	1277	2559	1914.92	416.698							
Number of Internet Users, 10,000 Persons	1904.0	3812.0	3223.692	589.0173							
Inter-Korea Exchange, USD 1,000	402957	1971105	1245472.08	604209.489							
Personnel Exchange, Persons	7986	186775	84616.46	62494.505							
Number of Defectors, Persons	947.0	2914.0	1967.538	672.5869							

Table 5 illustrates medians and modes of GNP and other major variables. The table displays median, mode, min and max values from 2000 to 2012. The max values for inter-Korea exchange surpassed 1.9 billion dollars and personnel exchange 180,000 persons. The median and max value for number of North Korean defectors are 2013 and 2914 persons, respectively. In other words, there are over 2,000 North Koreans admitted into South Korea every year.

Table 5 Frequency Analysi	Table 5	Frequency	Analys
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	GNP, KRW 100M	FDI, USD 1M	KOSPI	Current Account Balance, USD 1M	Foreign Exchange Reserve, USD1,000	GDP per capita, KRW10,000	Number of Internet Users, 10,000 Persons	Inter-Korea Exchange, USD 1,000	Personnel Exchange, Persons	Number of Defectors, Persons
Median	9087438.00	11563.00	1352.2200	18606.500	210390703.00	1882.00	3491.000	1349740.00	101708.00	2013.000
Mode	6032360a	6469a	572.80a	3197.5a	96198117a	1277a	1904.0a	402957a	7986a	947.0a
Min Value	6032360	6469	572.80	3197.5	96198117	1277	1904.0	402957	7986	947.0
Max Value	12724595	16286	1983.42	48082.3	326968393	2559	3812.0	1971105	186775	2914.0

Note: a. The smallest mode values are illustrated in the table.

Because of the political and military reasons including incidents involving Warship Cheon'an and bombing of Yeonpyeongdo, inter-Korea exchange activities were stalled in 2010 and 2011. Even in this hardship, exchange activities persisted by our SMEs in GIC. Since Kim Jung II's visit, China expanded mutual economic cooperation by designating free economic zones along the Tumen and Abrok River. However, the relationship between North Korea and China became disdainful since the execution of Seongtaek Jang 2014.

5. Result of Empirical Analysis

Table 6 below illustrates coefficient of regression, standard deviation and p-value. As shown, GDP per capita has statistically positive correlation with GNP.

The correlation coefficients in Table 8 illustrate that for GNP, the volume of inter-Korea exchange, personnel exchange, composite stock price index, foreign exchange reserve, GDP per capita and number of internet users statistically significant at $p \le 0.01\%$. The number of North Korean defectors is statistically significant at $p \le 0.05\%$.

				Table 0	Regress		nysis Result				
м	odel	Nonstandardized Coefficient		Standardize Coefficient	dt	n Valua	B 95 Confiden	.0% ce Level	Coeff	icient of Cor	relation
IVI	oder	B Std. Dev. Beta		Beta	Beta		Min	Max	No Correlation	Partial Correlation	Part Correlation
	(Constant)	-509700.360	217118.879	1	-2.348	0.101	-1200669.532	181268.813	ł		
	FDI, USD 1M	-1.009	8.606	-0.001	-0.117	0.914	-28.398	26.379	0.407	-0.068	0.000
	KOSPI	-91.264	184.703	-0.021	-0.494	0.655	-679.072	496.545	0.949	-0.274	-0.002
	Current Account Balance, USD 1M	-1.594	2.809	-0.009	-0.567	0.610	-10.534	7.346	0.647	-0.311	-0.002
	Foreign Exchange Reserve, USD1000	0.001	0.001	0.042	0.834	0.465	-0.003	0.006	0.958	0.434	0.003
1	GDP per capita, KRW10,000	5495.467	186.619	1.051	29.447	0.000	4901.561	6089.373	1.000	0.998	0.119
	Number of Internet Users, 10,000 Persons	-243.910	148.775	-0.066	-1.639	0.200	-717.379	229.558	80.910	-0.687	-0.007
	Inter-Korea Exchange, USD 1,000	-0.018	0.162	-0.005	-0.113	0.917	-0.533	0.496	0.933	-0.065	0.000
	Personnel Exchange, Persons	-0.023	1.264	-0.001	-0.019	0.986	-4.046	3.999	0.793	-0.011	0.000
	Number of Defectors, Persons	3.399	20.623	0.001	0.165	0.880	-62.234	69.032	2 0.600	0.095	0.001

Table 6 Regression Analysis Result

Note: a. Dependent Variable: GNP

Table 7 Model Summary b

Model	D	R2	Modified	Std Day			Durbin Watson			
	ĸ		R2	Sid. Dev.	R2	F	df1	df2	p-Value	Durom-watson
1	1.000a	1.000	1.000	30487.396	1.000	6804.117	9	3	0.000	2.448

Note: a. Predicted Value: (Constant), number of North Korean defectors, FDI in million dollars, current account balance in million dollars, number of personnel exchange, GDP per capita in 10,000 won, number of internet users in 10,000 persons, KOSPI, inter-Korea exchange in 1,000 dollars, and foreign exchange reserve in 1,000 dollars. b. Dependent Variable: GNP in 100 million won.

Closely examining the correlation coefficients reveals that GNP has extremely high correlation with the volume of inter-Korea exchange at 0.933. The total volume of exchange in Korean won is 2.1681 trillion won in 2012, which is 0.2% of GNP of the same year, but correlation is extremely high. The coefficient of correlation between GNP and the number of defectors is significant with value of 0.600 and p-value of 0.03%. The three variables pertaining to inter-Korea exchange have extremely high correlation with major economic variables.

As for FDI, the three variables of inter-Korea exchange were not influential. The correlation between FDI and exchange is moderately high at 0.303, but not statistically significant. The total volume of exchange had extremely high correlation with GNP, KOSPI, foreign exchange reserve, GDP per capita, number of internet users, personnel exchange and number of defectors and statistically significant. In other words, as the volume of exchange increases, personnel exchange and number of defectors increase.

Inter-Korea personnel exchange also displayed high correlation to GNP, KOSPI, foreign exchange reserve, GDP per capita, number of internet users personnel exchange and number of defectors and statistically significant.

Correlation analysis between the number of defectors and other economic variables displays a discernible linear relationship. No statistical significance was found with FDI. It appears that FDI is determined not by economic variable, but human resource, labor-management system, and international credit rating.

Composite stock price index also displayed high correlation to GNP, KOSPI, foreign exchange reserve, GDP

per capita, number of internet users personnel exchange and number of defectors and statistically significant. In other words, as the volume of exchange increases, economy stabilizes and stock prices go up.

According to Social Science Research Method and Analysis, absolute values of coefficient of correlation below 0.1 are considered as having no correlation, and therefore, can be neglected. Those between 0.1 and 0.3 are considered as having low correlation, and high correlation if the values are between 0.3 and 0.7.

		GNP, KRW 100M	GNP, KRW 100M	KOSPI	Current Account Balance, USD 1M	Foreign Exchange Reserve, USD 1,000	GDP per capita, KRW 10,000	Number of Internet Users	Inter-Korea Exchange, USD 1,000	Personnel Exchange, Persons	Number of North Korean Defectors
GNP, KRW	Pearson Correlation Coefficient	1	0.407	0.949**	0.647*	0.958**	1.000**	0.910**	0.933**	0.793**	0.600*
100M	p-Value (two-tailed)		0.167	0.000	0.017	0.000	0.000	0.000	0.000	0.001	0.030
GNP, KRW	Pearson Correlation Coefficient		1	0.449	0.541	0.378	0.397	0.135	0.303	0.231	0.053
100M	p-Value (two-tailed)			0.123	0.056	0.203	0.179	0.661	0.314	0.448	0.864
KOSPI	Pearson Correlation Coefficient			1	0.530	0.927**	0.949**	0.855**	0.960**	0.873**	0.623*
	p-Value (two-tailed)				0.062	0.000	0.000	0.000	0.000	0.000	0.023
Current Account	Pearson Correlation Coefficient				1	0.728**	0.641*	0.518	0.475	0.237	0.122
Balance, USD 1M	p-Value (two-tailed)					0.005	0.018	0.070	0.101	0.435	0.692
Foreign Exchange Reserve, USD 1 000	Pearson Correlation Coefficient					1	0.959**	0.927**	0.906**	0.765**	0.570*
	p-Value (two-tailed)						0.000	0.000	0.000	0.002	0.042
GDP per capita,	Pearson Correlation Coefficient						1	0.917**	0.937**	0.802**	0.607*
10,000	p-Value (two-tailed)							0.000	0.000	0.001	0.028
Number of Internet	Pearson Correlation Coefficient							1	0.911**	0.846**	0.678*
Users	p-Value (two-tailed)								0.000	0.000	0.011
Inter-Kor ea Exchange	Pearson Correlation Coefficient								1	0.942**	0.681*
, USD 1,000	p-Value (two-tailed)									0.000	0.010
Personnel Exchange	Pearson Correlation Coefficient									1	0.736**
Exchange ,Persons	p-Value (two-tailed)										0.004
Number of North Korean	Pearson Correlation Coefficient										1
Defectors	p-Value (two-tailed)										

Table 8	Correlation	Coefficient
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Note: **. Coefficient of correlation is significant with two-tailed p-value of 0.01.

*. Coefficient of correlation is significant with two-tailed p-value of 0.05.

Based on this information, the value of 0.933 displays extremely high correlation, and therefore, it can be assumed that the three major economic variables including the volume of inter-Korea exchange have strong correlation with GNP.

The correlation between the transition of inter-Korea personnel exchange and major variables including GNP came out to be 0.793~0.873. It can be interpreted that they have a strong linear relationship. In other words, increased personnel exchange diminishes country risks for both Koreas, and therefore, increases GNP.

The correlation between the number of North Korean defectors and major variables came out to be 0.600-0.736. It can be interpreted as having a strong positive and linear relationship. As the total volume of exchange increases, FDI also increases. Based on these findings, it is absolutely necessary for the Koreas to reconcile including the affairs in GIC. In early 2000's, many SMEs moved to the vicinity of the city of Paju as it accommodated LG Philips plant. The fact that a major foreign corporation built a plant in close proximity to North Korea contributed largely to alleviating tension between the Koreas. If the risk seemed too great, Philips would have never built its plant in that area. A direct investment of foreign corporation indicates lower country risk. In January 2014, President Park gave a speech which included a request for increased direct investments as she will promote optimal business environment. As seen here, FDI leads to job creation, introduction of advanced management techniques, and strengthened competitiveness of all domestic industries.

6. Conclusion

In conclusion, the total volume of inter-Korea economic and personnel exchanges significantly influences major economic variables including GNP. First, the correlation coefficient between inter-Korea economic and GNP was 0.933, displaying strong correlation. Second, the correlation coefficient between GNP and inter-Korea personnel exchange was 0.793, also displaying strong positive and linear relationship. Third, the correlation coefficient between GNP and the number of defectors was 0.600, displaying moderate positive and linear relationship.

As the country risk of South Korea increased due to North Korea's nuclear testing and other affairs, our GNP and major economic variables took hits. The significance of this paper is in the fact that it analyzed the country risk of South Korean, and for the first time, exploiting a range of data and materials on inter-Korean exchange, empirically analyzed its correlation with various economic variables including GDP. US, China, and Korea are keenly communicating with regard to possible sudden changes in North Korea. Many factors influence the increase and decrease of GNP and current account balance. Among them, inter-Korea exchange is a significant determinant that can exhibit country risk of South Korea. Kim Jung Un's execution of his uncle triggered much talk concerning the uncertainty of his regime and reunification of Korea. Also, in January 2014, President Park openly requested foreign direct investments. The subject of this paper is to analyze the impact of the transition of volume of inter-Korea economic cooperation, personnel exchange and trading volume have on GNP, current account balance, and FDI.

For us, inter-Korea exchange has not been profitable. However, we must expand the exchange because it contributes to expansion of FDI. The exchange does have some economic merits to our GNP, but it is more significant as it decreases geological risk and contribute to FDI. Due to our limited land, we must fully exploit our outstanding resources including telecommunication and internet. Our internet and mobile device penetration rates are most advanced in the world. This is why many worldwide corporations are releasing their products including

electronics, medicine and films, first in Korea to study consumer reaction. We are a "test bed" for corporations worldwide. Because of this reason, Microsoft and other international corporations are building research centers in Korea. We must exploit this opportunity to the fullest and actively attract foreign investments. Our government needs to deregulate on foreign investments and provide land and financial aids. In the summer of 2012, US President Obama personally participated in the commencement of construction ceremony of LG Chemicals plant in the US. He proudly said, "Even though LG Chemicals is a Korean company, it builds its factory in the US, creating jobs for the American people, and manufactures hybrid car batteries, the core component of next generation automobiles". He also mentioned that, "Because LG Chemicals builds electric car batteries that are part of green industry and next generation growth industry, LG Chemicals can have a confidence of an US company". US provided LG Chemical with land free of charge and also promised to compensate for any incurred losses. The reason why US is in first place in world trade and economy is because they are in first place in attracting FDI with their aggressive strategy.

We must also aggressively attract foreign investments by cutting taxes, providing land, supporting labor-management relations, building international schools and other strategic attraction tactics. Again, unlike indirect investments, FDI is extremely beneficial as it creates jobs. Therefore, the government must be directly involved in attracting more direct investments. As of February 2014, world economy has recovered from the deep impact of subprime mortgage crisis that began in the US. Lehman Brothers declared bankruptcy in 2008 and Merrill Lynch was bought by Bank of America at USD 50 billion. The quantitative easing by the US brought prosperity to world economy, but tapering in 2014 shaking the financial markets around the world. Considering the Koreas' unusual circumstances, our volume of exchange is small, but significant. The recent reunion of separated families and stable operation of GIC is tremendously positive occurrence. Exchange with North Korea is not significant as an economic activity, but exhibits our political stability. The significance of this paper lies in empirically analyzing inter-Korea exchange and its impact not only on our GNP, but also on financial market, FDI and the entire sphere of economics.

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