

Initial Conditions, Economic Performance, and Reform Prospects in North Korea

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This study aims to predict the possible changes in the North Korean economic system by examining 27 countries that have experienced economic transition since 1990. This study divides the 27 transition countries into three groups (*i.e.*, outstanding, fine, and poor transition) through discriminant analysis based on the outcomes of economic reforms over the past two decades. The discriminant analysis reveals that North Korea can be classified into the poor transition group and is likely to follow the pattern of the Commonwealth of Independent States. Pyongyang must realize that transition from its rigid socialist economy to a market economy is the only way to escape from poverty.

Keywords: North Korea (DPRK), Economic transition

JEL Classification: F59, P20

I. Introduction

North Korea is one of the weakest and most vulnerable economies in the world. Famine, poverty, and economic decline have gripped North Korea; thus, its situation is likely to deteriorate. To escape from poverty,

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Kim Jong-un has greatly emphasized the revitalization of the moribund economy. In his first speech as the nation's leader in April 2012, he insisted that he "would ensure that North Koreans would never have to tighten their belts again."¹ Since then, North Korean official media have repeatedly announced that the country will be concentrating on strengthening the economy in addition to its military capability. Thus, whether the new economic measures will bring about positive changes in North Korea has received much interest. However, the previous decade suggests that the economic policies of the country bear many startling resemblances to the reform policies of past socialist countries. An economic reform experiment in 2002 failed because of a crackdown on markets when market and trading activities expanded and boomed. Since then, however, markets have expanded spontaneously even under the control of North Korean authorities. Nearly 83% of the North Korean population are involved in household economic activities mainly related to raising vegetables, livestock, or poultry.² This rate of participation in household economic activities can be deemed the same, or similar at least, as that in informal economic activities. Advances in marketization will weaken the state control of North Korean authorities. In addition, the spread of markets suggests the high possibility of transition to a market economy, which occurred previously in socialist states in Eastern Europe and China. Predicting the transition of North Korea to a market economy might still be premature. However, considering the economic situation and the expansion of the informal economy, the country is placed in an abnormal situation where a planned economy and markets coexist. Thus, marketization in North Korea is inevitable.

The future of the economy of North Korea is difficult to predict and therefore presents South Korea and its neighboring countries with unknown problems. Even if we disregard the necessity of North Korean economic reform itself, the troubled economy of North Korea is as much an object of concern of neighboring countries as its nuclear weapons program. Thus, how the North Korean economy will develop and what

¹The New York Times, Available at: <http://www.nytimes.com/2012/09/06/world/asia/north-korea-may-be-preparing-economic-reforms.html?r=0>, accessed 28 April 2013.

²Jeong, H. G., *et al.* (2012), The Current Situation of Marketization in North Korea and Prospects for Changes in Its Economic System. (in Korean) Korea Institute for International Economic Policy. Kim and Song (2008) observe that North Korea has a large informal economy and that 78% of the total income of North Korean households comes from informal economic activities.

direction the autocratic, poor, and isolated country takes are two of the most important issues faced by the neighbors of North Korea.

The development of the North Korean economy depends on the initial conditions of the economy because such conditions influence economic development during reform. Growth rate and economic performance depend on the inherited conditions of a country and on the transition process (Stiglitz 1999; Falcetti, Raiser, and Sanfey 2002). However, although such initial conditions are critical, their influence on economic performance diminishes rapidly over time (De Melo *et al.* 1997; Berg *et al.* 1999). To achieve economic growth, market reform should be implemented while maintaining macroeconomic stability. Initial conditions more significantly influence the determination of the severity of output decline than policy choice; the effects of initial conditions on variations in performance have a long half-life of perhaps a decade (Krueger and Ciolko 1998). Given that transition policies are insignificant factors in the severity of the decline in output during the early years of transition, initial conditions “affect both reform and growth in transition countries even after almost two decades since the transition process started” (Cerovic and Nojkovic 2009).

This study aims to predict the possible changes in the North Korean economy under the Kim Jong-un regime by examining 27 countries that have experienced economic transition since 1990 and by analyzing their initial economic conditions and course of reform. Discriminant analysis will be performed to classify these countries into three transition groups according to their initial economic conditions and economic performance since their transition into market economy to determine to which group North Korea is likely to belong. Analysis of the similarities and differences among the three transition groups will allow constructive predictions regarding the future of the economic system and performance of North Korea.

II. Research methodology and data analysis

A. Methodology

This study uses the statistical methods developed by R. A. Fisher to perform discriminant analysis, which predicts the placement of an observation within a group of samples. Twenty-seven countries are classified into three groups according to the outcome of their transitions, namely, outstanding, fine, and poor transition. Data on the countries

are then compared with the conditions of North Korea to identify the group that best predicts the future economic reform of the country. The average discriminant scores for each of the 27 countries will be analyzed for statistical significance to produce discriminant functions that predict the results of the reform of North Korea.³

A discriminant function, a linear combination of independent variables, is expressed to maximize between-group variance and minimize within-group variance, as follows:

$$Z = W_1X_1 + W_2X_2 + \cdots + W_pX_p, \quad (1)$$

where Z is the discriminant score, W_i is the weight, and X_i is an independent variable. Once the discriminant function is computed for the 27 sample countries, a discriminant score for each observation within the groups can be calculated to obtain the average discriminant score or centroid of each group.

B. Data

The dependent variables are the GDP of the 27 countries from the year when their economic transition began in the early 1990s to 2010. UN statistical data are used to determine the economic performance of the countries, and the transition indicator developed by the European Bank for Reconstruction and Development (EBRD)⁴ is used to determine the extent of reform in each country. This indicator is considered because the results of reform cannot be measured by GDP growth alone and without assessing the degree of policy reform.⁵

However, this study focuses on the economic conditions before the transition (*i.e.*, initial economic conditions). Although the timeliness and effectiveness of transition policy certainly affect economic performance

³ Discriminant analysis compares the known outcomes of a sample and draws similarities and dissimilarities. On the basis of such findings, discriminant analysis predicts an unknown outcome.

⁴ EBRD continues to update transition indicators by sector, but has not updated these indicators by country since 2009. Therefore, this study uses 2009 data.

⁵ Fischer, Sahay, and Vegh (1996), Fischer and Sashay (2000), and Falcetti, Raiser, and Sanfey (2002) stress the importance of policies that aid stabilization during transition. The International Monetary Fund (2000) reports that countries with low inflation rates have high growth rates and that those with great progress in economic reform have high economic growth.

in the transition process, the initial economic conditions considerably affect economic performance during the transition because these conditions determine the speed, scope, and direction of the transition. In the case of North Korea, its economic situation serves as the basis for the direction of its future economic reform. Although the effect of these initial conditions will be temporary and will decrease as the transition begins and economic policies take effect,⁶ these conditions more significantly affect the economic outcome of transition countries than any positive changes in their economic policies during the early stage of transition (Lee and Jeong 2006).

Based on these findings, this study performs a discriminant analysis of the initial economic conditions of transition countries. The criteria for categorizing the transition countries are as follows. First, outstanding transition countries have transition indicator values of 3.5 or higher and a GDP growth rate of 300% or higher in the year the economic reform took place (reform year). Second, fine transition countries have transition indicator values of 3.0 or higher and a GDP growth rate of 300% or higher in the reform year. Lastly, poor transition countries have transition indicator values lower than 3.0.

The independent or discriminant variables consist of the initial conditions of the countries when market reforms were first implemented. These conditions include GDP per capita (PPP), the share of informal economy (IE), the black market exchange rate premium (BMP), growth rates before transition, Council for Mutual Economic Assistance (CMEA) trade dependency (TD), repressed inflation (RI), urbanization ratio (UR), duration of planned economy (DPE), and the share of the industrial sector (SI). Many of these variables are used by De Melo *et al.* (1997) to explain the economic performance of transition countries.

Before discriminant analysis, the independent variables should be checked to verify if they have a multivariate normal distribution to minimize discrimination error. The population distributions for each subgroup should also be examined to confirm if they share a covariance matrix. Afterward, the dependent variables (discriminant variables) are linearly combined to determine the criteria for the country groupings and to determine the level of accuracy of the discrimination. Finally, the condi-

⁶ Many scholars, including De Melo *et al.* (1997) and Berg *et al.* (1999), who emphasize the importance of initial conditions find that these conditions are an important deciding factor in economic performance during the transition period, although their effect decreases over time.

TABLE 1
EIGENVALUES

Function	Eigenvalue	Dispersion Ratio (in %)	Dispersion Ratio, Accumulated (in %)	Canonical Correlation
1	4.481 ^a	83.7	83.7	0.904
2	0.870 ^a	16.3	100.0	0.682

Note: a. First two discriminant functions used in analysis.

tions of North Korea are applied to the discriminant variables and functions to determine the group that makes the best prediction for North Korea.

C. Data Analysis and Results

In Table 1, the ratio between the eigenvalues of each function refers to the variance explained by each function. The first and second variables have explaining power of 87.3% and 16.3%, respectively. Canonical correlation measures the relationship between the grouping and discriminant function such that the closer to 1 the canonical correlation, the greater the explanatory power of the discriminant function. Given that the canonical correlation coefficients of the first and second discriminant functions are 0.904 and 0.682, respectively, the first function has greater explanatory power than the second function.

The significance of residuals from the functions should be tested to check if any additional discriminant function is necessary. If the result is significant, another function should be added; otherwise, no additional functions are necessary. Before the discriminant functions are derived, the chi-square is 46.540, and the significance (p-value) is 0.000 (Table 2). This result is lower than the significance level (α) of 0.05. Therefore, the null hypothesis that the residuals are not statistically significant at the 5% level is rejected, indicating the need for an additional function. After the first discriminant function is derived, the chi-square is 12.515, and the significance is 0.130. Thus, the null hypothesis that the residuals are not statistically significant at the 5% level is accepted.

Table 3 shows the standardized canonical discriminant function coefficients, which can be expressed as discriminant functions. The magnitude of these coefficients indicates their relative effect on the discriminant function.

Pooled within-groups correlations between discriminating variables and

TABLE 2
WILKS' LAMBDA

Test of Functions	Wilks' Lambda	Chi-Square	Df	Sig.
1 to 2	0.098	46.540	18	0.000
2	0.535	12.515	8	0.130

TABLE 3
STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	Coefficients	
	1	2
Per capita GNP before reform (Per capita GNP)	0.384	1.656
Black market premium (BMP)	2.664	-1.630
Average growth rate before reform (AG)	0.206	0.056
CMEA trade dependency (TD)	1.488	1.480
Repressed inflation (RI)	-2.923	0.715
Urbanization rate (UR)	0.644	-1.982
Duration of planned economy (DPE)	-2.313	0.226
Share of industry (SI)	1.096	0.208
Informal economy (IE)	0.988	0.250

TABLE 4
STRUCTURE MATRIX

	Function	
	1	2
Duration of planned economy (DPE)	-0.260*	0.140
Repressed inflation (RI)	-0.251*	0.224
Per capita GNP before transition (Per capita GNP)	0.182*	0.006
Informal economy (IE)	-0.180*	0.114
Share of industry (SI)	0.102*	-0.080
Trade dependency (TD)	-0.027	0.369*
Urbanization rate (UR)	0.120	-0.275
Average growth rate before transition (AG)	0.049	0.274*
Black market premium	-0.145	0.197*

standardized canonical discriminant functions. Variables ordered by absolute size of correlation within functions. Highest absolute correlation between each variable and any discriminant function.

Table 4 shows the correlation between the observed variables and discriminant functions. The correlation indicates the contribution of

TABLE 5
CLASSIFICATION FUNCTION COEFFICIENT

	Assessment of Transition		
	Outstanding (X)	Fine (Y)	Poor (Z)
Per capita GNP before transition (Per capita GNP)	0.002	0.000	0.002
Black market premium (BMP)	0.043	0.031	0.027
Average growth rate before transition (AG)	-1.315	-1.780	-1.680
CMEA trade dependency (TD)	2.560	1.856	2.179
Repressed inflation (RI)	-3.795	-2.611	-2.573
Urbanization rate (UR)	0.457	0.444	0.163
Duration of planned economy (DPE)	-2.520	-1.760	-1.795
Share of industry (SI)	10.264	8.528	8.840
Informal economy (IE)	3.544	2.597	2.792
(Constant)	-197.098	-142.144	-149.335

Fisher's linear discriminant functions

each variable and its relative importance to the function. The variables with the greatest effect on the first discriminant function were, in decreasing order, DPE, RI, per capita GNP, IE, and SI. The variables with the greatest effect on the second discriminant function were, in decreasing order, TD, UR, per capita GNP, and BMP.

Table 5 shows Fisher's linear discriminant functions, which determine the discriminant score of each group. Fisher's classification functions are derived from a discriminant analysis of the initial economic conditions of the 27 transition countries to categorize North Korea's variables. Thus, the discriminant functions are obtained by calculating the discriminant variables, and the classification functions indicated below are derived by calculating the discriminant functions on the basis of the initial economic conditions of the Eastern European countries. Applying the initial economic conditions of North Korea to the classification functions allows us to predict the group to which North Korea will belong if it seeks transition in the future.

Table 5 can also be expressed as Fisher's linear discriminant functions. X is the discriminant score of the outstanding transition group, Y of the fine transition group, and Z of the poor transition group.

$$X = -197.098 + 0.02GNP + 0.043BMP - 1.315AG + 2.560TD - 3.795RI \\ + 0.457UR - 2.520DPE + 10.264SI + 3.544IE \quad (2)$$

$$Y = -142.144 + 0.00GNP + 0.031BMP - 1.780AG + 1.856TD - 2.611RI \\ + 0.444UR - 1.760DPE + 8.528SI + 2.597IE \quad (3)$$

$$Z = -149.335 + 0.02GNP + 0.027BMP - 1.680AG + 2.179TD - 2.573RI \\ + 0.163UR - 1.795DPE + 8.840SI + 2.792IE \quad (4)$$

III. Predictions of Path of Economic Reform of North Korea

The analysis aims to predict which transition group North Korea would belong to in the future. To make the actual prediction, Fisher's discriminant functions are used. On the basis of these functions, the group which North Korea likely will belong to is identified. The policy implications of the economic reform of North Korea are analyzed by examining the characteristics of the group.

A. Estimation of North Korea's Variables

To predict the path of economic reform of North Korea, the same system of variables used in analyzing the 27 transition countries should be identified for North Korea. This study focuses on deriving nine variables that represent the initial conditions of North Korea. All variables are based on data from 2011. If 2011 statistics are unavailable, statistics of the most recent year are used instead. All data are obtained from international organizations or official government statistics; however, these data are mere estimates. This study adopts the method used by De Melo *et al.* (1997) for deriving variables for the initial conditions. The explanation below explains North Korea's variables in detail.

The GDP per capita (PPP) of North Korea in 2011 was USD1800, according to the Central Intelligence Agency (CIA) World Factbook.⁷

The repressed inflation of North Korea is difficult to estimate because of data on this variable are unavailable. Repressed inflation is the real GDP growth rate subtracted from the real wage growth rate.⁸ Whereas

⁷ The GDP per capita (PPP) of the 27 countries, including China and Vietnam, are obtained through UN COMTRADE statistics. Because UN statistics exclude the GDP per capita (PPP) of North Korea, CIA statistics were used instead. Available at: <https://www.cia.gov/library/publications/the-world-factbook/geos/kn.html>, accessed 20 March, 2013.

repressed inflation in the form of monetary overhang is high in many socialist countries, the repressed inflation of North Korea is expected to be even higher than that of any of the former socialist countries. This position is due to the fact that economic management and market regulation in North Korea are more rigid than in the former socialist countries of Eastern Europe. For the purpose of this study, we assume the repressed inflation of North Korea to be 25.7%, the highest repressed inflation among former transition countries, such as Armenia, Georgia, Tajikistan, and Uzbekistan. The repressed inflation of North Korea may be higher than this proxy, but the value is not used to derive the discriminant function and slight changes in this variable have no effect on the overall results.

The share of industry of a country is an indicator of the economic development of that country. In many socialist countries, however, the implementation of policies that prioritize the promotion of heavy and chemical industries exaggerates the share of industry in the GDP. The CIA World Factbook reports that the share of industry of North Korea is 43.4%.

A black market premium distorts the overall economy and trade of a country. Vietnam, Bulgaria, and other Eastern European countries had a high black market premium, whereas countries that initiated reform early, such as Hungary, had a low black market premium. The black market premium of China was also only marginally high during the early stage of reform. By contrast, the black market premium of North Korea is higher than that of any of the socialist countries. As of 2012, the official exchange rate of North Korea against the US dollar is 100 won, but the actual market rate is as high as 3000 won to 4000 won. Therefore, this study assumes the value of 340 won for the black market premium of North Korea.

The Bank of Korea reports that the average growth rate of North Korea between 2007 and 2011 was 0.26%.⁹

CMEA trade dependency refers to the trade dependency of a country on CMEA countries. In the case of the former socialist countries, trade only slightly contributed to their GDP, and their CMEA trade dependency was high. In the case of North Korea, when the socialist countries underwent economic transition in the 1990s, its trade with China and Russia changed from compensation trade to trade in hard currency. As

⁸ De Melo *et al.* (1997).

⁹ Available at: <http://www.bok.or.kr/broadcast.action?menuNaviId=2236>.

TABLE 6
ESTIMATION OF NORTH KOREA'S VARIABLES

GDP per capita (PPP) in 2011 ¹	USD1800
Repressed inflation	25.7%
Share of industry ²	43.4%
Black market premium in 2012	3400%
Average growth rate between 2007 and 2011 ³	0.26%
CMEA trade dependency	0%
Rate of urbanization in 2010 ⁴	60.6%
Size of informal economy ⁵	83%
Duration of planned economy (from establishment of its government in 1945 to 2012)	67 years

Source: 1. The GDP per capita (PPP) of the 27 countries, including China and Vietnam, are obtained through UN COMTRADE statistics. Because UN statistics exclude the PPP of North Korea, CIA statistics are used instead. Available at <http://www.cia.gov/libRARY/publications/the-world-factbook/geos/kn.html>, accessed 20 March, 2013.

2. CIA World Factbook.

3. <http://www.bok.or.kr/broadcast.action?menuNavidID=2236>.

4. *Population in North Korea and Population Census Analysis*: Statistics Korea, 2011.

5. Jeong, Hyung-Gon, *et al.* (2012), "The Current Situation of Marketization in North Korea and Prospects on the Change of Its Economic System," KIEP (in Korean).

a result, the CMEA trade dependency of North Korea is 0.

The rate of urbanization of North Korea is obtained from Statistics Korea data. *Population in North Korea and Population Census Analysis* by Statistics Korea (2011) reports that the rate of urbanization of the country in 2010 was 60.6%.

The size of the informal economy of North Korea is 83%.¹⁰ The duration of the planned economy of the country is 67 years, that is, from the establishment of its government in 1945 to 2012.

¹⁰ Suk Lee estimates that nearly 83% of the North Korean population are involved in household economic activities, most of which are related to the growing of vegetables and the raising of livestock or poultry. This rate of participation in household economic activities can be deemed the same or similar to that in informal economic activities. Jeong, Hyung-Gon, *et al.* (2012), "The Current Situation of Marketization in North Korea and Prospects on the Change of Its Economic System", KIEP (in Korean).

B. Estimation Results

Applying North Korea's variables discussed above and the classification function coefficients in Table 5 to the linear discriminant function allows us to predict which country group North Korea will belong to. *X* refers to the outstanding transition group, *Y* to the fine transition group, and *Z* to the poor transition group. Substituting North Korea's variables into Fisher's discriminant function, we derive 293.9 for *X*, 216.1 for *Y*, and -202.1 for *Z*. Given that the group with the highest value is the group to which North Korea should belong, North Korea is categorized as a poor transition country. All variables used are estimated because reliable data cannot be obtained from a closed country such as North Korea. The estimates are obtained from international organizations and the South Korean government and contain some degree of error. However, the errors are not expected to be significant enough to change the flow or result of the overall analysis.

C. Prospects of Marketization of North Korea

This study aims to provide the prospects of the marketization of North Korea on the basis of North Korean economic conditions. Whether the marketization of North Korea will follow the path of radical or gradual reform has been the topic of much debate. Of the 27 countries analyzed in this study, 19 chose radical reform, whereas 8 preferred gradual reform. Of the countries that chose radical reform, six (*i.e.*, Azerbaijan, Belarus, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan) were categorized as poor transition countries. These countries maintained their socialist regimes. Considering how countries such as China and Vietnam, which implemented gradual reform, are governed by political parties, North Korea's leadership structure, which is based on lineage, closely resembles that of the Central Asian and Eastern European countries that sought gradual reforms. Moreover, the economic conditions of North Korea suggest a likely scenario for gradual reform. A principal component analysis using North Korea's economic variables supports this scenario. The result of the analysis is shown in Table 7. The sum of the variance between components 1 and 2 is 68.123%.

Component 1 has BMP, RI, DPE, and TD as its variables (Table 8). All these variables have positive values and can be considered characteristics of a planned economy. Thus, an increase in the value of BMP or any other variable can be interpreted as an increasing tendency toward a planned economy. Meanwhile, Component 2 has per capita GNP, UR,

TABLE 7
TOTAL VARIANCE

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.155	39.438	39.438	3.155	39.438	39.438
2	2.295	28.685	68.123	2.295	28.685	68.123
3	1.353	16.907	85.030			
4	0.421	5.258	90.289			
5	0.350	4.380	94.668			
6	0.197	2.458	97.126			
7	0.127	1.585	98.711			
8	0.103	1.289	100.000			

Extraction Method: Principal Component Analysis

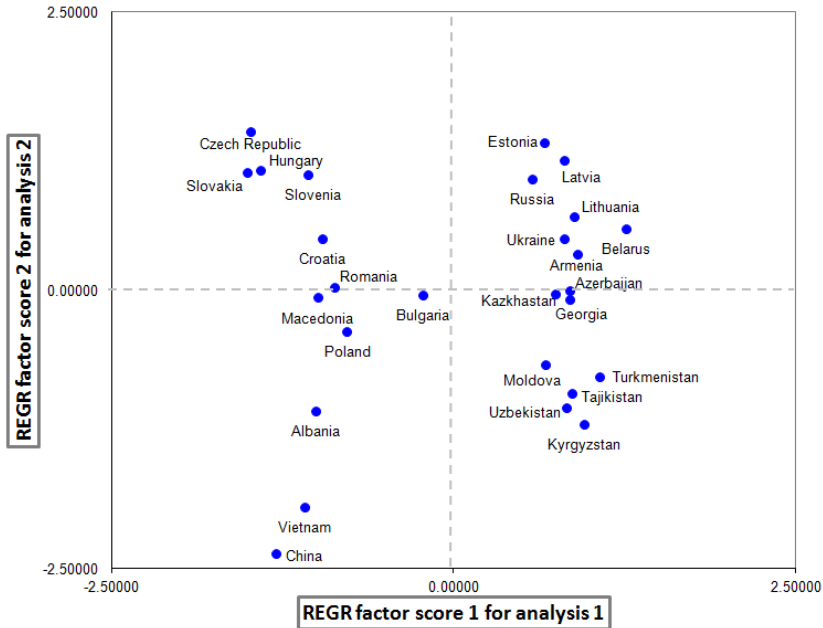
TABLE 8
COMPONENT MATRIX^a

	Component	
	1	2
Black market premium (BMP)	0.927	-0.030
Repressed inflation (RI)	0.921	-0.054
Duration of planned economy (DPE)	0.842	0.057
CMEA trade dependency (TD)	0.758	0.250
Per capita GNP before reform (Per capita GNP)	-0.030	0.948
Urbanization rate (UR)	0.160	0.884
Informal economy (IE)	0.283	-0.541
Average growth before reform (AG)	0.238	-0.503

Extraction Method: Principal Component Analysis

Note: a. Two components were extracted.

IE, and AG as its variables. These variables indicate economic development prior to reform. Thus, the higher the level of economic development of a country, the higher its per capita GNP before reform, the higher its urbanization rate, and the lower the share of its informal economy. The variables in Table 8 are standardized so that each of their values can be interpreted as correlated with the scores of components 1 and 2; the factors that most significantly influence the score of Component 1 are BMP and RI, followed by DPE and TD. The factors that most significantly influence the score of Component 2 are per capita GNP and UR, where-



Source: Scores of Components 1 and 2 based on component matrix in Table 8

FIGURE 1

PLOT OF PRINCIPAL COMPONENT SCORES OF TRANSITION COUNTRIES

as the greatest factors that negatively influence Component 2 are IE and AG.

Figure 1 illustrates the scores of components 1 and 2 on a coordinate plane. The higher the score of Component 1, the more clearly that a country displays the characteristics of a planned economy and the lower its economic growth rate. The overall experience of the 27 countries shows that those that clearly exhibited the characteristics of a planned economy had considerable difficulty achieving radical reform. Such correlation is apparent when countries in the fourth quadrant, including Uzbekistan, Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan, are examined. Considering the earlier discussion on North Korea's variables, the high values of the BMP, RI, and DPE of North Korea indicate a strong tendency toward a planned economy and thus imply that the country is unlikely to pursue radical reform. Several countries with clear characteristics of a planned economy were able to implement radical reform. The success of countries such as Russia and Georgia, which

are located in Quadrants I and IV, respectively, in achieving fine transition through radical reform is due to the rise of new powers, which resulted in the collapse of governments. Countries in the bottom of Quadrant IV, such as Tajikistan, Uzbekistan, and Turkmenistan, implemented gradual reform because their leadership and political structure underwent slight or no changes. Considering that North Korea clearly displays the characteristics of a planned economy, its high Component 1 score is likely to place it in Quadrant I or IV. Under such circumstances, the gradual reform of North Korea is likely to result in North Korea joining Central Asian countries toward the path of poor transition.

Meanwhile, countries in Quadrant II, such as Hungary, Czech Republic, and Slovakia, pursued radical reform. Although strong political movements in the region partly contributed to radical reforms, these countries did not have a deeply rooted planned economy.

By contrast, the countries with high levels of economic development, as indicated by their high Component 2 scores, have a fast transition. As illustrated by Czech Republic, Hungary, and Slovakia in Figure 1, the higher the location of a country in Quadrant II, the higher its per capita GNP prior to the reform and its urbanization rate and the smaller its informal economy. The urbanization rate of North Korea (60.5%) is higher than the average urbanization rate of the outstanding transition group (60%). However, considering that the per capita GNP of North Korea is significantly lower than that of the countries in the outstanding transition group and that its informal economy is larger, the Component 2 score of the country is expected to lie between those of Poland and Albania. In summary, the Component 2 score of North Korea will be significantly lower than those of the radically reformed countries in Quadrant II, suggesting that North Korea is likely to pursue gradual reform.

IV. Conclusion

This study attempts to predict the possible changes of the economic system of North Korea by examining 27 countries that have experienced economic transition since 1990. The discriminant analysis reveals that North Korea falls into the poor transition group, along with Azerbaijan, Belarus, Croatia, Kyrgyzstan, Moldova, Slovenia, Tajikistan, Turkmenistan, and Ukraine. Many of these countries were members of the Commonwealth of Independent States (CIS) and possessed a deeply rooted planned

economy. These countries maintained their socialist regimes by preserving their political and leadership structures. Consequently, their transition to a market economy progressed slowly. Several countries in the outstanding transition group were also deeply rooted in a planned economy. Estonia, Latvia, and Lithuania revolted against their socialist regimes as new political powers emerged and sought economic democratization. The EBRD transition indicators of these countries were 3.9, 3.6, and 3.7, respectively, higher than those of countries with comparable initial conditions. These countries were able to enhance their economic outcomes compared with the poor transition countries.

In the case of North Korea, the hereditary transfer of power from Kim Il-sung to Kim Jong-il and later to Kim Jong-un suggests that North Korea is unlikely to follow Eastern European countries in pursuing radical reform as long as its political structure continues. Instead, the country is likely to adopt slow and gradual transition similar to the Central Asian CIS countries. The principal component analysis of the nine economic variables of the 27 transition countries also suggests that the economic reform of North Korea is more likely to be gradual than radical. With the black market premium, repressed inflation, and duration of planned economy as a proxy for the characteristics of the planned economy of a country (expressed as the Component 1 score), the high values of North Korea's variables compared with those of other socialist countries show how its current economic conditions impede the pursuit of radical reform.

North Korea's economic initial conditions (expressed as the Component 2 score) also suggest little possibility for radical reform. Despite having a high urbanization rate, North Korea had a low Component 2 score because of its large informal economy. Compared with the Component 2 scores of the countries that pursued radical reform, that of North Korea is low, further suggesting North Korea's likelihood to pursue gradual reform.

In summary, as long as North Korea maintains its economic and political structure and seeks gradual reform, it is expected to follow the same path of economic development as the CIS. Moreover, the economic and political conditions of North Korea are considerably worse than the initial conditions of the transition countries in Eastern Europe; therefore, its reform is expected to face many difficulties in the initial stage of reform. Lee and Jeong (2006) find that the negative effects of the initial conditions of a country are more significant than their positive effects, at least during the first 10 years of transition, implying that the success

of the reform of a country is contingent on how it can overcome the adverse effects of its initial conditions. Of course, positive initial conditions alone do not guarantee success. Thus, North Korea should focus on overcoming its adverse initial conditions to transition into a market economy. In other words, North Korea should transform its current conditions to create a reform-friendly environment while actively adopting policies that promote a market economy. Without such policies, Kim Jong-un's slogans of "no more belt-tightening" and "great leap forward" are mere political propaganda and lip service. Thus, Pyongyang must realize that transition from its rigid socialist economy to a market economy is the only way to escape poverty. This study offers the following policy suggestions for the economic reform of North Korea.¹¹

The North Korean government should create a favorable environment for sustained economic growth and minimized ill effects of economic transition. Specifically, North Korea should improve initial conditions concerning repressed inflation, CMEA trade dependency, and openness. Among the initial conditions, the duration of planned economy is not subject to change but has significant influence. In the case of North Korea, CMEA trade dependency is zero. Therefore, policies must pursue greater openness and lower repressed inflation.

At the outset, the rapid opening-up of the North Korean economy seems desirable. However, rapid economic liberalization may completely collapse domestic industries, which are barely being sustained. Therefore, the following steps are recommended for the economic openness of North Korea: (i) avoiding the rapid economic opening-up of the entire country; (ii) the complete opening-up of Gaeseong, Pyeongyang, Nampo, Sinuiju, Geumgangsan Mountain, and Naseon Economic Special Zones; and (iii) offering intensive support to domestic industries and linking between these industries and the economic special zones. A policy that connects economic special zones and other areas for gradual reform can dispense expenses for short-, mid-, and long-term reform. However, the development of a market economy with special zones in the socialist system may be a costly economic reform in the long term. Therefore, only a con-

¹¹ These policy recommendations are based on "What Can North Korea Learn from Transition Economies' Reform Process?," a KIEP Working Paper 09-04 published by Jeong, H. G., in 2009. Also refer to Roland, G. "Transposable and Non-transposable Lessons from Transition Experience." *Seoul Journal of Economics* 21 (No. 2 2008): 265-83. Roland discusses the transposable and non-transposable experiences of transition economies from socialism to capitalism, especially with regard to North Korea.

tinuous reform out of special zones can achieve the merits of reform, which is one potential means through which North Korea can open its markets. South Korea can support the procedural aspects of such openness through investment in the special economic zones of North Korea.

To eliminate repressed inflation, accumulated monetary overhangs must be eliminated. The North Korean government can drastically liberalize prices to remove the overhangs; however, such a measure can cause hyper-inflation and increase unemployment rates. The experiences of Eastern European states suggest that great monetary overhangs fuel hyper-inflation, which places undue pressure on society. The repressed inflation of North Korea is estimated to be 25.7%. Price has been remarkably rationalized in North Korea since the 7.1 Economic Management Improvements in 2002. However, price has not been fully liberalized not only because all product prices are controlled but also because drastic price liberalization results in hyper-inflation owing to supply shortages. Therefore, North Korea must liberalize prices by gradually reducing subsidies for goods and stabilizing prices by controlling the amount of currency. North Korea must resolve the distortion in pricing structure by perfect price liberalization for the mid- or long-term. However, removing monetary overhangs and liberalizing prices only partially eliminate inflation. Ultimately, a financial reform to stabilize the North Korean won would be essential to achieve macroeconomic stability in North Korea.

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