

The Effects of Inter-Korean Integration Type on Economic Performance: the Role of Wage Policy

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* The authors thanks Kyuil Chung, Sung Ju Song, Ji Young Choi at the Bank of Korea and Byung-Yeon Kim at Seoul National University for helpful comments and suggestions.

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This paper analyses the effects of various possible types of inter-Korean integration on economic performance in the northern part of Korea after reunification, focusing on the role of wage policy. The wage policy of reunified Germany is generally said to have been one of the major reasons for the increase in unification costs there, because it led to East German worker wages in excess of their productivity level. To reduce the costs of unification, Korea therefore needs to apply wage policies different from reunified Germany's and from South Korea's, which requires a new type of integration. Against this backdrop, this paper classifies the integration types into three—a unitary state, a federation, and an SAR (Special Administrative Region)—and analyzes their relative economic effects under the assumption that each type is accompanied by different wage policies. According to this analysis, the federation type shows unemployment and growth patterns similar to those observed in East Germany, the unitary state type higher unemployment and lower growth than in East Germany, and the SAR type lower unemployment and higher growth.

Key Words: Korean reunification, economic integration, wage policy, minimum wage

JEL Specification: H77, O21, O24

I . Introduction

There is much concern that Korean reunification may lead to difficulties in the South Korean economy in many aspects. Some therefore argue that reunification would result in enormous costs and confusion on the peninsula, and if so would be unfeasible, and even if realized would not be maintained in a stable manner. We accordingly need to devise measures to reduce the costs of unification, and to further improve economic performance after it has been achieved.

To this end many studies have been conducted, and various views have been suggested. Recent studies argue that a wage policy suitable to the economic situation in the northern part of Korea needs to be introduced, for the sake of better economic performance in that region after reunification. In Germany after its reunification in 1990, wage policy was one of the major causes of the increase in the related costs. This policy, aimed at increasing wages in East Germany to the same level as those in Western Germany, resulted in East German workers' wages exceeding their productivity level, thus aggravating company profitability and reducing economic activities and resulting thereby in higher unification costs. To avoid what Germany experienced with respect to wage policy, some insist that Korea needs to adopt different policies so as to consolidate its wage-related policies and labor markets more slowly than Germany did.

However, sufficient and comprehensive studies on how these factors influence economic performance after reunification, through what mechanism and to what extent, have not yet been conducted. In particular, there have been few studies of whether a wage policy suitable to North Korea can be effectively implemented, under either consolidated or separate labor markets; of what the options of integration type for Korean reunification would be; or of what the effects of various integration types

on wage policy and economic performance in the northern part of Korea after reunification would be.

Against this backdrop, this study reviews several optional integration types, and the differences in wage policies likely to accompany each, while analyzing their effects on economic performance in the northern part of Korea using an economic model.

Here, the types of integration are classified into three, in consideration of their differing degrees of political and economic integration—a unitary state, a federation and an SAR (Special Administrative Region).¹

In the analysis, the integration types based on different wage policies appear to have greatly divergent effects on employment and growth in the northern part of Korea after reunification. With a federation, when the parameter values of policy variables such as wage-productivity gap are assumed to be the same as in East Germany, the unemployment rate in the northern part of Korea is similar to that in East Germany while the growth rate is a bit higher. In a unitary state, the unemployment rate is high and the growth rate low, under the assumption that the discrepancy between wages and productivity (the wage-productivity gap) among northern workers will be wider than that seen in other types of integration. In the SAR type, finally, under an assumption that the wage-productivity gap will be very low, the unemployment rate is low and the growth rate high.

This paper is organized as follows. Chapter 2 deals with the implications of different integration types and wage policies by summarizing previous studies in respect of the related costs and benefits. Chapter 3 explores the types and characteristics of each option for integration type, and the possible wage policy options for each integration type. Chapter 4 analyses the effects of different wage policies and integration types by using an economic model. Chapter 5 consolidates the results of this study and concludes.

¹ In this paper, reunification refers to the formation of one country, and integration to the combining of different regions so that they work together or form a whole but the degrees of consolidation in various areas may differ. Accordingly, the extents of political, economic, social and cultural integration can differ in Korea after reunification.

II. Previous Studies

There has been much literature exploring the factors affecting economic performance after reunification. However, most of these studies focus only on these factors in terms of the costs and benefits of reunification. This paper brings all of these studies of costs and benefits together, and examines the implications for economic performance of differences in integration types and wage policies.

Among previous related studies are those on the reunification of East and West Germany, on that of North and South Korea in the future, and on economic theories of the integration of nations. These studies differ in terms of their definitions of the costs and benefits of unification, and of the major factors affecting these costs and benefits.

1. Studies on Reunification of East-West Germany and South-North Korea

There have been many discussions of the costs of reunification of East and West Germany and South and North Korea, but few studies on the benefits of reunification have been undertaken.

In case studies on East-West German reunification, most have defined the unification costs as the fiscal transfers from the federal and West German government to the East German government, whose size is estimated to have amounted to 2 trillion euros during the 20 years after reunification.² This can be translated as 11 billion euros per year, accounting for 4% of German GDP.

These studies look at the factors behind the increase in unification costs, so as to determine why these costs were higher than expected. Such factors as currency

² Alexander Fisher, former director of DIW, estimated that it reached 2.1 trillion euros, Schroeder (2009) 1.6 trillion euros during 1990-2008, and Muller (2005) 1.56 trillion euro during 1991-2004.

conversion rate, wage policy, privatization policy, and the transfer payment policy that focused more on ensuring decent living standards rather than promoting economic growth, are suggested. In particular, the wage-productivity gap (the difference between wages and productivity) is cited as one of the most important factors increasing unification costs (Sinn (2002), Snower and Merkl (2006)).

In studies on South-North Korean reunification, unification costs are defined as the total amount of money necessary for risk management, system consolidation and economic investment. The estimated amount differs depending upon the scope of the elements involved, and upon who pays the cost, but is roughly estimated to be an annual average of around \$100 billion³. This is similar to the total costs of East-West German reunification, but considering the differences in GDP is actually twice as much. The Korean unification cost burden would be more serious than Germany's because the economic gap between South and North Korea is so wide, and the size of the North Korean population relative to that of South Korea higher than that of East Germany's relative to West Germany's.⁴

These studies discuss several factors that increase or decrease unification costs, in attempts to find ways of reducing unification costs. According to them, the costs of unification will differ in accordance with its timing and the process involved (peaceful or violent, etc.)⁵ Wolf and Akramov (2005) at the Rand Research Institute argue that the earlier reunification takes place, the lower its costs will be. Some other researchers insist that Korea can reduce its unification costs by narrowing the gap in per capita income between South and North through economic cooperation. Other studies, whose numbers are on the rise recently, say that the costs of unification may differ in

3 Wolf and Akramov (2005) at the Rand Research Institute estimated the cost to have been between 50 and 667 billion dollars over a four- to five-year period, and Peter M. Beck (*The Wall Street Journal*, January 4, 2010) predicted it to be from 2 to 5 trillion dollars over a 20-year period.

4 As of 2010, South Korea's GDP was 1,014.3 billion dollars and the former West Germany's (including Berlin) 2,210.2 billion euros. Right after reunification, the population in East Germany was one-fourth and the per capita income one-third those of West Germany. As of 2010, North Korea's population and per capita income were one-third and one-nineteenth those of South Korea.

5 Of course, peaceful reunification based on consensus rather than military force may cost less, but no study on this has yet been undertaken.

accordance with its speed and type. Lee (2001), for instance, insisted that gradual reunification can reduce the relevant costs, while Mun and Yang (2007) and Kwon (2009) argued that SAR type integration similar to the case of China regarding Hong Kong can cut unification costs.

Some studies consider high unemployment and low economic growth rates as costs. In East Germany, the unemployment rate increased continuously after reunification, to reach 20% during the period of 2003-2005. From the initial time of reunification up until 1994 the economic growth rate was very high, at more than 10%, but from 1996 then recorded low levels of 0.2 to 2.8 percent annually. Noland et al. (1998), considering changes in income on the Korean Peninsula after reunification, defined a decrease in income as a cost, and an increase in income as a benefit. Kwon (2009) at Goldman Sachs suggested growth as one of the biggest benefits, and insisted that Korea will be able to join the G5 roughly forty years after unification if it integrates in the way adopted by China with regard to Hong Kong.

2. Economic theories of integration of nations

Economic theories of the integration of nations, such as discussed by Casella and Feinstein (1990), Bolton and Roland (1997) and Alesina and Spolaore (2003), address the incentives for integrating or separating a nation. They suggest that whether or not integration will take place is determined by the costs and the benefits involved.

These theories explain the costs of integration to be the losses of control over political decisions of member countries or groups with different preferences when they have to share the same public goods.⁶ Such costs are incurred due to the difficulties of reflecting each group's preference when the government provides public goods, since the size of the country grows after integration.

The benefits of integration can be said to be the efficiency gains caused by

⁶ Public goods include systems related to monetary finance, taxation and finance, judicature, education and welfare; and basic infrastructures like those for transport, communications, and parks.

economies of scale. In other words, the nation's size grows when the countries are integrated, and this leads to greater economies of scale such as reduction in the per capita costs of providing public goods and declines in transaction costs thanks to market expansion. Other additional benefits include then easing of security concerns, the reduction in defense costs, the lessening of inefficiency, and the enhancement of the nation's status in the global community.

The sizes of these benefits differ in accordance with the differences in regional preferences over policies, and the degree of policy interdependence (i.e. strategic complementarity or substitutability) between the countries becoming unified (Bolton and Roland (1997), Etro (2002), Haimanko et al. (2005), Ruta (2005)).⁷

Policy preference differs in accordance with political and ideological inclination, and with the level of economic development, and if the differences are large the costs may increase and the benefits decrease. Regarding economic inequality, in particular, when economic agents have different preferences over tax and income redistribution policies, they will have to pay the costs of being unable to choose policies which they favor. Bolton and Roland (1997) and Alesina and Spolaore (1997) note that economic agents with low incomes favor high income tax rates and strong redistribution policies, whereas rich economic agents prefer low income tax rates and weak redistribution policies⁸.

Regarding policy interdependence, when the policies of two countries are strategic complements, one country moves its policy towards the first best level, the other country does the same; the policies are strategic substitutes otherwise (Etro (2002)). Policy interdependence is determined by the preferences and income levels of the people in the different regions. When national policies are substitutive, the costs arising from such policy substitutability can be reduced through measures like

7 The sizes of the costs and benefits may also differ in accordance with the extent of insecurity and stability of the international order, the degree of democratic development (Alesina and Spolaore (2005), Spolaore et al. (2001)), ethnicity, race, culture and language. Bolton, Roland and Spolaore (1996) argued that having one common language is one of the major factors significantly reducing the probability of political separation.

8 A FTA (Free Trade Area) that integrates either the goods market only or the capital market only does not pursue labor market integration; the difference in income is therefore unlikely to be a problem.

transfers of public finance, and a variety of localized policies by the regional governments in a federation (Bolton and Roland (1997)).⁹

3. Implications of integration types and wage policies

In previous studies, integration types and wage policies are referred to as one of among the major factors that will determine the costs and benefits and economic performance in the northern part of Korea after reunification.

Wage policy is considered one of the major factors that gave rise to the increase in costs of German reunification, because the wages of East German workers exceeded their productivity level. In the economic theories of integration of nations, choosing a suitable integration type is suggested as one of the ways of reducing the costs arising from integration. In particular, the extent of labor market integration will differ depending upon the type of integration pursued, and accordingly different wage policies can be applied to northern Korean workers.

Few studies, however, have investigated the effects of these factors on unification costs and benefits and economic performance. Some studies in East Germany insist that radical changes in labor policies could have reduced the wage-productivity gap (Snower and Merkl (2006), etc.) However, there have been few studies analyzing the effects of the wage-productivity gap or dealing with the extents of the wage-productivity gap in respect of the different possible integration types after North-South Korean reunification.

Against this backdrop, this study analyzes the effects of integration types and wage policies on economic performance in the northern part of Korea after reunification.

9 In the meantime, Haimanko et al. (2005) argued that fiscal transfer policy is not effective in addressing problems arising from the integration of nations. For instance, if competition to attract capital by reducing taxes is severe, benefits will increase for those who succeed in easing such competition when countries integrate (Bolton, Roland, and Spolaore (1996)). Competition among local governments to attract capital may occur even after integration. In this case, countries may favor a federation over a non-federation type of integration.

Meanwhile, South-North Korea unification costs need to be estimated on the basis of utility reduction rather than the funds necessary. Estimating the amount of utility appears to be accompanied by many difficulties, however, and this study accordingly analyzes the economic effects of reunification by focusing mainly on employment and growth, with the aim of providing a basis for future estimation of the costs and benefits in utility terms.

III. Integration Types and Wage Policies

1. Options of integration type in Korean Unification

There has been little discussion of the different possible types of inter-Korean integration, and this has led to some misunderstandings about integration types. For instance, some think that Korea may integrate in the same way Germany did if North Korea collapses and is absorbed by South Korea, and others that SAR type integration implies a sort of recognition of North Korea's communist system because it means two systems under one government. In practice, however, the legal system in South Korea is suitable for a unitary state, and so if the Korean peninsula reunifies under South Korea's lead, by its absorption of North Korea, the integration type will differ from what was done in East-West Germany. Germany is a federation and can therefore apply somewhat different labor policies to East and West Germany. However, if South and North Korea integrate as a unitary state in accordance with the South Korean law and system, labor market integration will take place much faster than it did in Germany. The SAR type, meanwhile, does not necessarily need to be pursued in the form of two systems.

This paper classifies the types of possible integration into three.¹⁰ They include

¹⁰ Integration types can be viewed from many aspects, for example political, economic, societal and cultural, but this paper considers the political and economic aspects only. Political integration refers to

the unitary state and federation types, characterized on the basis of the government organizations and power structures concerned, and the SAR (Special Administration Region) type, which has been suggested by some recent studies as a way of reducing unification costs. In the meantime, the confederation type is excluded from discussion as its pursuit is based on the assumption of North Korean change and growth, which is in contrast to the precondition of this paper that South and North Korea unify in a situation similar to that at present.

In a unitary state, the central government establishes and executes almost all policies regarding diplomacy, defense and legislation as well as administration. In this type of unification, all of the markets related to goods, services and factors (capital and labor) are integrated into one at the same time as political integration; hence, although partially recognized, the extent of autonomy is very low. Many countries including Korea currently exist in the forms of unitary states. If South Korea takes the lead in reunification, and its current legal system and rules are applied to the northern part of Korea, the integration achieved will be the unitary state type. If the country integrates in this way, the same policies will be applied to both South and North Korea. The costs may therefore increase if the countries' differences in political and ideological inclinations and in economic development levels are large, and the substitutability of policies will be strong.

In the federation type, the federal government takes charge of defense, diplomacy and so on, and shares its authority over internal controls like legislation, justice and administration with the regional governments. Under this type of integration, each regional government establishes and implements independent policies on taxation, welfare and so on, within the scopes allowed by their federal constitutions. Germany, the US and Canada are states of this type.

In federation type integration, the commodities and capital markets integrate rapidly, as the political sector does, but the labor market is divided or integrates only gradually. This is based on the definition by Bolton and Roland (1997) and Caplan et

formation of a political unit accommodating a central organization, and economic integration that of a free market in which goods and services, and capital and labor move freely.

al. (2000) that a federation refers to a country in which the capital markets are integrated and the labor markets separated.¹¹ Considering these factors, East-West German reunification was neither a unitary state nor a federation type, and should rather be viewed as something in between these two types.

In the SAR (Special Administration Region) type, the central government gives a high level of autonomy to the governments of the SARs in all sectors except for diplomacy and defense. This is also called the “One Country, Two Systems” type, and is what China adopted when integrating Hong Kong and Macao after their returns.¹² This paper will however use the term to refer to a type under which a country is under one central government and the economy only is separated. Under the so-called “One Country, Two Systems” type of integration in China, the two different regions maintain two different economic systems, one capitalist and the other communist, but in the SAR type two different regions separate their economies without respect to their respective economic systems.

In this type, all markets remain separated even after political integration. In the integration between China and Hong Kong, Hong Kong has been able to maintain free capital movements and the principle of no customs imposition in order to continuously improve its function as an international financial hub; however, the flows of capital and labor between it and mainland China have been limited and with customs duties imposed. For fifty years after the return of sovereignty (over it to China, Hong Kong is allowed to establish and implement autonomous macro-economic policies, use its own currency, maintain independent customs and tax systems, participate in non-national level international organizations and establish agreements with other nations.

¹¹ In most nations of federations, the labor markets become integrated as time passes but usually tend to be relatively separated during the initial periods of federation.

¹² Hong Kong was returned to China by the UK in 1997, and Macao was returned by Portugal in 1999.

<Table 1> Major characteristics of different integration types

	Extent of political autonomy	Extent of market integration
Unitary state	Restricted local autonomy	Integration of all markets
Federation	Autonomy of local governments	Integration of commodity and capital markets, separation of labor market
SAR	High degree of local autonomy	Separation of all markets

2. Wage policy options accompanying different integration types

The wage policy and the wage-productivity gap in the northern part of Korea after reunification may differ depending upon the integration type chosen. This is because the likelihood of discriminative application of laws and rules, and the degrees of goods and factor market integration can also vary depending upon integration type.

Wage policy will be established with respect to the rate of increase in wages, the minimum wage, and so on; the extent of the wage-productivity gap after reunification may differ in line with the requests and agreements of North Koreans regarding the currency conversion rate, the rate of wage increase, and the minimum wage system.

In particular, the difference between South Korea's minimum wage and North Korea's average wage is very big relative to their levels of labor productivity, and the implementation of wage policy to reduce the wage-productivity gap in the northern part of Korea will therefore be difficult should the most suitable integration type not be adopted, given that the different integration types are accompanied by different wage policies in line with their varying degrees of market integration.

The average wage for the level of labor productivity of North Korea is estimated to be about 73,100 to 158,400 won per month. This is based on the assumptions that North Korea's labor productivity is 2.4% to 5.2% that of South Korea's, according to the North Korean National Account Statistics of the UN and the Bank of Korea, given

South Korean laborers' average wage of 3,047,000 won.^{13 14}

<Table 2> Per Capita GNI in South and North Korea

		2007	2008	2009	2010
South Korea (A)		\$21,695	\$19,296	\$17,193	\$20,759
Bank of Korea Statistics	North Korea (B) ¹⁾	\$1,152	\$1,065	\$932	\$1,074
	B/A (%)	5.3%	5.5%	5.4%	5.2%
UN Statistics	North Korea (C) ²⁾	\$597	\$552	\$497	\$503
	C/A (%)	2.8%	2.9%	2.9%	2.4%

Notes: 1) Per capita GNI based on prices in South Korea 2) Per capita GNI based on prices in North Korea

Sources: The Bank of Korea, UN Statistical Commission

This is far lower than South Korea's minimum wage level. As of 2012, the minimum wage in South Korea is 4,580 won per hour, and 957,220 won to 1,035,080 won per month (based on 40 to 44 working hours), which is thus 6.0 to 14.2 times the average wage for the labor productivity level of North Korea (73,100 won to 158,400 won).

Under a unitary state type of unification, South Korea's law and system would have to be applied equally to the northern part of Korea; hence, South Korea's minimum wage system would have to be applied indiscriminately to the north. This would lead naturally to a big gap between the wages and productivity of northern Korean laborers. This gap could of course be changed by a variety of factors after reunification; however, there would be limits on its reduction. The goods and factor markets would be totally integrated with reunification, and labor productivity might therefore increase with the investment of South Korean capital. The overall average wage for the level of labor productivity might change, or the minimum wage might go down with integration of northern Korean labor and southern low-skilled Korean labor.

13 Average monthly wages at businesses with more than five full time workers (Ministry of Employment and Labor 「Survey Report on Labor Force at Establishments」)

14 Average monthly wage of South Korean workers (3,047,000 won) × 2.4% or 5.2%

However, there would be limits on such changes. Any cuts in minimum wage, in particular, might face opposition from southern Korean labors and cause social disruption, and the extent of adjustment could thus not be so great. A wage for northern Korean laborers exceeding their productivity level might also result in high unemployment and low growth. Wage subsidies aimed to reduce the wage-productivity gap would lead to greater fiscal costs.

In the federation type of unification, the individual regional governments can apply different laws and rules within the range allowed by the federal constitution, and different wage policies can therefore be applied to these regions. In particular, the labor market is separated, and a minimum wage level lower than South Korea's could hence be applied to the northern part of Korea. The labor market can be separated either through economic incentives as Germany did, or through the application of laws and rules like a work permit system. In East-West German integration, the government tried to restrict labor movement by providing East German workers incentives such as wages exceeding their productivity and excessive welfare benefits, rather than application of mandatory rules. And this, some point out, caused the increase in integration costs. Korea could however separate the labor market by introducing laws and systems like a "work permit system," requiring northern Korean workers wishing to work in the southern part of Korea to mandatorily obtain permission from the government first. This might reduce unification costs. Even if a work permit system were introduced, however, the problem of the wage-productivity gap in the northern part of Korea remains, and this gap would unlikely be smaller than that seen in East Germany. Specifically, with the productivity of northern Korean workers improving only slowly, the unified Korean government would have no choice but to raise northern Korean workers' wages faster than the rate of improvement in their productivity level, since when active interchange between southern and northern Korea took place northern Korean workers would strongly demand pay raises given the high wage gap between the two Koreas.

In the SAR type of integration, finally, the degree of economic separation between the two regions is high enough that they can be regarded as different

countries. Hence, the level of northern Korean workers' wages could be maintained so that it went hand in hand with their productivity. Even if a wage–productivity gap might occur should the government take measures to increase northern Korean workers' wages to let them enjoy some of the benefits of reunification, the extent of the gap would not likely be high. Accordingly, the average monthly wage of northern Korean workers could be set at 73,100 to 158,400 won, and if so wage competitiveness in the northern part of Korea could be ensured, compared with the wage level of workers in other Southeast Asian countries.

IV. Economic Model

We analyze the effects of different integration types and the accompanying wage policies on the economic performance in the northern part of Korea after reunification based on an economic model in accordance with Blanchard and Fischer (1989). We use the wage-productivity gap, the ratio of wage subsidies, and so on as policy variables.

1. Baseline Model

The baseline model is a small open economy model where the labor force (L_t) and labor efficiency (A_t) evolve exogenously as follows:

$$L_t = (1 + n)L_{t-1} \tag{1}$$

$$A_t = (1 + g)A_{t-1} \tag{2}$$

given the initial values, L_0 and A_0 .

The representative household maximizes the following utility:

$$U_0 = \sum_{t=0}^{\infty} \beta^t u(c_t) \quad (3)$$

where β is the discount rate, $u(\bullet)$ the utility function, and c_t the consumption per unit of effective labor, or $c_t = C_t / A_t L_t$. The budget constraint is

$$C_t + (1+r)B_t \leq B_{t+1} + D_t + \bar{w}_t A_t N_t \quad (4)$$

where C_t denotes consumption, rB_t interest expenses, $B_{t+1} - B_t$ new borrowing, D_t dividend income, r the overseas interest rate, N_t employment and \bar{w}_t the real wage of effective employment ($A_t N_t$). Since we consider the cases where there is unemployment, \bar{w}_t or the real wage of effective employment ($A_t N_t$) may not be equal to w_t^* , the full employment wage. For the simulation later, the utility function is assumed to be

$$u(c_t) = \frac{c_t^{1-\theta}}{1-\theta}, \quad \theta > 0 \quad (5)$$

where θ is the relative risk aversion parameter.

The representative firm maximizes the present value of its dividend income (D_t)

$$V_0 = \sum_{t=0}^{\infty} \beta^k \frac{u'(c_t)}{u'(c_0)} D_t \quad (6)$$

under the following budget constraint:

$$K_{t+1} \leq (1-\delta)K_t + I_t \quad (7)$$

where K_t is the capital stock, I_t investment, and δ the depreciation rate.

The dividend income is defined as

$$D_t = F(K_t, A_t N_t) - \bar{w}_t A_t N_t - I_t \left[1 + T \left(\frac{I_t}{K_t} \right) \right] \quad (8)$$

where $F(\cdot)$ denotes the production function and $T(\cdot)$ the capital adjustment cost function. As for the production function, we use the Cobb-Douglas production function, that is:

$$Y_t = F(K_t, A_t N_t) = K_t^\alpha (A_t N_t)^{1-\alpha}, \quad 0 < \alpha < 1 \quad (9)$$

and for the capital adjustment function we follow Summers (1981) and King and Rebelo (1993), that is:

$$T\left(\frac{I_t}{K_t}\right) = \frac{\frac{\psi}{2} \left(\frac{I_t}{K_t} - [(1+n)(1+g) - (1-\delta)] \right)^2}{\frac{I_t}{K_t}}. \quad (10)$$

where ψ determines the degree of capital adjustment costs.

Finally, the market clearing condition is

$$C_t + (1+r)B_t \leq B_{t+1} + F(K_t, A_t N_t) - I_t \left[1 + T\left(\frac{I_t}{K_t}\right) \right] \quad (11)$$

2. Adjustment of model for analysis of policy effectiveness

In this section, the baseline model is adjusted to introduce a minimum wage system and a wage-productivity gap. We also add a transfer for investment (TRI), a wage subsidy (WS), and an unemployment benefit (UB) for further policy analysis.

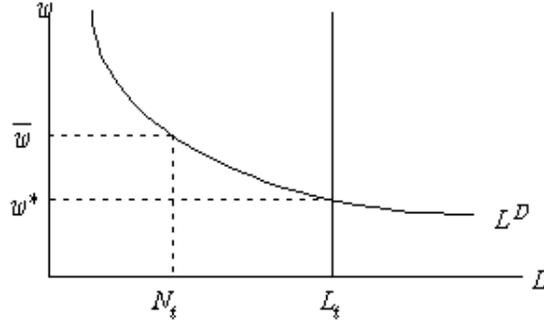
First, following Irmen & Wigger (2006), we assume that the minimum wage (\bar{w}_t) is determined to be

$$\bar{w}_t = (1 + \mu)w_t^* \quad (12)$$

where w_t^* is the full employment wage, and μ indicates the degree of wage difference. Later we will assign a different value for μ to each integration type.

Here the extent of wage difference (μ) varies in accordance with the integration type. When the minimum wage is set, unemployment takes place as much as $L_t - N_t$, as shown in <Figure 1>:

<Figure 1> Minimum Wage and Unemployment



In our model, w_t^* and \bar{w}_t can be obtained as follows:

$$w_t^* = (1 - \alpha) \left(\frac{K_t}{A_t L_t} \right)^\alpha \quad (13)$$

$$\bar{w}_t = (1 - \alpha) \left(\frac{K_t}{A_t N_t} \right)^\alpha \quad (14)$$

Now, we can show that employment is determined by

$$N_t = (1 + \mu)^{-(1/\alpha)} L_t \quad (15)$$

for every K_t , and

$$N_t = (1 + n) N_{t-1} \quad (16)$$

since the rate of growth in the labor force is n .

Transfer for investment (TRI) is assumed to increase both the amount of capital and the efficiency of labor. That is, capital formation (ΔK) is defined by the sum of investment (I_t) and the transfer for investment (TRI), as follows:

$$\Delta K_{t+1} = I_t + TRI_t \quad (17)$$

In addition, based on the study of Barro (1990),¹⁵ who argues that the transfer for investment is mainly for forming social overhead capital, and that the increase in social overhead capital increases labor efficiency, TRI is assumed to increase the rate of exogenous growth of A_t as follows :

$$A_t = (1 + g)(1 + \kappa(TRI_t)^{1/2})A_{t-1} \quad (18)$$

where κ determines the degree of acceleration. Transfer for investment (TRI) is assumed to be provided in the same amount over the 20-year period after reunification in the following simulations:

$$TRI = \sum_{t=1}^{20} TRI_t = \overline{TRI} \times 20 \quad (19)$$

The wage subsidy (WS) can be provided by a factor of τ so as to diminish the wage that firms actually pay to workers, as follows:

$$WS = \tau\mu w_t^* A_t N_t \quad (20)$$

In this case, the wage that firms actually pay is

$$\overline{w}_t = [1 + \mu(1 - \tau)]w_t^* \quad (21)$$

and the wage income of workers is the same as before:

$$w_t^L = [1 + \mu]w_t^* \quad (22)$$

Finally, an unemployment benefit (UB) can be provided to compensate the unemployed, as follows:

$$UB = \gamma w_t^L A_t (L_t - N_t) \quad (23)$$

According to the last version of the model, employment is determined as

$$N_t = (1 + \mu(1 - \tau))^{-(1/\alpha)} L_t \quad (24)$$

That is, employment is affected by the degree of the wage gap, μ , and the wage

15 Barro (1990) introduces an assumption that, in an endogenous growth model, separating the public capital arising from government spending from private capital and forming a public fund can be productive, but this paper differs from Barro (1990) in that public and private capital are not separated.

subsidy, τ . The degree of the unemployment benefit, γ , has no effect on the unemployment rate, since it does not affect the demand for labor and the supply of labor is in this paper determined exogenously.

Output growth is on the other hand determined by three factors: TRI , the speed of convergence, and the initial value of $k_t = \frac{K_t}{A_t N_t}$, or k_0 . TRI increases output growth by improving labor efficiency. The speed of convergence is a function of all of the model parameters except μ , τ and γ . However, μ and τ determine the initial value of k_t , and as a result affect the growth rate. The wider the degree of the wage-productivity gap (μ), the smaller N_0 and the bigger k_0 , thereby reducing output growth. In contrast, the bigger the ratio of the wage subsidy (τ), the bigger N_0 and the lower k_0 , thereby raising the growth rate. To sum up, TRI , μ and τ affect output growth but γ does not. The reason that the degree of the unemployment benefit γ , has no effect on output growth is that it does not change employment in this model.

V. Simulation

The economic effects of the respective integration types are analyzed through a simulation based on the assumption that each integration type is accompanied by different wage policies. We first simulate the economic performance in East Germany after reunification, in order to decide the parameter values required for establishing a simulation of Korean reunification. We then simulate the economic performance of the northern part of Korea after reunification. The basic assumptions of this paper are comparable to what was observed during German reunification, with the only

difference being that Germany provided industrial subsidies instead of wage subsidies; therefore, the ratio of wage subsidy payment is estimated through simulation.¹⁶

1. Simulation of German Reunification

The initial economic situation of German reunification is assumed to be the same as that in 1991, as in <Table 3>. The assumptions of various parameters are based on the economic statistics, relevant studies, etc., of Eastern Germany. The degree of technological development and the rate of population increase are set at 2.8% and – 0.66% respectively, which are the averages in East Germany during the 1992-2007 period. The extent of the wage-productivity gap (τ) is assumed to be 0.1,¹⁷ meaning 10%, in consideration of the average (9%) for Eastern Germany between 1991 and 2007 and previous studies. The transfer of investment (TRI) is assumed to be 19.2 billion euros (17.9% of the initial GDP in East Germany), which is the annual average of the total transfer of investment (TRI) (250 billion euros) made to the East German regional government during 1991-2003. Other parameter values are assumed as below in <Table 4>, in reference to previous studies.

<Table 3> Initial Economic Situation in Germany (as of 1991)

GDP (1 billion euros)	Labor force (1,000 persons)	Capital stock (billion euros)	Per capita GDP (euros)	Population (1,000 persons)
107.25	7,800.3	597.38	7,330	14,631.8

Source: Statistisches Bundesamt (www.destatis.de)

16 Unified Germany mainly provided industrial subsidies, but this model takes wage subsidies into consideration based on the analysis of previous studies that wage subsidies are more effective in increasing employment. Previous studies supporting wage subsidies include Akerlof et al.(1991), Begg and Portes(1993), Sinn(2005) who dealt with German cases; and Hamermesh(1978), Phelps(1994), Katz(1998), Dreze(2002) who explored general cases (reference is made again to Dluhosch and Horgos(2008) pp.372-373).

17 According to the Federal Statistical Office of Germany, the average annual wage-productivity gap during 1991-2007 in East Germany was about 9%, meaning that μ is 0.09, different from the average annual wage-productivity gap estimated at 80-90% for seven years (1991-1997) by Conny Wunsch (2006).

<Table 4> Parameter Assumptions

		value	Reference
α	Capital income share	0.25	Funke and Strulik (2005)
δ	Annual depreciation rate	0.04	
r	International interest rate	0.04	
β	Discount rate	0.962	$1 / (1+r)$
ψ	Capital adjustment coefficient	32.2	Summers (1981), King and Rebelo (1993)
κ	Degree of TRI efficiency	0.0012	
θ	Degree of relative risk aversion	1	

Considering the above assumptions, the rate of wage subsidy that best explains the rates of real growth and employment is 0.5073. When the above assumptions and this subsidy rate are applied in simulation, the annual average rates of growth and unemployment are equal to Eastern Germany's during 1991-2007 (at 3.71% and 17.5%, respectively).

2. Basic Simulation of South-North Korean Reunification

We simulate the effects of the respective integration types on the economic performance of the northern part of Korea after reunification. The rates of growth and unemployment and the government fiscal burden are compared for each integration type. We use average growth and unemployment rates over 20 years. We define the government's fiscal burden (FB) as the sum of the transfer of investment (TRI) and social security costs (SSC), computed as below. Here, social security costs (SSC) are defined as the sum of the wage subsidy (WS) required until northern Korean per capita income reaches \$10,000 and unemployment benefits (UB):

$$FB = TRI + SSC \quad (24)$$

$$SSC = WS + UB \quad (25)$$

First, all parameter values are assumed to be the same as East Germany's in the baseline scenario, and the effects of each parameter are analyzed by changing the policy values one by one.

In the baseline scenario, all parameter values except for the initial economic situation and the policy variables are assumed to be the same as East Germany's. The initial economic situation in North Korea is assumed to be the same as it was in 2010, when North Korea had a greater labor force than East Germany but its economy was weaker and its capital stock smaller. The size of the transfer for investment to the northern part of Korea is assumed to be \$4.7 billion, a figure whose ratio to North Korean GDP (17.9%) is the same as it was to East German GDP.

<Table 5> Assumptions on initial economy in northern part of Korea(as of 2010)

GNI (\$1 billion)	Labor force (thousand persons)	Capital stock (\$1 billion)	Per capita GNI (dollars)	Population (thousand persons)
26.0	12,253	19.9	1,074	24,187

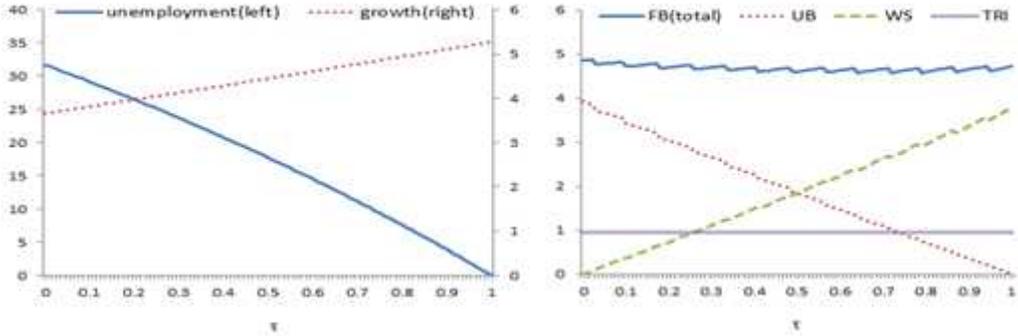
Source: Bank of Korea

The high level of the wage-productivity gap has negative effects on both employment and growth in the northern part of Korea, and the extent of its negative effects appears greater than those caused by other policy variables. When the degree of the wage-productivity gap grows (shrinks), the employment rate increases (decreases) and the growth rate goes up (down). The South Korean regional government's fiscal burdens after reunification increase in accordance with the rise in the extent of the wage-productivity gap, because sluggish growth will lead to a longer period before achievement of \$10,000 per capita GNI; the burden of unemployment benefits resulting from increasing unemployment thus grows.

The analysis shows that the wage subsidy ratio affects unemployment and growth by changing the extent of the wage-productivity gap that companies feel. When the wage subsidy ratio goes up (down), the growth rate rises (declines) and the unemployment rate declines (rises), which means an increase (decrease) in the wage

subsidy and a decrease (increase) in the unemployment benefit. Meanwhile, the effects of the wage subsidy ratio on the government fiscal burden may differ in line with the degrees of change of the wage subsidy and the unemployment benefit. That is, when the wage subsidy ratio goes up, the rate of the wage subsidy increases but that of the unemployment benefit decrease, so that the government fiscal burden can either increase or decrease when the two variables are summed. For instance, with an unemployment benefit ratio assumed to be 21%, the fiscal burden of the government decreases if the wage subsidy ratio increases from 0% to 64%, whereas it increases if the ratio goes up from 64% to 100%:

<Figure 2> Simulation of Changes in Wage Subsidy Ratio



3. Simulation of Korean Reunification: Effects of Integration Types

The effects of the different integration types are compared by differently assuming the extent of the wage-productivity gap and the wage subsidy accompanying each type. The unification costs and benefits may also differ in many aspects, but this study focuses only on the effects of the different wage policies accompanying each integration type. While the wage policies are highly likely to vary in accordance with the different integration types¹⁸, however, there are many restrictions on coming up

¹⁸ For more details on this, refer to Chapter 3.

with detailed numbers on the degree of the wage-productivity gap or the ratio of the wage subsidy, and in predicting unemployment and growth in the northern part of Korea after unification. This paper accordingly compares the effects of different wage policies on post-reunification unemployment and growth in northern Korea by assuming the most feasible wage policies.

The assumptions as to the extents of the wage-productivity gap and the wage subsidy ratio are made in consideration of the different characteristics of the respective integration types. In the federation type of integration, the wage-productivity gap and wage subsidy ratio levels are assumed to be the same as those in East Germany. Although the extent of the wage-productivity gap could of course differ from that in East Germany, it is assumed here to be the same because of the coexistence of factors that could push it up and those that could pull it down. Compared with the East-West German unification case, the gap in economic levels between South and North Korea is wider; the wage-productivity gap between them will hence be bigger, because the speed of northern Korean wage convergence to the southern Korean level will be faster than that seen between East and West Germany. As for the labor market, however, Korea can prevent such a wage increase and maintain a manageable level of wage-productivity gap by adopting a work permit system limiting labor movement, in consideration of the lessons learned from the German reunification experience.

The unitary state type is expected to have a wider wage-productivity gap and lower ratio of wage subsidy compared to the other types of integration, for the reason that South Korea has a very low wage subsidy at present. Accordingly, the level of the wage-productivity gap is assumed to be 0.2 (meaning 20%), twice the level of East Germany and the federation type, and the wage subsidy ratio 0.4 (meaning 40%), which is 10% points lower than the federation type. In the meantime, the extent of the wage-productivity gap could be even more than twice that of East Germany, given that the wage for the current productivity level in North Korea is just one-sixth the minimum wage in South Korea, as of 2010. However, the wage-productivity gap is assumed as above, in consideration of the characteristics of the model.

The SAR type of integration can be expected to have the lowest level of wage-

productivity gap and the highest level of wage subsidy, since the related government fiscal burden is very low in this type and the government can thus afford to provide a higher wage subsidy. Accordingly, the extent of the wage-productivity gap under this type of integration is assumed to be 0.01 (meaning 1%), one-tenth that of East Germany, and the wage subsidy ratio 0.6 (meaning 60%), which is 10% points higher than the federation type. A wage-productivity gap may meanwhile not even exist in SAR type integration, since an independent wage policy can be applied to the northern region of Korea; it is assumed to exist on a small scale, however, to show the characteristics of the model:

<Table 6> Policy variable assumptions, by integration type

	Federation type	Unitary state type	SAR type
Wage-productivity gap (μ)	0.1	0.2	0.01
Wage subsidy ratio (τ)	0.5	0.4	0.6

Following are the results of simulation conducted in accordance with the above policy variable assumptions.

In federation type integration, the unemployment rate in northern Korea after reunification is similar to that of East Germany, whereas the growth rate is a bit higher (3.7%→4.3%) and the unemployment rate similar (17.5%→17.7%). The higher growth rate in northern Korea in this analysis seems to be due to the fact that the size of initial capital in North Korea is smaller than that in East Germany. When the size of initial capital is small, the speed of convergence to move on to a steady state is fast. And in this respect, the growth rate becomes lower if the size of initial capital in North Korea is larger than that in the initial assumption. For instance, if the assumed North Korean initial capital is doubled (to \$3.98 billion), the rate of growth in northern Korea goes down (4.28%→3.49%).

In unitary state type integration, economic performance in the northern part of Korea is expected to be worse than that in East Germany. The growth rate appears likely to be lower (3.7%→3.35%) and the unemployment rate higher (17.5%→36.4%).

The fiscal burden of the government will accordingly be heavier, at nearly double that with the federation type of integration, due to the increase in costs of social security to pay unemployment benefits. Furthermore, unexpected additional costs not explained in the model may also be incurred. For example, there may be additional fiscal burdens necessary to promote growth and reduce unemployment in the northern part of Korea, and there could be a decline in southern Korean workers' wages and social benefits due to integration of northern labor into the low-wage labor market in the south. If a policy to increase taxes in southern Korea is implemented to raise money to finance such costs, growth in southern Korea will also go down. In a nutshell, if Korea is reunified under this type of integration, the economy on the Korean peninsula will not be invigorated and Korea might not derive any benefits from unification.

In SAR type integration, meanwhile, the economic performance of the northern region of Korea appears very positive, since the growth rate is higher (3.7%→5.21%) than East Germany's and the unemployment rate far lower (17.5%→1.6%). In this type of integration, the government fiscal burden related to social security costs for increasing unemployment benefits is expected to fall significantly. It will be less than one-third that required for the federation type. Additional benefits absent in the model may also appear. For instance, South Korea could be expected to also enjoy benefits from the high rate of growth in northern Korea.

<Table 7> Simulation based on different policy variable assumptions by integration type

		Policy variables (assumptions)		20-year average		Per capita GNI (20 years later)
		μ	τ	Growth rate	Unemployment rate	
North Korea	Unitary state type	0.2	0.4	3.35%	36.4%	2,399\$
	Federation type	0.1	0.5	4.28%	17.7%	2,980\$
	SAR type	0.01	0.6	5.21%	1.6%	3,370\$
East Germany		0.1	0.5	3.7%	17.5%	22,384€

For more proximity to reality than in the simulation, we simulate with some differently set parameters without the policy variables included above. Especially in the SAR type, the united government can afford an increase in the transfer for investment (TRI) because of its light fiscal burden, and the rate of population growth in the northern region of Korea may become higher than that in East Germany considering the favorable economic situation and the restrictions on labor movement based on the laws and systems concerned. In <Table 8> below, Case 1 assumes a transfer for investment (TRI) twice that in the baseline scenario, and a rate of population growth of 1.43%, the annual average among developing countries during 2000-2005. Case 2 assumes a transfer for investment three times the baseline scenario and annual population growth of 2.08% (the developing country average over the 1961-1980 period), leading to an increase in the economic growth rate to between 8.6% and 10.0%:

<Table 8> Simulation in consideration of reality of SAR type integration

	Policy variables (assumption)		20-year average		Per capita GNI (20 years later)
	TRI (billion \$)	Population growth rate	Growth rate	Unemployment rate	
Case 1	9.4	1.43%	8.57%	1.58%	\$4,557
Case 2	14.1	2.08%	9.97%	1.58%	\$5,336

VI. Conclusion

The economic performance of reunified Korea will be affected by the political and economic environment at the time of reunification, which will in turn stem from a multitude of uncontrollable factors so that Korea will not have much room for choice. Reunification policies are controllable to some extent, however, and have many implications for the country's economic performance and are thus very important. One of the most important policies after reunification will be wage policy, more specifically related to the wage-productivity gap which is suggested as a major factor behind the increase in unification costs during the process of German unification. Such wage policies can differ in accordance with the type of integration pursued, with the extent of the wage-productivity gap inevitably depending upon the integration type because the probability of discriminative application of laws and systems, and the degrees of commodity and factor market integration will differ in each type.

Against this backdrop, this paper has analyzed the effects of the wage policies accompanying each integration type on economic performance in the northern part of a reunified Korea. Its analysis shows that wage policies, especially those related to the extent of the wage-productivity gap and the wage subsidy ratio, have important implications for economic performance in the northern part of Korea after reunification. It also appears that the SAR type of integration leads to a relatively good economic performance with a small fiscal burden.

While more study is necessary to come up with the most beneficial type of integration for both South and North Korea, based on our analysis of three integration types we find the SAR type of integration to display the best economic performance. If economic performance is one of the major factors determining the costs and benefits of unification, and the SAR type displays the best economic performance, Korea then needs to choose SAR type integration in making its preparations for the possibility of

abrupt reunification. Reunification without such preparation for SAR type integration, and the choice therefore of a unitary country type integration in which most of South Korea's legal systems are applied to the northern part of Korea, may lead to enormous difficulties for Korea, even more than what Germany experienced.

More studies need to be undertaken if South and North Korea are to integrate in a type other than the unitary state type. This study has focused on economic performance only, but studies need to be done on other aspects of different possible integration types as well, such as their political and social impacts. In order to enhance the possibility of adopting SAR type integration, more preparation and study are necessary to come up with proper legal and systemic measures to limit labor movement even within one united country. In particular, consensus among people on the most desirable integration type needs to be reached, through various studies and discussions.

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Appendix A.

If the budget constraint is divided by the effective population ($A_t L_t$), the following is obtained:

$$c_t + (1+r)b_t \leq (1+g)(1+n)b_{t+1} + d_t + \bar{w}_t \frac{N_t}{L_t},$$

where $c_t \equiv \frac{C_t}{A_t L_t}$, $b_t \equiv \frac{B_t}{A_t L_t}$, and $d_t \equiv \frac{D_t}{A_t L_t}$. From the first-order conditions

of the household's utility maximization, the following Euler equation is derived:

$$\frac{1+n}{1+r} = \beta \frac{u'(c_{t+1})}{u'(c_t)}.$$

The first-order conditions for producers are

$$q_t = 1 + T\left(\frac{i_t}{k_t}\right) + \frac{i_t}{k_t} T'\left(\frac{i_t}{k_t}\right),$$

$$q_t = \beta \frac{u'(c_{t+1})}{u'(c_t)} \left[f'(k_{t+1}) + \left(\frac{i_{t+1}}{k_{t+1}}\right)^2 T'\left(\frac{i_{t+1}}{k_{t+1}}\right) + q_{t+1} \right],$$

$$(1+g) \frac{N_{t+1}}{N_t} k_{t+1} \leq (1-\delta)k_t + i_t, \text{ and}$$

$$\bar{w}_t = f(k_t) - k_t f'(k_t),$$

where $i_t = \frac{I_t}{A_t N_t}$, $k_t = \frac{K_t}{A_t N_t}$, q_t is the shadow price of new investment, i.e.

Tobin's q , and $f(k_t) = k_t^\alpha$.

The market clearing condition, if it is divided by $A_t N_t$, is

$$\frac{L_t}{N_t} c_t + (1+r) \frac{L_t}{N_t} b_t + i_t \left[1 + T \left(\frac{i_t}{k_t} \right) \right] \leq b_{t+1} (1+g)(1+n) \frac{L_{t+1}}{N_{t+1}} + f(k_t).$$

The equilibrium is defined as $\{q_t, k_{t+1}, i_t, \bar{w}_t, c_t, b_{t+1}\}_{t=0,1,2,\dots}$, given the initial values k_0 and b_0 , which satisfy the following equations:

$$\begin{aligned} q_t &= 1 + T \left(\frac{i_t}{k_t} \right) + \frac{i_t}{k_t} T' \left(\frac{i_t}{k_t} \right), \\ q_t &= \frac{1+n}{1+r} \left[f'(k_{t+1}) + \left(\frac{i_{t+1}}{k_{t+1}} \right)^2 T' \left(\frac{i_{t+1}}{k_{t+1}} \right) + q_{t+1} \right], \\ i_t &= (1+g)(1+n)k_{t+1} - k_t(1-\delta), \\ \bar{w}_t &= f(k_t) - k_t f'(k_t), \\ \frac{1+n}{1+r} &= \beta \frac{u'(c_{t+1})}{u'(c_t)}, \text{ and} \\ (1+\mu)^{\frac{1}{\alpha}} c_t + (1+r)(1+\mu)^{\frac{1}{\alpha}} b_t + i_t \left[1 + T \left(\frac{i_t}{k_t} \right) \right] \\ &= b_{t+1} (1+g)(1+n)(1+\mu)^{\frac{1}{\alpha}} + f(k_t) \end{aligned}$$

Appendix B.

Major Details of Integration Types

	Federation
Subject of international law	Federation type only
Nationality	Genuine one country
Basis of integration	Constitutional law of federation
Domestic control rights	Legislative, executive and judiciary rights divided among federal government and state governments
Diplomatic rights	Owned by federal government
International responsibility	Federal government assumes responsibility
Military forces	Owned by federal government
Stability of integration	Permanent integration
Representative cases	United States (1787), Switzerland (1848), Canada (1867), Germany (1871)
	SAR (Hong Kong and Macao)
Subject of international law	People's Republic of China
Nationality	Genuine one country
Basis of integration	Constitution of the People's Republic of China, Article 31
Domestic control rights	Special administrative regions have independent legislative, executive and judiciary rights, with mainland laws not applied to these regions (with several exceptions)
Diplomatic rights	Owned by People's Republic of China (however, special administrative regions have independent rights to conclude a variety of agreements with other countries and regions with respect to mutual visa waivers, legal structures, aviation services, extradition of foreign criminals, adjustment of double taxation, etc., and to participate in international sporting events independently from China.)
International responsibility	People's Republic of China assumes responsibility
Ownership over military forces	People's Republic of China
Stability of integration	Permanent integration
Representative cases	Integrations of Hong Kong and Macao to China

<Abstract in Korean>

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본 연구는 남북한이 통일을 이룰 경우 선택하게 될 통합유형이 통일 이후 북한지역의 경제적 성과에 어떤 영향을 미치는지를 분석하였다. 통합유형이 북한지역의 경제성과에 미치는 영향은 여러 가지 요인이 있으나 본 연구에서는 주요 요인 중 하나인 임금정책에 초점을 맞춰 분석하였다. 임금정책은 동서독 통일 사례에서 보는 바와 같이 통일 이후 동독 노동자의 임금이 생산성 수준을 상회하게 되는 원인을 제공하였으며 이러한 이유로 통일독일의 임금정책은 예상보다 많은 통일 비용을 발생시킨 주요 원인 중 하나로 분석되고 있다. 따라서 남북한의 경우도 통일비용을 줄이려면 북한지역 노동자의 임금이 생산성 수준을 상회하지 않도록 해야 하며, 이를 위해서는 남북한에 서로 다른 임금정책이 시행될 수 있는 새로운 통합유형이 필요할 것이다. 이는 남북한의 경제력 격차가 동서독보다 훨씬 크다는 점을 감안할 때 독일 통일의 경우보다 더 효과적으로 노동시장을 분리할 수 있는 방안이 필요할 것이기 때문이다. 이러한 관점에서 본 연구는 남북한 통합유형을 정치·경제적 통합 정도를 기준으로 단일국가, 연방국가, SAR(Special Administration Region; 특별행정구역) 등 세 가지로 구분하였으며, 각 유형에 따라 임금정책이 다르게 시행된다는 가정을 도입하여 통합유형의 경제적 효과를 분석하였다. 분석결과, ‘연방국가 유형’에서는 동독과 유사한 실업과 성장, ‘단일국가 유형’에서는 동독보다 높은 실업과 낮은 성장, ‘SAR 유형’에서는 동독보다 낮은 실업과 높은 성장을 보이는 것으로 나타났다.

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