Dynamic Interrelationship between Administrative Consolidation and Segregation: Korean Example

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1. Introduction:

For more than half a century after the World War II, many Korean politicians and administrators have been busy with reclassifying the status of various cities and counties but without considering geographical characteristics of regions in question. When the Republic of Korea was officially established in August 1948, there were 9 provinces, 14 cities, and 133 counties. In 1994, the basic administrative structure was transformed into 1 special city, 5 metropolitan cities, 9 provinces, 68 cities, and 136 counties.

With the initiation of a new local autonomy system in the mid-1990s, however, the form of local jurisdictional rearrangements has become a ‘hot potato.’ The self-professed reform advocates disliked what they regarded as the historical pattern of administrative fragmentation. They have aggressively pursued the policy of urban-rural consolidation as the most feasible method to tackle a series of conflicts deriving from existing urban-rural

segregation. The protagonists have proposed a consolidation option as a specific means to strengthen regional competiveness in the era of globalization. They also have insisted that the administrative integration of two neighboring urban and rural regions could more easily resolve or at least ameliorate problems originating from regional sectoralism. The typical example can be found in the so-called NIMBY(Not In My Back Yard) syndromes in which necessary but undesirable public functions are usually pushed onto someone else's territory.
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As a result, the jurisdictional rearrangements were carried out on a large scale, mostly in the second half of 1990s. That is, with a series of household opinion surveys and policy directives from August 1994 to April 1998, altogether 42 cities and 46 counties were reorganized again as 47 consolidated, or urban-rural complex cities. In fact, these institutional rearrangements were regarded as a once-in-a-hundred-years event in the history of Korean local administration. But the Cheongju Metropolitan Areas (CMA), which include the mother city of Cheongju and its neighboring rural county of Cheongwon,[1] is one of only two exceptional cases to which the urban-rural consolidation alternative was repeatedly opposed by the majority of rural residents.

This study aims at constructing dynamic models which would measure the direct and indirect impacts originating from the proposed administrative integration. Specifically, it compares two antithetical points of view, that of the existing and consolidation scenarios. Applying Cheongju and Cheongwon sample, it tries to set up causal and stock-flow models reflecting the above two scenarios. The simulation work focuses on dynamics changes of major urban indicators in the mother city of Cheongju and its vicinities, i.e. Cheongwon, respectively. It also analyzes whether the proposed consolidation scenario would exert meaningful positive impacts in enhancing regional attractiveness.

2. Theoretical Argument: For and Against Administrative Consolidation

Most of the existing documents dealing with administrative consolidation and segregation primarily have focused on what kind of standards should be applied in order to estimate the appropriate administrative units, rather than administrative integration per se. Furthermore, they haven't paid due attention to the dynamic characteristics of a city or a region, which has heavily limited the applicability of the previous findings. Therefore, this study is more interested in better understanding the theoretical raison d'être of administrative consolidation and segregation, going beyond the futile arguments surrounding the relevant population size.

Theories emphasizing the economy of scale, which was advocated by Wood(1958) and Zimmerman(1970), Horan & Taylor(1977), Rusk(1993), and Downs(1994) presupposed that the unified metropolitan government would increase the efficiency of the administrative management, facilitating public service provisions, and levying a more equality-based tax-burden. In the same vein, Voith(1992) and Dubnick & Mitchell(1993) also suggested that the inequality between the mother city and its neighboring county would hinder the metropolitan development as a whole as they are economically interdependent. They considered the duplication and fragmentation as the main causes of administrative waste and inefficiency.

[1] The other exception is centered around Jeonju city and Wansan county in Jeonbuk Province, Korea.

In a similar manner, Friedman and Douglas(1978) suggested the concept of aglopolitan development as one of endogenous development strategies, tying a small city with its hinterland in one bundle. This is not similar to growth-pole development strategies founded on dualistic dependency. Friedman and Douglas suggested that a mother city and its neighboring county should be treated as a co-existence unit.

Recently, innovation and network approaches have been accepted as main paradigms for the continuation of innovation and technology changes. For example, Porter(1990), and put more emphasis on the innovative milieu. In contrast, Kilduff and Tsai(2003), Carrington, Scott and Wassermand(2007), and Knoke and Yang(2008) have provided specific tools based on social network theories. Here, spatial network forms usually imply cooperative behavior between individual, firm and non-governmental organizations, not to mention territorial partners.

We think that there exist a series of theoretical and practical similarities between the innovation and network approaches and system dynamics, considering the fact that both have primarily dealt with dynamic components as a whole, going beyond the dichotomized classification between consolidation and segregation. Furthermore, the concept of the networked city system defined as system of horizontal and non-hierarchical relations is directly related to the urban attractiveness proposed by urban dynamics: without building a complementary and synergic inter- and intra-networks, we cannot make a spatial unit more attractive.

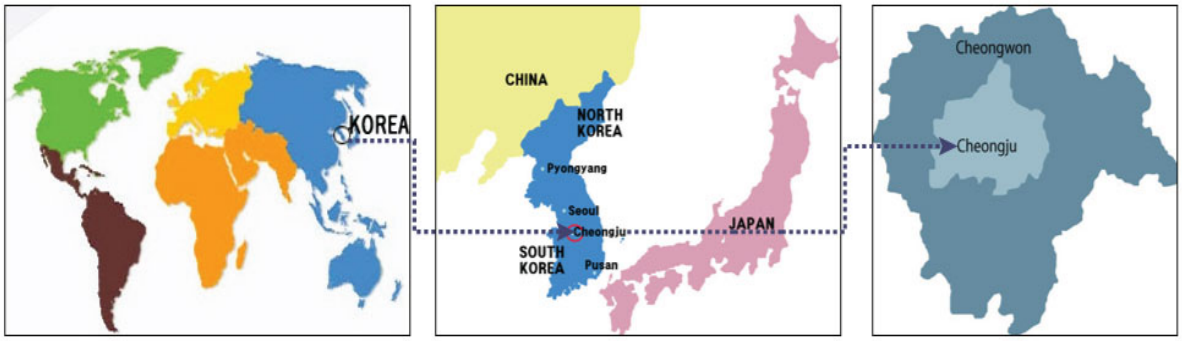
3. Background: Cheongju-Cheongwon Integration Issues

Located in the central part of Korean peninsular, Cheongju and Cheonwon have shared almost the same historical genealogy, presumably over bicentennials. The administrative jurisdiction separated Cheongju the mother city from Cheongwon the rural county right after World War II. These two regions represent unique administrative characteristics in Korea as rural Cheongwon encircles urban Cheongju, just like the egg and its yolk. Even though the area of Cheongwon(814.2km^2) is 5 times greater than that of Cheongju(153.4 km^2), Cheongju's population(640,000) is 4.5 times higher than that of Cheongwon (140,000) as of February 2008.

In the residential survey of April 1995, the urban-rural consolidation option was denied as 65.7% of Cheongwon residents rejected the proposal, whereas 76.5% of Cheongju citizens supported it. In September 2005, after an unprecedented decade of tugs-of-war, the Cheongju and Cheongwon governments carried out a local referendum. Even though the absolute majority of the Cheongju citizens(91.3%) opted for the consolidation policy, more than a half of Cheonwon constituents (53.5%) again rejected it. Even though the objection rate in Cheonwon had diminished over the previous decade, its votes were large enough to derail the consolidation petition.

As the prohibition deadline for the local referendum between two regions expired on September 29, 2007, the Cheongju city government has rekindled the consolidation movement, proposing same rosy promises. In contrast, the Cheongwon county government has tried to mainly highlight the potential adverse effects of the consolidation. Furthermore, the county government has proclaimed that it would pursue independent city status,

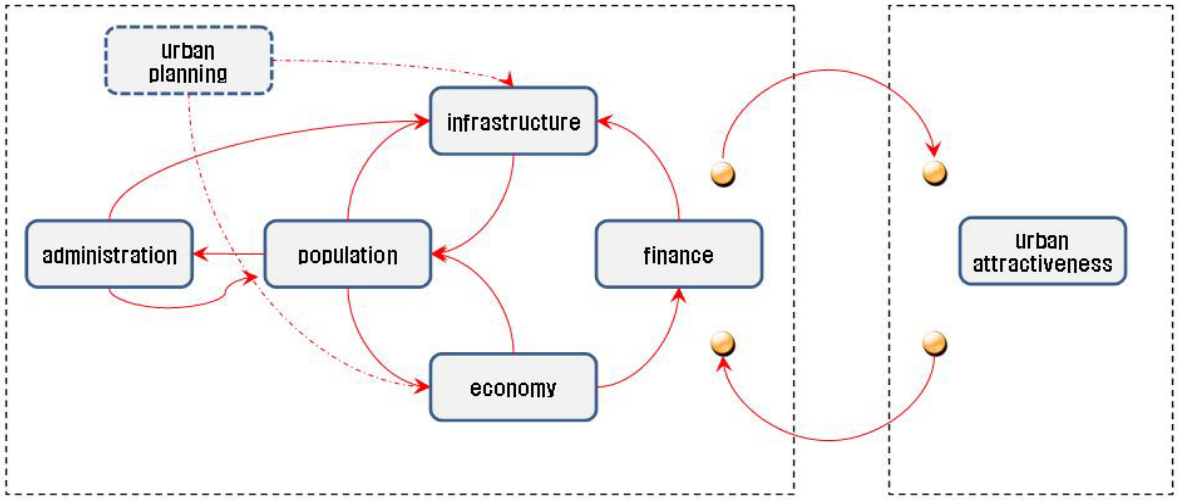
substituting it for the urban-rural consolidation option. Still, the pros and cons are easily categorized according to the geographical characteristics.
Since 2004, the local mass media have implemented more than 7 opinion surveys. The proponents in the surveys have usually stressed the fact that the consolidation would contribute to a more balanced development between two neighboring regions, ultimately enhancing the regional competiveness of the Cheongju Metropolitan Areas (CMA) as a whole. In contrary to this suggestion, the opponents have continuously insisted that Cheongwon residents may have to endure an unexpected additional tax burden, in addition to the unwanted invitation of so-called NIMBY facilities within Cheongwon proper.



<Figure 1> Cheongju and Cheongwon Jurisdiction

4. Administrative Consolidation and Separation Model Building

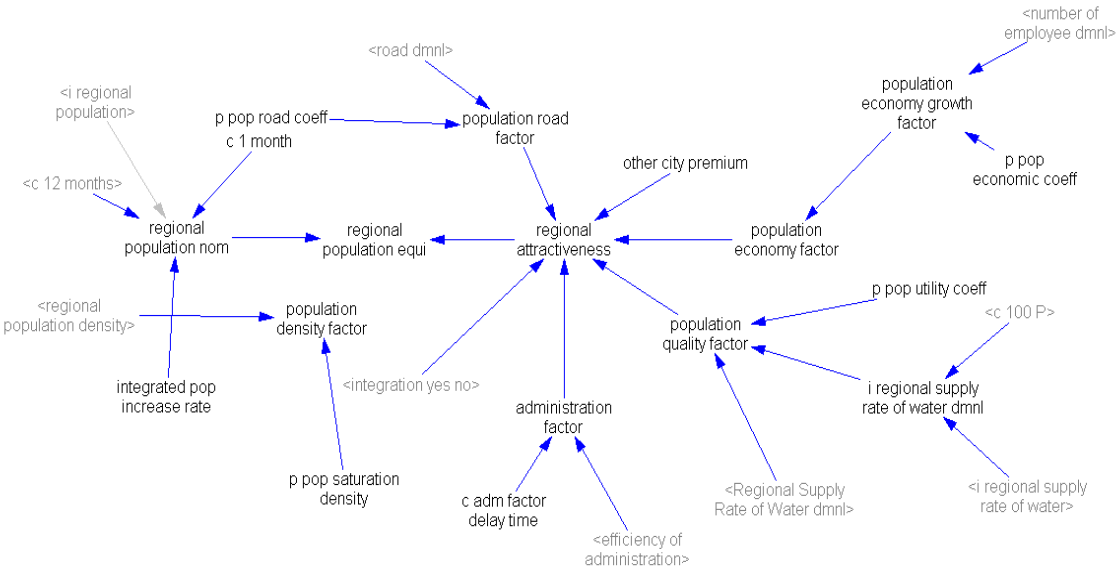
Modeling works are based on the two opposing scenarios: administrative consolidation and administrative separation models. The base year of the administrative integration is given to be 2010. Furthermore, it presupposes that the urban-rural balanced development strategies would be adopted when two organizations agree with each other. In fact, Cheongju and Cheongwon already reached a mutual agreement for the 2nd local referendum in September 2005: if they are integrated, a Cheongwon-centered development priority would be set up. Otherwise, if imbalanced development strategies are adopted, it might structurally induce a vicious cycle which would lower the regional attractiveness.



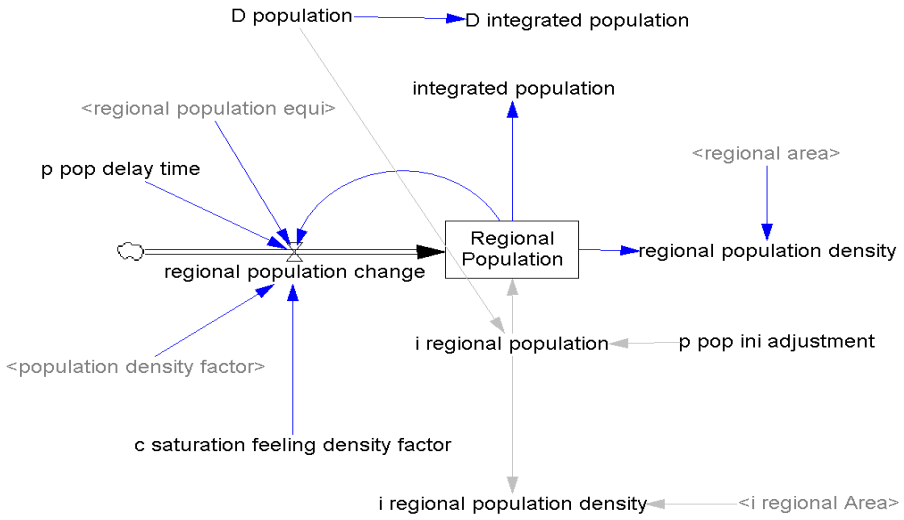
<Figure 2> Network of Key Modules

In order to select key components to represent systemic behavior, this study examines analytical indicators which are used in the previous studies dealing with administrative consolidation. This study primarily focuses on quantifiable indicators. Among 32 candidates, this study selects 11 variables, all of which have been well equipped with time-series data since 1999. These variables form five subsystems of population, administration, economics, finance, and infrastructure. In Figure 2, the regional attractiveness, quite similar to the urban attractiveness coined by J. W. Forrest, implies the aggregated concepts derived from five subsystems. The base year in the stock-flow modeling is 2001.

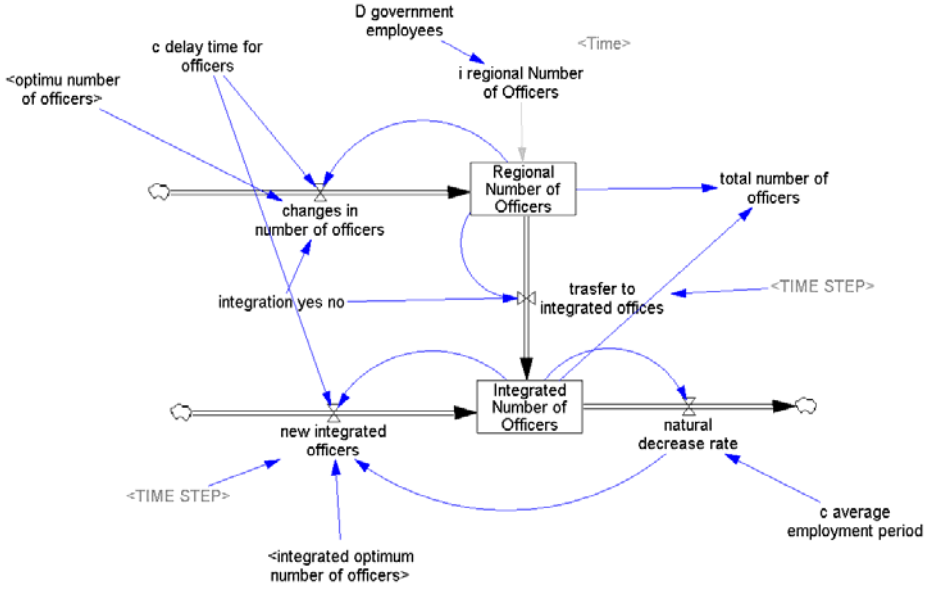
Figures 3 through 12 present stock-flow diagrams of 11 variables. Here, population sector deals with regional population, a single module. In contrast, the administration sector covers both the number of officers and the optimum number of officers. Regional number of companies, companies per capita, and employees per company make up the economic modules. The finance sector is exemplified by tax volume index and land value. Lastly, the infrastructure modules in the model are handled by the regional supply rate of water, the number of regional paved roads, the total required paved roads, and the number of regional registered vehicles.



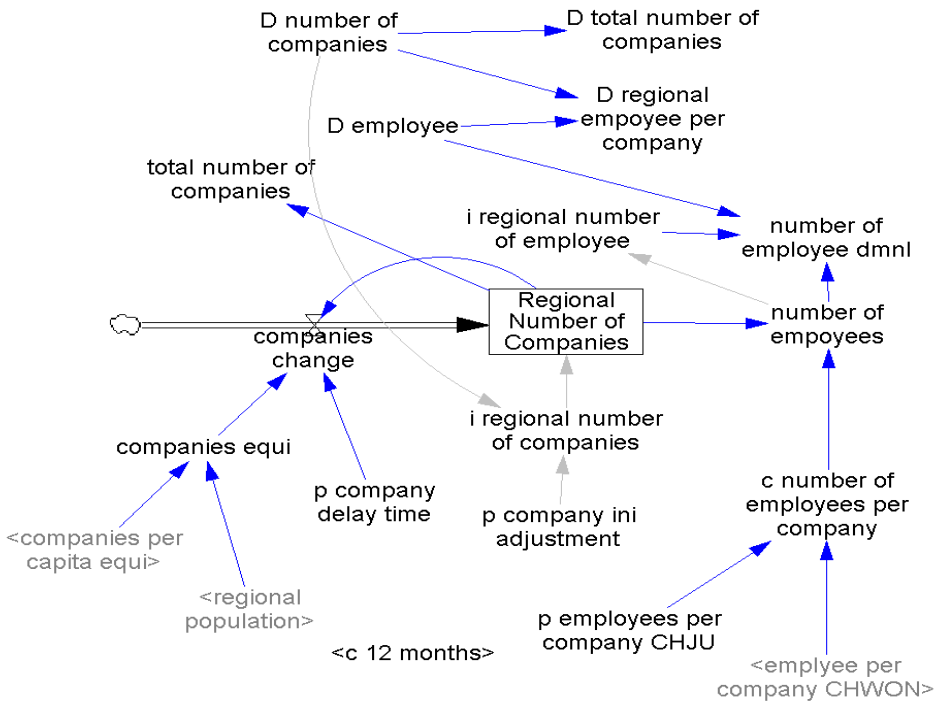
<Figure 3> Regional Attractiveness Module



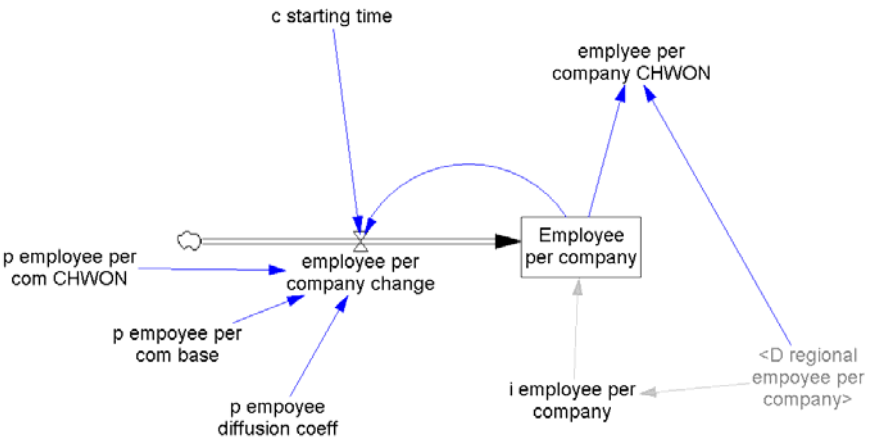
<Figure 4> Population Module



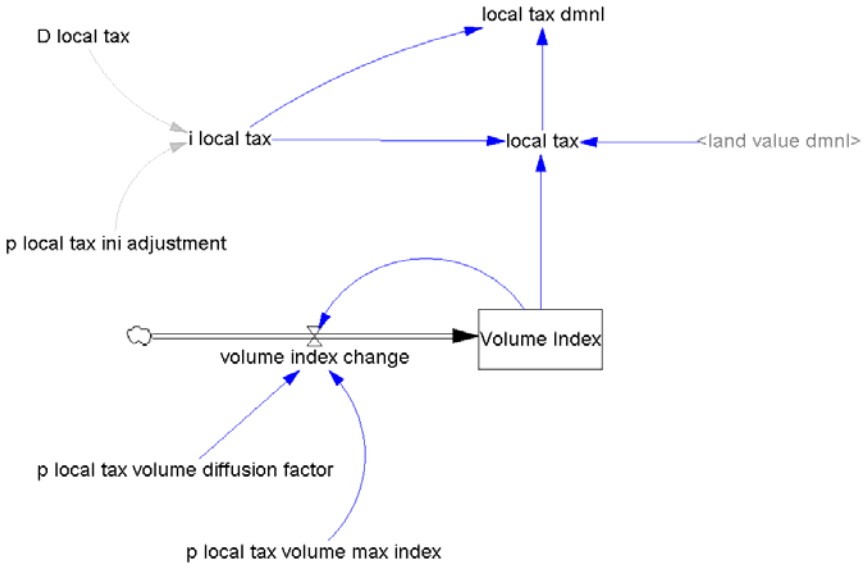
<Figure 5> Officers Module



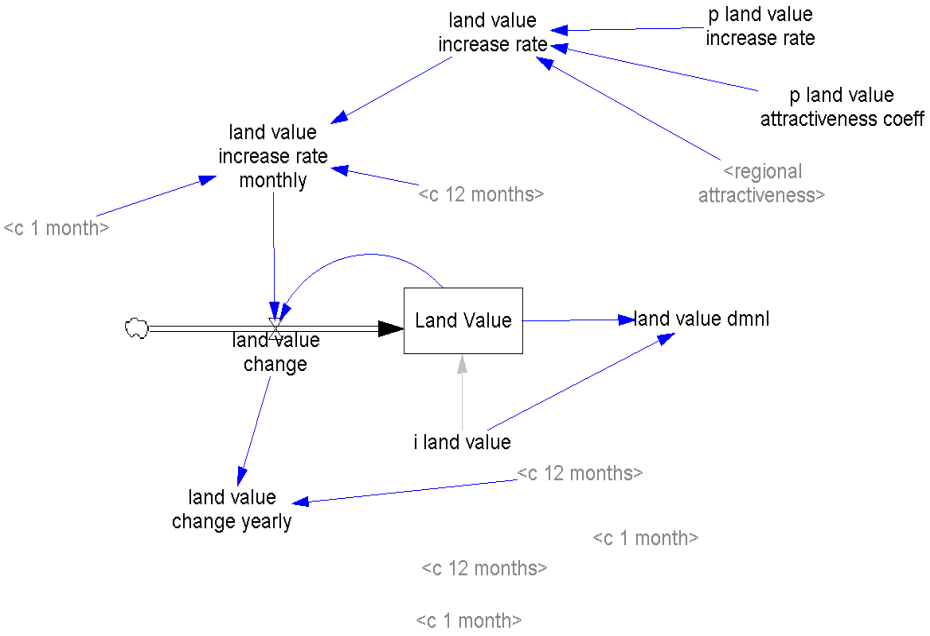
<Figure 6> Industry Module



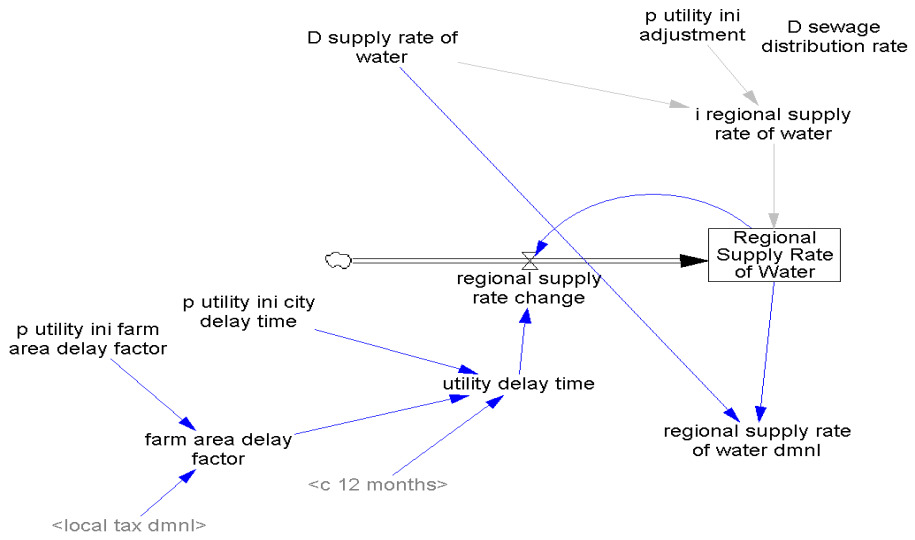
<Figure 7> Employee Module



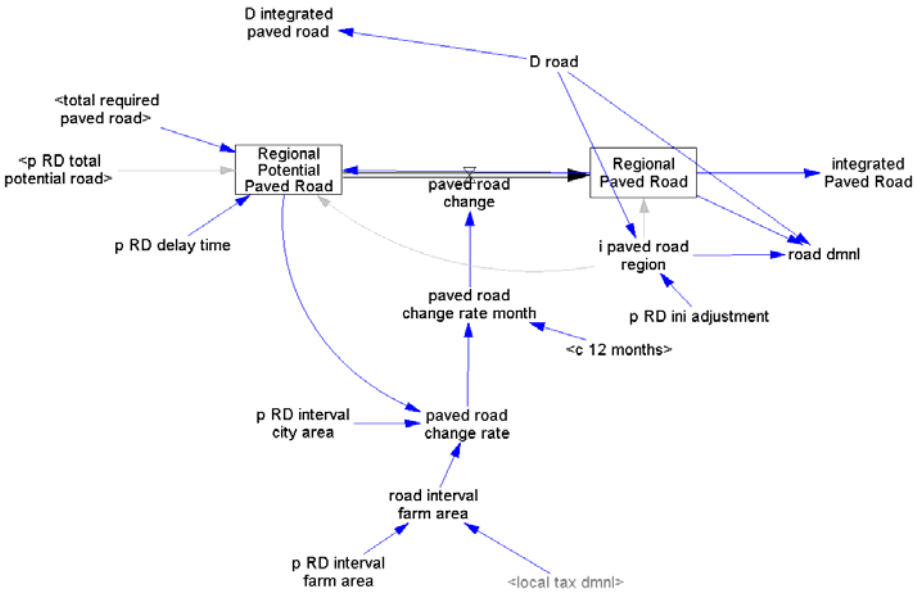
<Figure 8> Local Tax Module



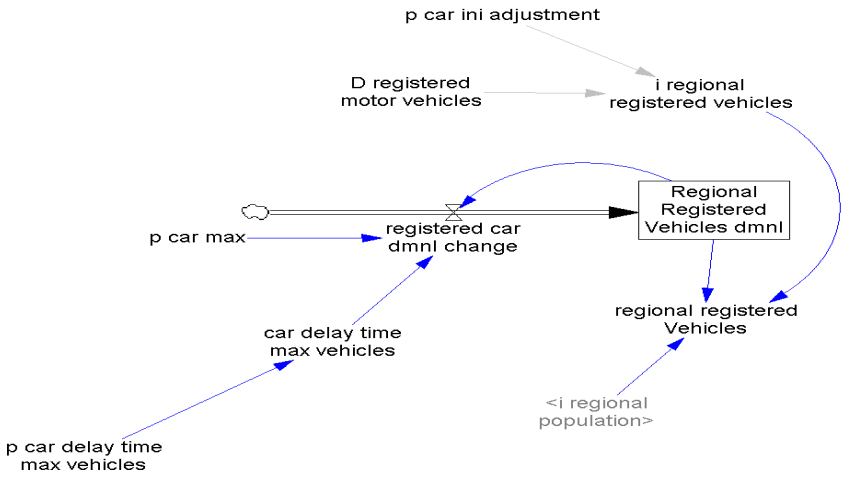
<Figure 9> Land Value Module



<Figure 10> Tap Water Module



<Figure 11> Paved Road Module



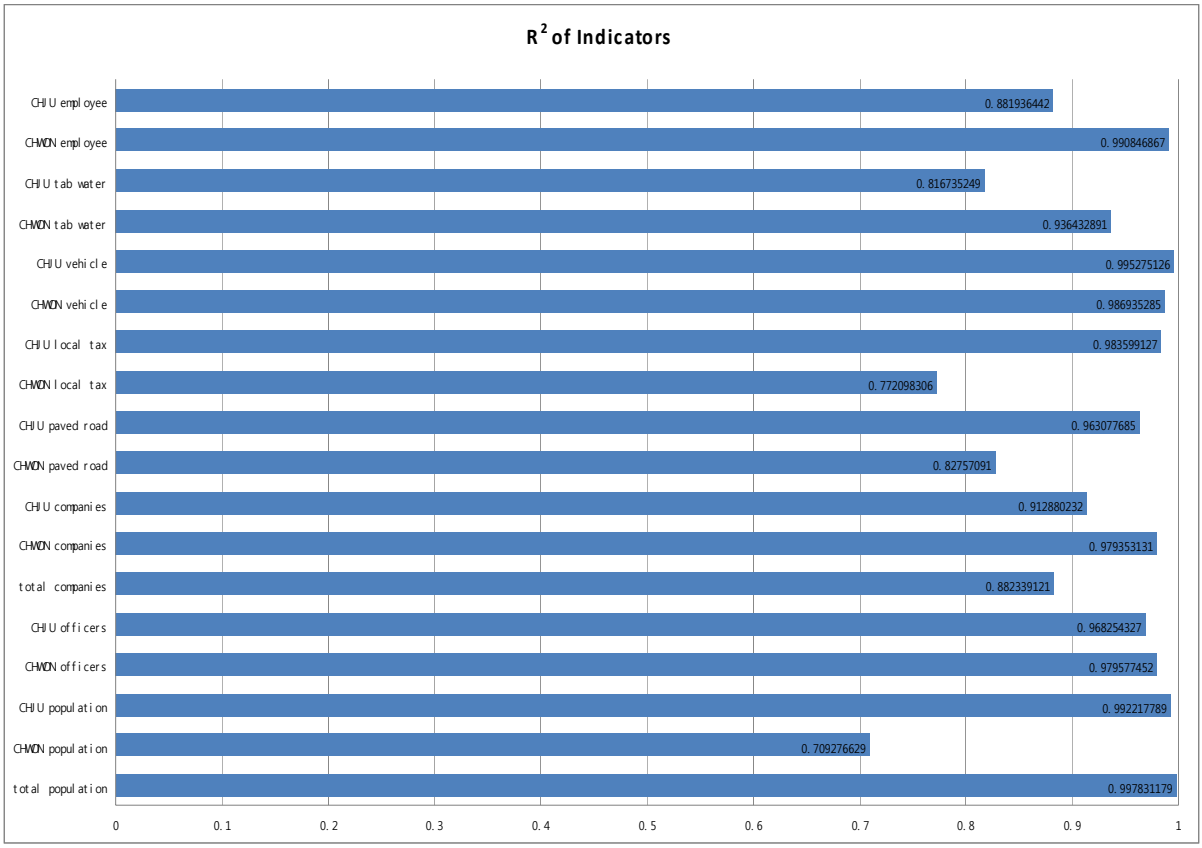
<Figure 12> Vehicle Module

5. Simulation Works

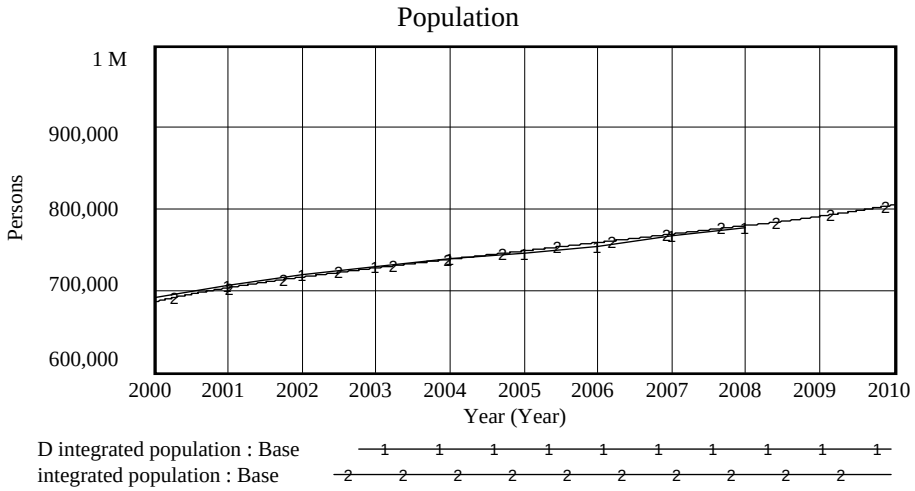
1) Relevance Tests

Before conducting the simulations, this study tries to test the models' relevance, applying least square methods and top-down approaches. The former implies that the relevance between real data and estimated models would increase as the value of R^2 approaches 1. In this study, the value of R^2 is between 0.70 to 0.99, implying exceptional reliability, as shown in Figure 13. The top-down approach visually compares existing data with simulated results.

As a specific means to develop reference mode, it relies on couples of historical data. Using optimizing processes, it tries to fix equations and coefficients. It puts emphasis on identical behavioral patterns between real and experimental data rather than mimicking the existing data over time. Based on traditional optimizing processes, the simulated behavior of stock-flow diagrams try to reflect the graphical pattern of existing statistical data between 1999 to 2007.



<Figure 13> Relevance Test of Major Indicators Based on Least Square Method



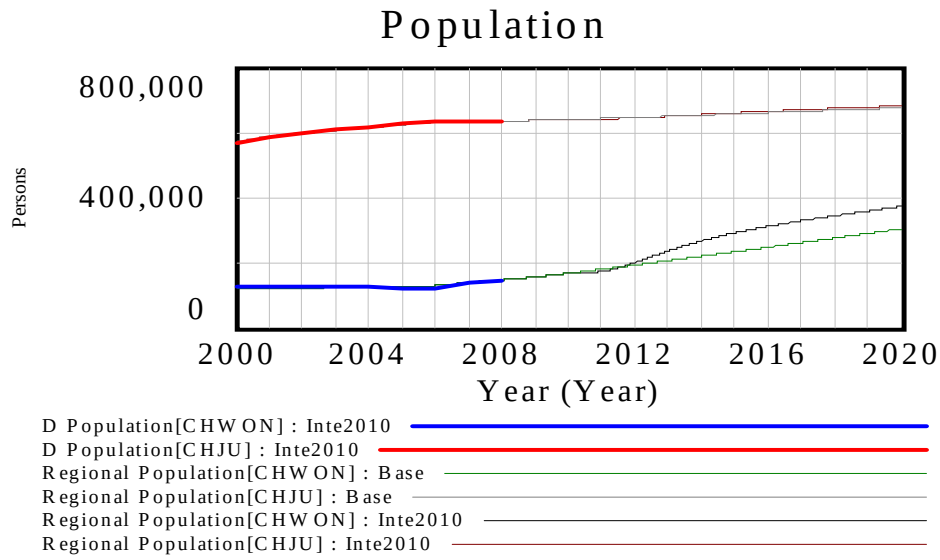
<Figure 14> Test of Population Variables

2) Changes in Key Indicators

2-1. Demographic Factors

Cheongju, the mother city, recorded 11.3% population increase rate per annum from 1999 to 2007. During the same period, Cheongwon's population increase rate was higher than that of Cheongju, 16.4% per annum. Especially, when comparing demographic data in the two regions from 2004 to 2007, it found that Cheongwon's population increase rate (19%) was far ahead of that of Cheongju (1%). Cheongwon's case is quite exceptional as the absolute majority of rural counties in Korea have lost their population base. It also partially reflects the fact that Cheongju is experiencing population outmigration into Cheongwon.

Suppose the existing independent administration systems continue, Cheongju and Cheongwon may repeat the current pattern in population movement by 2020: a mildly increasing rate in Cheongju and a highly increasing rate in Cheongwon (see Figure 15). Nonetheless, if Cheongju and Cheongwon are administratively integrated in 2010, it is estimated that the synthesized area would accommodate 1,051,994 people in 2020, 75,000 people more than that of the independent scenario.

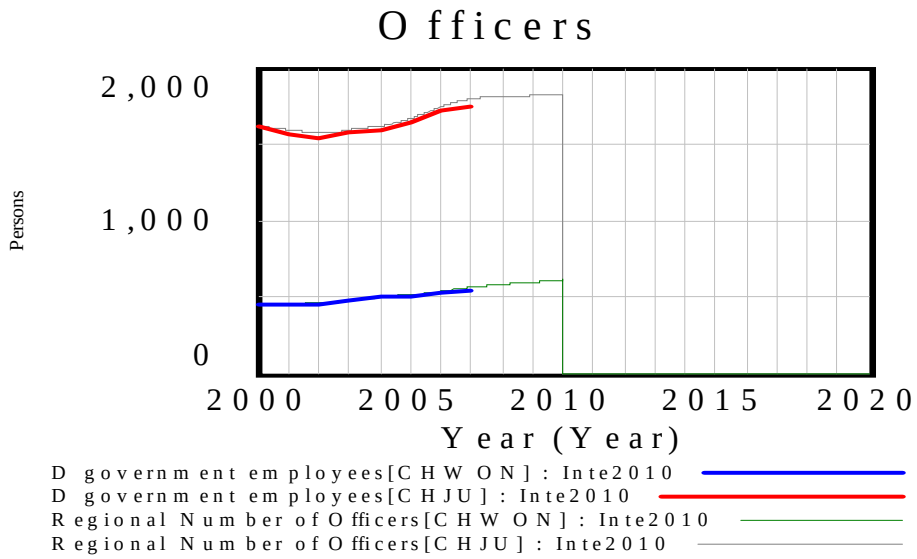


<Figure 15> Population Movement with and without the 2010 Consolidation Scenario

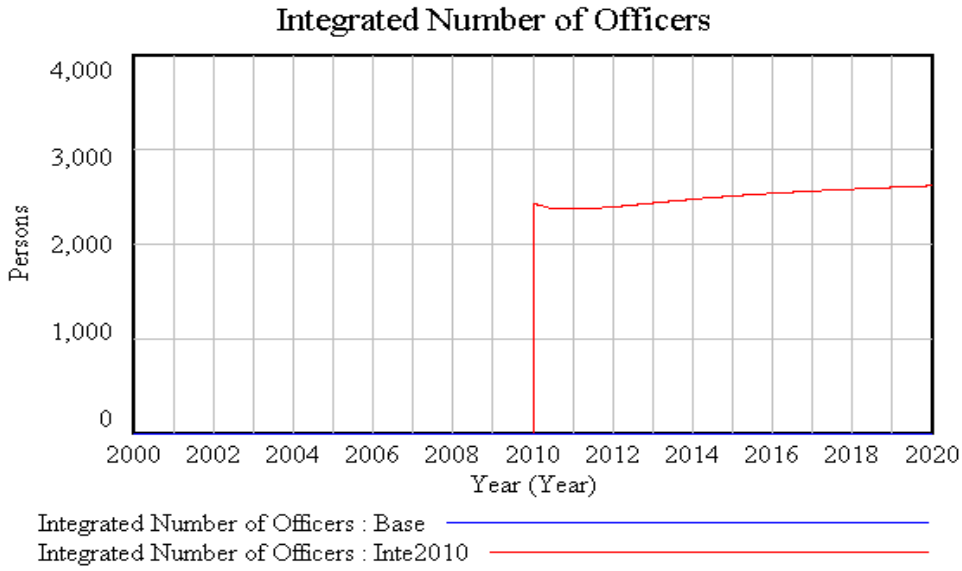
2-2. Administrative Factors

As the representative variable in the administrative dimension, this study focuses on the total number of government officials before and after the consolidation. In fact, the pro for the consolidation movement continuously points out the fact that the administrative integration could significantly reduce the personnel expenses, mostly originating from the control of additional recruitment of the personnel. They expect that the money saved from these measures would be diverted to the regional development fund.

Based on the existing separate scenario, the total number of additional government officials would be 239 (46 from Cheongju and 193 from Cheongwon) in 2020. Applying the integrated scenario, it would be 226. As the difference between the two scenarios is only 13, the impact of manpower reduction from the proposed integration movement seems not so meaningful as the pro group have suggested.



<Figure 16> Existing Number of Officers

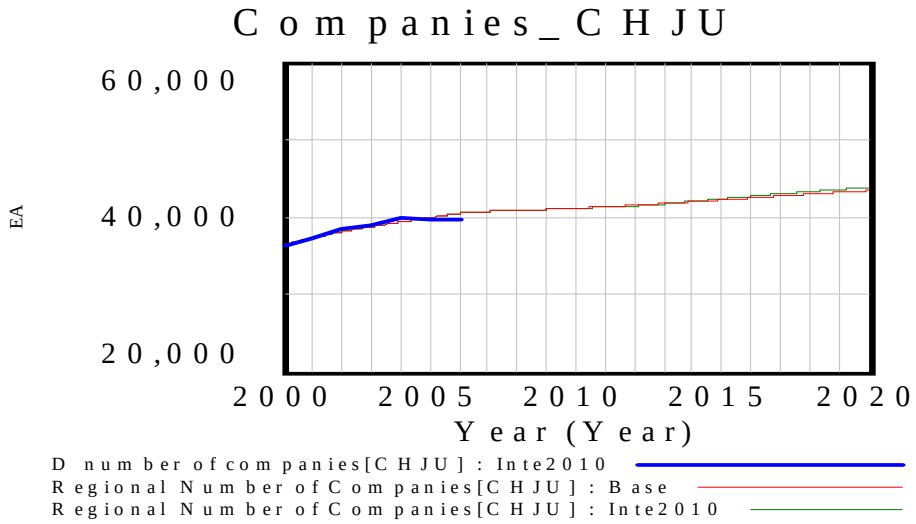


<Figure 17> Number of Officers with the 2010 Consolidation Scenario

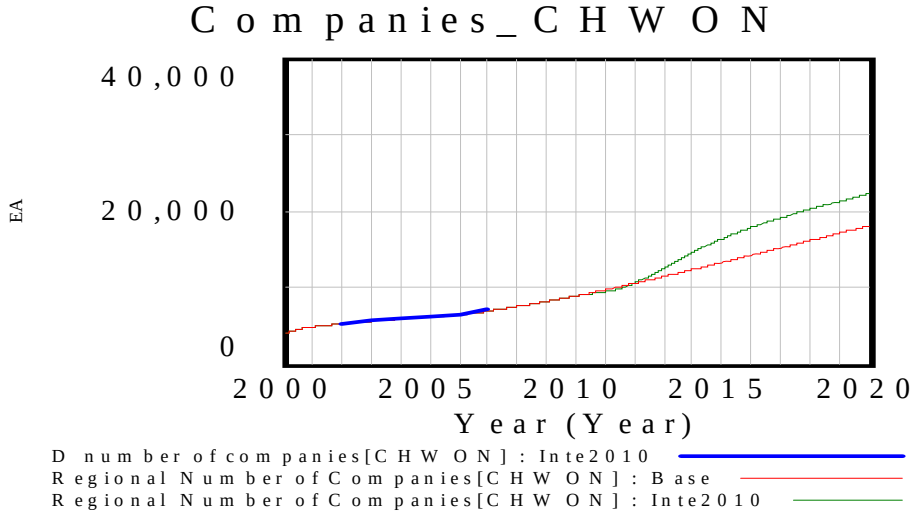
2-3. Economic Factors

In the economic dimension, this study focuses on two key variables---the number of companies and the number of employees. Almost the same as the separation scenario, the consolidation scenario would incur minimum impact on the number of Cheongju companies.

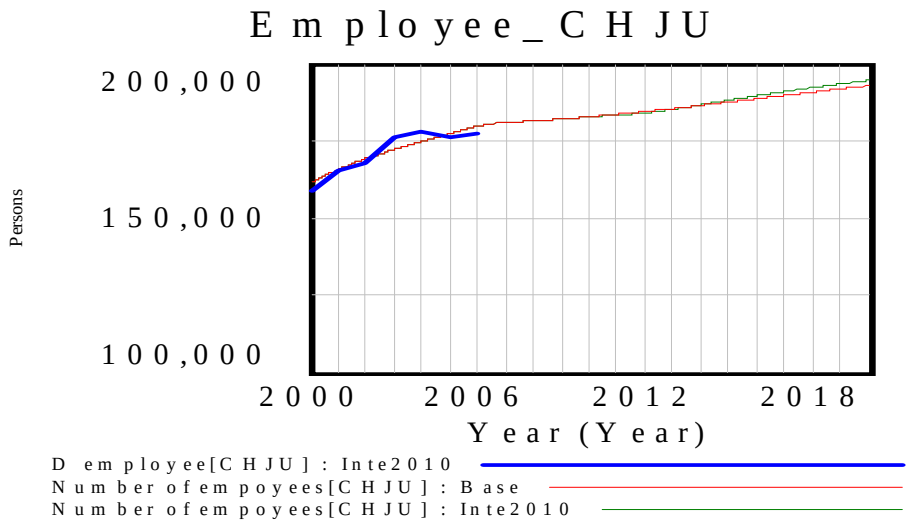
However, it is expected that the consolidation scenario would exert significant impact on the number of companies within Cheongwon proper. The difference comes from the multiplier. That is, Cheongju's multiplier is almost constant over the research period. In contrast, Cheongwon's becomes bigger over time. The same trend is observed in the number of employees. The number of Cheongju employees is almost same, regardless of consolidation. In contrast, the administrative integration would bring about a 23% increase in the number of Cheongwon employees from 2010 to 2020.



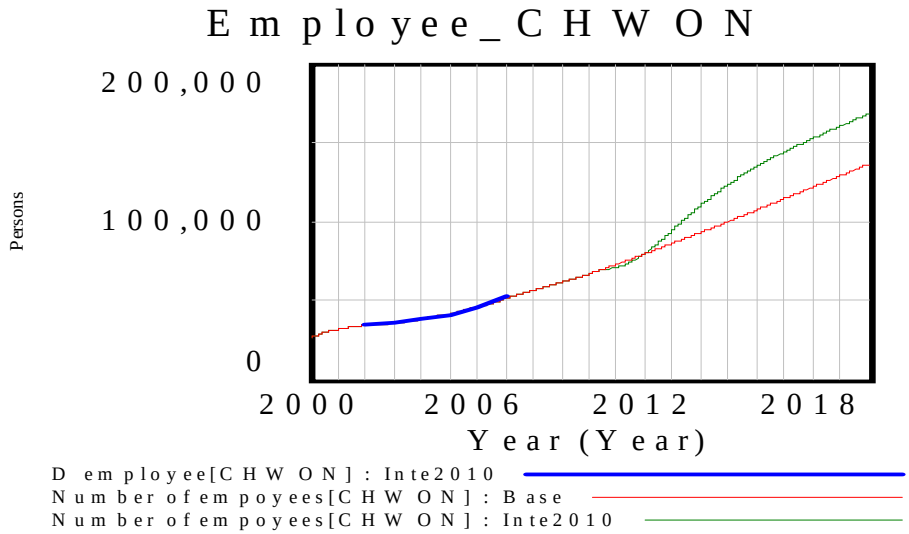
<Figure 18> Number of Companies in Cheongju with the 2010 Consolidation Scenario



<Figure 19> Number of Companies in Cheongwon with the 2010 Consolidation Scenario



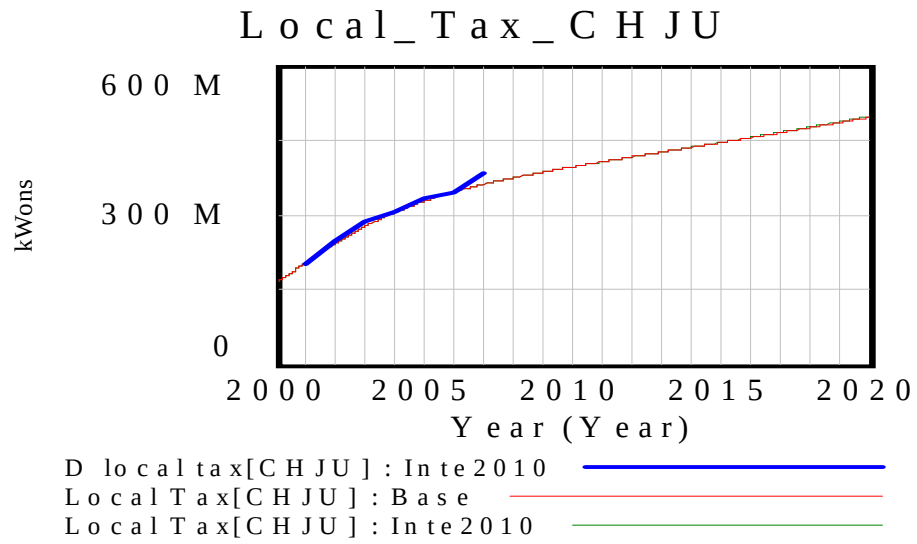
<Figure 20> Number of Employees in Cheongju with the 2010 Consolidation Scenario



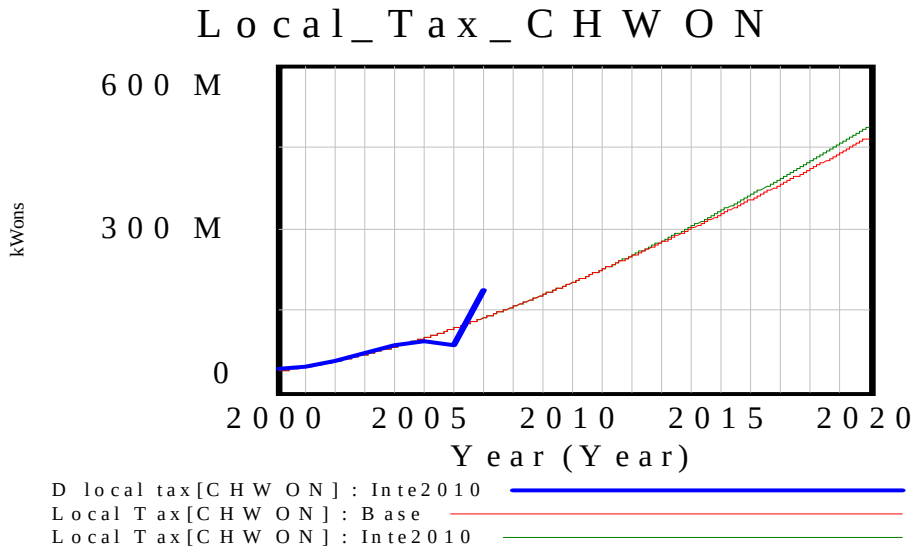
<Figure 21> Number of Employees in Cheongwon with the 2010 Consolidation Scenario

2-4. Financial Factors

Based on simulation results, the financial impact derived from the administrative integration is not so strong as that of the economic factor. That is, expected local tax in 2020 is 981.89 and 963.62 billion KRW(Korea Won) for consolidation and separation scenarios, respectively. This simply reflects the fact that the administrative integration is indirectly related to the local tax base which principally depends on the population and companies, not to mention an increase in land value. Furthermore, the existing laws strictly control the integrated authority from levying any type of additional tax burden on the existing rural constituents.



<Figure 22> Changes of Local Tax in Cheongju with the 2010 Consolidation Scenario



<Figure 23> Changes of Local Taxation in Cheongwon with the 2010 Consolidation Scenario

6. Conclusions

Based on the system dynamics approach, this study tries to better understand diverse impacts originating from administrative jurisdiction consolidation. Specifically, it pays attention to the unique experiences of the two neighboring administrative authorities, namely Cheongju and Cheongwon, to which the advantages and disadvantages of jurisdiction consolidation have been argued for almost two decades.

This study reexamines theoretical basis of the administrative consolidation and separation and tries to build a series of causal loops reflecting the theoretical interrelationship between these two approaches. Concerned with the administrative integration between a mother city and its vicinities, this study focuses on modeling work reflecting administrative consolidation and separation, respectively. It also examines whether the proposed consolidation scenario would exert a meaningfully positive impact in enhancing regional attractiveness.

Following the general procedures of the system dynamics approach, first of all, this study focuses on the formation of causal loops. The theoretical grounds both of the consolidation and separation advocates are represented with causal loops. Secondly, applying cases derived from the existing documents, it juxtaposes specific examples of feedback structures between consolidation and separation advocates. Thirdly, it tries to develop experimental causal loops of administrative integration, reflecting the current and future conditions of Cheongju and Cheongwon.

The base scenarios are dichotomized between the administrative consolidation in 2010 and the status quo—administrative separation between Cheongju and Cheongwon. This study tries to build quantifiable models and their 13 modules are interconnected. Key variables include population, administration, economics, finance, urban infrastructure, and urban attractiveness. After constructing two scenarios, this study analyzes administrative jurisdiction consolidation and separation dynamics and compares value changes of key factors between two administrative authorities. The proposed consolidation scenario assumes that the integrated administrative authority guarantees balanced regional development strategies, starting from 2010 as a base year. In order to test the relevance of models, this study applies least square methods and top-down approaches. For the simulation work, it puts emphasis on comparison of behavioral patterns between real and experimental data, rather than mimicking the existing data over the research period, 1999-2007.

The followings are major findings. Firstly, it is expected that the integrated jurisdiction as a whole would attract more people than the case of jurisdiction separation. If the consolidation plan is carried out as expected, it would record relatively larger volumes of in-migration population within the Cheongwon territory. This type of in-migration rate directly implies a reflection of improved urban attractiveness.

Secondly, there would be nominal difference in terms of the number of government officials between the before- and after- consolidation scenarios. Therefore, it seems inappropriate for the advocates of integration to advertise that the consolidation movement would substantially increase the regional development fund, as it guarantees cost-saving effects of the administrative integration.

Thirdly, similar trends are observed in the number of companies and employees. That is, regardless of the administrative consolidation, there would be minimal difference to the number of companies and the number of employees in Cheongju. In contrast to this trend, changes to the integrated Cheongwon's companies and employees would be relatively larger than that of the separation scenario.

Fourthly, it is difficult to find meaningful differences in local taxation between the before-

and after-consolidation scenarios, as legal and institutional factors are involved in the separation and integration initiatives. From extrapolating past trends, the differences in local taxation between Cheongju and Cheongwon would be narrowed in the future as the latter would keep higher increases in the rate of local tax.

Fifthly, in the dimension of urban infrastructure facilities, key indicators like the supply rate of tap water and pavement road would present nominal difference between the before- and after-consolidation scenarios. Nonetheless, it is expected that Cheogwon would enjoy meaningful benefits in terms of urban infrastructural networking, nonetheless, if the administrative consolidation is adopted. Judging from existing promises between the two neighboring units, it is almost sure that the integrated administrative authority may have to initially invest large volumes of regional development funds past-Cheongwon boundary of old.

These findings partially contradict the repeated explanations of consolidation critics and advocates. In fact, each group has been busy highlighting only one-sided views, not revealing both positive and negative aspects of the jurisdictional consolidation. They seemingly treat jurisdictional consolidation either as a cure-all or an out-dated curse. Consolidation advocates insist that the jurisdictional consolidation would significantly increase regional competitiveness, without due attention to the regional attractiveness. In fact, they have not provided substantive programs to guarantee regional attractiveness yet. At the same time, consolidation critics dare to claim that the jurisdictional consolidation would incur extra tax burdens to Cheongwon residents, not to mention unreasonable concentrations of so-called NIMBY facilities within the Cheongwon vicinity. Unlike the critics' arguments, it almost seems sure that Cheongwon would primarily enjoy a series of benefits originating from the administrative integration. Furthermore, in order to enhance regional attractiveness, Cheongju and Cheongwon should fulfill a decade-old promise—both regions should adopt balanced regional development strategies right after the administrative integration.

Even though Cheongju and Cheongwon constituents already had to endure enormous social costs for the administrative integration through the residential survey of April 1995 and the local referendum in September 2005, they still experience difficulties in building the schematic scenarios for the future Cheongju Metropolitan Areas(CMA). It should be remembered that residents should be provided with a sufficient amount of information before casting their votes again.

Special Note: We are extremely thankful for Dr. Sang-Man Kwak's help in running stock-flow models.

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