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The Study on Housing Price Change and Population Movement in Response of Planned City Construction

: Republic of Korea Case

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Introduction

Seoul, the capital of the Republic of Korea is now under a population concentration problem. According to The Seoul Research Data Service (2010), the population living in Seoul is more than 20 percent of total population and if we expand the range to metropolitan Seoul, the population living near Seoul is 48.9 percent of total population. The government has continued to regulate housing price through interventions on the housing market. Soared housing price in metropolitan area is the main concern for politicians; the polarized housing price can be regarded as the obelisk of solidified economic class. Representatively, government has tried to interfere with the housing market through taxation policy such as property tax and housing allowance. The taxation policy was an effective indirect intervention on housing market with respect to control speculation by regulating multiple house ownership, but the taxation had definite limitations because of the shortage of house supply in the area. A preference for residence in metropolitan area is behind the shortage of house supply. The Korean government implemented the policy called 'planned city' which was derived from the concept of Garden City (Howard, 1902). The Garden City is a city structure in which multiple satellite cities are connected to a central city through transportation such as road or rail. The Korean government adopted the concept of the

Garden City near Seoul. The detailed explanation will be covered in the latter part of this paper. A first generation of such cities was built in the 1960s. We focus on the second wave of such constructions, which was implemented in the 2000s. The purpose of this second generation planned city from 2000s was to distribute the population to nearby cities to control the housing price and balanced regional development.

In this paper, we interpreted the real-estate issue in Republic of Korea based on the question.

How does the housing price in Seoul respond to the construction of the planned city?

Theoretical Framework

Republic of Korea's planned city policy has two big branches. One is a land development and the other is solving the problem of the capital concentration (Kim, 2013). The early planned cities were different from the recent planned city. The early planned city has a definite purpose, for instance, one of the early planned cities, Ulsan (1962), was constructed for the development of heavy industry. The recent concept of planned city, Howard's Garden City', was adopted from the late 1980s. The first planned city which adopted the concept of 'Garden City' was constructed in the 1980s with the background of the current account surplus. Garden City theory has several conditions. First, 'population of the city should be limited'. This condition was not strictly kept in Seoul. The Republic of Korea's capital was too huge to meet with the proposition of Howard (limiting city's population 30,000 to 50,000). Instead of limiting population of the city, government tried to distribute population to near cities. Second condition is 'protecting agricultural area near the city to limit the expansion of the city'. Korean government limits the expansion of the city by designate agricultural area as 'Green Belt'. In this area the construction of industrial facilities is

prohibited. Third condition is maintaining satisfiable economy by retaining the industry. Fourth is 'city use exclusive water, sewage, gas, electricity'. Fifth condition is 'land could not be a subject of private possession by management main body'. Sixth condition is 'make the residents to enjoy the right of free union'. Many of those conditions of garden city were adopted to planned city policy of Korea. The feature of the planned city resembles the theoretical feature of Garden City.

Figure 1. Garden City, Three Magnet (Howard, 1898)

The Garden city and Korea's planned city share its core value. Garden City was proposed to solve the problems of urban sanitation and slumism in the United Kingdom industrial revolution period. The main purpose of Garden City was to alleviate the population concentration of metropolitan areas. The main purpose of Korea's planned city is same as Howard's Garden City, and in addition to the population decentralization, government tried to distribute some of the functions of the capital to planned cities.

As part of government policy, some of the planned cities shared functions of the

capital. For instance, Sejong Special Autonomous city is constructed as Multifunctional Administrative City. Therefore, main government branches such as Minister of Economy and Finance relocated to Sejong-si (Sejong Special Autonomous city). As Sejong-si constructed, public officers moved to the city and the local economy activated. Distributing the functions of the capital to planned cities is one of the most important factors of success for planned city.

Planned City project was one of the policies that government implemented to solve the housing shortage problem of metropolitan area. Thus, planned city needed to be constructed close to metropolitan area to attract employees who commute to Seoul. Accordingly, government constructed various means of commute as the part of planned city to protect resident's short commuting time to Seoul. One example is planned city 'Pangyo' which was constructed with direct rail transportation to Gangnam, the center of Seoul. The direct rail transportation to Gangnam was considered to be one of the main factors for the success of planned city Pangyo. This railroad, now, is expanded to further new generation planned cities such as 'Gwanggyo'. After Gwanggyo was connected with the direct train, the housing price of Gwanggyo has significantly increased. This is the evidence of the high demand for houses in Gwanggyo which means that transportation factor is also valid success factor of planned city.

In addition to functional factors and transportation factors, we considered speculation in real estate market. Overheated real-estate speculation is one of the reasons for house price soaring. However, there is no direct index to show the degree of speculation in the real-estate market. Thus, we considered the alternative way to capture the degree of speculation. We thought that real-estate policy of the Republic of Korea could give us the answer to whether there is existing real estate speculation in the market, and if so, how did speculation affect

housing price in Seoul. Korean government has tried to drag down the soared housing price in Seoul. In 2017, government implemented strong policies that levied holding tax to those who own more than one house. After the policy implemented, some of the speculators exit the market. If the policy had valid effect on real estate speculation, the housing price would be stable after speculators exit from market, and the housing price change would be monotonous afterward. However, if the housing price still dramatically fluctuates after policy implemented, it means the policy did not affect the real estate speculation in the market. The effect of policy would be addressed in policy evaluation part with comparison of various policies that had implemented.

Data

The data contains housing price in Seoul, planned cities and other adjacent regions, and population movement of each city and state, consumer price index, producer price index, mortgage price, interest rate, and Korea Composite Stock Price Index (KOSPI). The data was collected from Korea Appraisal Board. Korea Appraisal Board is a public enterprise under the Minister of Land, Infrastructure and Transport; hence, our data was collected from a credible source. The housing price is the monthly data. We used the average housing price in Seoul and the average housing price of states and metropolitan cities. There are 9 states and 6 metropolitan cities in South Korea. Among the states, we excluded Jeju independent state (Jeju Island). Jeju is the island that has unique economic structure and culture, therefore, the data of Jeju could not be used as a control variable. The data of housing price, consumer price index, producer price index, mortgage rate, interest rate, and equity price have ranged from January 2007 to April 2020. The population data range was January 2008 to April 2020, thus, the population data from 2007 to 2008 was missing. We decided to interpolate missing data.

The detailed procedure of interpolation and the reason that we decided to interpolate was addressed in the Research Methodology part.

Data Description

Variable	Obs	Mean	Std.Dev.	Min	Max
Housing price Seoul	160	95.124	6.426	79.305	108.852
Housing price Incheon	160	96.295	6.761	70.928	104.63
Interest rate	160	2.855	1.312	1.22	6.28
Overall housing price index	160	93.014	6.432	77.862	102.301
Population Seoul	160	1.01e+07	177000	9730000	1.03e+07
Unsold new house Seoul	160	1346.831	1119.177	27	4331
Unsold new house Incheon	160	2896.762	1637.56	219	7443

Table 1. Data Description

Data Range	
2007-01 - 2020-04	2008-01 - 2020-04
Housing Price	Population movement
Consumer Price Index	
Mortgage rate	
Interest rate	
Equity price	
Unsold new House Seoul	
Unsold new House Incheon	

Table 2. Data Range

State	Megalopolis	Planned City
Gangwon	Seoul	Pangyo

Chung-cheong bukdo	Incheon	**Dongtan***
Chungcheongnam-do	Busan	**Kimpo**
Jeollabuk do	Dae-gu	Paju
Jeollanam-do	Gwangju	**Gwangyo**
Gyeongsangbuk-do	Daejeon	**Yangju**
Gyeongsangnam-do	Ulsan	**Wiryre**
	Ulsan	

*Second planned city in Dongtan

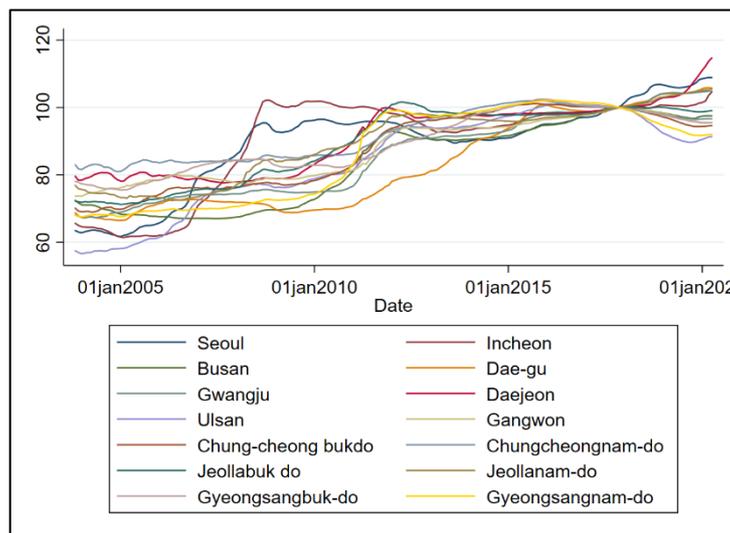Table 3. South Korea States, Megalopolis, and Planned Cities

Figure 2. Housing Price Trend South Korea

Second Generation Planned City South Korea							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Pangyo	**Dongtan**	**Kimpo**	Paju	**Gwangyo**	**Yangju**	**Wiryre**
Site area	8.9	24	11.7	16.6	11.3	11.2	6.8
House number	29.3	116.5	61.3	88.2	31.3	63.4	44.8
Population (thousand)	88	286	167	217	78	163	110
Population density (person/ha)	98	119	146	130	69	146	163
Initial lotting-out	March-06	Aug12	Aug08	Sep06	Sep-08	Oct12	Nov-11

First move-in	Dec-08	Jan-15	June-11	June-09	July-11	Nov-14	Dec-13

Table 4. South Korea Planned City Construction Information

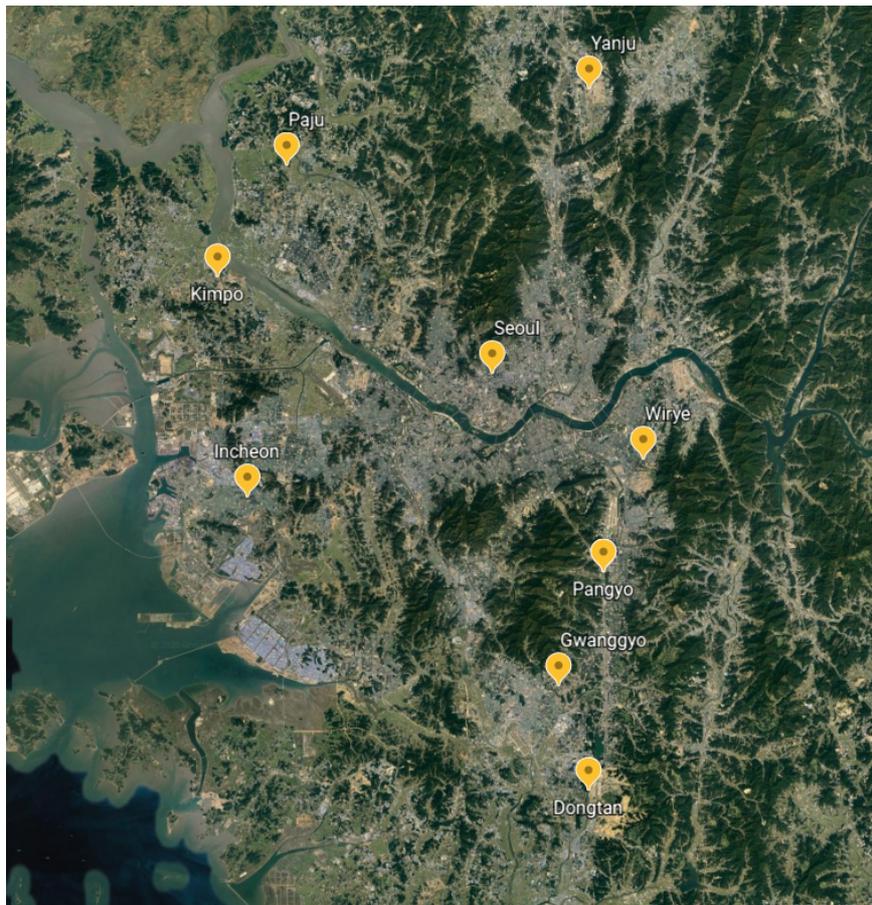(Ministry of Land, Infrastructure and Transport, 2017)

Figure 3. Planned City Location

Research Methodology

The purpose of this paper is to evaluate the effect of planned city construction on the

housing price in Seoul. We decided to include population, interest rate as determinants of

housing price. Seoul is the capital of South Korea and has a unique city structure. Almost

50% of the total population of South Korea live near Seoul. Therefore, the housing demand in

Seoul is usually higher than any other region in South Korea. Even though the high housing price in Seoul is normally high, the recent housing price soared in Seoul is worthy of notice. Soared housing prices in Seoul became a social issue. Accordingly, the Central Bank of Korea explained the reasons for the soared housing price in Seoul. The first reason is the low-interest rate. As central bank set standard interest rate low, people demand real estate as an alternative investment. The second reason is the expectation of people. Historically, the housing price in Seoul increased. People expected a further increase in the housing price in Seoul and the increased uncertainty of economics boosted the demand for houses in Seoul. The last reason is the shortage of house supply in Seoul. As mentioned above, the population density of Seoul is high, the demand for house exceeds far much than the supply of the house. This is the fundamental reason for the high housing price in Seoul. Consider the reasons for housing prices soared in Seoul, we decided to include population, number of unsold new houses in Seoul, number of unsold new houses in Incheon, and interest rate in the model. We decided to include the metropolitan city 'Incheon' as a control variable. Incheon is the only metropolitan city near Seoul. and it has a similar housing price trend with Seoul. Therefore, including population of Seoul and housing price of Incheon in the model would make our model more accurate. The housing price data range is from January of 2007 to April of 2020. Between these two periods, there was a huge event which gave a tremendous shock to our economy and market: subprime mortgage crisis. The subprime mortgage crisis was a shock. Therefore, we include a subprime mortgage crisis as a dummy variable from December 2007 to May 2009. It would capture the dramatic increase or decrease in housing price between two periods.   However, our population data range was from January 2008 to April 2020. Compare to housing price, data between 2007 and 2008 was missing. The subprime mortgage crisis was a huge shock to housing market, therefore, we need to include a subprime

mortgage crisis in the model. Besides the monthly population data from 2008 to 2020, we had

yearly data on the population. As we can see in Figure 4, the yearly population data from

2007 to 2008 was linear. Thus, we interpolated yearly data to monthly data from 2007 to

2008. Figure 5 show the interpolated monthly population data. The trend of the interpolated

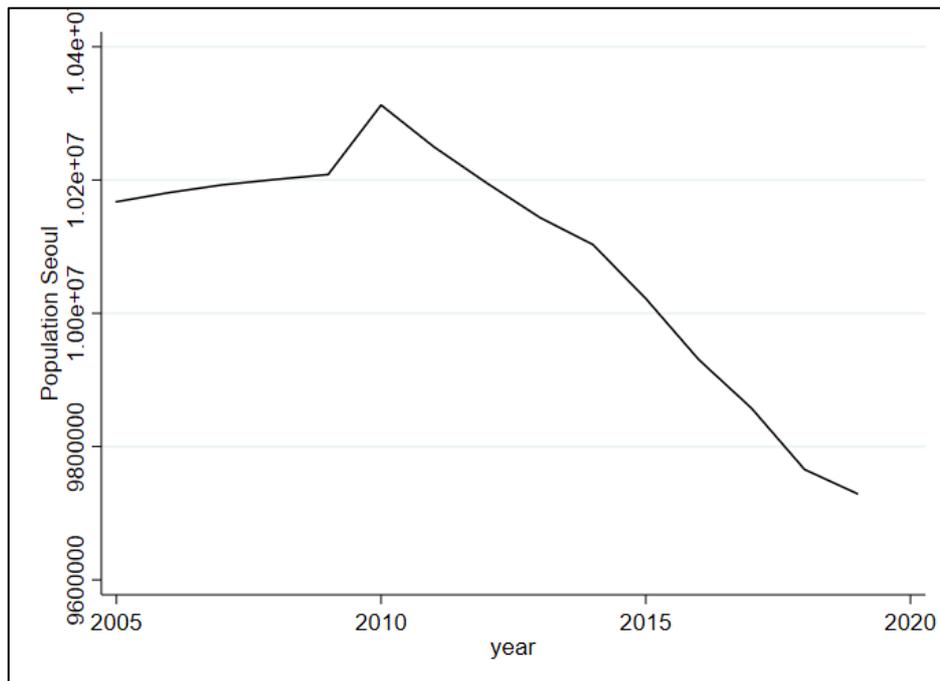monthly population data is analogous with yearly population data.

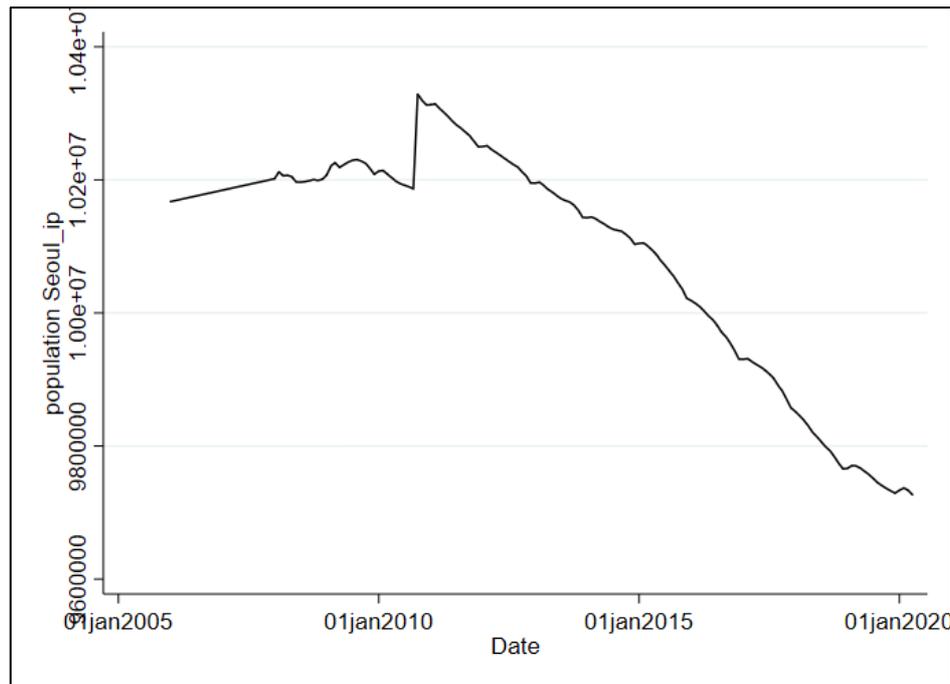Figure 4. Yearly Population Seoul

Figure 5. Interpolated Monthly Population Seoul

Recall from above, house demand affects the housing price. The increased population in Seoul could show the demand of houses in Seoul. Not only house demand, but also house supply affects the housing price. The shortage of houses would increase the housing price in Seoul. Accordingly, we decided to import number of unsold new houses in Seoul and Incheon. The unsold new house is an alternative indicator of house supply. If the number of unsold new houses increased, it means that there is excess house supply in the market. We included unsold new house as an indicator of house supply in our model.

We conducted linear regression to interpret the effect of planned city construction on the housing price in Seoul. The response variable is the housing price in Seoul. The control variables are housing price of Incheon, population of Seoul, interest rate, overall housing price index of South Korea, subprime mortgage crisis, and number of unsold houses in Seoul

and Incheon. The explanatory variables are dummy variables of planned cities. The second-generation planned cities are Pangyo, Dongtan, Paju, Kimpo, Gwanggyo, Yangju, and Wirye. Among second-generation planned cities, we exclude Pangyo and Paju which was constructed in 2006. The data of other variables started in 2007, thus, we exclude two planned cities from the model. Explanatory variables are Dongtan, Kimpo, Gwanggyo, Yangju, and Wirye. The model can be addressed as below:

$$\text{Housing Price Seoul}_t = \beta_0 + \beta_1 \text{housing price Incheon}_t + \beta_2 \text{Population}_t + \beta_3 \text{Interest Rate}_t + \beta_4 \text{housing price index}_t$$

$$+ \beta_5 D_{\text{Subprime}} + \beta_6 \text{Unsold Seoul} + \beta_7 \text{Unsold Incheon} + \beta_8 D_{\text{Dongtan}} + \beta_9 D_{\text{Kimpo}} + \beta_{10} D_{\text{Gwanggyo}} + \beta_{11} D_{\text{Yangju}} + \beta_{12} D_{\text{Wirye}}$$

Result

Linear regression

Seoul	Coef.	St.Err.	t-value	p-value	95% Conf	Interval	Sig
Incheon	0.481	0.046	10.44	0.000	0.390	0.572	***
InterestRate	0.725	0.385	1.89	0.061	-0.035	1.485	*
hpriceindex	0.644	0.054	11.92	0.000	0.537	0.751	***
Population**	-28.32	1.184	-23.91	0.000	-30.66	-25.98	***
subprime	-1.368	0.334	-4.10	0.000	-2.029	-0.708	***
Seoul_unsold*	1.746	0.201	8.65	0.000	1.347	2.144	***
Incheon_unsold*	-0.191	0.072	-2.65	0.009	-0.333	-0.048	***
Dongtan	-4.620	0.675	-6.84	0.000	-5.954	-3.286	***
Kimpo	-3.004	0.804	-3.74	0.000	-4.593	-1.415	***
Gwangyo	-1.777	0.332	-5.35	0.000	-2.434	-1.121	***
Yangju	-1.200	0.409	-2.93	0.004	-2.009	-0.392	***
Wirye	-2.589	0.499	-5.19	0.000	-3.574	-1.603	***
Constant	282.102	13.602	20.74	0.000	255.222	308.982	***

Mean dependent var	95.124	SD dependent var	6.426
R-squared	0.980	Number of obs	160.000
F-test	.	Prob > F	.
Akaike crit. (AIC)	450.129	Bayesian crit. (BIC)	487.031

* unit: thousand **unit: million

Table 4. Regression Result.

The test result is Table 1. Interest rate was the only variable that is not significant at a 5% confidence level. Other control and explanatory variables are valid in this model. The variable 'Incheon' is the housing price of Incheon. This variable is significant at a 5% confidence level. The coefficient of the variable is 0.481 which means that the unit increase in the housing price of Incheon increases the housing price index of Seoul by 0.481. The housing price in Seoul is proportional to housing price in Incheon. Population is significant at a 5% confidence level. The coefficient is -28.32. We could interpret the coefficient as the population increase by one million, the housing price index of Seoul decrease by -28.32. We divided the original population data into million. The housing price index was converted with the index which set November 2017 as100, but the population was real value. There was a big difference in unit. Accordingly, the absolute value of coefficient was too small to interpret the effect of variable. This is the reason that we divided population data into million. Next variable is Interest Rate. We took the first difference of Interest Rate because the unit root was present in data. According to the result, interest has a high p-value (0.061), that we cannot reject the null hypothesis at 5% confidence level. The p-value of 0.061 is significant at a 10% confidence level, but compared to other variables, the explanatory power of the

variable is relatively weak. Central bank announced that low interest rate is one of the reasons for the high housing price in Seoul, but our result showed that interest rate does not have a significant effect on housing price. If we look at the history of the standard interest rate of South Korea, interest rate was dropped from around 5% to 2% during the subprime mortgage crisis. During the period of the subprime mortgage crisis, housing price was decreased even the interest rate was low. The deep depression in the market decrease income of people and increased unemployment make people hesitate to invest in any type of investment. Accordingly, even though the interest rate was decreased, housing price also decreased. Central bank of Korea explained the reason of housing price increased is low interest rate, but it was opposite during subprime mortgage crisis. This opposite trend was continued after recovered from the subprime mortgage crisis. After recovered from the subprime mortgage crisis, people sought safe investment. With shortage of housing supply in Seoul and experience of deep depression made housing price increased even if the interest rate increased. Increase in house price of Seoul has continued until recent year and the central government set low standard interest rate. This could be the reason that interest rate was less significant in our model. Subprime mortgage crisis was significant in our model. According to Table 4, coefficient of subprime mortgage crisis was -1.368. As mentioned above, during subprime mortgage crisis, housing price dropped even though the interest rate decreased. Next variable is overall price index. The overall house price index is the national housing price index and it could show the housing price trend of South Korea. The variable is significant at 5% confidence level and the coefficient was 0.644 which means that while national housing prices increased, the housing price in Seoul increased further. Unsold new house is the number of houses which were newly constructed but not yet sold. This could show the house supply of the regions. We expected that unsold new house could capture the

effect of house supply of the region. For explanatory variables, we included Dongtan, Kimpo, Gwanggyo, Yangju, and Wirye as dummy variables. Every planned city has significant effect on the housing price in Seoul. The coefficient of Dongtan is -4.62. The negative value of coefficient means that construction of Dongtan decreased housing price in Seoul. The purpose of the planned city was to control the housing price in Seoul and the result of Dongtan satisfied the purpose of planned city policy. Construction of Kimpo, Gwanggyo, Yangju, and Wirye also have significant effect on housing price in Seoul. The coefficients of variables are negative. We interpreted the magnitude of coefficient. The variable with the largest coefficient was Dongtan and followed by Kimpo, Wirye, Gwanggyo, and Yangju. This order is related to number of new house and population of each city. Recall from above, the size of planned city and the magnitude of the coefficients are related. The largest planned city was Dongtan and followed by Yangju, Kimpo, Wirye, and Gwanggyo. Yangju was exceptional because it is far from Seoul. Dongtan is also distance from Seoul, but it is beside Suwon, one of the largest metropolitans in South Korea, and there is direct train called 'SRT' which connects Seoul and Dongtan. Thus, the effect of construction of Dongtan was less affected by distance. We could conclude that the construction of planned city has significant effect on housing price in Seoul, and the effect was decrease in housing price in Seoul. Planned city construction satisfied the purpose of the policy, controlling soared housing price in Seoul.

Policy Evaluation

The result from linear regression showed the usefulness of planned city construction.

The main purpose of the planned city was controlling soared housing price of capital and distributing capital concentrated population. As we can see from Figure 10, population and housing price in Seoul had decreased for years. However, the housing price in Seoul soared from early 2015 and the aggregate population movement of Seoul became positive from 2019. The period of these changes was similar with the period of regime change. The Lee Myung-bak administration had governed the country until early 2013. During the period of Lee Myung-bak administration, the housing price in Seoul had decreased. Starting from mid-2013, the housing price trend had shifted from downward slope to upward slope. The Park Geun-hye administration was also started from mid-2013. There were significant differences between before and after Park Guen-hye government. Before Park Guen-hye government, the housing policies can be represented as 'supply policy'. There were detailed differences, but most of governments tried to supply apartments to solve the housing shortage problem. Roh Tae-woo government was the beginning of the planned city project. The main policy of Roh Tae-woo government was the expansion of housing construction and Roh Moo-hyun government also established new planned city policy. Lee Myung-bak government focused on apartment supply in Seoul and outskirt of Seoul (Kim & Lee, 2017). The supply of housing around Seoul had valid effect on housing price and population distribution. According to the Figure 10, increased in supply of houses decreased the housing price in Seoul, according to Figure 8, the aggregate number population movement in Seoul was negative. Followed by Lee Myung-bak administration, Park Guen-hye administration also implemented housing supply policy. However, the main focus were mortgage policy and taxation, not housing supply. Park Guen-hye government tried to boost the real estate market by revitalizing housing sales. The mortgage and taxation policy were implemented with that purpose. From 2015, the government recognized the drawback of revitalizing housing sales.

People could buy houses in Seoul by getting a loan. Accordingly, the housing price was not decreased, and the household debt was increased. With the effectiveness of the government policy suspected, the government changed their stance a bit to public renting house supply. However, the subject of house supply was corporates. There was criticism that it is just replacing the corporate house sale to public renting. (Cho, 2017). This means that total supply of houses near Seoul was not increased, just the subject of house supply was changed. The government relaxed regulations to boost the economy, but as a side effect, increased speculation demand has emerged as a new problem. Accordingly, from November of 2016, the government changed their stance from relaxed regulation to strong regulation and came up with the policies to ban the speculation in the market and restricted loaning balance. As the rule of the market, price would not be decreased if there is shortage of supply. The fundamental solution of housing shortage problem is increasing supply of house and distributing population to other regions. Park Geun-hye government neglected the importance of housing supply in Seoul. Accordingly, housing price in Seoul have increased from 2015.
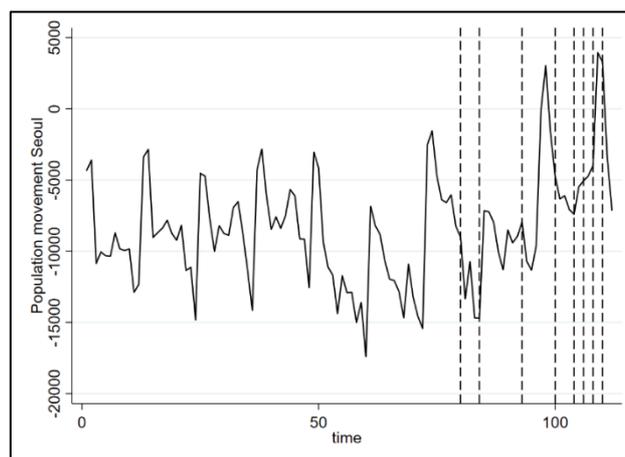

Figure 8. Population movement Seoul (vertical line: Moon government real estate policy implementation)
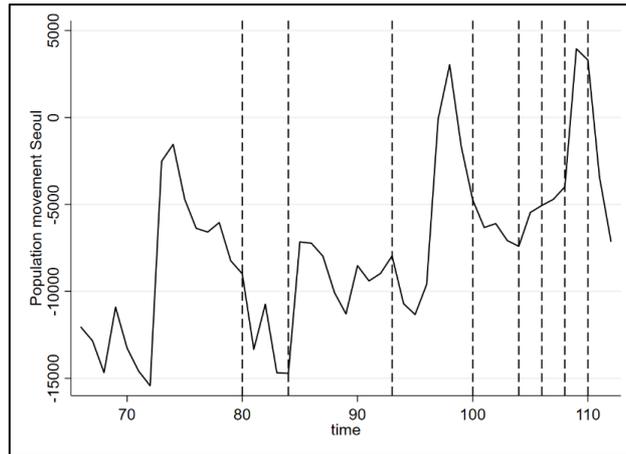
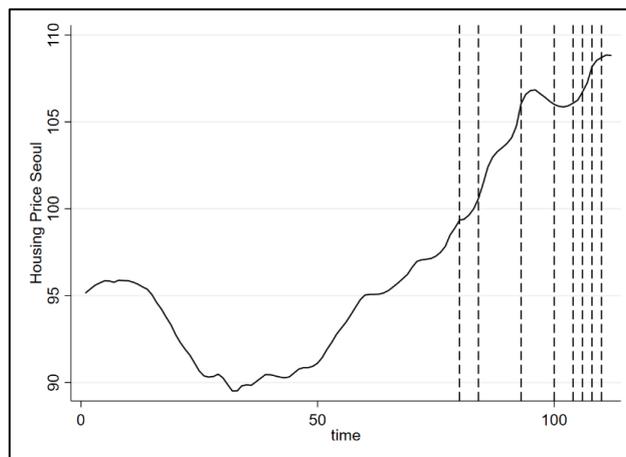Figure 9. Population movement with policy time-line Seoul
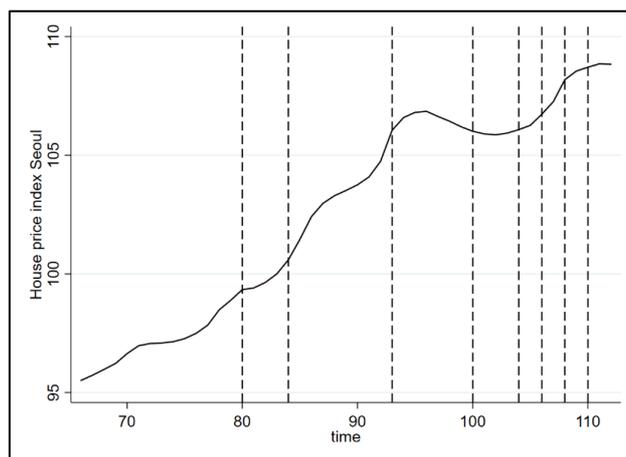

Figure 10. Housing price change Seoul

Figure 11. Housing price change Seoul, limited time range

The strong regulation from Park Guen-hye government remained the same in Moon Jae-in

government. Moon Jae-in government thought that the real estate market is distorted by speculations and multi-house owners. Therefore, the government implemented much stronger regulations in the housing market. As we mentioned above, this is not a fundamental solution of the housing market. Lack of new housing supply, it is obvious that government take the stance that they would not increase the housing supply in the capital, the housing demand in the capital increase. People do not expect drop in the housing price if there is less additional housing supply. The limitation of the land to construct large housing complexes, redevelopment, and reconstruction of the old housing complex could be the alternative, but the government stayed with strong regulation without housing supply (Doo, 2018).

According to the test result of this paper, planned city construction is a valid policy to control the housing price in Seoul. Planned cities shifted the proportion of housing demand in Seoul to other regions and the demand for houses in Seoul decrease. The planned city is located near Seoul and the planned cities have the same zone of life as Seoul. It means that population movement from Seoul to planned cities is not impossible. Banning speculation in the real estate market can be a valid policy to control the housing price, but Seoul is a unique case. More than 50% of the aggregate population of South Korea lives in Seoul and near state. The core business facilities and universities all located in Seoul. Thus, it is inevitable to live near Seoul and this is the reason that regulation policy has side effects. The current government gave disadvantages to multi-house owners and high price house owners. To be specific, the government gave disadvantages to the people who want to get a loan to buy high price houses and levied high taxation to people who owned multiple houses. Regulating the loan to buy high price houses can encourage the drop in housing prices of Seoul, especially drop in high priced houses in Seoul. However, there are criticisms that the government deprived the opportunity to live in Seoul, and the regulation itself could decrease the housing

price in Seoul. With consideration of the taxation policy to multiple house owners, this policy would not be a solution of housing problem of Seoul. The possible result of this policy is that the people who owned multiple houses would sell relatively low priced houses and try to buy a single high price house. This means that middle-priced houses price would be decreased and the high priced house price would be increased. The housing price in Seoul and near areas would be polarized. In addition to polarized housing prices near Seoul, the rent cost of the houses in Seoul could be increased. The burden of limited loan and increased taxation should be levied to landlords. However, landlords would avoid those burdens by raising house rent. To sum up, if the house rent in Seoul increased as a result of the policies, it means that the people who shouldered the tax are tenants, not landlords. According to Figure 11. some of the regulations implemented by this government had significant effects, but housing prices returned to an upward trend. The strong regulation policy made some speculators exit from the market, but the policy could not control the housing price in Seoul. Seoul is an over-populated city. The shortage of housing supply is a fundamental problem. The planned city policy had an analogous effect with increasing housing supply in Seoul. If it is not possible to supply additional houses to Seoul, constructing planned city near Seoul with direct transportation to Seoul could be an ideal solution.

Conclusion

 South Korea has problem of housing shortage in Seoul. This is due to the capital concentrated structure of the Republic of Korea and the lack of government's plan to distribute the overconcentrated function of a capital to provinces. Due to capital concentration, the housing price in Seoul historically increases over the years. Many policies were implemented to relax the capital concentration and control the housing price in Seoul. In this paper, we evaluate the

effect of one of those policies. Planned city was constructed to solve the problem of capital concentration. We conducted linear regression to interpret the effect of planned city construction on the housing price in Seoul. The result was significant. The planned city could be an ideal solution to the capital concentration problem. Every planned city construction in the model decreased the housing price in Seoul. Taken into consideration of the functional and transportation factors, the planned city policy would be more effective. Cities such as 'Pangyo' and 'Sejong' share some of the functions of capital, and these cities have evaluated as the foundation of balanced national development. Despite these benefits of planned city policies, the recent government mostly focus on making people not to buy houses in Seoul. This could not be a fundamental solution in Seoul. If it is not possible to supply more houses in Seoul, the great way to solve capital concentration is to induce people shift voluntarily to provinces. Instead of imposing strict regulation on people living in Seoul, the government should give more incentives to people who chooses to live outskirt of the Seoul. The planned city could be a great incentive to distribute people from concentrated capital to provinces.

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