The Effect of Green Belt Policy Reform on the Seoul Metropolitan Area Housing Market

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Korea introduced an urban containment policy in the early stage of urbanization to control growth of congestion and prevent urban sprawl in the Seoul Metropolitan Area (SMA). However, the arbitrary designation a lack of popular support or accurate scrutiny caused an irrational pattern of land use which reinforced concentrations and threatened residential stability in terms of restrictions on the land supply. Therefore, the Green Belt Area Law was legislated in 2000 and the deregulation has released the green belt area mainly for residential purposes. Although the existing researches dealt with the effect of green belt reform, none of them actually applied practical aggregate data set of the SMA including housing values and regional characteristics. In this sense, this study aims to analyze the effect of green belt reform on housing market in the SMA. Using panel data set from 2001 to 2010, the fixed-effect model is estimated. The estimation results suggest that the release of green belt land has decreased the average housing sales price while Seoul has larger partial effect than Gyeonggi. Furthermore, the serious discontinuity of population and employment as well as the job-housing mismatch can be improved under the condition that lowered housing price benefits the unprivileged to have more accessibility and opportunity for location decisions.

I. Introduction

The green belt policy is a commonly used as a means of planning for containing the physical expansion of brownfield and preserving the environment. In Britain, green belts have been a central feature of the planning system for several decades. Although the scale or extent matter, the value of green belt land in terms of amenity, recreational, and savings in costs was beneficial by restricting the size of urban area (Willis and Whitby, 1985). Based on the success of the United Kingdom, Korea also introduced the green belt policy in place as an urban containment policy since 1971. Urbanization in Korea began in the early 1960s and the population and employment grew rapidly amid the capital city Seoul. In this sense, the green belt policy aimed (1) to control growth of population and industrial concentration in the Seoul Metropolitan Area (SMA) including Seoul city, Inchon city, and Gyeonggi Province (2) to prevent contiguous metropolitan sprawl (3) to develop an environmental protection area by reserving regional open

spaces. However, since the boundary was set up on political decisions without conducting any surveys or scientific analysis (Jun and Bae, 2000), various urban problems have emerged to the extent that pressure of deregulation has arose after three decades from its initial implementation.

Many previous studies found the effects of green belt land, in particular, on housing market and urban form. As the boundary has provided the premium for development to the inside of the green belt, the policy has unambiguously raised land and housing prices through serious restrictions on the supply of land in the SMA (Kim, 1987; Hannah, Kim, and Mills, 1993; Choi, 1993). High housing prices that lead the city to suffer the high level of congestion forced not only the existing residents to move outside the boundary but also new moving-in demand to choose suburbs (Cho, 1997). Under the stringent government's action, development pushed beyond the green belt reinforced this propensity of location decisions. As development pressure shifted from inner part of the city to the exurb, leap-frog development to the outer area was appeared (Cho, 2002; Choi, 2008; Kim and Yeo, 2008). Jun and Hur (2001) argued that the green belt and leap-frog development have resulted in a significant discontinuity of urban population and employment density gradients. The distortion of urban structure has created a serious jobs–housing imbalance and made longer commuting distances with higher dependency on core cities in the SMA. Bae and Jun (2003) also disputed the propensity that the green belt interfered with continuous urban development and accelerated urban sprawl has ended in an inefficient allocation of land uses and serious social costs in terms of transportation as well as the environment. While leap-frog development has strengthened residential relocation with respect to new town and satellite city construction in the suburbs, the government has rarely acted strongly enough to promote the decentralization of jobs.

Although some researches showed that the green belt has provided continuously

growing environmental benefits overwhelming the congestion costs (Lee and Linneman, 1998; Lee, 1999; Kim and Lee, 2006), the central government has deregulated the green belt policy in order to increase housing supply for low- and middle-income people and elevate regional economy: 1,491 km^2 of the whole nation's green belt land (27.68%) and 134 km^2 of the SMA's green belt land (8.60%) were released due to the implementation from 2000 to 2010. Mitigated land was mainly utilized for residential purpose of public housing provision as a context of one of the important national plan. Choi and Kim (2008) supported the new action by analyzing the economic effects of the reduction of green belt on housing market using simulation model. The result revealed decrease in rent through deregulation of the green belt improves social welfare when the economic impact is larger enough than aggravation of housing physical environment due to the loss of green land. On the other hand, Lee (2008) claimed that change of zoning due to the relaxation has only exacerbated social justice and equity by providing additional financial gains to the landlords. Park and Kim (2009) also argued that the price of the relaxed green belt land has risen more than the price of remaining one. In the meantime, the approach toward the urban containment policy of the central government was suspected in terms of its political context. Kim (2007) and Ha and Cho (2009) pointed out that conurbation causing regional growth segregation is more likely to occur if the central government releases the green belt regulation only for national public housing provision upon their political need without providing a long-term vision.

To answer the contradict arguments of previous studies and evaluate the deregulation of green belt land, appropriate empirical analysis is needed. Although the existing researches dealt with the effect of green belt reform, none of them actually applied practical aggregate data set of the SMA including housing values and regional characteristics. As I use panel data set produced

ever since the mitigation policy was implemented, its validity will be accurately determined. Because the initial green belts had obstructed housing supply and the corresponding deregulation policy intended to promote residential development, change in housing prices should be considered in terms that increase of housing prices is lowered if the goal of green belt reform has achieved. In other words, by analyzing the effect of the mitigation of green belt on housing market, it could be concluded that the deregulation policy's contribution to the stabilization of housing prices increases the unprivileged people's accessibility and opportunity of location decisions so as to diminish not only the discontinuity of urban population and employment but also the job-housing mismatch in a long term. Furthermore, different impacts of estimation between the core city and the suburbs are expected to suggest policy implications regarding the approach toward the reduction in urban contained land that causes the spatial segregation.

In this end, this paper aims to analyze the effect of green belt reform on housing market using panel data set of the SMA. The fixed-effects model will be estimated to disclose whether the deregulation in fact has affected the decrease in housing prices so as to ensure the opportunity of location decisions and adjust the job-housing imbalance. Finally, policy implications regarding the approach and spatial range of the deregulation of green belt land are highly anticipated.

II. The Green Belt Policy in Korea

Green belt areas were initially designated in the SMA in 1971, and were expanded to over 14 urban regions throughout the country over a series of 8 rounds (Kim and Kim, 2008). The total size of the green belt system in 2010 was 3,895 km^2 which is 3.89% of the total size of Korea.

Table 1 displays the land area and population size of the SMA. It has 1,424 km^2 for green belt land which is 12.07% of the total size of the SMA, but has 76,031 residents which share only 0.31% of the total population of the SMA. The green belt occupies 25.29% of Seoul, 8.65% of Incheon, and 11.63% of Gyeonggi while the population covers 0.17% of Seoul, 0.07% of Incheon, and 0.47% of Gyeonggi.

Table 1 Areas and population of the green belt shares by region

Region	**Land Area (km^2, 2010)**			**Population (2010)**		
	Total	**Green Belt**		**Total**	**Green Belt**	
the Seoul Metropolitan Area	11,801	1,424	(12.07%)	24,857,463	76,031	(0.31%)
Seoul	605	153	(25.29%)	10,312,545	18,039	(0.17%)
Incheon	1,029	89	(8.65%)	2,758,296	2,054	(0.07%)
Gyeonggi	10,167	1,182	(11.63%)	11,786,622	55,938	(0.47%)

Sources: the Ministry of Land, Transport and Maritime Affairs, South Korea

The history of the Korean green belt started from the advent of the Third Republic in 1961. The former military leader led a huge shift in Korea's socioeconomic growth through the new economic development plan, setting in motion events that would form the roots of the current system. It pushed for industrialization and induced rapid urbanization. However, as the urbanization swiftly progressed, social concerns such as congestion, environmental degradation became influential. An imbalanced population of Seoul due to the political and military tension between South Korea and North Korea was also an issue that had to be considered along with planning for urban expansion. In this sense, the green area scheme was initially proposed in the 1964 Seoul Metropolitan Area Plan, and its precise implementation was laid out in the Seoul Urban Basic Plan. Although the belt-shape plan was cancelled because of private property right infringement issues, an alternative green belt proposal that prohibited any development in designated areas was settled through legislation from the National Assembly in 1970. Thus, the

green belt system not only paid insufficient attention given to basic principles of law but also arbitrarily created without based on popular support or accurate scrutiny.

In the late 1980s, urbanization progressed inside of designated green belt areas and began to expand quite significantly. As most developing countries experience, suburbanization has widely expanded with respect to the housing crisis threatened the residential stability of low-income group in Seoul. Despite triggering massive new town development on the fringes on the fringes of metropolitan areas, urban planning had to concentrate on increasing land supplies via the relaxation of land use regulations throughout the 1990s. The irrational and imprudent pattern of land use modification affected residents in the green belt to raise their voice regarding the deregulation for property development. In 2000, the Green Belt Area Law was legislated by the Committee for Green Belt System Improvement, which not only offered a process for making compensation claims and institutionalized schemes for financial support of residents in the green belt but also produce the improvement plan for the green belt system including release of the areas with low expansion pressures and environmental degradation. The green belts with high development pressure in seven metropolitan areas also partially relaxed though the establishment and adjustment of metropolitan comprehensive planning.

In the SMA, the green belt could be released when one of four categories satisfies. First, grouped communities with more than 300 houses were released without regard to the results of the environmental evaluation, within the total amount of adjustable land in green belt areas. Second, releasable land of more than 10 hectares and more than 60% their land uses in the aforementioned fourth and fifth classes were classed as green belt land that could be relaxed. Third, certain lands were designated for the implementation of national policy without regard to their total amount of green belt area to be released. Fourth, depending on the needs of regional

policy, certain lands could be mitigated up to a limit of 10% of the total green belt area to be released. In practical, even though the green belt fulfilled the one of above conditions, the decision-making was made through a deliberation process conducted by the committee of central urban planning. However, as most green belt areas with the high potential for development have been released by the initial classifications and environmental values have significantly been degraded due to the continuous increasing illegal activities in the green belts, the central government has lowered the level of deregulation policy in 2008. Based on the new improvement plan, the green belts with land uses in the aforementioned third, fourth, and fifth classes where located in existing metropolitan areas or near major infrastructure have newly become to be developed mainly for public housing provision. The new green belt system has accelerated the deregulation in particular in the SMA.

Table 2 Areas and released shares of the green belts from 2000 to 2010

Green Belt (km^2, %)	**Korea**	**SMA**	**Non-SMA**
2000	5,386	1,558	3,828
2010	3,895	1,424	2,471
Release (%)	27.68%	8.60%	35.45%

Sources: the Ministry of Land, Transport and Maritime Affairs, South Korea

Table 2 shows released areas and shares of the green belts by region. In the whole nation, 1,491 km^2 of the green belts was released from 2000 to 2010, which is 27.68% of the total size of the green belts. On the other hand, relatively small portion of the green belts (8.60%) was deregulated in the SMA; nevertheless, areas of mitigation (134 km^2) are still meaningful considering the SMA has the most restrictions in terms of military, environment, and growth control. Those released areas were utilized mainly for residential purposes as the central government aimed at first. Table 3 presents released green belts areas according to the purpose of

deregulation from 2000 to 2010: approximately 90% of deregulated green belts developed for residential use in the SMA. It is not exaggerated that the most of deregulation was for providing land for housing supply, especially in Seoul city. This propensity is expected to retain relevance to the one million Kukmin rental housing program and the additional one and half Bogeumjari public housing program (Oh, 2009).

Table 3 Released green belts areas according to the purpose of deregulation from 2000 to 2010

Region	Purpose of deregulation (m^2, 2000-2010)			
	Residential		Non-Residential	
the Seoul Metropolitan Area	127,079,144	89.14%	15,484,627	10.86%
Seoul	14,545,077	95.67%	658,937	4.33%
Incheon	6,397,511	82.36%	1,370,149	17.64%
Gyeonggi	106,136,556	88.75%	13,455,541	11.25%

Sources: the Ministry of Land, Transport and Maritime Affairs, South Korea

III. The Analysis Model

I use panel data set of the SMA provided by the Real Estate 114, Statistics Korea, and each region's statistical year book from 2001 to 2010. In the model, Incheon city is excluded. This omission is intended in terms of reliability: the area connecting Seoul and Incheon was developed in 1960 before the designation of the green belt (Kim and Kim, 2008). The fact enables to assume that a discontinuity of population or employment does not exist between those two regions. Of course, the released green belts in Incheon where are originally designated other than the border area facing Seoul would affect the local housing prices with increasing supply of residential land. Nevertheless, the simple effect of housing provision on housing market is not the target of the study. It is the objective that the study concentrates on finding how green belt reform has influenced housing prices which represent the discontinuity of population and job-

housing mismatch. In this sense, Seoul and Gyeonggi are selected as a sample space in which each region embodies the core city and the suburb.

The analysis is conducted at the district level (in Korean statistical classification, *Si-Gun-Gu*). Since Seoul has 25 districts (*Gu*) and Gyeonggi has 31 districts (*Si* and *Gun*), the total number of observation equals to 560 that multiplied 56 districts by 10 years. The time range for panel data set is from 2001 to 2010 whereas the first relaxation of green belt land was in 2000; although the deregulation has begun from 2000, the land use change for residential purpose has implemented from 2001 in the SMA to which corresponds the primary focus of this study.

The fixed-effects model is estimated to analyze the effect of green belt reform on housing market. Hausman and Taylor (1981) suggested that a purpose in combining time-series and cross-section data is to control for individual-specific unobservable effects which may be correlated with other explanatory variables. Analysis of cross-section data alone can neither identify nor control for such individual effects while the fixed-effects model using a panel data can do both. To consider a specific model, the linear regression model is described as:

$$y_{it} = \alpha + \beta x_{it} + u_i + e_{it} \ , \qquad i = 1,2,\ldots,n \text{ and } t=1,2,\ldots,T$$

In the equation, two error terms are considered to reflect the unobserved individual. The error term u_i is heterogeneous for different the individual, but is permanent within the individual. On the other hand, the error term e_{it} is idiosyncratic varying along with the time. The fixed-effects model assumes that the intercept, denoted as $(\alpha + u_i)$ in the equation (1), is different for individual and is fixed parameter that needs to be estimated (Min and Choi, 2010). On the contrary, the random-effects model considers the error term u_i as random variable. The reason why the analysis model in this study chooses the fixed-effects model depends on the inference of the error term u_i. If the set of individual is a random sample from its population, it can be

assumed that the error term u_i is normally distributed. However, if the set of individual exactly matches to the population, the assumption cannot be hold. Since panel data set in this study includes all districts of Seoul and Gyeonggi, the fixed-effects model is appropriate; though the econometric test is still needed to check whether the fixed-effects model provides the consistent results or the random-effects model suggests more efficient outcomes. In this end, the analysis model is denoted as:

$$\ln Y_{it} = \sum_{i=1}^{n} \alpha_i + \ln X_{it}\beta + \ln Z_{it}\gamma + D_{it}\delta + \varepsilon_{it}$$

where ln *Y* refers to a dependent variable, natural logarithm of average housing sales price per m^2, α refers to the unobserved individual effect, *X* refers to a vector of green belt areas, *Z* refers to a vector of other explanatory variables, *D* refers to a vector of policy and year dummies, *i* refers to districts of the SMA, and *t* refers to year.

Table 4 Variables and definitions of the fixed-effects model

Variables	Definitions
Dependent Variable	
LNSALES	Natural logarithm of average housing sales price per m^2 (ten thousand Korean won/m^2)
Independent Variables	
GBAREA	Area of green belts (km^2)
TRANSAC	Area of land transaction of residential zone (km^2)
HOUSING	Construction of total housing units (house)
CNSTPMT	Gross coverage of dwellings construction permits (km^2)
PARK	Area of parks (km^2)
ROAD	Length of roads (km)
TPR	Teacher-pupil ratio
MEDICAL	Number of medical institutions (number)
EXPNDT	Amount of local expenditure (million Korean won)
d02-d10	Year dummies

Variable definitions for the data used in the analysis are provided in Table 4. Average housing sales price per m^2 at the district level is applied as the dependent variable. Area of green belts is the key explanatory variable to analyze the effect of green belt reform on housing market while housing and regional characteristics such as transaction, housing supply, physical environment, and education that affect housing sales price are also included to control the estimation errors. If area of green belts has positive effect on housing sales price, it can be concluded that the deregulation of green belt land has been effective to stabilize local housing market so that the unprivileged people suffering from job-housing imbalance and housing affordability has had an expanded opportunity for location decisions.

IV. Results and Discussion

Table 5 shows the estimation results of the fixed-effects model. To check a robustness of the model, separate models for Seoul and Gyeonggi were estimated in addition to the full model: if the models do not show the similar results, the structural difference will be suspected. For each model, within R-squared is quite high enough to trust; the correlation between the error term u_i and the explanatory variables is closer to 0, which satisfies the basic assumption of the fixed-effects model and indicates that coefficients are consistent; the fraction of variance due to u_i (rho) that is calculated with standard deviations of u_i and e_{it} shows almost zero, which implies that it is necessary to adapt the fixed-effects or random-effects model because those models reflect the unobserved individual effect rather than the pooled OLS do; F-test also provides whether the model has to consider the error term u_i, and the result rejects the null hypothesis that u_i is not significant. These results hold the reliability and validity of the estimation.

Table 5 estimation results of the fixed-effects model

Explanatory Variables	**Full** **coef/se**	**Seoul** **coef/se**	**Gyeonggi** **coef/se**
GBAREA	0.005*	0.022**	0.006*
	(0.003)	(0.011)	(0.004)
TRANSAC	14.360***	42.396**	14.758**
	(5.071)	(18.128)	(6.295)
HOUSING	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
CNSTPMT	0.010	0.009	0.010
	(0.011)	(0.015)	(0.015)
PARK	-2.104	13.052	-1.965
	(1.375)	(14.964)	(1.660)
ROAD	-0.000*	-0.001	-0.000
	(0.000)	(0.001)	(0.000)
TPR	-0.007	0.000	-0.007
	(0.006)	(0.010)	(0.009)
MEDICAL	0.000*	0.000*	0.000*
	(0.000)	(0.000)	(0.000)
EXPNDT	-0.000	0.000	-0.000*
	(0.000)	(0.000)	(0.000)
d02	0.164***	0.211***	0.124***
	(0.020)	(0.023)	(0.032)
d03	0.275***	0.332***	0.236***
	(0.023)	(0.027)	(0.038)
d04	0.292***	0.369***	0.242***
	(0.025)	(0.033)	(0.041)
d05	0.382***	0.453***	0.334***
	(0.027)	(0.037)	(0.045)
d06	0.624***	0.698***	0.575***
	(0.029)	(0.043)	(0.049)
d07	0.711***	0.768***	0.683***
	(0.033)	(0.049)	(0.056)
d08	0.746***	0.799***	0.728***
	(0.037)	(0.059)	(0.063)
d09	0.775***	0.837***	0.757***
	(0.042)	(0.074)	(0.074)
d10	0.763***	0.831***	0.751***

	(0.047)	(0.078)	(0.081)
constant	5.074***	5.338***	4.687***
	(0.148)	(0.522)	(0.257)
No. of Observation	560	250	310
Within R-squared	0.924	0.964	0.898
corr(u_i, Xb)	-0.195	-0.366	-0.296
sigma_u	0.558	0.410	0.478
sigma_e	0.085	0.059	0.100
rho	0.977	0.980	0.958
F test that all u_i=0:	F(55, 486)=159.89	F(24, 207)=117.49	F(30, 261)=103.22
	Prob > F = 0.000	Prob > F = 0.000	Prob > F = 0.000

note: *** p<0.01, ** p<0.05, * p<0.1

Table 6 presents the result of Hausman test. Although I establish the fixed-effects model because the sample data correctly respond to the population, the estimation will be assured of its consistency by testing and rejecting the null hypothesis that covariance of a vector of explanatory variables and error term u_i equals to zero, or the random-effects model should be chosen for more efficient estimation results. For all three models, the null hypothesis is rejected at the 5 percent significance level, which implies that the estimation of the random-effects model is not consistent so the fixed-effects model needs to be selected.

Table 6 the results of Hausman test

Hausman Test	**Full**	**Seoul**	**Gyeonggi**
Test statistics (*H*)	chi2(13) = 33.45	chi2(6) = 25.19	chi2(9) = 20.44
Prob > chi2	0.002	0.000	0.015

Back to the estimation results, most coefficients of explanatory variables display the desirable results along with the expectation. The coefficient of *GBAREA*, in particular, is statistically significant at the 10 percent level in the full model. It is interpreted that the average housing sales price decreases 0.5%, *ceteris paribus*, when 1 km^2 of the green belt land releases. The other coefficient of *TRANSAC* is statistically significant at the 1 percent level, and is

explained that increase in land transaction of residential zone influences increase in housing sales price. This propensity implies that the transaction is growing in the free market as housing demand is increasing, which inevitably causes the boost of housing sales price. All year dummies are significant at the 1 percent level reflecting the continuous increase of housing sales price.

For the models of Seoul and Gyeonggi, most coefficients are consistent with those of the full model in terms of signs and partial effects except *GBAREA*, *TRANSAC*, and *PARK* variables. The coefficients of *GBAREA* and *TRANSAC* that are statistically significant show the difference in the magnitude of the partial effect: for both variables the model of Seoul has larger effect than that of Gyeonggi. The deregulation of 1 km^2 in the green belts decreases 2.2% of average housing sales price in Seoul whereas the release reduces only 0.6% of the price in Gyeonggi. This result indicates that the full model has a robustness problem: the structure difference is suspected in data set. To ensure the reliability of outcomes, the full sample should be separated into two different samples according to its geographic feature.

The estimation results are consistent with the previous studies' findings in terms of housing supply control. Since the green belt policy has unambiguously raised housing sales price through serious restrictions on the supply of land in the SMA (Kim, 1987; Hannah, Kim, and Mills, 1993; Choi, 1993), the deregulation has been able to lower the increase in housing sales price. The fact that housing sales price in Seoul has been higher than one in Gyeonggi is revealed in the estimation: every values of the constant and year dummies are higher in Seoul than one in Gyeonggi. Although the average housing sales price of Seoul is still excessive, the difference between the core city and the suburb would have been enormous if green belt reform has not been implemented.

The difference in the effect size of green belt reform between Seoul and Gyeonggi is

also supported by the literatures. The magnitude of decrease in housing sales price for the same area of release should be bigger in Seoul because it is the core city where has been suffered from the high level of congestion and has been densely developed. As the green belt policy shifted development pressure from the core city to the suburb and leap-frog development consequently appeared (Cho, 1997; Cho, 2002; Choi, 2008; Kim and Yeo, 2008), the inside of green belt areas has the premium for development. This premium makes the housing market exclusive to maintaining the high demand. In this sense, the marginal effect of land use change in Seoul is inevitably high rather than the one in Gyeonggi. The larger coefficient of land transaction in Seoul also supports this propensity: the demand side of the housing market is an important determinant of aggregate housing prices (Dawkins and Nelson, 2002).

Stabilization of housing market due to green belt reform is likely to contribute to solving distortion of urban structure. If the premium of development in Seoul is controlled by the deregulation and the original green belts are filled with relocated low-and middle-income groups as the central government aimed, the severe discontinuity of urban population and job-housing imbalance (Jun and Hur, 2001; Bae and Jun, 2003) will be improved. To this end, providing the residential land in the former green belt areas with lower price than the market price of surrounding areas is crucial so that the benefits of the new government action mostly go to the unprivileged people for their location decisions. Social welfare suggested in Choi and Kim (2008) will be enhanced when this condition is satisfied. Otherwise, redevelopment without containing low-income group may aggravate the segregation and distort social equity (Lee, 2008).

V. Conclusion

This study has analyzed the effect of green belt reform on housing market in the SMA. Using panel data set, the fixed-effects model is estimated to find whether the deregulation of green belts has actually influenced the decrease in housing prices so as to ensure the opportunity of location decisions and adjust the job-housing imbalance. The estimation results suggest that the release of green belt land has decreased the average housing sales price while Seoul has larger partial effect than Gyeonggi. The green belt policy has invested Seoul with the premium for development that has enabled to retain the high housing prices corresponding to high demand. By the deregulation, relatively larger marginal effect of land use change in Seoul inevitably has decreased considerable amount of housing prices compared with Gyeonggi's experience. Furthermore, the serious discontinuity of population and employment as well as the job-housing mismatch can be improved under the condition that lowered housing price benefits the unprivileged people to have more accessibility and opportunity for location decisions.

On the other hand, findings lack in explaining the possibility of conurbation and environment aggravation. As Kim (2007) and Ha and Cho (2009) indicated, conurbation causing regional growth segregation is more likely to occur if the central government releases the green belt regulation solely for national public housing provision upon their political need. Although we establish reasonable alternatives with a clear vision to prevent conurbation, it is highly concerned that spatial segregation grows as the former green belt areas are mainly fulfilled with low-income group living in the public housing. The appropriate level of social mix should be considered when provides the housing supply in the deregulated green belt areas. In addition, some of the current green belts where the ecological value is excessive ought to be conserved no matter how much the release of green belts promotes the housing market. Those policy implications need further empirical researches to set the level and extent.

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