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A Study of Factors Affecting the Elapsed Time of Housing Renewal Project Implementation in Seoul

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***Abstract*—**This study analyzed the effect of area variables and economic variables on the length of each period of the project in order to analyze the effect of agreement rate on project implementation in housing renewal projects. In conclusion, as can be seen from these results, a low agreement rate may not translate into project promotion, and a higher agreement rate may not translate into project delay. The expectation of the policy is that the lower the agreement rate, the more projects would be promoted, but that is not the actual effect. From a policy consistency viewpoint, changing the agreement rate frequently, depending on the decision of the public, is not reasonable. The policy of using agreement rate as a necessary condition for project implementation should be reconsidered.

***Keywords*—**Area and Economic Variables, Elapsed time, Housing Renewal Project.

I. Introduction

HOUSING renewal projects in Korea began in the 1970s with the enactment of the Urban Renewal Act. Even though infrastructure and modern structures have been supplied, many social issues have arisen as a result of development methods focused on massive evacuation of residents, and lack of compensation for the evacuated residents. In particular, the most notable characteristic of housing renewal in Korea is the transfer of urban development from the public sector to the private sector in order to overcome the lack of public funding during the industrialization era. If a certain percentage of owners within a district consented, the owners could form a legal entity called a renewal association and acquire the property rights of those owners who did not consent. In this manner, the development rights were transferred from the public sector to the private sector based on the rule of majority. Over time, the agreement rate has changed over time in order to resolve social conflicts or energize projects. The agreement rate, used to determine the project developer, could not be defined as one fixed value. However, unlike other public projects that are supplied by the public sector with public objective, granting the public capacity to private sector project with the objective of supplying private sector housing in accordance with the consent of the owners of housing renewal projects and allowing land condemnation in the end determines the superiority or inferiority of property rights among the majority and minority. In the end, agreement rate must be considered at the level of the social agreement of the relevant constituents. In addition, the common understanding regarding infringement of private property rights and personal rights could form only if the standard for agreement rate is calculated on such basis.

By analyzing the effect of agreement rate, used as a condition for project implementation in housing renewal projects, on actual project implementation, this study seeks to contribute to the establishment of social standards for the agreement rate, to achieve efficiency and fairness. This study also seeks to discuss the adequacy of agreement rate as a standard for social agreement.

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II. Literature Review

Reference [1] analyzed the elements that affect the prolongation of projects, by performing a multiple regression analysis of 219 districts completed from 1973 to 2004. The real estate related explanatory variables were zone area, public government land ratio, number of buildings subject to refurbishment, non-permitted building ratio, building deterioration, planned FAR, and coverage ratio. The economic explanatory variables were economic growth rate, stock price index, loan interest rate, land value fluctuation rate, rate of increase in housing, and housing supply rate.

Reference [2] analyzed the factors that affect the time needed for renewal projects, based on 83 cases of joint renewal. The variables used were zone area, public government land ratio, building deterioration, ratio of tenants, ratio of general sale. The dependent variable was the time elapsed from area designation to completion.

Reference [3] analyzed the affect the Urban Renewal Act has had on housing renewal projects, based on 38 cases in Seoul that commenced between 2000 and 2009. The variables were classified as either area variables or economic variables. Area variables included zone area, number of association members, public government land ratio, number of land plots, number of buildings refurbished, number of planned households, household density, and building deterioration, while economic variables included stock price index, loan interest rate, housing sale price index and housing lease price index, and the rate of land value fluctuation.

Reference [4] studied the factors that affect renewal projects in 285 renewal districts in Seoul. The explanatory variables used included zone area, public government land ratio, land, non-permitted building ratio, purpose of existing building, structure, deterioration, planned households, and land use. The dependent variables were the time elapsed between area designation and development permit, the time elapsed between

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development permit and property disposal and the time elapsed between management disposal and project completion.

Reference [5] analyzed the elements that affect the periods of renewal projects, focused on 27 cases of housing renewal. The study used 10 defendant variables as an economic and area variables. Area variables were district scale, FAR, coverage ratio, affordable housing ratio, number of the owner's association member, land endowment ratio, small housing ratio and number of tenants. Economic variables were annual inflation rate and interest rate between 2003 and 2013.

This study focused on the fact that, although the agreement rate is a condition that must be satisfied for permits and approvals at various stages of a project, no consideration is made for the change in project period resulting from the 2003 and 2007 changes in the agreement rate. Also, unlike the prior studies that examined area designation, project development permit, and the period between management disposal and project completion, this study analyzed the time elapsed between area designation, association establishment, project development permit, and management permit (the stages for which owner consent is needed) in an effort to determine the effect of agreement rate on project period.

III. Scope and Methods

The scope of this study was housing renewal projects in Seoul, based on the following stages: designation of renewal district, establishment of renewal association, project implementation, and property disposal. The period covered was from 2000 to 2013, and the effects were analyzed before and after 2003 and 2007, the years when agreement rate was changed.

The variables for analysis were classified as either area variables or economic variables, based on Seoul's statistics data. Area variables were district area, number of established households (sale and lease), floor area ratio (FAR), total floor area, association member, and agreement rate. The economic variables were stock price index, government bond coupon rate, housing sale price index, housing lease price index, and land value fluctuation rate.

This study set the area variable and economic variables as independent variables and sought to analyze the effect they have on the various stages of the project. Accordingly, the dependent variables were the stages of area designation, association establishment, development permit, and management permit. To understand the relationship between the project stage and changes in the agreement rate, base analysis and Poisson regression were used.

IV. Analysis

A. Selection of Subject of Analysis

This study analyzed the period after the ceiling for planning FAR was designated in July 2000, for 60 districts, from 2000 to 2013. The location of each renewal district in Seoul was as follows:

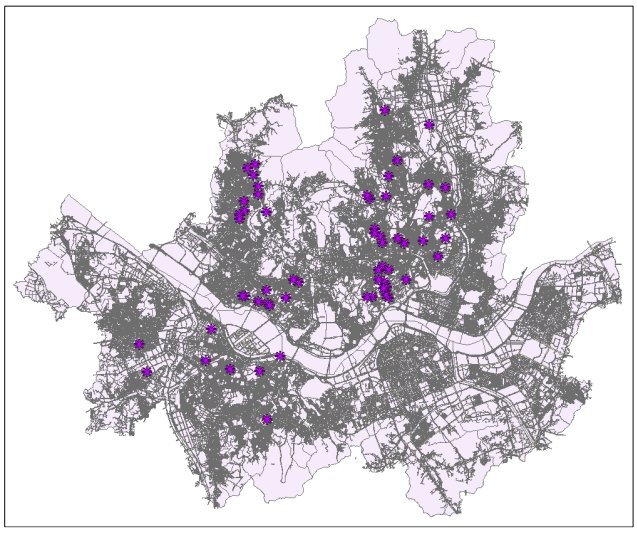


Fig. 1 Location map for 60 districts

The variables used in this study were independent variables, including area variables and economic variables, as well as dependent variables. The area variables, obtained from the City Hall of Seoul, included zone area, number of households established (sale or lease); planned FAR, total floor area, number of association members, and agreement rate. The economic variables, obtained from the City Hall of Seoul and Statistics Korea, included Korea Composite Stock Price Index (KOSPI), land value fluctuation rate, housing sale price index, housing leasing price index, and interest rate—all variables shown to affect the implementation period for housing renewal projects in prior studies. The dependent variables were the time elapsed between phases, from area designation to association establishment, to development permit, to management disposal. Prior studies targeted the entire time elapsed from commencement to completion. However, this study targeted only the time between area designation and management disposal, in other words, the time during which the agreement rate was a factor.

Three of the dependent variables considered—the number of houses sold, number of association members, and housing lease price index—were ultimately excluded from the analysis. The inclusion of these variables would have resulted in multi-collinearity, which is a problem in regression analysis. In fact, the number of houses sold and the number of association members were very highly correlated with the project area, while the housing lease price index was very highly correlated with the housing sale price index. In effect, project area could substitute for the number of houses sold, and housing sale price index could substitute for housing lease price index. The technical statistics of the variables ultimately selected are as follows:

B. Comparison of Project-Permitted Districts and Project Period Resulting from Changes in the Agreement Rate

The number of project-permitted districts after the changes in agreement rate are shown in the following histogram, which shows that a larger number of permitted projects when the

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agreement rate is higher. The agreement rate and successful permitting of a project appear to have a positive relationship.

TABLE I
TECHNICAL STATISTICS OF THE VARIABLES

	Min	Max	Avg	SD
Area(sq.m)	10,811.6	124,593.9	38,511.8	22,709.8
Affordable houses	0.0	340.0	115.9	74.8
Agreement rate	66.7	80	80	0.0
FAR	0.178	0.292	0.230	0.24
Total floor area	234.0	1,370,052.8	126,426.3	173,157.9
KOSPI 1	544.0	2,063.0	1,472.7	351.3
KOSPI 2	614.0	2,052.0	1,505.0	335.7
KOSPI 3	804.0	2,052.0	1,551.5	353.4
KOSPI 4	1,116.0	2,171.0	1,790.8	233.3
[a]Interest rate 1(%)	3.3	5.9	5.0	0.8
Interest rate 2(%)	3.3	5.9	4.9	0.9
Interest rate 3(%)	2.8	5.7	4.4	1.0
Interest rate 4(%)	2.8	5.7	3.6	0.9
[b]Sale price index1	68.4	105.4	85.1	11.4
Sale price index2	67.3	105.3	88.1	11.3
Sale price index3	67.9	105.3	95.3	10.2
Sale price index4	70.7	105.4	99.6	7.1
[c]Land value rate1	-3.5	1.0	0.5	0.6
Land value rate2	-0.9	3.0	0.5	0.5
Land value rate3	-3.5	2.3	0.0	1.0
Land value rate4	-3.5	0.8	0.2	0.6
Period 1(day)	273.0	2,688.0	1,213.2	504.3
Period 2(day)	40.0	410.0	126.1	76.7
Period 3(day)	101.0	1,562.0	460.9	278.9
Period 4(day)	97.0	2,352.0	626.2	425.9

[a]Interest rate is a government treasury bond interest rate provided by national government statistics.
[b]Sale price index is a housing sale price index in Seoul provided by Seoul Metropolitan government.
[c]Land value rate is a land value fluctuation rate provided by national government statistics.

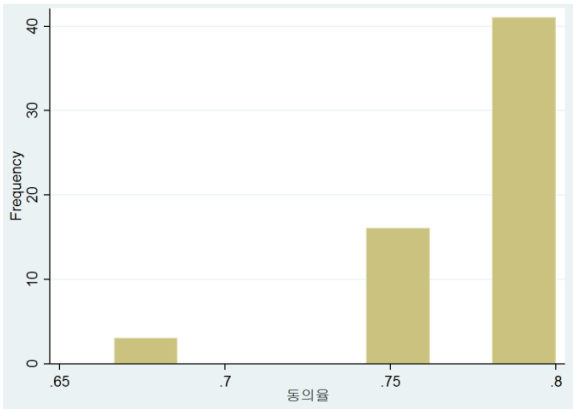


Fig. 2 Project-permitted district under agreement rate

The project periods for the various agreement rates are shown in the following scatter diagram and prediction line. The graph was prepared with the four periods serving as dependent variables. Although there are some disparities, in general the project period is shorter for higher agreement rates. A higher agreement rate appears to reduce the project period. However, more statistical review is needed order to determine whether the project period was, in fact, reduced when the agreement rate was higher. Although the graph showed a tendency toward reduction in project period, it was not possible to determine whether such an effect could be generalized. The tendency towards project period reduction, observed in the 60 sample project districts in this study, could not be generalized to the entire population of districts based solely on the graph. Additional statistical estimation and analysis will be necessary.

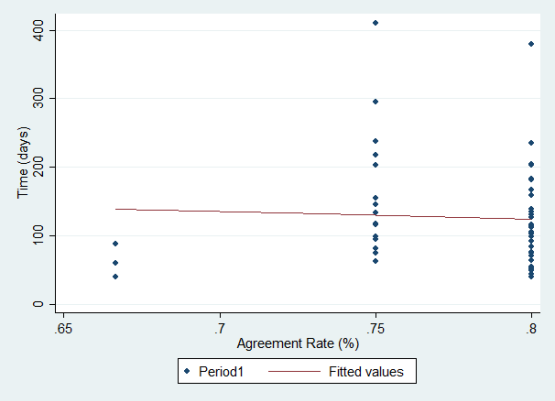


Fig. 3 Project periods for the various agreement rates (period 1)

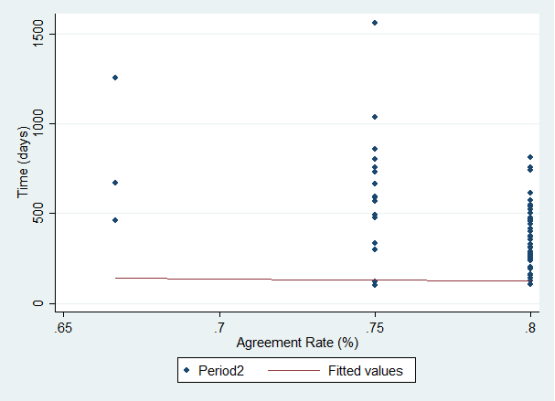


Fig. 4 Project periods for the various agreement rates (period 2)

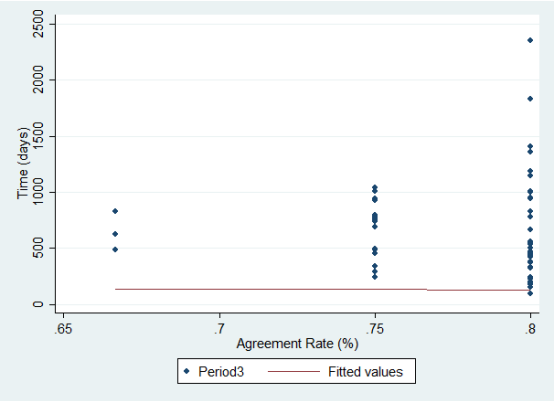


Fig. 5 Project periods for the various agreement rates (period 3)

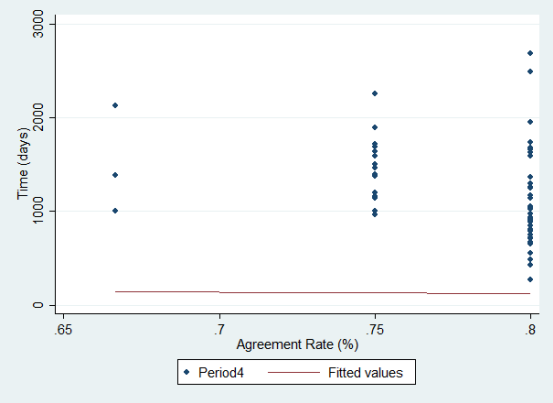


Fig. 6 Project periods for the various agreement rates (period 4)

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