REAL ESTATE BUSINESS CYCLE AND REAL ESTATE POLICIES: THE CASE OF KOREA*

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Abstract
By using the rate of change in the price of land, the perception and analysis of determinants of the real estate business cycle, and the appraisal of past real estate policies have been proceeded. Korean real estate business cycle is asymmetric (i.e., the expansion and contraction period of which is 3 - 4 years and 8 - 9 years respectively). Effects of the determinants of real estate business cycles are dependent upon the phase of the cycle. Results of the regression, which explicitly include the quantified real estate policies, indicate that past real estate policies were myopic and very much cycle-dependent. It is also highly probable that pre-emptive policies of fixed rules may stabilize real estate prices more effectively than the past myopic ones. This implies that, in addition to cycle-dependent short-term real estate policies, it might be more desirable to sustain cycle-independent long-term real estate policies.
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1. Introduction

The question of whether real estate policies have been consistent with other macroeconomic policies is very meaningful in determining the macroeconomic roles of future real estate policies. If real estate policies are not designed and implemented in a pro-market direction, the real estate market may constitute a serious obstacle to economic growth. Yet, it is difficult to determine whether the executed real estate policies are indeed pro-market. In Korea, various

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real estate deregulation policies introduced after the financial crisis of 1997 deemed to be pro-market. Nevertheless, a casual observation is insufficient and needs to be verified through an empirical analysis. Due to the non-quantitative nature of both real estate policies and the degree of reinforcement of the market mechanism, such analysis is quite difficult. The present study aims at tackling this problem through analyzing the relationship between the real estate business cycle and the real estate policies so that if the real estate policies show a repeated pattern of easing and tightening in accordance with the business cycle, we will conclude that the real estate policies have been temporary remedies. In this paper, the following three-step approach will be used. Firstly, the real estate business cycle will be established. By using real estate price changes, the length of real estate business cycles, peaks and troughs may be determined, and the possible asymmetricity of the real estate business cycle will be tested. Secondly, determinants of the real estate business cycle will be analyzed. It should be noted that effects arising from changes in macroeconomic variables upon real estate prices, are dependent upon the phase of the real estate business cycle. Lastly, executed real estate policies will be tested to determine whether they were temporary remedies or not. If previous real estate policies are found to be temporary remedies, it will be necessary to review the future real estate policies from the beginning.

2. Literature Review

The previous studies of the real estate business cycle have aimed at explaining the real estate business cycles using theoretical and empirical models. Most studies, identifying the real estate business cycle from general business cycles, use the rate of return of real estates. After detecting the pattern of the real estate business cycle by the mere observation, the changes of coefficients by time periods or the changes of coefficients of the variables in the structural model establishments are analyzed. Since there are numerous variables to represent rates of return, carefully selecting a relevant variable is a crucial issue. A number of studies have been more specific in analyzing the cap rate [Roulac (1978), Ambrose and Nourse (1993)]; time-series of rate of return made both by using the value-weighted equation [Liu, Grissom and Hartzell (1990), Mei and Liu (1994)] and

by using the investment appraisal model [Ricks (1969), Guntermann and Smith (1987)]; weighted rate of return [Sirmans and Webb (1980), Liu, Grissom and Hartzell (1990)]; rate of return of specific industry [Liu and Mei (1992)]; indirect rate of return [Burn and Epley (1982), Webb and Rubens (1986), Gyouko and Siegel (1994), Gyouko and Kiem (1994)]. Theoretical models of the real estate business cycle generally use the stock-flow model, which explicitly includes variables of expectation, development time-lag, and elasticity of market demand [DiPasquale and Wheaton (2000), Wheaton (1999), Childs, Ott and Riddiough (1996)]. A general result of the stock-flow model is that the existence of the real estate business cycle is dependent upon the expectation mechanism. In cases of adaptive expectation or myopia, a real estate business cycle can be detected. However, a real estate business cycle is not likely to be found in cases of rational expectations or perfect foresight. In the case of rational expectations, if the independent variables, which explain real estate prices, have business cycles, there can exist a real estate business cycle [DiPasquale and Wheaton (2000)]. Even though perfect foresight is assumed, a real estate business cycle does exist when there are expected uncertainties and when exogenous structures such as debt financing or multiple-leasers affect the operation of the real estate market and finally when long-run feedback is explicitly considered in the model [Wheaton (1999)]. Empirical models of a real estate business cycle are classified in various types according to the core variables related to that real estate business cycle. Studies have investigated macro-economic perspectives including the consumer price index [Liu, Hartzell, Greig and Grissom (1990)]; capital markets including interest rates [Chan, Hendershott and Sanders (1990), Sagalyn (1990), Mueller (1994), Mueller and Pauley (1995)]; income tax and rate of returns on capital [Ambrose and Nourse (1993), Dorhrmann (1995), Grenadier (1995); structural changes [Grissom and DeLisle (1999), Giaccoio and Clapp (1992), Khoo, Hartesell and Hoesli (1993)].

3. Data and Methodology

In this section, the recognition and the determination of peaks and troughs of Korean real estate business cycle will be analyzed. In order to recognize the Korean real estate business cycle, the rate of

change in land price from 1974 to 2002 will be used, which is the longest real estate price series in Korea. Data used in this section and the next is summarized in Table 1.

Table 1. Data description

Variable name	Descriptions & Sources
PL	Land price index, Korea Land Corporation
GDP	Gross Domestic Product, Bank of Korea
RCB	Interest rate for 3-year treasury note, Bank of Korea
PS	Stock price index, Korea Stock Exchange
CPI	Consumers Price Index, National Statistical Office
data frequency: yearly, Sample period: 1974 – 2002	

Let PL_t be the land price at time t and GPL_t be the rate of change in PL_t, (i.e., $(GPL_t = (PL_t - PL_{t-1})*100/PL_{t-1})$. By using the graph of GPL_t, turning points can be noticed. In order to determine turning points as clear as possible, regression analysis, recursive residual test, CUSUM test, squared CUSUM test and Chow's break point test will be used. The method of determining turning points can be summarized as follows. Let us first consider a case of one clear turning point, t*. By using the results of a regression such as $GPL_t = a_0 + a_1 t$, we can examine whether t* is a turning point. For example, if a starting point is 1, and t* is the first turning point recognized, we will run the regression on the period of [3, t*+k]. Even though the sample's starting point is 1, the regression analysis' starting point is 3 in order to avoid the degree of freedom problem. Also, k is a proper examining point to recognize as a turning point of the real estate business cycle ($k > 4$). The logic here is as follows. If t* is the turning point, either the level of significance of a_1 will become fairly low, or the sign of a_1 will be changed when we extend the sample period up to t*+k. Here, the number '4' comes from the mere experience.

The remaining problem is to determine how low is the low significance level. In order to determine this, the following criteria for the t-value of a_1 will be used. One is the case where the absolute of t-value of a_1 is lower than 0.5 for example. The other is the case where the t-value of a_1 is monotonically decreasing after t* up to t* + k even though the absolute value is not so low. This criterion can

help to determine the turning point around 1998, which was the year after the foreign currency crisis and a period of extremely huge decrease in the land price, as the trough.

Now, we will consider the case of multiple potential turning points, the typical example of which is as follows. When we run the regression after t*, without changing the sign of a_1, the level of significance falls up to t*+h but rises again up to t* + k (h < k).[1] This is the case where t** rather than t* might be the turning point (t* < t*+h < t*+k < t**). Standard testing procedures are followed in order to determine the real turning point.[2] Let's assume t_0 is a pre-determined turning point. For the sample period of [t_0, t**], a recursive residual test is made using recursive residuals obtained by the recursive least square method. If the recursive residual at t* is less than half the standard deviation, we will decide that t* cannot be the turning point. In order to rise the robustness of tests, we will also proceed with CUSUM test and squared CUSUM test. In both tests, if both test's statistics reveal a significance level greater than 95%, we will conclude that there is no turning point within the sampling period. There is also no guarantee the above three tests will all show the same results. Therefore, if t* is not recognized as a turning point in two or more tests, we will conclude that t* is not a turning point. Finally, Chow's break point test will be proceeded in order to test whether the whole turning points are determined appropriately.

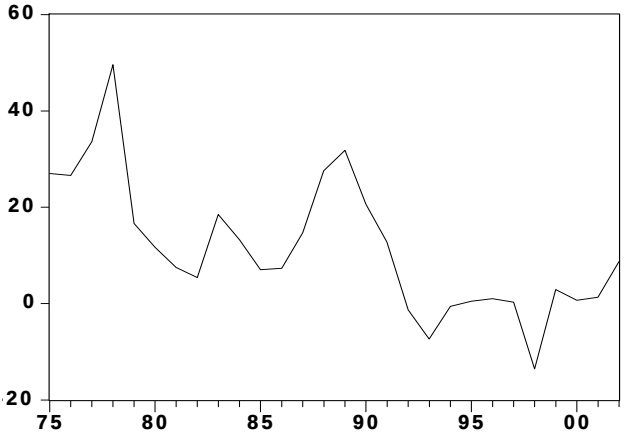
As shown in Figure 1, the movement of GPL_t seems to suggest a business cycle. But, a mere observation of the graph does not necessarily clearly determine the turning points. There might be cases where one clear turning point may be observed between an

[1] Here, h and k indicate some points of time such that t* < t*+h < t*+k < t**.

[2] After t_0 is recognized as the peak (trough), it is necessary to decide whether t* or t** will be the peak (trough). If t* becomes a turning point, t* can be recognized as the peak (trought). And, if t* does not become a turning point, t** will be recognized as the turning point. Because the purpose was to examine the possibility of one turning point within the given sampling period, finding various turning points to the entire sampling period is not appropriate.

expansionary and subsequent contractionary period. But, sometimes we might observe two or more potential turning points between the aforementioned two periods. Now we will consider how to determine actual turning points by using GPL_t data from 1974 to 2002.

Figure 1. Rate of changes in land price



From the casual observation of Figure 1, we notice that 1978 is the first peak. In order to confirm this, we run a regression such as $GPL_t = a_0 + a_1 t$. Results of the regression are summarized in Table 2. According to the criterion mentioned above, we can conclude that 1978 is actually a peak.

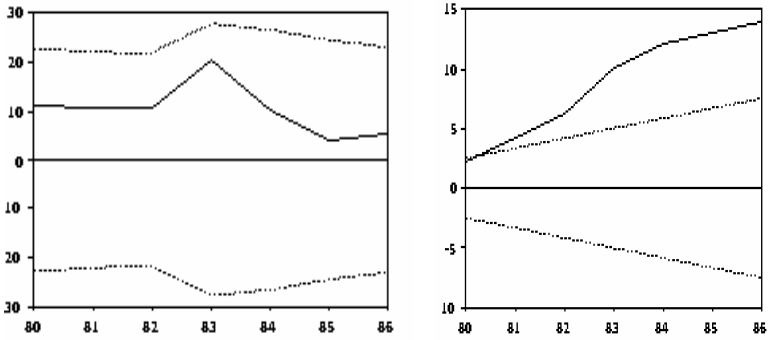
Table 2. Result of regression analysis (I)

Period	a_1	t-value	Level of confidence
1975 – 1977	3.29	1.55	0.3647
1975 – 1978	**7.47**	**2.88**	**0.1023**
1975 – 1979	0.22	0.44	0.9635
1975 – 1980	-2.58	-0.77	0.4808
1975 – 1981	-3.76	-1.53	0.1855

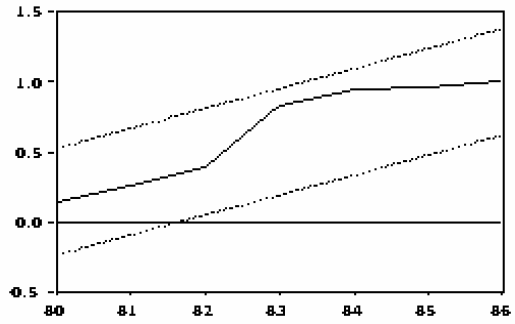
Also, from the casual observation of Figure 1, we notice that either 1982 or 1986 may be a trough. In order to determine the trough, recursive residual test, CUSUM test and squared CUSUM test have

been applied. Test results are summarized in Figure 2. According to the criterion mentioned above, 1982 is not a trough. Thus, we should conclude that 1986 is the trough. The similar result can be obtained through the Chow's break point test. The F- statistics for this test is obtained as 3.83, which implies that 1982 is not the turning point for the period of 1978 – 1986 under 10% significance level.

Figure 2. Test results of determining whether 1982 or 1986 is the trough



___ : recursive residuals ___ : CUSUM
---: 2 S.E. ---: 5% significance level



___ : squared CUSUM ---: 5% significance level

By using the same method, another set of turning points can be determined. Results are summarized in Table 3. According to Table 3, we can observe the asymmetry of the Korean real estate business cycle. In other words, the length of expansion period is about 3–4 years and a contraction period is about 8–9 years. This pattern of

asymmetry is, however, quite the opposite of the general Korean business cycle, the length of expansion period is twice as long as that of the contraction period in the Korean real estate business cycle.

Table 3. Results of regression analysis (II)

Period	a_1	t-value	Level of confidence
1978 – 1980	-18.94	-2.34	0.2570
1978 – 1981	-13.12	-2.65	0.1175
1978 – 1982	**-9.74**	**-2.82**	**0.0667**
1978 – 1983	-5.52	-1.66	0.1719
1978 – 1984	-3.98	-1.58	0.1734
1978 – 1985	-3.53	-1.86	0.1109
1978 – 1986	**-3.06**	**-2.05**	**0.0786**
1978 – 1987	-2.35	-1.76	0.1152
1978 – 1988	-1.12	-0.91	0.3833
1978 – 1989	-0.26	-0.23	0.8173

4. Determinants of the real estate business cycle

In this section, the determinants of the rate of change in land price, GPL_t, will be found. Also, it will be tested whether size of effects of the change in determinants upon GPL_t are dependent upon the phase of the business cycle. These empirical studies are meaningful by themselves, and can be considered to be a precedent process in examining the impacts of real estate policies. When rational expectations are considered, GPL_t can have the cycle either when some determinants of GPL_t have the cycle or when there are intrinsic rigidities in the land market [Wheaton (1999)]. Therefore, if variables reflecting cycles are found to be determinants of GPL_t, they might be considered as causes of the real estate business cycle. According to previous studies on Korean land prices, major factors affecting GPL_t can be categorized as the market fundamental and the portfolio selection factors [Suh (2000, 1996, 1994), Shon (1991), Chung, et. al. (1996), Shon et. al. (1994), Lee (1992), and Hur (1991)].

Since the major 'market fundamental' factor is the GDP, the growth rate of GDP, $GGDP_t$, will be considered. Major 'portfolio

selection' factors are stock price, interest rate, and inflation rate. Therefore, the rate of change in the stock price, GPS_t, the rate of change in the 3 year CB (Convertible Bond) rate, $GRCB_t$, and the rate of change in the CPI (Consumer Price Index), $GCPI_t$, will be considered. In order to consider the possible asymmetric effect, the slope dummy variable (SD) representing expansion periods will be used. SD's value is 1 during periods of 1975 over 1978, 1987 over 1989 and 1999 over 2002 and is 0 otherwise. The result of the regression is as follows.

$$GPL_t = -6.8949 + 0.7034\ GGDP_t - 0.7419\ GGDP_t * SD + 0.1374\ GPS_{t-2}$$
$$(2.93) \quad (2.67) \quad (2.25) \quad (3.82)$$
$$+ 0.0667\ GPS_t * SD + 0.3569\ GCPI_t + 2.2316\ GCPI_t * SD$$
$$(1.68) \quad (1.98) \quad (6.06)$$
$$- 0.1756\ GRCB_{t-1} + 0.2089\ GRCB_{t-2} * SD + 0.3706\ GPL_{t-1}$$
$$(2.18) \quad (1.68) \quad (4.18)$$
$$DW: 1.63,\ adj\text{-}R^2: 0.9105$$

Here, DW is Durbin-Watson's d-statistics; adj-R^2 is a coefficient of determination adjusted by the degree of freedom; the values in the parenthesis are t-statistics. Determinants can be classified as the following two types. The one is the case where the sign of the coefficient of the entire period is different from the additional coefficient of the expanding period. Examples of this case are $GGDP_t$ and $GRCB_t$. The other is the case where the sign of the coefficient of the entire period is the same as the additional coefficient of the expanding period. Examples of this case are GPS_t and $GCPI_t$. The coefficient of $GGDP_t$ in the contraction period is 0.7034, and is 0.7034 - 0.7419 = -0.0385 in the expanding period, which is almost zero. This implies that, even though economic growth affected land price during the contraction period, the same is not true in the expanding period. This happens because portfolio selection motives, rather than the market fundamental ones, for the demand for land dominate during the expansion period.[3] The

[3] Since the purpose of introducing the slope dummy variable is to recognize the asymmetric effect of GGDP upon GPL according to the phase of the

coefficient of $GRCB_t$ in contraction period is –0.1756, and is –0.1756 + 0.2089 = 0.0333 in the expanding period, which is also nearly zero. Lowering of the interest rate during a contraction period can stimulate the land price. But, during the expansion period, even if the interest rate rise, the rising speed of the land price is not affected. This might happen because the attractiveness of the land dominates over bond yields during the expansion period.

If the stock price rises, it triggers GPL_t with some time lags. Its magnitude is even bigger in the expansion period. Portfolio selection activities have greater effects on the real estate market especially during the real estate market expansion periods. In case of inflation, a similar result is obtained, but its meaning is somewhat different. Effects of inflation during the contraction period are small. However, its hedging capability during expansion period is very large. There is a possibility to have misleading conclusion when discussing the hedging capability of inflated land prices with only data of early and mid 1990's in Korea.[4] The asymmetric effects of determinants of GPL_t implies the possibility of misleading interpretations in the correlation coefficient and the co-integration analyses, which are proceeded for the entire sample period. For example, the correlation between GPL_t and $GGDP_t$

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real estate business cycle, we are mainly interested in the size of the coefficient not the t-values of the coefficient.

[4] Some may not be comfortable with using slope dummy variables. Since the correlation coefficient of GCPI and GCPI*SD, for example, is as low as 0.21, the multicollinearity problem may not be serious. This might be confirmed indirectly by the following way. If we run the regression for the expanding period only, the following result can be obtained.

$$GPL_t = -1.07 - 0.39\ GGDP_t - 0.02\ GRCB_t + 1.78\ GCPI_t + 0.15\ GPS_t + 0.37\ GPL_{t-1}$$
(0.3) (0.7) (0.2) (3.2) (3.7) (3.4)

DW: 2.08, adj-R^2: 0.98

As was expected, the sign of the coefficient of GGDP is incorrect and coefficients of GGDP and GRCB are statistically insignificant. But the regression result for the contracting period is quite contrary.

$$GPL_t = -9.38 + 1.17\ GGDP_t - 0.13\ GRCB_t + 0.48\ GCPI_t + 0.09\ GPS_t + 0.26\ GPL_{t-1}$$
(2.8) (3.6) (1.5) (2.0) (1.7) (2.4)

DW: 1.08, adj-R^2: 0.74

These two regression results reinforce the former regression result using the slope dummy variables.

during the contraction period is positive, and that during the expansion period is almost zero. If we calculate the correlation coefficient for the entire sample, containing several contraction and expansion periods, the size of it might have a downward bias. Similar results may be obtained in case of the co-integration test.

5. The real estate business cycle and real estate policy

In this section, the relationships between the real estate business cycle and real estate policies will be analyzed. The empirical analysis confirms whether policy implemented prior to change in business cycle or not, and whether those policies of real estate have contributed to stabilize real estate prices. Korean real estate policies after 1974 include regulation of real estate transactions, taxation, regulations of real estate prices, supply policies, policies of real estate financing, and others.[5]

Table 4. Peaks and troughs of the Korean real estate business cycle

Year		1978		1986		1989		1998		2002
Turning points		Peak		trough		peak		trough		peak
	Expanding (3 years)		contracting (8 years)		expanding (3 years)		contracting (9 years)		expanding (4 years)	

These various policies can be divided into two categories such as controls for strengthened government intervention, regulations, and controls for relaxing intervention in the real estate market, deregulations. According to Table 5, regulations were carried out in 1978, 1983, 1988, 1990 and 2002, and deregulation was executed for the remaining years.

[5] Permission to execute a land transaction, registration, and others are included in controls of land transaction, and taxation policies of real estate include transfer capital gain tax, gift tax and other related taxes. Typical price regulation includes initial sales price control, and control measures related to supply side includes the development of new towns and others.

Table 5. Real estate policies in Korea

	GPLt	Government Policies
1978	48.9%	**Regulations:** Installation of permission of land transaction, Enlargement of areas for standard land price announcement, Reform of land tax for vacant land, Establishment of public organization for land development
1981	7.5%	**Deregulations:** Relax of Transfer income tax, Partial release of supply price of new apartment, Abandonment of requirement of at least 50% of small-size apartment supply for private construction company
1983	18.5%	**Regulations:** Installation of housing bond bidding system, Reinforcement of transfer tax, Reduction of applicable time for flexible transfer tax rate
1985	7.0%	**Deregulations:** Encouragement of cooperation between private sector and public sector for land development, Application of different price control for new apartment by region, Relax of building control, Enlargement of housing finance supply
1988	27.5%	**Regulations:** Enlargement of 274 new real estate special districts (Totally, 599 districts), Investigation of housing finance sources for individual housing purchase, Reinforcement of qualification for tax exemption, Usage of Official real estate transaction form, Installation of registration duty, Installation of Land development tax
1989	32.0%	**Regulations:** Development of 5 new towns (Supply of 2 million housing units)
1990	20.6%	**Regulations:** Installation of size ceiling of land for housing, land excess profit tax, and development tax, Reinforcement of gift tax, Promotion of housing supply, Prohibition of new land acquisition by large companies,
1992	-1.3%	**Deregulations:** Relax of prohibition of new land acquisition by large companies
1993	-7.4%	**Deregulations:** Relax of land use control, Establishment of 5 year plan for land supply and demand
1994	-0.6%	**Deregulations:** Relax of land use control in the Capital Region, Rearrangement of requirement of small-sized apartment supply
1998	-13.6%	**Deregulations:** Abandonment of price ceiling for new apartment, Tax exemption of transfer income tax in designated period, Abandonment of land excess profit tax, size ceiling of land for housing, Liberalization of real estate acquirement by foreigners
1999	2.9%	**Deregulations:** Abandonment of participation for new private apartment lotteries, Abandonment of giving priority to non-home owners
2000	0.7%	**Deregulations:** Abandonment of duties for land swap, Relax of requirement of rent housing, Relax of the qualification for joining housing association
2002	8.7%	**Regulations:** Reinstallation of participation for new private apartment lotteries, Reinforcement of transfer income tax, taxes related possession, Establishment of new town

The implemented real estate policies will be stated as POL_t, which is a combination of dummy variables. As shown in <Table 5>, the value of POL_t is +1 for regulation years (1978, 1983, 1988, 1990 and 2002), and is –1 for deregulation years. And, the values of POL_t for other years not shown in <Table 5> are zero. Values in the second column in <Table 5> show the rates of changes in land prices. This table clearly implies that the regulation was followed after the high land price increases, and the deregulation was followed after the stabilization of the land prices. In order to confirm these findings, POL_t was taken as an independent variable in the regression analysis formula of GPL_t.If a coefficient of POL_t is positive and statistically significant, it may imply that real estate policies were just temporary remedies.

$$GPL_t = -3.2517 + 0.5848\ GGDP_t - 0.7413\ GGDP_{t-1} * SD + 0.0270\ GPS_{t-2}$$
$$(1.56) \quad (2.56) \quad (2.90) \quad (1.02)$$
$$+ 0.0408\ GPS_t * SD + 0.2237\ GCPI_t + 1.9286\ GCPI_t * SD$$
$$(1.32) \quad (1.62) \quad (5.92)$$
$$-0.0716\ GRCB_t + 0.0915 GRCB_t * SD + 0.4632\ GPL_{t-1} + 6.5637\ POL_t$$
$$(1.10) \quad (0.94) \quad (5.79) \quad (4.42)$$
$$DW: 1.70,\ adj\text{-}R^2: 0.9379$$

As expected, the coefficient of POL_t is positive and statistically significant. This implies that all previous real estate policies were just temporary remedies. If real estate policy had a 'head start' or was executed in a market-oriented direction, the results would be different. A direct test of this is not possible due to the lack of data, since market oriented real estate policies have never been used. One possible indirect test method would be estimating the result of the above regression analysis by clearly stating the POL_t as an independent variable. In order for the pre-emptive real estate policy to be effective in stabilizing the real estate market, the real estate policy executed sometimes before the start of the expansion (contraction) period can decrease (increase) the rate of change in land price during the expansion (contraction) period. However, it is meaningless to introduce POL_{t-i} in the above regression equation for this examination, since this kind of pre-emptive policy is never used and thus is not included in the data. Actually, if POL_{t-1} (POL_{t-2}) is

introduced as an explanatory variable instead of POL_t in the above regression, the coefficient of POL_{t-1} (POL_{t-2}) is 2.57 (-0.72) with t-value of 0.89 (-0.72).

Therefore, we must consider the indirect test method. If the pre-emptive policy executed in a specific time in the past has an effect on a current GPL_t with an impact lag, a coefficient of pre-emptive policy must be negative. But, since pre-emptive policies are never used, we do not know the length of the impact lag. Thus, we will simply consider that the sign of the coefficient of GPL_t in the above regression equation is minus if the pre-emptive real estate policies were effective.

The remaining problem is to determine the magnitude of the coefficient under the effective pre-emptive policy. There is no way to determine a magnitude of the POL_t coefficient under a hypothetical condition. Two cases are considered here: coefficient values of POL_t are zero or –6.5637.[6] A POL_t value of zero might be considered to be the case where fixed rules, which are independent of the real estate business cycle, are used. A POL_t value of –6.5637 might have meaning as the benchmark case. Since the magnitude of the dummy variable, POL_t , is limited to ±1, 6.5637 can be considered to be the average effect of this dummy variable for the considered sample period. Since the same magnitude of the dummy variable is used in case of the pre-emptive policy, the magnitude of coefficient might be considered as –6.5637 if it is effective.

Table 6. Results of simulation of preceding real estate policy

	GPL_t	Case 1	Case 2
Average	9.46	9.11	8.84
Maximum	49.58	43.66	37.10
Minimum	-13.59	-5.22	-1.07
Standard Deviation	13.29	9.39	8.01

Note: Case 1 is the coefficient of GPL_t is zero, and Case 2 is that of GPL_t is -6.5637.

[6] It is noted that the preceding real estate policy is also effective when coefficient of POL_t is zero since the coefficient of POL_t is 6.5637 as the result of above regression formula.

Statistical findings about GPL_t are summarized in <Table 6>. It was concluded that the pre-emptive real estate policy is most effective in stabilizing the real estate market. But, a more remarkable finding is that the stabilizing effect of the fixed rule is almost the same as the well designed pre-emptive policy. Also, it is clear that the repeated use of temporary remedies is the worst.

6. Conclusions

The Korean real estate business cycle is found to be asymmetric. The length of the expansion period is 3-4 years while that of the contraction period is 8-9 years. This pattern of asymmetry is quite the opposite of the general Korean business cycle, the length of expansion period is twice as long as that of the contraction period. Determinants of the real estate business cycle are found to be the economic growth rate, inflation rate, the rate of change in the stock price, and the rate of change in the interest rate. Those effects on the rate of change in the land price are dependent upon the phase of the real estate business cycle.

Even though the economic growth affected the land price during the contraction period, the same is not true in the expansion period. Also, lowering of the interest rate during the contraction period can stimulate the land price. But, during the expansion period, even if the interest rate increase, the rate of acceleration of land price will not be affected. If the stock price rises, it triggers land price with some time lags, and its magnitude is even bigger in expansion period. Effects of inflation during the contraction period are small. However, its hedging capability during the expansion period is very large. Asymmetric effects of real estate business cycle determinants implies the possibility of having misleading interpretations in the correlation coefficient analysis and the co-integration analysis, which are proceeded for the entire sample period. As for real estate polices executed up to now, it is concluded that they were all temporary remedies. If a pre-emptive real estate policy can be designed, it will be most effective in stabilizing the real estate market. But, a more remarkable finding is that the stabilizing effect of the fixed rule is almost the same as the well designed pre-emptive policy.

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