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KOREAN REAL ESTATE MARKET AND BOOSTING POLICIES: FOCUSING ON MORTGAGE LOANS

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ABSTRACT. The Korean real estate market is currently slowing down due to the global economic crisis, which resulted from subprime mortgage crisis in the United States. In response, the Korean government has adopted various policies in an attempt to deregulate real estate speculation. For example, the Loan to value ratio (LTV) has been increased in order to stimulate housing supply, demand, and housing transactions. However, these policies could potentially result in a mortgage crisis due to an increase in over-amplified and high-risk derivatives in Korea's secondary mortgage market. Consequently, the housing market could fall into such deep confusion that it will be even more difficult to perform empirically based housing market forecasting. Therefore, a comprehensive and systematic method is required to analyze the real estate financial market and the causal relationships between market influence factors. With an integrated perspective and an application of a system dynamics methodology, this paper proposes Korean Real Estate and Mortgage Market dynamics models based on the fundamental principles and causal loops of housing markets, which are determined by the economic activities of consumers, financial agencies, and real estate financing investors. The potential effects of the Korean government's deregulation policies are also considered by focusing on the main factor of these policies: the mortgage loan.

KEYWORDS: System dynamics; Real estate market; Mortgage loan; LTV

1. INTRODUCTION

In the last several years, the subprime mortgage crisis has been caused by an increase in mortgage delinquencies, particularly among riskier loans, and is a result of excessive and indiscreet lending practices related to mortgage loan qualifications (e.g., lending to individuals with low credit rating and a high loan to value ratio). Consequently, homeowners, lenders, financial institutions, and investors have been affected, and there has been widespread concern that an economic recession comparable to the Great Depression could occur (Lander et al. 2009). Korea has not been exempt from the current international financial problems. In fact, the Korean real estate market has also experienced a slowing down of housing transactions due to the global economic crisis caused by subprime mortgages.

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However, since 2000, housing values in the Korean real estate market have sky-rocketed, and the Korean government has accordingly regulated speculative demand in order to burst the housing price bubble (Cho and Ma, 2006). Particularly from early 2005 to late 2007, the Korean government adopted policies, which restrained housing loans, such as increasing interest rates and limiting the amount of loans Focused on Loan to value ratio (LTV) decrease and Debt to income (DTI) decrease. LTV means the amount of a first mortgage lien as a percentage of the total appraised value of a real property. Also, DTI is the percentage of a consumer's monthly gross income that goes toward paying debt.

Furthermore, as Korea's secondary mortgage market has not been activated, it has been assumed that a real estate market crisis, such as the subprime mortgage problem, will not occur in Korea. Yet, as a result of the global recession, the Korean real estate market has experienced a decrease in housing values and transactions. Consequently, in the second half of 2008, the Korean government was forced to adopt boosting policies based on deregulating real estate speculation, such as increasing the LTV and DTI, in order to stimulate housing transactions and boost housing prices. However, because mortgage loan is a key element of real estate financial market, impact on secondary market in charge of mortgage securitization should be conducted. For instance, these policies could potentially bring about a second subprime mortgage crisis in Korea because of the over-collateralized, over-amplified, and high-risk securities. These product which circulated in a secondary mortgage market, would be disastrous to the market, as no one would be able to determine the true value or risk of these derivatives (Lander et al., 2009).

This paper integrates causal loop analysis using system dynamics modeling and proposes several Korean real estate and mortgage market dynamics models based on the fundamental law of supply and demand in housing markets as well as on the economic activities of consumers, financial agencies, and real estate financing investors.

First, universal real estate and mortgage market model are developed and the impact of the Korean government's deregulation policies is analyzed while focusing on mortgage loan expansion, which is the main factor of these policies. Second, a systematic approach is deployed to comprehensively analyze the Korean real estate market and the causal nexus between market determining factors derived from previous research on economics and real estate financial theories.

2. OVERVIEW OF KOREAN REAL ESTATE MARKET

To develop System Dynamics policy model, this research begins with investigation of Korean housing market structures and real estate financial market in charge of mortgage lending and analysis of their structures. After this, the current Korean real estate policies analysis is conducted to apply policy factors to dynamic model.

2.1. Real estate financial market

The major benefits of real estate financing are the increased number of homeowners and the opportunity for these homeowners to create wealth (Chomsisengphet and Pennington-Cross, 2006). Also, mortgage lending has functions to activate housing transactions by controlling housing supply and demand (Malpass, 1990). Therefore, real estate finance plays an important role in the housing market in relation to housing demand through mortgage loans. In the real estate financial market, as consumers borrow money and credit to develop or acquire real estate property, financial agencies (e.g., commercial banks, mutual saving banks, and another lending institutions) make profits through mortgage loans.

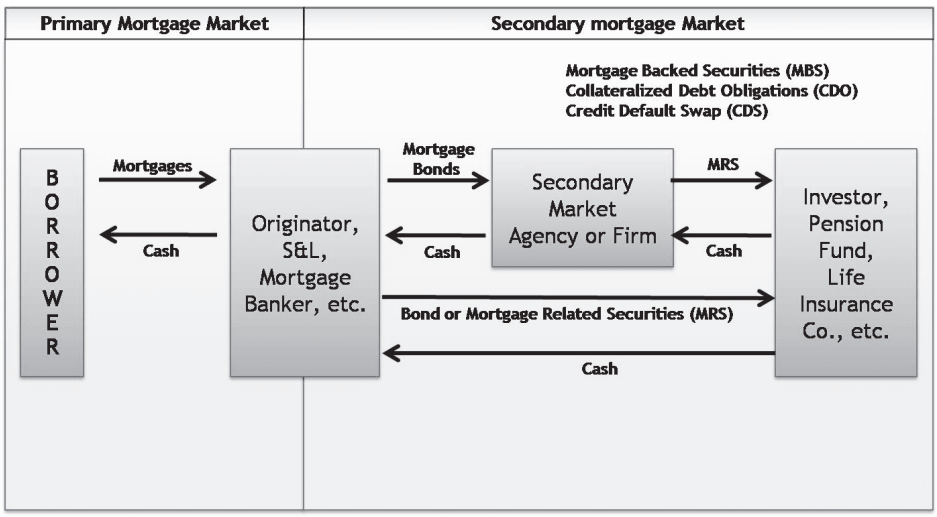

Figure 1. Mortgage market structure (Clauretie and Sirmans, 2003).

As demonstrated in Figure 1, mortgages primary originate from primary originator such as thrifts of mortgage bankers in the primary mortgage market. Some primary originators and all mortgage bankers sell these loans in the secondary market. Agencies and firms that purchase mortgages in the secondary market most often raise the funds required for such purchases by issuing bonds or other types of debt instruments such as Mortgage Backed Securities (MBS) (Clauretie and Sirmans, 2003). A mortgage bond is a bond secured by a mortgage on a property and backed by real estate or physical equipment that can be liquidated. MBS are defined as asset-backed securities whose cash flows are backed by the principal and interest payments of a set of mortgage loans.

2.2. Current real estate policies in Korea

Currently, the Korean economy is suffering from a business recession resulting from the international financial crisis. In particular, Korea's real estate market is being negatively impacted by the decrease in housing transactions, the fall of house prices, and by the numerous instances of unsold apartments. In an attempt to revitalize the real estate market, the Korean government has adopted boosting policies aimed at deregulating real estate speculation.

On October 21, 2008, the Korean government announced a comprehensive real estate program which removed the Excessive Real Estate Investment Areas n Seoul, except the south-east regions of Seoul such as Kangnam-Gu, Songpa-Gu, and Seocho-Gu. The Excessive Real Estate Investment Areas are defined as the areas where a housing price bubble may occur due to high speculative attractiveness. In these, 40% of the Loan to Value Ratio, and 40% of Debt to Income are applied to mortgage loans which are below the 10-year-stipulated time and above the 6 billion won of price for house trading.

However, when an Excessive Real Estate Investment Area is transformed into a general area, the LTV will be increased to 60% and the DTI will be removed. In other words, these policies are intended for the deregulation of mortgage loan borrowing qualifications such as the amount of loans and credit rating that is possible to lend.

3. PREVIOUS RESEARCH

To analyze the effects of real estate policies, previous studies relied upon the use of statistical analysis or empirical approaches. However, a comprehensive and systematical method is required to understand strategic problems in complex, dynamic systems. These are social, economic, political and environmental systems. This research applies the System Dynamics modeling tool, which provides various approaches to analyze policies' effects.

3.1. System dynamics

System Dynamics is a modeling tool for understanding strategic problems in complex, dynamic systems. Table 1 shows legend in SD models. Causal relationship in Causal loop diagram of System dynamics are made up of two types: positive relations represented as "+" and negative relations represented as "-". Also, if there are remarkable time delay between an independent variable and a dependent variable, it is expressed as follows.

Table 1. Causal loop diagram (Sterman, 2000)

Causal relationship	Relationship between effective factors	
A $\xrightarrow{+}$ B	When another conditions are same	When Factor A increases (decreases), Factor B increases (decreases)
A $\xrightarrow{-}$ B		When Factor A increases (decreases), Factor B decreases (increases)
A $\xrightarrow{\|}$ B	Including weighted delayed time between two factors	

An SD model provides system users with insight into the feedback processes and dynamic behavior of a system. This model is made up of feedback loops and their variables, which are known as causal loop diagrams or influence diagrams. Feedback loops can be divided into two categories: (1) a balancing loop which is a goal seeking structure of the system that causes balance and stability, and (2) a reinforcing loop which generates a growth process in which action builds a result that generates still greater action (Ahmad and Simonovic, 2000). Using these two types of loops, causal loop analysis can find the missing links of empirical approaches. In addition, SD models can connect these missing links using previous research and expert opinion, and organize additional market determining causal loops. Therefore, system dynamics modeling provides a comprehensive solution and systematic approach to analyze the impact of Korean real estate policies.

3.2. Literature review

Several studies have been conducted on housing price market models and real estate policy analysis. Guirguis et al. (2005) employed alternative estimation methodologies in which the parameters are allowed to vary over time in order to predict housing prices. Using quantile regression, Zietz et al. (2008) suggested determinants of house prices that contribute to observed variations in the estimated prices of housing characteristics. Shiller and Weiss (1999) proposed a framework for comparing real estate valuation systems by simulating mortgage lenders' profits and density estimation. Cho and Ma (2006) identified the long-term relationship between housing values and interest rates in the Korean housing market using the cointegration test and spectral analysis. Kim and Kim (1999) demonstrated the impact of lifting price control in Korea, while analyzing the relation between demand and house price using a stock-adjustment model of the housing market. In addition, Park et al. (2010) demonstrated the effectiveness of bank lending restrictions and analyzed the relationship between bank lending and apartment prices using real data. However, only a few influence factors were considered in these studies, and it is difficult to apply housing policies to the price models. Also, these studies

conducted their analysis using empirical approaches with only a few factors, instead of considering diverse perspectives.

Furthermore, there is evidence to support the relationships between the factors that comprise the real estate market. In the present research, dynamics models are constructed based on fundamental economic theories and expert opinion on market states. Table 2 shows the logic behind the relationship between the influence factors of these models. Factor A are independent variables and Factor B are independent variables. Using the previous researches and statistic data, we find their correlations whether they are in positive relations or negative relations.

Table 2. Relationship between influence factors

Factor A	Factor B	+/–	Source	Details
House transactions	House price	(+)	Korea Appraisal Board, 2008, http://www.ret.co.kr/	National data (Korean housing transaction and house price index).
House price	Expected profit from trading	(–)	C. Kim and K. Kim, 1999	The demand for housing is a decreasing function of its current price.
House price	Worth of mortgage	(+)	Bernanke, 2008	Rising prices provide leveraged borrowers with significant increases in home equity and, consequently, with greater financial flexibility.
Perceived house price	Expected profit from trading	(+)	C. Kim and K. Kim, 1999	Housing demand is an increasing function of the expected future price. The overall house price will rise immediately following decontrol.
Expected profit from trading	Potential investment demand	(+)	Brueggeman and Fisher, 2005	The investor anticipates selling properties after holding them for a period of time. Investors often expect prices to rise over the holding period, particularly in an inflationary environment.
Base rate	Interest rate of ARM	(+)	Clauretie and Sirmans, 2003	The basic concept behind the adjustable-rate mortgage (ARM) is to allow the rate of interest on a loan to move with the market rate.
Mortgage delinquency	Interest rate of ARM	(+)	Brueggeman and Fisher, 2005	When making mortgage loans, one major concern of lenders is the risk that borrowers will default on obligations to repay interest and principal.
Personal default rate	Interest rate of ARM	(+)	Brueggeman and Fisher, 2005	When making mortgage loans, one major concern of lenders is the risk that borrowers will default on obligations to repay interest and principal.
Personal default rate	MRS investors' risk	(+)	Lander et al., 2009	The over-collateralized, high risk securities created a chaos in the market, as no one could determine the true value or risk underlying these securities.
Fund of originator	Qualification of mortgage loan	(–)	Brueggeman and Fisher, 2005	The amount of credit that lenders are willing to supply is a function of their cost of attracting funds from savers, the cost of managing and originating loans, and the losses from loan defaults and foreclosures.
Qualification of mortgage loan	Borrower of mortgage loan	(–)	Brueggeman and Fisher, 2005	Housing demand is generally determined by the interest rate that must be paid to acquire mortgage credit. Hence, the demand for housing establishes, in a large part, the demand for mortgage credit at various rates of interest.

(Continued)

Factor A	Factor B	+/–	Source	Details
(Continued)				
High return high risk derivatives	Investors' dividend	(+)	Lander et al., 2009	Subprime mortgage backed securities, because of their higher returns, were becoming more popular for international investors.
High return high risk derivatives	MRS' risk	(+)	Lander et al., 2009	The over-collateralized, high risk securities created a chaos in the market as no one could determine the true value or risk underlying these securities.
Mortgage bonds	Mortgage backed securities	(+)	Chomsisengphet and Pennington-Cross, 2006	National data (Increasing securitization rates).
Mortgage backed securities	High return high risk derivatives	(+)	Chomsisengphet and Pennington-Cross, 2006	National data (Increasing securitization rates).
Expected profit from generating new derivatives	High return high risk derivatives	(+)	The Bank of Korea, 2008	The commission fee of CDS (a part of derivatives) is 2.5% on average, which is 1.1% higher than the margin of normal loans.
Perceived MRS' expected profit compared with risk	Investment in MRS	(+)	Lander et al., 2009; Boone and Kurz, 2003	Subprime mortgage backed securities, because of their higher returns, were becoming more popular with international investors, thus providing more funds for lending agencies. Individuals and institutions have five primary motivations for investing: growth in capital, stability of principal, liquidity, current income, and income growth.

4. POLICY MODEL

4.1. Korean housing market structures

In general, house price is determined by the supply and demand function, which is an acknowledged market principle. Based on this principle, house price determinants are illustrated in Figure 2. *Housing Supply* includes *Newly-Built Housing* and *Existing Housing for Sale*.

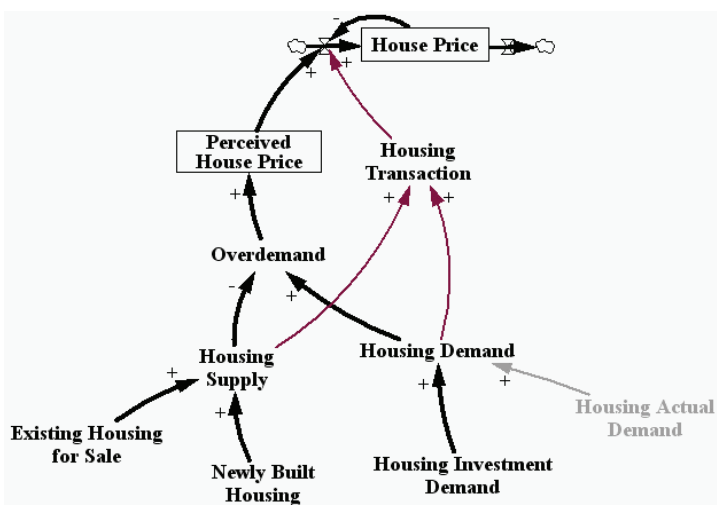

Figure 2. House price determinants

Housing Demand is derived from the sum of both *Actual Demand* and *Investment Demand*. *Actual Demand* represents a means of living and *Investment Demand* refers to the demand for property accumulation (Park et al., 2009).

Then, *Perceived House Price*–which is defined as the consumer's perception of the possibility of price volatility before *House Price* is determined–is derived from *Overdemand*, which subtracts *Housing Demand* from *Housing Supply*. This *Perceived House Price* is transformed into actual *House Price* when supply and demand are converted into *Housing Transactions*.

On the other hand, this model is based on the assumption that *Housing Actual Demand* cannot play an important role, as the KB Bank (the leading private bank in Korea) finds that most consumers (who make up housing demand) perceive the house as a means of property accumulation (The KB Bank, 2006).

According to general market principles, there is a significant causal relationship between *Housing Investment Demand* and *House Price*. As shown in Figure 3, the *Expected Profit from Trading* is an essential factor to explain this relationship. *Expected Profit from Trading* is defined as the expectancy of householders' profit production when trading houses. Also, *Expected Profit from Trading* is determined by price difference between *Perceived House Price* and *House Price*. This difference is generated by time delay between two factors affected by *Housing Transactions* (Park et al., 2009).

In the housing market, when *Housing Investment Demand* is high, consumers expect future house prices to increase (i.e., *Perceived House Price* increases). Therefore, more powerful speculative demand will influence the market (Loop R1) (Park et al., 2009). These expectations are maintained until *House Price* seems to have arrived at a definite point. That is, this reinforcing loop shows that there is mutual rising tendency between *House Price* and *Housing Investment Demand*.

However, as shown by Figure 4, if *Perceived House Price* is transformed into *House Price* as a result of *Housing Transactions* being activated, *Expected Profit from Trading* decreases, because price difference between *perceived house price* and *actual house price* are diminished (Loop B1-a, B1-b). Accordingly, *Investment Demand* is controlled because investors do not expect future prices to increase when *House Price* seems to have arrived at a definite point.

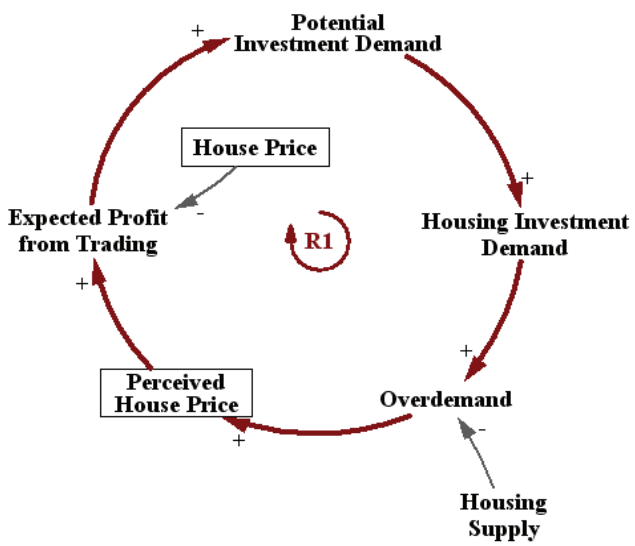

Figure 3. Housing investment demand and expectancy of house price rising

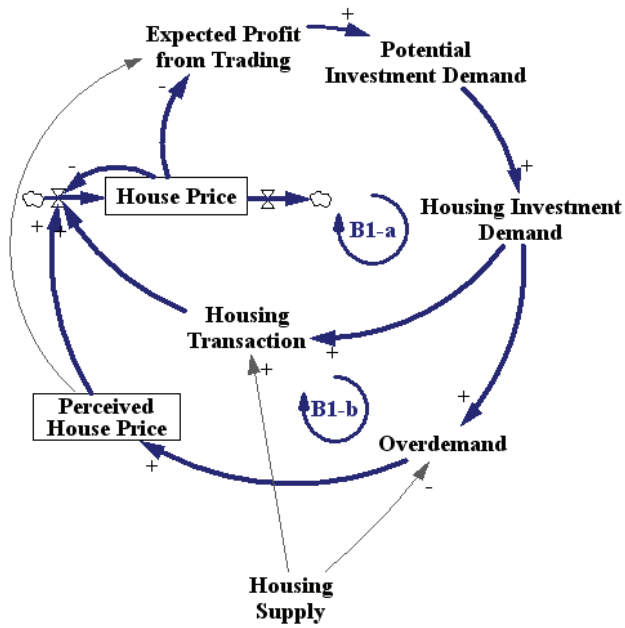

Figure 4. Housing investment demand and house price self-control

4.2. Real estate market behaviors

This study describes the general real estate financial market structure, with a focus on the mortgage market, using System Dynamics (SD) modeling, as illustrated by Figure 5. The *Fund of Originator* refers to the cash liquidity of primary mortgage agencies. Similarly, the *Fund of Secondary Market* signifies the cash liquidity of secondary mortgage markets (e.g., Freddie Mac and Fannie Mae, investment banks). A *Mortgage bond*, which is defined as the bond secured by a mortgage on a property, is backed by real estate or physical equipment that can be liquidated. *Mortgage Related Securities* (MRS) refers to the sum of mortgage-backed securities (MBS) and their derivatives. An MBS is an asset-backed security whose cash flows are backed by the principal and interest payments of a set of mortgage loans. Payments are typically made on a monthly basis over the life time of the underlying loans (Clauretie and Sirmans, 2003). Also, a derivative security derives its value from another security, index, or financial claim. Because the value of mortgage-backed securities (MBS), such as Mortgage pass-through securities (MPTs) and Collateralized mortgage obligations (CMOs), are based on pools of mortgages, both are referred to as "derivatives". There are many other derivatives such as options, swaps, and so forth (Brueggeman and Fisher, 2005).

Furthermore, the mortgage market earns profits by establishing a commission fee between the *Borrower of Mortgage Loan* and *Investment in Mortgage Related Securities* (*Mortgage Loaned Money→Profit Rate of Primary Agencies, Investment in MRS→Profit Rate of Secondary Market*). In other words, the financial market lends a mortgage loan to the borrower at the interest rate on loan (i.e., the interest rate on loan is represented by the *Interest of ARM* because the *Adjustable Rate Mortgage* is in common use in the mortgage market) related to the *Base Rate*, while issuing the securities at *Dividend Rates* lower than the interest rate on loan. Therefore, the more financial agencies lend mortgage loans and issue mortgage related securities, the more profits these agencies make. As a result, financial agencies tend to lower *Qualification of Mortgage*

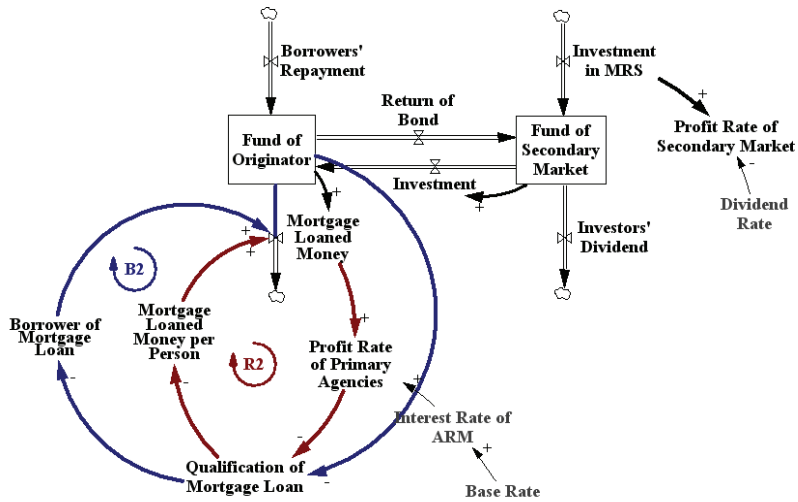

Figure 5. Real estate financial market structure

Loan such as extend mortgage loans by raising the maximum mortgage loan ratio and by lowering the credit rating at which mortgage loans are possible. This trend continues until they lack fund liquidity (Loop B2). However, if financial agencies issue MRS to ensure fund liquidity and investors buy these securities, financial agencies will extend mortgage loans lending as seen in Loop R2, and issue MRS much more frequently.

Figure 6 shows the process of mortgage securitization in the real estate financial market. Primary mortgage agencies (i.e., *Fund of Originator*) lower the *Qualification of Mortgage Loan* (i.e., the amount of loans and credit rating that is possible to lend), so that they can make more loans and make more profit. This means that while these agencies begin to acquire more mortgages, they also experience actual money shortage. To solve this problem, primary mortgage agencies create mortgage bonds and sell these to secondary mortgage agencies or other private investors in order to ensure fund liquidity (Loop R3-a).

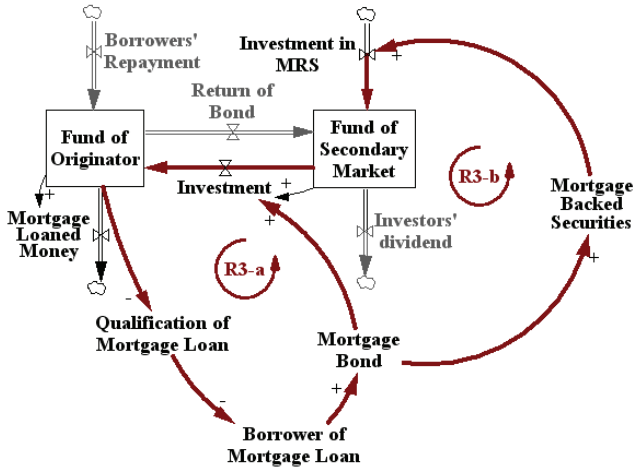

Figure 6. Investment in mortgage related securities

Consequently, they are able to continue lending more mortgage loans and subsequently gain more profits.

On one hand, after secondary mortgage agencies and other private investors invest in *Mortgage Bonds*, they desire to solve their lack of fund liquidity and make more profits. So, secondary mortgage agencies place *Mortgage Bonds* into a pool of similar mortgages and make *Mortgage Backed Securities* and new derivatives (i.e., a component of *Mortgage Related Securities*) through a process called "securitization." Then, secondary mortgage agencies sell MRS to investors such as private investors or investment banks (Loop R3-b). Like the primary agencies, they are able to keep investing in more mortgage bonds and make other derivatives.

Securitization has a positive effect on the components of the real estate market associated with house holding because potential housing demand can raise money to get a house through a mortgage loan. To obtain more profits, secondary mortgage agencies create more *Mortgage Related Securities*. In this process, mortgage derivatives (e.g., Collateralized bond Obligations, Collateralized Debt Obligations, Credit Default Swaps, and etc.) derived from *Mortgage Backed Securities* are diversified and transformed into highly profitable, but also highly risky, financial products. As these seem to bring such high dividends, so that investors expect more profit from these derivatives (i.e., *Perceived MRS' Expected Profit compared with Risk* increases), investors will attempt to invest in derivatives more and more. Consequently, primary agencies will obtain considerable fund liquidity to lend mortgage loans.

On the other hand, as illustrated by Figure 7, the more investors buy mortgage derivatives, the more mortgage agencies make profits through a commission fee (i.e., *Investment in MRS* increases; then, *Profit rate of Secondary Agencies* increases). Before long, the mortgage market becomes a highly profitable investment market, as competition for an earning rate of mortgage derivatives deepens because the number of market participants increases (i.e., *High Risk High Return Derivatives* increases). Accordingly, MRS become more popular because of high returns; therefore, in order to obtain more profits, secondary agencies use strategic processes to make more securities. That is, mortgage agencies issue more high profit, but also more risky, fluctuating, and over-amplified derivatives.

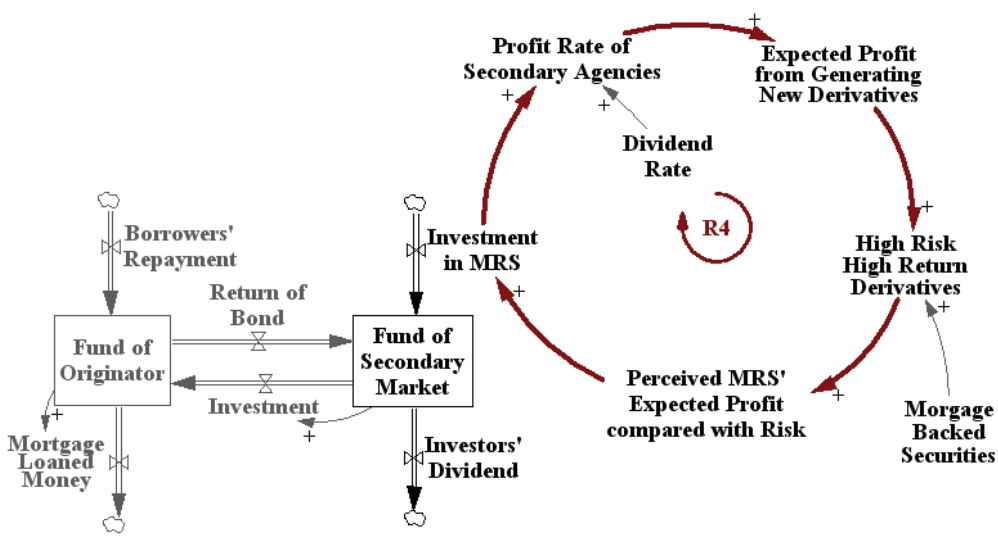

Figure 7. Amplification of derivatives generation by mortgage agencies

From the consumer perspective, these products seem attractive because of their high profit rate. So, investors continuously attempt to invest in these securities (Loop R4). In other words, derivatives become so transformed through frequent securitization processes that investors are unable to recognize the origin of these derivatives. Thus, no one can determine their true value or risk.

However, as shown in Figure 8, while the number of *High Risk High Return Derivatives* increases, the associated risk, which investors are unable to recognize, also increases. As soon as investors recognize the *MRS' Risk*, the *Perceived MRS' Expected Profit compared with Risk* decreases. As a result, investors attempt to retrieve invested funds from the mortgage market (Loop B3-a). Particularly if *Personal Default Rate* increases, the depreciation of the worth of mortgage bonds leads to the MRS derivatives' risk increasing derived from mortgage bonds risk. Consequently, mortgage agencies reduce high risk derivatives because investors recognize their investment risk. Also, when over-amplified derivatives continuously increase, *Secondary Agencies' Leverage* increases because of excessive liquidity. *Secondary Agencies' Leverage* is defined as the use of debt to supplement investment. Consequently, *Investment in MRS* decreases because *Perceived MRS' Expected Profit compared with Risk* decreases (Loop B3-b).

As represented by Figure 9, there is a reinforcing relationship between *House Price* and *Mortgage Loan*. If *House Price* increases, householders obtain more Rental Profit, and their mortgages become more valuable. This results in householders repaying their mortgage loans more sincerely, and mortgage agencies attempting to lend more mortgage loans because of borrowers' credit. Conversely, if *House Price* decreases, householders could potentially default on their obligation to repay their mortgage loans because they simply fail to pay back their financial debt or because their *Personal Default Rate* increases (i.e., after borrowers compare the remainder of their mortgage loans with their house value, they could default on their obligation to repay their mortgage loan).

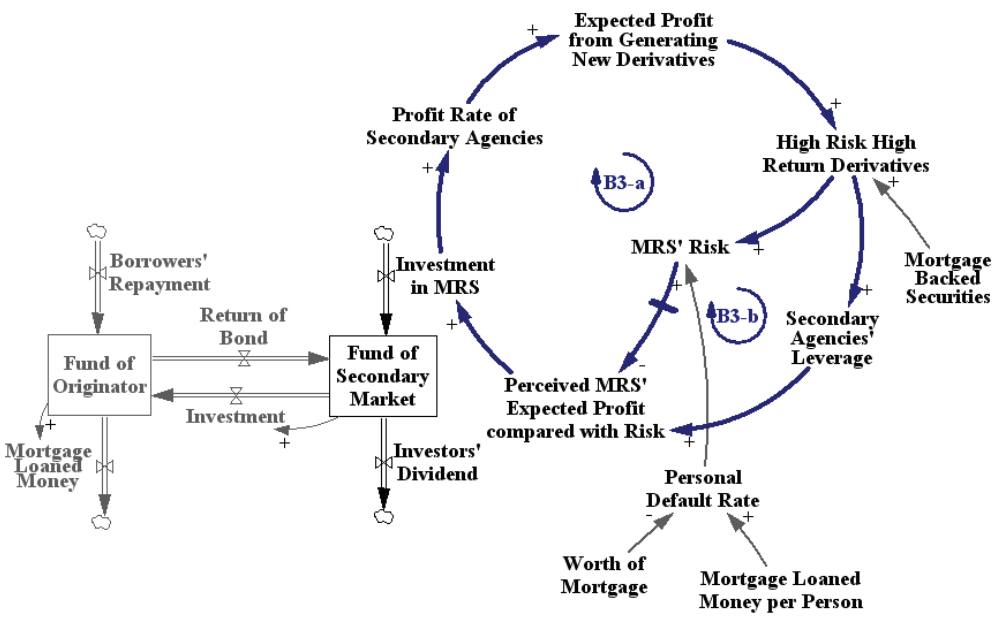

Figure 8. Adjustment of derivatives generation by mortgage agencies

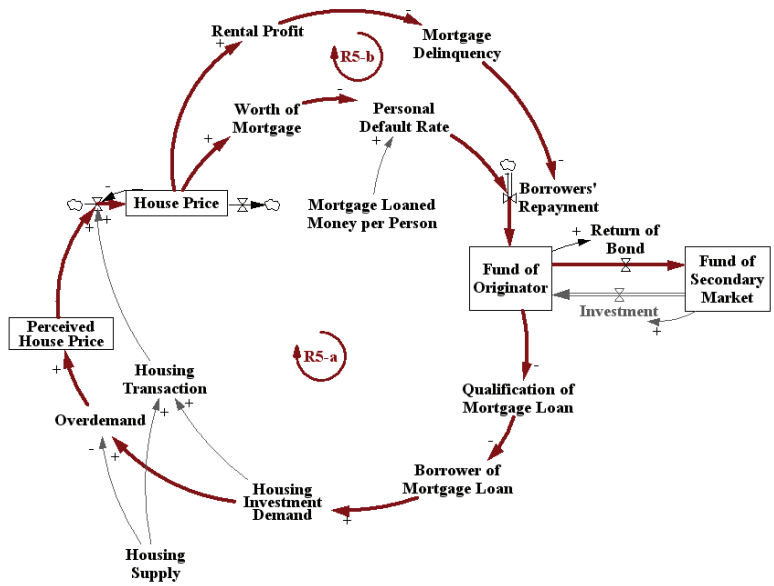

Figure 9. Relationship between house price and mortgage loan

Consequently, mortgage agencies will experience fund liquidity shortage, and housing transactions and housing demand will subsequently decrease (Loop R5-a, R5-b).

5. POLICY ANALYSIS

This study has attempted to analyze the fundamental structure of the Korean housing and mortgage market with a focus on the profit-seeking behaviors of borrowers, lenders, and investors. Based on the results of system dynamics modeling and analysis, the Korean government's current deregulation policies will now be further discussed.

The Korean government has adopted policies to activate housing transactions and prevent a sudden drop in house price. These policies are particularly aimed at removing part of the Excessive Real Estate Investment Area, which has been accompanied by the deregulation of mortgage loans. In other words, the LTV of this area has been increased to 60% and the DTI has been removed.

Figure 10 represents the effect of these policies desired by the Korean government. The Korean government increased the LTV and DTI to expand housing demand by lending considerable amounts of capital to borrowers with aspirations to own their homes. The government expects that this will activate the function of Loop R1 (*Housing Investment Demand→Housing Transactions and Overdemand→Perceived House Price and House Price→Expected Profit from Trading→Potential Investment Demand→Housing Investment Demand*). In other words, after raising *Perceived House Price* by increasing *Housing Investment Demand*, it is expected that it will be possible to activate *Housing Transactions*. It is also expected that this will activate the mortgage market by operating Loop R3-a (*Fund of Originator→Qualification of Mortgage Loan→Borrower of Mortgage Loan→Mortgage Bond→Investment→Fund of Originator*), which is related to primary mortgage agencies and loop R2-b (*Fund of Originator→Qualification of Mortgage Loan→Borrower of Mortgage Loan→Mortgage Bond→Mortgage Backed Securities→Investment in MRS→Fund of Secondary Market→ Investment→Fund of Originator*), which in turn is related to the secondary mortgage market. It is expected that this will temporarily stimulate housing demand and subsequently maintain adequate house prices.

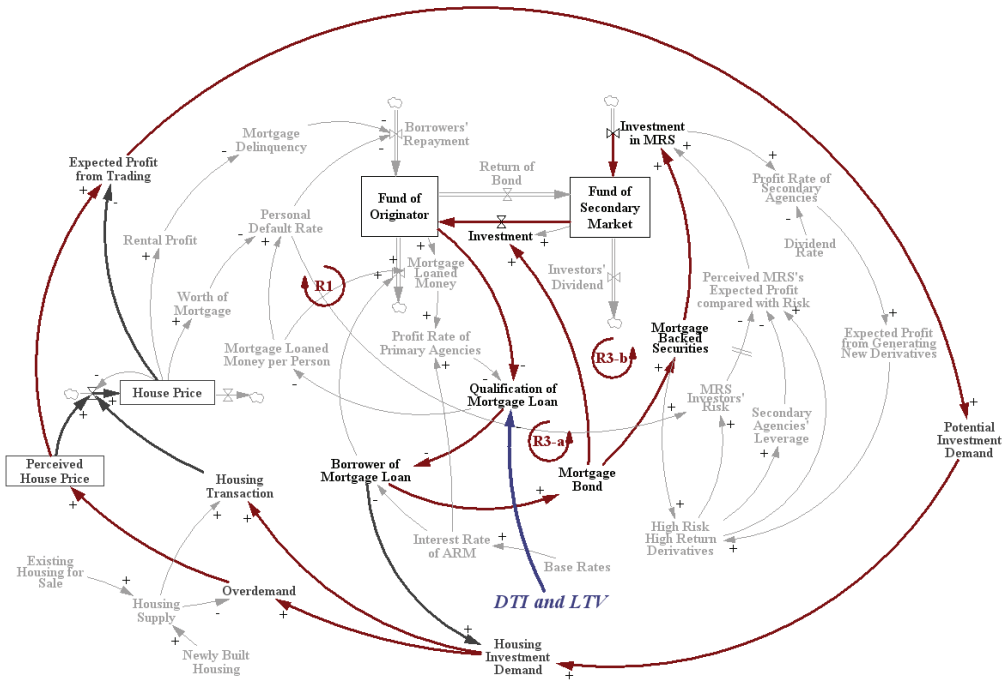

Figure 10. Government expectation of policies' effects

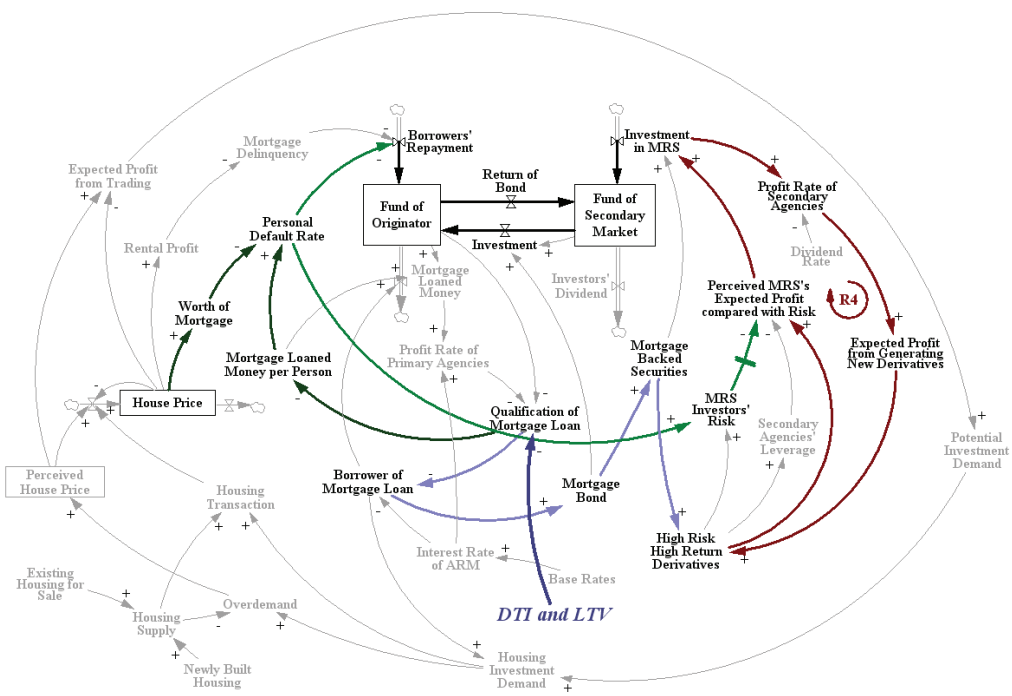

Figure 11. Forecasted side effects of policies

However, as illustrated by Figure 11, excessive and indiscreet mortgage lending can generate malignant transformed derivatives such as the function of the R4 loop (*High Risk High Return Derivatives→Perceived MRS's Expected Profit compared with Risk→Investment in MRS→Profit Rate of Secondary Agencies→Expected Profit from Generating New Derivatives→High Risk High Return Derivatives*). This could result in a second subprime mortgage crisis. Similarly, if mortgage agencies lend mortgage loans to individuals with low credit rating, high-risk derivatives, accompanied by an increasing *Personal Default Rate*, could be increased. Consequently, this situation could cause defaults on the debts of mortgage loan borrowers and the *Fund of Originator*. As a result, primary and secondary mortgage agencies could be in danger of going bankrupt due to a lack of fund liquidity, as has occurred in the recent subprime mortgage crisis.

On the other hand, mortgage agencies can self-adjust the *Qualification of Mortgage Loan* in the case of perceiving default risk. In this situation, the proposed government policies would be meaningless, as these cannot stimulate *Housing Investment Demand* and *Housing Transactions*.

6. CONCLUSION

Utilizing qualitative system dynamics modeling, this study analyzes the Korean government's deregulation policies targeting housing demand. A causal loop analysis of these deregulation policies explains several negative model behaviors that could result from these policies.

First, as demonstrated by the models, the real estate market is currently under the influence of balancing loops, such as demand controlling loops (B1-a, B1-b) and the balancing loops of mortgage lending (B2, B3-a, B3-b). Also, when reinforcing loops related to demand (R1) and the secondary market (R2, R3-a, R3-b) are self-regulated in the affirmative direction, the housing market will stabilize with adequate housing transactions and mortgage securitizations. However, these policies could potentially have damaging side effects when changing the direction of the reinforcing loops which are currently stationary. According to these models, government policies might be in danger of stimulating Loop R4 in the negative direction.

Second, examining policies depending on the market structure and its responses, rather than yielding a positive effect, these policies could potentially have damaging effects. That is, deregulation of mortgage loans could initiate another subprime mortgage crisis. Third, in the Korean real estate financial market, in which the secondary mortgage market has been inactive, the primary mortgage market cannot be accommodated with capital supplied by mortgage investors, even though the government intends mortgage agencies to lend more mortgage loans. Furthermore, if mortgage agencies tend to restrain excessive lending because of the current economic slump, these policies will have little impact on the stimulation of housing demand. On the other hand, if the government decides to activate the secondary mortgage market, the risky derivatives' generation will have to be cut off through related policies.

This study shows the potential effects of government policy on the real estate market through system dynamics, a tool to understand the causal relationships between real estate market factors based on economic and real estate financial theories. Through causal loop analysis, this study found the missing links of empirical policy analysis and connected these links in order to expose the hidden side effects of these policies. Also, this research verifies qualitative analysis using System Dynamics simulation. Through the results of simulation, decision-makers are able to determine

adequate policies directions and their intensity. In future research, the financial behavior of a construction company related to housing supply will be analyzed. Consequently, the proposed system dynamics models will be examined, not from the perspective of house price, supply, and demand, but with a particular focus on the relationship between the real estate market and the construction industry. Also, model validation should be performed with quantitative models and simulation using national data on housing policies.

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SANTRAUKA

KORĖJOS NEKILNOJAMOJO TURTO RINKA IR STAIGAUS PAKILIMO POLITIKA, PAREMTA PASKOLOMIS

Sungjoo HWANG, Moonseo PARK, Hyun-Soo LEE, Yousang YOON, Bo-Sik SON

Korėjos nekilnojamojo turto rinka šiuo metu išgyvena nuosmukį dėl pasaulinės ekonominės krizės, kuri kilo dėl JAV būsto paskolų rinkos krizės. Reaguodama į tai, Korėjos Vyriausybė ėmėsi įvairių politikos priemonių, siekdama užkirsti kelią nekilnojamojo turto spekuliacijai. Pavyzdžiui, buvo padidintas paskolos ir vertės santykis (angl. LTV), siekiant skatinti būsto pasiūlą, paklausą ir būsto sandorius. Tačiau šios politikos priemonės galėtų lemti būsto krizę dėl per daug išplėstos ir didelės rizikos išvestinėmis priemonėmis, didinant Korėjos antrinio būsto rinką. Tačiau būsto rinka gali atsidurti tokioje painioje situacijoje, kad bus dar sunkiau atlikti empiriškai pagrįstą būsto rinkos prognozę. Todėl reikalingas išsamus ir sisteminis metodas, padedantis analizuoti finansinę nekilnojamojo turto rinką ir priežastinį ryšį tarp rinką veikiančių veiksnių. Be integruotos perspektyvos ir dinamiško sistemingų metodų taikymo, šiame straipsnyje siūlomi Korėjos nekilnojamojo turto ir paskolų rinkos dinamikos modeliai, pagrįsti pagrindiniais principais ir pagrindinėmis nesėkmėmis būsto rinkose, kurios nustatomos pagal ekonominę vartotojų veiklą, finansuojančias institucijas, ir nekilnojamąjį turtą finansuojančiais investuotojais. Galimas Korėjos Vyriausybės pertvarkymo politikos rezultatas – sutelkti dėmesį į svarbiausią šių politikos krypčių rodiklį – būsto paskolas.