KDI SCHOOL

WORKING PAPER SERIES

KDI 국제정책대학원
KDI School of Public Policy and Management

KDI SCHOOL WORKING PAPER SERIES

Contagious Real Estate Cycles: Causes, Consequences, and Policy Implications

Man Cho

May 17, 2012

Working Paper 12-05

KDI 국제정책대학원
KDI School of Public Policy and Management

This paper can be downloaded without charge at:
KDI School of Public Policy and Management Working Paper Series Index:
http://www.kdischool.ac.kr/new/eng/faculty/working.jsp
The Social Science Network Electronic Paper Collection:
http://ssrn.com/abstract=2015866

Contagious Real Estate Cycles: Causes, Consequences, and Policy Implications

Man Cho
KDI School of Public Policy & Management
87 Hoegiro, Dongdaemun Gu,
Seoul 130-868, Korea
e-mail: mancho@kdischool.ac.kr

May 17, 2012
Working Paper 12-05

* I am grateful to the KDI School of Public Policy and Management for providing financial support.

Abstract

The objective of this study is two-fold: first, to conceptualize key causal relationships between housing price cycle and mortgage credit cycle based on relevant literature and, second, to present cases of two countries – Korea and the U.S. - in terms of evolution of, and recent milestone events in, residential mortgage lending sector in each country, observed patterns housing price and mortgage credit cycles, and key causal relationships found from data analyses. Our results show that, in the U.S., the housing price and mortgage credit cycles exhibit a statistically significant and, to some degree, explainable co-movement pattern in the recent period (1997-2010), but not in prior cycles. That is, a regime shift is observed in terms of causal relationship between housing price movement and mortgage credit cycle. In the Korean case, a similar co-movement is also observed in the mid-2000s, but different types of mortgage lenders – banks and non-bank depositories - are shown to have different lending patterns in more recent years. In terms of the underlying indicators, the leverage and other non-price terms in mortgage lending are very much conservative in Korea, which makes the debate of a housing driven systemic risk as in the subprime mortgage market in the U.S. as less relevant in the Korean context. In terms of public policy, we argue that a regulatory design of residential mortgage lending sector should consider both dimensions of market stability and housing affordability, and that policy target should be on the source of cyclical price or lending pattern, whether that is exuberant borrower, pro-cyclical lender, or yield-curve playing investor.

Key words: Mortgage credit cycle, housing price cycle, macro-prudence regulation, housing affordability
JEL codes: G21, E32, R21

I. Introduction

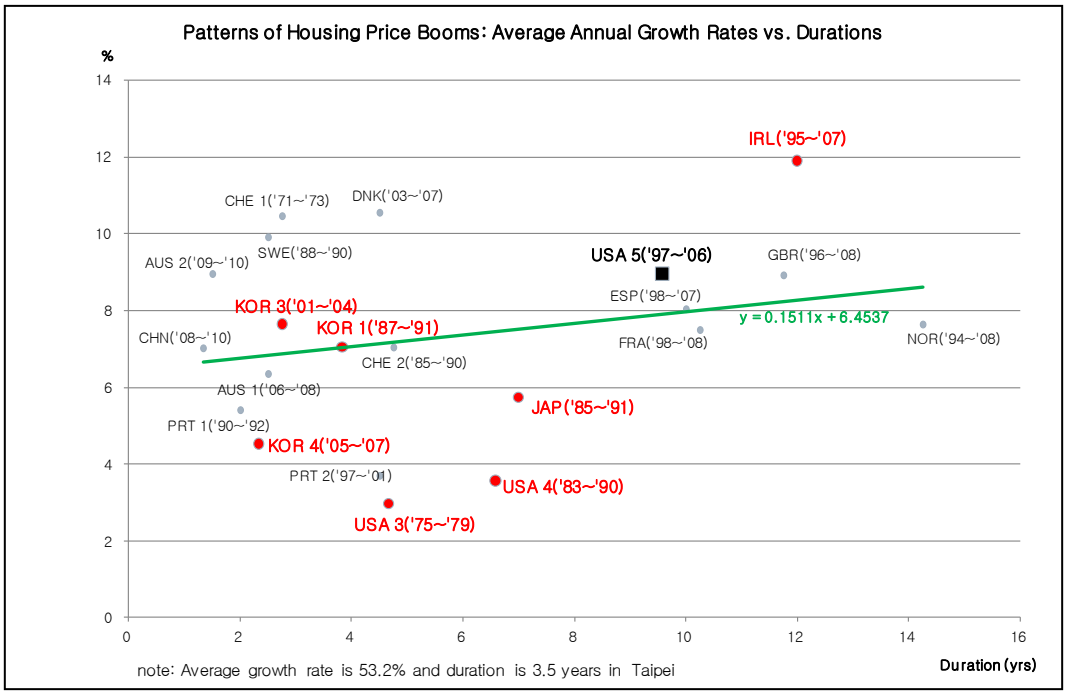
The recent home price boom-bust in the U.S. is record-setting: between 1997 and now, the price cycle exhibits the highest total price growth rate (87% in real term), the deepest downturn (-35% so far), and the longest duration (14 years) in the country. And the boom-bust of the residential mortgage credit was also unprecedented: having increased sharply from 2001, the total mortgage origination grew from about $100 billion (per quarter) to over $350 billion within a couple of years; in the secondary market, the share of Private-Lable MBS, the vehicle for securitizing subprime and Alt-A mortgage loans, showed a lagged but even more dramatic boom-bust, rising from less than 10 percent in total MBS issuance in 2004 to over 30 percent in 2006 but dropping to almost zero after the Lehman Brother's failure. As well documented in various academic and non-academic mediums, these housing and mortgage market cycles in the U.S. inflicted severe contagions to other sectors of economy, in particular, to private consumption, residential and non-residential investment, and banking soundness.

There are similar episodes of large and contagious housing price cycles observed in other counties in different time periods. As shown in Figure 1, the recent price boom in the U.S. (1997-2006) surpasses prior two cycles in the same country both in terms of the average annual growth rate during the boom and in terms of the duration of the boom. Nonetheless, it is not an outlier when comparing other international cases, although it certainly represents fairly large one. For example, two price booms during roughly same time spans - Ireland (1995-2007) and Great Britain (1998-2008) - show the higher average growth rates and the longer durations. It is documented by a number of studies that some of these price booms interacted with surge in residential mortgage lending in respective countries.[1] In general, the longer the price boom, the higher the average growth rate during the boom, as shown in the trend line.

East Asian countries also experienced housing price boom-busts in different time periods, which tend to be smaller in size and shorter in duration than the recent cases observed in the U.S. and Europe. In Korea, there were three price booms since mid-1980s, which all entailed much shorter durations and lower average growth rates compared to the Western countries. Japan, on the other hand, had a reasonably long booming period (1985 to 1991), followed by the two decades of price decline. It is also reported that, during the boom, there was a surge of mortgage credit in Japan as well with 120 percent loan-to-value ratio loans being prevalent in the home mortgage lending sector. Last but not least, China recently experienced a sharp home price upturn from 2009, which to a large degree is explained by the rapid expansion of residential mortgage credit. (Cho (2011)) In particular, the ratio of mortgage debt outstanding to GDP in China has risen from 19 percent in early 2009 to 28 percent in the end of 2010, almost a 50 percent hike during only one and half years!

Figure 1. Cases of Large Housing Price Boom:
An International Comparison

[1] For empirical studies on linkages between housing price cycle and lending cycle, refer Hofman (2001) and (2003) for 20 or so countries in 1985-2001, Greef and Haas (2001) for Netherland, Davis and Zhu (2004) for 17 countries in 1989-2002, Oikarinen (2009) for Finnland, Gimeno and Martinez-Carrascal (2010) for Spain, Gerlach and Peng (2005) for Hong Kong, Liang and Cao (2007) for China, and Park, Bang, and Park (2011) for Korea.



The objective of this study is two-fold: first, to conceptualize key causal relationships between housing price cycle and mortgage credit cycle based on relevant literature and, second, to present cases of two countries – Korea and the U.S. – in terms of evolution of, and recent milestone events in, residential mortgage lending sector in each country, observed patterns housing price and mortgage credit cycles, and key causal relationships found from data analyses. Based on our findings, we will further discuss policy implications for other countries.

Our results show that the housing price and mortgage credit cycles exhibit a statistically significant and, to some degree, explainable co-movement pattern in the recent period (1997-2010), but not in prior cycles. That is, a regime shift is observed in terms of causal relationship between housing price movement and mortgage credit cycle. We employed indicators to reflect behavior of three key cycle generators – exuberant borrowers, pro-cyclical lenders, and yield curve playing investors, which appear to be useful in assessing cyclical price and lending patterns.

In the Korean case, a similar co-movement is also observed in the mid-2000s, but different types of mortgage lenders – banks and non-bank depositories - are shown to have different lending patterns around the Global Financial Crisis. In terms of the underlying indicators, the variable for consumer psychology appears to have a similar correlation with home price cycle as in the U.S. But the leverage and other non-price terms in mortgage lending are very much conservative, which makes the debate of a housing driven systemic risk as in the subprime mortgage market in the U.S. as less relevant in the Korean context.

In public policy point of view, regulating residential mortgage lending sector should consider at least two dimensions – ensuring macroeconomic and housing market stability via prudential regulations (i.e., managing housing sector driven systemic risk) and enhancing housing affordability for first-time home buyers, self-employed borrowers, and other target consumer cohorts via affordable loan products (i.e., serving more underserved). The recent U.S. experience demonstrates that the price boom-bust can be caused by various factors, e.g., exuberant home purchase by borrowers, weakened leverage and other underwriting conditions by mortgage lenders, and “the yield curve play” (or

borrow-short-lend-long) behavior by investors of mortgage securities. Therefore, we argue that policy remedies should differ depending on what behavior to monitor and control and should go to the source of cycle generators. Later on, we will discuss a template that considers both dimensions of policy consideration and different, but inter-correlated, sources of cycle generation.

The rest of the paper consists of the following five sections: a conceptual framework that links the housing price and credit cycles (Section 2); the U.S. case of the linkages that are observed and explained (Section 3); the Korean case of the linkages (Section 4); and, policy implications and next phase research planned (Section 5).

II. Conceptualizing key Linkages

The lexicon definition of the word 'mort-gage' is defined as a conditional pledge of property to a creditor as security for repaying of a debt.[2] That is, it refers to a financing method that uses residential and non-residential real estate as collateral. In any country, there are numerous types of mortgage contract (about 3,000 in U.K. according to Miles (2004)) that are differentiated by interest rate variability (adjustable-rate vs. fixed-rate vs. hybrid mortgages), by amortization of principal payment (fully-amortizing vs. balloon vs. bullet mortgages), and by underwriting conditions (maximum LTV, DTI, consumer credits and other credit constraints). As any debt-financing product, it has the upside interest rate risk (or re-pricing risk) and the borrower default risk as key counterparty risk. In addition, however, certain products (e.g., fixed-rate mortgages with no prepayment penalty) can also pose a downside interest rate risk, a risk to investor due to higher-than-expected prepayment of principals and lower-than-expected yield to reinvest those principals in low interest rate environment.

There is a reasonably long history in the economic literature of examining collateralized lending and its linkages with asset price dynamics.[3] In the context of residential mortgage lending, the demand-side consists of borrowers, whose decision to purchase home (or refinancing existing mortgage) is influenced by housing market conditions. Specifically, the user cost of capital for owning has been a key analytical tool in housing literature: that is, in a competitive housing market, revenue generated from housing asset – per-period rental income, R, plus expected gain from future appreciation of asset price, $g^e \cdot P_h$ - should be equal to cost for owning:

$$(1) \quad R + g^e \cdot P_h = i \cdot P_h$$

In (1), i represents an after-tax cost of capital to be incurred by home owner, which, as usual, includes various financing, maintenance, depreciation, risk premium, and other cost items. Under this equality condition, marginal consumer should be indifferent between owning and renting.[4]

As one disequilibrating force, if $g^e > i$ (provided $R > 0$), then there will be upward shift in demand for

[2] 'Mort-gage' is a composite word, meaning 'dead pledge.' It is known as originated from France back in 14th century when people compared credit with real estate as collateral, which was deemed as "dead," with agricultural lending based on crop to be harvested, which as deemed "alive." (Geltner et al. (2007))

[3] Though the literature goes back to Veblen (1904), the modern theory on the role of collateralized lending starts with Bernanke and Gertler (1989), Schleifer and Vishiny (1992), Kiyotaki and Moore (1997), and Geanakoplos (1997).

[4] Refer Hendershott and Slemrod (1983), Poterba (1984), Himmelberg, Mayer, and Sinai (2005), and Duca, Muelbauer, and Murphy (2009) among others for details of this equilibrium condition.

owner housing and, accordingly, its price will also increase. That is, a high expectation of future price appreciation on the part of consumer can lead to a price boom, which, in turn, will increase demand for residential mortgage loan.

The consumer expectation on future capital gain, g^e, can be caused by various factors – shortage of housing supply (as observed in large cities in emerging market countries), inelastic housing supply with attractive locational attributes (i.e., "superstar cities")[5], and rise of residential mortgage lending (which will be elaborated below). As g^e goes up, the user cost goes down (i.e., $\frac{R}{P_h} = i - g^e$), and, in consequence, both demand and price for owner housing will go up, a condition for a rise of irrationally-exuberant borrower-buyers. In downturn, however, consumer psychology can quickly change and g^e can be lowered rapidly, which is one of the main reasons for a regime shift in the price trend.[6]

Question is how to measure g^e. For that, Campbell, Davis, Gallin, and Martin (2009) offer an empirical model, with which one can infer g^e as a residual between realized R/P and predicted i with two elements (risk-free interest rate and housing premium, housing return minus risk-free rate). We will follow their framework to estimate g^e as one of key explanatory variables in our empirical analyses.

In the supply side, mortgage lender will determine two equilibrium lending conditions for each borrower – lending interest rate and leverage rate (amount of down-payment relative to collateral value). In their theoretical exposition, Fostel and Geanakoplos (2008) and Geanakoplos (2010) describe how interaction between pro-cyclical lending by financial institutions and heterogeneous borrowers can result in a leverage cycle. That is, in ebullient times, lenders tend to relax credit constraints by increasing equilibrium leverage rate, which, in turn, will increases share of natural (or optimistic) buyers in the asset market. This rise of optimistic buyers, who are more risk-tolerant, will be bidding up asset price because the larger the number of optimistic buyers in the market, the higher the willingness to pay for the asset by marginal buyer. In downturn, opposite can happen: that is, facing bad news from market place, lenders lower equilibrium leverage rate, which will reduce share of optimistic buyers as well as collateral value.

In fact, the average loan-to-value (LTV) ratio among first–time home buyers in the U.S. sharply increased from about 87 percent in the early 2000s to almost 95 percent in 2005, dramatically reducing down-payment requirement. That, however, rapidly reverted back to its 1980s level after the housing price decline in 2006. Duca et al. (2009) empirically show that the increase in LTV (hence increase in the leverage rate) reduces the user cost (R/P $\downarrow$) in the U.S. through its positive impact on the asset price. As another finding, Duca et al. show that the LTV trend in the U.S. closely tracks the rise and fall of the Private-Label MBS issuance.

By using micro data, Haughwout, Lee, Tracy, and Klaauw (2011) document the surge of investor-borrowers in the U.S. mortgage market during the housing price boom, an evidence of the shift to more optimistic buyers (or "buy and flip investors"). During the boom, the flippers' investment

[5] See Glaeser and Gyourko (2005), Glaeser, Gyourko, and Saiz (2008) among others for role of supply elasticity or regulatory restrictiveness in bubble-building in housing prices.

[6] For example, a prolonged period of above-trend housing construction can result in overhang of excess supply, which depress price decline. (Ellis (2008)) As to the effect of mortgage lending, a growing number of studies document evidences on the correlation between the recent price hike and the mortgage lending outcomes. That is, sub-national home price growth rates are shown to be positively (negatively) correlated with the amount of subprime mortgage lending in the localities during the upturn (the downturn). (Mian and Sufi (2009), Pavlov and Wachter (2011), Wheaton and Nacheyev (2008), Coleman et al. (2008), Goetzmann et al. (2009))

behavior was enabled by weakened underwriting conditions, not only in terms of the leverage rate (as shown by the increasing LTV limit) but also in terms of other non-price terms (ONPTs) in mortgage underwriting (e.g., debt-to-income ratio, consumer credit rating, documentation requirements, and so on). Haughwout et al. also report that the multi-unit owning investors default more frequently than single-unit home owners during the downturn.

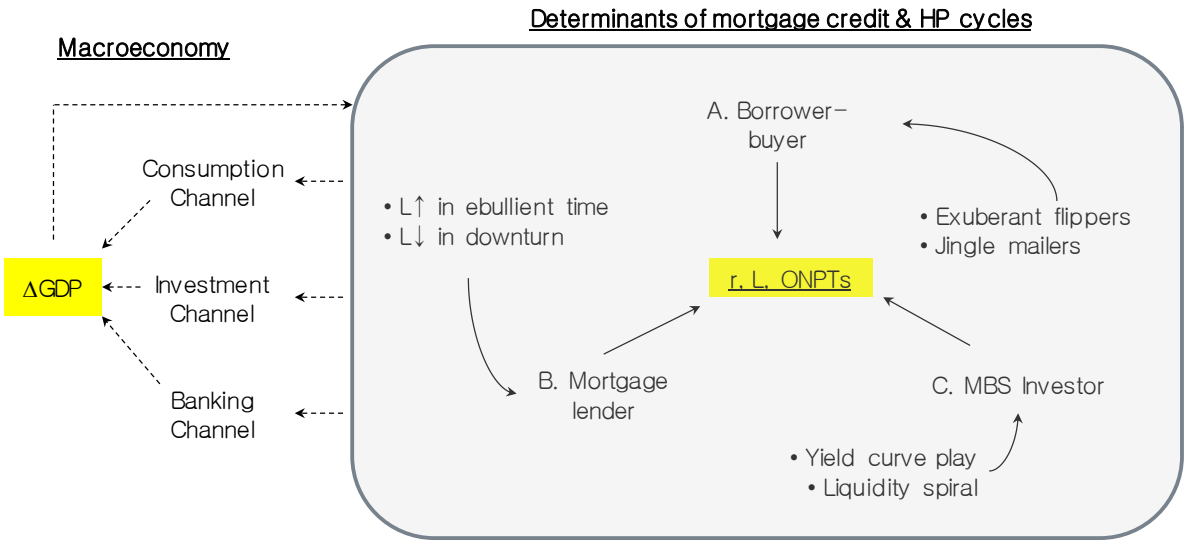
Third key player whose behavior should be examined is investor of mortgage related securities. In the U.S. and other countries where the secondary mortgage market is well-developed, mortgage finance service is unbundled between lending and funding, and those who buy MBS or other mortgage related securities make their investment decisions based on cost of capital, yield spread, and other financial market conditions.

The experience of the U.S. subprime mortgage lending sector demonstrates that, among others, interest rate environment played a critical role in funneling a large quantity of liquidity to the residential mortgage lending sector between 2003 to 2006. That is, this particular time period was unprecedented in the recent history in two respects: that is, between August 2002 to September 2004, the real Fed Fund Rate was negative, and the spread between long rate and short rate (10-year Treasury rate minus 1-year Treasury rate) continuously exceeded 200 basis points. This, which is unrivaled by any two-year period since 1950, offered a fertile ground for yield curve playing on the part of the MBS investors: those investors who had access to money market could issue short-term securities such as ABCP and could have a windfall gain by investing the mobilized fund into the long-term bonds such as RMBS. That favorable environment abruptly ended when the U.S. Fed rapidly increased the short rate from 2005, eventually creating an inverted yield curve between July 2006 to May 2007.

There are other factors that make subprime MBS investors' behavior as cyclical, as reported in literature: the uncertainty caused by product complexity (in Subprime ABS CDO and Subprime ABS CDO-squared), which was the sources of the liquidity spiral[7] after the Lehman's bankruptcy (Brunnermeier (2008), Fender and Mitchell (2009), and Ashcraft and Schaumann (2009)); and, the pro-cyclical bond ratings by rating agencies, which exacerbated the downturn from the second half of 2007 (Benmelech and Dlugosz (2009), and Griffin and Tang (2010)).

Figure 2. Three Key Cycle Generators
Whose Incentives To Be Monitored

[7] It refers to the feedback loop driven: drop in asset value of subprime mortgage securities → fire sale by holders of such securities → increase in margin requirement by lenders (to security holders) → further fire sale and drop in security value, and so on.



In this study, and subsequent research planned in this vein, we attempt to systemically examine interactions between housing price and mortgage credit cycles from various advanced and emerging market countries in terms of the following factors: first, observed co-movement pattern (or lack thereof) between housing prices and mortgage lending volume (ΔP_h and ΔM, where M refers to MDO or new issuance), second, trends of the key indicators of bubble-building and bubble-busting behavior by three economic agents as shown Figure 2 (consumer psychology, g^e, leverage rate, L, other non-price terms in mortgage underwriting, and yield spread or others for interest rate environment), and, third, econometric analyses to identify causal relationships among those examined market outcomes and the indicators. This paper contains our preliminary findings for two countries – Korea and the U.S.

III. Case (1): The U.S. Mortgage Market

Evolution and Milestone Events

The first institutional mortgage lending in the US began in 1835, with "Terminating Building Society (TBS)" as the prevalent intermediary. TBS, whose origin goes back to 1775 in England, represents a "communal solution" to housing finance: that is, a small number of people from a town pooled savings and provided funds to one another for construction of houses; and, they ceased to exist once all members received the loans. Later on, more formal lending institutions emerged out of TBS – to Permanent Building Societies (PBS), to Building and Loans (B&L), and eventually to Savings and Loans (S&L).[8]

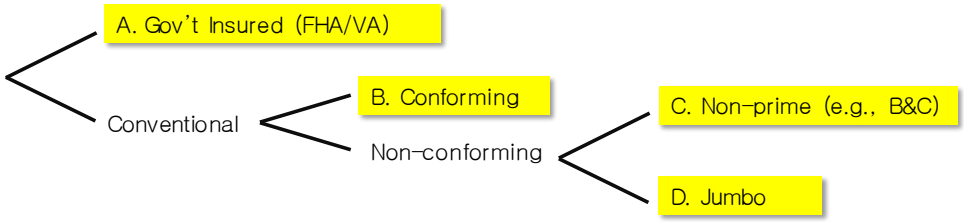
Before the 1980s, S&Ls were the predominant business model for residential mortgage intermediation. This model can be characterized as localized lending and funding, and bundled intermediation functions, i.e., all three functions of funding, underwriting, and servicing being done within same institutions. Typical mortgage product, whose origin can be traced to the Great Depression era, were long-term (either 15-year or 30-year maturity), fixed-rate (FRM), level-paying (constant payment each month), fully-amortizing (no balloon payment at maturity) mortgages with no prepayment penalty. Before the surge of the subprime mortgage market in 2000s, this product took more than 90 percent of market share. This plain vanilla FRM posed a low degree of uncertainty in projecting post-origination cash flows and, hence, easy to administer (especially when being securitized), and involved with no payment shock during loan life. However, besides the problem of varying asset value as market interest rate changes, this FRM product also poses two cash flow issues - the well-known tilt problem (a higher payment burden early on for young borrowers) and the reinvestment risk.

The first major shock in the U.S. mortgage market in recent years was the S&L crisis in 1980s, which fundamentally changed the mode of mortgage funding in the US. That is, the vacuum created by those failed S&Ls was gradually filled by GSEs (Government Sponsored Enterprises, referring to Fannie Mae and Freddie Mac) and Ginnie Mae, the government-run funding agency, through their issuance of Mortgage Backed Security (MBS). The MBS market has grown steadily during the 1980s, and has steeply risen during 1990s with its share in total origination reaching over 50 percent. The typical MBS products in the market of the plain vanilla FRMs were Pass-Through with no internal structure, and CMO (Collateralized Mortgage Obligation) with various tranches with different levels of call protection for investors. Borrower default risk was generally not a concern for MBS investors as it is controlled with external credit enhancements by GSEs and other guarantee providers.

As the market for MBS grew, the GSEs' underwriting guidelines, i.e., the rules as to which loans were eligible for their funding vis-à-vis which ones were not, practically segmented the US mortgage market. As shown in Figure 3, conventional loans (i.e., loans without a government guarantee) were divided into two segments: those that complied with the GSEs' underwriting guidelines, labeled as "conforming" or "A" loans; and, those that did not, referred to as "non-conforming" loans. The eligibility is essentially a bundle of loan characteristics such as the maximum allowable loan-to-value (LTV) and debt-to-income (DTI) ratios, acceptable borrower credit scores, documentation requirements, interest rate variability, and so on. The non-conforming segment is further divided into two groups, non-prime and jumbo loans. Non-prime loans, originally called as "B&C" loans, are the origin of subprime and Alt-A mortgages. Jumbo loans are those that exceed the size of the GSEs' regulatory loan limit.

[8] See Cho (2007) and (2009) for detailed description of the evolution of the U.S. mortgage and MBS markets.

Figure 3. Segmentation of the U.S. Mortgage Market



A. Gov't-insured (FHA/VA): Explicit gov't guarantee, & securitized by Ginnie Mae
B. Conforming conventional: Implicit gov't guarantee, & securitized by GSEs
C. Non-conforming non-prime: No gov't guarantee, & securitized by private-label (PL) MBS issuers
D. Non-conforming jumbo: No gov't guarantee, & securitized by PL MBS issuers

One major shock occurred in 1990s, which has not been discussed much in the context of the subprime mortgage crisis, was the IT-driven innovation in mortgage underwriting, the introduction of inter-based Automatic Underwriting Systems (AUS) that linked mortgage lenders and securitizers. Both Fannie Mae and Freddie Mac implemented AUS systems in the mid-1990s - DesktopUnderwriter (DU) and LoanProspector (LP), respectively, and large lenders followed the suit by developing their proprietary systems (e.g., CAPES by Countrywide). Since then, the use of AUSs in mortgage origination and point-of-sale decisions rose sharply. For example, the share of Fannie Mae acquisitions processed through DU increased from less than 10 percent in 1997 to about 60 percent in 2002.[9]

The wide-spread use of AUS made mass production of residential mortgages possible, which is evidenced in the rapid rise of origination volume in the late 1990s and early 2000s.[10] Besides the dramatic reduction in transaction time and cost (e.g., the decline of processing time from a month to several minutes), it also had a profound impact in risk management, both positively and negatively. In the positive side, the assessment of credit risk became more scientific and data-driven. At the core of AUS there is a mortgage scoring model, a discriminant statistical method first used in car loan and credit card markets. It measures the level of creditworthiness of borrowers based on historical default/delinquency data and other information specific to loan applications. In addition, most AUSs utilize an Automated Property Valuation Model (APVM or AVM) to streamline or even waive property appraisal requirements in mortgage underwriting, further reducing the transaction cost for borrowers.

The main improvement comes from the fact that, in this model-based world, so-called "compensating risk factors" can be assessed and used more easily and accurately in loan underwriting and product development. That is, some of key risk drivers (e.g., borrower credit history, level of downpayment, payment-to-income ratios, etc.) can be examined in aggregate based on their risk weights from the

[9] Cho (2007)
[10] AUS has been contributing to further specialization in mortgage origination and in servicing, as key market participants achieve economies of scale in various intermediation steps. For example, the volume of loans originated by mortgage brokers has increased since the implementation of AUS because the cost of interfacing with the borrower and making the underwriting decision has been equalized for large and small lenders with the use of the AUS tools. Many large lenders are now focusing more on servicing with specialized AUS and IT solutions both in streamlining its administrative tasks (e.g., disbursing tax and insurance payments and reporting to investor and borrower) as well as in managing problem loans (deciding which loans present the greatest risk of default and then focusing their collection effort on them).

model. Hence, the overall risk for a given loan product can be examined in a more holistic fashion in underwriting and pricing.

The challenge to this era of automation is potential increase in fraudulent loan applications, either via identity thefts or incorrect/invalid documentation (on employment, wealth, income, or collateral). It also increased "model risk" in that parameters of risk factors in the scoring model can be outdated, in which case projection of default risk can be fatally incorrect. The delinquency trend of the subprime and Alt-A mortgage loans before and after the Global Financial Crisis is a good illustration of this model risk.

As the last shock to mention, the widely-publicized accounting scandals of both Freddie Mac (in 2003) and Fannie Mae (in 2004) shifted the landscape in mortgage funding once again, away from GSEs toward the Private-Label (PL) MBS issuers. Those private funding institutions were mostly investment banks (IB) and large commercial banks, including Lehman Brothers, Bear Sterns, JPMorgan, Goldman Sachs, Bank of America and Wells Fargo, as well as several major mortgage lenders such as Countrywide, Washington Mutual, and Indy Mac. In fact, the competition between GSEs and the PL MBS issuers is rooted from the early 1990s and, more often than not, it went beyond the market place. That is, the public policy debate on the role of GSEs in the mortgage market was frequently surfaced as a hot topic for both academic studies and the media coverage. Some of the private MBS issuers even formed a trade organization, called as "FM Watch," as a vehicle to lobby Congress for limiting the GSEs' function in the mortgage finance industry.

Table 1. Description of RMBS Categories

	Prime	Jumbo	Alt-A	Subprime
Mortgage characteristics				
Lien Position	1st Lien	1st Lien	1st Lien	Over90%1st Lien
Weighted Average LTV	Low70s	Low70s	Low70s	Low80s
Borrower Credit History	No credit derogatories	No credit derogatories	No credit derogatories	Credit derogatories
Conforming to Agency Criteria	Conforming	Conforming by all standard but size	Non-conforming due to documentation or LTV	Non-conforming due to FICO, credit history, or documentation
Loan-to-Value(LTV)	65-80%	65-80%	70-100 %	60-100%
Securitization attributes				
MBS Products	Pass-through CMO	ABS	ABS, CDO CDO-squared	ABS, CDO CDO-squared
Collateral	Predominantly FRMs (15-/30 yrs)	Mixed with ARMs and FRMs	Mixed with ARMs and FRMs	Predominantly ARMs w/ "exotic" features
Credit Enhancement	External CE	Internal, "6-pack" CE	Internal, "6-pack" CE	Internal, XS/OC
Risk Indicators	Prepay-OAS G-fee	N/A	Credit-OAS (being developed)	Credit-OAS (being developed)
Issuers	GSEs	Private Label issuers	IBs & large CBs	IBs & large CBs

Source: Gorton (2008); Cho (2008)

Table 1 compares four segments of the U.S. mortgage market in terms of loan and MBS characteristics, including the prime, jumbo, Alt-A, and subprime segments. The Alt-A loans refer to those whose documentation or LTV requirements do not conform with the GSEs' funding eligibility, while the subprime loans are issued to those borrowers with poor credit histories (hence, very low FICO scores) and/or with non-conforming documentations. Compared to other segments, the subprime mortgages also exhibit a higher LTV level on the average (low 80s vs. low 70s) and a higher share of second-lien mortgages.

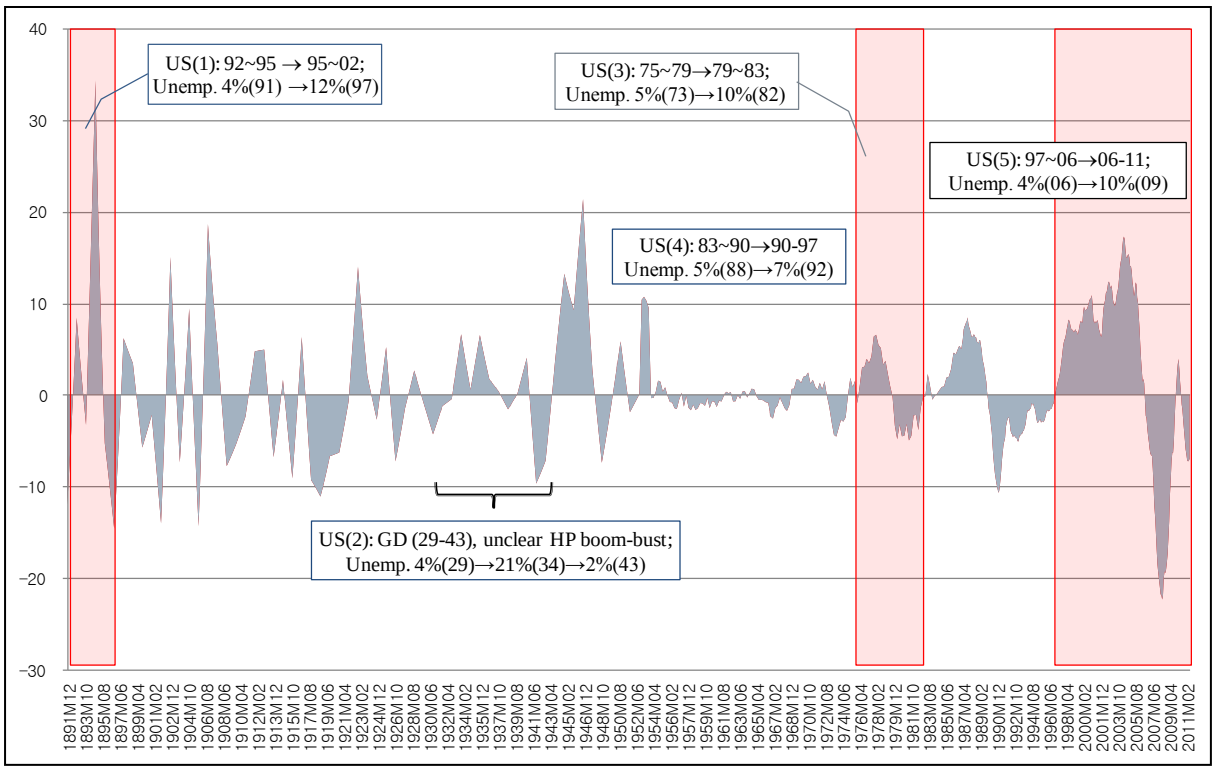
Mortgage products in the subprime market are predominantly Adjustable Rate Mortgages (ARMs), in contrast to the prime market where Fixed Rate Mortgages (FRMs) are a majority. Those subprime ARMs also have various special features, often called as "exotic" mortgages, including Interest Only (IO) ARMs, Option ARMs (for which borrowers have several options to choose in each payment node including a negative amortization of principal), 2/28 or 3/27 Hybrids (that usually have below-market interest rates and non- or negatively-amortizing principal during first 2-3 years of loan life), and 40-year maturity ARMs. These exotic mortgage loans gradually increased their shares in total subprime origination between 2002-2006.

Such products as 2/28 Option ARMs have an additional option embedded, besides the default and prepayment options, in the form of possible refinancing decisions by lenders at the time of reset (hence, an asset to lenders but a cost to borrowers). That is, subprime lenders can waive the prepayment penalty to existing borrowers at, or right after, the reset, only if market conditions (home price appreciation, in particular) favor doing so. (Gorton, 2008) Due to this added possibility, the cash flow projection and risk assessment for subprime mortgage collateral were highly challenging from the outset.

Housing and Credit Cycles Observed

Figure 4 shows real annual home price growth rates in the U.S. between 1890 to 2011.[11] Over that hundred or so years period, a number of price cycles are observed. The first one was at the turn of the 20th century, showing a housing price boom-bust combined with the ramping up unemployment rate (from 4 percent in 1891 to 12 percent in 1897). Between then and early 1970s, there was a number of cases of rise and fall, some of which appear to represent data-driven volatilities. Before, during, and after the Great Depression, there are cyclical price movements observed, which do appear to be coinciding with the macroeconomic shock.

Figure 4. Real Home Price Growth Rates in the U.S. (1890 – 2011)



After 1970s, there are three more pronounced price cycles observed. During the first two – one in

[11] The price data before 1975 are from Shiller (2008), while periods thereafter use combined data from Federal Housing Finance Agency and Fiserv (the Case-Shiller indexes).

1975-1983 and another in 1983-1993, the principle of "what goes up comes down" seems to apply: that is, in real term, total price growth during the boom is followed by a fairly similar amount of decline in the downturn. In the last one (1997-2011), the total cumulative real growth rate during the boom (87 percent) amounts to several times of those from the earlier booms, followed by a deep downturn of 34% price decline so far. Overall, the price cycle in the U.S. gets amplified over time.

In the context of the credit cycle, that the price growth accelerates more from 2003 is worth noting. That propelled price boom from 2003 and the precipitous bust from 2006 is nicely coinciding with the PL-MBS issuance pattern as depicted in Figure 5. As shown in the figure, the mortgage origination itself started picking up rapidly from 2001, which is followed by a sharp reduction in 2004. The fall, I presume, is caused by the business shock occurred to Fannie Mae and Freddie Mac as discussed earlier. However, the origination volume was rising again from 2004, which, as shown in the figure, is co-moving with the rise and fall of PL-MBS issuance. As discussed in Section II, the dramatic rise and fall of PL-MBS is, in turn, seemingly reflecting the highly-favorable and unique interest rate environment in 2003-2005. (See Figure 6 for the pattern interest rate movement.)

Figure 5. Total residential mortgage origination &
Private-Label MBS Issuance in the U.S.

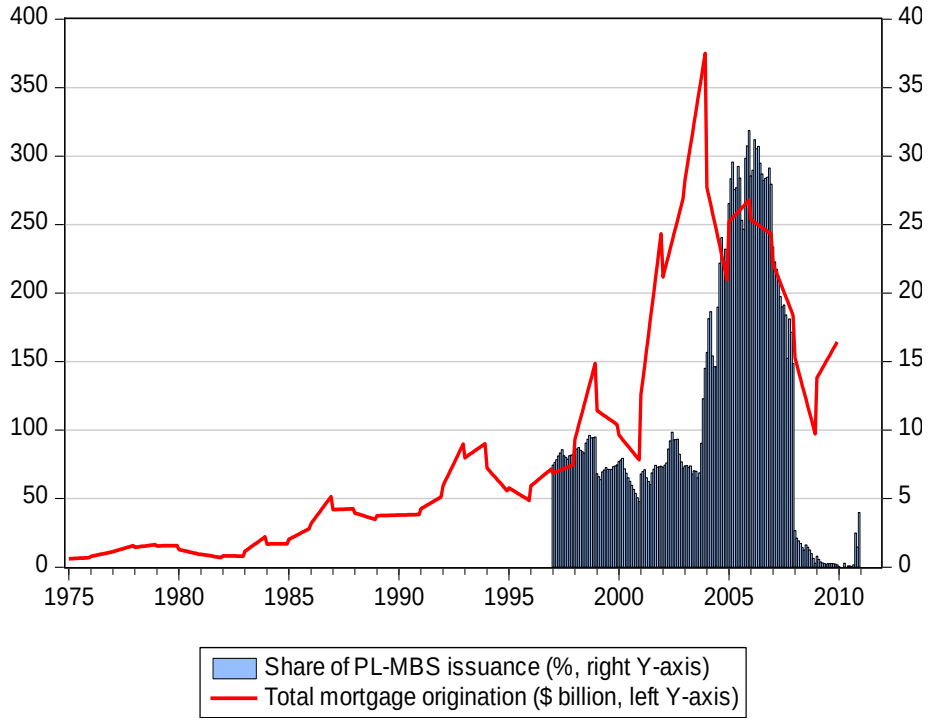
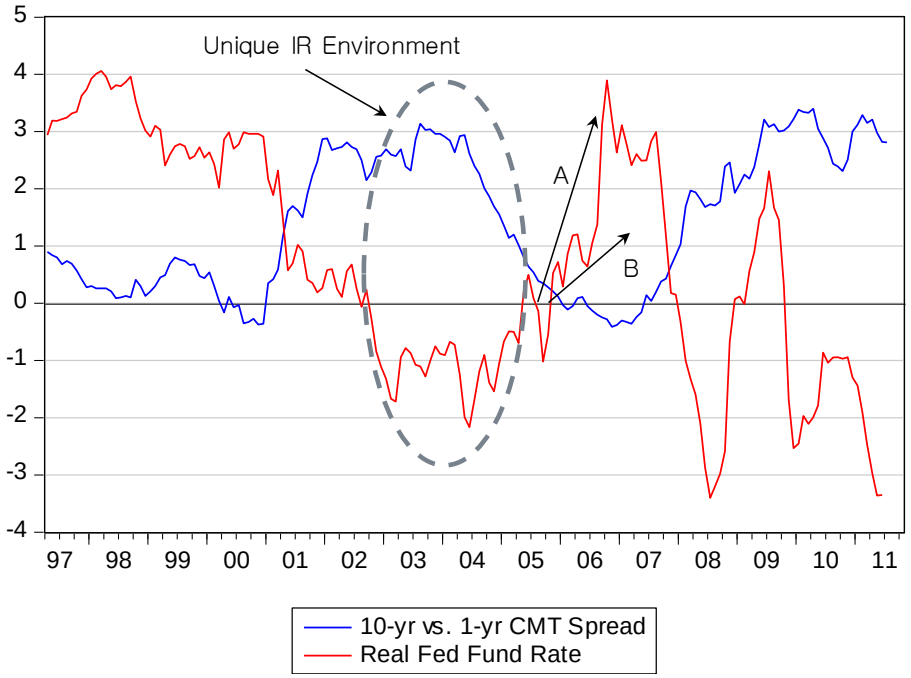


Figure 6. The Unique Interest Environment in the U.S. (2002 to 2007)

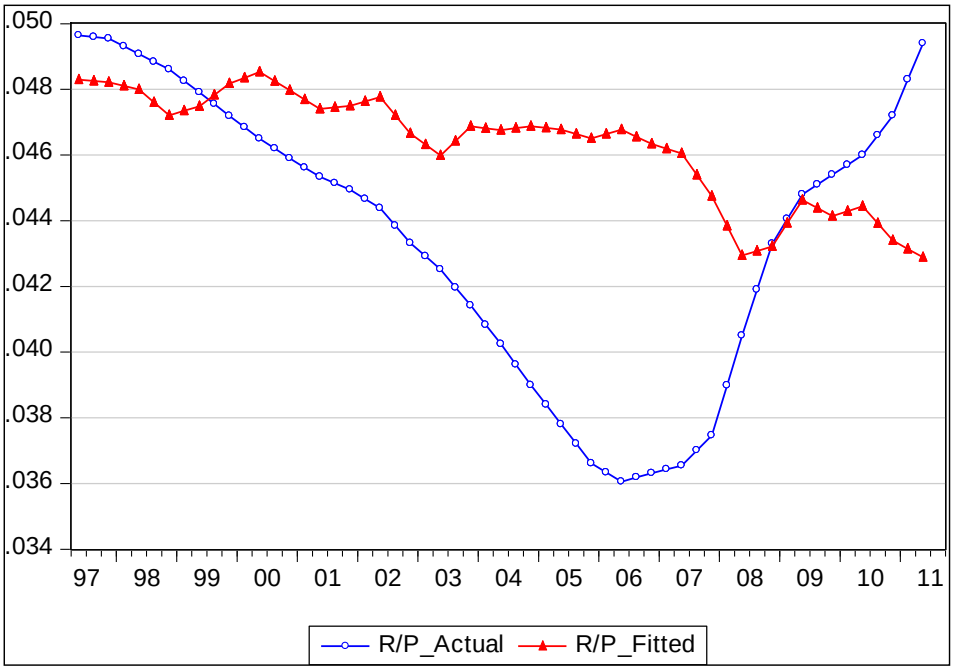


As reported by Mason (2008), Gorton (2008), Ashcraft and Schuerman (2009) among others, other non-price terms in mortgage underwriting have continuously weakened in early to mid 2000s, as evidenced by incrementally high delinquency rates from more recent origination-year loan cohorts. During the downturn, those geographical areas with high subprime and Alt-A loan origination dueing the boom tend to experience higher frequency defaults and distressed sales of foreclosed homes. (Mian and Sufi (2009))

Key Linkages Explained

To obtain the indicator (though indirect) of consumer psychology on future price appreciation, g^e, we fitted a rent-price equation by applying the method used by Campbell et al. (2009). At first glance, the residual appears to be correlated with the housing price boom in the U.S. That is, as shown in Figure 7, the actual R/P ratio started declining from late 1990s, from about 5 percent in 1997 to 3.6 percent in 2006, after which it rises rather rapidly. The fitted trend did come down from early 2000s, but not as much as the actual ratio, creating the sizable residual between 2004-2007.

Figure 7. Rent-Price Ratios, Actual vs. Fitted



There is one policy shift in the U.S. that seems to be coinciding with the fall of the R/P ration: The Taxpayer Relief Act of 1997 practically made the capital gains tax rate close to zero for most home owners, by allowing home sellers to exclude $500,000 (or $250,000 for single filers) capital gains when they sell their homes and to potentially claim such an exclusion as often as every two years. Before this change, only those 55 years or older could claim a one-time exclusion of $125,000 against their capital gains, and a number of studies examine effects of this particular policy change. (Farnham (2006), Biel and Hoyt (2007), Cunningham and Engelhardt (2008), and Shan (2008))

As a first step of data analyses, we performed pair-wise Granger causality tests among the following six variables (separately for 1980-1997 and 1997-2010 to check a regime shift):

- Real annual home price growth rate in the U.S. (ΔHPI)
- Residual of the R/P model fitted (RP_RES)
- Annual growth rate of residential mortgage origination (ΔMORT)
- Average loan-to-value ratios, as reported by Duca et al. (2009) (LTV)
- Share of Private Label MBS issuance (PL_MBS)
- 10-year vs. 1-year CMT yield spread (CMT_spread)
- Real GDP growth rate (ΔGDP)

The results (Table 2) show that:

- RP_residual, LTV, and PL-MBS all Granger-cause ΔHPI in 1997-2010, but not in the prior two cycles, and CMT_spread Granger-causes ΔHPI in 1980-1997 but not in the later period

- For both time periods, CMT_spread Granger-causes RP_residual, but no other factor included does so

- ΔHPI, RP_residual, LTV, CMT_spread Granger-cause PL-MBS in 1997-2010 (no data on PL-MBS being available for the prior cycles)

- ΔHPI, RP_residual, LTV, PL-MBS Granger-cause CMT_spread in the latter period, and only ΔHPI Granger-causes CMT_spread in the earlier period

Overall, there appears to be a regime shift between the two time periods examined, in terms of causal relationships among the included variables, and a endogenous linkage between the price cycle and mortgage market variables is detected.

Table 2.
<Table> Granger Causality Tests

(1) 1980.1~1997.3

B \ A	△(HPI)	RP_RES	△MORI	LTV	CMT spread	△(GDP)
△(HPI)	-	0.58	0.09	0.67	4.49***	0.11
RP_RES	0.77	-	0.10	0.55	2.98***	0.08
△MORI	1.50	2.14**	-	0.38	0.56	0.08
LTV	1.04	1.20	0.13	-	0.03	0.14
CMT spread	0.93	1.34	0.96	0.15	-	2.12**
△(GDP)	4.99***	1.59	2.10**	0.36	3.91***	-

(2) 1997.4~2009.3

B \ A	△(HPI)	RP_RES	△MORI	LTV	PL / MBS	CMT spread	△(GDP)
△(HPI)	-	8.22***	0.18	3.79***	2.14**	1.59	0.68
RP_RES	1.25	-	0.10	0.19	0.44	2.08**	0.59
△MORI	1.13	0.74	-	0.98	0.66	0.29	0.87
LTV	0.21	0.66	0.04	-	0.59	1.66*	1.46
PL / MBS	3.93***	3.59***	0.21	2.09**	-	2.13**	0.49
CMT spread	2.33**	1.97**	1.01	2.38**	4.24***	-	3.46***
△(GDP)	3.82***	3.07***	1.08	1.88*	0.31	0.40	-

Note: 1) A does not Granger Cause B.
2) ***, ** and * imply significant at 1%, 5% and 10% level, respectively.

As a next step, we are currently testing a VECM-ARDL model of the following form, also separately for the two time periods – (1) 1980-1997, and (2) 1997-2010:

(2) $$\Delta x_t = \alpha_0 + \alpha_1 x_{t-1} + \sum_{i=1}^{p} \beta_i \Delta x_{t-i} + e_t$$

Following Pesaran et al. (2001), t-test on α_1 confirms cointegrating relationships among a vector of endogenous variables, x (rejecting it for a given variable in a particular equation means rejecting no cointegration between left-hand and right-hand variables, which requires to include a lagged residual as a error correction term). The model also enables to test optimal lag, p.

Preliminary results of the VAR model (Table 3) generally confirm the regime shift observed: Ceteris paribus, RP_residual, LTV, and CMT_spread are statistically significant determinants of ΔHPI in the latter period, but not during the prior two cycles. On the other hand, PL-MBS and CMT_spread are significant determinants of LTV in 1997-2010, while ΔHPI, and LTV are key determinants of PL-MBS during the same price cycle. No significant relationship is observed between ΔHPI and the mortgage market variables in the earlier period. More refined regression analyses are planned going forward.

Table 3.
<Table> Results of VAR(1)

(1) 1980.1Q~1997.1Q

	△HPI	RP_RES	△MORI	LTV	CMT spread	△GDP
△HPI(t-1)	0.96***	0.00*	-0.57	-0.03	-0.02	0.15*
	(26.2)	(-1.7)	(-0.8)	(-1.0)	(-1.5)	(1.8)
RP_RES(t-1)	-0.01	0.84***	-9.55	0.99	0.04	4.33
	(-0.0)	(16.6)	(-0.4)	(1.0)	(0.1)	(1.5)
△MORI(t-1)	-0.001	0.0002	0.80***	-0.002	0.003	0.010
	(-0.2)	(1.3)	(9.1)	(-0.7)	(1.5)	(1.0)
LTV(-1)	-0.02	0.003	-1.49	0.74***	-0.02	-0.31
	(-0.1)	(0.6)	(-0.6)	(8.3)	(-0.3)	(-1.1)
CMT spread(t-1)	0.31	0.02**	2.07	-0.08	0.82***	0.05
	(1.5)	(2.6)	(0.5)	(-0.5)	(9.4)	(0.1)
△GDP(t-1)	0.01	-0.002	0.32	0.05	-0.001	0.18
	(0.2)	(-1.6)	(0.3)	(1.4)	(-0.1)	(1.5)
constant	0.01	0.00	1.27	0.22***	0.02	0.28
	(0.1)	(-0.6)	(0.6)	(2.9)	(0.4)	(1.2)
R-squared	0.93	0.94	0.69	0.64	0.79	0.28
Adj. R-squared	0.93	0.93	0.65	0.60	0.77	0.20

Note: 1) t-statistics are reported in parenthesis.
2) ***, ** and * imply significant at 1%, 5% and 10% level, respectively.

(1) 1997.2Q~2009.1Q

	△HPI	RP_RES	△MORI	LTV	PL/MBS	CMT spread	△GDP
△HPI(t-1)	1.13***	-0.01***	1.18	-0.09***	0.37***	-0.02	0.07
	(24.3)	(-3.9)	(1.2)	(-4.1)	(3.9)	(-1.5)	(0.8)
RP_RES(t-1)	5.35***	0.88***	-4.83	-0.76	3.34	-1.03***	1.34
	(4.3)	(21.0)	(-0.2)	(-1.3)	(1.3)	(-3.8)	(0.6)
△MORI(t-1)	-0.01**	0.0001	0.72***	-0.002	-0.01	0.003***	0.01
	(-2.1)	(0.7)	(7.1)	(-0.8)	(-0.7)	(3.4)	(0.6)
LTV(-1)	0.44*	-0.002	-1.83	0.41***	1.48***	-0.08	-0.42
	(1.7)	(-0.3)	(-0.3)	(3.5)	(2.8)	(-1.4)	(-0.8)
PL/MBS(t-1)	-0.004	-0.004*	-0.92	0.11***	0.73***	-0.04**	0.14
	(-0.1)	(-1.7)	(-0.6)	(4.0)	(5.5)	(-2.6)	(1.1)
CMT spread(t-1)	0.53**	-0.01*	-8.98*	0.39***	0.15	0.85***	-0.15
	(2.2)	(-1.8)	(-1.7)	(3.6)	(0.3)	(16.1)	(-0.3)
△GDP(t-1)	-0.03	0.002	-4.46**	-0.09**	0.09	-0.02	0.24
	(-0.4)	(0.6)	(-2.5)	(-2.4)	(0.5)	(-1.4)	(1.6)
constant	-0.38*	0.003	1.91	0.52***	-1.30***	0.08	0.38
	(-1.7)	(0.3)	(0.4)	(5.1)	(-2.8)	(1.5)	(0.9)
R-squared	0.99	0.99	0.69	0.95	0.93	0.95	0.48
Adj. R-squared	0.98	0.99	0.63	0.94	0.92	0.94	0.39

Note: 1) t-statistics are reported in parenthesis.
2) ***, ** and * imply significant at 1%, 5% and 10% level, respectively.

IV. Case(2): The Korean Mortgage Market

Evolution and Milestone Events

Before the Asian Financial Crisis (AFC) in 1997-1999, the Korean housing finance system was underdeveloped, with access to mortgage credit being limited to selected groups of target households and the lending rates being set at below-market subsidized level. After AFC, however, two particular deregulations turned out to be catalysts in expanding mortgage finance system dramatically.

First, both the lending rates and the deposit rates charged by financial institutions were directly regulated by the government before AFC. However, realizing that the regulation was an obstacle in creating competitive and efficient financial markets, the Korean government announced a four-phase interest rate liberalization plan in 1991. The deregulation started from short-term lending rates and long-term (3 plus years) deposit rates. And the final stage initiated in July 1997 was completed in February 2004, at which point all lending rates and deposit rates, including demand deposits and short-term savings accounts, were liberalized.

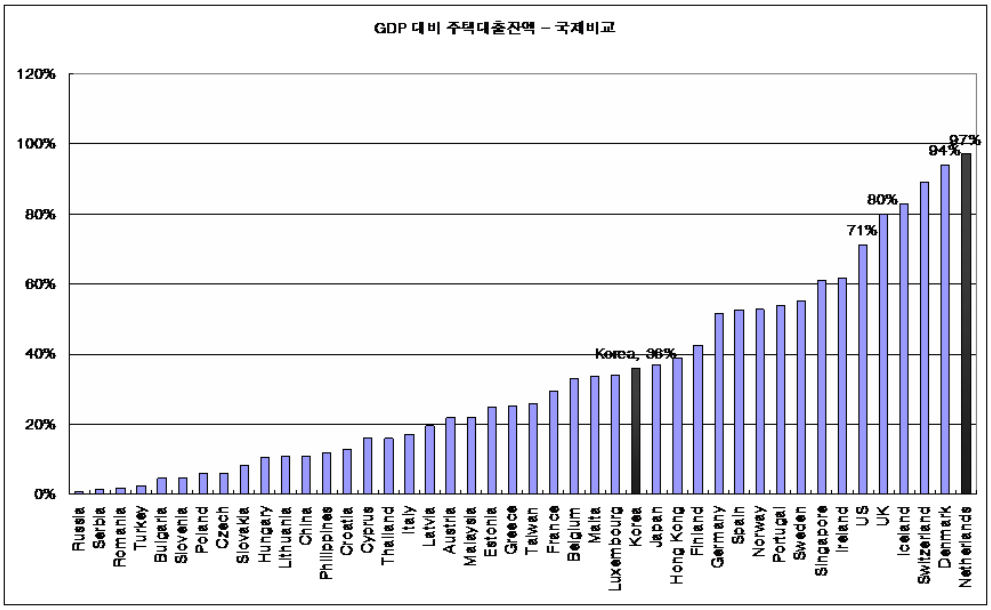
Under the interest rate regulation, lending institutions had no incentive to issue high risk loans as lending rates were set by the government. Furthermore, whole-sale funding from the capital market was not feasible because of the negative interest rate spread in the mortgage intermediation process, i.e., the controlled lending rates being lower than market-based funding costs. There had long been a discussion, since 1980s, in the policy circle on establishing a mortgage securitization system, but it was not possible until the interest rate liberalization. Thanks to the phased deregulation, and to the overhaul of the financial system after AFC, the first MBS issuer was created in 1999, which was later merged to the Korea Housing Finance Corporation (KHFC) in 2003, a wholly government-owned MBS issuer. As of today, KHFC is the sole issuer of MBS sold domestically, although there have been private MBS issuers (e.g., the Korean affiliate of Standard & Chartered Bank) who sold the securities in the international markets. .

Second, as a part of the directed credit policy in the country, the Bank of Korea restricted real estate lending by private FIs. Banks were not allowed to make loans to finance land purchases and the purchases and construction of houses larger than 100 square meters of floor space. The regulation was lifted in February 1998 right during AFC. That deregulation, plus the interest rate liberalization, strongly induced private FIs in Korea, the large commercial banks (CBs) and non-bank deposit-taking financial institutions, to enter mortgage lending business. In particular, CBs with national branch network quickly dominated the residential mortgage market, with about 70% share in mortgage debt outstanding (MDO) as of the end of 2008. The two public sector institutions – National Housing Fund as a lender of affordable mortgage loans and KHFC as a securitizer of long-term fixed-rate mortgages – only have less than five percent market share, with the rest being filled by other private lending institutions such as insurance companies and cooperative financial institutions.[12]

In consequence, the residential mortgage sector in Korea registered a remarkable growth over the past decade. As of the end of 2008, MDO in Korea amounts to 340 trillion KRW, representing 52% of the total household debt and 33% of GDP in the same year, a big jump from around 10% before the crisis. In fact, the 2008 MDO to GDP ratio is comparable with such countries as France, Japan, and Hong Kong (Figure 7).

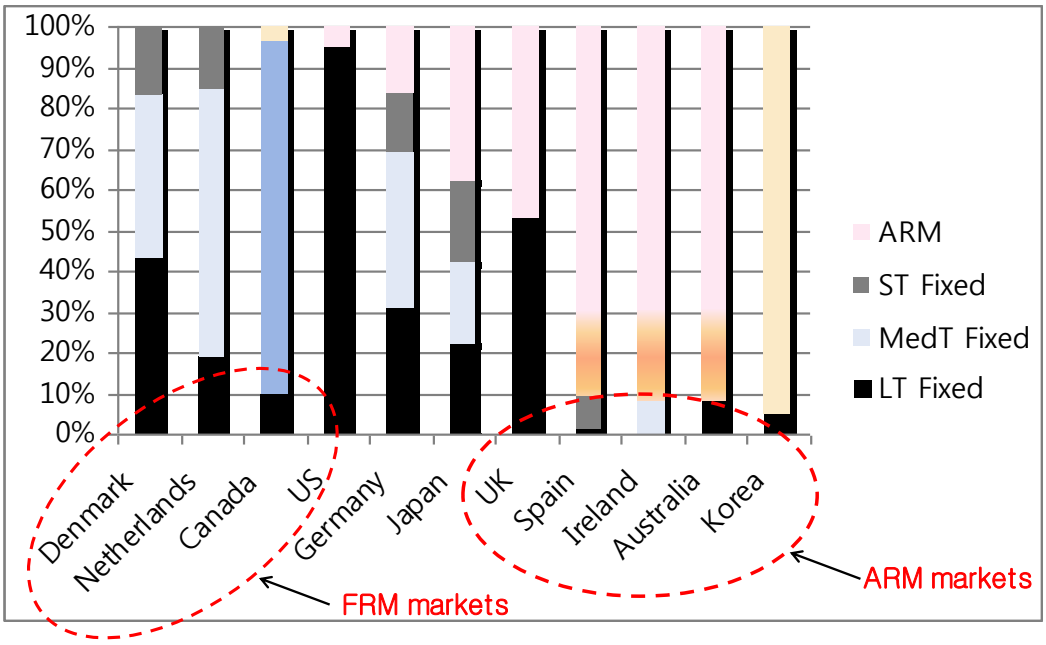
[12] Besides the development of the MBS market, there was a series of other innovations in financial markets after the Asian crisis: namely, the Asset Backed Security (ABS) Act of 1998, which was initially used as a vehicle for securitizing non-performing loans in bank portfolios but was extended to other lending sectors such as credit card receivables, auto loans, and real estate construction loans; and, the Real Estate Indirect Investment Act of 2001, based on which the market for REITs (Real Estate Investment Trust) was created.

Figure 8. MDO-to-GDP Ratios,
An International Comparison



In terms of mortgage product, Korea represents a typical ARM market. As shown in Figure 9, more than 90% of outstanding mortgage contracts are adjustable-rate mortgages (ARMs), about the highest ARM share among OECD countries examined. As additional risk factor, majority of ARMs in Korea had less than three year maturities with non-amortizing principal, although their share in MDO has been decreasing in more recent years. Similar to the 2/28 IO or Option ARM products in the subprime mortgage market in the U.S., these short-maturity bullet mortgage loans in Korea can incur severe payment shock and rollover risk when housing and mortgage markets head to a downturn. These products essentially have an embedded option that can be exercised by mortgage lenders, i.e., whether or not to rollover, depending on market conditions. (Gorton (2009))

Figure 9. Variability of Mortgage Products,
ARM vs. Hybrid vs. FRM



Source: Lea (2010), and Cho/Kim (2011)

There are other product features that make mortgage lending in Korea less borrower-friendly. As shown in Table 4, the ARM contracts in Korea have very frequent rate-reset (every three months), prepayment penalty, and no cap on periodic or lifetime rate reset. Hence, it seems to be necessary to design a more equitable risk-sharing arrangement between consumers and lenders.

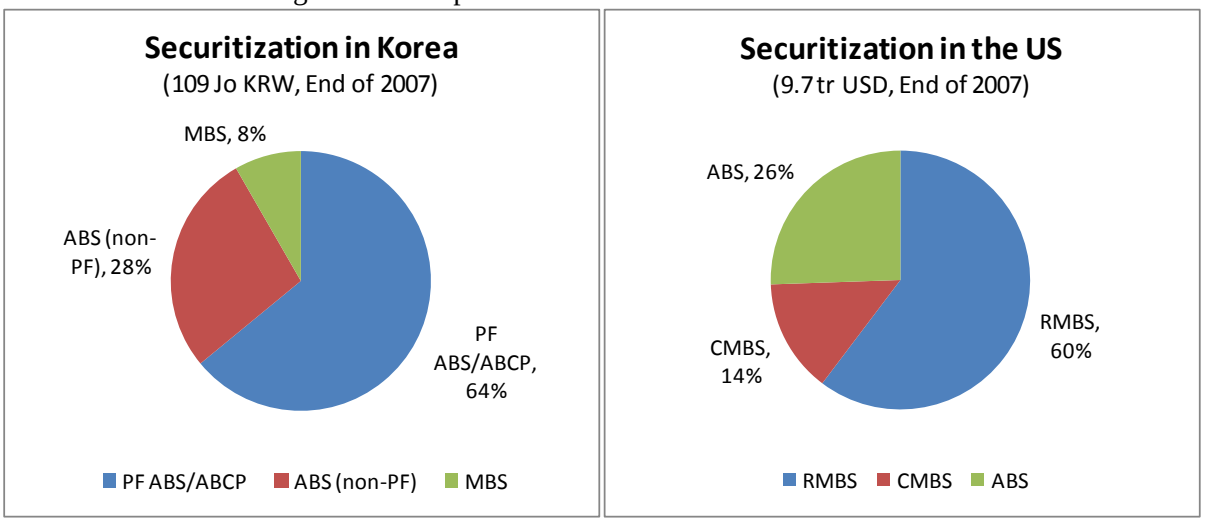
Table 4. Comparison of Features of Mortgage Product

Country	Index & reset	Caps	Margin	Options	Prepay penalty
Denmark	CIBOR; 6 months	Lifetime cap (5%)	0.50%	5-yr max	Yield maintenance; ST FRMs
Germany	Lender discretion	Rate insurance policy available	N/A	Mixed	Reinvestment loss; All FRM but no ARM; No penalty if property sold
Spain	Euribor; 6-12 months	Caps & floors (30% of lenders)	~2%	N/A	2.5% yield maintenance for FRM; 0.5% for ARM
France	Euribor; 3-12 months	2-3%	1-3%	FRM to ARM conversion	Max 6 months interest or max 3%; no fee if unemployed, death, or job change
Netherlands	Euribor; 1-12 months	N/A	~2.5%	FRM to ARM conversion	Yield maintenance for FRM; No penalty for hardship or relocation
U.K.	Renewable; Monthly	Caps availabe (tracker)	0.5-1.5%	N/A	2-5% for FRM
Canada	Prime rate; Index change	Caps availabe	~0.5%	Mixed conversion	Higher of lost interest or 3 months
Australia	Lender discretion	None	1.2-2.2%	N/A	Change in lost of fund from FRMs
U.S.	Hybrid, 3/1 or 5/1	Periodic & lifetime	2.50%	FRM to ARM conversion	Up to 5%, declining over time; ARMs only (mostly in the subprimes)
Switzerland	CHF Libor; 3-6 months	Optional caps	0.50%	Mixed conversion	Yield maintenance for FRM
Japan	Prime rate; 6 months	Caps availabe	N/A	Mixed conversion	None
Korea	KOPIX/CD rate; 3 months	None	-2%	Mixed conversion	Declining over 3 years (1.5%. 1%, 0,5%); Applicable for ARMs & FRMs

Source: Lea (2010), and Cho/Kim (2011)

Finally, the market for securitization is still being developed in Korea. As shown in Figure 10, the total size of the ABS-MBS market in Korea (in the U.S.) is 11 percent (70 percent). One similarity between two countries is the fact that the securities backed by real estate loans take majority: in the U.S., CMBS and RMBS together take 74 percent, while the securitized construction loans (referred to as Real Estate PF Loans) and residential MBS together take 72 percent in Korea. The main difference is that maturity of securities in Korea is much shorter than that in the U.S., implying that the securitization of residential mortgages has not helped so far in expanding the long-term bond market in Korea.

Figure 10. Composition of the Market for Securitization



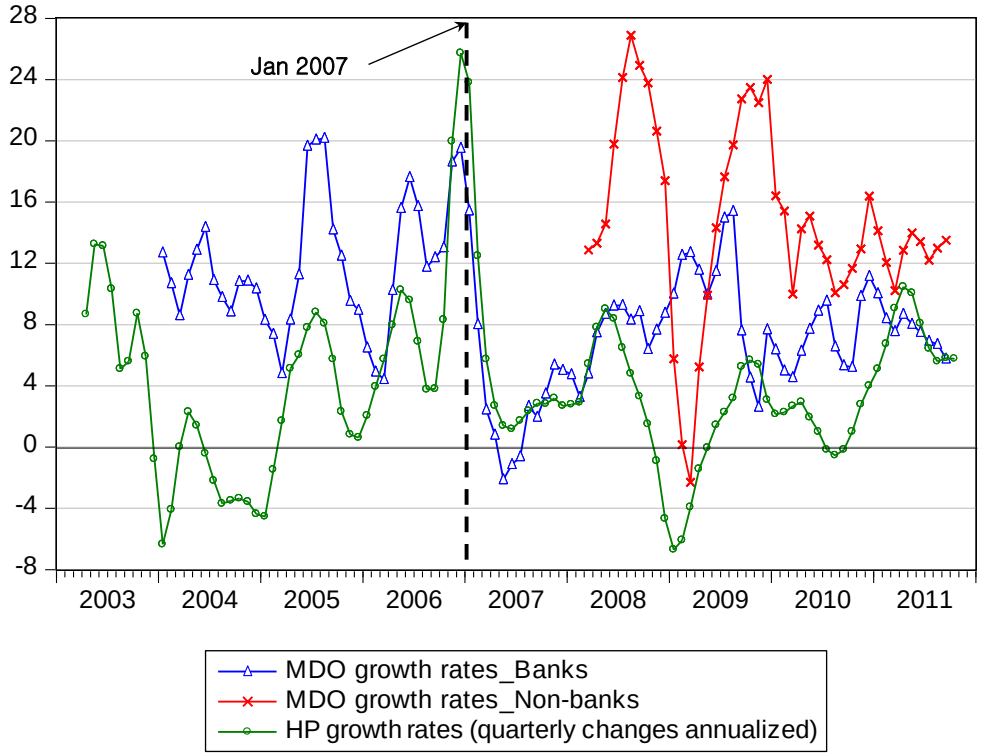
Source: Cho (2010)

Housing and Credit Cycles in Korea

Ever since the economic growth took off since 1960s, there have been several pronounced real estate price cycles in Korea. Although the housing price indexes in Korea do not go back before 1986, it appears that the cycle in 1970s (based on the land price index) was the most volatile one (see Appendix). However, it would be not that meaningful to extend our analysis before AFC as a market-oriented mortgage finance system was in full steam only thereafter. In 2000s, there were two prices cycles – one in the early 2000s and another in 2005 to 2007, the housing price declined in 2008 in response to the GFC, and it is recovering since then.

Figure 11 shows that the MDO cycles in Korea was closely co-moving with the price cycle in 2003 to 2007, confirming the linkage as hypothesized in Section II and as evidenced by the recent boom-bust in the U.S. Both price and MDO trends began deceleration from early 2007, which would be consequence of the DTI regulation by the Korean government from January 2007 (which is to be confirmed by empirical study).

Figure 11. Home Price and MDO Growth Rates in Korea
(2003 to 2011; MDO by Banks vs. Non-Banks)



One strange pattern is observed after GFC, in that the price cycle and the bank MDO cycle noticeably deviates in the second half 2008 until end of 2009, in which period the non-bank MDO change co-moves with the price. Given that non-bank lenders in Korea are generally not penetrating the business lending sector, the deviation can be construed as a possible substitution in lending portfolio of banks away from (more toward) business (consumer) lending. Overall, as shown from the recent cycle in the U.S., the housing price and mortgage credit cycles in Korea exhibit a close linkage, at least in one pronounced cycle in 2000s.

In order to compile indicators of the underlying determinants to the cycles (or "the cycle-generators" discussed in Section 2), we estimate the R/P ratio in Korea. As shown in Figure 12, like in the U.S., the deviation becomes larger during the price boom, in 2005-2007 in particular. Unlike in the U.S., however, the LTV and DTI trends are low and flat in Korea (Figure 13): while the average (the top 90th percentile) LTV is hovering right below 40 (mid-50) percent, the average (the top 90th percentile) DTI is around 20 (30) percent. This outcome indicates that there is room for growth in the mortgage financing sector in terms of serving more underserved (or more marginal borrowers) without impairing market stability. We will come back to this point with further data analyses going forward.

Figure 12. Actual and Fitted R/P in Korea

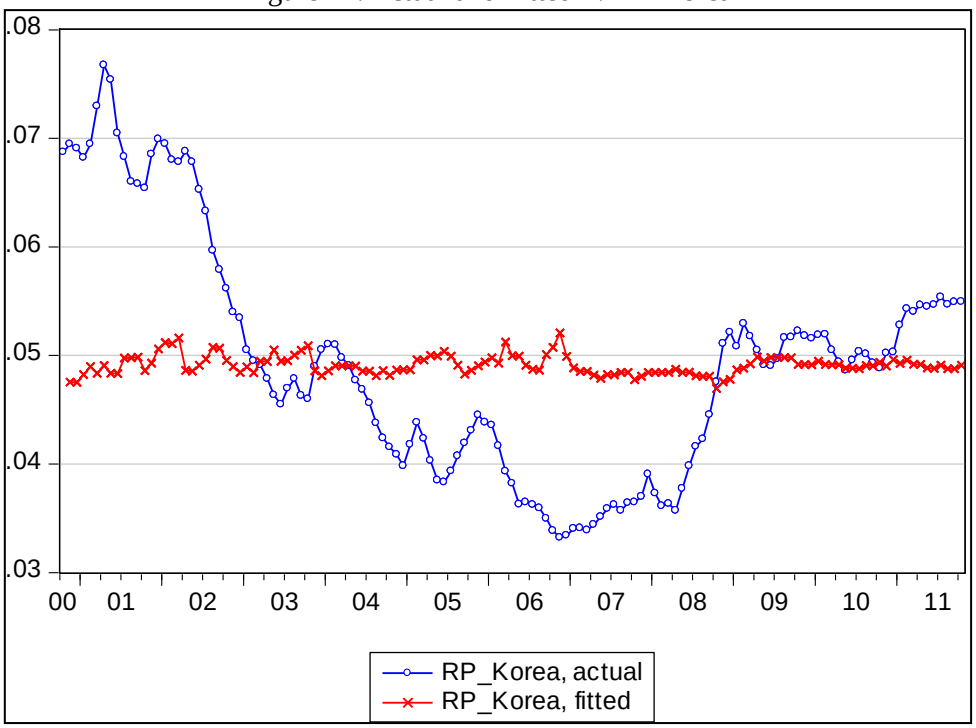
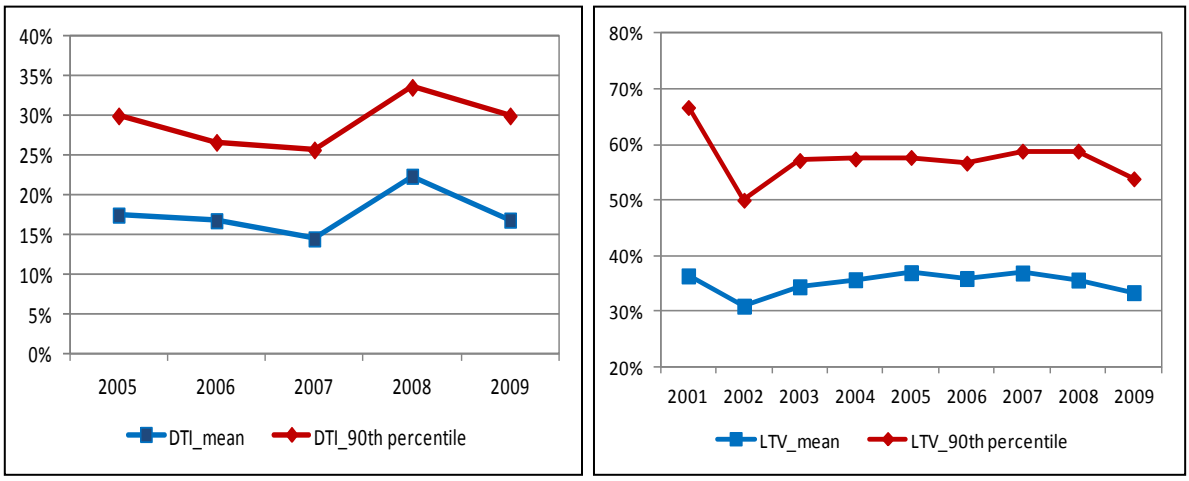


Figure 13. LTV and DTI Trends in Korea
(Average and Top 90th Percentile)



Data source: Survey of Demand for Housing Loan (Kookmin Bank)

V. Policy Implications and Next Steps

In this study, we attempt to explain linkages between housing price and mortgage credit cycles observed from two countries – Korea and the U.S. In the U.S. case, the two cycles exhibit a statistically significant and, to some degree, explainable co-movement pattern in the recent period (1997-2010), but not in prior cycles. That is, a regime shift is observed in terms of causal relationship between housing price movement and mortgage credit cycle. The indicators employed to reflect behavior of three key cycle generators – exuberant borrowers, pro-cyclical lenders, and yield curve playing investors – show endogenous relationships, and appear to be useful in assessing cyclical price and lending patterns in other countries.

In the Korean case, a similar co-movement is also observed in the mid-2000s, but different types of mortgage lenders are shown to have different lending patterns around the Global Financial Crisis possibly due to the difference in their business models. In terms of the underlying indicators, the variable for consumer psychology appears to have a similar correlation with home price cycle as in the U.S. But the leverage and other non-price terms in mortgage lending are very much conservative, which makes the debate of a housing driven systemic risk as in the subprime mortgage market in the U.S. as less relevant in the Korean context.

As the last issue to discuss, we argue that regulating residential mortgage lending should be done by considering both dimensions of market stability and housing affordability, and that target of regulation should point to the source if cyclical price and lending pattern. The table below is one template we put together to illustrate what policy issues to consider in each dimension under different underlying factor. Going forward, we will extend our data analyses to other countries, those in East Asia in particular, and will further elaborate policy remedies as shown in the table. [13]

Table 5. A Matrix of Mortgage Market Policy Design

	A. Ensuring Market **Stability**	B. Enhancing Housing **Affordability**
1. Exuberant borrower-flippers	• Differentiate via risk weight, and risk premium • Enforce residence requirement, to sort out "liars" (via loss-mit effort)	• Protect "real" borrowers for primary residence • Define and serve underserved consumer cohorts (1st-timers, self-employed, and so on)
2. Pro-cyclical lenders: Leverage rate	• Impose risk-based LTV limits (reflecting HP volatility) • Differentiate the limits in upturn vs. downturn	• Develop affordable LTV loans to serve wealth-constrained • Introduce MI program, public and/or private
3. Pro-cyclical lenders: ONPTs	• Require risk-based limits on DTI, CB, product, and others	• Define "prime" mortgage product, & decide govt's role

[13] As mortgage and MBS products become more complicated, information asymmetry between borrowers, lenders, other intermediaries, and investors can get more severe, and protecting both borrowers and investors under such condition has become an important policy issue in various countries. As an example, the U.S. government enacted the Dodd-Frank Wall Street Reform and Consumer Protection Act in July 2010, and Title XIV of the Act defines the minimum mortgage lending standards and the ways to protect consumers from predatory and/or high-cost (i.e., high risk spread) mortgage lending. Also, FSA (Financial Supervision Administration) in U.K. issued a similar guideline in 2009, and, later on, the Consumer Protection and Market Agency was created in June 2010 as a part of the overhaul of the banking supervision system. Currently, Korean government is drafting legislation for financial consumer protection.

	• Do: Private FIs' implementation & banking supervisor's validation and monitoring	therein • Consider international standard on QRM (a la FSB)
4. Yield-curve playing investors	• Ensure a stable and predictable monetary policy, to control "BSLL" • Require reasonable & counter-cycle margins	• Ensure long-term funding to "prime mortgage" sector, via MBS/CB • Develop intermediaries with a good credit standing

References

Adrian, T., and H. Shin, 2009, “Liquidity and Leverage,” Forthcoming in Journal of Financial Intermediation.

Ashcraft, A., and T. Schuermann, 2008, “Understanding the Securitization of Subprime Mortgage Credit,” Federal Reserve Bank of New York Staff Report, #318.

Benmelech, E., and J. Dlugosz, 2009, “The Alchemy of CDO Credit Ratings,” Journal of Monetary Economics 56, 617-634.

Brunnermeier, Markus K., “Deciphering the Liquidity and Credit Crunch 2007-2008”, Journal of Economic Perspectives, 23(1), Winter 2009, 77-100.

Cho, M., 180 Years’ Evolution of the US Mortgage Banking System: Lessons for Emerging Mortgage Markets. International Real Estate Review, Vol. 10(1), 171-212, 2007.

Cho, M., 2009, Managing Mortgage Credit Risk: What went wrong with the subprime and Alt-A markets?, Working Paper.

Cho, M., Kyung-Hwan Kim, 2010, “Three Pillars of Managing Mortgage Credit Risk: A Framework and the Korean Case,” Forthcoming in Housing Finance International.

Cifuentes, R., G. Ferruci, and H. Shin, “Liquidity risk and contagion,” Journal of the European Economic Association 3, 2005, 556-566.

Collyns, C., and Senhadji, A., "Lending booms, real estate bubbles and the Asian crisis," IMF Working Paper, No. 02/20, 2001.

Davis, E. and Zhu, H., "Bank lending and commercial property prices: some cross country evidence," BIS Working Paper No. 150, 2004.

Duca, J., J. Muelbauer, and A. Murphy, 2009, “House Prices and Credit Constraints: Making Sense of the U.S. Experience,” Presented at the 2010 ASSA Meeting, Atlanta, U.S.A.

Fender, I., and J. Mitchell, 2009, “The Future of Securitization: How to Align Incentives,” BIS Quarterly Review, September 2009, 27-43.

Fostel, A., and J. Geanakoplos. 2008. “Leverage Cycles and the Anxious Economy.” American Economic Review 98, no. 4 (September): 1211-44.

Geanakoplos, J. 1997. “Promises, Promises.” In W. B. Arthur, S. Durlauf, and D. Lane, eds., The Economy as an Evolving Complex System, vol. 2, 285-320. Reading, Mass.: Addison-Wesley.

Geanakoplos, J. 2010. “Solving the Present Crisis and Managing the Leverage Cycle,” FRBNY Economic Policy Review / August 2010.

Gerlach, S. and Peng, W., "Bank lending and property price in Hong Kong," Journal of Banking and Finance 29, 2005, 461-481.

Gimeno, Ricardo and Martinez-Carrascal, Carmen, "The relationship between house prices and house purchase loans: the Spanish case," Journal of Banking and Finance 34, 2010, 1849-1855.

Goetzmann, W., L. Peng, and J. Yen, 2009, “The Subprime Crisis and Home Price Appreciation,” Presented at the 2010 ASSA Meeting, Atlanta, U.S.A.

Gorton, G., 2009, “Securitized Banking and Run on Repo,” NBER Working Paper 15223.

Gramlich, R., Subprime Mortgages: America’s Latest Boom and Bust, The Urban Institute Press, Washington, D.C, 2007.

Greef, I.J.M. and Haas R.T.A., "Housing prices, bank lending, and monetary policy," De Nederlandsche Bank Research Series Supervision Paper 31, 2001, 1-23.

Green, R., and S. Wachter, "The American Mortgage in Historical and International Context." Journal of Economic Perspectives Vol. 19, No. 4, 2005.

Griffin, J., and D. Tang, 2009, “Did Subjectivity Play a Role in CDO Credit Ratings?” Presented at the 2010 ASSA Meeting, Atlanta, U.S.A.

Hofmann, B., "The determinants of private sector credit in industrialized countries: do property prices matter?," BIS Working Papers No. 108, 2001.

Hofmann, B., "Bank lending and property prices: Some international evidence," The Hong Kong Institute for Monetary Research Working Paper No. 22, 2003.

Iacoviello, M. (2005), House Prices, Borrowing Constraints and Monetary Policy in the Business Cycle American Economic Review. Volume 95, Number 3, pp. 739-764(26)

Kiyotaki, N. and J. Moore (1997). Credit cycles. Journal of Political Economy 105, 211-248.

Liang, Q. and Cao, H., "Property prices and bank lending in China," Journal of Asian Economics 18, 2007, 63-75.

Mason, J., and J. Rosner, “How Resilient Are Mortgage Backed Securities to Collateralized Debt Obligation Market Disruptions?” Manuscript presented at the Hudson Institute, February 2007.

Mian, A., and A. Sufi, 2009, “The Consequence of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis,” The quarterly Journal of Economics, November 2009, 1449-1496.

Miranda, M., and Fackler, P. (2002), Applied Computational Economics and Finance MIT Press.

Oikarinen, E., "Interaction between housing prices and household borrowing: The Finnish case," Journal of Banking and Finance 33, 2009, 747-756.

Park, S. W., D. W. Bahng and Y. W. Park, "Price run-up in housing markets, access to bank lending and house prices in Korea," Journal of Real Estate Finance and Economics 40, 2010, 332-367.

Rudebusch, G. D., and Svensson, L. E. (1998), Policy Rules for Inflation Targeting NBER. Working Paper No. 6512

Shan, H., “The Effect of Capital Gains Taxation on Home Sales: Evidence from the Taxpayer Relief Act of 1997,” mimeo, Federal Reserve Board.

Shiller, R., 2008, The Subprime Solution: How Today’s Global Financial Crisis Happened, and What to Do About It?, Princeton University Press, Princeton, New Jersey, 2008.

Song, I. H. (2011), House Prices and Consumption PH.D. Dissertation, The Ohio State University.

Uhlig, H. (1999), A Toolkit for Analysing Nonlinear Dynamic Stochastic Models Easily Oxford University Press.

Wheaton, W., and G. Nechayev, "The 1998-2005 Housing 'Bubble' and the Current 'Correction': What's Different This Time?" Journal of Real Estate Research Vol. 30(1), pp. 1-26, 2008.

Yang, T., C. Lin, and M. Cho, "Collateral Risk in Residential Mortgages," Forthcoming in Journal of Real Estate Finance and Economics, 2009.

Appendix

Land and Housing Price Cycles in Korea since 1975

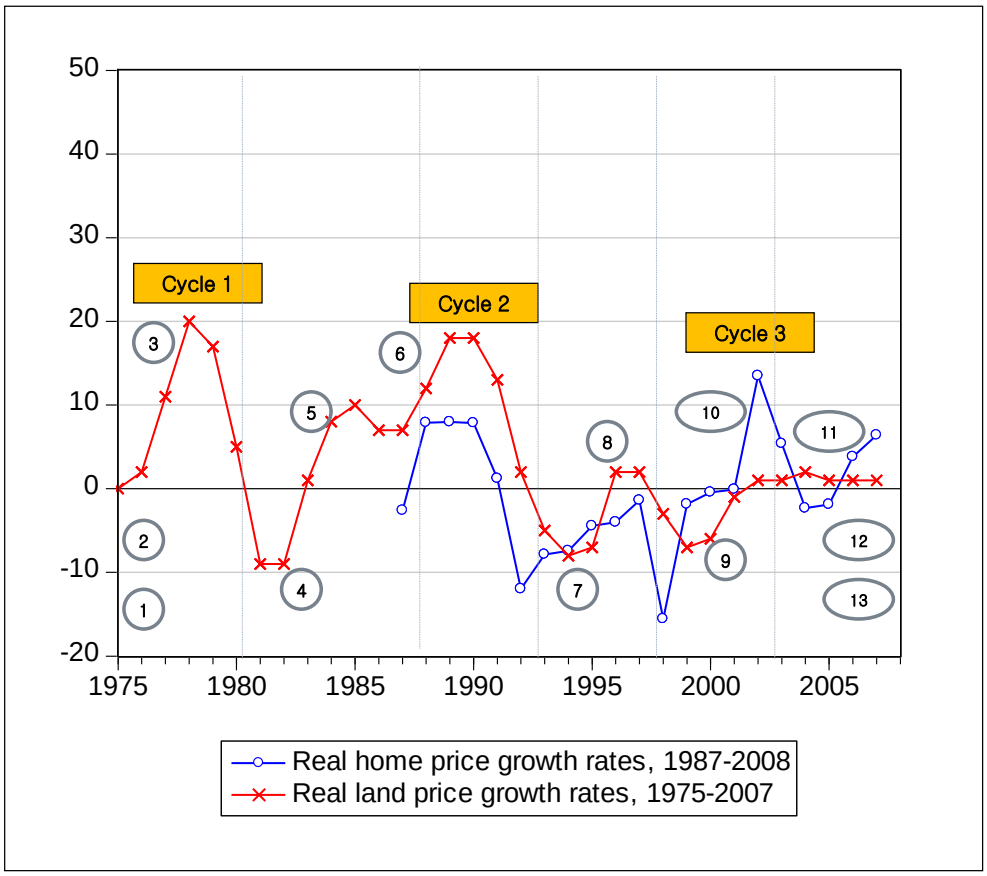


Table. 5-years moving average of housing price changes

A. Period : 1980~2011								
country	Mean	S.D	Min	50th pct	30th pct	5th pct	1th pct	Pct of 0%
United State	10.0	28.5	-39.1	3.9	-7.5	-29.2	-38.7	44.0
Japan	-4.3	21.8	-29.5	-12.7	-21.7	-29.2	-29.5	58.0
Switzerland	3.8	16.8	-27.9	7.9	-2.1	-26.2	-27.6	30.0
Sweden	18.5	25.0	-26.8	28.9	10.7	-25.6	-26.8	27.0
Ireland	28.4	42.5	-27.5	16.7	-0.3	-21.4	-26.7	31.0
United Kingdom	26.9	34.0	-25.6	25.6	0.8	-24.0	-25.6	29.0
China	-1.9	7.3	-23.0	-0.1	-5.2	-16.7	-22.1	51.0
Taiwan(Taipei)	48.1	87.9	-21.7	7.5	-3.8	-15.4	-21.5	41.0
Spain	35.8	27.8	-19.5	35.8	16.8	-11.2	-19.5	13.0
Denmark	30.9	17.2	-15.8	33.3	21.4	-2.5	-15.8	5.0
Korea	19.7	22.5	-12.9	22.1	-0.1	-9.6	-12.5	31.0
Portugal	1.8	8.1	-11.3	0.3	-3.7	-9.0	-11.3	49.0
Australia	22.1	9.5	5.8	22.5	16.3	5.8	5.8	-
France	38.4	18.7	6.2	40.8	26.1	9.3	6.2	-
Norway	37.4	10.8	21.3	36.7	28.0	22.2	21.3	-

B. Period : 1980~2005								
Japan	-1.9	22.4	-29.5	-2.5	-21.5	-29.2	-29.5	51.9
Switzerland	2.7	18.3	-27.9	7.5	-9.6	-26.2	-27.6	36.5
Sweden	12.0	26.3	-26.8	18.0	-13.4	-25.6	-26.8	37.5
United Kingdom	27.6	37.3	-25.6	27.2	-5.7	-24.0	-25.6	32.7
China	-5.1	7.3	-23.0	-4.0	-8.7	-18.7	-23.0	71.4
Ireland	31.7	43.8	-22.9	16.9	2.1	-19.8	-22.9	28.3
Taiwan(Taipei)	50.0	94.3	-21.7	1.4	-4.1	-18.4	-21.5	47.1
United State	11.4	25.5	-21.2	4.6	-6.5	-20.0	-20.9	41.3
Korea	17.1	25.6	-12.9	10.2	-4.9	-10.0	-12.8	42.2
Portugal	3.7	8.7	-11.3	3.6	-3.1	-9.5	-11.3	38.5
Spain	42.9	21.0	12.9	45.4	26.5	13.0	12.9	-
Denmark	31.4	11.0	12.9	32.8	23.7	14.7	12.9	-
France	39.0	13.4	19.2	39.9	29.6	19.6	19.2	-
Norway	40.7	10.8	21.3	39.8	32.3	25.9	21.3	-
Australia	-	-	-	-	-	-	-	-

Working Paper Series

Category	Serial #	Author	Title
Working Paper	99-01	Se-Il Park	Labor Market Policy and The Social Safety Net in Korea: After 1997 Crisis
Working Paper	99-02	Sang-Woo Nam	Korea's Economic Crisis and Corporate Governance
Working Paper	99-03	Sangmoon Hahm	Monetary Bands and Monetary Neutrality
Working Paper	99-04	Jong-Il You Ju-Ho Lee	Economic and Social Consequences of globalization: The Case of South Korea
Working Paper	99-05	Sang-Woo Nam	Reform of the Financial Sector in East Asia
Working Paper	99-06	Hun-Joo Park	Dirigiste Modernization, Coalition Politics, and Financial Policy Towards Small Business: Korea, Japan, and Taiwan Compared
Working Paper	99-07	Kong-Kyun Ro	Mother's Education and Child's Health: Economic Anlaysis of Korean Data
Working Paper	99-08	Euysung Kim	Trade Liberalization and Productivity Growth in Korean Manufacturing Industries: Price Protection, Market Power, and Scale Efficiency
Working Paper	99-09	Gill-Chin Lim	Global Political-Economic System and Financial Crisis: Korea, Brazil and the IMF
Working Paper	99-10 (C99-01)	Seung-Joo Lee	LG Household & Health Care: Building a High-Performing Organization
Working Paper	00-01	Sangmoon Hahm Kyung-Soo Kim Ho-Mou Wu	Gains from Currency Convertibility: A Case of Incomplete Markets
Working Paper	00-02	Jong-Il You	The Bretton Woods Institutions: Evolution, Reform and Change
Working Paper	00-03	Dukgeun Ahn	Linkages between International Financial and Trade Institutions: IMF, World Bank and WTO
Working Paper	00-04	Woochan Kim	Does Capital Account Liberalization Discipline Budget Deficit?
Working Paper	00-05	Sunwoong Kim Shale Horowitz	Public Interest "blackballing" in South Korea's Elections: One-Trick Pony, or Wave of the Future?
Working Paper	00-06	Woochan Kim	Do Foreign Investors Perform Better than Locals? Information Asymmetry versus Investor Sophistication
Working Paper	00-07	Gill-Chin Lim Joon Han	North-South Cooperation for Food Supply: Demographic Analysis and Policy Directions
Working Paper	00-08 (C00-01)	Seung-Joo Lee	Strategic Newspaper Management: Case Study of Maeil Business
Working Paper	01-01	Seung-Joo Lee	Nokia: Strategic Transformation and Growth
Working Paper	01-02	Woochan Kim Shang-Jin Wei	Offshore Investment Funds: Monsters in Emerging Markets?
Working Paper	01-03	Dukgeun Ahn	Comparative Analysis of the SPS and the TBT Agreements
Working Paper	01-04	Sunwoong Kim Ju-Ho Lee	Demand for Education and Developmental State: Private Tutoring in South Korea
Working Paper	01-05	Ju-Ho Lee Young-Kyu Moh	Do Unions Inhibit Labor Flexibility? Lessons from Korea
Working Paper	01-06	Woochan Kim Yangho Byeon	Restructuring Korean Bank's Short-Term Debts in 1998 - Detailed Accounts and Their Implications -
Working Paper	01-07	Yoon-Ha YOO	Private Tutoring as Rent Seeking Activity Under Tuition Control

*** The above papers are available at KDI School Website <http://www.kdischool.ac.kr/new/eng/faculty/working.jsp>. You may get additional copy of the documents by downloading it using the Acrobat Reader.**

Working Paper Series

Category	Serial #	Author	Title
Working Paper	01-08	Kong-Kyun Ro	경제활동인구 변동의 요인분석: 선진국과의 비교분석
Working Paper	02-01	Sangmoon Hahm	Restructuring of the Public Enterprise after the Crisis : The Case of Deposit Insurance Fund
Working Paper	02-02	Kyong-Dong KIM	The Culture of Industrial Relations in Korea : An alternative Sociological Approach
Working Paper	02-03	Dukgeun Ahn	Korean Experience of the Dispute Settlement in the world Trading System
Working Paper	02-04	BERNARD S. BLACK Hasung Jang Woochan Kim	Does Corporate Governance Matter? (Evidence from the Korean Market)
Working Paper	02-05	Sunwoong Kim Ju-Ho Lee	Secondary School Equalization Policies in South Korea
Working Paper	02-06	Yoon-Ha YOO	Penalty for Mismatch Between Ability and Quality, and School Choice
Working Paper	02-07	Dukgeun Ahn Han-Young Lie	Legal Issues of Privatization in Government Procurement Agreements: Experience of Korea from Bilateral and WTO Agreements
Working Paper	02-08	David J. Behling Kyong Shik Eom	U.S. Mortgage Markets and Institutions and Their Relevance for Korea
Working Paper	03-01	Sang-Moon Hahm	Transmission of Stock Returns and Volatility: the Case of Korea
Working Paper	03-02	Yoon Ha Yoo	Does Evidentiary Uncertainty Induce Excessive Injurer Care?
Working Paper	03-03	Yoon Ha Yoo	Competition to Enter a Better School and Private Tutoring
Working Paper	03-04	Sunwoong Kim Ju-Ho Lee	Hierarchy and Market Competition in South Korea's Higher Education Sector
Working Paper	03-05	Chul Chung	Factor Content of Trade: Nonhomothetic Preferences and "Missing Trade"
Working Paper	03-06	Hun Joo Park	RECASTING KOREAN *DIRIGISME*
Working Paper	03-07	Taejong Kim Ju-Ho Lee	Mixing *versus* Sorting in Schooling: Evidence from the Equalization Policy in South Korea
Working Paper	03-08	Naohito Abe	Managerial Incentive Mechanisms and Turnover of Company Presidents and Directors in Japan
Working Paper	03-09	Naohito Abe Noel Gaston Katsuyuki Kubo	EXECUTIVE PAY IN JAPAN: THE ROLE OF BANK-APPOINTED MONITORS AND THE MAIN BANK RELATIONSHIP
Working Paper	03-10	Chai-On Lee	Foreign Exchange Rates Determination in the light of Marx's Labor-Value Theory
Working Paper	03-11	Taejong Kim	Political Economy and Population Growth in Early Modern Japan
Working Paper	03-12	Il-Horn Hann Kai-Lung Hui Tom S. Lee I.P.L. Png	Direct Marketing: Privacy and Competition
Working Paper	03-13	Marcus Noland	RELIGION, CULTURE, AND ECONOMIC PERFORMANCE
Working Paper	04-01	Takao Kato Woochan Kim Ju Ho Lee	EXECUTIVE COMPENSATION AND FIRM PERFORMANCE IN KOREA
Working Paper	04-02	Kyoung-Dong Kim	Korean Modernization Revisited: An Alternative View from the Other Side of History

*** The above papers are available at KDI School Website <http://www.kdischool.ac.kr/new/eng/faculty/working.jsp>. You may get additional copy of the documents by downloading it using the Acrobat Reader.**

Working Paper Series

Category	Serial #	Author	Title
Working Paper	04-03	Lee Seok Hwang	Ultimate Ownership, Income Management, and Legal and Extra-Legal Institutions
Working Paper	04-04	Dongsoo Kang	Key Success Factors in the Revitalization of Distressed Firms : A Case of the Korean Corporate Workouts
Working Paper	04-05	Il Chong Nam Woochan Kim	Corporate Governance of Newly Privatized Firms: The Remaining Issues in Korea
Working Paper	04-06	Hee Soo Chung Jeong Ho Kim Hyuk Il Kwon	Housing Speculation and Housing Price Bubble in Korea
Working Paper	04-07	Yoon-Ha Yoo	Uncertainty and Negligence Rules
Working Paper	04-08	Young Ki Lee	Pension and Retirement Fund Management
Working Paper	04-09	Wooheon Rhee Tack Yun	Implications of Quasi-Geometric Discountingon the Observable Sharp e Ratio
Working Paper	04-10	Seung-Joo Lee	Growth Strategy: A Conceptual Framework
Working Paper	04-11	Boon-Young Lee Seung-Joo Lee	Case Study of Samsung's Mobile Phone Business
Working Paper	04-12	Sung Yeung Kwack Young Sun Lee	What Determines Saving Rate in Korea?: the Role of Demography
Working Paper	04-13	Ki-Eun Rhee	Collusion in Repeated Auctions with Externalities
Working Paper	04-14	Jaeun Shin Sangho Moon	IMPACT OF DUAL ELIGIBILITY ON HEALTHCARE USE BY MEDICARE BENEFICIARIES
Working Paper	04-15	Hun Joo Park Yeun-Sook Park	Riding into the Sunset: The Political Economy of Bicycles as a Declining Industry in Korea
Working Paper	04-16	Woochan Kim Hasung Jang Bernard S. Black	Predicting Firm's Corporate Governance Choices: Evidence from Korea
Working Paper	04-17	Tae Hee Choi	Characteristics of Firms that Persistently Meet or Beat Analysts' Forecasts
Working Paper	04-18	Taejong Kim Yoichi Okita	Is There a Premium for Elite College Education: Evidence from a Natural Experiment in Japan
Working Paper	04-19	Leonard K. Cheng Jae Nahm	Product Boundary, Vertical Competition, and the Double Mark-up Problem
Working Paper	04-20	Woochan Kim Young-Jae Lim Taeyoon Sung	What Determines the Ownership Structure of Business Conglomerates? : On the Cash Flow Rights of Korea's Chaebol
Working Paper	04-21	Taejong Kim	Shadow Education: School Quality and Demand for Private Tutoring in Korea
Working Paper	04-22	Ki-Eun Rhee Raphael Thomadsen	Costly Collusion in Differentiated Industries
Working Paper	04-23	Jaeun Shin Sangho Moon	HMO plans, Self-selection, and Utilization of Health Care Services
Working Paper	04-24	Yoon-Ha Yoo	Risk Aversion and Incentive to Abide By Legal Rules
Working Paper	04-25	Ji Hong Kim	Speculative Attack and Korean Exchange Rate Regime
Working Paper	05-01	Woochan Kim Taeyoon Sung	What Makes Firms Manage FX Risk? : Evidence from an Emerging Market
Working Paper	05-02	Janghyuk Lee Laoucine Kerbache	Internet Media Planning: An Optimization Model

*** The above papers are available at KDI School Website <http://www.kdischool.ac.kr/new/eng/faculty/working.jsp>. You may get additional copy of the documents by downloading it using the Acrobat Reader.**

Working Paper Series

Category	Serial #	Author	Title
Working Paper	05-03	Kun-Ho Lee	Risk in the Credit Card Industry When Consumer Types are Not Observable
Working Paper	05-04	Kyong-Dong KIM	Why Korea Is So Prone To Conflict: An Alternative Sociological Analysis
Working Paper	05-05	Dukgeun AHN	Why Should Non-actionable Subsidy Be Non-actionable?
Working Paper	05-06	Seung-Joo LEE	Case Study of L'Oréal: Innovation and Growth Strategy
Working Paper	05-07	Seung-Joo LEE	Case Study of BMW: The Ultimate Driving Machine
Working Paper	05-08	Taejong KIM	Do School Ties Matter? Evidence from the Promotion of Public Prosecutors in Korea
Working Paper	05-09	Hun Joo PARK	Paradigms and Fallacies: Rethinking Northeast Asian Security
Working Paper	05-10	WOOCHAN KIM TAEYOON SUNG	What Makes Group-Affiliated Firms Go Public?
Working Paper	05-11	BERNARD S. BLACK WOOCHAN KIM HASUNG JANG KYUNG-SUH PARK	Does Corporate Governance Predict Firms' Market Values? Time Series Evidence from Korea
Working Paper	05-12	Kun-Ho Lee	Estimating Probability of Default For the Foundation IRB Approach In Countries That Had Experienced Extreme Credit Crises
Working Paper	05-13	Ji-Hong KIM	Optimal Policy Response To Speculative Attack
Working Paper	05-14	Kwon Jung Boon Young Lee	Coupon Redemption Behaviors among Korean Consumers: Effects of Distribution Method, Face Value, and Benefits on Coupon Redemption Rates in Service Sector
Working Paper	06-01	Kee-Hong Bae Seung-Bo Kim Woochan Kim	Family Control and Expropriation of Not-for-Profit Organizations: Evidence from Korean Private Universities
Working Paper	06-02	Jaeun Shin	How Good is Korean Health Care? An International Comparison of Health Care Systems
Working Paper	06-03	Tae Hee Choi	Timeliness of Asset Write-offs
Working Paper	06-04	Jin PARK	Conflict Resolution Case Study: The National Education Information System (NEIS)
Working Paper	06-05	YuSang CHANG	DYNAMIC COMPETITIVE PARADIGM OF MANAGING MOVING TARGETS;
Working Paper	06-06	Jin PARK	A Tale of Two Government Reforms in Korea
Working Paper	06-07	Ilho YOO	Fiscal Balance Forecast of Cambodia 2007-2011
Working Paper	06-08	Ilho YOO	PAYG pension in a small open economy
Working Paper	06-09	Kwon JUNG Clement LIM	IMPULSE BUYING BEHAVIORS ON THE INTERNET
Working Paper	06-10	Joong H. HAN	Liquidation Value and Debt Availability: An Empirical Investigation
Working Paper	06-11	Brandon Julio, Woojin Kim Michael S. Weisbach	Uses of Funds and the Sources of Financing: Corporate Investment and Debt Contract Design
Working Paper	06-12	Hun Joo Park	Toward People-centered Development: A Reflection on the Korean Experience

*** The above papers are available at KDI School Website <http://www.kdischool.ac.kr/new/eng/faculty/working.jsp>. You may get additional copy of the documents by downloading it using the Acrobat Reader.**

Working Paper Series

Category	Serial #	Author	Title
Working Paper	06-13	Hun Joo Park	The Perspective of Small Business in South Korea
Working Paper	06-14	Younguck KANG	Collective Experience and Civil Society in Governance
Working Paper	06-15	Dong-Young KIM	The Roles of Government Officials as Policy Entrepreneurs in Consensus Building Process
Working Paper	06-16	Ji Hong KIM	Military Service : draft or recruit
Working Paper	06-17	Ji Hong KIM	Korea-US FTA
Working Paper	06-18	Ki-Eun RHEE	Reevaluating Merger Guidelines for the New Economy
Working Paper	06-19	Taejong KIM Ji-Hong KIM Insook LEE	Economic Assimilation of North Korean Refugees in South Korea: Survey Evidence
Working Paper	06-20	Seong Ho CHO	ON THE STOCK RETURN METHOD TO DETERMINING INDUSTRY SUBSTRUCTURE: AIRLINE, BANKING, AND OIL INDUSTRIES
Working Paper	06-21	Seong Ho CHO	DETECTING INDUSTRY SUBSTRUCTURE: - Case of Banking, Steel and Pharmaceutical Industries-
Working Paper	06-22	Tae Hee Choi	Ethical Commitment, Corporate Financial Factors: A Survey Study of Korean Companies
Working Paper	06-23	Tae Hee Choi	Aggregation, Uncertainty, and Discriminant Analysis
Working Paper	07-01	Jin PARK Seung-Ho JUNG	Ten Years of Economic Knowledge Cooperation with North Korea: Trends and Strategies
Working Paper	07-02	BERNARD S. BLACK WOOCHAN KIM	The Effect of Board Structure on Firm Value in an Emerging Market: IV, DiD, and Time Series Evidence from Korea
Working Paper	07-03	Jong Bum KIM	FTA Trade in Goods Agreements: 'Entrenching' the benefits of reciprocal tariff concessions
Working Paper	07-04	Ki-Eun Rhee	Price Effects of Entries
Working Paper	07-05	Tae H. Choi	Economic Crises and the Evolution of Business Ethics in Japan and Korea
Working Paper	07-06	Kwon JUNG Leslie TEY	Extending the Fit Hypothesis in Brand Extensions: Effects of Situational Involvement, Consumer Innovativeness and Extension Incongruity on Evaluation of Brand Extensions
Working Paper	07-07	Younguck KANG	Identifying the Potential Influences on Income Inequality Changes in Korea – Income Factor Source Analysis
Working Paper	07-08	WOOCHAN KIM TAEYOON SUNG SHANG-JIN WEI	Home-country Ownership Structure of Foreign Institutional Investors and Control-Ownership Disparity in Emerging Markets
Working Paper	07-09	Ilho YOO	The Marginal Effective Tax Rates in Korea for 45 Years : 1960-2004
Working Paper	07-10	Jin PARK	Crisis Management for Emergency in North Korea
Working Paper	07-11	Ji Hong KIM	Three Cases of Foreign Investment in Korean Banks
Working Paper	07-12	Jong Bum Kim	Territoriality Principle under Preferential Rules of Origin
Working Paper	07-13	Seong Ho CHO	THE EFFECT OF TARGET OWNERSHIP STRUCTURE ON THE TAKEOVER PREMIUM IN OWNER-MANAGER DOMINANT ACQUISITIONS: EVIDENCE FROM KOREAN CASES

*** The above papers are available at KDI School Website <http://www.kdischool.ac.kr/new/eng/faculty/working.jsp>. You may get additional copy of the documents by downloading it using the Acrobat Reader.**

Working Paper Series

Category	Serial #	Author	Title
Working Paper	07-14	Seong Ho CHO Bill McKelvey	Determining Industry Substructure: A Stock Return Approach
Working Paper	07-15	Dong-Young KIM	Enhancing BATNA Analysis in Korean Public Disputes
Working Paper	07-16	Dong-Young KIM	The Use of Integrated Assessment to Support Multi-Stakeholder negotiations for Complex Environmental Decision-Making
Working Paper	07-17	Yuri Mansury	Measuring the Impact of a Catastrophic Event: Integrating Geographic Information System with Social Accounting Matrix
Working Paper	07-18	Yuri Mansury	Promoting Inter-Regional Cooperation between Israel and Palestine: A Structural Path Analysis Approach
Working Paper	07-19	Ilho YOO	Public Finance in Korea since Economic Crisis
Working Paper	07-20	Li GAN Jaeun SHIN Qi LI	Initial Wage, Human Capital and Post Wage Differentials
Working Paper	07-21	Jin PARK	Public Entity Reform during the Roh Administration: Analysis through Best Practices
Working Paper	07-22	Tae Hee Choi	The Equity Premium Puzzle: An Empirical Investigation of Korean Stock Market
Working Paper	07-23	Joong H. HAN	The Dynamic Structure of CEO Compensation: An Empirical Study
Working Paper	07-24	Ki-Eun RHEE	Endogenous Switching Costs in the Face of Poaching
Working Paper	08-01	Sun LEE Kwon JUNG	Effects of Price Comparison Site on Price and Value Perceptions in Online Purchase
Working Paper	08-02	Ilho YOO	Is Korea Moving Toward the Welfare State?: An IECI Approach
Working Paper	08-03	Ilho YOO Inhyouk KOO	DO CHILDREN SUPPORT THEIR PARENTS' APPLICATION FOR THE REVERSE MORTGAGE?: A KOREAN CASE
Working Paper	08-04	Seong-Ho CHO	Raising Seoul's Global Competitiveness: Developing Key Performance Indicators
Working Paper	08-05	Jin PARK	A Critical Review for Best Practices of Public Entities in Korea
Working Paper	08-06	Seong-Ho CHO	How to Value a Private Company? -Case of Miele Korea-
Working Paper	08-07	Yoon Ha Yoo	The East Asian Miracle: Export-led or Investment-led?
Working Paper	08-08	Man Cho	Subprime Mortgage Market: Rise, Fall, and Lessons for Korea
Working Paper	08-09	Woochang KIM Woojin KIM Kap-sok KWON	Value of shareholder activism: evidence from the switchers
Working Paper	08-10	Kun-Ho Lee	Risk Management in Korean Financial Institutions: Ten Years after the Financial Crisis
Working Paper	08-11	Jong Bum KIM	Korea's Institutional Framework for FTA Negotiations and Administration: Tariffs and Rules of Origin
Working Paper	08-12	Yu Sang CHANG	Strategy, Structure, and Channel of Industrial Service Leaders: A Flow Chart Analysis of the Expanded Value Chain
Working Paper	08-13	Younguck KANG	Sensitivity Analysis of Equivalency Scale in Income Inequality Studies
Working Paper	08-14	Younguck KANG	Case Study: Adaptive Implementation of the Five-Year Economic Development Plans

*** The above papers are available at KDI School Website <http://www.kdischool.ac.kr/new/eng/faculty/working.jsp>. You may get additional copy of the documents by downloading it using the Acrobat Reader.**

Working Paper Series

Category	Serial #	Author	Title
Working Paper	08-15	Joong H. HAN	Is Lending by Banks and Non-banks Different? Evidence from Small Business Financing
Working Paper	08-16	Joong H. HAN	Checking Accounts and Bank Lending
Working Paper	08-17	Seongwuk MOON	How Does the Management of Research Impact the Disclosure of Knowledge? Evidence from Scientific Publications and Patenting Behavior
Working Paper	08-18	Jungho YOO	How Korea's Rapid Export Expansion Began in the 1960s: The Role of Foreign Exchange Rate
Working Paper	08-19	BERNARD S. BLACK WOOCHAN KIM HASUNG JANG KYUNG SUH PARK	How Corporate Governance Affects Firm Value: Evidence on Channels from Korea
Working Paper	08-20	Tae Hee CHOI	Meeting or Beating Analysts' Forecasts: Empirical Evidence of Firms' Characteristics, Persistence Patterns and Post-scandal Changes
Working Paper	08-21	Jaeun SHIN	Understanding the Role of Private Health Insurance in the Universal Coverage System: Macro and Micro Evidence
Working Paper	08-22	Jin PARK	Indonesian Bureaucracy Reform: Lessons from Korea
Working Paper	08-23	Joon-Kyung KIM	Recent Changes in Korean Households' Indebtedness and Debt Service Capacity
Working Paper	08-24	Yuri Mansury	What Do We Know about the Geographic Pattern of Growth across Cities and Regions in South Korea?
Working Paper	08-25	Yuri Mansury & Jae Kyun Shin	Why Do Megacities Coexist with Small Towns? Historical Dependence in the Evolution of Urban Systems
Working Paper	08-26	Jinsoo LEE	When Business Groups Employ Analysts: Are They Biased?
Working Paper	08-27	Cheol S. EUN Jinsoo LEE	Mean-Variance Convergence Around the World
Working Paper	08-28	Seongwuk MOON	How Does Job Design Affect Productivity and Earnings? Implications of the Organization of Production
Working Paper	08-29	Jaeun SHIN	Smoking, Time Preference and Educational Outcomes
Working Paper	08-30	Dong Young KIM	Reap the Benefits of the Latecomer: From the story of a political, cultural, and social movement of ADR in US
Working Paper	08-31	Ji Hong KIM	Economic Crisis Management in Korea: 1998 & 2008
Working Paper	08-32	Dong-Young KIM	Civility or Creativity?: Application of Dispute Systems Design (DSD) to Korean Public Controversies on Waste Incinerators
Working Paper	08-33	Ki-Eun RHEE	Welfare Effects of Behavior-Based Price Discrimination
Working Paper	08-34	Ji Hong KIM	State Owned Enterprise Reform
Working Paper	09-01	Yu Sang CHANG	Making Strategic Short-term Cost Estimation by Annualized Experience Curve
Working Paper	09-02	Dong Young KIM	When Conflict Management is Institutionalized: A Review of the Executive Order 19886 and government practice
Working Paper	09-03	Man Cho	Managing Mortgage Credit Risk: What went wrong with the subprime and Alt-A markets?
Working Paper	09-04	Tae H. Choi	Business Ethics, Cost of Capital, and Valuation

*** The above papers are available at KDI School Website <http://www.kdischool.ac.kr/new/eng/faculty/working.jsp>. You may get additional copy of the documents by downloading it using the Acrobat Reader.**

Working Paper Series

Category	Serial #	Author	Title
Working Paper	09-05	Woochan KIM Woojin KIM Hyung-Seok KIM	What makes firms issue death spirals? A control enhancing story
Working Paper	09-06	Yu Sang CHANG Seung Jin BAEK	Limit to Improvement: Myth or Reality? Empirical Analysis of Historical Improvement on Three Technologies Influential in the Evolution of Civilization
Working Paper	09-07	Ji Hong KIM	G20: Global Imbalance and Financial Crisis
Working Paper	09-08	Ji Hong KIM	National Competitiveness in the Globalized Era
Working Paper	09-09	Hao Jiang , Woochan Kim , Ramesh K. S.	Contract Heterogeneity, Operating Shortfalls, and Corporate Cash Holdings
Working Paper	09-10	Man CHO	Home Price Cycles: A Tale of Two Countries
Working Paper	09-11	Dongcul CHO	The Republic of Korea's Economy in the Swirl of Global Crisis
Working Paper	09-12	Dongcul CHO	House Prices in ASEAN+3: Recent Trends and Inter-Dependence
Working Paper	09-13	Seung-Joo LEE Eun-Hyung LEE	Case Study of POSCO - Analysis of its Growth Strategy and Key Success Factors
Working Paper	09-14	Woochan KIM Taeyoon SUNG Shang-Jin WEI	The Value of Foreign Blockholder Activism: Which Home Country Governance Characteristics Matter?
Working Paper	09-15	Joon-Kyung KIM	Post-Crisis Corporate Reform and Internal Capital Markets in Chaebols
Working Paper	09-16	Jin PARK	Lessons from SOE Management and Privatization in Korea
Working Paper	09-17	Tae Hee CHOI	Implied Cost of Equity Capital, Firm Valuation, and Firm Characteristics
Working Paper	09-18	Kwon JUNG	Are Entrepreneurs and Managers Different? Values and Ethical Perceptions of Entrepreneurs and Managers
Working Paper	09-19	Seongwuk MOON	When Does a Firm Seek External Knowledge? Limitations of External Knowledge
Working Paper	09-20	Seongwuk MOON	Earnings Inequality within a Firm: Evidence from a Korean Insurance Company
Working Paper	09-21	Jaeun SHIN	Health Care Reforms in South Korea: What Consequences in Financing?
Working Paper	09-22	Younguck KANG	Demand Analysis of Public Education: A Quest for New Public Education System for Next Generation
Working Paper	09-23	Seong-Ho CHO Jinsoo LEE	Valuation and Underpricing of IPOs in Korea
Working Paper	09-24	Seong-Ho CHO	Kumho Asiana's LBO Takeover on Korea Express
Working Paper	10-01	Yun-Yeong KIM Jinsoo LEE	Identification of Momentum and Disposition Effects Through Asset Return Volatility
Working Paper	10-02	Kwon JUNG	Four Faces of Silver Consumers: A Typology, Their Aspirations, and Life Satisfaction of Older Korean Consumers
Working Paper	10-03	Jinsoo LEE Seongwuk MOON	Corporate Governance and International Portfolio Investment in Equities
Working Paper	10-04	Jinsoo LEE	Global Convergence in Tobin's Q Ratios
Working Paper	10-05	Seongwuk MOON	Competition, Capability Buildup and Innovation: The Role of Exogenous Intra-firm Revenue Sharing

*** The above papers are available at KDI School Website <http://www.kdischool.ac.kr/new/eng/faculty/working.jsp>. You may get additional copy of the documents by downloading it using the Acrobat Reader.**

Working Paper Series

Category	Serial #	Author	Title
Working Paper	10-06	Kwon JUNG	Credit Card Usage Behaviors among Elderly Korean Consumers
Working Paper	10-07	Yu-Sang CHANG Jinsoo LEE	Forecasting Road Fatalities by the Use of Kinked Experience Curve
Working Paper	10-08	Man CHO	Securitization and Asset Price Cycle: Causality and Post-Crisis Policy Reform
Working Paper	10-09	Man CHO Insik MIN	Asset Market Correlation and Stress Testing: Cases for Housing and Stock Markets
Working Paper	10-10	Yu-Sang CHANG Jinsoo LEE	Is Forecasting Future Suicide Rates Possible? - Application of the Experience Curve -
Working Paper	10-11	Seongwuk MOON	What Determines the Openness of Korean Manufacturing Firms to External Knowledge?
Working Paper	10-12	Joong Ho HAN Kwangwoo PARK George PENNACCHI	Corporate Taxes and Securitization
Working Paper	10-13	Younguck KANG	Housing Policy of Korea: Old Paradigm, New Approach
Working Paper	10-14	Il Chong NAM	A Proposal to Reform the Korean CBP Market
Working Paper	10-15	Younguck KANG	Balanced Regional Growth Strategy based on the Economies of Agglomeration: the Other Side of Story
Working Paper	10-16	Joong Ho HAN	CEO Equity versus Inside Debt Holdings and Private Debt Contracting
Working Paper	11-01	Yeon-Koo CHE Rajiv SETHI	Economic Consequences of Speculative Side Bets: The Case of Naked Credit Default Swaps
Working Paper	11-02	Tae Hee CHOI Martina SIPKOVA	Business Ethics in the Czech Republic
Working Paper	11-03	Sunwoo HWANG Woochan KIM	Anti-Takeover Charter Amendments and Managerial Entrenchment: Evidence from Korea
Working Paper	11-04	Yu Sang CHANG Jinsoo LEE Yun Seok JUNG	The Speed and Impact of a New Technology Diffusion in Organ Transplantation: A Case Study Approach
Working Paper	11-05	Jin PARK Jiwon LEE	The Direction of Inter-Korean Cooperation Fund Based on ODA Standard
Working Paper	11-06	Woochan KIM	Korea Investment Corporation: Its Origin and Evolution
Working Paper	11-07	Seung-Joo LEE	Dynamic Capabilities at Samsung Electronics: Analysis of its Growth Strategy in Semiconductors
Working Paper	11-08	Joong Ho HAN	Deposit Insurance and Industrial Volatility
Working Paper	11-09	Dong-Young KIM	Transformation from Conflict to Collaboration through Multistakeholder Process: Shihwa Sustainable Development Committee in Korea
Working Paper	11-10	Seongwuk MOON	How will Openness to External Knowledge Impact Service Innovation? Evidence from Korean Service Sector
Working Paper	11-11	Jin PARK	Korea's Technical Assistance for Better Governance: A Case Study in Indonesia
Working Paper	12-01	Seongwuk MOON	How Did Korea Catch Up with Developed Countries in DRAM Industry? The Role of Public Sector in Demand Creation: PART 1
Working Paper	12-02	Yong S. Lee Young U. Kang Hun J Park	The Workplace Ethics of Public Servants in Developing Countries
Working Paper	12-03	Ji-Hong KIM	Deposit Insurance System in Korea and Reform

*** The above papers are available at KDI School Website <http://www.kdischool.ac.kr/new/eng/faculty/working.jsp>.**
You may get additional copy of the documents by downloading it using the Acrobat Reader.

Working Paper Series

Category	Serial #	Author	Title
Working Paper	12-04	Yu Sang Chang Jinsoo Lee	Technology Improvement Rates of Knowledge Industries following Moore's Law? -An Empirical Study of Microprocessor, Mobile Cellular, and Genome Sequencing
Working Paper	12-05	Man Cho	Contagious Real Estate Cycles: Causes, Consequences, and Policy Implications

*** The above papers are available at KDI School Website <http://www.kdischool.ac.kr/new/eng/faculty/working.jsp>.**
You may get additional copy of the documents by downloading it using the Acrobat Reader.