



# BOK-IMF Workshop

## Managing Real Estate Booms and Busts

April 11-12, 2011  
Seoul, Korea



THE BANK OF KOREA





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Papers in this volume were prepared for a workshop held at the Bank of Korea, Seoul on 11-12, April, 2011, with participants from many universities, central banks, international institutions and supervisory authorities. The views expressed are those of the authors and do not necessarily reflect the views of the organizations they are affiliated with. Individual papers (or excerpts thereof) may be reproduced or translated with the authorization of the authors concerned.

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Bank of Korea: E-mail: [fsbbok@bok.or.kr](mailto:fsbbok@bok.or.kr) Fax: +82 2 750 6856  
IMF: E-mail: [hhwang@imf.org](mailto:hhwang@imf.org) Fax: +1-202 589-7476

ISBN 978-89-92858-63-2

## **Preface**

I would first like to thank Mr. Stijn Claessens (IMF), Mr. Tae Soo Kang (BOK) and the BOK officials concerned for making this BOK-IMF workshop a success.

My particular thanks go to the two keynote speakers, Professor Susan Wachter and Professor Franklin Allen. I would also like to thank all the speakers and chairpersons for each session, and the discussants who took part in the panel discussions for all their valuable contributions.

As revealed to many, the recent global financial crisis was sparked by the accumulation of excessive household debt related to real estate mortgages. Household debt problems still remain major concerns in many advanced countries and emerging markets, including Korea.

In this context, I believe that the theme of this workshop "Real Estate Booms and Busts" was very timely and calls for immediate and concrete policy responses.

There is a saying, 'Don't waste a crisis'. I interpret this to mean if the policy makers do not learn the lessons from past failures, we are doomed to go through a similar crisis sooner or later. I hope that the lessons from this workshop will be utilized in building sounder financial systems in many jurisdictions.

**Choongsoo Kim**

**Governor, Bank of Korea**

## Participants in the workshop

University of Pennsylvania	Susan Wachter Professor
	Franklin Allen Professor
University of California	Atif Mian Professor
University of Southern California	Richard K. Green Professor
University of Virginia	Veronica Warnock Senior Lecturer
National Singapore University	Lum Sau Kim Professor
Cheung Kong Graduate School of Business (China)	Jie Gan Professor
National Institute of Public Finance and Policy (India)	Ila Patnaik Professor
Sogang University (Korea)	Kyung-Hwan, Kim Professor
Seoul National University (Korea)	Se-Jik Kim Professor
Bank for International Settlements	Frank Packer Head of Financial Stability and Markets for Asian and the Pacific
	Haibin Zhu Senior Economist
Bank of Spain	Jesus Saurina Director of Financial Stability Department
Norges Bank	Haakon Solheim Economist
Bank of Japan	Shimizu Shigeru Deputy Director
OCC, US Dept. of Treasury	Souphala Chomsisengphet Senior Financial Economist
China Banking Regulatory Commission	Yu Yun Economist
Deutsche Bank Securities	Torsten Slok Chief International Economist

International Monetary Fund

Stijn Claessens  
Assistant Director, Research  
Department

Giovanni Dell’Ariccia  
Advisor, Research Department

Deniz Igan  
Economist, Research Department

Sean Craig  
Resident Representative in Hong Kong

Bank of Korea

Tae Soo Kang  
Director General, Financial System  
Stability Department

Byung Hee Seong  
Director, Financial Stability Division

Heedon Kang  
Economist, New York Representative  
Office

Hoon Kim  
Head, Financial Stability Division

Ko, Won Hong  
Economist, Financial Stability Division

Hyunkil Shin  
Economist, Financial Stability Division

Ryu, Jaemin  
Economist, Financial Stability Division

Shin, Chae Ho  
Economist, Financial Stability Division

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## Introduction

Real estate boom-bust episodes, and their effects on macroeconomic activity and the risk of financial crises, have come to the fore of research and policy circles in the last few years. Policy makers around the world are now considering various tools aimed at preventing real estate booms from happening and having adverse consequences on the real economy. They are also having to decide how best to respond to the busts that have occurred in many economies.

Knowledge on what an effective policy toolkit is to manage real estate boom-bust episodes, however, is still in its infancy. Many policy makers used to believe that attempts to spot and prick bubbles in real estate (and other asset) markets were likely to be at best ineffective and at worst counterproductive. The better model was believed to be mopping up after the bubble had burst. Yet, the global financial crisis has shifted the balance: the cost of doing nothing and mopping up may be prohibitively high. Hence, it may be better to err on the safe side.

The question then arises which policy levers are best suited to achieve the objective of financial stability, while maintaining the goals of macroeconomic and price stability and efficient allocation of resources. Incipient research points to macro-prudential policies – maximum loan to value ratios, limits on credit growth, adjustment to margins and buffers, etc. – as candidates to moderate boom-busts and contain adverse consequences. But little is still known on the use of these macro-prudential policy tools in general and for real estate booms and busts specifically and what the lessons are from the experiences of those who have used them. Related questions like, how do central banks improve on monetary policy making and how micro-prudential regulation and supervision should be adapted in light of real estate booms and busts, still lack satisfactory answers as well.

To enhance the understanding of macro-prudential policy tools in managing real estate boom and bust episodes and to encourage further inquiry on this topic, the Research Department of the International Monetary Fund and the Bank of Korea co-organized a workshop that took place in Seoul on April 11-12. The workshop brought together representatives from a number of central banks, supervisory agencies, academics, market participants and other experts from various countries and with different perspectives. These experts provided in-depth studies of particular aspects of dealing with real estate booms and busts, with topics matched to the specific countries' use of macro-prudential tools or particular circumstances. In-depth discussions followed regarding options for managing real estate booms and busts and lessons learned from each others' experiences and perspectives. A panel discussion focused on lessons for policy makers, market participants and academics.

Altogether some 18 papers were presented at a workshop, of which 16 papers are included in these Proceedings. Two keynote speeches, by professor Wachter and Allen, address how to deal with house price bubbles and what central banks should do about real prices.

Professor Wachter points out that one solution is to focus on the role of credit in fuelling real estate booms. One option is to limit the loan-to-value ratios in real estate lending. She adds that it is necessary to measure the degree of persistent price deviations from fundamentals and especially to determine the underpricing of risk to judge whether it is the banking system that is fueling a bubble and endangering itself and the overall economy.

Professor Allen asserts that the real estate bubbles should be addressed by central banks through monetary policy and macroprudential policies. He claims that raising rates, that can make speculation less attractive, is a desirable policy for small homogeneous countries like Sweden. He also points out, however, that in large heterogeneous economies like the U.S. and the eurozone, where real estate bubbles tend to be regional, macroprudential policies are likely more effective.

Both keynote speakers thus argue that central banks should play a significant role in controlling real estate (and other asset price) bubbles. Moreover, given the globally growing emphasis on their role in supporting financial stability, they see central banks needing to actively partake in detecting asset price bubbles and other risk factors.

Several of the cross-country papers included in this part of the proceedings summarize current



knowledge on the determinants of property price movements, the effects of housing finance system characteristics on real estate booms and busts, and the role of household behavior in generating macro-financial linkages in a range of countries. Other papers provide policy lessons based on theoretical models, and derive general lessons as well as provide a research agenda for this area.

The second section of the proceedings provides a number of country case studies. They include empirical evidence on aspects, such as the use of land policies and loan to value and debt to income ratios in mitigating real estate booms and busts, and general country experiences with macro-prudential tools. Geographical coverage of cases presented spans countries in Asia, Europe, and Latin America, as well as the United States.

The workshop provided key insights on how to manage real estate booms and busts. The discussions focused on the role of macro-prudential tools, given the emerging consensus of their promising features. Experiences with dynamic provisioning in Spain and loan-to-value and debt-to-income ratios in Korea and Hong Kong SAR pointed to potential benefits of these macro-prudential tools. The general consensus was that these tools, while of significant value at certain points in time and in selected real estate markets, are not fully able to reduce real estate booms. Most participants agreed, however, that these tools have proven to be useful in mitigating the adverse consequences of the subsequent busts by building buffers at financial institutions and limiting the buildup of leverage at the borrowers' level.

Experiences with similar tools, as well as with counter-cyclical capital regulation and tax measures, in China, India, and Singapore (and land supply policies in some economies) were generally considered not as encouraging. It was pointed out, however, that policy objectives in these countries were not always as clearly aimed at reducing real estate booms or mitigating the impact of busts. Furthermore, institutional problems and lack of policy coordination may have limited the efficacy of these tools in some cases.

Circumvention, through financing from non-bank and other less regulated financial institutions, was one issue often mentioned why macro-prudential and other policies failed to stop the booms. Because of ease of circumventions, countries have a more limited ability to use macro-prudential tools. An important constraint for many economies in this respect is international financial integration, through cross-border capital flows or large foreign banking presence.

In terms dealing with the aftermath of real estate busts, several case studies highlighted the complexities of restructuring mortgages and other forms of household debt, particularly on a large scale and when loans are securitized. Initial experiences from the US and some other markets suggest that there can remain a large debt overhang following a bust, which is, however, difficult to reduce using public interventions.

The workshop also helped to identify and promote research on the topic. Much of the discussion focused on the need to know more on the optimal design of specific macro-prudential tools. Other issues raised included how to avoid potential conflicts of macro-prudential policies with other policies, the best way to achieve coordination among different agencies, and how to overcome informational capacity problems in detecting booms and implementing policies. More generally, political economy factors were mentioned as important to consider, since the use of macro-prudential tools tends to have more direct impact and is thus likely to be more subject to political pressure than those of say a monetary authority. These and other topics were identified as important research areas for further work in the field.

The Governor of Bank of Korea highlights the need for coordination among different regulatory authorities. In this context, he emphasizes the central bank's key role in the macroprudential regulatory framework because stable and continuous growth of the real economy requires a close coordination of monetary policies and macroprudential tools.

**Stijn Claessens and Tae Soo Kang**

## **Confronting the New Global Threat: Financial Stability in the Wake of the Housing Bubble**

**Susan M. Wachter**

It is a great honor to be here today to examine the important questions of policy options to contain real estate booms and busts and the potential systemic instability to which they may contribute.

The financial crisis from 2007 to 2009 awoke the world to the new threat of global financial instability. Of course, economies have been roiled by financial panics since the dawn of capitalism, but the modern financial infrastructure had never been subjected to such worldwide turmoil. While some economists claimed that globalization had “decoupled” domestic economies such that shocks would be isolated by national borders, on the contrary worldwide contagion prevailed in the global economy.

With the death of old ideas comes the realization of “obvious” new ones. The reigning consensus now holds that systemic risk must be measured, quarantined, and, if possible, moderated. But how is this to be done? It was once thought that financial growth would minimize risk through diversification, but financial institutions tend to diversify into the same assets, increasing the correlation of risks. Firms that are too big to fail or too correlated to be ignored are now designated as systemically important with various consequences. Less attention has been paid to containing the specific systemic risks arising out of real estate lending in part because here too it was believed that geographical diversification would provide safety and the correlated risks from deteriorated lending standards on a national scale were ignored.

Among financial asset classes, real estate is the most prone to booms and busts, and the most prone to accompanying banking busts. Unlike most other assets, it is almost impossible to short sell real estate. As a result, optimists set the price and there is limited downward pressure on prices to bring them back in to line with fundamentals. With “limits to arbitrage,” as suggested in 1997 by Andrei Shleifer and Robert Vishny, and without short selling, the market is incomplete and missing a critical signal when prices have gone above their fundamental value. The result has been a long list of financial crises to which bubbles contributed: the savings and loan crisis in the United States in the late 1980s and early 1990s, the long depression in Japan beginning in 1990, the East Asian financial crisis in 1997, and now the global financial crisis from 2007 to 2009. These are not black swans. They occur too frequently. Instead, they are an inevitable feature of the modern economy.

And so we gather today to identify these systemic risks and to try to begin to construct a new system that isn't prone to failure. I will address policy options specific to the systemic risk that real estate booms and busts generate, but first let me describe the effort being undertaken more generally to identify and respond to these risks.

In the United States, this effort has taken the form of the Dodd-Frank Wall Street Reform and Consumer Protection Act, which brings together what is hoped to be a series of weapons against systemic failure. Among these are: a Financial Stability Oversight Council to identify, monitor, and more stringently regulate systemically important financial companies; an Office of Financial Research; a resolution authority to ensure that no systemically important financial company supposedly is ever bailed out; the Consumer Finance Protection Bureau; a requirement that securitizers retain 5 percent of the credit risk of each security, except for “qualified residential mortgages”; a regulation calling into question the use of rating agencies; derivatives trading, even of those not part of the crisis being pushed onto central clearinghouses; and a rule separating proprietary trading from investment banks.

In the United Kingdom, on this last, proposals currently being discussed go further separating the parts of banks which receive demand deposits from everything else. There too the regulatory structure is being overhauled. Of course negotiations over Basel III are underway in an effort this time to get it right.

What all of these responses have in common is the belated recognition that the financial sector is different from the rest of the economy. When the dot-com bubble burst in 2000, we didn't convene conferences like this to consider the effects of a redesign of a century's worth of regulations; we didn't

pass two thousand plus pages of legislation; and we certainly didn't invest hundreds of billions of taxpayers' dollars into the companies that faced bankruptcy when prices tumbled. Why? Because, as important as the Internet is to our economy and our society, it doesn't control the money supply and it didn't disappear overnight. Finance is the lifeblood of the economy, and it can stop flowing at a moment's notice.

But this recognition will not stop financial companies from taking on leverage, racing to the bottom the next time circumstances are ripe. It's not the job of the firm or their managers or shareholders to protect or stabilize the macro-economy. It's their job to maximize shareholder value.

Even if they could see the eventual collapse, it's not obvious that individual firms, their managers or shareholders, could or would do anything about it, other than profit from it, thus the negative externality that can give rise to systemic crises.

Why is real estate in particular subject to cycles of booms and busts and as Richard Herring and I have pointed out, booms that are followed by banking busts? Positive demand shocks together with lagging and inelastic supply can give rise to price rises which with adaptive expectations can become self-fulfilling. But even more to the point, optimists who otherwise would have limited equity to invest get loans which are collateralized at the prices set by the optimists which is taken as the correct fundamental price. Funding is done at declining risk spreads in order to increase demand beyond the level justified by market fundamentals. But how do we identify that this is occurring?

The indicator that this is happening as demonstrated in Pavlov and Wachter is the correlation of the error term in pricing equations with a compression in the lending spread. In a study of real estate booms across the world we show that this correlation is predictive of the depth of the subsequent bust.

The resulting loans that underprice risk can be securitized, aggregated, and tranching, to raise more capital from worldwide sources.

If lending is regarded as increasingly risky, trading of securities and other derivatives could and should place downward pressure on security prices and upward pressure on the cost of capital, limiting borrowing and the bubble. But in fact in this episode and in others that I and coauthors have identified the cost of credit fell as the riskiness of the book of business, both for commercial and residential loans increased. Why is this important?

The problem is that instead of solving the underlying inability to short sell real estate with an efficient market for derivatives, derivatives themselves are mispriced. In this recent crisis, the derivatives were marked to model not to market and they were not standardized and not traded so that pricing was not transparent.

Not that this knowledge is new. My own research with Adam Levitin has pointed to Wall Street's underpricing of risk. The Federal Reserve under Chairman Greenspan was concerned over the impact of low interest rates on the home price boom of the early part of the decade. Alan Greenspan suggested as much in 2002 when he considered "the bursting of an asset bubble." However, he concluded, "whether incipient bubbles can be detected in real time and whether, once detected, they can be defused without inadvertently precipitating still greater adverse consequences for the economy remain in doubt." His successor, Chairman Ben Bernanke, had come to much the same conclusion in 1999 when he and NYU economist Mark Gertler presented a model of an asset price bubble which showed that "pricking" the bubble wasn't worth the risk of creating an unnecessary recession. In commentary, the late Rudi Dornbusch suggested a hole in their simulations. Wasn't it possible, he asked, that the bubble could result in a complete liquidity freeze, such a state of the world was considered highly improbable.

Greenspan and Bernanke were repeating a common warning among financial economists of the past half-century. It's impossible to identify bubbles in real time and once identified, there is little that can be done.

Greenspan and Bernanke were right that interest rates are too blunt an instrument to curtail asset appreciation. We may try to prick a bubble and wind up stabbing the entire economy in the back.

We should not be looking to control bubbles through interest rates nor should we be in the business of setting asset prices. That is not equivalent to saying asset prices are always correct.

The other reason for hesitancy when it comes to identifying and moderating asset bubbles is Eugene Fama's Efficient Market Hypothesis which states, "the price is right." If prices are right, they can never be too high. If they do crash, it is because the fundamentals have changed, not because prices were misaligned with fundamentals and have crashed back to reality. But efficiency is not the only possible explanation for the market's unpredictability.

We may have difficulty predicting the pricing of financial instruments because they are so complex, heterogeneous, and opaque. Indeed, this latest bubble confirms that markets suffer from these information (and computational) failures. Neither investors nor regulators knew that the price of risk was declining while the risk profile of each successive mortgage pool was growing. They lacked information about the underlying mortgages and their increasing risk, including the growing debt to income ratio and layering of risks. Any solution must therefore involve greater transparency and standardization.

We are discussing credit-fueled bubbles, so the solution must target mispriced credit. One solution is to focus on the credit, by restricting loan-to-value ratios. But when prices are increasing rapidly, due to other factors like deteriorating lending standards on income, the "V" in "LTV" is unreliable. Risky lending practices that boost demand and housing prices will eventually lead to defaults but these are postponed by the temporarily boosted V. If the only lending standard being targeted is LTV, other standards such as DTI may deteriorate. The result is an inflated V in the short run until the poor underwriting leads to increased defaults then the result will be a high LTV, as credit freezes and prices fall. One goal is to *maintain* LTV over the cycle.

This would be easy if lending standards could be known and controlled, and this certainly should be the goal. In 2005 Federal Reserve Board economists identified housing prices as being about 20% too high based on fundamentals. They rejected the use of interest rates to resolve this because of the fear that this would cause a recession. They believed that prices would on their own stabilize but what they did not know because it was unknowable at the time was that lenders had eased credit standards considerably to all time lows and at the same time had lowered the price of risk to all time lows, a combination that was unsustainable and that would have set off alarm bells if it had been known. But the layering of risks and the declining risk premia were not known, and the asset price bubble was therefore viewed as benign. Going forward we need to measure persistent price deviations from fundamentals and the pricing of risk to determine whether it is the banking (or shadow banking sector) that is fueling a bubble and endangering itself and the overall economy.

But for now we do not have the data to track lending standards and pricing of risk to determine whether risk is underpriced and correlated with asset bubbles. Instead, we may have to rely on second-best measures. Since loan volume is an indirect measure of credit bubbles, we might consider "dynamic provisioning," which would allow us to build a cushion against rising risk as loan volume increases.

Commercial banks in Spain employed this practice during the recent bubble, and this moderated the impact of the inevitable bust. But note that the cajas sector did not follow this procedure and increased the volume of lending and riskiness of lending. No matter what tool we use to correct imbalances, we must insist on a more transparent market so investors can better price risk and regulators can better identify mispricing of credit.

One thing in the reigning consensus is correct: Systemic risk must be measured, quarantined, and, when possible, moderated. Many economists will tell you it can't be done. It's too difficult. It will undermine the efficiency of market pricing. But we're here today because we may be a different answer: we can reign in systemic risk.

Let's step back to 1923. Yes, it's too difficult for the government to end recessions, Joseph Schumpeter would tell John Maynard Keynes, and even if you could, it would upset the long-term balance of the economy. Keynes insisted that deficit spending could help stem crises and over the next few decades, Keynesians measured and modeled the macroeconomy, pushing unemployment to

lows by the 1960s, to too lows in fact, which Okun's law would later explain. When inflation reached double digits shortly thereafter, Milton Friedman suggested that the Federal Reserve follow a rule of steady growth in the monetary base. His initial proposal eventually took the form inspired by Stanford economist John Taylor of an equation linking the federal funds rate to inflation and unemployment. To this day, the "Taylor rule" is the first step in any analysis of monetary policy.

Going forward there is a need for surveillance systems to track and for data and models to identify correlated asset and credit bubbles.

In closing let me congratulate the conference organizers. The work that needs to be done, I believe, will be advanced by this gathering.

Proffered solutions which appear to make sense include greater capital requirements as a cushion and contingent capital, so-called co-co bonds, that switch from bonds to equity, for example if share prices breach a trigger as in Columbia Law Professor John Coffee's proposal for firms identified as systemically important.

The answer to a negative externality is to tax it, and these proposals can have the effect of raising the cost of risk taking and act as a tax. But capital requirements and share values need to be in part determined by collateral value of loans. Real estate values can drop without seeming warning and far too quickly to put into place greater capital requirements and apparently without sufficient warning for coco holders to push for greater safety.

<Link to the author's homepage> <http://real-estate.wharton.upenn.edu/people/faculty.cfm?id=819>

# What Should Central Banks do About Real Estate Prices?

Franklin Allen

## Introduction

Do central banks cause asset price bubbles? The crisis that started in the summer of 2007 has renewed interest in this important question. Many have argued that loose monetary policy led to the real estate bubble that lay at the heart of the crisis in the U.S. and in other countries such as Ireland and Spain. This idea has a long history. What is missing in accounts is a theory of when and how such bubbles arise and the precise role of the central bank in causing them. The purpose of this speech is to provide such a view. I start with a discussion of the inflation targeting approach to monetary policy. The theory underlying this suggests that in the long run, monetary policy cannot affect unemployment and should therefore focus on medium term inflation. The conventional wisdom is that asset prices should only be considered to the extent that they affect consumer price inflation and other objectives that a central bank may have but should not be targeted directly. I argue that this approach has not performed well in terms of financial stability and needs to be revised to take into account the fact that monetary policy can trigger and enhance asset price bubbles and in particular real estate bubbles.

I discuss theories of bubbles and argue why they may arise more easily in real estate. How can such bubbles be prevented? I argue that in small countries such as Korea, Sweden and possibly the U.K. monetary policy and control of credit may have an important role to play. However, in large heterogeneous economies such as the U.S., Eurozone, and China such policies are unlikely to be effective. In such cases macroprudential policies based on controlling loan-to-value ratios, real estate transfer taxes, real estate taxes and restrictions on lending should be used to control bubbles. There is an issue, however, of how likely they are to succeed.

## Traditional Views on Monetary Policy and Real Estate Prices

In recent years the conventional view in the macroeconomics literature has been that the best way to conduct monetary policy is for central banks to adopt inflation targeting. Before this developed, there was a widespread belief that there was a trade-off between unemployment and inflation. As the Phillips Curve illustrated, by lowering interest rates it was possible to stimulate the economy and lower unemployment but at the expense of higher inflation. Many since have argued instead that there was a natural rate of unemployment that the economy reverted to in the long run no matter what the rate of inflation. The rational expectations models showed that there was no long run trade-off, only a short term one.

Once it became accepted that monetary policy cannot affect the unemployment rate in the long run, the next step was to realize that monetary policy should be focused on controlling inflation. After the high inflation era of the 1970s and 1980s the inefficiencies of inflation were well appreciated and this led to the desire to lower inflation rates substantially.

These contributions provide the intellectual foundations of inflation targeting. The practical implementation involves a number of measures. The first is establishing fiscal stability. If governments run large fiscal deficits and build up significant amounts of debt, there will be a temptation to inflate away the value of this debt. If, on the contrary, governments are fiscally responsible, price stability is feasible. This is the idea behind the Growth and Stability Pact in the 1992 Maastricht Treaty in the European Union, for example.

The second necessary condition for inflation targeting to be viable is financial stability. Financial regulation has been mostly based on a microprudential approach. So far banks have been regulated on an individual basis. The idea was that if individual banks are limited in the risks they take, there cannot be a problem in the financial system. Unfortunately, the recurrent occurrence of systemic financial crises has shown that this approach is not correct. Poor regulation and supervision of financial institutions may lead to large losses in the financial sector. This could, for example, prevent the raising of interest rates to fight inflation if the banks and other institutions were in a bad situation. For financial stability to be achieved, macroprudential policies need to be designed based on systemic risks.

The third necessary measure is central bank independence to overcome the time-inconsistency problem. By delegating the running of monetary policy to an independent central bank charged with maintaining low inflation, it is possible to prevent a boom-bust cycle. The particular mandates of central banks may differ depending on whether they are required to just fight inflation (like the European Central Bank) or whether in addition they are required to maintain full employment (like the Federal Reserve). In either case, however, central banks should avoid using interest rate policy to accommodate political needs such as elections.

In order for inflation targeting to be implemented, a target inflation rate is chosen. This can be done by the central bank itself or by the government. The target inflation rate acts as a nominal anchor for the economy and the independent central bank has to ensure that this target is implemented. It does this by making medium term forecasts. If inflation looks to be too high, the central bank will raise interest rates, while if it is set too low it will cut rates.

In practice many factors are taken into account in the process of setting interest rates particularly if the central bank has a dual mandate that is concerned with the level of economic activity as well as inflation. One of the main issues that has arisen with inflation targeting is the extent to which asset price inflation and in particular real estate prices should be taken into account in setting interest rates. It has been widely argued that central banks should only take asset prices into account to the extent they affect consumer price inflation and economic activity. The idea is that asset prices are useful for providing information and may play a role in the transmission mechanism. However, they should not be targeted.

The framework described above has turned out to be inadequate. Prudential regulation has been unable to maintain financial stability largely because it has not properly recognized the problem of systemic risk. In practice systemic risk arises from a number of sources including common exposure to asset price bubbles, particularly real estate bubbles, liquidity provision and the mispricing of assets, multiple equilibria and panics, contagion, fiscal deficits and sovereign default, and currency mismatches in the banking system. Here I focus on real estate bubbles as the cause of systemic risk since the empirical evidence suggests this is the most important source of systemic risk.

There is much persuasive evidence that collapses in real estate prices, either residential or commercial or both, are one of the major causes of financial crises. In many cases these collapses occur after bubbles in real estate prices that often appear to be associated with loose monetary policy and excessive availability of credit. When the bubbles burst, the financial sector and the real economy are adversely affected.

The current crisis provides a good example of this. The main cause of the crisis was that a bubble in real estate in the U.S. but also in a number of other countries such as Spain and Ireland. When the bubble burst in the U.S., many financial institutions experienced severe problems because of the collapse in the securitized mortgage market. Problems then spread to the real economy.

It can be argued that the real estate bubble in these countries was the result of loose monetary policy and global imbalances that led to excessive credit availability. Central banks, in particular the Federal Reserve in the U.S., set very low interest rates during the period 2003-2004 to avoid a recession after the bursting of the tech bubble in 2000 and the 9/11 terrorist attacks in 2001 at a time when house prices were already rising quite fast. These levels of interest rates were much lower than in previous U.S. recessions relative to the economic indicators at the time captured by the "Taylor rule". In such an environment of low interest rates, people in the U.S. started to borrow and buy houses to benefit from their increasing prices.

Spain and Ireland also had very large run ups in property prices and also had loose monetary policies relative to the Taylor rule. Spain, which had one of the largest deviations from the rule, also had the biggest housing boom as measured by the change in housing investment as a share of GDP. Other countries in the Eurozone such as Germany did not have a housing boom. Their inflation rates and other economic indicators were such that for them the European Central Bank's interest rates did not correspond to a loose monetary policy.

As I (with coauthors) have argued elsewhere, asset price bubbles are also caused by growth in credit.



During the recent crisis, credit expanded rapidly in the countries with a loose monetary policy due to global imbalances. Several Asian countries started accumulating large amounts of reserves in the late 1990s and these grew to high levels. This acquisition of reserves was primarily an Asian phenomenon. In Latin America and Central and Eastern European countries reserves did not increase significantly.

There are a number of reasons behind this accumulation. The Asian countries affected by the crisis of 1997 started accumulating reserves in response to the tough conditions that the International Monetary Fund imposed on them in exchange for financial assistance. The motivations for the reserve accumulation of China, which is the largest holder, are probably more complex than this. Beside the precautionary reason, China started accumulating reserves to avoid allowing its currency to strengthen and damage its exports as well as to increase its political power. The accumulated reserves were mostly invested internationally. Much of it was invested in U.S. dollars in debt securities such as Treasuries, and Fannie and Freddie mortgage-backed securities. The large supply of debt in the U.S. helped to drive down lending standards to ensure that there was enough demand for debt from house buyers and other borrowers. However, funds did not only flow to the U.S. Spain and Ireland also ran large current account deficits.

The burst of a real estate bubble has a clear effect on the stability of the financial sector as documented by others. In the current crisis, for example, the sudden drop in securitized asset prices starting in the summer 2007 triggered by the fall in real estate prices and the large volatility that followed worsened the balance sheets of financial institutions significantly and froze several financial markets including the normally stable interbank market.

The financial crisis then spread to the real sector. The burst of a bubble can, however, also directly damage the real economy. In Spain during the current crisis, for example, the bursting of the property bubble led to a doubling of unemployment to around 20 percent. However, the financial sector was not much affected, at least initially, thanks to strict financial regulation and the use of some macroprudential instruments such as countercyclical loan loss ratios. The fact that the burst of a bubble can affect both the financial and the real sector underlines the importance of preventing bubbles.

While most of the macroeconomic literature has argued that central banks should not target real estate and other asset prices, a number of papers stress the importance of asset prices. Some emphasize problems when asset prices collapse through collateral and other effects. Others argue the question is not so much about pricking asset price bubbles, but whether central banks should lean against the buildup of financial imbalances which may later unwind at a much larger cost. Some investigate the optimal response of monetary policy to asset price booms when this risks leading to large collapses in lending and economic activity. These models show that taking preemptive action using monetary policy to prevent large run ups in asset prices can be desirable if significant falls in asset prices can have serious effects on real output. None of these papers however, model asset price bubbles and the role of interest rates in causing them. And very few central banks have taken the approach of targeting real estate prices.

One exception though is Sweden's central bank, the Riksbank, which actually raised interest rates for this reason. One interpretation of the Riksbank's policy is that, if there is evidence of a growing bubble in real estate central banks, may want to take actions to try and cool such bubbles. In order to understand why this kind of response makes sense and what other policies should be used to combat bubbles in real estate prices and prevent financial crises, it is necessary to have a theory of bubbles. What is missing from much of the literature is a theory of why low interest rates and credit expansion lead to real estate bubbles.

Arguably the most important reform to prevent future crises is to design policies that ensure that asset price bubbles are minimized. In order to do this, we need tractable models of bubbles that can be used as a basis for policy analysis. Developing such theories has so far proved a difficult task. Much of the early theoretical literature was concerned with showing that bubbles do not arise in standard models.

Theories of bubbles can be divided into four categories. These are (i) bubbles based on infinite horizon overlapping generations' models, (ii) asymmetric information bubbles, (iii) agency theories,

and (iv) behavioral theories. It is suggested that agency theories provide the best foundation for developing a theory of monetary policy, credit and real estate bubbles. I argue that in normal times real estate prices are driven by consumer preferences for housing services and reflect fundamentals. However, if interest rates are low enough and credit is plentiful enough then a threshold may be crossed, speculators may enter the market and create a bubble in real estate prices. When this bubble bursts the collapse in values can lead to a banking crisis as so often appears to happen in practice.

## **Policies to Prevent Real Estate Bubbles**

I have argued that systemic risk can arise from bubbles in real estate prices. What are policies that might be put in place to deal with this source of systemic risk? Besides the setting of interest rates and attempts to control global imbalances, macroprudential regulatory measures can be used that deal with systemic risk, not just with the risk of failure of single financial institutions. The current crisis has clearly shown that the microprudential approach to financial regulation is not sufficient to prevent systemic crises.

In order to avoid future crises it is of the utmost importance to try to be able to predict and identify real estate bubbles and prevent their emergence. While it is difficult to predict property bubbles, it is not impossible. Evidence is available that rapid credit growth combined with large increases in real estate prices can lead to financial instability. In low inflation environments, inflationary pressures can first appear in asset prices rather than in the prices of goods and services. In such cases it may be appropriate to use monetary policy to prick asset bubbles and to preserve financial and monetary stability.

### *Interest Rate Policy*

The setting of interest rates by central banks plays a significant role as to whether the economy is in normal times or whether speculators are attracted to the real estate market. When cutting interest rates to very low levels, it is possible to set off a bubble. It is this factor that central banks need to take account of when conducting monetary policy.

Another factor that is important is that real estate markets are not efficient. Unlike stock prices where returns follow random walks, in fact returns on housing are positively serially correlated. This means that once a bubble is started it will make speculation more attractive and will make the bubbles longer lived. Presumably the positive serial correlation is due to the microstructure of real estate markets. Price discovery and the search process are very different in real estate markets than in stock markets.

One important issue is how bubbles should be pricked once they have started. Should central banks raise interest rates to prevent speculation? By raising rates enough, it is possible to make speculation unattractive. For small homogeneous countries like Sweden this kind of policy is desirable. Thus the policy used in Sweden makes considerable sense. In medium sized economies like the U.K. and perhaps Korea it may also be a good idea to take into account real estate bubbles when setting interest rates. However, in large heterogeneous economies like the U.S., the Eurozone, and China, real estate bubbles tend to be regional. Raising interest rates to burst bubbles is then a blunt instrument and often will not be desirable because of its effects on regions without bubbles. In this case, it will be necessary to use macroprudential policies to which we turn next. These policies also have an important role to play in smaller economies as interest rate increases alone may not be very effective in bursting bubbles.

### *Macroprudential Regulation*

What exactly is meant by the term macroprudential regulation? Three policies are typically associated with macroprudential regulation and supervision: (1) Countercyclical regulatory policy; (2) Control of contagion risk; and (3) Discretionary policies

The first involves increasing financial institutions' capital reserves when the economy is growing and financial institutions are not under stress. The second requires stronger supervision of systemically important firms, counterparty risk and financial infrastructure. The final one involves timely

interventions by regulators and supervisors to deal with growing imbalances and risk exposures. In particular, it means to intervene to cool down asset real estate and other asset price bubbles. It is this kind of macroprudential intervention that I will focus on. Countercyclical capital ratios and control of contagion risk are key policies but our focus here is in real estate bubbles and crises.

An important issue is how likely it is that such interventions will actually be deployed. While many Financial Stability Reports (FSRs) were successful in identifying many of the risks and unsustainable trends that led to the financial crisis, most were regarded as low probability events not worthy of action and several factors that were not important in the crisis were also identified. It may thus be unrealistic to expect macroprudential regulation and supervision to reliably prevent a financial crisis. Nevertheless these kinds of intervention may be able to contribute positively to the prevention and ability to manage a crisis.

Whether or not interest rates can be used, it may often be desirable to use other forms of discretionary macroprudential regulation to prevent bubbles. Possible macroprudential policies to prevent dampen real estate bubbles include the following: (i) Mandatory reductions in loan to value ratios; (ii) Increases in taxes on real estate transfers (iii) Increases in annual real estate taxes (iii) Direct restrictions on real estate lending.

The first measure would involve limits on loan-to-value ratios that would be lowered as property prices increase at a pace. This can be effective for residential property but may be difficult to enforce for commercial property. The reason is that firms may be able to use pyramids of companies that effectively increase leverage. The second measure is to have property transfer taxes that are greater the higher is the rate of property price increases. The third is a shift towards higher annual real estate taxes as the bubble grows to make owning real estate less attractive. Finally, perhaps the most direct measure is to impose restrictions on real estate lending in regions where property prices are booming.

#### *Global Imbalances*

One of the important factors for bubbles to arise is the easy availability of credit, with the easy availability of credit manifested itself in terms of high loan-to-value ratios. An important factor in this process in some countries, particularly the U.S., was financial innovation. The proliferation of subprime mortgages allowed the credit market to expand considerably. It has been suggested that excessive credit emerged during the recent crisis because of large global imbalances and in particular the large holdings of foreign exchange reserves by Asian central banks. To prevent bubbles in the future, it is important to solve this problem.

While it is individually advantageous for countries to self-insure by accumulating reserves, this is an inefficient mechanism from a global perspective. The accumulation of reserves by the Asian countries was at least partly a response to the policies that the IMF imposed on a number of countries during the Asian crisis in the late 1990s. Part of the problem was the fact that East Asian countries were not well represented in the senior staff of the IMF. It is therefore important to reform the governance structure of the IMF and of the other international organizations to ensure that the Asian countries receive equal treatment when they need financial help. This would reduce the need of these countries to accumulate reserves as a self insurance mechanism.

A more likely medium term scenario is that the Chinese Reminbi becomes fully convertible and joins the U.S. dollar and the euro as the third major reserve currency. With three reserve currencies there would be more scope for diversification of risks and China itself would have little need of reserves. This is perhaps one of the most practical solutions to the global imbalances problem. The Chinese have already taken some steps in this direction. They have started to allow the settlement of trade in Rmb. They have also allowed the issue of Rmb bonds by Western companies such as McDonalds in Hong Kong. Of course, the most important aspect of being a reserve currency is full convertibility of the Rmb. That is still some way off and this is the sense in which this solution to the global imbalances problem is a medium term one.

Another important issue is whether countries should pursue policies to limit capital inflows. As has been argued already, countries like Spain and Ireland have run large current account deficits in the years preceding the crisis. These seem to have contributed to the emergence of bubbles in those

countries. Going forward, it is important for countries to control their current account deficits if capital inflows are being invested in real estate and driving up prices.

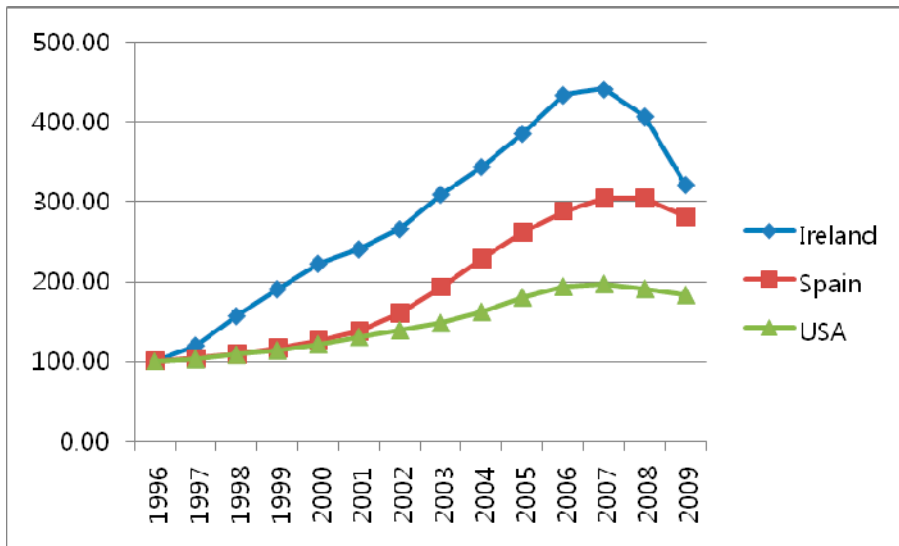
## **Concluding**

The empirical evidence suggests there is a strong relationship between run ups in property prices, which then collapse, and the occurrence of financial crises. Such crises have large effects on real output and inflation. This suggests that real estate prices should be taken account of when conducting monetary policy, particularly in small homogeneous countries like Sweden. The traditional approach to inflation targeting, where asset prices only play a limited role in the determination of monetary policy, needs to be adapted. The models on which policies are based should incorporate a financial sector where property price bubbles can arise and lead to a financial crisis. Once these models are developed, they can be used as the foundations for analyzing monetary and macroprudential policies.

<Link to the full version of the paper>

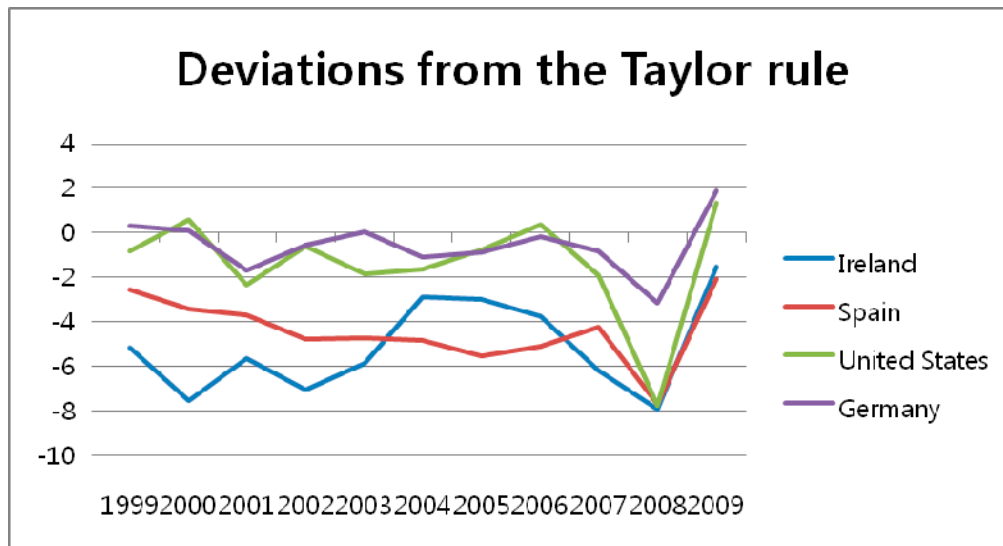
<http://finance.wharton.upenn.edu/~allenf/download/Vita/Central-Banks-Asset%20Prices-21Jan11.pdf>

Figure 1 Housing Prices in Ireland, Spain and the U.S.



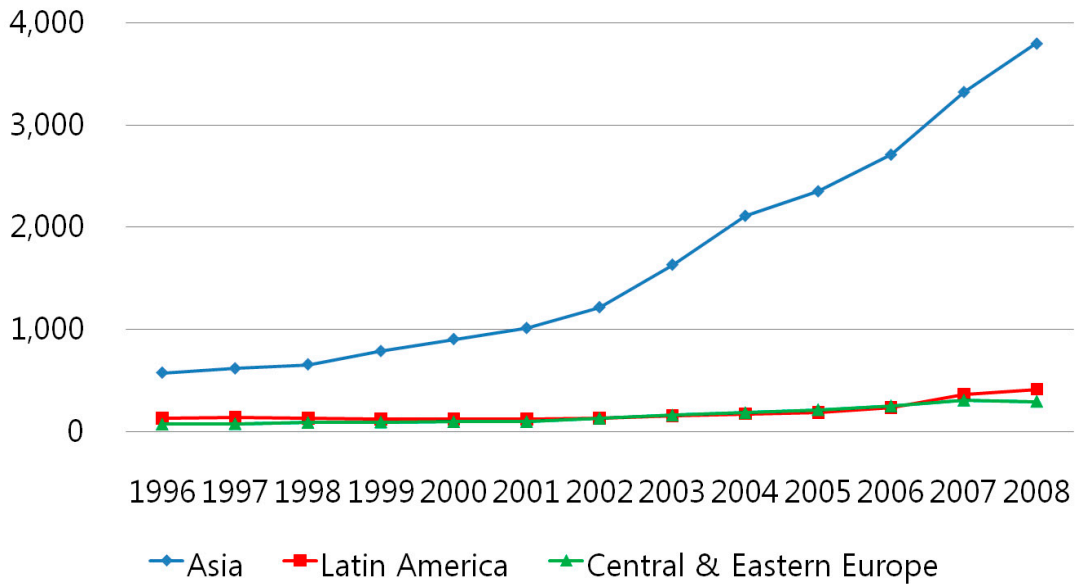
Sources: Irish Dep. of the Environment, Banco de España, FHFA, OECD.

Figure 2. Deviations from the Taylor Rule in Ireland, Spain and the U.S.



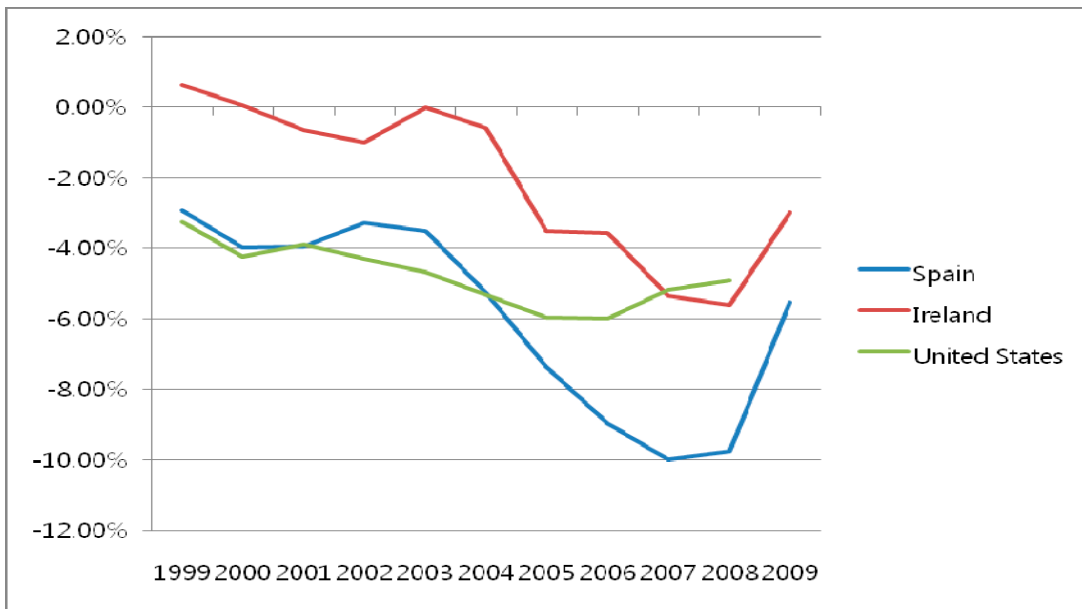
Source: Data on inflation and output gap from the IMF World Economic Outlook Database and calculated the implied interest rate according to the formula  $TR_t = CPI_t + (\text{average IR over the sample period}) + 0.5 \cdot (CPI_t - 2\%) + 0.5 \cdot \text{output gap}_t$ , where  $TR_t$  is the implied interest rate in period  $t$ ,  $CPI_t$  is the consumer price index and IR is the central bank's official interest rate.

Figure 3. A Comparison of Foreign Exchange Reserves in Different Regions



Source: IMF website. Asia is the six East Asian countries China, Hong Kong, Japan, Singapore, South Korea, Taiwan, province of China.

Figure 4. Current Account Deficits as a % of GDP in Ireland, Spain and the U.S.



Source: Eurostat

## Dealing with Real Estate Booms

Giovanni Dell’Ariccia and Deniz Igan<sup>1</sup>

### Introduction

Before the global financial crisis, the main policy tenet in dealing with a real estate boom was one of “benign neglect” (Bernanke, 2002), that it was better to wait for the bust and pick up the pieces than to attempt to prevent the boom. This was based on two assumptions. First, the belief that it is extremely difficult to identify unsustainable real estate booms, or “bubbles”, in real time. Second, the notion that the distortions associated with preventing a boom outweigh the costs of cleaning up after a bust. But, the crisis has shown that post-bust policy intervention can be of limited effectiveness and, thus, the costs associated with a bust can be daunting. While early intervention may engender its own distortions, it may be best to undertake policy action on the basis of a judgment call (as with inflation) if there is a real risk that inaction could result in catastrophe.

Yet, a call for a more preventive policy action raises more questions than it provides answers. What kind of indicators should trigger policy intervention to stop a real estate boom? If policymakers were fairly certain that intervention were warranted, what would be the policy tools at their disposal? What are their impacts? What are their negative side effects and limitations? What practical issues would limit their use? This paper explores these questions.

It should be recognized at the onset that there is no silver bullet. A more proactive policy stance can help reduce the risks associated with real estate booms, but will inevitably entail costs and distortions, and its effectiveness will be limited by loopholes and implementation problems. With this in mind, we reach the following conclusions. Policy efforts should focus on booms that are financed through credit and when leveraged institutions are directly involved, as the following busts tend to be more costly. In that context, monetary policy is too blunt and costly a tool to deal with the vulnerabilities associated with increased leverage, unless the boom occurs as a result of or at the same time as broader economic overheating. Fiscal tools may be, in principle, effective. But, in practice, they would likely create distortions and are difficult to use in a cyclical fashion. Macroprudential tools (such as limits on loan-to-value ratios) are the best candidates to deal with the dangers associated with real estate booms as they can be aimed directly at curbing leverage and strengthening the financial sector. But their careful design is crucial to minimize circumvention and regulatory arbitrage. Further, they will entail a cost to the extent that some agents find themselves rationed out of credit markets.

In what follows, we first give a summary of how real estate boom-bust cycles may threaten financial and macroeconomic stability. Then, we discuss different policy options to reduce the risks associated with real estate booms, drawing upon several country experiences (a more detailed analysis of country cases is in Crowe et al., 2011). We conclude with a brief discussion of guiding principles in dealing with real estate booms.

### The Case for Policy Action on Real Estate Booms

#### *Leverage and the link to crises*

From a macroeconomic stability perspective, what matters may be not the boom in itself, but how it is funded. Busts tend to be more costly when booms are financed through credit and leveraged institutions are directly involved. This is because the balance sheets of borrowers (and lenders) deteriorate sharply when asset prices fall. When banks are involved, this can lead to a credit crunch with negative consequences for real economic activity. In contrast, booms with limited leverage and bank involvement tend to deflate without major economic disruptions. For example, the burst of the dot-com bubble was followed by a relatively mild recession, reflecting the minor role played by

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<sup>1</sup>Giovanni Dell’Ariccia is an Advisor in the IMF Research Department where he coordinates the activities of the Macro-Financial Linkages Unit. Deniz Igan is an economist in the IMF Research Department’s Macro-Financial Linkages Unit. This paper derives from “Policies for Macroeconomic Stability: Options to Deal with Real Estate Booms,” available as IMF Staff Discussion Note No. 11/02 and co-authored with Christopher Crowe and Pau Rabanal. The authors thank the participants at the BOK-IMF Workshop on Managing Real Estate Booms and Busts for useful comments. The views expressed here are those of the authors and do not necessarily represent those of the IMF, its Executive Board, or its Management.



leverage and bank credit in funding the boom.

Real estate markets are special along both these dimensions. The vast majority of home purchases and commercial real estate transactions in advanced economies involve borrowing. And banks and other levered players are actively involved in the financing. Moreover, homebuyers are allowed leverage ratios orders of magnitude higher than for any other investment activity. A typical mortgage loan carries a loan-to-value ratio of 71 percent on average across a global sample of countries. In contrast, stock market participation by individuals hardly ever relies on borrowed funds. And when it does, loans are subject to margin calls that prevent the buildup of highly leveraged positions.

During the current crisis, highly leveraged housing markets had a prominent role, but this pattern is not limited to the United States, nor is it new to this crisis. The amplitude of house price upturns prior to 2007 is statistically associated with the severity of the crisis across countries (Claessens et al., 2010). Put differently, the U.S. market may have been the initial trigger, but the countries that experienced the most severe downturns were those with real estate booms of their own. And, historically, many major banking distress episodes have been associated with boom-bust cycles in property prices (Reinhart and Rogoff, 2008). A distinguishing feature of “bad” real estate boom-bust episodes seems to be coincidence between the boom and the rapid increase in leverage and exposure of households and financial intermediaries. In the most recent episode, almost all the countries with “twin booms” in real estate and credit markets (21 out of 23) ended up suffering from either a financial crisis or a severe drop in GDP growth rate. Eleven of these countries actually suffered from both damage to the financial sector and a sharp drop in economic activity. In contrast, of the seven countries that experienced a real estate boom but not a credit boom, only two went through a systemic crisis and they, on average, had relatively mild recessions.

#### *Wealth and supply-side effects*

Real estate is an important, if not the most important, storage of wealth in the economy. Additionally, the majority of households tend to hold wealth in their homes rather than in equities. Typically, in advanced economies less than half of households own stock (directly or indirectly) while homeownership rate hovers around 65 percent. In addition, the supply-side effects can be substantial. In most advanced economies, house price cycles tend to lead credit and business cycles (Igan et al., 2009). This suggests that fluctuations in house prices create ripples in the economy through their impact on residential investment, consumption, and credit while the reverse effect is not as prominent, implying that the housing sector can be a *source* of shocks. Recessions that coincide with a house price bust tend to be deeper and last longer than those that do not, and their cumulative losses are three times the damage done during recessions without busts. Again, by contrast, recessions that occur around equity price busts are *not* significantly more severe or persistent than those that do not (Claessens et al., 2008).

#### *Illiquidity, opacity, and network effects*

Boom-bust cycles are an intrinsic feature of real estate markets. This reflects delays in supply response to demand shocks and the slow pace of price discovery due to opaque and infrequent trades as well as illiquidity owing to high transaction costs and the virtual impossibility of short sales. In other words, real estate prices and construction activity can be expected to display large swings over long periods, even absent the distortions due to institutional features of real estate finance and policy actions. Network externalities also complicate the picture. Homeowners in financial distress have diminished incentives to maintain their properties and do not internalize the effects of this behavior on their neighbors. Similarly, foreclosures reduce the value of neighboring properties beyond their effect through fire sales. The double role of real estate as investment and consumption good may reduce mobility and increase structural unemployment, as households in negative equity may be reluctant or unable to sell and take advantage of job opportunities elsewhere. Hence, a housing bust may weaken the positive association between employment growth and mobility.

## **Policy Options**

The crisis has lent some support to the camp favoring early intervention in real estate boom-bust cycles. If we accept that intervention may be warranted although it is difficult to separate good from bad booms, the question arises as to which policy lever is best suited to reining in the latter. The main

risks from real estate boom-bust cycles come from increased leverage in both the real (in particular, households) and financial sectors. Then, policies should, whenever possible, aim at containing these risks rather than price increases. In that context, policies should target two main objectives (not to be taken as a mutually exclusive categorization): (i) preventing real estate booms and the associated leverage buildup altogether, (ii) increasing the resilience of the financial system to a real estate bust. Table 1 gives a summary of policy measures available towards these objectives along with their pros and cons.

What follows are explorations. The narrative focuses on residential real estate but several (although not all) of the measures discussed would easily apply to commercial real estate booms as well. We examine the potential role of monetary, fiscal, and macroprudential policies. We discuss the benefits and challenges associated with the various policy options, using case studies of countries with experience in the use of particular measures and, where possible, cross-country evidence.

Table 1. Policy Options to Deal with Real Estate Booms

	Potential impact	Side effects	Practical issues
<u>Macroeconomic Policy</u>			
<i>Monetary measures</i>			
Interest rates Reserve requirements	responding to property prices and/or real estate loan growth	potential to prevent booms, less so to stop one that is already in progress	inflict damage to economic activity and welfare
			identifying 'doomed' booms and reacting in time; constraints imposed by monetary regime
<i>Fiscal measures</i>			
Transaction / Capital gains taxes linked to real estate cycles	automatically dampen the boom phase	impair already-slow price discovery process	incentive to avoid by misreporting, barter, folding the tax into the mortgage amount
Property taxes charged on market value	(could) limit price increase and volatility	-	little room for cyclical implementation
Abolition of mortgage interest deductibility	reduce incentives for household leverage and house price appreciation	(potentially) inflict damage on the real estate sector by taking away a sectoral advantage	little room for cyclical implementation
<u>Regulatory Policy</u>			
<i>Macro-prudential measures</i>			
Differentiated capital requirements for real estate loans Higher risk weights on real estate loans	increase cost of real estate borrowing while building buffer to cope with the downturn	costs associated with potential credit rationing	may get too complicated to enforce, especially in a cyclical context; effectiveness also limited when capital ratios are already high
Dynamic provisioning for loans collateralized by real estate	increase cost of real estate borrowing while building buffer to cope with the downturn	earnings management	data requirements and calibration
Limits on mortgage credit growth	(could) limit household leverage and house price appreciation	loss of benefits from financial deepening	move lending outside the regulatory periphery
Limits on exposure to real estate sector	(could) limit leverage and price appreciation as well as sensitivity of banks to certain shocks	costs associated with limiting benefits from specialization	shift lending to newcomers for whom exposure limits do not yet bind or outside the regulatory periphery
Limits on loan-to-value ratio Limits on debt-to-income ratio	(could) limit household leverage and house price appreciation while decreasing probability of default	costs associated with potential credit rationing	calibration is difficult, circumvention is easy

## Monetary Policy

Can monetary tightening stop or contain a real estate boom? An increase in the policy rate makes borrowing more expensive and reduces the demand for loans. Besides, higher interest payments lower affordability and shrink the number of borrowers that qualify for a loan of certain amount. Indirectly, to the extent that monetary tightening reduces leverage in the financial sector, it may alleviate the financial consequences of a bust even if it does not stop the boom (De Nicolo et al., 2010).

Yet, monetary policy is a blunt instrument for this task. First, it affects the entire economy and is likely to entail substantial costs if the boom is limited to the real estate market. Put differently, a reduction in the risk of a real estate boom-bust cycle may come at the cost of a larger output gap and the associated higher unemployment rate (and possibly an inflation rate below the desired target range).

Obviously, these concerns are diminished when the boom occurs in the context (or as a consequence) of general macroeconomic overheating.

A second concern is that, during booms, the expected return on real estate can be much higher than what can be affected by a marginal change in the policy rate. It follows that monetary tightening may not directly affect the speculative component of demand. If that is the case, it may have the perverse effect of leading borrowers towards more dangerous forms of loans. For instance, in the Czech Republic, Hungary, and Poland, monetary tightening led to decreased domestic currency lending but accelerated foreign-currency-denominated loans (Brzoza-Brzezina et al., 2007). Moreover, under free capital mobility, the effectiveness of monetary policy may be limited, especially for not-fully-flexible exchange rate regimes. Finally, the structure of the mortgage market also matters: in systems where mortgage rates depend primarily on long-term rates, the effectiveness of monetary policy will depend on the relationship between long and short rates.

To a large extent, empirical evidence supports these concerns, leading to the bottom line that monetary policy could in principle stop a boom, but at a very high cost. Policymakers would have to “lean against the wind” dramatically to have a meaningful impact on real estate prices and credit, with large effects on output and inflation. This is confirmed by a panel vector autoregression, which suggests that, at a 5-year horizon, a 100 basis point hike in the policy rate would reduce house price appreciation by only 1 percentage point, compared to a historical average of 5 percent increase per year (see Crowe et al., 2011, for details). But it would also lead to a decline in GDP growth of 0.3 percentage points.

## **Fiscal Tools**

A variety of fiscal measures (transaction taxes, property taxes, deductibility of interest payments) bear on the decision to invest in real estate. The result is often a socially driven favorable treatment of homeownership (and sometimes housing-related debt). In theory, some of these fiscal tools could be adjusted cyclically to influence house price volatility, while preserving the favorable treatment of homeownership on average over the cycle.

Yet, if the net present value of all future taxes are capitalized in property prices, adjusting taxes countercyclically around the same expected mean would not affect the prices. Also, the evidence on the relationship between the tax treatment of residential property and real estate cycles is inconclusive: during the most recent global house price boom, real house prices increased significantly in some countries with tax systems that are highly favorable to housing (such as Sweden) as well as in countries with relatively unfavorable tax rules (such as France). Similarly, appreciation was muted in countries with both favorable systems (e.g., Portugal) and unfavorable ones (e.g., Japan). Overall, taxation was not the main driver of house price developments during the recent global housing boom (Keen et al., 2010).

Technical and political economy problems may further complicate implementation of cyclically adjusted fiscal measures. In most countries, tax policy is separated from monetary and financial regulation policies, making it extremely hard to implement changes in tax policies as part of a cyclical response with financial stability as the main objective. Instead, local governments may use lower property or transaction taxes to attract residents during good times if the burden in the case of a bust is shared with other jurisdictions. The ability of cyclical transaction taxes to contain exuberant behavior may be further compromised if homebuyers do not respond to these taxes fully, because they consider them to be an acceptable cost for an investment with high returns and consumption value. Also, during a boom phase, the incentives to “ride the bubble” may increase efforts to circumvent the measure by misreporting property values or folding the tax into the overall mortgage amount. Finally, as with most tax measures, the distortions created by a cyclical transaction tax may make it more difficult to evaluate a property, which already tends to be a hard task, and also the mobility of households with potential implications for the labor market.

## **Macroprudential Regulation**

At least in theory, macroprudential measures such as higher capital requirements or limits on various aspects of mortgage credit could be designed to target narrow objectives (for instance, household or bank leverage) and tackle the risks associated with real estate booms more directly and at a lower

cost than with monetary or fiscal policy.

Against the benefit of a lower cost, these measures are likely to present two shortcomings. First, they may be easier to circumvent as they target a specific type of contracts or group of agents. When this happens, these measures can be counterproductive, as they may lead to liability structures that are more difficult to resolve/renege in busts. Second, they may be more difficult to implement from a political economy standpoint since their use could be considered an unnecessary intrusion into the functioning of markets and since winners and losers would be more evident than in the case of macro policies.

We focus our analysis on three specific sets of measures: (1) capital requirements or risk weights that change with the real estate cycle, (2) dynamic provisioning (the practice to increase banks' loan loss provisions during the upswing phase of the cycle), (3) cyclical tightening/easing of eligibility criteria for real estate loans through loan-to-value (LTV) and debt-to-income (DTI) ratios. These tools may be able to achieve both objectives: (i) reducing the likelihood and/or magnitude of a real estate boom (for instance, by imposing measures to limit household leverage), and (ii) strengthening the financial system against the effects of a real estate bust (for example, by urging banks to save in good times for rainy days).

A major limitation in assessing the effectiveness of macroprudential tools stems from the fact that macroprudential policy frameworks are still in their infancy, and only a handful of countries have actively used them. And these measures have been typically used in combination with macroeconomic policy and direct interventions to the supply side of housing markets (such as in Singapore), further complicating the challenge to attribute outcomes to specific tools.

Yet, much can be learned from case studies. Following the Asian crisis, some countries in the region took a more heavy-handed approach to deal with risks posed by real estate booms. Countries in Central and Eastern Europe experimented with various measures to control the rapid growth in bank credit to the private sector in the 2000s. Others put in place a dynamic provisioning framework. On the whole, success stories appear to be few, perhaps to some extent reflecting the learning curve in expanding the policy toolkit, improving the design of specific tools, and sorting out implementation challenges. But, when policy succeeded in slowing down a boom and avoiding a systemic crisis in a bust, it almost always involved some macroprudential measures (a detailed account of these cases is in Crowe et al., 2011).

#### *Higher capital requirements/risk weights*

Capital regulation has a procyclical effect on the supply of credit. During upswings, better fundamentals reduce the riskiness of a given loan portfolio, improving a bank's capital adequacy ratio and its ability to expand its assets. In a downturn, the opposite happens. Procyclical capital requirements could help reduce this bias. Further, by forcing banks to hold more capital in good times, it would help build buffers for future losses.

For real estate loans, the procyclical element of capital regulation is largely absent. In most countries, existing rules do not take collateral values into consideration or reflect the heterogeneity among loans backed by real estate, other than the commercial-residential distinction. Under Basel II's standard approach, risk weights for property loans are fixed (50 percent for residential mortgages and 100 percent for commercial property loans). As a result, mortgage loans with predictably different default probabilities (for instance, because of different LTV ratios or exposure to different aggregate shocks) are often bundled in the same risk category and no adjustment is made over time to account for the real estate cycle. In this context, capital requirements or risk weights linked to real estate price dynamics could help limit the consequences of boom-bust cycles. By forcing banks to hold more capital against real estate loans during booms, these measures could build a buffer against the losses during busts. And, by increasing the cost of credit, they might reduce demand and contain real estate prices themselves. Finally, weights could be fine-tuned to target regional booms.

A few caveats are in order. First, absent more risk-sensitive weights, an across-the-board increase in risk weights (or capital requirements) carries the danger of pushing lenders in the direction of riskier loans. Thus, the introduction of procyclical risk weights for real estate loans should be accompanied by the implementation of a finer cross-sectional risk classification as well. Second, as with any other measure increasing the cost of bank credit (when credit is in high demand), procyclical risk weights may be circumvented through recourse to nonbank intermediaries, foreign banks, and off-balance-

sheet activities. Third, these measures will lose effectiveness when actual bank capital ratios are well in excess of regulatory minima (as often happens during booms). Fourth, while improving the resilience of the banking system to busts, tighter requirements are unlikely to have a major effect on credit availability and prices. Put differently, they are unlikely to reduce vulnerabilities in the real (household) sector. Finally, regulators may be reluctant to allow banks to reduce risk weights during a bust (when borrowers become less creditworthy).

The empirical evidence on the effectiveness of these measures is mixed. In an effort to contain the rapid growth in bank credit to the private sector and the associated boom in asset markets, several countries have raised capital requirements and/or risk weights on particular groups of real estate loans. Some attempts (such as the cases of Bulgaria, Croatia, Estonia, and Ukraine) failed to stop the boom; others (such as the case of Poland) were at least a partial success. Yet, it is not easy to say why measures taken in one country may have been more effective than those taken elsewhere or how much other developments account for the observed changes. Furthermore, even in countries where tighter capital requirements appeared to produce some results on controlling the growth of particular groups of loans, real estate price appreciation and the overall credit growth remained strong.

#### *Dynamic provisioning*

Dynamic provisioning (the practice of mandating higher loan loss provisions during upswings and one of the elements in Basel III) can help limit credit cycles. The mechanics and benefits are similar to those of procyclical capital requirements. By forcing banks to build (in good times) an extra buffer of provisions, it can help cope with the potential losses that come when the cycle turns (see, for example, the case of Spain). It is, however, unlikely to cause a major increase in the cost of credit, and thus to stop a boom. That said, one advantage over cyclical capital requirements is that dynamic provisioning would not be subject to minima as capital requirements are, so it can be used when capital ratios maintained by banks are already high. Provisioning for property loans could be made a specific function of house price dynamics. In periods of booming prices, banks would be forced to increase provisioning, which they would be allowed to wind down during busts. As in the case of risk weights, provisioning requirements could depend on the geographical allocation of a bank's real estate portfolio.

This measure is primarily targeted at protecting the banking system from the consequences of a bust rather than having a significant impact on credit and contain other vulnerabilities, such as increases in debt and leverage in the household sector. In addition, practical issues and unintended effects such as calibration of rules with rather demanding data requirements and earnings management (which may raise issues with tax authorities and securities markets regulators) should be discussed in each country's context to design a framework that best fits the country's circumstances. There are also other shortcomings, similar to those of procyclical risk weights (being primarily targeted at commercial banks, dynamic provisioning may be circumvented by intermediaries outside of the regulatory perimeter). Lastly, application of the measure only to domestically regulated banks may hurt their competitiveness and shift lending to banks abroad, raising cross-border supervision issues.

The experience with these measures suggests that they are effective in strengthening a banking system against the effects of a bust, but do little to stop the boom itself. Spain led the countries that have adopted countercyclical provisioning and constitutes an interesting case study for a preliminary assessment of its effectiveness. Starting in 2000 and with a major revision in 2004, the Bank of Spain required banks to accumulate additional provisions based on the "latent loss" in their loan portfolios (for more details on the Spanish dynamic provisioning framework, see Saurina, 2009). Dynamic provisions forced banks to set aside, on average, the equivalent of 10 percent of their net operating income. Yet, household leverage grew by a still-high 62 percent in Spain. At the end of 2007, just when the real estate bust started, total accumulated provisions covered 1.3 percent of total consolidated assets, in addition to the 5.8 percent covered by capital and reserves (for some perspective, the value of the housing stock has, so far, decreased by roughly 15 percent in real terms). Hence, Spanish banks had an important buffer that strengthened their balance sheets when real estate prices started to decline and the economy slipped into recession.

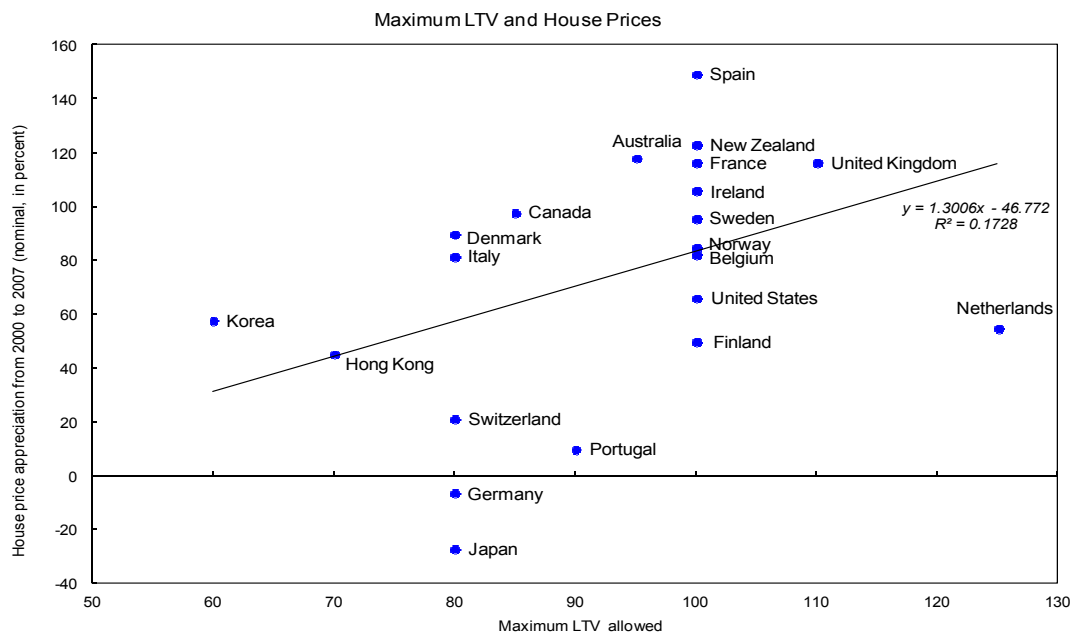
#### *Limits on loan-to-value and debt-to-income ratios*

A limit on LTV can help prevent the buildup of vulnerabilities on the borrower side. The lower the

leverage, the greater the drop in prices needed to put a borrower into negative equity. This will likely reduce defaults when the bust comes as more borrowers unable to keep up with their mortgages will be able to sell their houses. In addition, in case of default, lenders will be able to obtain higher recovery ratios. On the macro front, a limit on LTV will reduce the risk that a large sector of the real economy ends up with a severe debt overhang. In addition, it will reduce the pool of borrowers that can obtain funding (for a given price) and thus will reduce demand pressures and contain the boom.

Similar to limits on LTV, DTI limits will rein in the purchase power of individuals, reducing the pressure on real estate prices. In particular, they will be effective in containing speculative demand (they will screen out borrowers that would qualify for a mortgage only on the assumption the house would be quickly turned around). They will also reduce vulnerabilities, as borrowers will have an “affordability” buffer and will be more resilient to a decline in their income or temporary unemployment.

Careful design of these measures is key to limit circumvention. For instance, in Korea, lower LTV limits for loans with less than three years of maturity spurred a boom in loans originated with maturity of three years *and* one day. In the United States, during the housing boom, the practice of combining two or more loans to avoid mortgage insurance (which kicked in when LTV exceeded 80 percent) became common. Similarly, an obvious way to get around a DTI limit would be to extend sequential loans and report the ratios separately. In Hong Kong SAR, where regulators impose maximum limits on the debt service ratio (which takes into account the payments the borrower has to make on non-mortgage loans as well), supervisors often encounter cases where lenders do not report all outstanding debt obligations. Circumvention may entail significant costs, as it may result in liability structures that can complicate debt resolution during busts (for example, in the United States, it is often second-lien holders that object to restructuring). In addition, circumvention may also involve shifting of risks not only across mortgage loan products, but also outside the regulatory perimeter, through expansion of credit by nonbank, less-regulated financial institutions and/or by foreign banks (which may result in increased currency mismatches as the proportion of foreign-currency-denominated loans rises).



Sources: BIS, OECD, UNECE, ECLAC, IDB, European Mortgage Federation, International Union for Housing Finance, International Union of Tenants, national statistics, and central bank statistics.

Notes: Maximum LTV allowed refer to new mortgage loans and, in most cases, shows the limits over which additional requirements such as mortgage insurance would apply.

The narrow target nature of these measures may increase political economy obstacles (as happened in the case of Israel), particularly since the groups more impacted by LTV and DTI limits tend to be those more in need of credit (poorer and younger individuals). In addition, unlike with more “macro” measures, the consequences of these limits are immediate and transparent. Beyond these political economy considerations, LTV and DTI limits, by rationing sensitive groups out of credit markets, will

entail a cost in terms of diminished intertemporal consumption smoothing and lower investment efficiency.

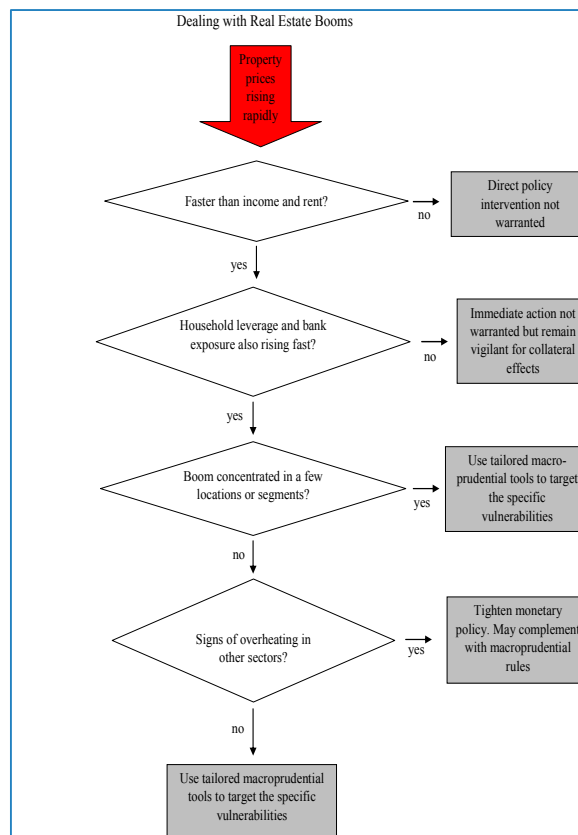
The scant existing empirical evidence suggests that these are promising measures. For example, in a simple cross-section of 21 (mostly) developed countries, maximum LTV limits are positively related to house price appreciation between 2000 and 2007 (see figure). And back-of-the-envelope calculations suggest that a 10 percentage point increase in maximum LTV allowed by regulations is associated with a 13 percent increase in nominal house prices (see also Duca et al., 2010).

Experiences of countries that experimented with changing mandatory LTV limits in response to real estate market developments also suggest that doing so can be quite effective. When the Korean authorities introduced LTV limits in September 2002, month-on-month change in house prices decreased by 3 percentage points immediately and remained low until April 2003. A similar pattern applies to DTI limits, with month-on-month change dropping by 2 percentage points in August 2005 with the introduction of the measure. Interestingly, the measures had a much smaller (or no) impact on prices in “non-speculative” areas where the limits were untouched. The impact on year-on-year changes, however, has been smaller, since prices tend to start increasing at a faster pace again after the first immediate reaction. In Hong Kong SAR, prudent lending practices guided by LTV and DTI limits have been credited with pausing the house price boom briefly in 1994 and guarding the system against the fallout from the crash in 1997 (Wong et al., 2004; also see Wong et al., 2011).

## Conclusion

The correct policy response to real estate booms is, like many other policymaking decisions, an art more than a science. Macroprudential measures seem to be the best option to achieve the objective of curbing real estate prices and leverage because they attack the problem at its source, adapt to specific circumstances in different locations at different times, and give the added benefit of increasing the resilience of the banking system.

Ultimately, policy recommendations depend on the characteristics of the real estate boom in question (see flow chart). If property prices are out of sync with income and rent *and* leverage is increasing rapidly, taking action is advisable. In deciding which policy option to choose, policymakers should adopt a wider view of the economy and complement targeted measures with broader macroeconomic tightening if the boom is a part or reflection of general overheating in the economy.





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## Determinants of House Prices<sup>2</sup>

Haibin Zhu<sup>3</sup>

House price risks have played a central role in the recent global financial crisis. A number of industrialized economies, including the United States, the United Kingdom and Spain, had witnessed a protracted period of significant increases in house prices in mid-2000s. The perceived lower risk had encouraged lax lending criteria in mortgage markets, which greatly contributed to the US subprime crisis and the consequent global financial turmoil. The bust in house prices led to substantial losses for the banking system and had a major impact on household consumption and the real economy.

The global financial crisis has led to fundamental changes in policymakers' attitude towards asset price "bubbles". Prior to the crisis, policymakers (including the central bank community) were in favour of a hands-off approach to asset prices, based on the arguments that it was easier to clean up the mess of a bust than to spot bubbles and that monetary policy was too blunt to deflate them. However, the validity of such arguments became highly questionable given the huge economic losses in the aftermath of the global financial crisis. There is wide support nowadays that policymakers should pay close attention to asset price imbalances so as to improve the stability and resilience of the financial system.

In practice, the switch in the attitude towards asset price "bubbles" needs to be supported by an operational framework. This framework should be able to provide answers to a number of issues, including asset price assessments, a list of policy instruments to be used to address asset market concerns, their transmission mechanisms and interactions with other policy measures. Encouragingly, many progresses have been made along these directions in recent years.

In this presentation, I will focus on the housing market and introduce various approaches that can be used to monitor and assess house price developments. This is based on an earlier work with Eloisa Glindro (Bangko Sentral ng Pilipinas), Tientip Subhanij (Bank of Thailand) and Jessica Szeto (Hong Kong Monetary Authority), which investigates the determinants of house price dynamics in nine Asia-Pacific economies.

### Pros and Cons of Existing Approaches

House price assessment is typically based on house price growth or various housing market indicators, such as housing affordability indicators (including the price-income ratio and the debt-income ratio) and the price-rent ratio.

The traditional approach is to compare these measures with their historical average levels, and conclude that house prices are too high if observed measures are significantly above historical norms. This approach has obvious caveats. In particular, historical average levels ignore the variation in "equilibrium" ratios driven by fluctuations in economic fundamentals, such as income growth, desired rate of return and rent growth, and hence are inadequate barometers for policy analysis.

The second approach is to compare these measures with calibrated "equilibrium" levels. Two methods have been adopted in practice. One is to use the price-rent ratio. Housing is treated as a particular type of investment asset and its market value equals the discounted present value of future rents. In this framework, the equilibrium price-rent ratio is a time-varying discount factor that is determined by the user cost of owning a house, which consists of mortgage interest, property tax, maintenance cost, tax deductibility of mortgage interest payments, the risk premium and expectations on house price appreciation. The second method uses house price data and compares observed

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<sup>2</sup> © 2011 The Association of the International Journal of Central Banking. Reprinted with permission. All rights reserved. The original article is titled "Determinants of house prices in nine Asia-Pacific economies" (by Eloisa Glindro, Tientip Subhanij, Jessica Szeto and Haibin Zhu).

<sup>3</sup> Bank for International Settlements, Representative Office for Asia and the Pacific, Hong Kong. Tel: 852 2878 7145; Fax: 852 2878 7123; E-mail: haibin.zhu@bis.org.

house prices with fundamental values that are predicted based on the long-run relationship between house prices and a list of demand and supply side factors.

Nevertheless, this equilibrium approach also has important caveats. In particular, it implicitly assumes that house prices or price-rent ratios tend to stay at their equilibrium values if there is no house price bubble. This assumption is problematic because frictions in the housing market, including lags in supply, asymmetric information, financial constraint, high transaction cost and lack of short-sale opportunity, may cause house prices to deviate from their fundamental values in the short term. For instance, Wheaton (1999)<sup>4</sup> and Davis and Zhu (2011)<sup>5</sup> show that market frictions can generate intrinsic house price cycles. In other words, deviation of house prices from their equilibrium values tends to be a normal status in the housing market. In addition, the equilibrium approach that uses the price-rent ratio is constrained by data limitations (rent data are not comparable with house price data in some markets) and the endogeneity problem in calculating the user cost, especially the risk premium component and expectations on house price appreciation.

## Our Approaches

The paper by Gliandro, Subhanij, Szeto and Zhu (2008) proposes a new method to examine the determinants of house prices and to detect house price bubbles. This method is able to distinguish among house price increases, house price overvaluation and house price bubbles within a coherent framework, and hence is able to provide helpful insights on the policy perspective.

Regarding the determinants of house prices, this paper proposes to run two-step regressions. The first regression estimates the fundamental value of house prices. The equilibrium (or fundamental) house prices are determined by a list of demand and supply factors, which include real GDP, population, real mortgage rates, mortgage credit to GDP ratios, land supply index, real construction cost, equity prices, exchange rates and an institutional factor index. The institutional factor is constructed as the first principal component of four index variables compiled by the Heritage Foundation: the business freedom index, the corruption index, the financial sector index and the property rights index. A high score in the institutional factor is associated with higher business freedom, better regulatory conditions, lower corruption, a greater range of intermediation functions by the financial sector, a higher degree of flexibility in acquiring land and better legal protection to land/home owners.

The second regression estimates the short-term dynamics of house prices using a standard econometric framework. In particular, house price changes in the current period are explained by house price changes in the last period (a persistent process), the deviation of observed house prices from fundamentals in the last period (a mean-reverting process) and the change in house price fundamentals from the last to current period. This model specification allows for rich dynamics of house price movements depending on the magnitude of the persistence and mean-reversion coefficients. An important extension in the analysis is that it allows for interactive effects between various housing market factors and the persistence and mean-reverting coefficients, so that the results show what housing market factors are driving behind the short-term dynamics of house prices. In particular, these housing market factors could include supply conditions, lending practices and institutional factors (which are also a proxy for housing finance systems in each economy).

Based on the two-step regression results, house price movements can be decomposed into three separate and additive components. The first component is the fundamental value of housing, which is a *trend term* calculated from the first regression. The second component is the deviation from fundamental values that can be attributable to frictions in the housing market, which is labelled as a *cyclical term* calculated from the second regression. The last component, the residual or error term, is defined as a bubble component in a strict sense. The bubble component cannot be explained by economic and housing market factors used in the analysis and is most likely driven by overly optimistic expectations in the housing market.

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<sup>4</sup> Wheaton, William (1999): "Real estate cycles: some fundamentals", *Real Estate Economics*, vol 27, 209-230.

<sup>5</sup> Davis, E Philip and Haibin Zhu (2011): "Bank lending and commercial property cycles: some cross-country evidence", *Journal of International Money and Finance*, vol 30, 1-21.

## General Findings

Glindro et al applied this approach to nine economies in Asia and the Pacific (Australia, China, Hong Kong SAR, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand), both at national levels and in a breakdown (city and market segment) analysis, for the year between 1993 and 2006. Below are some general findings learned from this study.

First, the analysis shows significant cross-country differences in the pattern of house price dynamics, both in long-term and short-term determinants. The differences can largely be attributable to the differences in housing market factors, such as land supply elasticity and the degree of financial market developments. For instance, house prices tend to be more volatile in the short run in those economies with low land supply elasticity, or with a high score in institutional factors. An immediate and important lesson from this finding is that, from a macro-prudential perspective, it is important for central bankers and prudential regulators to be aware that the determination of house price dynamics may have changed in the process of liberalizing housing markets and housing finance systems.

Second, the analysis shows clear distinctions among house price growth, house price overvaluation and house price bubbles. For the nine economies examined in this study, house price increased substantially (double-digit percentage growth) in a number of economies in mid-2000s, but they were mainly driven by increases in house price fundamentals. Except for Hong Kong (where the house price was 10 percent higher than predicted fundamentals in 2005), the deviation of house prices from fundamentals values (house price overvaluation) was quite small for the nine economies in mid-2000s. And if excluding the cyclical component (the deviation from fundamentals caused by housing market frictions), the housing bubble component was negligible in all economies.

Third, the breakdown analysis (at city or market segment level) is important for house price assessment. Location is a crucial factor in determining house prices, and house price assessment based on national level data may be insufficient to monitor housing market developments. For instance, while the analysis did not find evidence of house price bubbles at national levels for the nine economies in mid-2000s, there was evidence that house prices were overvalued in some market segments (such as Shanghai in China, Seoul in Korea and Manila luxury market in the Philippines), which were in part driven by the bubble component. Indeed, house price overvaluation and bubbles appeared to be more likely to exist in major cities and high-end markets.

To summarize, it is an important first step for policymakers, especially macro-prudential authorities, to monitor housing market developments and assess house price risks. Distinguishing various sources of house price growth has important policy implications. An increase in house prices that reflects improved fundamentals would not call for a tightening in regulatory measures or an increase in policy rates. Moreover, when house prices are higher than their fundamental values, policymakers should take the appropriate policy actions to mitigate frictions in the housing market or to remove the irrational expectations in the market, depending on what factors have caused the overvaluation.

Looking forward, the big challenge for researchers and policymakers is to improve our understanding on the linkages between the property market, finance and the real economy. In particular, policymakers need to understand the role of liquidity and risk-taking in generating asset price bubbles and the implications for the transmission mechanism of monetary policy. It is also important to understand how different policy instruments would affect the house price dynamics, so as to adopt the most effective policy when housing market concerns intensify.

<Link to the full version of the paper> <http://www.bis.org/publ/work263.pdf>

## Remarks On the Supply of Mortgage Credit

Richard K. Green

### Introduction

I have been asked to provide a few remarks about the supply of mortgage credit. These remarks will be informed by a number of experiences: my research with Susan Wachter, among others, my fifteen months as an employee of Freddie Mac, and my consulting work with the Securities and Exchange Commission. My remarks will be divided into four parts: a description of the size of the mortgage market; variations in loan origination channels and the government regulation of those channels; variations in sources of mortgage finance, both from the perspective of varieties of private sector entities, and the roles of public and private sectors; and a few words about modeling default in real time.

### The Size of Mortgage Markets

Countries have large variations in the size of mortgage markets; while this may well reflect differences in the demand for mortgage credit, it also probably relate to supply. Until recently, mortgage credit was more or less inelastically supplied in the United States and the United Kingdom—we know this because as demand rose dramatically between 2000 and 2007, mortgage spreads remained constant or even fell. For example, the spread between 30 year-fixed mortgage rates and 10-year Treasuries in the United States fell from 203 basis points in 1997 to 162 basis points in 2006<sup>6</sup>.

It is quite notable how even across the G-7 and the Republic of Korea, there are substantial differences in the size of mortgage markets relative to economies. One measure of mortgage market "depth" is the ratio of residential mortgage debt outstanding to GDP. Note how the ratio in Italy, the lowest among the G-7, is barely above 20 percent, while in the United States and United Kingdom, it is well over 80 percent. Because mortgages are a stock and GDP is a flow, another way we might look at this is the cost of mortgage debt relative to GDP. In the United States, the typical prime mortgage rate is around 5 percent, which means that mortgage costs are roughly four percent of GDP. Current mortgage rates in the United Kingdom are roughly 3 percent, so mortgage costs there are about 3 percent of GDP.

One could well ask the question whether there is an optimal level of Mortgage Debt Outstanding to Gross Domestic Product. In countries such as India, where annual mortgage originations are less than \$ 30 per person, capital markets are arguably insufficiently developed, and are inhibiting the ability of the market to deliver housing appropriate give incomes. But the high ratios in the US and the UK may reflect over-investment in housing as well as over-leverage.

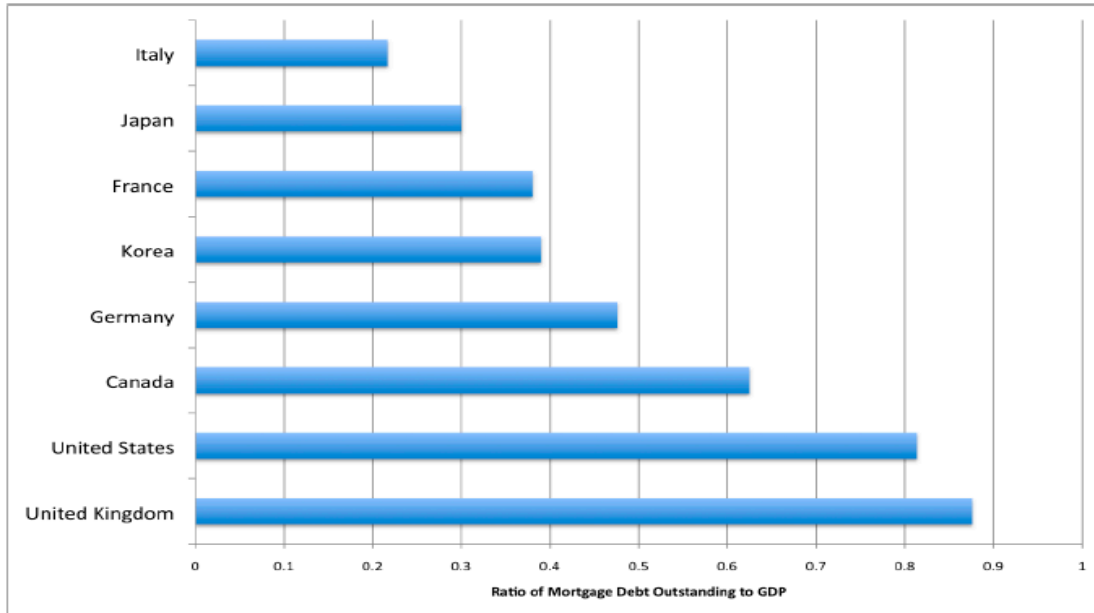
### Loan Origination Channels

Loan origination channels can range from simple to complicated. The simplest lending channel is when a mortgage investor is also a direct lender: for many years, the principal sources of housing finance in the United States were banks and specialized housing finance institutions, called Savings and loans that originated loans that were then held in their own portfolio. Depositories remain the principal source of housing finance in many, and perhaps most, countries around the world, including the United Kingdom, Canada, Japan and Singapore. Many currently argue that this is a superior form of housing finance for reasons that I will discuss below.

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<sup>6</sup> Data on mortgages rates and 10-year Treasury come from Federal Reserve Bank of St. Louis

Figure 1. Since of Mortgage Markets G-7 plus Republic of Korea Sources:



But the other major channel for mortgage lending, the broker-retailer channel, has been around for a long time as well. In the nineteenth century, mortgage brokers would find borrowers for life insurance companies to fund. And Denmark and Germany have long used mortgage backed bonds-usually originated by banks-to fund home borrowers. But the broker model evolved to an "originate to distribute model." Under this model, brokers gather loan applications from borrowers and then "shop them around" to different sources of funds. Many commenters, including Berndt[1], maintain that it was the "originate to distribute" model that created the conditions for the poor mortgage underwriting that became endemic to the United States. Originators were compensated based on volume of new business, rather than loan performance.

The problem with blaming the "originate to distribute" model for the mortgage crisis is that the incentives to loan originators have always been clear. For those who funded loans, it was no secret that originators were compensated base on funding. If anything, the principal-agent problem should have led funders to be less willing to fund loans originated by brokers.

An objection to this argument is that funders themselves didn't keep loans for very long: that there was in fact a long chain from the origination of a mortgage to its ultimately source of capital. Funders might want to rid themselves of their "lemons" and keep their good loans. An amusing and enlightening example of this channel comes from Edstrom (2009):

Clearly, mortgages may be resold and repackaged many times before they are eventually held by an end investor. The market for lemons, however, does not explain why investors up the mortgage supply chain lost money. Such investors would expect sellers to market their lemons, and so would only offer to buy at a discount. Indeed, as mortgages move up the chain, the discounts sellers will need to offer to buyers should get larger, and yet we arguably did not see that happen.

One might also argue that the problem with the securitization chain is that information gets lost from one stage to the next; that the end buyer in the securitization process will, even in the absence of lemons, be privy to inferior information by virtue of the complexity of securities and distance from origination. Yet all this was known to investors as well.

Finally, the hypothesis that the originate to distribute model was the principal culprit behind the crisis is belied by the fact that many investment banks, including Bear Stearns, Merrill Lynch and, of course, Lehman Brothers, got into trouble because they held onto mortgage backed securities. In fact, these firms held onto the most dangerous pieces of mortgage backed securities: the residual tranches that got paid last.





## Sources of Mortgage Capital

One can subdivide mortgage capital two ways: depositories and capital markets, and public and private sectors. Singapore, the United Kingdom and Canada rely largely on depository funding; the United States, Denmark and Germany rely on capital markets for funding.

Depository funding potentially allows lenders to connect investors (depositors) with borrowers. When depositories were local institutions, it was possible for lenders to collect "soft" information on borrowers, and use this information in underwriting<sup>7</sup>. On the other hand, long term assets such as mortgages create vulnerabilities for depositories. If the rate of interest on mortgage loans is fixed, even for relatively short periods, depositories become exposed to duration risk, which can lead to insolvency. This is precisely how American Savings and Loans got into trouble in the 1970s.

Long-term capital markets help solve the problem of duration risk. In Germany, where mortgage are funded largely via mortgage-backed bonds, mortgages have fixed rates and prepayment lock-out clauses or penalties. The certainty of mortgage duration in Germany, combined with the fact that mortgage backed bonds in Germany are constrained by regulation to be very carefully underwritten, makes German mortgages attractive to investors with long liabilities. Examples of such investors are pension funds and life insurance companies.

Capital market funded mortgages in Denmark and the United States are different, in that borrowers in both countries can repurchase their mortgage at any time at par. Prepayments are difficult to model, because they require both interest rate forecasting and an understanding of sometimes "suboptimal" borrower behavior. Many borrowers do not prepay their mortgages, even when it is in their interest to do so, meaning that investors in prepayable mortgages face great uncertainty about duration risk. This risk can be managed if mortgage investors use callable debt to access capital, but callable debt has historically been expensive because its investors face uncertainty about investors.

Finally, different countries have different levels of government involvement in the mortgage market. One country with a mixture of government and private sector support for mortgages, Canada, has so far survived the financial crisis relatively well, and it has not had a collapse in house prices. Canada also allows for low downpayment mortgages (i.e., mortgages with down-payments of less than 25 percent), but borrowers must under such circumstances purchase mortgage insurance, either from the government or the private sector. As it happens, about two-thirds of the mortgage insurance is purchased from the Canadian government.

But even in countries with "purely private" mortgage markets, the government intervenes, both through mortgage regulation and with interventions in other parts of the housing market. For example, Germany places stringent regulations on the characteristics of mortgages that are eligible for placement into mortgage backed bonds. It also provides strong tenant protections in the renter market; protections that are much greater than those in the United States. Consequently, Germans have security of tenure without being owners, meaning that ownership is less important there than in other countries.

And while Denmark's covered mortgage backed bonds have not defaulted since first being issued in 1795 (Boyce)[2], they are also heavily regulated, and the Danish government has shown a willingness to bail out its banks.

## Modeling Default

The antecedents of the mortgage finance crisis were not entirely malignant. To some extent, the crisis evolved because of increasing sophistication in mortgage modeling-or at least the appearance of sophistication.

Until relatively recently, mortgages were essentially rationed: lenders would decide whether borrowers would get a loan, but they would not offer risk-based pricing. As lenders, particularly Fannie Mae and Freddie Mac, collected large amounts of standardized data about borrower

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<sup>7</sup>For a discussion of "soft" information and loan performance, see Rajan et al. [7]. But allowing lenders to use "soft" information also produces a mechanism for discrimination based on race, ethnicity, and/or gender.

characteristics and loan performance, they began determining the correlations between one and the other. At the same time, a literature developed around the fact that mortgages contained embedded options, both calls (repayments) and puts (defaults). The pioneers in this literature included well known scholars John Shoven and Jerry Green, but also the financial research department at Freddie Mac, where Robert Van Order, Chet Foster and Arnold Kling labored.

The combination of modeling sophistication and data availability led to an explosion of statistical underwriting models. While the corporate world tended not to use the most sophisticated models-the competing risk unobserved heterogeneity models developed by Yongheng Deng, John Quigley and Robert Van Order{the models that were used were a step forward from the previous modeless world. While I have no comprehensive knowledge of model specification-such things are generally proprietary-it is likely that the foundation model on the probability of mortgage default looked something like:

$$(1) \quad p(d) = \frac{e^{x\beta}}{1 + e^{x\beta}}$$

where

$$(2) \quad p(d) = \text{probability of default}$$

$$(3) \quad x = \text{borrower covariates}$$

and

$$(4) \quad \beta = \text{a vector of coefficients on borrower covariates}$$

$E[.]$  is the expectations operator. Then to price expected losses, lenders would use a simple equation:

$$(5) \quad E[L] = p(d)E[L|d]$$

where  $L$  is losses and  $L|d$  is losses conditioned on default. Lenders would often assume that losses were independent of default conditions. The idea was that borrowers would default upon reaching some threshold, and that the costs of default, such as legal expenses and foregone interest, were constant.

A paper by Gates, Perry and Zorn [5] implied that at least one lender, Freddie Mac, had substantial confidence in its model. This confidence led them to believe that they could "thread the needle" for determining who should and who should not receive a mortgage. In particular, they thought that they could use models to determine how a "good" borrower characteristic might offset a "bad" characteristic. For example, a borrower with a strong credit score might be a good risk, even if their potential payments to income ratio was high and downpayment was low.

The authors had a statistical foundation for their confidence. Freddie Mac required standard documentation for their loans, and purchased millions of loans each year. Consequently, the company could run models that featured coefficients with very small standard errors. Moreover, for some period, the model would not only perform well in sample, in would perform well out of sample as well.

Once analysts thought they could produce precise models of mortgage default, it was only natural that they would begin to believe that they could price mortgage default, and consequently move from a business model of rationing to a business model of pricing. For example, if lenders could know with precision that a worsening of FICO from 700 to 650 would produce an increase in lifetime default incidence of 100 basis points, and that mortgages would lose 35 percent of value conditional on

default, they could simply add a markup to interest rates to compensate for expected default costs. They would consequently be able to approve loans (at higher cost) that were previously rejected.

But this business model had many problems embedded in it. First, it calibrated models based on a period when house prices were rising at all times everywhere. This meant that defaults were rare events, and that models were not particularly helpful at predicting default in more normal, let alone difficult times. Modeling using data from this period was akin to modeling turkey life expectancy based on a period before American Thanksgiving<sup>8</sup>.

Second, the models were based on the performance of mortgages that had been approved. It is not possible to estimate the performance of loans that were rejected based on those that were approved<sup>9</sup>.

In light of these conditions, it is not surprising that models predicting default performed poorly at predicting performance for an out of sample population at an out of sample time. We may draw two lessons from this. First, in evaluating mortgages, it is important to draw on a very long period of history-one that includes periods of substantial house price declines. Second, if a lender wishes to expand the population of borrowers who receive loans, it needs to proceed cautiously, learning information about any new population of borrowers before substantially expanding the business.

## Conclusion

The fact that housing finance was the principal cause of the recent financial crisis and its subsequent great recession, makes it natural that analysts and policy-makers are looking for a magic bullet to assure that such a crisis never happens again, while at the same time assuring that there is an "adequate supply" of mortgage credit.<sup>10</sup> But magic bullets rarely appear for less difficult problems than how to supply mortgages correctly. Models using securities can work, using depositories can work, and relying somewhat on government can work. But all such models can lead to disaster as well.

<Link to the author's homepage> <http://www.usc.edu/schools/sppd/faculty/detail.php?id=57>

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<sup>8</sup> This is a useful analogy from Taleb [8].

<sup>9</sup> Manski[6] wrote the classic treatment of the problem of trying to identify the impact of a policy on a non-treatment group by using data from a treatment group.

<sup>10</sup> Defining "adequate supply" is itself difficult.

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# Housing Booms, Busts, and Dynamic Provisions

Jesús Saurina<sup>11</sup>

## Introduction

The widespread experience among banking supervisors across the world shows that banks' lending mistakes are more prevalent during upturns. Borrowers and lenders are overconfident about investment projects. Banks' over-optimism implies lower lending standards. During recessions, banks suddenly turn very conservative and tighten lending standards, with the possibility of a credit crunch ensuing. This classic lending cycle may have a significant impact on the real economy.

There is robust empirical evidence of looser credit standards during expansions. For instance, Jiménez and Saurina (2006) show that there is a direct, although lagged, relationship between credit growth and credit risk, so that a rapid increase in loan portfolios is positively associated with an increase in non-performing loan ratios later on. Moreover, loans granted during boom periods have a higher default rate than those granted during slow credit growth periods. Finally, in boom periods collateral requirements are relaxed, while the opposite happens during recessions.

Therefore, banking supervisors' experiences (and concerns) are well founded on both theoretical and empirical grounds. The risk in bank portfolios builds up during expansion periods. In recessions, the *ex ante* credit risk increase materializes *ex post* in credit losses. It is important that banks recognize the increase in credit risk/credit losses in their loan portfolios at the time that risk is building up. In doing so, bank managers and shareholders will be much more aware of the financial position of the bank and may have greater incentives to control risks.

Loan loss provision, an accounting item to cover credit losses, is the natural tool to be used. A proper recognition of credit risk and credit losses along the lending cycle will enhance the soundness of each bank, as well as that of the banking system as a whole, helping to curb procyclicality in lending. Therefore, loan loss provisions that account for the credit risk increase in the upturn can help to cope with the potential damage that lending cycles can inflict on the real economy, the growth potential and the level of employment and welfare of any society. Such provisions, which are sometimes referred to as dynamic, statistical or countercyclical loan loss provisions, merit attention from regulators and supervisors as a macroprudential tool to enhance financial stability. Spain has had such a system of loan loss provisions for a decade.

From a macroprudential point of view, dynamic provisions can help to deal with part of the procyclicality inherent in the banking system. By allowing earlier detection and coverage of credit losses in loan portfolios, they enable banks to build up a buffer in good times that can be used in bad times. Their countercyclical nature enhances the resilience of both individual banks and the banking system as a whole. Admittedly, there is no guarantee that, on their own, they will suffice to cope with all the credit losses of a downturn (i.e. countercyclical loan loss provisions are not a *silver bullet* for dealing with a classic lending cycle); but insofar as dynamic provisions are applicable, they have proved useful, in particular in Spain and during the current financial crisis. In this regard, they could be an important prudential tool for other banking systems.

The Banco de España implemented the new provisioning system, incorporating the statistical provision, in July 2000. The International Financial Reporting Standards (IFRS) coming into force in 2005 across European Union countries, including Spain, brought about the need for a reform of the Spanish loan loss provisioning system. Since the beginning of 2005, the Spanish provisioning system has been made up of two elements: on the one hand, the specific provision, which covers incurred losses individually identified in specific loans; and, on the other hand, the so-called general provision, to cover the incurred losses, although not yet individually identified in specific loans, in homogeneous loan portfolios, classified as performing and calculated using statistical procedures. To do so, the

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<sup>11</sup>Jesús Saurina is Director of the Financial Stability Department at the Banco de España. This paper is the sole responsibility of its author and the views represented here do not necessarily reflect those of the Banco de España or the Eurosystem. This paper draws significantly from Saurina (2009a) and Repullo, Saurina and Trucharte (2010). Any errors that remain are, however, entirely my own.

Banco de España proposed a parametric method, based on statistical procedures and very detailed information from its Credit Register. This parametric model was used by all the banks from 2005 onwards.

It may be the case that not every banking regulator agrees with and/or has the ability to impose such a macroprudential tool. Moreover, it could be the case that addressing procyclicality through dynamic provisions was only a part of the global problem of decreasing the procyclicality of the banking system. In fact, we know that the level of expected losses may be several times below that of unexpected losses. Since provisions are used to cover the former while capital is used for the latter, it may also be important to complement dynamic provisions with less procyclical capital requirements.

Basel II/III is a step forward to making bank capital regulation more sensitive to risk taking. However, it could be the case that the current proposals of Basel II/III deliver a capital ratio that fluctuates too much along the business cycle, spurring even more procyclicality in bank lending. In this paper we analyze this issue, collecting evidence from former work (Saurina and Trucharte (2007) and, in particular, Repullo, Saurina and Trucharte (2010)) on the excessive fluctuation along the business cycle of capital requirements based on probabilities of default (PD) calculated using a point in time (PIT) approach (explained below). Moreover, we compare several approaches put forward to correct such excess procyclicality concluding that using a multiplier approach based on GDP growth may be the best answer.

In Section 2 we explain briefly the current mechanism for loan loss provisions in Spain. In Section 3 we provide evidence on how loan loss provisions (the flow) and its accumulated fund (the stock) have evolved since the onset of dynamic provisions. Section 4 is devoted to discussing alternatives to smooth capital requirements and, thus, exploring another macroprudential tool. Finally, Section 5 concludes the paper.

## How do Dynamic Provisions Work? The Theoretical Mechanism

In this section we explain how the current loan loss provisioning system works. As said before, previously to 2005, when IFRS came into force in Spain, the provisioning system was slightly different (there were three types of provisions instead of the current two, and there were also some differences in the value of the parameters provided by the Banco de España's model). Nevertheless, and despite these differences, the rationale behind both provisioning systems, as well as the amount of provisions produced by them, were very similar.<sup>12</sup>

Current general loan loss provisions are based on four components. The first is called component alpha ( $\alpha$ ), and it is obtained as the product of a certain parameter  $\alpha$  times the change in the amount of the loans granted. This component reflects the inherent losses of the transactions granted in the period. The second, component beta ( $\beta$ ), is the product of the parameter  $\beta$  times the total amount of outstanding loans in the period. This second component is compared with a third component, the specific net provisions made in the period. These last two components take into account the effect of the business cycle on inherent losses and, therefore, form the basis of the macroprudential dimension of the provision.

Component  $\beta$  reflects the average specific provision over a business cycle. Its comparison with the current specific provision is indicative of the strength/weakness of the lending cycle. During expansion periods non-performing loans and specific provisions are very low; thus, the difference between the second and the third components is positive, and that amount is charged to the profit and loss account, increasing the general loan loss provision fund and thus accumulating provisions. On the contrary, during recessions non-performing loans and specific provisions surge; hence, the difference between the second and third components becomes negative. If credit declines, the first component is also negative. The final negative amount is drawn down from the general fund, provided it has a positive balance, and credited in the profit and loss account.

The three components cited above are used to calculate the theoretical general provision. This means that the initial provision figure calculated on the above terms is not necessarily the final

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<sup>12</sup> For a detailed description of the former system, see Fernández de Lis, Martínez and Saurina (2000). For an explanation of the changes brought about by IFRS implementation, see Banco de España Financial Stability Report, May 2005, Box III.1.

provision to be made, since the limit to the general provision (fourth component) must be taken into consideration. This implies that there is a cap for the fund of general loan loss provisions fixed at 125% of the product of parameter  $\alpha$  and the total volume of credit exposures. Therefore, the fund of general provisions should be below 125% of the inherent loss of the loan portfolio. The objective of this cap is to avoid an excess of provisioning, which might occur in a long expansionary phase as specific provisions remain below the beta component, whereas the alpha component contributes positively to the accumulation of provisions in the fund. The cap is intended to avoid a fund that keeps growing indefinitely, producing unnecessarily high coverage ratios of non-performing loans through provisions.

Analytically, one period's total loan loss provisions are the sum of the specific provisions (*dot.espe*) plus the general one (*dot.gen*). The formula describing how general provisions (the flow) are computed is as follows:

$$dot.gen_t = \alpha \Delta C_t + \left( \beta - \frac{dot.espe_t}{C_t} \right) C_t$$

where  $C_t$  is the stock of loans at the end of period  $t$  and  $\Delta C_t$  its variation from the end of period  $t-1$  to the end of period  $t$  (positive in a lending expansion, negative in a credit crunch).  $\alpha$  and  $\beta$  are the previously defined parameters, and they are set by the Banco de España.

Intuitively, parameter  $\alpha$  is the estimated average of credit losses or, in other words, the collective assessment for impairment in a cyclically neutral year for each homogeneous group of risk. Parameter  $\beta$  is the historical average (i.e. through a lending cycle) of the specific provisions for each homogeneous loan portfolio. Parameters  $\alpha$  and  $\beta$  are the same for all banks, although the overall impact will differ depending on the structure of each bank's loan portfolio. During periods of strong credit growth and low levels of specific provisions,  $\beta$  is larger than the specific provisions, so that general provisions recognize the increase in incurred losses not yet individually identified on specific loans. During recessions these losses quickly translate into specific losses, and so  $\beta$  is below the specific provisions. The difference can be drawn from the general fund and credited to the profit and loss account<sup>13</sup>.

Regarding tax treatment, general provisions are tax-deductible up to 1% of the increase in gross loans, as long as they are not mortgages. Non-deductible amounts (i.e. those above that threshold) are accounted for as deferred tax assets, because they will become specific provisions in the future, and therefore deductible, when the impairment is assigned to an individual loan. Tax deductibility has made dynamic provisions more popular among banks. Nevertheless, the Spanish experience shows that they can still be implemented even if they are not fully tax-deductible.

It is worth noting that a rules-based system of loan loss provisions like the one explained in this paper enhances transparency and comparability across banks.

Based on the simulation of a lending cycle with a recession in the middle period, Saurina (2009b) shows that at the peak of the recession provisions (including dynamic provisions) would be 40% lower than traditional provisions, while during good periods, both before and after the recession, the amount of provisions would be higher when dynamic provisions are used. It goes without a saying that a different set of alpha and beta parameters would produce a different provisioning profile.

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<sup>13</sup> The above formula is in fact a simplification. There are six risk buckets, or homogeneous groups of risk, to take into account the different nature of the distinct segments of the credit market, each of them with a different  $\alpha$  and  $\beta$  parameter. Saurina (2009a, b) explain it in detail.

## How Much Was Built Up and How Much Has Been Used? The Mechanism in Motion

A system of dynamic provisions has to be implemented in an expansionary phase of the economy. Conceptually, because this is when credit risk builds up and, practically, because banks need to build up a buffer to be used when the recession arrives, i.e. when credit losses materialize *ex post* in specific loans. Moreover, this is precisely what determines its macroprudential dimension and utility.

As explained in the introduction, in the period before the statistical provision was introduced, credit had been moving on a high and increasing trend, as the economy had definitely left behind the recession of the early nineties. The subsequent economic expansion allowed banks to have low levels of non-performing loans and, thus, to experience a declining path in the level of the ratio of specific loan loss provisions to total loans. The credit expansion and the benign economic conditions extended over a period of more than ten years. But, by the second half of 2007, economic growth and lending started a significant slowdown, with a sharp rise in the non-performing loan (NPL) ratio in 2008 as the Spanish economy headed for its deepest recession in more than 60 years.

Specific provisions (over total loans granted) represented a very small share of credit exposures (around 0.05%) during the expansion years, while general provisions were more than twice that figure during the same period. However, in 2008, due to the change in general economic conditions, a deep and rather sharp change took place in the lending cycle and specific provisions increased very rapidly, while general provisions moved into negative territory, with the final result of a much less pronounced increase in total provisions.

If Spain had had only specific provisions, in around two years these would have jumped from around 0.05% of total credit to more than 0.5% (a tenfold increase). However, current total provisions have evolved from a minimum of around 0.15% of total loans two/three years ago to a level around 0.35% currently. Loan loss provisions are, therefore, still increasing and have an impact on the profit and loss account of banks, but much smaller thanks to the countercyclical mechanism which contributes to the resilience of the whole banking sector. This is the macroprudential dimension of dynamic provisions.

The loan loss provision fund (stock) has evolved accordingly. The countercyclical nature of dynamic provisions can also be seen in the changes in the general fund which starts to be depleted as the slowdown gains momentum. The buffer of provisions accumulated in the expansion phase is ready to be used in the downturn. It was not the idea of the regulator to build up a *permanent* buffer of provisions. On the contrary, the idea was to cover the latent risk built up in the upturn and to use the provisions accumulated in good times when those risks materialize *ex post* in losses on specific loans. As already mentioned, there is now no minimum for the general fund. Therefore, the general fund built up in the upturn can be fully depleted as specific provisions keep growing as a result of the increase in non-performing loans.

It is interesting to see the stock of provisions in relative terms. The specific provision fund relative to problem loans is around 50% for almost the whole period analyzed, while the most relevant changes are for the general fund, as expected. During the upturn, the coverage of doubtful loans with general loan loss provisions reached a maximum of around 250%, which reflects the very low level of problem loans in good times as well as the fact that the latent credit risk in banks' balance sheets had not yet materialized in individual loans. As those losses materialized, the coverage of the general fund relative to problem loans started to decline sharply, because the former increased significantly, forcing the latter to start to be depleted. Following the same trend, the stock of total provisions also declined. Although much smaller than in previous years, the total provision fund currently offers an acceptable level of coverage, taking into account the average loss given default expected for the aggregated Spanish bank portfolios.

The impact of the flow of general provisions on net operating income is material, being around 15% during the period before the general provision fund started to be used. This explains why banks are usually not much in favor of them in an expansionary phase. It can also be seen that when dynamic provisions are used (i.e. when the general fund is being drawn down), the impact on net operating income is also very significant, helping banks to protect their capital during recessions. All in all, we have shown in practice, with real bank data, how countercyclical loan loss provisions are



accumulated during the upturn and how they start being used in the downturn, along with their effects on total provisions. Whether or not they will suffice for each Spanish bank to withstand the current financial crisis remains unknown. Clearly, for some banks the answer is no, and they will need to make additional provisions, further impacting their profit and loss accounts or, in extreme cases, denting their capital buffers. However, for many others, there is no doubt that the provisioning buffer has helped them to withstand the shock and to cope with the crisis from a much better starting point.

### **Other Macroprudential Tools to Reduce Procyclicality**

Basel II/III capital requirements are much more risk sensitive than those of Basel I. Therefore, there are concerns that they could amplify business cycles. In particular, there could be a contraction in loan supply in downturns due to the increase in regulatory capital required from banks, which under Basel II/III is an increasing function of the probability of default (PD), the loss given default (LGD) and the exposure at default (EAD), all likely to rise in a downturn. Capital is difficult to raise during recessions, either by issuing new equity or by increasing earnings retention; while for many non-financial firms it may prove very difficult to switch from bank funding to market funding (in particular, for small and medium sized firms). Therefore, there is a rationale for a cyclical adjustment of Basel II/III capital requirements.

Repullo, Saurina and Trucharte (2010) (hereafter RST) show that there is a significant difference in the level of expected and unexpected losses, while both behave similarly along the business cycle. In fact, for a portfolio of loans to firms such a difference could be between four and five times. That is, a countercyclical tool for dealing with procyclicality in expected losses (i. e. dynamic provisions) may not be enough to curve bank lending procyclical behavior. The question then is, how should the cyclical adjustment of Basel II/III be made?

RST develop a strategy to compare the different smoothing procedures. First, they estimate a model of PD for Spanish firms' loans encompassing two lending cycles (close to 25 years of loan by loan data). Once the PD model has been estimated, capital requirements PIT and TTC are computed using current macro variables or averages along the business cycle, respectively. Furthermore, they develop a benchmark to compare different proposals for smoothing PIT capital requirements by estimating a Hodrick-Prescott (HP) filter. Finally, the different smoothing procedures proposed can be compared by minimizing the root mean square deviations from the HP benchmark.

The estimate of the PIT capital requirements function confirms that Basel II is going to significantly increase procyclicality in regulatory capital. From peak to trough, capital requirements increase more than 50%. That is, a bank may need to post close to 12% of regulatory capital to a portfolio of loans to firms in the middle of a recession, while in the expansion phase, less than 8% would be required. Saurina and Trucharte (2007) find very similar qualitative results for a portfolio of mortgages of Spanish banks in a relatively similar time span, although the quantitative impact is even stronger (from 2.5% to 1.25%). Therefore, on top of dynamic provisions, dealing with the procyclicality of expected losses, there is a need to develop another macroprudential tool to deal with excess procyclicality in capital requirements (which cover unexpected losses).

RST show that in comparison with PIT capital requirements, TTC-based capital requirements would have been higher (between 1% and 2%) during the expansion periods before the recession arrived, while during the recession the pressure over banks would have eased significantly, delivering an altogether smoother capital level while still being risk sensitive.

For smoothing the PIT capital requirements RST apply a business cycle multiplier:

$$\hat{\kappa}_t = \mu_t \kappa_t$$

where  $\kappa_t$  is the original PIT capital requirements series and  $\hat{\kappa}_t$  is the adjusted series. A convenient functional form for the multiplier  $\mu_t$  is:

$$\mu_t = \mu(g_t, \alpha) = 2N\left[\frac{\alpha(g_t - \bar{g})}{\sigma_g}\right]$$

where  $g_t$  is the growth rate of some business cycle indicator,  $\bar{g}$  its long-run average,  $\sigma_g$  its long-run standard deviation,  $N[\cdot]$  is the standard normal cumulative distribution function, and  $\alpha$  is a positive parameter. Using the multiplier  $\mu_t$ , capital requirements would be increased in good times (i.e.  $g_t$  above  $\bar{g}$ ) and reduced in bad times (i. e.  $g_t$  below  $\bar{g}$ ), in relation to those from Basel II/III formulas based on a PIT model, with no adjustment at the average of the business cycle.

The comparison of different business cycle indicators with the HP benchmark allows RST to conclude that the best outcome is obtained using either the TTC approach or an output adjustment based on the variable GDP growth. After the GDP indicator, the next most suitable one for smoothing the output was credit growth. Many other variables were assessed: In particular, market indicators (stock returns), accounting variables (ROE and ROA) as well as leverage ratios (credit over GDP). None of them worked as well as the GDP growth indicator. Recently, the Basel Committee on Banking Supervision (BCBS (2010)) has issued a consultative proposal to deal with procyclicality of Basel II/III capital requirements, suggesting that the ratio credit/GDP could be a useful common reference in taking buffer decisions. RST show that this latter indicator is the one with the worst adjustment. It seems that such a ratio may be useful in building up a buffer in good times but much less useful in drawing down the buffer, which may enhance loan contraction in recessions; just the opposite of what is intended, unless supervisors use discretion and allow banks to draw down the buffer. Such discretion, and its ensuing lack of transparency, also clouds the usefulness of a TTC adjustment, as is argued in detail in RST.

All in all, on top of dynamic provisions, it seems reasonable to develop other macroprudential tools. One simple, transparent and effective mechanism would be to adjust the Basel II/III capital requirements based on a PIT system with a multiplier itself based on the GDP growth deviations.

## Conclusions

There is widespread agreement among banking regulators and supervisors on the need to develop a macroprudential approach, which means going beyond the microprudential, institution-by-institution approach applied by some supervisors. The idea is to combat the fallacy of composition: if each individual bank is sound, the whole banking system must be sound. The latest financial crisis has shown that correlations across assets and banks' balance sheets can sharply increase and pose systemic risk. Therefore, the microprudential approach to supervision needs to be complemented with a macroprudential approach.

What a macroprudential approach exactly means and, in particular, which tools are available, and what challenges they pose to policy makers and, in particular, central banks, is still an issue open to debate and to be determined. It seems reasonable that a countercyclical loan loss provision may be part of the toolbox for macroprudential supervision. Smoothing Basel II/III capital requirements calculated point in time using a macro variable such as the GDP growth could also be an important countercyclical tool. However, it is also important to know the limits of the instruments at hand.

<Link to the author's homepage> <http://www.bde.es/investigador/staff/70.htm>

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## Property Markets and Financial Stability

Frank Packer<sup>14</sup>

First of all, I want to thank Stijn Claessens and Tae Soo Kang for organising this excellent workshop. It is quite a privilege to meet so many of the world's experts and participate in discussions on recent developments in real estate markets, both on the long-term research and policy analysis fronts.

As the attendees from the Bank of Korea are aware, the BIS Asian office was asked in 2010 by its consultative council of Asian central bank governors to focus a significant portion of its research work and the support it gives central banks over the next few years on the theme of property markets and financial stability in the region.

We are currently organising our work by four general topic areas. First of all, we want to deepen our understanding on how best to monitor and assess valuations in housing market. I think Haibin Zhu discussed methodological issues in his presentation yesterday, but it might also be worth mentioning that China in particular has a number of problems with the quality of the housing price data, many of which Yun Yu alluded to his presentation. For instance, while many in China were greatly concerned with soaring house prices in 2009, the recorded level of nominal house prices nationwide – based on the so-called "35/70 Cities Indices" – only increased by 1.5%. Measurement issues include the representativeness and completeness of sample transactions used to construct housing price indices, as well as accounting for the heterogeneity of the housing market.

A second area is housing finance arrangements and their market impact. Here again you've already heard many of the critical questions raised by Veronica Warnock. We continue to be interested in what institutional variables – such as stronger legal rights, credit information systems - are associated with the provision of housing finance.<sup>15</sup> We might also add explanatory variables such as regulatory loan restrictions. But we also know now that bigger is not necessarily better, so we might consider examining which systematic factors point to unsustainable growth in mortgage markets, i.e. deviations from trend. Do certain types of housing finance systems promote stability? Are smaller mortgage markets, bank-based financial systems less prone to sharp pull-backs in lending?

Thirdly, we of course are also interested in work on the relationship between property markets and the health of the banking sector. Here the focus is on the resilience of financial systems to shocks, as well as the procyclicality of bank lending. We would like to promote more research on the vulnerability of Asian banking systems to shocks,<sup>16</sup> as well as encourage central banks and financial supervisors to share with each other their methodologies for identifying these vulnerabilities, both in terms of stress tests and other tools.

Finally, and this is a very broad category, we are interested in the work on the impact of various policy instruments on property prices and valuations. I think we've already heard a lot at this workshop about the impact of measures in Korea, Hong Kong and Singapore. As we have discussed, not only has the use of tools such as LTV or DTI become much more frequent, but the authorities are also adopting differentiated caps depending on the type of borrower or property. LTV requirements are considerably stricter for multiple mortgage holders in China and Singapore, or in high-end markets, for instance in Hong Kong. This may be to address heterogeneity in borrowers' financial constraints, so as to minimize collateral damage when reining in speculative excess. But why this is happening and the effectiveness of finally differentiated measures as opposed to more granular ones is probably worth even further thought and investigation.<sup>17</sup>

Another research area which is still wide open and was touched on in Giovanni Dell'Ariccia's presentation is the extent to which property price movements are in fact driven by changes in interest

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<sup>14</sup> Head of Financial Stability and Markets, Representative Office for Asia and the Pacific, Bank for International Settlements, Hong SAR. The views expressed here are my own and do not necessarily reflect those of the Bank for International Settlements.

<sup>15</sup> Warnock, V., and F. Warnock, 2008. Markets and Housing Finance. *Journal of Housing Economics* 17: 239-251.

<sup>16</sup> For example, see Craig, R S, E P Davis and A G Pascual (2006): "Sources of procyclicality in East Asian financial systems", in S Gerlach and P Gruenwald (eds), *Procyclicality of Financial Systems in Asia*, pp 55–123.

<sup>17</sup> Asian authorities also tend to rely more on discretionary measures as opposed to rules. In the case of loan loss provisioning in Asia, see Angklomkiew, S, J George, and F Packer (2009), "Issues and Developments in Loan Loss Provisioning: The Case of Asia," *BIS Quarterly Review*, December.

rates, and by extension whether monetary policy would be effective in attenuating housing market excesses. While monetary policy shouldn't be the principal tool to address financial stability issues and more specifically property market bubbles, many argue that it shouldn't be taken off the table for the sake of an exclusive focus on inflation targeting either. What is needed is an enhanced understanding of the effectiveness of non-monetary policies, and in particular macro-prudential regulation, in combination with monetary policy. Researchers may wish to draw upon the measures of the stance of macroprudential policies first developed in the work of Claudio Borio and Ilhyock Shim, as well as the 2009-2010 survey of central banks by the Committee on the Global Financial System (CGFS) on their use of macroprudential instruments.<sup>18</sup>

So these are the four main themes. Of course, a more ambitious strategy might include other topics, many of which have come up over the course of the past few days' discussions. I like to touch on two of these in the remainder of my time, including (a) the political economy of macroprudential style intervention, and (b) communications strategy. Both of these of course have long been hot topics in the monetary policy sphere.

What always strikes me about discussions of macroprudential policies and their use in developed countries, particularly in Europe and the US, is how often the conclusion boils down to how difficult it will be to remove the punchbowl when the party's going strong. This sort of conclusion is rarely heard in Asia, where it's usually just taken for granted that the government will intervene if necessary. The CGFS survey I referred to earlier documents a greater prevalence in emerging market economies to use macroprudential policies aimed at real estate-related lending activities than in advanced economies. And within emerging markets, Asian central banks and financial authorities have long been especially active practitioners of macroprudential policy, without necessarily knowing that they were supposed to call it that.<sup>19</sup> An interesting research question, then, is what explains the prevalence of the use of macroprudential/interventionist policies in Asia, and emerging markets more generally.

A related issue in the case of macroprudential policy is that of communications strategy. Just as with monetary policy, policymakers need a narrative to present to the public that logically links diagnosis to policies to desired outcomes. It has been argued that financial stability policy would be more effective if the message communicated to the public about financial conditions were simpler, and oriented towards recommendations for action. A recent working paper by ECB economists assesses the financial stability reports of many central banks and reaches the conclusion that simpler communications are indeed more effective.<sup>20</sup>

One metric of simplicity or lack thereof, is simply the number of words, and by this measure communication about financial stability policies could certainly be simpler. Domanski and Ng (2011) compare the number of words in the regular press releases regarding monetary policy (official interest rate decisions), and those related to the financial stability report publications of the same three central banks (the Reserve Bank of New Zealand, the Bank of England, and the Swedish Riksbank).<sup>21</sup> They find the release of financial stability reports to be significantly longer than the monetary policy releases in the case of two of the three central banks. In a previous study, Cihak (2006) compared the full financial stability reports versus the inflation reports in the countries that produce both and found the financial stability reports to be on average 36% (20 pages) longer.<sup>22</sup>

Another measure of simplicity is the co-called Flesch Reading Ease index, a statistic that summarizes how easy any text is to read. Again, Domanski and Ng find the financial stability press releases to be harder to read than the monetary policy press releases in two of the three central banks. Domanski and Ng also note that while financial stability reports warned of excesses ahead of the recent global financial crisis, they did little to curb excessive risk taking. They conjecture that carefully balanced pros and cons muffled the strength of the reports' messages. Reports that are more focused,

<sup>18</sup> Borio, C and I Shim (2007) "What Can (Macro-) Prudential Policy do to Support Monetary Policy?" BIS Working Paper No. 242, December. See also Committee on the Global Financial System (2010) "Macroprudential instruments and frameworks: a stocktaking of issues and experiences", CGFS Papers No 38.

<sup>19</sup> Caruana, J (2010). "Macroprudential policy: what we have learned and where we are going" Keynote speech of the Second Financial Stability Conference of the *International Journal of Central Banking*, Bank of Spain, Madrid, June.

<sup>20</sup> Born, B, M Ehrmann and M Fratzscher (2010), "Macroprudential policy and central bank communication", CEPR Discussion Paper DP8094.

<sup>21</sup> Domanski D, and T Ng (2011), "Getting effective macroprudential policy on the road: Eight propositions", paper presented at the Bank of Korea/Bank for International Settlements conference of "Macroprudential regulation and policy", Seoul, Korea, January.

<sup>22</sup> Cihak, M (2006), "How do central banks write on financial stability?" IMF Working Paper WP/06/163.

selective and prioritized can be more effective in influencing risk-taking activity than a cataloguing of risks per se.

Of course, another reason the reports weren't effective may simply have been the lack of frameworks authorizing specific policies in response to the identification of risks. Communications accompanied by the threat of action are likely to be more powerful. The new and strengthened macroprudential mandates in many developed countries may do more to enhance the communication of financial stability risks than the endeavors of wordsmiths.

## Housing Finance in Latin America and the Caribbean

**A.Galindo, A.Rebucci, F.Warnock and Veronica Cacadac Warnock**

Housing sectors in Latin America and the Caribbean (LAC) provide some form of shelter to many, with home ownership rates in many LAC countries as high as anywhere in the world. But for many the quality of housing outcomes is substandard. Many LAC countries are still grappling with substantial housing deficits—some actual (i.e., people without any form of adequate shelter), some qualitative (shelter exists, but it is substandard along a number of dimensions)—and have a substantial portion of their population living in slums (Table 1).

A high homeownership rate with substandard outcomes along other dimensions (slums, housing deficit) notwithstanding, LAC housing finance systems (i) have been the subject of enormous government involvement spanning many decades, and (ii) are small relative to those in other countries (Figure 1). Housing finance systems in the LAC region tend to be quite shallow, with Chile and Panama having the largest mortgage markets at 20 percent of GDP, other LAC countries having much smaller markets (Mexico 9%, Brazil 3%, Argentina 2%), and the region as a whole having a (GDP-weighted) average mortgage market that is 5.5 percent of GDP. By contrast, mortgage markets in Asia are somewhat larger (Malaysia 31%, Thailand 19%, regional average 12.4%), and in advanced economies mortgage markets average roughly 60 percent of GDP but with substantial variation (Netherlands, Denmark, and Switzerland at roughly 100%; USA, Australia, and New Zealand at around 80%; Japan and Korea at around 20%).

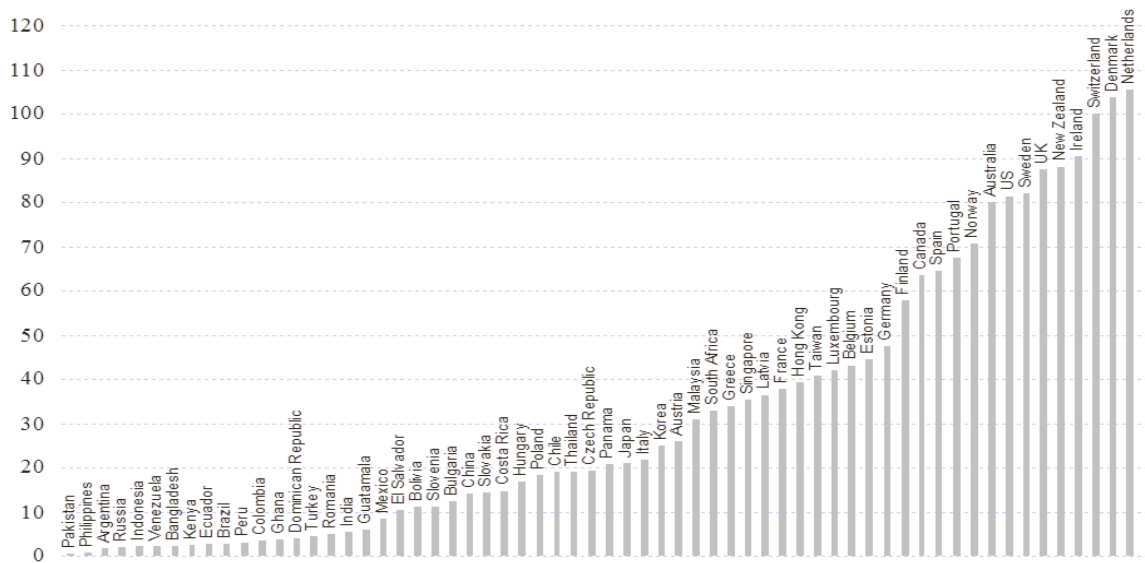
Larger mortgage markets are not always and everywhere better. But, in the face of large housing deficits and substandard housing outcomes, it is important to understand what is holding back the development of LAC mortgage markets. The extensive government involvement alongside little growth suggests the private sector might be crowded out by government involvement. While reality might be somewhat more nuanced than that, it bears examination: How can governments in LAC reduce their direct involvement in housing finance systems and enable and promote the development

Table 1. Selected Housing Indicators (various years)

	Homeownership Rate (%)	Informal Economy (as a % of GDP)	Slums (% of population)	Housing Deficit (units)	(%)
Argentina	66.0	32.9	24.1	3,500,000	20%
Brazil	69.9	28.4	24.4	5,572,313	
Chile	65.9	32.1	7.8	639,000	
Colombia	60.0	43.5	13.2	3,828,055	36%
Costa Rica	72.2	41.8	6.7	182,265	15%
El Salvador	66.0	36.8	17.5	540,499	38%
Guatemala	70.0	42.3	20.1	1,500,000	
Mexico	69.5	28.2	11.2	6,000,000	
Panama		44.4	13.3	125,014	14%
Peru	65.7	38.1	26.9	1,500,000	
Trinidad & Tobago		24.4	18.7	40,000	

Sources: Cristini and Moya (2008), Vuletin (2008), Schneider (2002), UN Global Urban Indicators database, Titularizadora Colombiana (2010), DANE Censo General (2005), UN-Habitat (2006), Martins et al (2010), Sancho et al (2011), Cuevas et al (2011), Auguste et al (2010), and Arbelaez et al (2011).

Figure 1. Mortgage Debt Outstanding as a Percent of GDP (2009)



Source: Compiled by Warnock and Warnock (2012), "Housing Finance and Financial Stability".<sup>23</sup>

of sustainable, private systems? Or is the provision of housing finance and housing perpetually to be the task of governments in LAC? With many LAC countries having substantial housing deficits, extensive government involvement (and, hence, government spending) in the housing and housing finance sectors, and still-small housing finance systems, we ask: What is holding the LAC housing finance systems back?<sup>24</sup>

In what follows we summarize analysis from the Warnock and Warnock (2012) extension of the Warnock and Warnock (2008), henceforth WW12 and WW08, a study of the determinants of the size of mortgage markets across a wide range of countries. This analysis helps to put LAC housing finance systems, and some of the underlying building blocks, in a global context. Second, we summarize research on some individual LAC countries as part of an ongoing Inter-American Development Bank (IDB) research project; as the research program is ongoing and evolving, all analysis should be considered preliminary.

## LAC Housing Finance Systems: A Global Perspective

There are many dimensions along which one might want to gauge how well a housing finance system functions. These might include access (the portion of households that has access to appropriate housing finance products), product range (the range of financing products available)<sup>25</sup>, and stability

<sup>23</sup> There is no one source for data on mortgage markets, so Warnock and Warnock (2012) compiled data from Hypostat, Swiss National Bank, Titularizadora Colombiana, UN-Habitat, Bank of Ghana, and, for Asia, national sources as provided by BIS Asia. See Warnock and Warnock (2012) for complete details.

<sup>24</sup> Low income levels—in some countries a large portion of the population might have income levels too low to afford any type of formal housing—and a high amount of informality make it all the more difficult to attain adequate housing outcomes. All around the world the lowest income households are served (if at all) by some form of government support, whether direct provision, subsidies, state-provided insurance, or other forms. While other problems in the housing system might dominate, housing finance can help or worsen the situation (Hoek-Smit and Diamond 2003, page 5). This is not to say that private housing finance arrangements cannot extend to the lowest income segments.

<sup>25</sup> Across countries mortgages vary in their typical length, loan-to-value ratios, and whether they tend to be at fixed or adjustable rates WW08 noted that as of 2005 no EME had widespread availability of long-term fixed rate mortgages. Only a few—Malaysia, Thailand and some transition economies in Eastern Europe—had typical maturities of 30 years, and another, non-overlapping subset of EMEs tended to have fixed-rate mortgages. In contrast, many developed countries had mortgages with terms of 25 years or greater, and roughly half had predominantly fixed rate products. While data on such characteristics were not complete or reliable enough to be included in the WW08 empirical analysis, they noted while in any economy it is not clear a priori whether the prevalence of fixed or variable rate mortgages owes to lender or borrower preferences, it appeared to be the case that within the set of developed countries those with more stable inflation tend to had a greater share of fixed rate mortgages.



(the extent to which housing finance systems help or hinder macroeconomic stability, a topic explored in WW12).

For a variety of reasons, size (as measured by mortgage debt outstanding scaled by GDP) is not an optimal measure of how well a housing finance system functions. Mortgage market size can be heavily influenced by price dynamics and tax considerations—favorable tax treatments in countries such as Netherlands, Switzerland, and the U.S. tend to result in a larger stock of mortgage debt—and mortgage markets that are too large or growing too quickly might contribute to macroeconomic instability (a housing bubble requires, all else equal, a larger housing finance market). But all else equal, larger housing finance markets likely reach a greater proportion of the population, and as a measure size has the important advantage that it can be constructed for a wide range of countries.

Once the decision is made to explain cross-country differences in the size of mortgage markets, a simple supply-and-demand framework can be used. See WW08 and WW12 for complete details; what follows is a summary.

Many factors influencing housing finance supply and demand are available from the World Bank's *Doing Business* database.<sup>26</sup> *Legal Rights for Borrowers and Lenders* is an index that ranges from 0 to 10, with higher scores indicating that collateral and bankruptcy laws are better designed to expand access to credit; for a mortgage lender to be comfortable lending long-term, it needs to be able to secure collateral against the loan, and this ability hinges on being able to seize the collateral (the property) in the case of default.<sup>27</sup> *Credit Information* is a 0 to 6 index that measures the depth of lenders' access to standardized and informative sources of credit information on potential borrowers, with higher values indicating greater availability of credit information.<sup>28</sup> A measure not included in WW08 but utilized in WW12 is *Ease of Registering Property*. *Doing Business* ranks countries using three component indicators: the number of procedures, the time, and the official costs necessary for a buyer to purchase a property and to transfer the property title so that it can be used, sold, or posted as collateral. WW12 recast the World Bank's ranking into a variable, *Ease of Registering Property*, which ranges from zero (very difficult and costly) to 10 (easy). The final measure is *Inflation Volatility*, which is related to interest rate risk that can impede lending; we use the standard deviation of quarterly CPI inflation rates (from the IFS database) over the 2000-2009 period.<sup>29</sup>

How does LAC stack up along these dimensions? The depth of credit information does not vary much across countries—most countries, including those in LAC, score 5 or 6 out of 6. Indeed, this is where LAC scores the best; its credit information systems, at least by this measure, are as good as anywhere in the world.<sup>30</sup> On *Legal Rights for Borrowers and Lenders*, there is much more variation, with most LAC countries scoring 5 or below (out of 10) and many countries in other regions scoring much better. On *Ease of Registering Property*, many LAC countries score well enough, but three large LAC countries—Brazil, Argentina, and Mexico—score quite poorly. For *Inflation Volatility*, lower volatility (i.e. greater stability) is associated with larger mortgage markets, and here LAC scores well enough (certainly much better than in the 1980s or 1990s).

Given LAC's scores on the various factors, it is not surprising that it has small mortgage markets. Simple regression analysis from WW12 suggests that mortgage markets, whether scaled by GDP or private credit, are larger in countries with stronger legal rights for borrowers and lenders, deeper credit information systems, greater ease in registering property, and less macroeconomic instability. Along those dimensions, compared with other regions, LAC scores well only on the depth of its credit

<sup>26</sup> For complete details, see [www.doingbusiness.org/MethodologySurveys/GettingCredit.aspx](http://www.doingbusiness.org/MethodologySurveys/GettingCredit.aspx) and <http://www.doingbusiness.org/methodology/registering-property>. The *Doing Business* database is available at <http://www.doingbusiness.org/data>.

<sup>27</sup> Specifically, *Legal Rights for borrowers and lenders* is composed of ten criteria, eight pertaining to collateral law and two to bankruptcy law. A score of 1 is assigned for each criterion that is present in the country, so the overall score indicates how many of the criteria are met.

<sup>28</sup> Similar to *Legal Rights*, the *Credit Information* score is one point for each criterion that is met, although here there are only six criteria.

<sup>29</sup> In the regression analysis WW08 and WW12 follow Djankov et al. (2007) in using as a control variable country size, which can be argued to be exogenous, rather than per capita income, which is influenced by financial sector development (Levine 1997; Levine, Loayza, and Beck 2000). In the regressions discussed below, country size is measured by PPP-adjusted nominal GDP, from <http://data.worldbank.org/>, averaged over the 2000-2009 period.

<sup>30</sup> There is always a question of whether the type of credit information collected is informative about all segments of the population, but with vibrant microfinance sectors in many LAC countries, it could well be the case that appropriate information is available even for the lowest income segments.

information systems.<sup>31</sup>

## Housing Finance Systems in Latin America: Preliminary Results

Seven years ago IDB (2004) asked the question “Why is there so little housing finance in LAC?”<sup>32</sup> The answer focused on four fundamental reasons: (i) the inability of families to pay, (ii) issues with collateral, (iii) interest rate risk, and (iv) maturity mismatches. With the region’s high concentration of income at the upper levels and high informality, ability to pay is still an issue for the median household, although IDB (2004) noted that this has not held back homeownership—which is high in the region—in part because families can build home incrementally. On the second reason, the evidence discussed in the previous section indicates that LAC still has some way to go on issues concerning collateral. Moreover, while interest rate risk has decreased greatly in the region, memories of less stable times are long-lived. IDB (2004) discussed attempts to resolve the problems, focusing on state-run mortgage banks and savings funds (successful in some places over some time periods, but prone to mismanagement and crises), subsidies (to deal with the inability to pay, but that often end up benefiting those who have the ability to pay, and cause a drain on fiscal resources), and, starting in the 1990s, private mortgage lending systems.<sup>33</sup>

This past year IDB has asked, through an ongoing research project, a follow-up question: “What is holding back housing finance in LAC?”<sup>34</sup> The remainder of this summary discusses some preliminary findings from a few of the papers in this research project. As the project is not yet completed, everything here should be viewed as preliminary.

### Brazil

Martins, Lundberg, and Takeda (2010), henceforth MLT, note that the Brazilian housing finance system, while small, has been growing the past five years, from 1.2 percent of GDP in 2004 to 2.9 percent by 2009. What is behind this growth? A reduction in macro instability, which allowed interest rates to fall, clearly helped. Inflation, well over 1000% in the late 1980s and early 1990s, has come down significantly with the Real Plan of 1994 and inflation targeting since 1999. After spiking to about 17% in 2003, inflation the past five years has fluctuated around 5 percent (sometimes a bit higher, sometimes lower). There were also some important new laws, some of which, such as Law 9154 (1997) and Law 10,931 (2004), reduced legal risks to lenders (among other things).

But even with increased macroeconomic stability and some improvement on the legal front, the Brazilian housing finance system has not grown much. MLT note that almost all of the recent growth is due to government involvement, either directly through public lenders (which make up 40 percent of the market), or through its “earmarking” rule for housing funds.

The “earmarking” works like this. Brazilian banks, for every *real* they receive for deposit in savings accounts, must direct 65 centavos to housing finance.<sup>35</sup> A lower bound on funds available for home loans is given, roughly, by 65 percent of savings in Brazilian banks. One expects there to be a negative relationship between the SELIC (overnight policy) rate and savings, as savings accounts earn a quasi-fixed return (of 6% plus TR) and alternative stores of value such as fixed income instruments and CDs have returns that are highly correlated with the SELIC rate.<sup>36</sup> Indeed as the SELIC rate has been reduced, the amount deposited in savings accounts increased, thereby generating increased funds for housing finance as “earmarked” fund grew sharply, from about R\$95 billion between 2002 and 2006 to R\$125 billion by 2008.

MLT document that the increase in private lenders’ home loans has moved in lock step with

<sup>31</sup> WW12 notes that countries with deeper financial systems, as measured by Private Credit (as a percent of GDP), will likely have larger mortgage markets, and there is indeed great dispersion in Private Credit across countries, with financial systems in LAC being much shallower than elsewhere. But WW12 also shows that the factors that explain the size of mortgage markets as a percent of GDP—strength of legal rights for borrowers and lenders, depth of credit information systems, ease of registering property, and low inflation volatility—also explain mortgage debt outstanding as a percent of private credit.

<sup>32</sup> See, in particular, IDB (2004), *Unlocking Credit*, “Foundations of Housing Finance.”

<sup>33</sup> For a partial list of the many subsidy programs in the LAC region, see Table 15.4 in IDB (2004).

<sup>34</sup> See [http://www.iadb.org/research/projects\\_detail.cfm?id\\_sec=8&id=1999](http://www.iadb.org/research/projects_detail.cfm?id_sec=8&id=1999) for additional details on the IDB research project.

<sup>35</sup> It is somewhat more complicated than that, but the 65% rule is a good first approximation. See MLT for full details.

<sup>36</sup> TR is the Brazilian central bank’s ‘reference rate’, somewhat akin to the Federal Reserve’s prime rate. In recent years it has averaged a few percentage points.

requirements through the earmarking. Public lenders have more flexibility, but for private lenders the amount of funds in savings accounts drives, through the 65% earmarking rule, the amount they lend into the housing market. In the Brazilian housing finance sector, funds are either from public lenders or from mandated earmarked amounts; private lenders do not seem willing to fund more home loans than required.

## Mexico

Lopez-Silva, Abreu-Lastra, Saracho-Martinez, and Paulin-Hutmacher (2011), henceforth LASP, study the impact of subsidies on repayment rates. They note that the Mexican mortgage market, at roughly 10 percent of GDP, is relatively large by LAC standards. Predominant lenders are the mandatory housing provident funds INFONAVIT (for private employees) and FOVISSSTE (for public employees), which together issue most new mortgages in 2009 (82 percent by number of loans, 70 percent by peso volume). The rest of the market is made up of lending by commercial banks (at 15 percent) and the private non-bank financial institutions called SOFOLES (at 3 percent). Together the commercial banks and SOFOLES are currently small, but they were quite large just prior to the global financial crisis, peaking at more than 40 percent of the market, and their lending quite clearly appears to be highly cyclical.<sup>37</sup>

Housing and housing finance have been a prominent focus of the 2000-2006 and 2007-2012 Mexican Federal Administrations, which launched (and maintained) a comprehensive policy package geared towards promoting housing finance, construction and ownership. INFONAVIT, the largest public-sector mortgage bank, has implemented changes that have enabled it to boost mortgage issuance while greatly reducing its non-performing loan rate and increasing the share of loans to the poor; new private-sector mortgage issuers were encouraged; a mortgage-backed securities market was established; and a large-scale grant program for the acquisition of affordable housing, especially for low-income families, was implemented. The results have been impressive in many aspects: the number of housing mortgages issued each year almost tripled from 2000 to 2009; annual grants for the purchase of affordable housing reached 340,475 units in 2009; and financial institutions have issued mortgage-backed securities for seven years now.

LASP's empirical analysis focuses on a key element of Mexico's housing policy, large subsidy programs that could potentially imply significant financial costs to mortgage banks. Upfront grant programs are explicitly designed to enable relatively poor applicants (with lower job stability and thus potentially higher default rates) to obtain a mortgage and purchase a house, and the upfront subsidies may affect repayment behavior, as borrowers who receive such assistance risk losing a lower amount of their own money in case of a foreclosure.

LASP analyze INFONAVIT's mortgage operations over the last few years (using a large random sample of accounts) in an attempt to identify whether borrowers who received subsidies show a different repayment behavior than comparable borrowers who did not. Focusing on mortgage recipients who lost their jobs, they use a propensity-score matching technique to show that those with a subsidy miss a lower percentage of monthly payments (about 1.8 percentage points less) and take about 1.7 months longer before missing a payment.<sup>38</sup> Thus, LASP argue that the large subsidy programs currently under operation do not have negative financial implications for mortgage institutions; the subsidy appears to improve repayment behavior among workers, especially among those who have lost their formal employment. Better repayment behavior is important, as LASP report that INFONAVIT offers lower rates the lower the borrower's income, so there is no buffer against higher defaults. Moreover, while LASP have some quibbles about the design of the subsidy and its cut-offs, they note that the subsidy appears to enable the purchase of a higher-priced home.

LASP are, however, worried about a number of aspects of the Mexican housing and housing finance systems. Although Mexico has a very high homeownership rate (80 percent), surveys have indicated some dissatisfaction with housing outcomes. They point to a need for revised regulation, a strengthening of legal rights for lenders, an easing of the onerous process to transact property, and an improvement in market data. They report the following challenges:

<sup>37</sup> Additional analysis of commercial bank/SOFOL lending is warranted.

<sup>38</sup> LASP argue that for those with uninterrupted work the monthly payments are automatically deducted from payroll, so an analysis of their repayment would not be interesting.

- Regulation is inadequate and dispersed among all three executive-branch levels of government.
- Supply of developable land is an issue, as cities' limits reach formerly rural, *ejido*-owned property, which requires cumbersome procedures to be transferred or sold. Investment protection needs to be significantly improved, as foreclosure procedures can take two to three years in some Mexican states.
- Market participants have relied on new housing as the most appropriate way to satisfy demand, with insufficient efforts to take advantage of a large stock of vacant housing.
- A large informal sector implies a limited pool of potential customers with easily-verifiable credit information.

## Argentina

Argentina is another LAC country with a high home ownership rate and a mortgage market, which was small, then grew steadily up until the country's 2001/2002 crisis, and is now nearly non-existent. Auguste, Bebczuk, and Moya (2011), henceforth ABM, attempt to understand this seeming contradiction: a tiny mortgage market together with a high homeownership rate.<sup>39</sup> They argue that the Argentine mortgage market is held back by affordability issues. In the aftermath of the country's 2001/2002 crisis, real estate—the one asset that did not suffer from expropriation of some sort—has become the country's safe asset, its store of value. As such, much real estate is locked up by families, and few want a mortgage. A survey they designed for the study finds that 80 percent of homeowners (in Buenos Aires) did not use any type of loan at all to finance the home purchase. The authors, through various tests, point to a lack of demand for housing finance as the primary reason behind the small size of the Argentine mortgage market. Sometimes crises impinge on the future supply of finance; ABM think in this case the Argentine crisis led to a sharp decline in demand.

## Chile

Chile has, by many accounts, a well-functioning housing finance system. Its mortgage market is the largest in South America at almost 20 percent of GDP, and housing outcomes have improved dramatically over the past few decades. However, as Micco and Parrado (2011) point out, there are two potentially worrisome issues concerning concentration in the mortgage sector and an explosion of debt-financed mortgage lending. One potential concern in Chile is an explosion of debt-fueled mortgage lending by banks in the 2000-2008 period. Another concern is that one bank, Banco Estado, a state-owned commercial bank that focuses on lower income segments, is responsible for about a quarter of all outstanding mortgages, and recently 25 percent of the home loans on its books are non-performing. Some of the dramatic increase in nonperforming loans (NPLs) is from a definitional change—NPLs were, through 2009, 90 days overdue, and since January 2010 are based on the concept of impaired portfolios, or loans with evidence that the debtors will not meet the obligations. However, a 25% NPL rate is something that needs close examination.

## Summary

In this note we have summarized a presentation made at the April 11-12, 2011 Bank of Korea/IMF Workshop "Managing Real Estate Booms and Busts". Despite substantial government involvement, LAC housing finance systems are quite small, in part because compared to other regions LAC countries have weak legal rights for borrowers and lenders, greater costs in registering property, and somewhat more macroeconomic instability. An ongoing IDB research project is attempting to assess what is holding back LAC housing finance systems; we briefly discuss 4 of the 9 papers from that project.

<Link to the author's homepage> <http://people.virginia.edu/~mcw7n/home.html>

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<sup>39</sup> Recall that high home ownership does not necessarily imply that the homes are of adequate quality.

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## A Study of Property Market Bubbles Using Hong Kong Data

Jie Gan

In this study, we examine two broad questions related to property market bubbles. The first question concerns the role of rational overbidding by property developers in land auctions in prompting and sustaining property bubbles. The second question asks how (burst of) property bubbles may affect the real economy through its impact on consumer spending. The analyses are based on two published papers (Chang, Dasgupta, and Gan, 2007 and Gan, 2010)

### Rational Overbidding and Property Market Bubble<sup>40</sup>

While the theoretical literature has shown that rational overbidding is a possible reason for asset market bubbles, there is little empirical evidence. We examine how a toehold effect may lead to rational overbidding in land auctions. A significant “toehold effect” arises because a developer may already have an on-going project in the same geographical area as the land being auctioned. If the winning bid is high, then it might help the developer to sell the new units from the on-going project at a higher price.

In Hong Kong, the government owns all land, and sells land through long term leases to private developers. Proceeds from land sales have averaged around 15% of government revenues. The typical way in which the government sells land for development is through open ascending bid auctions. What creates a “toehold effect” in these auctions is the following. Many developers often have other development projects that have been recently completed or are soon to be completed in the same geographical area (district) as the land being auctioned. The winning bid in the auction is known to influence the transaction prices in the property market subsequent to the auction. In fact, the press regularly reports whether or not a recent auction has had an impact on property prices. Thus, bidders who already have units for sale or under construction benefit from a high winning bid in the auction even if they lose, because such bids enable them to sell properties in the same district at higher prices.

The fact that high auction bids affect property prices locally, and that bidders with toeholds benefit from these high bids, is well recognized in Hong Kong. For example, a news article in a local daily dated 26 October 2006, commenting on successful applications for two auction sites, reports

*According to a senior regional operating director of the Centaline Group, stimulated by the high launch price of Sausalito in Ma On Shan by Cheung Kong and the successful land auction application news, sellers of property units with more than 1000 sq. ft. in the same district immediately increased their asking price by about 5%.[translation ours].<sup>41</sup>*

Further, the article adds:

*Cheung Kong executive director ..... claimed that, had the company known about the success of the land application earlier, it would have set higher launch prices for Sausalito.*

It is not unusual to come across discussions of the toehold effect addressed in this paper. A news article dated September 13, 2006 reports<sup>42</sup>:

<sup>40</sup> This is part of the analysis is based on Chang, Dasgupta, and Gan (2010).

<sup>41</sup> The daily newspaper is the Chinese language daily *Ming Pao*. The article appeared under the heading “Two successful applications attract large developers”. A “successful application” under the current system in Hong Kong occurs if a developer offers a price for a site that is above 80% of the government’s secret reserve price for the site (see Section II for details). The developer was K. Wah International, which successfully triggered the auction for two pieces of land located at 1 Broadcast Drive, Kowloon Tong, Kowloon and Area 77, Ma On Shan, Sha Tin, New Territories. Cheung Kong is one of the biggest property companies in Hong Kong. *Sausalito* is the name of the project. The Centaline Group owns the Centaline Property Agency Ltd., a major property agency in Hong Kong.

<sup>42</sup> This article also appeared in *Ming Pao* under the heading “Sun Hung Kai has a heap of land bank along Castle Peak Road”. The eventual winner was Sun Hung Kai, a major developer in Hong Kong (Sino Land is another major property developer in Hong Kong).

*Sino Land, initially bidding aggressively in the auction yesterday, has two investment properties in the same area. The Ng family (a large shareholder in Sino Land) also privately holds buildings in Gold Coast. If the auction results are favorable, they will benefit indirectly [translation ours].*

We compile a comprehensive database including all 201 auctions in Hong Kong during 1991-2004. The data provide information on various attributes of the land being auctioned, information on individual bids and participants, analysts' estimates of the value of the land being auctioned, and ongoing or completed projects of major developers in each district for each fiscal year. The summary statistics of the main variables used in the analysis is in Table 1. Table 2 shows the impact of auction price on property prices in the nearby region.

Our results support rational overbidding as predicted by auction theory. Our main findings are summarized as the following.

- (1) Toeholds significantly increase the bidder's probability of winning. The details of the results are in Table 3.
- (2) Toeholds significantly increase individual bidders' bids.
- (3) Consistent with the toehold effect but inconsistent with synergy or collusion, stock prices of bidders with significant toeholds experience more positive announcement effects when the bid premia are higher
- (4) The above effects are stronger when there is greater uncertainty about the value of the land being auctioned, which in turn coincides with periods of high property valuation in Hong Kong.

Collectively, our results suggest that developers have a stronger incentive to bid aggressively when the property market is overvalued in order to protect the value of their toeholds.

### **Consequences of Property Market Bubbles<sup>43</sup>**

Housing is the dominant source of private wealth around the world. Housing markets, however, are volatile with large swings in prices. This has raised much concern among both academics and policy makers about the economic consequences of housing price movements. One particular worry in the United States, for example, is that with the current decline in the housing market, consumers cannot continue to borrow against their home value to fuel consumption, which could result in a larger-than-expected economic contraction.

On the empirical front, how housing wealth might affect consumption has not been fully examined, primarily due to the lack of detailed household-level data. Our objective is to use micro data to identify the effect of housing wealth on consumption and, based on a rich set of household characteristics, to examine the mechanism that drives this effect. In particular, we use a large panel dataset that simultaneously tracks the housing wealth and credit card spending of 12,793 individuals in Hong Kong. This dataset allows us to address some important empirical challenges to identification. First, exploiting a transactions database containing all the 1.5 million housing transactions between 1992 and 2004, we track individual housing wealth over time for nine districts in Hong Kong. Compared to metropolitan-level housing returns used in some previous studies, district-wide housing returns in the same metropolitan area are not only a more accurate measure of housing wealth, but they also avoid the endogeneity problem due to metropolitan-level economic shocks simultaneously affecting both housing prices and consumption. Second, we rely on time-series variation within individual households to identify the empirical models (through household fixed effects). This ensures that the estimates do not simply pick up unobserved household characteristics, which have been shown to be important concerns (e.g., Skinner, 1989; Deaton, 1985). Finally, we track consumption growth through households' credit card charges provided by six large credit card issuers in Hong Kong, which is arguably a more accurate measure of consumption than is food consumption alone or its implied total consumption as used in some previous micro studies.

The data also contain a rich set of household characteristics that helps to pin down the mechanism that drives the relationship between housing wealth and consumption. In particular, some households

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<sup>43</sup> This part of the analysis is based on Gan (2010).

own more than one house, which allows me to identify a “pure” wealth effect. Further, some households face more binding liquidity constraints than others, e.g., they are close to their credit limits or cannot pay credit card bills in full, or they may have high housing leverage (i.e., high loan-to-value ratio, or high mortgage payment relative to income). Such variation facilitates a test that distinguishes between the liquidity constraints and precautionary saving. The usual story about liquidity constraints is that a rise in housing wealth relaxes borrowing constraints, resulting in increased consumption and that such an effect should be more pronounced in more constrained households. However, unless one sells one’s house, housing wealth can relax the liquidity constraints only through refinancing, which is costly and occurs infrequently (Bennet, Peach, and Peristiani, 1998). Thus, while a stronger consumption response among those who refinance is evidence of credit constraints, a significant consumption response in the absence of refinancing is more consistent with a reduction in precautionary saving. Moreover, since highly leveraged households are unlikely to have enough precautionary savings, i.e., they have saved less than desired, when increased housing wealth reduces the need for precautionary saving, these households are unlikely to increase consumption. In other words, a reduction in precautionary saving should lead to greater consumption sensitivity responses in less constrained households, which is in contrast to the credit constraint hypothesis.

A second test that can distinguish between liquidity constraints and precautionary saving is to examine consumption responses to predictable versus unpredictable housing returns. It is well known that housing returns are predictable. Since under the liquidity constraint hypothesis housing serves as collateral for borrowing, consumption should respond to all realized price increases whether they arise from the predictable or unpredictable component. The precautionary saving hypothesis, in contrast, implies that consumption would only respond to the unpredictable component of housing returns, to the extent that households have already factored predictable returns into their consumption/saving plans.

Finally, we examine some additional implications of precautionary saving. Specifically, consumption responses should be stronger in younger households that behave more like “buffer stock savers” than do other age groups (Gourinchas and Parker, 2002) and for discretionary spending (e.g., entertainment) as opposed to non-discretionary spending.

We present two sets of results. First, we document the effect of housing wealth on consumption. For every 10% change in housing wealth, consumption responds by 1.7%, an economically significant magnitude. Second, we document how housing wealth influences consumption. A “pure” wealth effect can explain part of the sensitivity: the consumption responses are much greater among households with more than one house. Relaxation of credit constraints also plays a significant role, in that those households that refinance exhibit significantly larger consumption sensitivity to housing returns. However, credit constraints do not explain the consumption responses for the majority of households that do not refinance. For these households, consumption sensitivity seems to be due to a reduction in precautionary saving: (1) there is significant consumption sensitivity even in the absence of refinancing and such sensitivity is driven by less leveraged households whose credit constraints are not binding; (2) consumption responds only to unpredictable housing returns, not to predictable returns; (3) consumption sensitivity mainly occurs among relatively younger households that have been shown to behave more like “buffer stock consumers,” and (4) consumption responses are stronger for discretionary spending (e.g., dining out and entertainment). These findings highlight the importance of precautionary saving and suggest that, even in the absence of refinancing and relaxation of credit constraints, housing wealth can have a substantial impact on consumption.

It is interesting to discuss the economic significance of the baseline estimate of consumption sensitivity, which is 0.17. Between 2000 and 2006, based on the OFHEO housing index, U.S. housing prices grew at an annualized rate of 7.7%. This implies a 1.3% consumption growth. The actual consumption growth is 3.8% per year. Thus 35% of consumption growth during 2000–2006 is driven by housing wealth gains. Another popular housing index, the Case-Shiller price index, reports an annualized housing return of 9.16%, which implies that 42% of consumption growth during 2000–2006 is due to housing wealth gains.

Our estimates also suggest that, during the current economic downturn, every 10% drop in housing price implies a 1.7% drop in consumption. Given that consumption is about 70% of GDP, this translates into a 1.2% decline in GDP. Between 2007Q1 and 2008Q4, the OFHEO index dropped 4.5%, implying a moderate decline in GDP of 0.5%. In contrast, the Case-Shiller index dropped



24.7%, which translates into a 3% decline in GDP.

While the unique dataset from Hong Kong provides an excellent setting to examine the relationship between housing wealth and consumption, it is useful to discuss how the findings may apply to the U.S. and other countries. We believe several factors make the findings in Hong Kong quite general. First, credit cards are widely used in Hong Kong (22% of total consumer expenditure vs. 20% in the U.S.) and credit card spending is a good proxy for non-durable consumption. Second, Hong Kong's mortgage markets are well developed, which encourages home ownership. According to the Population Census 2001, half of the households lived in owner-occupied accommodations. Within these households, about half have outstanding mortgages. By law, people can mortgage up to 70% of their house value and, with a second mortgage, can borrow up to 90%. Third, the precautionary saving motive, which is the main driver of the consumption responses to housing returns, has been documented to affect consumption in the U.S. and other countries. For example, Gourinchas and Parker (2002) estimate that precautionary wealth accounts for 65% of U.S. household liquid wealth.

Hong Kong, however, may differ in a few dimensions from other countries and the U.S. in particular. First, refinancing is not as common in Hong Kong as in the U.S. Since refinancing increases consumption sensitivity, our results probably *under-estimate* the magnitude of the effect of housing wealth on consumption. Second, households in the East typically save more than households in the West, which may strengthen the effect of precautionary saving. Third, in Hong Kong mortgages have adjustable rates (ARM). Thus, while the findings from Hong Kong are useful to predict a directional impact of housing wealth, the exact magnitude should not be simply extrapolated.

The findings contribute to our understanding of the consequences of asset market "bubbles" (or large price movements). The previous literature has identified two channels through which large swings in asset prices may be transmitted into the real economy. One is a collateral channel: the bursting of asset market bubbles is likely to impair collateral values and thus diminish firms' ability to finance investment projects (Bernanke and Gertler, 1989, 1990; Gan, 2006a). The other is a lending channel: the bursting of asset market bubbles impairs the financial condition of banks, since they have significant exposure to asset markets either through their real estate lending or through their direct holdings of equity and land (Bernanke, 1983; Bernanke and Gertler, 1995; Gan, 2006b). The results of this paper shed light on an additional impact of asset market bubbles; that is, the bursting of a housing bubble may amplify a downturn through its negative effects on household consumption.

<Link to the author's homepage> <http://www.ckgsb.edu.cn/jgan>

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## **Effectiveness of Policies in Restraining Property Prices: Lessons from Hong Kong**

**R. Sean Craig and Changchun Hua**

(International Monetary Fund, Resident Representative Office, Hong Kong SAR)

### **Introduction and key results**

This paper examines what drives the residential property price in Hong Kong and the effectiveness of recently policy measures have been in slowing the rapid increase in this price. An econometric model is used to estimate the impact fundamental variables on property prices and test for a statistically significant effect on price of the three main policy instruments: the stamp duty on property transactions, the loan-to-value ratio on mortgage lending and supply of apartment, which is through land sale policy. An event-study methodology is also used to examine the impact of the stamp duty on transaction to “drive speculators out the market.”

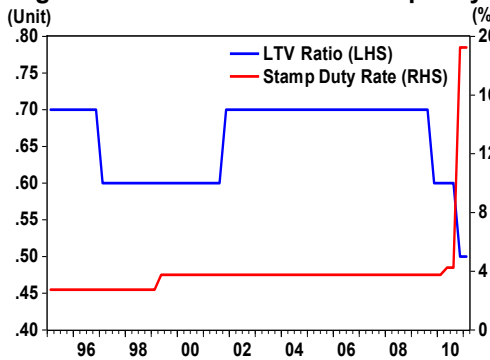
A byproduct of the model is an estimate of the long run “equilibrium” price consistent with property market “fundamentals.” A rise in the actual price above this equilibrium price that is statistically “large” can be interpreted as evidence of a “bubble.” This can help decide whether policy should aim to burst the bubble (i.e. by targeting speculators) or to restrain the fundamental drivers of property prices.

The reduced form model uses a co-integration estimation methodology involving two stages. First, the co-integration equation estimates the long run relationship between the property price and the fundamental variables. Second, the error-correction equation estimates the effect of policies and other variables on short run property price dynamics. The equations perform very well statistically and yield the following results:

- The long run determinants of the property price are real GDP per capita, the real interest rate, building construction costs, new apartments supply, and real domestic credit. Several variables that policymakers control are show to have strong effects: an increase in apartment supply of 1,000 new units reduces the property price by 2.4% (with a lag); a rise in the interest rate of 1 ppt. drives price down by 2.1%; however, a fall in domestic credit of HK\$1 bn reduces price by a small 0.2%.
- The loan to value ratio does have a short run impact, where a 10 ppt. reduction in this ratio slows property price inflation by 2.8%. The stamp duty, in contrast, does not have an effect. An event study analysis shows that the duty does trigger an initial fall in transaction volume and price but this is quickly reversed.
- Finally, there is evidence that the recent sharp rise in the property price reflected a bubble in 2010 as the price moved more than two standard deviations above the equilibrium price. However, this gap has since narrowed as the equilibrium price rose rapidly owing to very favorable fundamentals such as negative real interest rates and rapid GDP growth.

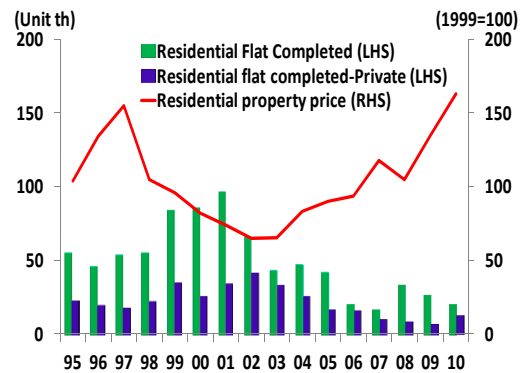
### **Policies to restrain residential property prices in Hong Kong**

The surge in housing prices since mid-2009 raised concern about the risk of a housing price bubble, leading the authorities to take a number of policy measures to slow rising prices. These measures fall into three categories: (i) prudential measures targeting mortgage lending, particularly, reductions in loan-to-value (LTV) limits; (ii) anti-property speculation measures, such as the special stamp duty tax for property transactions; (iii) changes in land supply policy to increase the volume of apartments (Figures 1-2).

**Figure 1: Loan-to-Value and stamp duty rate**

Note: The Special Stamp Duty imposed in Nov 2010 is added to the regular stamp duty rate.

Data source: HKMA and Government

**Figure 2: Residential property price and flat supply**

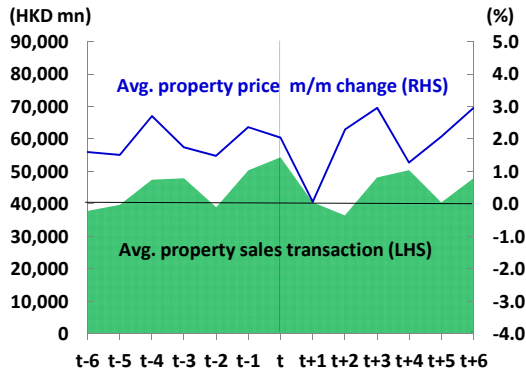
Data source: CEIC

The LTV ratio has been used most actively owing to its prudential role in limiting credit risk in the banking system (Wong et al., 2011). The HKMA tightened LTV ratio several times over the last few years on concerns that rapid mortgage lending might fuel a speculative bubble in property market. At present, properties valued HK\$10 million or above are subject to a 50 percent LTV ratio (Figure 1). The LTV works by slowing residential mortgage lending which, in turn, reduces property purchases. These loans are banks' largest single source of credit exposures in Hong Kong, always accounting for at least 20 percent of domestic loans since 1991 with a peak of 37 percent.

The stamp duty on residential property transactions aims to curb speculative activities in the property market. For example, it raises the cost of buying properties and then reselling them quickly (a practice called "flipping"). The Government introduced a special stamp duty (SSD) in November 2010 on residential properties resold within 24 months of acquisition on top of the existing stamp duty (of 4 percent). The tax rate is 15 percent for properties resold within six months but declines the longer a property is held, falling to zero after 24 months.

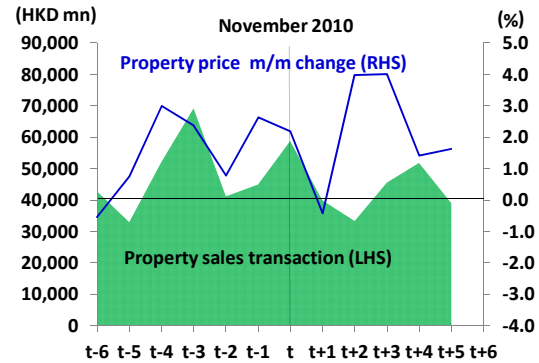
To assess the impact of the stamp duty on the property market we use an event study methodology, which shows property transaction volume and prices around the time of policy adjustments. Figure 3(a) shows the average change in these two variables for increases in the stamp duty in October 2009, April 2010, August 2010, and November 2010. Figure 3(b) shows these changes for just the much large (15 percentage point) increase in the SSD in November 2010. The residential property price growth slowed in the month after the tax was introduced but then rebounded. Similarly, transaction volumes fell for two months after the tax increase but then rebounded. Overall, this suggests a short-lived impact from this policy, which may account for its lack of statistical significance in the econometric model below.

**Figure 3a: Property price changes and transaction volume around stamp duty increases**



Note: Vertical line corresponds to policy change date.  
Data source: CEIC

**Figure 3b: Property price changes and transaction volume around Nov. 2010 stamp duty hike**



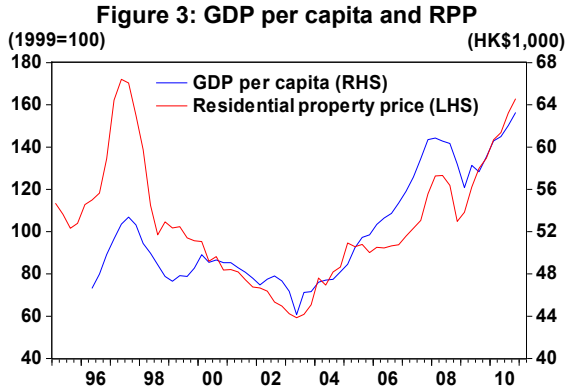
Note: Vertical line corresponds to November 2010.  
Data source: CEIC

The supply of apartments is the third main policy variable that the Hong Kong authorities are relying on to restrain property price increases. Figure 2 suggests the changes in supply of apartments do influence property price. Prices fell during the boom in public housing construction early last decade but then rose after the global financial crisis curbed construction activity in 2008-10. This instrument also works through a relatively indirect channel by shifting the supply curve, typically with a substantial lag, and, thus, needs to be tested econometrically.

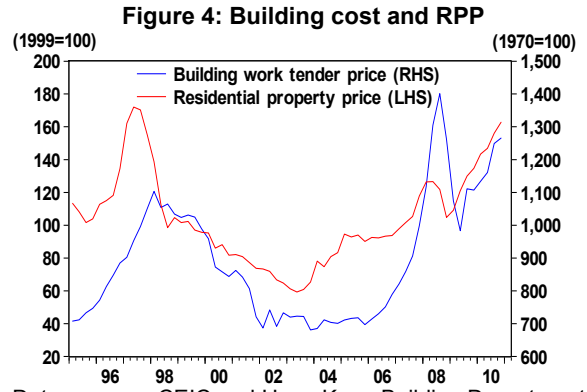
#### **Fundamental determinants of property prices: econometric model specification**

To test whether these policy measures have an effect on property prices we need to estimate an econometric model that can control for other determinants of the property price. To this end, we specify a reduced-form model of the property price that combines both supply and demand side variables. Co-integration analysis is used, which involves estimating: (i) the long run co-integration relationship among variables; and (ii) an error correction model of short run price dynamics that can capture the impact of policies.

The model specification builds on the literature on Hong Kong's residential property market (particularly, Ahuja and Porter, 2010; Chan, Peng, and Fan, 2005; Leung, Chow, and Han, 2008; Lai and Wang, 1999; Peng, 2002). Fundamental variables affecting long run supply in the property are the supply of flats and building costs (essentially materials and labor costs). Flats completed ( $h$ ) appear negatively correlated with residential property price (Figure 2). Building costs ( $c$ ) put pressure on property developers' margin which, in turn, tends to push up residential property price, reflected in the positive co-movement between building work tender price and residential property price (Figure 4).

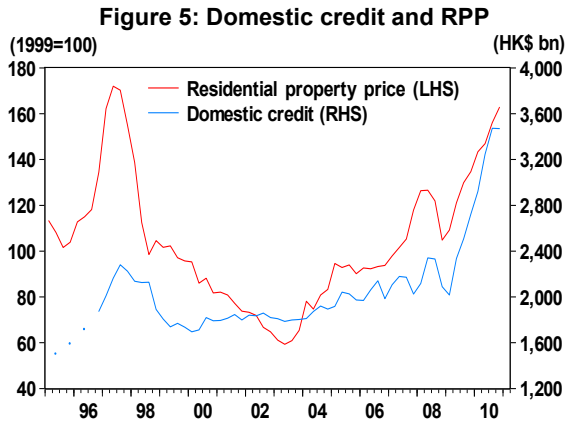


Note: GDP per capita is seasonally adjusted.  
Data sources: CEIC and staff estimation

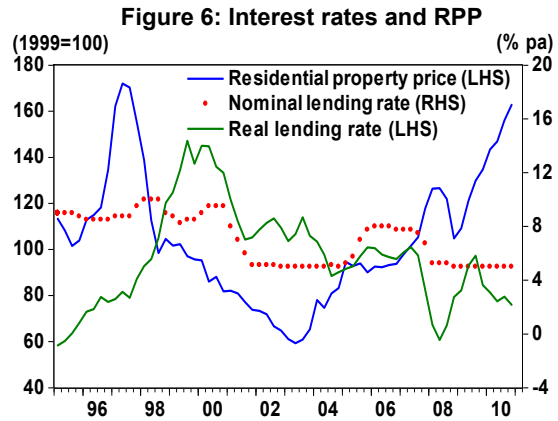


Data sources: CEIC and Hong Kong Building Department

Variables that affect long run housing demand include GDP per capita, the real interest rate, and bank credit. Higher household income ( $y$ ) and lower interest rates ( $r$ ) tend to improve housing affordability, raising housing demand. Thus, residential property price should be positively correlated with GDP per capita (Figure 3) and negatively correlated with the interest rate, as suggested by (Figure 6). Finally, domestic credit ( $l$ ) is a source of mortgage credit and, therefore, contributes to housing demand. Thus, growth in credit would exert positive pressure on the residential property price. Figure 5 shows that the residential property price is positively correlated with domestic credit.



Data sources: CEIC



Data source: CEIC

Assuming a long run linear relationship exists between the equilibrium residential property price and the above variables, the co-integrating equation specification is:

$$p_t^* = \alpha_0 + \alpha_1 c_t + \alpha_2 h_{t-m} + \alpha_3 y_t + \alpha_4 r_t + \alpha_5 l_t \quad (1)$$

To allow for the long lag it takes for completed flats to come onto the market and be sold,  $h$  enters the equation with  $m$ -quarter lag, with  $m$  determined by empirical tests. The variable  $p^*$  is the “equilibrium” property price as determined by long run fundamentals. Assuming statistical tests find a long run co-integrating relationship among  $p_t$ ,  $c_t$ ,  $h_{t-m}$ ,  $y_t$ ,  $r_t$  and  $l_t$ , the associated error correction model of short-term price dynamics that can be used to test for the impact of policies is:

$$\Delta p_t = \beta_0 + \lambda \Pi_{t-1} + \beta_1 \Delta c_t + \beta_2 \Delta h_{t-m} + \beta_3 \Delta y_t + \beta_4 \Delta r_t + \beta_5 \Delta l_t + \varpi_1 LTV_t + \varpi_2 SDT_t \quad (2)$$

The error-correction term in this model,  $\Pi_{t-1} = p_{t-1} - p_{t-1}^*$ , is the error term from equation 1 lagged one period. This term is the deviation of the actual residential property price from the long-run equilibrium price estimated in equation 1. The parameter on this term,  $\lambda$ , represents the speed of adjustment of the property price back to its long run equilibrium value. The loan-to-value ratio and stamp duty tax are represented by the variables  $LTV$  and  $SDT$ .

**Table 1: Estimation of long-run determinants of real property price (equation 1)**

<b>Dependent variable:</b>	<b>Co-integration Equation Beta (t-stat)</b>
<b>Log(real property price)</b>	
<b>Constant</b>	-0.525245 (-0.741438)
<b>Linear trend</b>	-0.028775*** (-9.435119)
<b>Real interest rate</b>	-0.020640*** (-2.930558)
<b>Real GDP per capita</b>	0.050169*** (6.122004)
<b>Log(real tender price)</b>	0.496790*** (5.019790)
<b>Private flat supply (t-2)</b>	-0.023163** (-2.371821)
<b>Real domestic credit</b>	0.000229*** (3.595604)
<b>Adjusted-R<sup>2</sup></b>	0.935494
<b>DW-Statistic</b>	1.335613
<b>Obs.</b>	54 (1997Q2-2010Q3)

Notes: (1) Relationships are estimated using dynamic least squares (DOLS) method with one lead and one lag heteroskedasticity-autocorrelation consistent (HAC) standard errors. The lead and lag of the dynamic terms are not shown in the table. (2)\*\*\* 1% significance, \*\* 5% significance, \* 10% significance

### Model estimation results

Equations (1) and (2) are estimated using quarterly data from 1996 to 2010, with nominal variables deflated by the CPI. Unit root tests for all the variables used in regressions find that  $\log(p)$ ,  $\log(c)$ ,  $h$ ,  $y$ ,  $r$  and  $l$  all have one unit root (Annex Table 2). Johansen's system co-integration test shows that at least two long-run co-integrating relationships exist for these variables, even allowing for a linear trend in the co-integration equation.

Estimation results for **the co-integration regression** (Table 1) show all variables have the correct signs and are statistically significant at the 1% or 5% level (except the constant). Specifically: (i) a one percentage point (ppt) hike in real interest rate reduces real residential property price by around 2.1%; (ii) a rise of HK\$1,000 in real GDP per capita tends to raise real residential property price by around 5.0%; (iii) a 1% increase in real building cost push up real residential property price by around 0.5%; (iv) an additional 1000 units of flat supply drives real residential property prices down by 2.3%; and (v) an additional HK\$1bn in real domestic credit increases real residential property price by 0.02%.

Table 2: Estimation of Error Correction Model for real property price (equation 2)

Dependent variable:	ECM with fundamental variables	ECM with policy variables added
$\Delta \log(\text{real property price})$	Beta (t-stat)	Beta (t-stat)
Constant	-0.023146** (-2.201444)	-0.211624** (-2.077761)
Error-correction term (t-1)	-0.394885** (-2.118987)	-0.353804* (-1.858808)
$\Delta \log(\text{GDP Per capita})$	1.854512*** (3.612215)	1.757416*** (4.005522)
$\Delta$ Real interest rate	-0.005269 (-1.195832)	-0.005823 (-1.162467)
$\Delta \log(\text{real tender price})$	0.205364* (1.741719)	0.193986* (1.839850)
$\Delta$ Private flat supply(t-4)	-0.005397 (-1.648900)	-0.005259 (-1.656847)
$\Delta \log(\text{real domestic credit})$	0.050239 (0.260668)	0.034544 (0.152532)
LTV ratio		0.284502* (1.920769)
Stamp duty tax		0.000257 (0.139442)
D_200809	0.046044** (2.357752)	0.053638*** (2.891861)
Adjusted-R <sup>2</sup>	0.351439	0.372708
DW-Statistic	1.991812	2.111342
Obs.	54(1997Q3-2010Q4)	54(1997Q3-2010Q4)

Notes: (1) All specifications are estimated using OLS method with HAC standard errors.  
(2)\*\*\* 1% significance, \*\* 5% significance, \* 10% significance

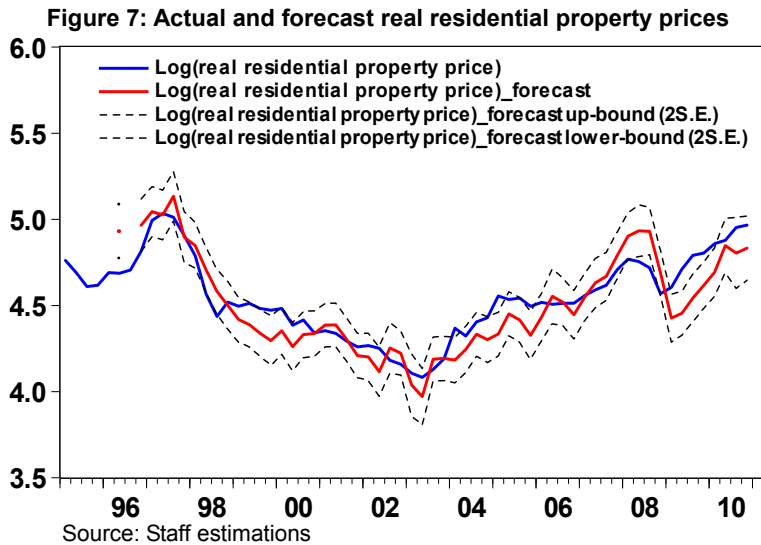
Estimation results for the **error correction model** (Table 2) are shown for two specifications: with just the fundamental variables from the long run, co-integration equation (in Table 3); and with property-related policy variables, the LTV ratio and stamp duty tax, added. Also added is a dummy variable for September 2008 when Lehmann Brothers failed. The results show: (i) that the real interest rate, apartment supply and real domestic credit do not have statistically significant short run effects on property prices. This may reflect the long lags and relatively indirect transmission channels (i.e. through the mortgage market) for these variables. (ii) A one ppt increase in the real GDP per capita growth rate temporarily raises real property price inflation by around 1.8 ppt. (iii) A one ppt rise in real building cost temporarily raises the growth rate of the real residential property price by around 0.2 ppt. Finally (iv) the coefficient on the error-correction term shows that one-third of the deviation between the actual and long-run equilibrium property prices is closed within one quarter.

Tests for the effectiveness of property-related policy instruments show that the LTV ratio has a statistically significant effect (at the 10% level) but the stamp duty tax does not.<sup>44</sup> Specifically, (v) a 10-ppt LTV ratio tightening slows the growth rate of real residential property price by around 2.8 ppt. The failure of the stamp duty tax to have a statistically significant impact on the property price may be due its highly transitory effect revealed in the event study analysis above. Another explanation is that changes in the tax have been too small and infrequent (until 2010) for there to be a statistical effect. Nevertheless, the tax can still achieve in its objective of driving speculators out of the market without have a lasting effect on price since most buyers may be intending to hold their properties for a longer period anyway (rather than flipping them).<sup>45</sup>

<sup>44</sup> Results remain largely unchanged when policy dummy variables, instead of actual LTV ratio or marginal stamp duty rates, are used in the regressions.

<sup>45</sup> Evidence for this interpretation comes from the fact that the SSD did sharply reduce residential property confirmor transactions. These are when a buyer re-sells the flat to a sub-purchaser before the legal completion of the original sale. It



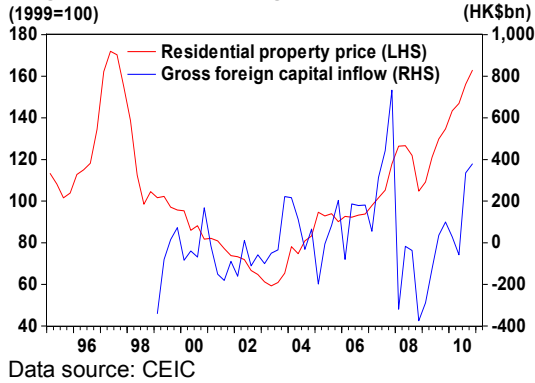
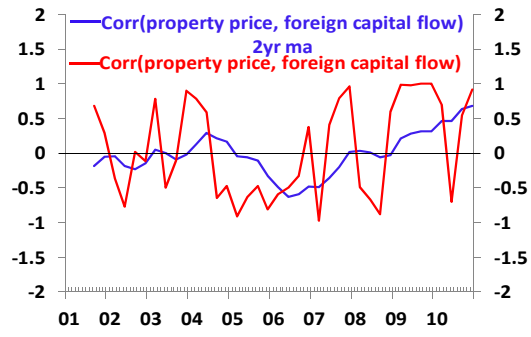


#### Evidence of a residential property price bubbles

The model estimation results can shed light on whether the recent sharp rise in property prices is due to a property market bubble. In this context, a property price bubble can be defined as a rise in the actual price above the long run equilibrium price estimated from fundamentals variables in the long run model (i.e. Equation 1/Table 1). When this gap is statistically “large” – two standard deviations – this can be interpreted as a bubble. Figure 7 shows that the actual price moved above the 2.s.e. error bank during 2009 – providing evidence of a bubble – but in 2010 the gap closed owing to a more rapid increase in the equilibrium price. This latter convergence reflects the fact that the fundamental variables turned highly supportive of rapidly rising property prices with, owing to negative real interest rates, a limited supply of new apartment, and rapid real GDP and domestic credit growth. Overall, this suggests that policy should focus on restraining the fundamental drivers of property prices rather than seeking burst the bubble by targeting speculators.

#### Evidence of an impact of global capital flow on property

Finally, it is often argued that strong capital inflows have contributed to the rapid rise in residential property prices in Hong Kong or other location. This could occur either directly via foreign investments in local properties; or indirectly, through the impact on the risk appetite of local investors. This paper tested whether various measures of capital flows had an impact on property prices once you control for other fundamental variables and rejected the hypothesis that there was an effect. Figure 8 reveal why the model failed to find a statistically significant effect: the correlation between capital inflows and residential property prices is quite unstable, shifting between negative to positive a number of times over the sample. Of course, capital flow might have an indirect effect through its impact on monetary conditions; this effect is fully captured by the interest rate in the model.

**Figure 8a: Gross foreign capital inflow and RPP****Figure 8b: One-year rolling correlation between foreign capital inflow and RPP**

## Conclusions

Several results emerge from the analysis of the effectiveness of policy measures targeting the rapid increase in property prices in Hong Kong.

- Several variables that policymakers control have strong effects: particularly an increase in apartment supply, although this instrument operates with a lag; a rise in the real interest.
- The loan to value ratio does have a short run impact on property prices but the stamp duty, in contrast, does not. An event study analysis shows that the duty does trigger an initial fall in transaction volume and price but this is quickly reversed.
- There is evidence that the recent sharp rise in the property price reflected a bubble in 2010 as the actual price moved significantly above the model's equilibrium price. However, this gap has since narrowed as the equilibrium price rose rapidly owing to very favorable fundamentals such as negative real interest rates, limited new apartment supply and rapid GDP growth.

Annex Table 1: Descriptive statistics

	Real property price index	Real interest rate (% pa)	Real GDP per capita (HK\$1,000)	Real tender price index	Private flat supply (1,000 units)	Real domestic credit (HK\$bn)
<b>Mean</b>	97.82463	5.729834	49.63401	840.1864	5.602029	1930.601
<b>Median</b>	93.49585	5.749740	46.85162	802.1290	5.363628	1847.843
<b>Maximum</b>	153.6208	14.36727	62.57585	1286.820	14.05453	3146.273
<b>Minimum</b>	59.30000	-0.85704	39.61064	667.9111	0.860224	1510.144
<b>Std. Dev.</b>	23.36797	3.728575	7.497390	143.6422	2.902988	335.1206
<b>Skewness</b>	0.524963	0.464606	0.353932	1.063480	0.520446	1.915237
<b>Kurtosis</b>	2.676829	2.773783	1.550031	3.557326	3.275895	7.126138
<b>Jarque-Bera</b>	3.218095	2.438961	6.400228	12.89219	3.043886	79.24388
<b>Probability</b>	0.200078	0.295384	0.040758	0.001587	0.218287	0.000000
<b>Sum</b>	6260.777	366.7094	2928.407	53771.93	352.9278	115836.0
<b>Sum Sq. Dev.</b>	34401.91	875.8433	3260.229	1299883.	522.4952	6626044.
<b>Obs.</b>	64	64	59	64	63	60

Note: Nominal data are deflated by CPI at the quarter.

Data sources: CEIC and Hong Kong Building Department

Annex Table 2: Unit root test result (ADF-test)

	(c, t, L)	Level	First difference	I(k)
<b>Log(real property price index)</b>	(c, t, 1)	-0.762193	-5.489621***	I(1)
<b>Real interest rate</b>	(c, 0, 1)	-2.140323	-5.086072***	I(1)
<b>Real GDP per capita</b>	(c, t, 1)	-1.692138	-5.636148***	I(1)
<b>Log(building work tender price index)</b>	(c, 0, 1)	-1.481188	-5.877528***	I(1)
<b>Private flat supply</b>	(c, 0, 2)	-1.937870	-10.20554***	I(1)
<b>Real domestic credit</b>	(0, 0, 6)	1.536115	-3.096750***	I(1)

Notes: (1) Null hypothesis: variable has a unit root. Lags in the test are automatically selected.

(2) \*\*\* 1% significance

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## Managing boom and bust in real estate: What lessons can India offer?

Ila Patnaik

The monetary policy strategy of central banks has traditionally focused on delivering low and stable inflation. In this framework, asset prices play a role only to the extent that they affect consumer price inflation. In the recent literature, there are new arguments suggesting that asset prices may be important for monetary and financial stability (Ingves, 2007; Iacoviello, 2005; Lambertini and Forlati, 2011). It can be argued that asset price booms set off economic distortions, endanger systemic stability and make it difficult to achieve inflation targets.

At the same time, monetary policy is a relatively weak tool for addressing asset price booms. The linkages from the short-term interest rate to asset prices are not well understood (Giavazzi *et al.*, 2006; Williams, 2011). As a consequence, there may be a case for using tools of financial regulation in addressing asset price bubbles such as those in real estate (Allen and Carletti, 2010; Christensson *et al.*, 2010; Scrine, 2010). It is argued that counter-cyclical variation of financial regulation can help reduce the extremities of boom and bust in the real estate market.

The Indian central bank has argued that one of the reasons that India fared relatively well in the global crisis of 2008 was the counter-cyclical variation of capital for loans against real estate, which insulated financial firms and countered the boom-and-bust of real estate prices (Scrine, 2010).

As an example, a speech by Deepak Mohanty, the executive director of RBI, in 2010 says: *the experience in the use of pro-cyclical provisioning norms and countercyclical regulations ahead of the global crisis helped enhance financial stability.*

International perception about the regulatory intervention in India is similar: *One of the reasons that India fared relatively well in the global crisis of 2008 was the counter-cyclical variation of capital for loans against real estate, which insulated financial firms and countered the boom-and-bust of real estate prices.* (Scrine, 2010).

Contemporary thinking about macro-prudential regulation in connection with the field of real estate is still evolving. This is a field where academics and practitioners have been engaged in considerable debate from 2008 onwards, which has resulted in a gradual evolution of thinking. While key ideas of the field continue to be vigorously debated, a broad outline of the contemporary consensus is required as the conceptual framework that is used in the body of the paper.

In the aftermath of the global crisis of 2008, there has been a fresh focus upon the field of real estate. The case for a special focus, in financial regulation, upon real estate can be motivated from three kinds of perspectives:

**Concerns about the banking system** The supervisor of banks may feel that the internal risk management of banks has deficiencies through which they have an excessive exposure to real estate. This may motivate special efforts to limit the risk of the banking system in the scenario of a collapse in real estate prices. This consideration falls under the traditional rubric of micro-prudential regulation and supervision of banks.

**Concerns about the financial system** Financial regulators may look beyond banking at the overall system. Even if every bank is safe in the scenario of a crash in real estate prices, this may induce severe distress in the financial system, depending on the financial firms which are ultimately holding this credit risk, and their capacity to absorb these losses. The essence of macro-prudential regulation lies in understanding the overall placement of risk in the financial system.

**Combating asset price bubbles more broadly** Even if the financial system is robust to shocks in real estate prices, there may be a case for identifying asset price bubbles and using tools of financial regulation in order to lean against the wind.

The objective of this paper is to examine the role of counter-cyclical regulations in ensuring financial stability in India. We first examine the size and characteristics of the mortgage market in India. Did financial institutions have large risk exposure to household mortgages? Do we see an asset price bubble in the housing market? We go on to ask:

- What were the regulatory changes for counter-cyclical policy in this sector?
- What impact did they have?
- What conclusions can we draw from the Indian experience?

Demand for housing is expanding rapidly as India urbanises and witnesses high GDP growth. Mortgages are a small and still underdeveloped financing instrument. Banks have low exposure to housing finance. There is also not much evidence of a speculative boom and bust cycle in housing prices.

In this paper we find low exposure of financial institutions to real estate. Of the total flow of credit, bank loans to real estate companies were 3-4 percent, for bigger loans (about USD 30,000) were another 3-4 percent, and for small low cost housing were 10 percent. In addition, specialized housing finance companies offered mortgages, but the total amount was smaller than that of banks. These are low by international standards.

Further, there is little evidence of an asset price boom and bust in Indian real estate prices. While prices did rise, they did so in line with other asset prices. While prices did rise, they did so in line with other asset prices, such as stock prices. However, unlike in the stock prices where there was a bust after 2008, this did not happen in real estate prices.

There is also no evidence of high credit risk with home loans. While the default history of housing loans by banks is not available, that of HEFC, the largest housing finance company, which accounts for nearly 50 percent of all housing loans, has a history of default of less than one percent. This did not change after the crisis.

There thus appears to no serious case for concern about risk to the Indian financial system as a whole from a real estate cycle. It seems more likely that the Indian economy was saved from the financial crisis because to begin with the exposure to housing was low.

Total size of mortgage market did not decline after prudential norms were tightened in Nov '05 and May'06. New mortgages shifted from banks to housing finance companies. Bank lending to HFCs increased sharply. In summary, it seems that India was not affected by the sub-prime crisis because there was low penetration of the mortgage market in India. Even though the change in provisioning shifted mortgages from banks to HFCs, the risk remained within the banking system.

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# Household Borrowing During a House Price Boom

Haakon Solheim

## Introduction

It is an empirical fact that there is a close link between house prices and household debt. We also know that there is a close link between house prices, household debt and the severity of economic crises, see e.g. IMF (2011). This kind of insight has led to a search for policy instruments to control the fluctuations in house prices and household debt. Measures that have been proposed are typically on the supply side of credit, such as stricter loan-to-value (LTV) requirements or larger capital buffers in banks.

It is not hard to predict that such measures will tend to have different effects on different groups of households. Typically, supply-side measures will hit harder on presumably more risky customers. For example, a stricter limit on the LTV ratio could be expected to restrict credit growth in young households, who tend to have high LTV ratios, while credit growth in older households, with low LTV, would be unaffected. To understand the impact of such policies, we therefore need to focus attention not only on the development of debt over time, but also across groups.

There exists a number of datasets of containing granular micro data on households. Recent publications using micro household data include Redwood and Tudela (2004), Johansson and Persson (2006) and Rochelle Belkar and Edwards (2007). We use a very granular data set from Statistics Norway. Previous publications using these data include Riiser and Vatne (2006), Vatne (2008) and Riiser (2009).

In this study, we distinguish between households according to the age of the main income earner. In the data set, we observe average levels of debt, income, bank deposits, housing value and house ownership for households between 25 and 75 years old, leaving us with 51 age groups. We define the debt burden as the share of income needed to service a given level of debt, assuming a constant interest rate and a 30-year repayment schedule. The data covers the time period from 1987 to 2008. Overall, this was a period with sharply rising house prices, income and household debt. From 1990 to 2008 real house prices, measured as the average square meter price, rose by almost 120 per cent.

We begin by introducing our rather interesting set of data. We calculate a measure of debt burden across age groups. We then model the debt burden as a function of both macro and micro variables, using panel regressions. We look at both within and between effects to identify how different factors will affect the debt burden across age groups. Finally, we discuss the policy implications of our findings.

## Data

The micro data is from income statistics compiled by Statistics Norway. The main source of information is Norwegian tax returns.<sup>46</sup> The population consists of all persons residing in Norway as of 31st December of the fiscal year.<sup>47</sup> The person is associated with a household, where a household is defined as people living at the same address. The age of the household is defined by the age of the person with the highest income in the household. In our sample, we use the average level of debt, income, bank deposits, percentage of home owners and housing wealth for households in each age group from the age of 25 to the age of 75, which gives us a total of 51 groups. The data cover the period from 1987 to 2008, but data on housing starts in 1992. We also have data on the number of households in each age group and on the number of households owning a house in each age group.

When calculating average holdings, we exclude households with the lowest 10 per cent of income and those with the highest 10 per cent of income. These groups tend to be problematic. The lowest

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<sup>46</sup> See [http://www.ssb.no/iffhus\\_en/](http://www.ssb.no/iffhus_en/)

<sup>47</sup> From 2005 our data include the whole population. Before 2005 we only have a representative sample of approximately 30,000 households. This will account for the fact that across age comparisons will be smoother when we look at samples that only include data from 2005-2008.

income group is quite versatile, as it includes both people with low income and low net wealth and persons with high net wealth but low income (e.g. for tax reasons). The highest income group is not very representative of the population as a whole.

The highest debt levels are found among households between 30 and 40 years old, see Chart 1, which shows the distribution of relative debt holdings per age group across the 51 age groups. The average level of debt has increased over time (Chart 2). There is evidence of a structural break around year 2000. Debt has increased for all groups, but tends to increase more for the older groups in the sample (Chart 3).

Income reaches its highest level at about the age of 40 (Chart 4). Income has increased much less than debt, but as was the case for debt, trend growth in income has increased most for the older groups (Chart 5). The “dip” for groups aged 62-63 is probably due to more households taking early retirement over this period. The minimum age for early retirement is 62.

The degree of home ownership in Norway is high. Among households between 40 and 75 almost 80 per cent own their own house (Chart 6). The rate of ownership has fallen slightly for most age groups over the last two decades, but it has risen for households older than 60 (Chart 7). However, the changes have been quite small.

Our data contains the tax value of household’s housing wealth. The tax value of a house is lower than the market value; according to law, the tax value shall not exceed 30 per cent of the market value of the property. On average, the tax value equals 18 per cent of the market value in 1999 and 21 per cent of the market value in 2007, according to calculations made by Statistics Norway. As this relationship seems fairly stable over time, we approximate market value by assuming that tax value in our sample equals 1/5 of market value over the whole period.

From house value data and data on ownership, we can calculate the age-specific level of the house price. This variable is highly correlated with the aggregate house price index observed in macro.

For most households, the security of real importance is the value of the house. We cannot differentiate between secured and unsecured debt, but from other sources we know that about 80 per cent of household debt is comprised of mortgages. In our data, we define LTV as the current level of debt over the current value of housing.

Chart 8 shows the distribution of LTV across age groups. As we see, the LTV ratio falls with age. Note that while the distribution is reasonable, the levels should be interpreted with some caution. As our transformation from housing wealth to market value is quite rudimentary, we might underestimate the actual security of lending. Furthermore, household borrowing includes other types of loans than mortgage loans. For example, younger households hold a high level of student loans, but home ownership is low. LTV will therefore be higher for these groups.

The tendency towards a high LTV among the young has actually become more pronounced over the sample period. LTVs have increased for all groups, but most among the young. This is despite the fact that debt has increased more for older households. One reason is that older households have increased their home ownership ratio as well.

### **Financial Innovation: Changes in Bank’s Credit Policy**

Over the sample period there has been two quite explicit shifts in the credit practice of Norwegian banks. The first change came in the late 1990s. Some small banks began to offer interest-only periods on new mortgages. The larger banks then followed. In our estimations, we date this transformation to the year 2000. This product was mainly offered to young customers with high expected wage growth.

Around 2005 banks introduced “flexible credit lines” for households. The limit of the credit lines was typically 60 per cent of house value and repayment is often flexible. From 2005, the level of credit drawn on such credit lines was identified as an independent statistical series in official bank statistics. The statistical reports include only actual lending and not the size of the credit lines.



For households that already have a high LTV, such credit lines have little importance. However, for households with a low LTV, this innovation gave an opportunity to increase borrowing on existing home values.<sup>48</sup>

## Debt Burden of Households

Debt levels alone are not enough to identify the debt burden of the household. What is important is the household's ability to repay a loan, given income and other assets. In the literature there exist a number of measures to capture household debt burdens, from basic debt-to-income to measures based on actual average time to maturity and the term of the interest rate contracts.

We assume that all debt, independent of age of the household, can be refinanced as an annuity loan with 30 years to maturity. This is the standard contract for a Norwegian household. This measure will underestimate the current cost of installments, but will be closer to the minimum cost of installments, and therefore to the size of exposure in a crisis.

Further, we assume that households relate the size of the annuity loan to their expected income over the same period, i.e. 30 years. When calculating expected income, we not only look at average expected real wage growth, but also at expected real wage growth given the age of the household. More specifically, we calculate a wage increase index based on the distribution of income across households, as shown in Chart 4. This implies that a household at the age of 25 can expect higher wage growth, all things equal, than older households.

Last, because we want to focus on changes in debt levels, real interest and real income growth are held constant. For simplicity, we set rates equal to the average rate observed over the sample period (1987-2008). The result is a measure that reflects the share of income needed to cover debt obligations, while holding interest rates and wage expectations constant over time.

In Chart 9 we show how our measure of the debt burden has changed between the late 1980s and the 2000s. As might be expected, it reaches its highest level among households in their early thirties, and then falls gradually. Over the last 20 years, the rate has shifted up for all age groups. However, as we can see in Chart 9, the change has been stronger for the most mature segment of the population.

## Panel Estimation

We have a panel of 51 groups and 16 time periods. To explain the changes in the debt burden we estimate a fixed effects panel model. We include four macro variables in the regression:

- changes in real income,  $d(\text{INC}_r)$
- changes in the real interest rate,  $d(\text{R}_r)$
- the level of the real interest rate,  $\text{R}_r$
- changes in real house prices,  $d(\text{PHN}_r)$ .<sup>49</sup>

In addition we include four micro variables:

- Share of house ownership, both change and lagged level (OWNER)
- Age-specific, inflation-deflated level of house prices lagged by one period (HouseValue)
- Level of debt-to-income as an in time measure of exposure, lagged by one period (DTI)
- Level of LTV lagged by one period (LTV)

Finally, we include the two policy shift dummies discussed above.  $\text{Dummy}_{2005}$  takes the value 1 from 2005-2008, while  $\text{Dummy}_{2000}$  takes the value 1 from 2000 to 2008.

First, we estimate the panel using the whole data set. Then we differentiate between different age groups. More specifically, we split the sample into groups containing 20 age groups, in continuous

<sup>48</sup> The product was offered to all households. For older households it would however have some of the same features as "reverse mortgages", as offered in e.g. the USA.

<sup>49</sup> We use the macro house price variable when we look at price changes, as the tax-data based micro price variable includes a lot of noise when we differentiate it.

and increasing order. We estimate the regression using fixed effects. Next, we eliminate the youngest age group, and include an older age group, retaining a sample covering 20 age groups, and estimate again. By doing this, we can graph how coefficient values change as we move towards older groups of households. In total we run 31 regressions. In Table 1, we report the results from the regression on all households, and three of these 31 regressions.

We concentrate our attention on the most important findings. First, the effect of changes in the interest rate is, as expected, negative and highly significant. The effect across groups is illustrated in Chart 10. As we can see, the effect increases with age, indicating that older households are more interest rate sensitive than younger households. If we assume that younger households to a larger extent borrow to buy a house while older households borrow to consume, this tendency is not unreasonable.

The effect of a change in the level of home ownership is positively correlated to the change in debt burden and increases with age. This effect might indicate that older households borrow using their house as security, while younger households can borrow e.g. based on the level of income.

Both the change in house prices and the level of house prices are only significant for the younger groups of households. The development of the coefficient of the level of house prices when we move across different age groups is illustrated in Chart 11. As we see can see from Table 1, a one per cent increase in the level of house prices increases debt payments as a share of income by 0.06 per cent for the age groups between 25 and 45.

The DTI seems to work as stabilizing mechanism. A high DTI will reduce the future debt burden. This is the case for all groups, but the effect is significantly larger the younger the household (Chart 12), indicating that banks' assessment of creditworthiness changes with the age of the household.

The LTV is positively correlated with the change in debt burden, but only for younger households, as shown in Chart 13. If we reduce the LTV for households under 45 by 1 per cent, we reduce the level of debt payments to income by approximately 0.04 per cent.

The effects for the two policy dummies are also interesting. We find that the change in 2000 mainly seems to affect younger households, as was expected. We also find that the change in 2005 for all practical purposes had the effect of introducing reverse mortgages in Norway. It increased credit growth among the old, but not among the young.

## Conclusion

Our first conclusion must be that, not surprisingly, age matters. Looking at more granular data really adds value to the analysis. Factors that drive credit growth are different across age groups. Younger households tend to borrow to buy a house and, not surprisingly, their borrowing behavior tends to be dominated by house prices. Older households borrow for other purposes, but with their house as security. They therefore tend to be more interest rate sensitive. On the other hand, their credit growth is also more sensitive to the extent of home ownership.

LTVs and DTIs both affect households asymmetrically across age groups. Younger households are much more sensitive to these factors than older households. This should be no surprise, given that the high debt levels among younger households would indicate that these measures primarily are a constraint for the young.

Last, the effect of financial innovation is substantial. Of course, given that the last dummy only covers a relatively short time span, we cannot say whether this is a long-term growth effect or just a short term adaption of new instruments. All the same, the substantial size of these coefficients indicates that financial innovation will have macro impact.

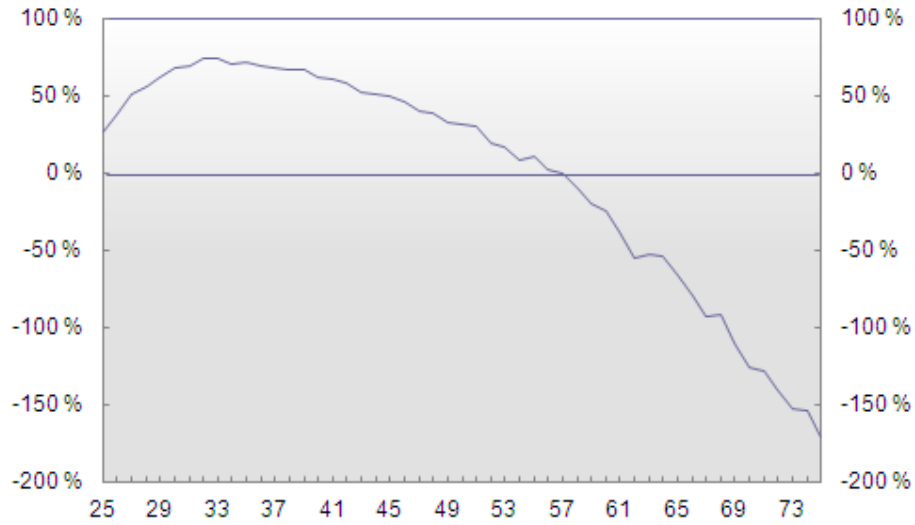
What are the implications for authorities wanting to restrain growth in credit? First, if they want a measure that works across the board, interest rates are most effective. However, we cannot dismiss the effectiveness of supply-side measures like the LTV based on these results. One might point out that putting a cap on LTVs would mainly affect younger households. However, these are the households that increase credit growth the most in response to rising house prices. In fact, we find

that the effects of the LTV and house prices on credit growth are almost symmetrical. If one could cap the LTV of households under 40 by 1.5 per cent, one would effectively nullify the effect of a house price increase of 1 per cent (cross-effects not taken into account).

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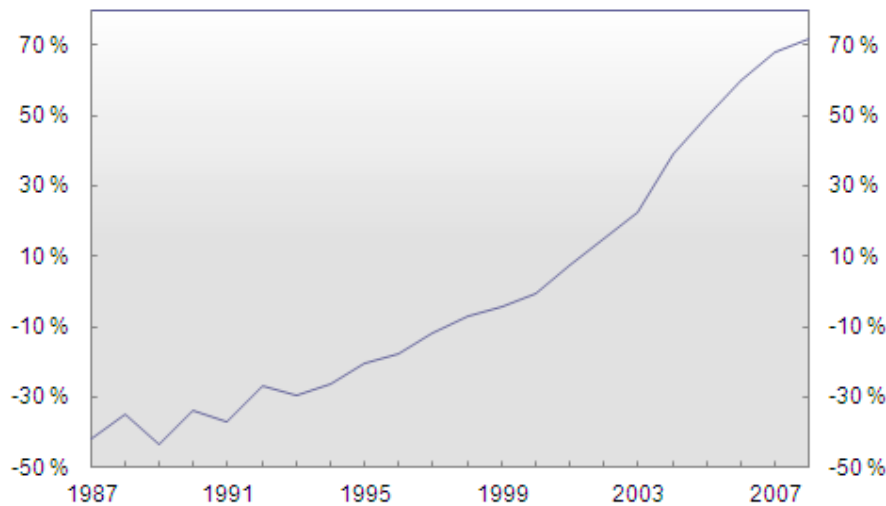
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Figure 1 Distribution of debt across age groups<sup>1)</sup>. Average for sample period 1987-2008. Per cent.



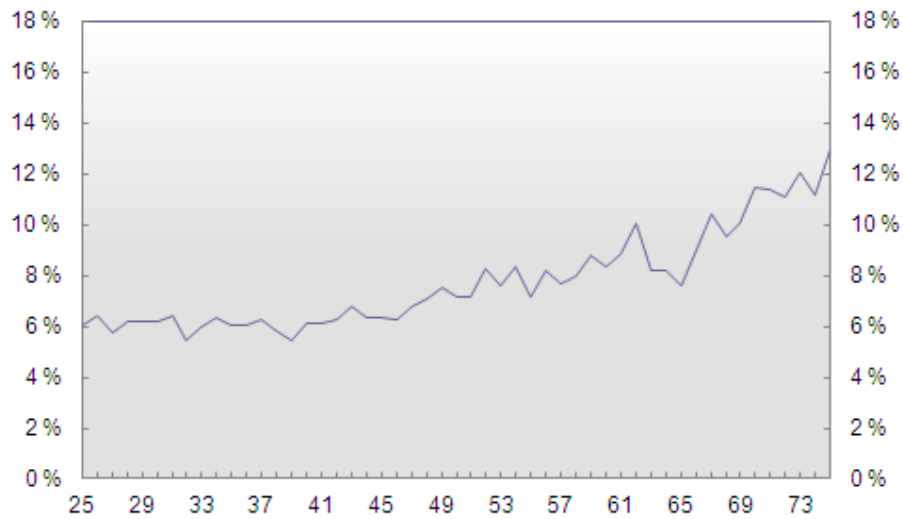
1) Fixed cross-section effects of a regression on the average level of debt per household per age group and a constant over the period 1987-2008. Source: Norges Bank

Figure 2 Nominal debt per household in a given year relative to average debt over the whole period<sup>1)</sup>. 1987-2008. Per cent.



1) Fixed period effects of a regression on the average level of debt per household and a constant. Source: Norges Bank

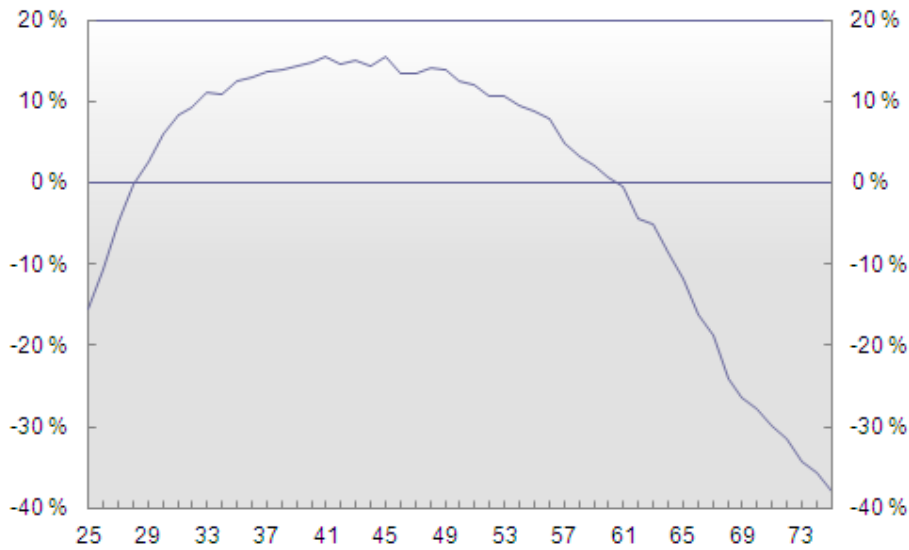
Figure 3 Average percentage increase in real debt per household across age groups from 1987 to 2008<sup>1)</sup>. Percentage.



1) Average increase calculated as a trend coefficient in a regression over debt levels from 1987 to 2008.

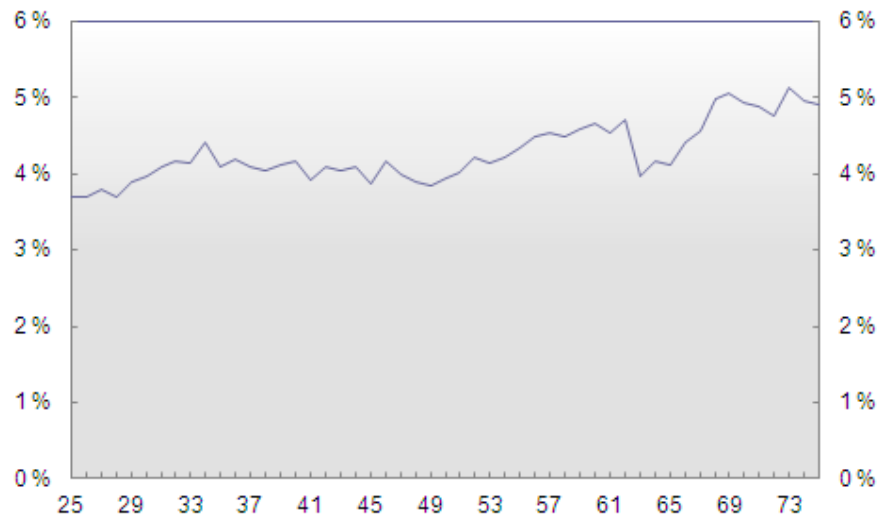
Source: Norges Bank

Figure 4 Distribution of income across age groups<sup>1)</sup>. Average over sample period 1987 to 2008. Per cent.



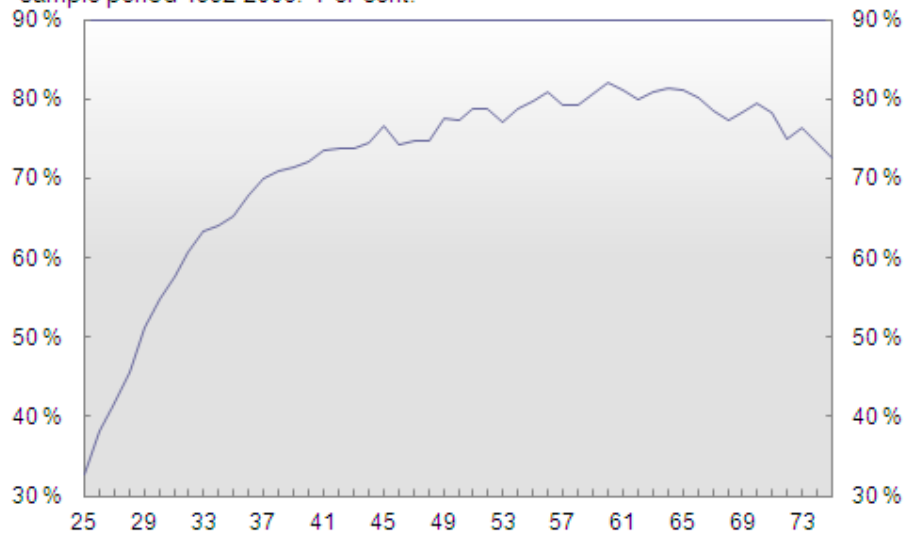
1) Fixed cross-section effects of a regression on the average level of income per household and a constant. Source: Norges Bank

Figure 5 Average annual percentage increase in real income per household across age groups from 1987 to 2008<sup>1)</sup>.



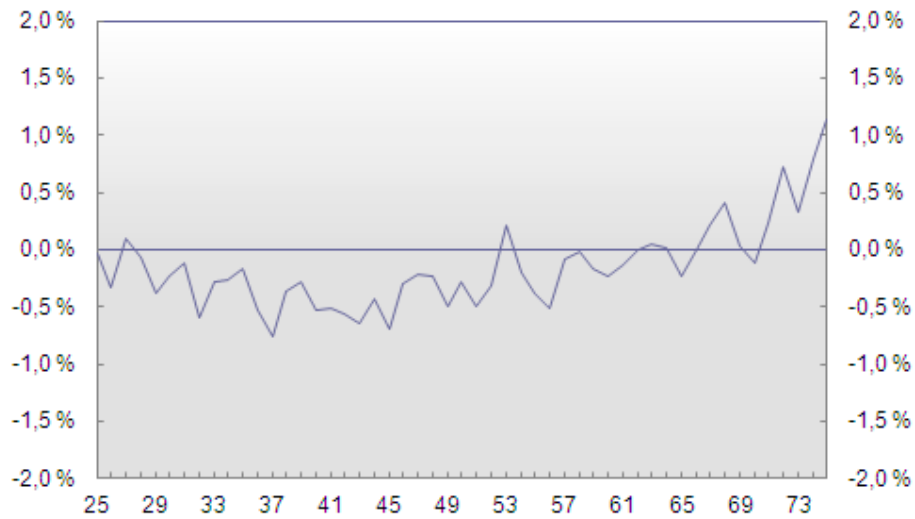
1) Average increase calculated as a trend coefficient in a regression over debt levels from 1987 to 2008. Source: Norges Bank

Figure 6 Share of home ownership across age groups<sup>1)</sup>. Average over the sample period 1992-2008. Per cent.



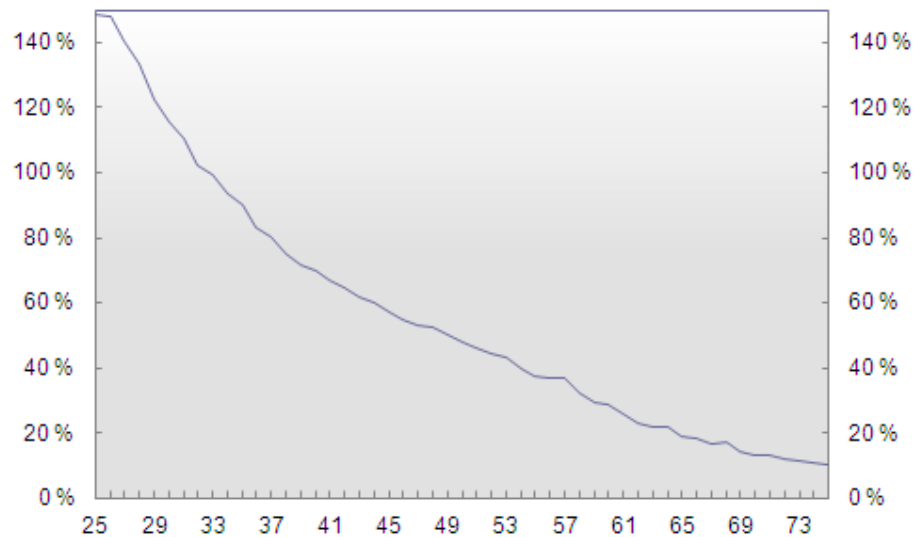
1) Fixed cross-section effects plus constant from a regression on the share of home ownership per household and a constant. Source: Norges Bank

Figure 7 Average annual change in share of home ownership per household across age groups from 1987 to 2008<sup>1)</sup>. Per cent.



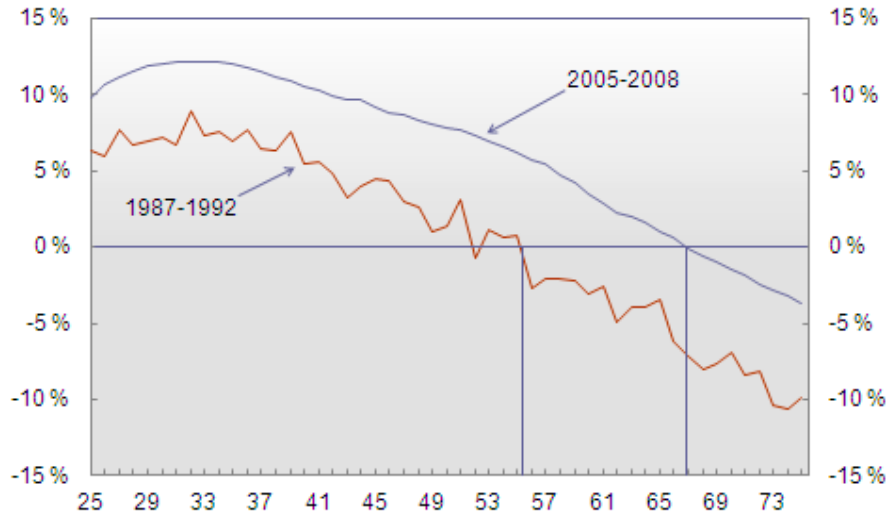
1) Average increase calculated as a trend coefficient in a regression over debt levels from 1987 to 2008. Source: Norges Bank

Figure 8 Distribution of loan-to-value ratios across age groups<sup>1)</sup>. Per cent. Average for sample period 1992-2008.



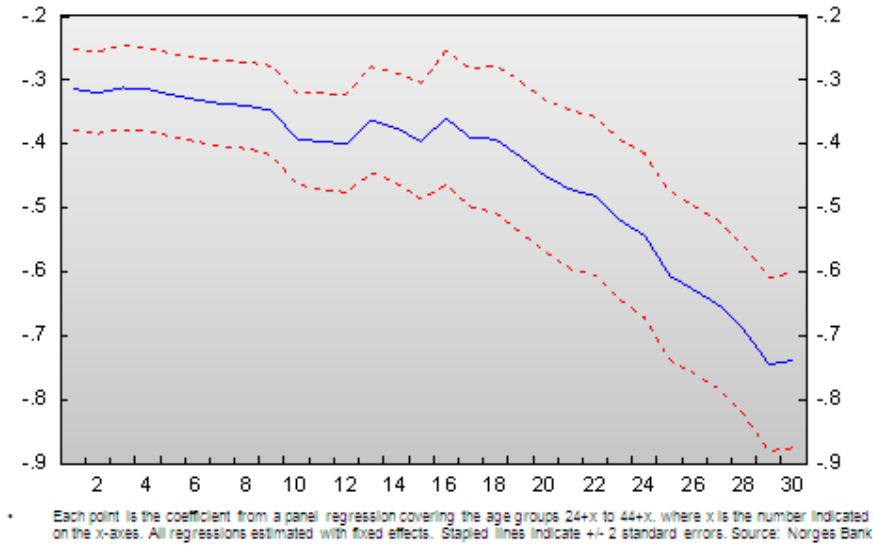
1) Fixed cross-section effects of a regression on the level of LTV and a constant  
Source: Norges Bank



Figure 9 Debt burden as share of income across age-groups<sup>1)</sup>. Per cent.

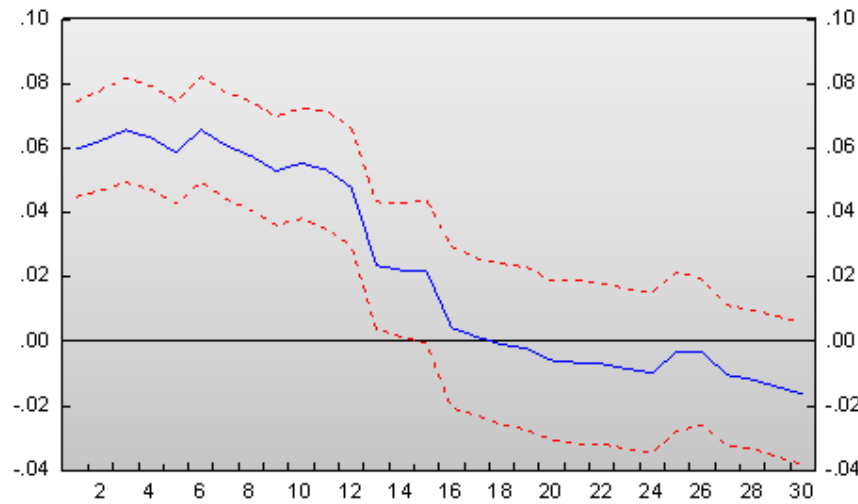
1) Fixed cross-section effects of a regression on the average level of debt-to-income per household per age group and a constant. Source: Norges Bank

Figure 10 Estimation on change in debt payments as share of income. Coefficient of "D(R\_r)" across age groups



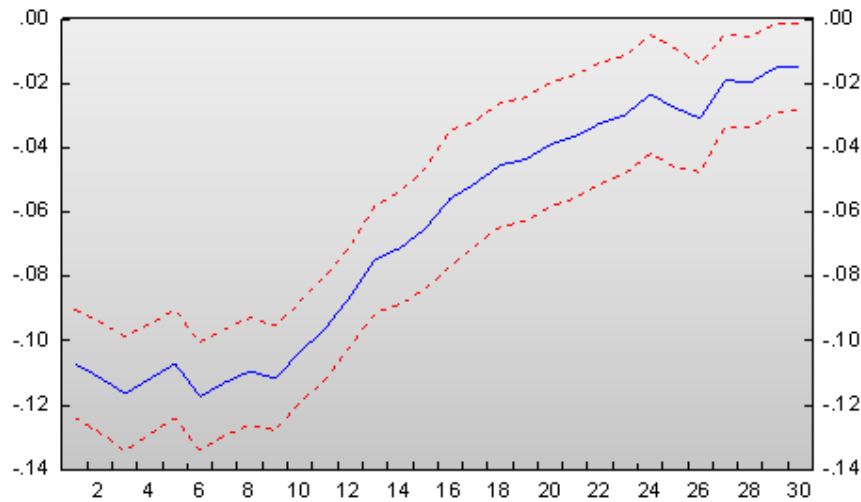
\* Each point is the coefficient from a panel regression covering the age groups 24+x to 44+x, where x is the number indicated on the x-axis. All regressions estimated with fixed effects. Staped lines indicate +/- 2 standard errors. Source: Norges Bank

Figure 11 Estimation on change in debt payments as share of income.  
Coefficient of "100\*log(HouseValue\_r(-1))" across age groups



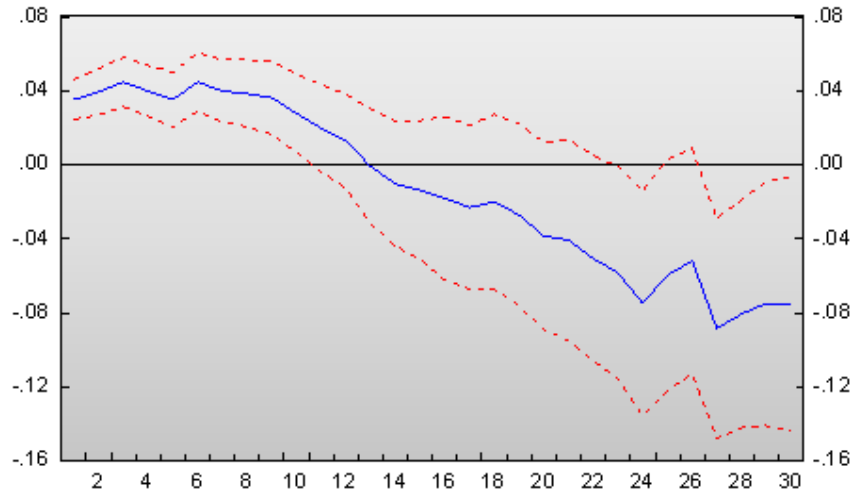
\* Each point is the coefficient from a panel regression covering the age groups 24+x to 44+x, where x is the number indicated on the x-axis. All regressions estimated with fixed effects. Staped lines indicate +/- 2 standard errors. Source: Norges Bank

Figure 12 Estimation on change in debt payments as share of income.  
Coefficient of "100\*DTI(-1)" across age groups



\* Each point is the coefficient from a panel regression covering the age groups 24+x to 44+x, where x is the number indicated on the x-axis. All regressions estimated with fixed effects. Staped lines indicate +/- 2 standard errors. Source: Norges Bank

Figure 13 Estimation on change in debt payments as share of income.  
Coefficient of "100\*LTV(-1)" across age groups



\* Each point is the coefficient from a panel regression covering the age groups 24+x to 44+x, where x is the number indicated on the x-axis. All regressions estimated with fixed effects. Stippled lines indicate +/- 2 standard errors. Source: Norges Bank

Table 1 Estimation on change in debt payments as share of income.

Dependent variable: change in "debt burden"-ratio. Estimated with cross-section fixed effects.  
Effects in per cent. Estimation period: 1993-2008

	Full sample	Ages 25 - 45	Ages 40-60	Ages 55-75
Constant	-1.616 (2.801)	24.754*** (3.148)	1.800 (4.550)	-9.363** (4.695)
100*Dlog(INC_r(-1))	-0.010 (0.010)	0.027** (0.011)	-0.018 (0.015)	-0.017 (0.016)
D(R_r)	-0.442*** (0.038)	-0.314*** (0.032)	-0.339*** (0.052)	-0.783*** (0.069)
R_r(-1)	-0.099** (0.040)	-0.234*** (0.034)	-0.131** (0.056)	-0.087 (0.071)
100*D(OWNER)	0.052*** (0.012)	0.045*** (0.010)	0.066*** (0.018)	0.092*** (0.022)
100*OWNER(-1)	0.007 (0.016)	0.091*** (0.014)	0.035 (0.028)	0.034 (0.030)
100*Dlog(PHN_r)	-0.006 (0.006)	0.018*** (0.007)	-0.010 (0.013)	0.007 (0.011)
100*log(HouseValue_r(-1))	-0.004 (0.006)	0.060*** (0.007)	0.004 (0.013)	-0.017 (0.011)
100*DTI(-1)	-0.036*** (0.003)	-0.107*** (0.008)	-0.036*** (0.011)	-0.017** (0.007)
100*LTV(-1)	0.004 (0.002)	0.035*** (0.005)	-0.018 (0.022)	-0.079** (0.036)
DUMMY_2005	1.059*** (0.188)	0.306 (0.156)	1.536*** (0.280)	1.891*** (0.368)
DUMMY_2000	0.306*** (0.143)	0.912*** (0.128)	0.711*** (0.247)	0.375 (0.265)
(s.e. in parenthesis)	*** 1% level	** 5% level	* 10% level	
R2	0.444	0.559	0.500	0.624
Durbin-Watson	2.458	2.267	1.899	2.500
Observations	816	320	320	320

## Real Estate Market and Banking Credit Risk in China

Yu Yun

Real Estate market has become more and more important in a lot of countries including China. In last decade, China has experienced huge and persistent rise of real estate price. Many cases have indicated real estate bubble could cause or provide a major source of economic turbulence or crises. Real estate risk has always been a high priority for China's banking regulatory authority. I'd like to exchange some personal opinions about the real estate market and banking credit risk in China.

On this topic, my presentation includes three parts. The first part provides the landscape of China's real estate market in the last decade. The second part makes banking credit risk analysis in China. And the third part points out the challenges coming from the future development.

### Background of China's Real Estate Market Development

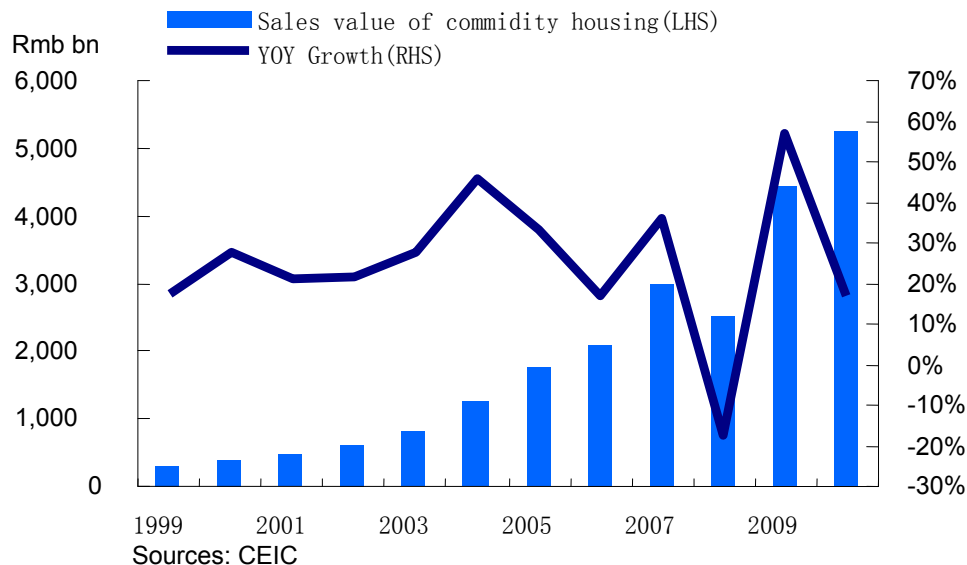
The key background of China's real estate market development can focus on two phrases: Housing-reform and Urbanization.

In March 1998, Chinese Premier Zhu Rongji introduced a series of reforms. Housing allocation through the government and state-owned employers officially ceased, and private (commodity) housing construction started in a major way around that time. The housing reform unleashed huge pent-up demand for modern private residential housing. At the end of 1998, this reform at least had changed more than 150 million families' choice in urban area.

The second key word is urbanization. The current urbanization rate, which means the percentage of the population that lives in urban areas, stood at 47.5% in the end of 2010, and this ratio was only 30.4% at the end of 1998. The volume of urban residential family increased by nearly 46 million from 1998 to 2009, which means at least 46 million new families were involved in the real estate market.

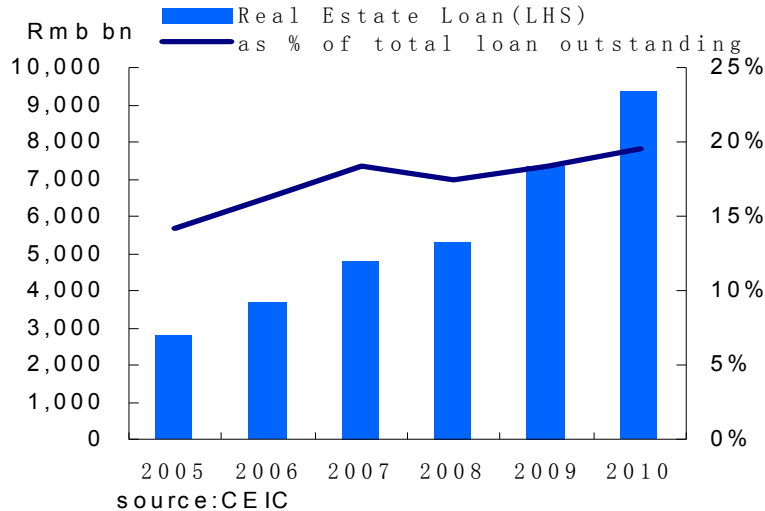
Combined with the rapid economic growth, the housing reform and urbanization created an extraordinary demand in real estate market. The figure 1 describes that the sales value of commodity housing per year have experienced long-term rise. Last year, the sales value was 17 times that of 1999. The sale floor space also touched 7 times that of 1999. Obviously, there was a surge of property price.

Figures 1. Sales value of Commodity Housing



In the same period, the real estate lending ascended rapidly as well. The total balance of real estate loan was 9.3 trillion at the end of last year, accounting for 20 percent of Chinese bank loan portfolio. Accordingly, it certainly plays an important role in china's banking credit risk.

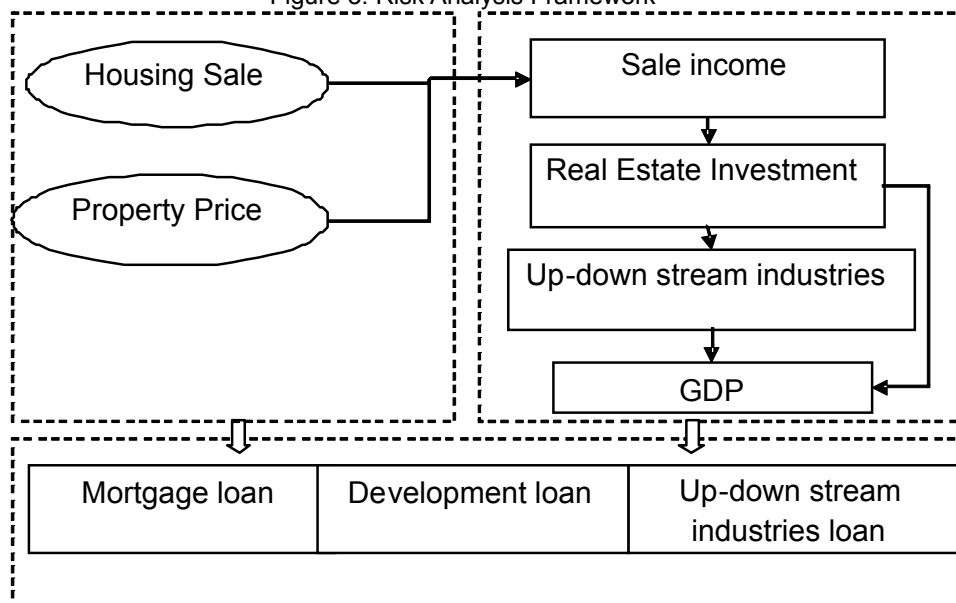
Figure 2. Real Estate Loans



## A Review of Relevant Chinese Banking Risk

There are three kinds of loans influenced directly by the real estate market fluctuation. They are mortgage loans, development loans and loans to its related industries. Generally, the risks mentioned above can be driven by 2 indices: one is house price, the other is house sales. Usually, falling house sales leads to declining house price, and the real estate developer's income shrinkage leads to their weaker capability to pay off loans. At the same time, falling house sales also does harm to those related industries, such as steel, cement, glass, home appliance, furniture producing and selling. Output value declination in real estate and related industries will directly influence GDP and individual welfare in a country, which are followed by increasing delinquency ratio.

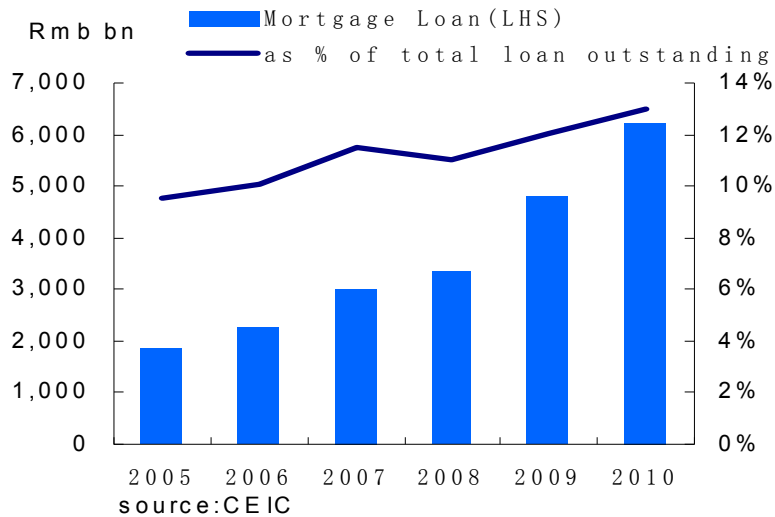
Figure 3: Risk Analysis Framework



### Mortgage loans

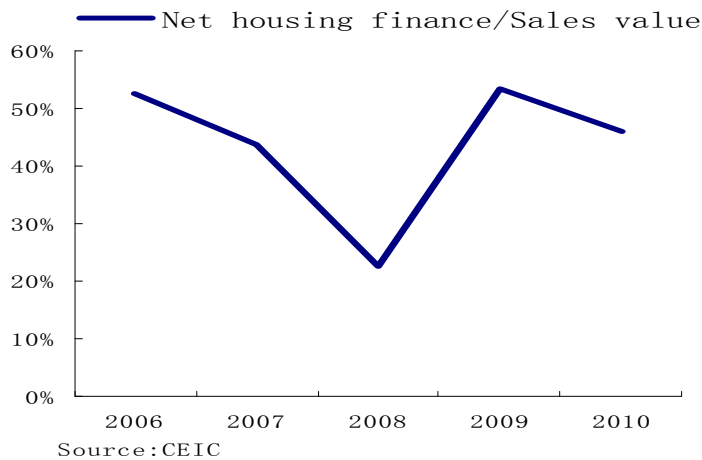
In the Chinese market, mortgage loans constitute the largest percentage among the three kinds of loans. In last five years, residential mortgage loan value has rocketed from 1.9 trillion RMB at the end of 2005 to 6.2 trillion RMB at the end of 2010. The mortgage loan was 13 percent in total credit balance of Chinese banking system at the end of 2010. Its average annual growth rate over the last five year is 27%. And the non-performed residential mortgage loans balance was only 20.5 billion at the end of 2010, together with a low non-performing ratio at 0.37%.

Figure 4: Mortgage Loans



Although the non-performing ratio is low, the supervisory authority still keeps a close eye on the very high loans balance, the rocketing house price, the rapidly increasing ratio between house price and residential income, and the rapidly rising ratio between house price and house rent. Chinese supervisory authority first hoisted the down payment ratio in September 2007 and then moved it up twice in 2010. Now the down payment ratio for the second house is 60% in Chinese market. In the real transactions, some buyers' down payment ratios are even higher than the supervisory authority limitation, which makes the average loan to value ratio nearly down to 80% in 2008 (figure 5).

Figure 5. Net Housing Finance

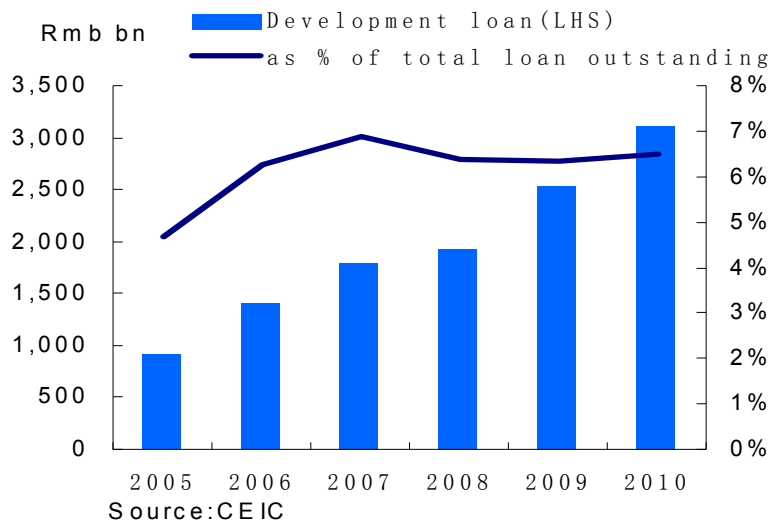


The LTV control is helpful for the whole banking system to control its exposure to real estate. According to the sampling inquiry about residential mortgage loans in 7 Chinese cities with most rapidly increasing house price in April 2010, the average LTV in the 7 cities was 50.4%, comparatively lower than the supervisory limit. The risks of residential mortgage loans are under control as a whole,

### *Development loans*

The risk level of real estate development loans is usually much higher than the risk level of mortgage loans. Development loan also have rapidly increased in total amount and decline in non-performing loan level from 2005. The compound growth rate of real estate development loans has reached 27%, exactly the same as that of residential mortgage loans. The non-performing loan reached 44 billion RMB at the end of 2010, with non-performing loans ratio at 1.26%.

Figure 6. Development Loans



Real estate development company is capital-driven, which means the constant cash flow is more important for it than others. The real estate company needs enough funding resource to support the real estate building and selling cycles. The resources usually include its owned capital, selling income, loans from banking system and other resources. In recent years, the loan is becoming less important in those funding resources. At the end of 2009, the percentage of loan in all funding of developer is down to 17.2%. The recent development of financial system is conducive to it. And other important factor, I think, is the loan-to-collateral ratio control. According to the result of survey I have mentioned, the Loan-to-collateral ratio of real estate development loan is about 54.4%. It is mainly because the Loan-to-collateral ratio is limited to no more than 70% as usual, and from last year, the regulator in China has begun to require the bankers to lower the ratio down to 50% in new real estate project.

As far as the future is concerned, we should still keep an eye on the risks of real estate development loans in Chinese market. There are two main reasons. First, liabilities-assets ratio has remained at high level (above 70%) for quite a long time. Secondly, the shrinking policy in real estate industry has turned down the house selling to some degree. According to the real estate public companies' annual reports of 2010, there were 43 in 59 real estate development companies' liabilities-assets ratio getting to higher level, and 59 real estate development companies' net amount of cash flow turned out to be -70.15 billion RMB, which is 112.72 billion RMB down from the level a year-earlier.

### *Loans to its related industries*

The third kind of loan influenced by the real estate market fluctuation is loans to its related industries. Rapid growth in property construction has been widely seen as an engine of China's economic growth in last decade, along with exports. Construction and real estate value added accounted for about 12% of GDP in 2009. According to the latest (2007) input-output tables, about 21% of the output of non-metal products, 16% of metal smelting and processing, and 8% of transport and storage go into the property sector.

I think, the construction activity is more important to the up-downstream industries than property price. In china, the negative side is that over the last decade, part of the massive urban residential housing boom after housing reform is one-off as pent-up demand was satisfied.

But the new demand is still coming into reality. First, the urbanization process is continuing. According to the government's five year plan, the urbanization ratio will increase from 47.5% to 51.5%. If the urbanization rate grows 1 percent per year, there will be about 10 million people moving to city. On the other hand, the social housing building will be other driving factor for the construction activity. According to the five years' plan, the social housing program will cover 20% of the urban household by 2015. China will invest about 1.3 trillion RMB (196.9 billion U.S. dollars) in building 10 million units in 2011. All these factors may keep the constructive activity stable.

And as we know, China is accelerating the transformation of economic development pattern, adjusting and optimizing the economic structure. The real estate thus will not play the role of such an important economic driver as it is now. A recent research conducted by Chen Xue song shows the input-output production tables of 2002 and 2007, which indicates that the correlative effects of real estate industry is strong but following the downtrend. This will be helpful to reduce the impact of real estate industry's slowdown.

## **Major Challenges**

### *High affordability ratio*

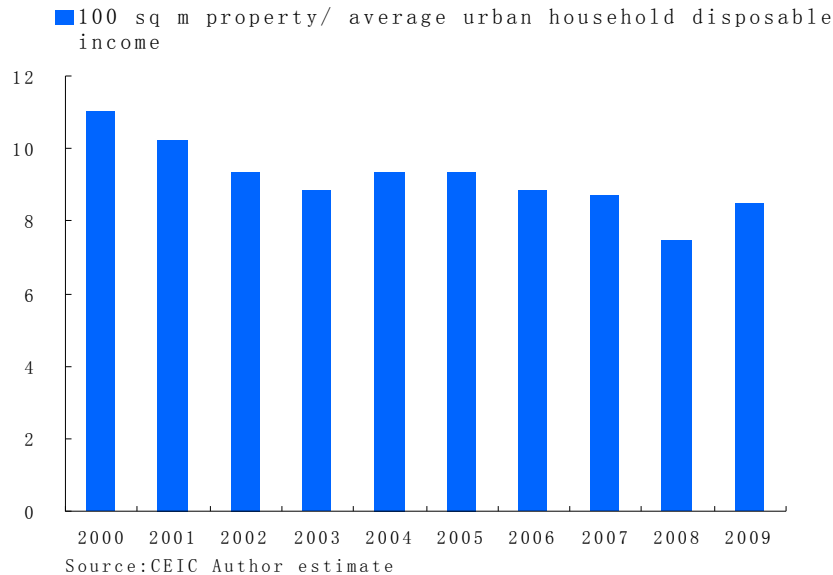
In my opinion, the first challenge is high affordability ratio. As shown in the chart, the affordability ratio, which is calculated as average prices of a 100 square meter apartment in cities over the average urban household disposable income, is over 8 at the end of 2009. It tells us that a citizen in China has to use 8-10 years income to afford an average sized apartment.

It is difficult to use this ratio to make a judgment about whether or not there is a bubble and how big it is, because the data on both the numerator and denominator are highly flawed. On the numerator, the average prices are based on sales of mostly new commodity housing, and not adjusted for quality that changes over time. The issues with the denominator are arguably even bigger. Basically, the official data tends to under-estimate household income, especially the incomes of higher income population. But this ratio still gives us much useful information; that there are many people can't afford an average size house in China.

In some large cities, it could be up to 20 years, compared to the developed economies' level at typically 4 – 6 years. And this also is convinced by another ratio, the rental yield. According to Centerline, a real estate intermediary company survey, the rental yields in tier 1 cities in china have been low and have dropped recently to below 3% (they are close to 2% in Shanghai). High affordability index and low and declining rental yields are not good signs for the housing market.



Figure 7: Affordability Ratio



### *Uncertainty in policy impact*

The second challenge is the impact of real estate policy. Recently, Chinese government has invested a lot of effort to control the housing price surge.

The most important policy is social housing program. The new plan requires at least 1.34 trillion RMB investments. It will inevitably push local governments to make more financing innovation. It will amplify the funding pressure of local government and may lead to more government debt.

The second policy is purchasing limit. In many middle and large sized cities, the rules prevent families with more than two apartments from buying any more in that city. Only after having certain years of working experience, the families can buy one house in the city. I believe this measure will efficiently control the property demand. But if there are no other policy to provide more investment channel or reduce the over-liquidity condition, the purchasing limitation will just push the bubble from real estate to other areas.

The last one is land policy. Land costs take up a considerable percentage in property price in China. Local governments have been increasingly relying on property sales for funding. China's property sales increased 70.4 percent from year to year to reach 2.7 trillion RMB (equal to 412 billion U.S. dollars) in 2010. Revenue from land sales is a major source of local government income in a number of Chinese cities. There are mandated segregation of urban land, rural land and housing markets. The government has high control capacity in land supply. Therefore, if there is no fiscal reforms to establish a more sustainable framework, the local government will keep these incentives to push up land prices and construction activity. The bubble may thus continue to accumulate.

# Loan-to-Value and Debt-to-Income Limits as Macroprudential Tools: Evidence from Korea

Deniz Igan and Heedon Kang

## Introduction

The financial crisis of 2007-08 brought real estate boom-bust cycles to the fore of policy discussions and academic circles. Prior to the crisis, when it came to dealing with asset price booms, the widely-accepted tenet was one of 'benign neglect', namely, to wait for the bust and pick up the pieces (Bernanke and Gertler, 2001). Yet, the crisis and its formidable costs shifted the balance to the opposite camp favoring pre-emptive policy actions that could stop bubbles or, at least, could contain the damage to the financial sector and the broader economy when the bust comes. In other words, many policymakers now think that it is better to act than wait on the sidelines because the cost of inaction may greatly exceed the potential negative side effects of policy intervention. But, many still agree that monetary policy is too blunt a tool to be the best response (Posen, 2009). Then, in the quest to better design the policy toolkit to deal with real estate booms and busts, macroprudential tools such as maximum limits on loan-to-value ratios (LTV) and debt-to-income ratios (DTI) are heavily advocated (see Crowe et al., 2011a, on pros and cons of various policy options). This has led several countries to recently adopt such limits or measures that would discourage high-LTV/DTI loans (see Crowe et al., 2011b, and IMF, 2011, for a summary of specific country cases on macroprudential measures).

But, especially from an empirical perspective, we know little about the impact of these measures that have become popular with many regulators after the crisis. Theoretically, limits on LTV and DTI can kill two birds with one stone: they can curb the feedback loop between mortgage credit availability and house price appreciation, and, by restraining household leverage, they can help reduce the incidence and loss given default of residential mortgage loan delinquencies. These mechanics are at work in many theoretical models such as the one in, for instance, Ambrose et al. (1997) and, more recently, in Allen and Carletti (2010). Econometric analyses analyzing their effects, however, have been relatively lacking. Lament and Stein (1999) and Almeida et al. (2006) provide evidence that economic activity is more sensitive to house price movements if LTV is higher. Duca et al. (2010) estimate that a 10-percentage-point decrease in LTV of mortgage loans for first-time buyers is associated with a 10 percentage point decline in house price appreciation rate. Crowe et al. (2011b) confirm the positive association between LTV at origination and subsequent price appreciation using state-level data in the U.S. Wong et al. (2004) argue that, in Hong Kong SAR, losses in the financial sector in the wake of the Asian crisis were limited because of low LTVs, in line with the finding that LTV at origination is an important determinant of loan default (see, for instance, Avery et al., 1996). Wong et al. (2011) present some cross-country evidence, at the aggregate level, that low LTVs can reduce delinquencies in response to economic downturns and property price busts. One reason for the little empirical evidence on the effectiveness of LTV/DTI limits used as macroprudential tools is the fact that use of mandatory limits on these loan eligibility criteria especially in an actively-managed manner in response to cyclical movements in real estate markets has a short history and only a few countries, namely, Korea, Hong Kong SAR, Singapore, and Malaysia (at varying degrees of complexity), have adopted such frameworks.

This paper examines the impact of LTV and DTI limits on house price dynamics, residential real estate market activity, and household leverage in Korea. First, a regional dataset is used to exploit the variation across regions with different LTV/DTI limits in effect at different points in time. Second, and more innovatively, we use a unique dataset gathered from annual surveys conducted by Kookmin Bank and complemented with information from the Bank of Korea. This unique dataset covers information on the housing tenure and mortgage decisions of roughly 2000 households each year and runs from 2001 to 2009. We ask two questions. First, what happens when LTV/DTI limits are adjusted in response to developments perceived to be risky? Second, can we quantify the impact of LTV and DTI limits on housing and mortgage activity?

We find that transaction activity drops significantly in the three-month period following the tightening

of LTV/DTI regulations. Price appreciation slows down a bit later, in a six-month window rather than the three-month window. Moreover, price dynamics appear to be reined in more after LTV tightening rather than DTI tightening. Survey data analysis using a matching estimator framework offers some insight into what the channel for the *impact* of the policy actions may be: expected house price increases in the future become lower after policy intervention and this is more prevalent among older households while plans to purchase of a home are more likely to be postponed by those who already own a property, i.e., potential speculators, but not by those who do not own a property, i.e., potential first-time home buyers. These findings suggest that tighter limits on loan eligibility criteria, especially on LTV, curb expectations and speculative incentives.

In terms of magnitude, our analysis point to sizeable impact on transaction activity and house price appreciation. More specifically, average drop in transaction activity in the three-month period following a tightening of macroprudential regulations on loan eligibility criteria is 16 percent for LTV and 21 percent for DTI. Appreciation rates decrease by a monthly rate of 0.5 percent against a historical monthly change of 0.4 percent in the six-month window following a tightening of LTV. The larger impact on transaction activity may indicate that most of the effect of these actively-managed macroprudential tools falls on the quantity in the market rather than the prices, raising concern that the price discovery process is hurt by the measures because some of the buyers and sellers decide to (temporarily) exit the market, but it may also be just an artifact of the adjustment mechanism in real estate markets where transactions respond first and prices adjust at a slower pace. We do not find as strong an effect on growth rates of mortgage loan originations and household debt levels, perhaps reflecting the slow-moving nature of these variables.

Our contribution to the literature comes not only from the study of a timely and interesting topic that has not yet been studied in depth but also the use of disaggregated data in the empirical analysis. Wong et al. (2011) look at the responses in aggregates, as we do in the first part of our analysis, but it is hard to infer causal links from such cross-country analysis. To the best of our knowledge, ours is the first paper to look into the effects of actively-managed macroprudential regulation on loan eligibility using information at the household level. By exploiting variation across households, we can go beyond the correlation between macroprudential tools and housing market developments and assess the *causal* impact of LTV and DTI limits. Policy implications of our analysis are also encouraging. In housing markets, expectations are key as they often facilitate the settling in of bubble dynamics. If, as suggested by the evidence here, limits on LTV and DTI curb expectations and discourage potential speculators, they can be effective tools to tame real estate booms and contain the associated risks.

The rest of the paper is organized as follows. Section II provides some brief background information. Section III gives the details of the dataset, describes the empirical approach, and presents the findings. Section IV concludes.

## **Background**

### *Regulatory approach*

One of the lessons policymakers in Korea, and a few other Asian economies, took away from the crisis in 1997-98 was that asset price and credit booms, and the ensuing busts, can be devastating. Moreover, the credit card bubble, which had emerged partly owing to the expansionary policy measures aiming to stimulate the economy in the aftermath of the crisis, burst in 2003. This demonstrated, once again, the need to monitor systemic risks and contain distress that can emerge from common exposures and feedback loops between the financial and real sectors, i.e., macroprudential supervision, since micro-prudential supervision focusing only on the soundness of individual financial institutions proved to be insufficient.

Financial Supervisory Service (FSS) took on the real estate markets starting in late 2002. LTV limits were introduced first, followed by DTI limits in 2005. Changes to LTV and DTI limits are used frequently as policy interventions to ensure the objective of “stable house prices”, defined as annual house price appreciation rates within the zero and nominal GDP growth rate band. Regulatory limits are set separately for “speculative zones” and non-speculative zones”. An area is designated as a speculative zone if the following criteria are satisfied: (1) monthly nominal house price index (HPI) rose more than 1.3 times nationwide inflation rate (CPI) during the previous month, and (2) either (i)

the average of the HPI appreciation rates in the previous two months was higher than 1.3 times the average of the national HPI appreciation rates in the previous two months, or (ii) the average of the month-on-month HPI appreciation rates over the previous year was higher than the average of the month-on-month national HPI appreciation rates over the previous three years.

### *Specific policy interventions*

Between 2001 and 2010, Korea experienced two major housing cycles split by the trough in March 2005. Since their launch in September 2002 and August 2005, respectively, the LTV and DTI limits have been changed several times not only in terms of the levels but also in terms of the areas and the financial institutions to which they are applicable. Table 1 gives a timeline of the LTV and DTI regulations.

**Table 1. Timeline of Policy Interventions**

Date	Description	Range of Application	Direction
<b>LTV Regulations</b>			
Sept. 2002	- Introduced the LTV ceiling as 60 percent	Banks & Insurance Companies	Inception
June 2003	- Reduced the LTV from 60 to 50 percent for loans of 3 years and less maturity to buy houses in the speculative zones	Banks & Insurance Companies	Tighten
Oct. 2003	- Reduced the LTV from 50 to 40 percent for loans of 10 years and less maturity to buy houses in the speculative zones	Banks & Insurance Companies	Tighten
March 2004	- Raised the LTV from 60 to 70 percent for loans of 10 years or more maturity and less than one year of interest-only payments	All Financial Institutions	Loosen
June 2005	- Reduced the LTV from 60 to 40 percent for loans of 10 years and less maturity to buy houses worth 600 million won and more in the speculative zones	Banks & Insurance Companies	Tighten
Nov. 2006	- Set the LTV ceiling as 50 percent for loans of 10 years and less maturity to buy houses worth 600 million won and more in the speculative zones and originated by nonbank financial institutions such as mutual credits, mutual savings banks, and credit-specialized financial institutions	Extended to Nonbank Financial Institutions	Tighten
Nov. 2008	- Removed all areas except the three Gangnam districts off the list of speculative zones	All Financial Institutions	Loosen
July 2009	- Reduced the LTV from 60 to 50 percent for loans to buy houses worth 600 million won and more in the metropolitan area	Banks	Tighten
Oct. 2009	- Expand the LTV regulations to all financial institutions for the metropolitan area	Nonbank Financial Institutions	Tighten
<b>DTI Regulations</b>			
Aug. 2005	- Introduced the DTI ceiling as 40 percent for loans used to buy houses in the speculative zones only if the borrower is single and under the age of 30 or if the borrower is married and the spouse has debt	All Financial Institutions	Inception
Mar. 2006	- Set the DTI ceiling as 40 percent for loans to buy houses worth 600 million won and more in the speculative zones	All Financial Institutions	Tighten
Nov. 2006	- Extended the range of application of DTI regulation to the overheated speculation zones in the metropolitan area	All Financial Institutions	Tighten
Feb. 2007	- Set the DTI ceiling as 40~60 percent for loans to buy houses worth 600 million won and less	Banks	Tighten
Aug. 2007	- Set the DTI ceiling as 40~70 percent for loans originated by nonbank financial institutions such as insurance companies, mutual savings banks, and credit-specialized financial institutions	Extended to Nonbanking Institutions	Tighten
Nov. 2008	- Removed all areas except the three Gangnam districts off the list of speculative zones (so, the DTI regulation does not apply to the metropolitan areas)	All Financial Institutions	Loosen
Sept. 2009	- Extended the range of application of DTI regulation to the non-speculative zones in Seoul and the metropolitan area (Gangnam Three 40 percent, non-speculative zones in Seoul 50 percent, the other metropolitan areas 60 percent)	Banks	Tighten
Aug. 2010	- Exempted the loans to buy houses in the non-speculative zones of the metropolitan area if the debtor owns less than two houses (set to expire by end-March 2011)	All Financial Institutions	Loosen

## Empirical Analysis

### *Effects of LTV and DTI Limits on Regional Housing and Mortgage Market Activity*

At the macro level, monthly series for house prices, transaction volumes, and mortgage loans are obtained from the Bank of Korea and the Korea National Statistical Office. Additionally, we get information from the Realtors Association on the “dominance of selling”, that is, the proportion of realtors reporting that the number of sellers exceeds the number of buyers.

We look at the differences in the responses of housing market activity and household debt across the regional divides of speculative and non-speculative zones before and after a change in the LTV and DTI regulations take effect. The baseline regression is

$$Y_{it} = \alpha + \beta'X_{it} + \gamma D_{it} + \varepsilon_{it}$$

where  $Y_{it}$  is the variable of interest, i.e., the house price appreciation rate, number of transactions, mortgage loan growth rate, and dominance of selling.  $X_{it}$  is a matrix of control variables including indicators of general economic activity, monetary policy stance, and measures of tightness and expectations in housing markets.  $D_{it}$  is a dummy variable that takes on the value of 1 in the six months after a rule change. We construct this dummy also for one or three months after the rule change and one, three, or six months before a rule change. Looking at the market responses at various windows helps us assess the horizon over which an intervention has an effect and find out whether the *anticipation* of an intervention, rather than the specifics of a rule change per se, triggers a response in the markets.

We examine interventions that tighten the existing regulations and those that loosen them separately. Admittedly, the decision to tighten a particular regulation in an area or to change the designation of an area to a speculative zone is not an exogenous one: areas showing signs of overheating are more likely to be subject to a tightening. Moreover, there generally is a two-way relationship between house prices and mortgage credit as well as between house prices and business cycle movements. Hence, it is difficult to tease out the causal effect of LTV and DTI limits in this setup. We analyze such a causal effect in the next subsection using household level information.

### *House prices*

Price appreciation rates are significantly lower following an LTV tightening (Table 2a, first column). Moreover, this effect is only observable in the metropolitan areas, where tighter rules apply. Hence, while still plausible, it is less likely that the negative and significant coefficients on the LTV tightening dummy are driven by nationwide developments over time. The evidence for DTI tightening is not as strong: while the coefficients for all windows (one, three, or six months) are negative, they are not statistically significant. There appears to be some positive association between price appreciation prior to an LTV tightening and the implementation of the rule change. While this may be an indication of anticipation of the rule changes by market participants, it is hard to rule out reverse causality: the tightening decision is based on recent price changes in the market.

Table 2a. Housing and Mortgage Market Activity Before and After Tightening

	House Prices		Transactions		Household Debt		Seller Dominance	
	Metro	Non-Metro	Metro	Non-Metro	Metro	Non-Metro	Metro	Non-Metro
LTV interventions								
Six months prior	-0.171 [0.260]	-0.151 [0.306]	2.108 [4.808]	5.081 [3.849]	0.008 [0.085]	0.014 [0.111]	-5.227 [7.760]	-6.513** [3.217]
Three months prior	0.526** [0.247]	0.218 [0.178]	6.464 [5.968]	-1.330 [5.024]	-0.094 [0.089]	-0.003 [0.081]	-21.636*** [8.070]	-3.724** [1.714]
One month prior	-0.117 [0.207]	-0.110 [0.268]	-1.581 [5.687]	1.780 [4.180]	0.022 [0.113]	0.409*** [0.127]	22.076*** [6.176]	-1.311 [2.402]
At announcement	0.903* [0.512]	0.057 [0.267]	8.826* [5.204]	4.411** [1.879]	0.226*** [0.062]	0.028 [0.168]	-8.235 [11.299]	1.428 [2.274]
One month later	-1.133** [0.463]	0.291 [0.300]	-15.019** [7.115]	-5.365* [2.836]	-0.078 [0.159]	-0.128 [0.158]	25.000 [19.942]	7.170 [6.412]
Three months later	-0.715** [0.319]	0.235 [0.266]	-15.697** [6.344]	-7.566** [3.208]	-0.067 [0.105]	-0.112 [0.124]	12.151 [8.102]	0.936 [3.283]
Six months later	-0.537** [0.248]	0.393 [0.289]	-6.201 [5.001]	-2.165 [3.205]	-0.001 [0.098]	-0.067 [0.092]	10.227* [6.013]	-0.761 [2.681]
DTI interventions								
Six months prior	0.451 [0.350]	0.283 [0.185]	-2.473 [6.600]	1.601 [2.585]	0.132 [0.117]	0.152 [0.094]	-8.365 [8.343]	0.094 [2.071]
Three months prior	0.557 [0.416]	0.104 [0.120]	3.264 [7.661]	0.951 [3.041]	0.220* [0.116]	0.155* [0.092]	-15.888* [9.471]	1.213 [1.672]
One month prior	-0.101 [0.146]	0.522 [0.397]	-2.693 [7.038]	1.448 [3.721]	0.351*** [0.075]	0.037 [0.140]	-12.155*** [3.844]	3.424 [5.154]
At announcement	0.774 [1.030]	0.240 [0.162]	15.889** [7.816]	-1.427 [4.394]	0.089 [0.154]	0.056 [0.122]	-19.957 [21.075]	4.124 [3.008]
One month later	-0.533 [0.492]	0.252 [0.237]	-25.757*** [5.769]	-9.923** [3.900]	0.022 [0.155]	0.123 [0.169]	20.175** [8.843]	-5.096 [3.281]
Three months later	-0.509 [0.368]	0.239 [0.244]	-21.163*** [4.860]	-7.307** [2.999]	-0.205* [0.114]	-0.059 [0.087]	20.507** [8.059]	3.213 [1.934]
Six months later	-0.420 [0.337]	0.281 [0.268]	-10.543* [5.440]	-5.398** [2.711]	-0.267*** [0.080]	-0.114 [0.090]	13.438 [8.312]	2.424 [1.987]

Notes: Data are at monthly frequency. Sample period covers from January 2000 to December 2010. The dependent variables are the log change in real house prices, number of transactions, and household debt level, in each respective column. LTV and DTI intervention variables are dummy variables that take on the value of 1 for the respective periods before/after the intervention. In each regression, only two dummies (one for LTV and one for DTI) are included. In all regressions, lagged house price change, mortgage loan rate, and log changes in the money supply (M2), in unsold inventory of properties, in the composite index of coincident indicators (a measure of the business cycle) and in the KOSPI are included as controls. 'Metro' refers to the Seoul Metropolitan Area. 'Non-Metro' are all remaining areas. Newey-West standard errors, with maximum lag of 2, are in square brackets. \*\*\*, \*\*, and \* denote significance at the 1, 5, and 10 percent level, respectively.

On the flip side, the response in house price appreciation rates is less visible when rules are loosened (Table 2b, first column). Actually, it looks like there is a negative association between house price changes and more lax rules: LTV dummy at rule change announcement and DTI dummy for the month following the rule change have negative and significant coefficients. While counterintuitive at first, this association can be explained by the policy intervention decision being based on what has been happening in the housing market and inertia in prices. The coefficient for the LTV reverses at the one-month window, but the coefficient is small in magnitude compared to tightening of the rules in Table 2a. Taken together, these seem to suggest that bringing a (temporary) halt to exuberance in housing and mortgage markets may be easier than giving a boost to slowing markets.

### *Transaction activity*

Growth in the number of transactions shoots up with the announcement of a tightening in loan eligibility criteria and plunges in the following months (Table 2a, third column). Especially with a DTI tightening, the hit from the tightening appears to be borne mostly by transactions rather than prices.

This may have important implications depending on the mechanism behind. Specifically, if the stronger response in transaction activity is just an artifact of the workings of housing markets, where quantity adjustment comes before price adjustment, macroprudential rules, especially LTV, appear to be effective tools to curb excessive house price appreciation. But, if this is a reflection of potential buyers and sellers exiting the market, the price discovery process, which is already slow in real estate markets, may become impaired. Further implications related to welfare concerns may follow in this case: it may be the first-time home buyers being forced out of the market by lower limits on LTV and DTI, and reduced access to finance by these (often younger and less wealthy) groups may create social and political frictions.

### *Mortgage loans*

Perhaps reflecting the slow-moving nature of balance sheets, we do not find much evidence of the expected negative association between the growth of household leverage and tightening of macroprudential rules. Contrary to the findings on prices and transactions, DTI appears to be more closely linked to the evolution of household debt levels. Furthermore, the symmetric effect exists with loosening of DTI rules but not with LTV. This is somewhat surprising given that LTV appeals more to leverage and strategic default incentives whereas DTI is considered to appeal more to affordability. One explanation could be that, since payments on loans other than mortgages are included in the calculation of DTI, households consolidate their debt in order to get approved for a mortgage loan. This may end up reducing the overall household debt levels although outstanding mortgage loans increase.

### *Dominance of selling*

There is some evidence that the residential real estate market becomes more seller-dominated following the changes, both tightening and loosening, in loan eligibility criteria (Tables 2a and 2b, seventh columns). DTI appears to be more effective in turning the marketplace from being buyer-dominated to seller-dominated when it is a tightening while LTV seems to have stronger support for such an effect in the loosening case. This may be indicating that potential buyers that are at the margin in terms of affordability constraints get out of the market when DTI limit is lowered but they are not as easily persuaded back in with the loosening whereas the developers flood the market when LTV limit is raised.

Table 2b. Housing and Mortgage Market Activity Before and After Loosening

	House Prices		Transactions		Household Debt		Seller Dominance	
	Metro	Non-Metro	Metro	Non-Metro	Metro	Non-Metro	Metro	Non-Metro
LTV interventions								
Six months prior	-0.314 [0.393]	-0.169 [0.217]	-5.321 [12.179]	-8.371* [4.480]	0.234* [0.165]	-0.229* [0.137]	11.526 [7.222]	-4.125 [7.755]
Three months prior	-0.468 [0.337]	-0.372* [0.200]	-20.348 [13.291]	-10.021* [5.346]	0.465*** [0.088]	-0.031 [0.078]	8.547 [5.217]	-12.855*** [3.486]
One month prior	0.315 [0.451]	-0.461** [0.181]	1.527 [8.924]	-6.677 [4.531]	0.270 [0.165]	-0.184 [0.130]	-14.976 [11.645]	-6.354 [7.316]
At announcement	-0.751*** [0.154]	0.267** [0.103]	33.220*** [3.314]	10.701*** [2.328]	0.535*** [0.117]	-0.062 [0.067]	5.198 [3.375]	-4.474 [2.920]
One month later	0.484*** [0.161]	0.177 [0.108]	-6.158 [3.958]	0.333 [2.261]	-0.017 [0.143]	0.054 [0.060]	8.037** [3.606]	-9.927*** [2.666]
Three months later	-0.095 [0.238]	-0.026 [0.157]	-9.624** [4.536]	6.264* [3.259]	-0.345*** [0.106]	0.016 [0.073]	10.441*** [3.811]	0.876 [4.244]
Six months later	-0.379 [0.288]	-0.162 [0.223]	-11.560** [4.893]	3.781 [3.298]	-0.271* [0.160]	-0.094 [0.100]	13.960*** [4.310]	-1.583 [3.829]
DTI interventions								
Six months prior	0.085 [0.213]	0.480** [0.229]	-5.281 [7.311]	-1.487 [3.548]	-0.006 [0.088]	-0.071 [0.152]	2.823 [5.320]	2.836 [2.524]
Three months prior	0.232 [0.204]	0.282 [0.182]	-11.123 [8.348]	-2.911 [3.301]	0.101 [0.091]	0.195* [0.103]	3.236 [6.824]	4.633* [2.430]
One month prior	-0.137 [0.236]	1.637 [1.165]	-15.269* [8.132]	-10.216*** [3.585]	-0.047 [0.096]	-0.255 [0.179]	1.999 [5.025]	12.970*** [3.940]
At announcement	-0.064 [0.239]	0.068 [0.224]	-9.424 [7.596]	-3.415 [4.027]	-0.066 [0.098]	-0.006 [0.171]	-4.325 [4.483]	-6.489 [4.819]
One month later	-0.788*** [0.165]	0.231 [0.463]	-2.598 [5.129]	3.070 [7.706]	0.034 [0.055]	0.079 [0.138]	2.054 [5.496]	-0.297 [2.647]
Three months later	-0.150 [0.403]	-1.188 [0.721]	10.520* [6.065]	5.908 [4.320]	0.216*** [0.076]	0.242** [0.122]	2.102 [5.016]	-6.358* [3.406]
Six months later	-0.224 [0.301]	-1.037 [0.668]	16.519*** [5.963]	4.726 [5.335]	0.197* [0.107]	0.263** [0.118]	-0.356 [6.067]	-4.075 [3.104]

Notes: Data are at monthly frequency. Sample period covers from January 2000 to December 2010. The dependent variables are the log change in real house prices, number of transactions, and household debt level, in each respective column. LTV and DTI intervention variables are dummy variables that take on the value of 1 for the respective periods before/after the intervention. In each regression, only two dummies (one for LTV and one for DTI) are included. In all regressions, lagged house price change, mortgage loan rate, and log changes in the money supply (M2), in unsold inventory of properties, in the composite index of coincident indicators (a measure of the business cycle) and in the KOSPI are included as controls. 'Metro' refers to the Seoul Metropolitan Area. 'Non-Metro' are all remaining areas. Newey-West standard errors, with maximum lag of 2, are in square brackets. \*\*\*, \*\*, and \* denote significance at the 1, 5, and 10 percent level, respectively.

## Effects of LTV and DTI Limits on Household Choices

At the micro level, we utilize information on individual households using the *Survey on Mortgages and Housing Demand* conducted annually by Kookmin Bank. This dataset covers the period from 2001 to 2009 and around 3000 households each year across the nation.

In order to estimate the average effect on property buying decisions and perceptions on the direction of house prices, we distinguish between households who are subject to a particular rule change, i.e., those that are given treatment, and those that are not. Let  $C_i^1$  and  $C_i^0$  denote the outcome variable for household  $i$  with treatment and without, respectively. Note that for each household we only observe the outcome in one state or the other. Further, let the conditional expectations of these variables, given a vector of observable characteristics  $X_i$ , be given by  $X_i\delta^1$  and  $X_i\delta^0$ , where  $\delta^1$  and  $\delta^0$  are unknown parameters. Defining  $T_i = 1$  if household  $i$  received treatment and  $T_i = 0$  if not, the observed outcome can be written as



$$C_i = \tau_i C_i^T + (1 - \tau_i) C_i^U$$

Although whether a household receives treatment or not is not random and potentially endogenous to the outcome variable, it is possible to estimate the effect of getting the treatment while accounting for its endogeneity is possible using the techniques described in Heckman, Ichimura, and Todd (1997) and Abadie and Imbens (2006). Specifically, the problem is one of missing data. For each household  $i$ , we do not observe the counterfactual so we cannot compare the outcome with and without treatment. But we can find another household whose characteristics are similar but who were not exposed to the LTV/DTI rule changes and associate the missing outcome to the outcome for that household. In other words, we first match the treated households to untreated households based on their observable characteristics and then compare the outcomes for the matched pairs to estimate the sample average treatment effect.

We match the households that were subject to the tightening of loan eligibility criteria to those that were not using their income level, financial assets, debt, and the price of the property they live in. Observably, the treated and the untreated have stark differences but the matching procedures eliminates these differences and the two subsamples are no longer statistically different. So, when we compare the outcomes for the treated and the untreated only using the matched pairs, the difference in the outcomes can be attributed to the treatment rather than to differences in observable characteristics.

### *Expectations and demand for housing*

Results from the matching estimator framework are presented in Table 3. On an experimental treatment effect basis, both LTV and DTI tightening is effective in delaying property purchase decisions. Such a policy intervention also pushes down price expectations. These findings offer an interesting interpretation for the results on the aggregate data: the drop in transaction activity and the slowdown in house price appreciation rates following a tightening may work through the expectations channel. This is promising because the inertia in house prices and the difficulty of breaking bubble dynamics once they set in real estate markets have been pointed out to highlight what makes real estate cycles potentially dangerous. If macroprudential tools can affect expectations, they offer an option to deal with real estate booms.

Table 3. Effect of Policy Tightening on Household Decisions

	LTV		DTI	
	SATE	SATT	SATE	SATT
Demand	-0.045*** [0.015]	-0.021 [0.0137]	-0.023** [0.012]	-0.005 [0.010]
Upward price expectation	-0.056** [0.024]	-0.065*** [0.021]	0.087*** [0.018]	0.132*** [0.016]
Expected price appreciation	-1.005** [0.459]	-1.613*** [0.430]	1.237*** [0.355]	1.943*** [0.327]

Notes: SATE stands for sample average treatment effect (aka experimental treatment average). SATT stands for sample average treatment effect for the treated. Treated are the households for whom the tightening of LTV/DTI regulation is applicable. 'Demand' is a dummy variable that takes on the value of 1 if the household is planning to purchase a property over the course of the coming year. 'Upward price expectation' is a dummy variable that takes on the value of 1 if the household is expecting house prices to go up over the course of the coming year. 'Expected price expectation', expressed in percent, is what the households expect the change in house prices to be over the course of the coming year. The estimates are corrected for the bias due to inexact matching in finite samples. Standard errors are in square brackets. \*\*\*, \*\*, and \* denote significance at the 1, 5, and 10 percent level, respectively.

## Response to policies and characteristics of households

Yet, one issue is *whose* expectations these macroprudential tools affect. A commonly-raised concern regarding LTV and DTI limits is that they may inadvertently target young couples or first-time home buyers. We split our sample to see if this is indeed an issue. Looking at the results in Table 4, it is not obvious that this is a problem in Korea's experience. On the contrary, it is the older households and speculators (i.e., those who already own a property) that are influenced more by the policy interventions. This is again promising for efficacy of LTV and DTI limits as macroprudential tools.

Table 4. Effect of Policy Tightening on Different Household Groups

	LTV		DTI	
	SATE	SATE	SATE	SATE
Young versus Old				
	Young		Old	
Demand	-0.040 [0.034]	-0.023 [0.028]	-0.037** [0.016]	-0.027** [0.012]
Upward price expectation	-0.121** [0.050]	0.048 [0.043]	-0.060** [0.024]	0.095*** [0.018]
Expected price appreciation	-1.873* [1.035]	1.548* [0.900]	-0.955** [0.483]	1.450*** [0.351]
First-time home buyers versus speculators				
	First-time home buyers		Speculators	
Demand	-0.038 [0.031]	-0.014 [0.025]	-0.062*** [0.016]	-0.042*** [0.013]
Upward price expectation	-0.021 [0.041]	0.118*** [0.034]	-0.078** [0.035]	0.080*** [0.027]
Expected price appreciation	-0.420 [0.873]	2.172*** [0.734]	-1.427** [0.620]	0.879* [0.489]

Notes: SATE stands for sample average treatment effect (aka experimental treatment average). Treated are the households for whom the tightening of LTV/DTI regulation is applicable. 'Demand' is a dummy variable that takes on the value of 1 if the household is planning to purchase a property over the course of the coming year. 'Upward price expectation' is a dummy variable that takes on the value of 1 if the household is expecting house prices to go up over the course of the coming year. 'Expected price expectation', expressed in percent, is what the households expect the change in house prices to be over the course of the coming year. Young versus old distinction depends on a dummy that is one if the age of the head of household is less than or equal to 35. First-time buyers versus speculators are defined based on whether the household currently owns a property or not. The estimates are corrected for the bias due to inexact matching in finite samples. Standard errors are in square brackets. \*\*\*, \*\*, and \* denote significance at the 1, 5, and 10 percent level, respectively.

## Conclusion

We examine the impact of LTV and DTI limits on house price dynamics, residential real estate market activity, and household leverage in Korea. We find that transaction activity drops significantly in the three-month period following the tightening of LTV/DTI regulations. Price appreciation slows down a bit later, in a six-month window rather than the three-month window. Moreover, price dynamics appear to be reined in more after LTV tightening rather than DTI tightening. Survey data analysis using a matching estimator framework offers some insight into what the channel for the *impact* of the policy actions may be: expected house price increases in the future become lower after policy intervention and this is more prevalent among older households while plans to purchase of a home are more likely to be postponed by those who already own a property, i.e., potential speculators, but not by those who do not own a property, i.e., potential first-time home buyers. These findings suggest that tighter limits on loan eligibility criteria, especially on LTV, curb expectations and speculative incentives.

<Link to the full version of the paper> [www.imf.org/external/np/cv/AuthorCV.aspx?AuthID=163](http://www.imf.org/external/np/cv/AuthorCV.aspx?AuthID=163)

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# Developments and Characteristics of the Korean Chonseil Rental System

Byung Hee Seong and Tae Soo Kang

## Introduction

Residence can generally be divided into two types : homeownership and renting. The most common type of rental housing is based upon a lease contract where the tenant pays a certain amount of up-front deposit along with monthly payments. Chonseil is an unique form of lease contract in which the deposit is maximized to about 40% to 80% of the value of the property, in return for not being required to make periodic (e.g. monthly) rent payments. Under the Korean Chonseil system, tenants make Chonseil contracts and pay deposit in a lump sum instead of paying regular (monthly) rents. The term of contract is generally 2 years and when the term ends the Chonseil deposit is returned to the tenant. If the landlord does not return the Chonseil deposit to the tenant upon the end of the contract, the tenant can collect the Chonseil deposit by disposing of the rental home according to the tenant protection law. Landlords can earn interest from the Chonseil deposit, or use it for other investment purposes. While a lease contract with monthly payments obligation is widely used all over the world, Chonseil is exceptionally prevalent in Korea. One of the reasons Chonseil has become so popular in Korea is an underdeveloped housing finance system, which failed to keep up with fast-growing housing demand amid rapid urbanization.

The up-front deposit, which is typically called Chonseil deposit in Korea, has recently risen rapidly. The average Chonseil deposit across the nation, which had risen only moderately following the global financial crisis, increased by an annual average of 6.4% in 2010 and subsequently 7.7% year-on-year in the beginning of 2011. Under these circumstances, concerns have been raised that the hike in Chonseil deposit might lead to the increase in housing price. As Chonseil deposit rises, Chonseil households may secure additional funding through loans from financial institutions, for instance, to become home buyers, or investors may make investment in residential properties for the rental purposes with a relatively small amount of money. The consequent growing demand in the housing market caused by potential buyers may drive up housing price.

It is not easy to pinpoint precisely how the Chonseil system, prevalent in Korea, affects the boom and bust in housing price. Firstly, housing price is determined not only by Chonseil deposit but also by other multiple factors, such as household income, interest rates, supply and demand conditions, related costs and taxes, expected growth in sales price, and real estate policies. Secondly, it is also difficult to conclude how the Chonseil system affects housing price, because Chonseil may serve a dual function of pulling up and down housing price. On one hand, it may delay Chonseil households' demand for houses for a considerable length of time until they can afford to buy a house. In this respect, it constrains Chonseil households from becoming potential home buyers, stabilizing housing price. On the other hand, investors may seek to purchase houses under Chonseil contracts in anticipation of capital gains, consequently advancing housing price.

In this paper, we set up a model which incorporates incentives of both landlords and tenants, based upon the job-market-search-theoretic framework, and estimate the equilibrium price of a lease contract. We examine the empirical validity of variables in the model to verify that they account for the level of Chonseil deposit. Furthermore, we analyze whether or not the rise in Chonseil deposit turns into a destabilizing force on housing price, with the focus on the relationship between Chonseil deposit and housing price.

## Chonseil System and Housing Price Development

### *Ratio of Chonseil by tenure types*

Explicit record on the origin of Chonseil is hard to find. Official records in the 'Survey Report on Social Customs' by the Japanese Government-General of Korea in 1910 suggest that Chonseil was a generally used housing lease contract before the Japanese colonial rule. Chonseil was particularly universal in Seoul by region and the rental objects were buildings rather than lands. After experiencing the Korean war that destroyed much of the housing stock, Chonseil gained popularity at

the national level. The reason that Chonseis has flourished since the 1960s lies in underdeveloped financial markets, which did not meet increasing demands for rental housing following rapid urbanization and industrialization. Choi and Ji (2007) point out that the government-led industrialization policies controlled interest rates and loans in a way that households did not have an access to housing finance enough to meet potential demands for houses, and therefore the ratio of Chonseis to total rental housing market has increased.

According to the Korean Census of Population and Housing, published every five years, the ratio of households residing in housing units with Chonseis have been over 20% since 1980. Chonseis is overwhelmingly more popular in cities, particularly in large cities, than in rural areas. For example, the percentage of households living with Chonseis contracts in rural area has remained at only 10% or so, whereas, the figure in Seoul has exceeded 40% during the period between 1990 and 2000.

Entering into 2005, there were some signs of change in the tenure types in Korea. While the popularity of Chonseis started to lose steam, albeit by a minimal degree, households who resided under a common type of lease contract with monthly payments and owner-occupied units increased by a small margin, except in rural areas. The percentage of households with Chonseis significantly decreased from the upper 20% range in 2000 to the lower 20% range in 2005. Meanwhile, the share of households with monthly rental contracts rose from 14.8% to 19.0%, and the percentage of owner households also rose slightly. The increase of households with monthly rental contracts appeared to be partly attributable to households, who could not afford to pay Chonseis deposit, moving towards the monthly rental contract instead of the Chonseis contract since 2005, when there was a sharp upswing in Chonseis deposit. The rise in the percentage of owner-occupied units was due to the increased homeownership based upon mortgage loans introduced in 2004 in response to a big jump of housing price since 2001. The trend was apparently more noticeable in Seoul, in which Chonseis is a popular form of housing tenure. The percentage of households with Chonseis dropped by 8.0%p between 2000 and 2005 while the percentage of households with monthly rental contracts and owner-occupied households rose 4.2 and 3.7%p, respectively.

The average annual income and age of Chonseis households were lower than those of homeowners. In 2009, an average monthly income was KRW 3.178 mil for owner households and KRW 2.724 mil for Chonseis households. The average age of owner, Chonseis, and monthly rental households was 55.2, 48.4 and 51.3, respectively.

#### *Trends of housing price and the Chonseis index*

By comparison, the consumer price index has steadily risen since 1986, whereas national housing price and Chonseis deposit have fluctuated significantly. During the period of a rapid rise between 2001 and 2002, the growth rates of national housing sales price and Chonseis indexes barely reached 13.2% and 13.3%, respectively. Those of apartments in Seoul, however, were up 25.1% and 17.4%, respectively. During the contraction phase in 1998, sales price and Chonseis index declined relatively steeper in Seoul apartments than in other types of houses.

Since 2008, whereas national housing price showed a moderate growth rate, around the upper 1% range in both 2009 and 2010, the Chonseis index reached 7.1% of growth year-on-year at the end of 2010 after rising by 3.9% in 2009. While Chonseis index for apartment in Seoul rose up to 7.4% in 2010, their sales price rather decreased by 2.2%.

### **Modeling**

#### *Incentives of Chonseis system*

Chonseis system has continued to prevail in Korea because it considerably meets incentives of both landlords and tenants in addition to the socioeconomic conditions mentioned in section II. According to Cho (1988), Chonseis is a relatively stable system. It offers landlords the possibility of capital gain and reduce inflationary cost (relative to financial assets). Under a Chonseis contract, tenants are entitled to receive Chonseis deposit without loss at their contract maturation and do not need to pay periodic payment. Homeowners can use Chonseis deposit to finance additional real estate purchases or to meet working capital needs of small business. Landlords can purchase a house with an amount

of money equal to the housing price minus the Chonsei deposit and could enjoy capital gains if the housing price goes up. On the other hand, the Chonsei system allows tenants to afford homes that would not be possible for outright cash purchase. (Ambrose and Kim, 2003). Tenants are free from monthly payments, one of income constraints, and use the Chonsei system as a first step towards purchasing their own houses with additional savings and/or financial loans on top of Chonsei deposit.

### *Equilibrium price for a rental contract*

Generally, under a monthly rental contract, tenants have to pay a monthly rent ( $R$ ) and a certain amount of up-front security deposit ( $S$ ) for the use of housing services during the contractual period. Chonsei can be considered as a corner solution where deposit is maximized to the point that periodic rents are zero.

In this section, we build a job-market-search-theoretic framework which incorporates incentives of landlords and tenants to determine the equilibrium value of a lease contract. There still is a limit, however, that the framework is a partial equilibrium model which only focuses on housing rental market without goods and labor markets considered.

The model assumes that agents make decisions in the following sequence during the period  $t$ .

- ① A vacancy might occur at the start of the period  $t$ , contingent on renewal of the contract at the end of the previous period.
- ② The probability of matching is each a ratio ( $\sigma(\eta)$ ) of the rental housing units supplied in the lease market by landlords over total houses, and is assumed to be defined as a ratio ( $\eta\sigma(\eta)$ ) of tenants' demand of rental homes over total houses.
- ③ The flow of housing services is available to tenants during the contract period.
- ④ Maximized value of landlords and tenants are determined
- ⑤ The probability of renewal of the rental contract is  $1 - \lambda$ , whereas the probability of termination of the contract is  $\lambda$ .

Landlords and tenants meet and negotiate the terms of the rental contract to determine an equilibrium price,  $f(R^*)$ . Given that there is a difference in bargaining power ( $\alpha$ ) between contracting parties, we assume the following Nash bargaining game.

$$f(R^*) = \operatorname{argmax}_R (O - V)^\alpha (H - L)^{(1-\alpha)}$$

The equilibrium price is derived, which now consists of exogenous variables.

$$R^* = \frac{(1-\alpha)(1-\eta)r^l D + [(1-\alpha)(C_1 - \eta C_2) + \alpha(C_4 - C_3)]P^h}{(1-\alpha)(1-\eta)w(\epsilon) - [r^d - (1-\alpha)(r^d - \eta r^l)\chi]S} \quad (1)$$

Since  $R = 0$  at equilibrium under the Chonsei contract, by substituting  $R$  into zero and rearranging equation (1) with respect to security deposit ( $S$ ), we may derive the equilibrium price of the Chonsei contract.

$$S = \frac{(1-\alpha)(1-\eta)[r^l D - w(\epsilon)] + [(1-\alpha)(C_1 - \eta C_2) + \alpha(C_4 - C_3)]P^h}{r^d - (1-\alpha)(r^d - \eta r^l)\chi} \quad (2)$$

## **Empirical Analysis**

### *Analysis on Chonsei ratio*

Since the Chonsei index is a non-stationary level variable, it needs to be transformed into a stationary time series variable. We divide both sides by the housing price index to transform the equation into a ratio variable.

$$\frac{S}{P^h} = \frac{(1-\alpha)(1-\eta)}{r^d - (1-\alpha)(r^d - \eta r^l)\chi} \left( \frac{r^l D}{P^h} - \frac{w(\epsilon)}{P^h} \right) + \frac{(1-\alpha)(C_1 - \eta C_2) + \alpha(C_4 - C_5)}{r^d - (1-\alpha)(r^d - \eta r^l)\chi}$$

By rearranging the equation above, we may derive equation (3) representing the Chonsei ratio, which is stationary for empirical analysis.

$$\frac{S}{P^h} = A(r^d, r^l, \alpha, \eta, \chi) \left( \frac{r^l D}{P^h} - E \left( \frac{P_{t+1}^h - P^h}{P^h} \right) \right) + B(r^d, r^l, \alpha, \eta, \chi, C_1, C_2, C_4, C_5) \quad (3)$$

The first element on the right hand side of equation (3) is related to financial gains and

losses  $\left( \frac{r^l D}{P^h} - E \left( \frac{P_{t+1}^h - P^h}{P^h} \right) \right)$  or financial cost, and the second element is related to real cost factors  $\left( \frac{(1-\alpha)(C_1 - \eta C_2) + \alpha(C_4 - C_5)}{r^d - (1-\alpha)(r^d - \eta r^l)\chi} \right)$  such as housing costs, housing services, etc. Since variables explaining the Chonsei ratio include unobservable variables  $(\alpha, \eta, \chi, C_1, C_2, C_4, C_5)$ , the state-space model is applied for estimation.

$$\frac{S}{P^h} = SV_A \left( \frac{r^l D}{P^h} - E \left( \frac{P_{t+1}^h - P^h}{P^h} \right) \right) + SV_B + \epsilon$$

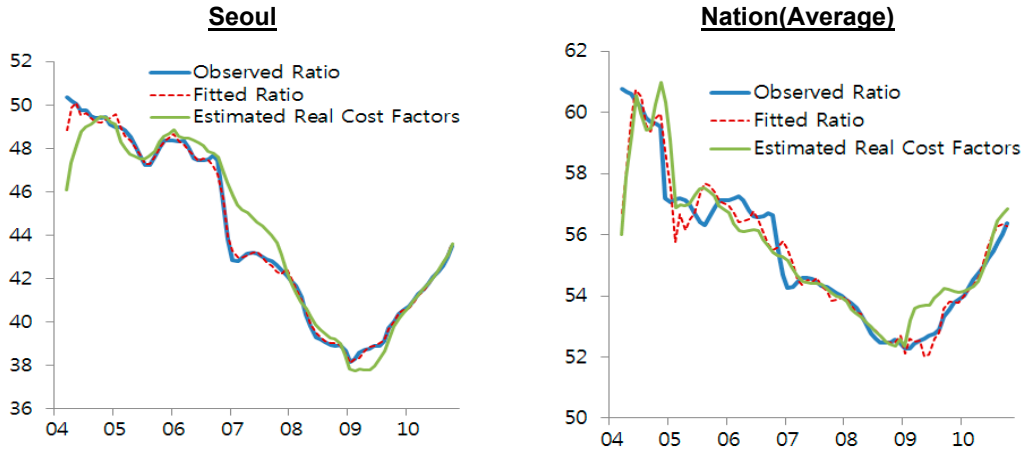
where  $SV_A = A(r^d, r^l, \alpha, \eta, \chi)$ ,  $SV_B = B(r^d, r^l, \alpha, \eta, \chi, C_1, C_2, C_4, C_5)$ .

The estimation of Equation (3) is based upon monthly data over the period between March 2004 and October 2010 from the Monthly Housing Finance Statistics and macroeconomic data and interest rate data from the Economic Statistics System at the Bank of Korea and National Statistic Information Service at the National Statistics Office. In order to examine regional differences, the analysis is conducted by regions, for example, at the national level, Seoul as a whole, Gangnam in Seoul, the metropolitan area, the 6 largest cities and other areas.

It turns out that the estimates of Chonsei deposit ratio based upon State Space Model are very close to the observed data. In particular, real costs of housing service explain most of the movement of observed Chonsei ratio and the remaining part, that is, the difference between the estimated and observed data is explained by the elements representing financial costs in Equation (3). The estimated financial costs are relatively much smaller than the real costs, implying that real cost factors such as supply and demand conditions, tax regime, maintenance costs play a major role in the trend of the Chonsei ratio, whereas the role of financial costs are limited. For example, even in Gangnam, Seoul where financial costs are relatively higher than those in other areas, only 2% (by absolute term) out of 40% of the Chonsei ratio is explained by financial costs. This can be interpreted that the role of financial costs is confined to adjusting Chonsei deposit.

Among real cost factors that explain relatively well the Chonsei ratio, we then examine which specific factor offers the greatest explanatory power. It is shown that excessive demand factor ( $\eta$ ) primarily drives Chonsei deposit to rise and it is statistically significant in almost all areas except Gangnam in Seoul. It implies that supply and demand conditions are a determining factor of the Chonsei ratio in most areas, while other factors better explain the Chonsei ratio in Gangnam.

Figure 1. The Ratio of Chonseil, Model Estimates and Real Cost Estimates



**Coefficients of excessive demand in estimating  $S^V_B$  (Real Cost Factors)**

	Gangnam	Metropolitan Area	Metropolis	Others	Seoul	National Average
Estimated coefficient <sup>1)</sup>	0.004	0.021**	0.071***	0.257***	0.020***	0.111***
p-value	55.99%	4.51%	0.00%	0.97%	0.00%	0.00%

Note: 1) \*, \*\*, \*\*\* indicate 10%, 5%, 1% significance level, respectively

Meanwhile, when we examine the empirical relationship between the growth rate of housing price and its financial costs, the statistically significant relationship is evident in all parts of the country. Given the impacts of housing price increase on financial costs and relatively marginal impacts of financial costs on Chonseil deposit, it is deduced that housing price fluctuation does not have a decisive impact on the change of Chonseil deposit.

**Relationship financial P/L and housing price growth  
(comparison of regression coefficients)**

	Gangnam	Metropolitan Area	Metropolis	Others	Seoul	National Average
Estimated coefficient <sup>1)</sup>	-0.05***	-0.03***	0.40***	0.13***	-0.09***	0.09***
CRDF <sup>2)</sup> (p-value)	0.00%	0.01%	0.38%	14.59%	0.00%	0.44%

Note: 1) \*, \*\*, \*\*\* indicate 10%, 5%, 1% significance level, respectively

2) According to unit root test on the regression residuals for statistical co-integration between two variables, those in Seoul and Metropolitan areas show statistical long-term stable relationships.

Looking at estimation results by regions, the difference between observed Chonseil ratio and real costs for housing services is biggest in the Gangnam area. For comparison, we calculate the absolute gap by dividing the squared sum of the difference between the actual and estimated values by mean square over the sample period. As a result, the number in Gangnam reached the biggest level, 28.57, which suggests that most parts that are unexplained by real costs are accounted for by financial cost factors such as housing price rise and interests on loans.



**Regional gap index<sup>1)</sup>**

Gangnam	Metropolitan Area	Metropolis	Others	Seoul	National Average
28.57	23.47	15.30	10.96	21.93	15.52

Note: 1) 
$$Gap = 100 \times \sqrt{\frac{\sum (\frac{J}{P^*} - \sigma_{V_B})^2}{\sum \frac{J}{P^*}}} \times \sqrt{\left(\frac{1}{n} \sum \frac{J}{P^*}\right)^{-2}}$$

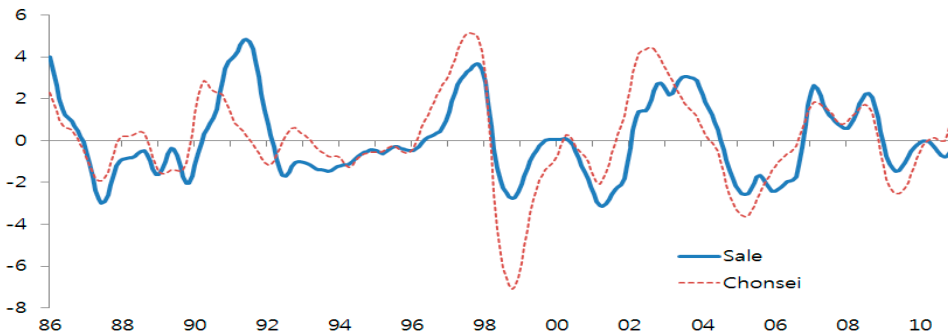
According to the analysis, the gap in actual and estimated Chonseil ratio was higher in areas with faster growth rate in apartment sales price over the sample period between March 2004 and October 2010. In other words, financial cost factors appear to reduce the Chonseil ratio in areas where sales price rises relatively steeply such as Seoul and its metropolitan area, while this kind of pattern is not found in other areas including 6 metropolises and others.

**Impacts of the Chonseil System on the Housing Market**

It is not easy to conclude whether the Chonseil system functions as a price stabilizer or destabilizer in the housing market, since it may affect the housing price in a bi-directional manner, either positively or negatively. On one hand, the Chonseil system has a role of delaying potential housing demand for a considerable time, which could otherwise convert into actual demand. In this context, Chonseil can be considered a contributor to the stability in housing price to a certain degree. On the other hand, the Chonseil system can promote an increase in housing demand. As the Chonseil deposit becomes closer to the level of housing price, tenants under Chonseil contracts are more likely to become potential home buyers if loans from financial institutions are available. Furthermore, from the investors' perspective, they could become actual home buyers because they can purchase houses under Chonseil contracts with a relatively smaller amount of fund in anticipation of capital gains.

We first examine how the Chonseil system contributes to the stability of housing price in an indirect way by reviewing related studies. We analyze the impacts of Chonseil deposit on housing sales price with a causality analysis between Chonseil and sales price indexes. The average national housing sales price index is used as a proxy of sales price, and the average national Chonseil index as Chonseil deposit. We calculate and compare estimated cyclical movements of indexes over the period from January 1986 to December 2012, after removing seasonal factors and irregular factors from the original series, using X12-ARIMA, subtracting the long-term trend obtained by HP filter from the original monthly indexes. As seen in the graph below, the cyclical movements of housing sales and Chonseil indexes appear to show very similar patterns but the volatility of the Chonseil index looks bigger than that of the sales price index.

Figure 2. Cyclical movements of housing indexes<sup>1)</sup>



Note: 1) After HP filtering and seasonal adjustment

In order to examine the causality relationship between cyclical movements of both indexes, Granger-causality test is conducted. According to regression results, the null hypothesis that the lagged sales price index does not Granger-cause the Chonseil index is not rejected while the lagged Chonseil index

appear to have a statistically significant explanatory power for the sales price index. This confirms the inference in the section 1 that the change in sales price has only small impacts on Chonseil deposit since the growth rate of sales price may have impacts on financial cost factors but the impacts of financial costs on sales price may be marginal. The key findings from the time series analysis are that sales price and Chonseil indexes show very similar patterns in their cyclical movements while the Chonseil index and the sales price index have a one-way causality relationship.

As analyzed in section 1, Chonseil deposit is explained largely by real cost factors, including housing costs, supply and demand conditions, rather than sales price expressed in equation (3). Since real costs, such as housing costs, housing services, and supply and demand conditions, do not move quickly over a short period of time at a particular time, the movements of the Chonseil deposit taking account of those factors is not likely to lead to the rise of sales price. If a particular factor drives up Chonseil deposit for a long period of time for structural reasons and therefore maintains Chonseil deposit growth rate at a high level, however, it is highly likely to result in the rise of sales price. It is because a growing demand for houses by investors seeking capital gains and households with Chonseil contracts attempting to become home-buyers is highly likely to drive up housing sales price in the case where the Chonseil ratio rises with the long-term increase in Chonseil deposit. We empirically examine how Chonseil deposit affects housing sales price, when Chonseil deposit has different growth rates. The threshold autoregressive model (TAR) by Hansen (1997) is applied for estimation.

According to estimation results, the threshold is 9% year-on-year. In other words, Chonseil deposit has only minimal impacts on sales price when its increase rate is below 9%. However, when it exceeds 9%, 1%p rise in Chonseil deposit leads to a 0.3%p rise in sales price. It suggests that Chonseil deposit hardly affects sales price before its increase rate reaches a certain level, but if it continues to be above the threshold for a long period of time, sales price could go up.

## Conclusion

One of the reasons Chonseil has become so popular in Korea is an underdeveloped housing finance system that failed to keep up with fast-growing housing demand amid rapid urbanization. Chonseil is Korea's unique and prevalent housing lease contract that cannot be found elsewhere. Chonseil meets considerably the incentives of both landlords and tenants: it offers landlords the possibility of capital gain in the case of rising housing price while allowing tenants to enjoy quality housing services for a defined period of time at much lower costs than from an outright cash purchase.

This paper derives an equilibrium price of Chonseil deposit from a job-search-type model, taking account of typical features of the Chonseil system. According to the empirical analysis on the Chonseil ratio to housing sales price, real cost factors such as supply and demand conditions, taxes and maintenance costs have much more explanatory power than financial cost factors. By regions, financial cost factors explain to a more significant degree in Seoul and Metropolitan area with a rapid rise of housing price than in other areas, while movements of the Chonseil ratio is captured by real cost factors to a great extent across all regions. The Chonseil index and sales price index have a one-way causality relationship from Chonseil to sales price. The growth rate of Chonseil deposit has different impacts on sales, depending on whether it exceeds the threshold of 9% or not. In the phase where the growth rate of Chonseil deposit is high, sales price rises significantly.

There are increasingly growing concerns on whether the current rise of Chonseil deposit leads to sales price hike as in the period between 2001 and 2002. However, the rise in Chonseil deposit may bring about demand for house purchase to only a limited extent, in the short term, as the expectation of housing price growth is not that high and many households already have a high level of debts. The recent increase in Chonseil deposit is led by supply shortage and therefore is not likely to be addressed in a short period of time. Taking both historical data and the current structural conditions into account, the possibility of the rise of housing sales price as a result of an increase in Chonseil deposit is getting higher in the long term.

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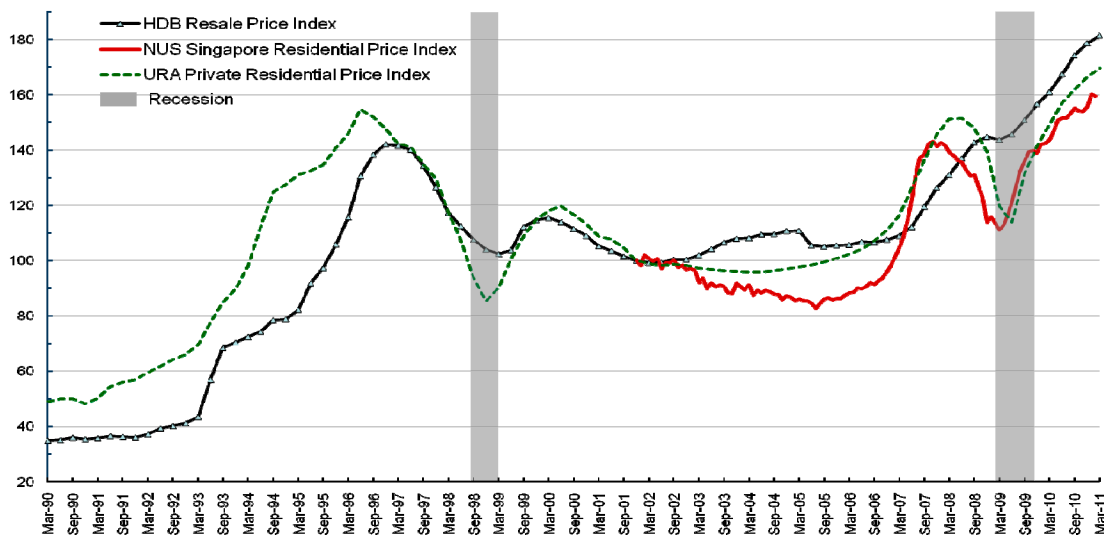
# The Impact of Land Supply and Public Housing Provision on the Private Housing Market in Singapore

Lum Sau Kim

## Introduction

Over the past five years, economic expansion, ample onshore funds and large capital inflows have made the Singapore private housing market an attractive investment proposition. In fact, it has been identified as one of the “frothiest” in the world both before and after the Global Financial Crisis (GFC)<sup>50</sup>. Figure 1 shows that from July 2005 to November 2007, nominal house prices as measured by the NUS Singapore Residential Price Index (SRPI)<sup>51</sup> appreciated 73% (26.5% CAGR). They subsequently declined 22% (-17.3% CAGR) and hit a post-GFC low in March 2009 before rebounding about 45% (20.4% CAGR) by March 2011. These movements are also broadly reflected by the URA Private Residential Price Index<sup>52</sup>. In the secondary public housing market, capital appreciation was equally impressive: the HDB Resale Price Index<sup>53</sup> rose 50% between mid-2007 and end-2010 with only a 1% fall in Q1:2009.

Figure 1 The HDB Resale Price Index (Q4:2001=100), the NUS SRPI (Dec 2001=100) and the URA Private Residential Price Index (Q4:2001=100)



As with many other countries, investment and speculation in residential property have been implicated in the economic vicissitudes of Singapore during the recent GFC. This paper provides a perspective on various developments that have led to its recent dramatic house price trajectory.

<sup>50</sup> See The Economist, July 5<sup>th</sup> 2007, May 22<sup>nd</sup> 2008 and April 15<sup>th</sup> 2010.

<sup>51</sup> The Singapore Residential Price Index is a quality-controlled transaction price index produced by the National University of Singapore (NUS) that tracks price movements in the Singapore private residential market on a monthly basis using a basket-based approach. For details, see <http://www.ires.nus.edu.sg/srpi.aspx>.

<sup>52</sup> The URA Private Residential Price Index is a median transactions price index that tracks the overall price movement of the private residential market using Q4:1998 as the base period.

<sup>53</sup> The HDB Resale Price Index is a median transactions price index that tracks the overall price movement of the secondary or resale HDB market from Q1:1990 with Q4:1998 as the base period.

Section 2 provides some stylized facts about the housing sector and land supply in Singapore. Section 3 describes the housing demand-supply imbalances before the Asian Financial Crisis (AFC) as well as the interventions undertaken to stabilize the residential market, including the introduction of the first prudential measures in Singapore. Section 4 presents the various policies implemented before the GFC that provide the institutional context for understanding the run-up in the Singapore housing sector before the Lehman collapse and its sharp recovery since early 2009. Section 5 examines the ongoing efforts by the government to moderate house price inflation. While it is still premature to assess how well the latest market cooling measures would work, the paper concludes with some thoughts on the policy levers available to the state and potential issues for the Singapore housing sector.

## **Stylized Facts About the Singapore Housing Sector and Land Supply**

Since attaining self-governance in 1959, Singapore policy makers have promoted owner-occupation and supported housing asset inflation, particularly in the public housing sector, to achieve various socio-economic and political goals. Through deliberate and pervasive state intervention in the housing sector as well as monopolistic control of both housing and land supply, a vertically segmented housing market has developed. It is characterized by the coexistence of a dominant public housing sector where dwellings are developed by public agencies and a small, growing private segment with relatively higher quality housing built by private firms. Except for a minor social housing component, 95 per cent of public housing in Singapore has been privatized through home ownership.

The demand for new public housing units, which are called Housing and Development Board (HDB) flats, is regulated using various eligibility rules such as citizenship status, non-ownership of private properties, a minimum household size of two persons and household income. Eligible households can purchase directly from the state a 99-year leasehold interest in a HDB flat, but not in the land or common areas. The prices of new leases are fixed by the government, having regard to the general state of the economy and affordability levels for the different flat types<sup>54</sup>, at subsidized rates that reflect a discount to comparable secondary market prices. After fulfilling a stipulated minimum occupation period, the residual leasehold in the flat can be sold at open market prices in the HDB resale market to eligible buyers subject to rules that circumscribe ownership rights and that prevent excess profiteering.

With more than 82% of the resident population being housed in HDB flats at present, private housing developers play a limited role of supplying expensive dwellings. In the past, private housing was built on land of predominantly freehold or long-leasehold (999-year) tenure. From the mid-1960s to the early 1980s, the state embarked on a massive exercise of land reclamation and compulsory acquisition that raised its ownership of the total land mass in Singapore from around 40% in 1960 to more than 80% currently.

As the limited amount of privately-held land was insufficient to accommodate the demand for private housing, the state began to auction state-owned land on shorter leaseholds of 99 years via its Government Land Sales (GLS) program for these developments. Besides house price stabilization, the GLS sought to facilitate housing provision based on the long-run planning goals in the national development blueprint. As in Hong Kong, the GLS program has become an important revenue generator for the state as well as the key source of private land supply. Unlike public housing leases however, buyers of private units built on these state-owned land parcels own an undivided share of the rights in the land as well.

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<sup>54</sup> As a matter of government policy, 3-room flats are priced such that at least 90% of new Singaporean households would be able to pay their HDB mortgage repayments using only their CPF contributions without having to use cash. Four-room flats would be similarly priced to be affordable to 70% of Singaporean households.

Table 1 shows the structure of the Singapore housing sector. The smallest HDB flats<sup>55</sup> that are rented to disadvantaged households represent the social housing component. Next are the smaller owner-occupied flats, the larger and newer public housing units, entry level private housing, medium level private housing and finally private luxury properties. Over time, the proportion of the total stock in private housing has been edging up and the planning intent is to have it rise to 25% in the long term.

Table 1. The Stock of Residential Units

	Number of Units as at end			Percentage of Total Stock*
	1997	2004	2009	
<b>Public Sector Housing</b>				
1-room	25,182	20,142	20,041	1.7%
2-room	34,610	29,351	29,680	2.6%
3-room	239,562	227,125	220,696	19.2%
4-room	267,517	325,794	339,782	29.6%
5-room	134,051	206,614	209,764	18.3%
Executive	50,320	65,158	65,076	5.7%
Studio Apartments	-	936	1,239	0.1%
HUDC Apartments	4,071	1,865	1,865	0.2%
<b>Total</b>	<b>755,313</b>	<b>876,985</b>	<b>888,143</b>	<b>77.4%</b>
<b>Executive Condominiums</b>	<b>-</b>	<b>8,856</b>	<b>10,430</b>	<b>0.9%</b>
<b>Private Residential Properties</b>				
Apartments	49,678	59,349	64,513	5.6%
Condominiums	48,364	94,916	115,478	10.1%
Terraced houses	33,496	37,031	38,101	3.3%
Semi-detached houses	19,597	20,702	21,128	1.8%
Detached houses	10,138	9,905	10,269	0.9%
<b>Total</b>	<b>161,273</b>	<b>221,903</b>	<b>249,489</b>	<b>21.7%</b>
<b>Total Stock</b>	<b>916,586</b>	<b>1,107,744</b>	<b>1,148,062</b>	<b>100.0%</b>

Notes: The public sector stock refers to units under HDB management, including apartments built by the Housing and Urban Development Company (HUDC) that were transferred to the HDB for management in 1982.

\*The percentages are computed for 2009 only.

Sources: Department of Statistics, Singapore, *Singapore in Figures, 2010*; and Urban Redevelopment Authority, REALIS

House buyers can withdraw their forced tax-exempt savings in their Central Provident Fund (CPF)<sup>56</sup> accounts to pay the downpayment, stamp duties and debt service for housing. In addition, the state provides concessionary loans to qualifying households for the purchase of new and resale flats.

<sup>55</sup> A flat is named according to the number of rooms it has. The sitting-dining room and bedrooms are counted but not the kitchen and washrooms. The executive apartment has 5 rooms but is larger than the 5-room flat.

<sup>56</sup> The CPF is essentially a national state-managed social security savings scheme set up in 1955 to ensure the financial security of all workers. It requires mandatory contributions from both the employer and employee of a defined percentage of the employee's monthly contractual salary into his/her personal account with the Fund. For details, see <http://www.cpf.gov.sg>.

Depending on prevailing economic conditions, the loan-to-value (LTV) ratio could reach 90% while the maximum loan repayment period was 32 years or when the borrower reached 65 years of age, whichever was earlier. To facilitate social mobility, flat owners could obtain more than one concessionary loan. For the most part, HDB concessionary loans were subsidized in that the mortgage contract rate, which was tied to the CPF savings rate, was below the commercial housing loan rate. Households that were ineligible for HDB concessionary loans and buyers of private housing could obtain market rate loans from private lenders for tenors of up to 40 years. Until prudential measures were first introduced in 1996, the LTV could be as large as 103%.

## **Housing Market Imbalances Pre-Asian Financial Crisis**

In the decade prior to the AFC, robust economic growth, rapid household formation and a conducive housing finance environment underpinned strong demand for both public and private housing. Sentiment was further heightened by a spectacular bull run in the Singapore stock market and from hot money flowing into the region. Over the same period, the government raised the income ceiling for new HDB flats four times and the withdrawal limit for CPF funds to buy private housing twice<sup>57</sup>. It also implemented a series of policy measures to privatize public housing that included:

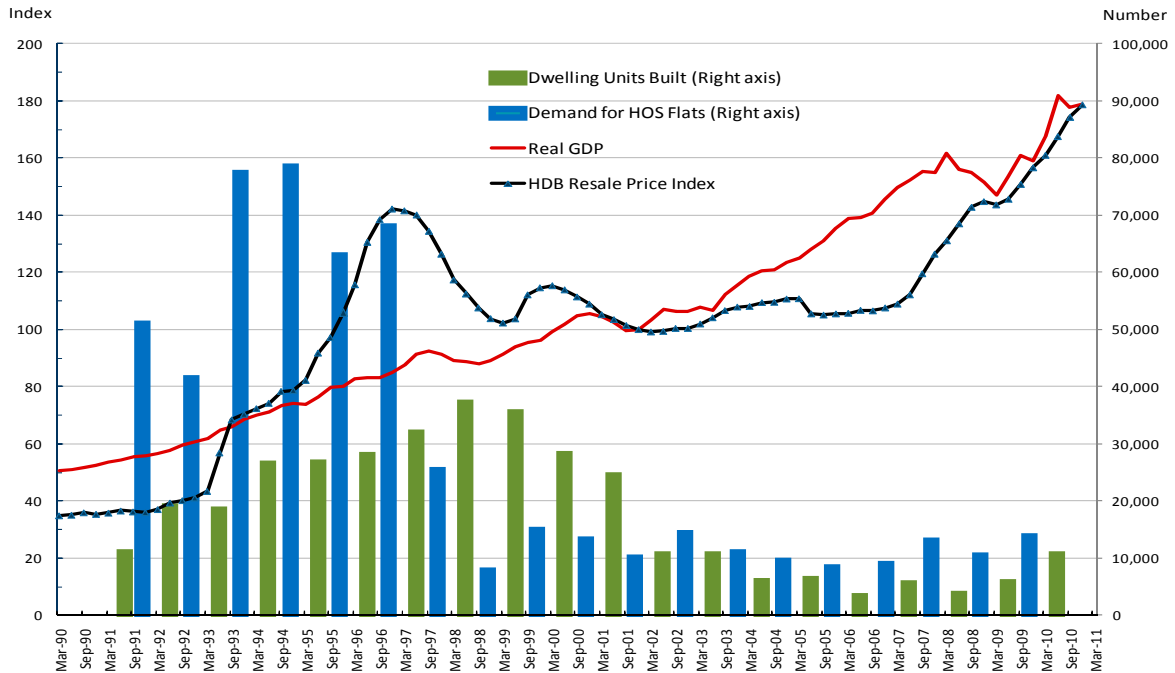
- from 1988, market-based instead of cost-based pricing of new HDB flats;
- from 1989, allowing HDB owners who had stayed in their units for at least five years to invest their excess CPF savings in private residential properties;
- in 1989 and 1991, the relaxation of eligibility criteria for owning HDB resale flats; and
- from 1993, extending larger loans for resale flat buyers with LTVs pegged to market values rather than historical prices.

This confluence of fundamental and policy demand drivers supported strong resale price inflation. As new HDB flats were subsidized but could be re-sold at higher open market prices, ownership of public housing became a source of tax-free “fortuitous” wealth (Lum, 1996). Through the resale mechanism, public housing served as a launching pad for upward social mobility and was seen as an investment good to build up equity. Figure 2 shows the HDB Resale Price Index in relation to an index of seasonally adjusted real GDP, the demand for new flats and HDB flat completions. Until 2001, new flats were allocated using a first-come first-served registration system where demand was measured by the number of applications in the new flat queue. As no downpayment was required, the number of new applications would likely overstate the demand for new HDB units. By end 1993, long queues had developed. Despite various attempts to pare down new flat demand, resale prices for HDB flats continued to outpace GDP growth and the queue for new flats lengthened.

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<sup>57</sup> In 1988, CPF members could withdraw up to 100% of the lower of the purchase price or valuation of the dwelling instead of 80% previously. The withdrawal amount was raised to cover mortgage interest payments in 1993.

Figure 2. The Demand for and Completions of HDB flats (Mar 1991 to Mar 2010) and the HDB Resale Price Index (Q4:2001=100) and real GDP (Q4:2001=100)



Notes: Demand for HOS flats refer to new demand in a fiscal year while flat completions are for a calendar year. 1990 data were omitted as they were computed on a different basis.

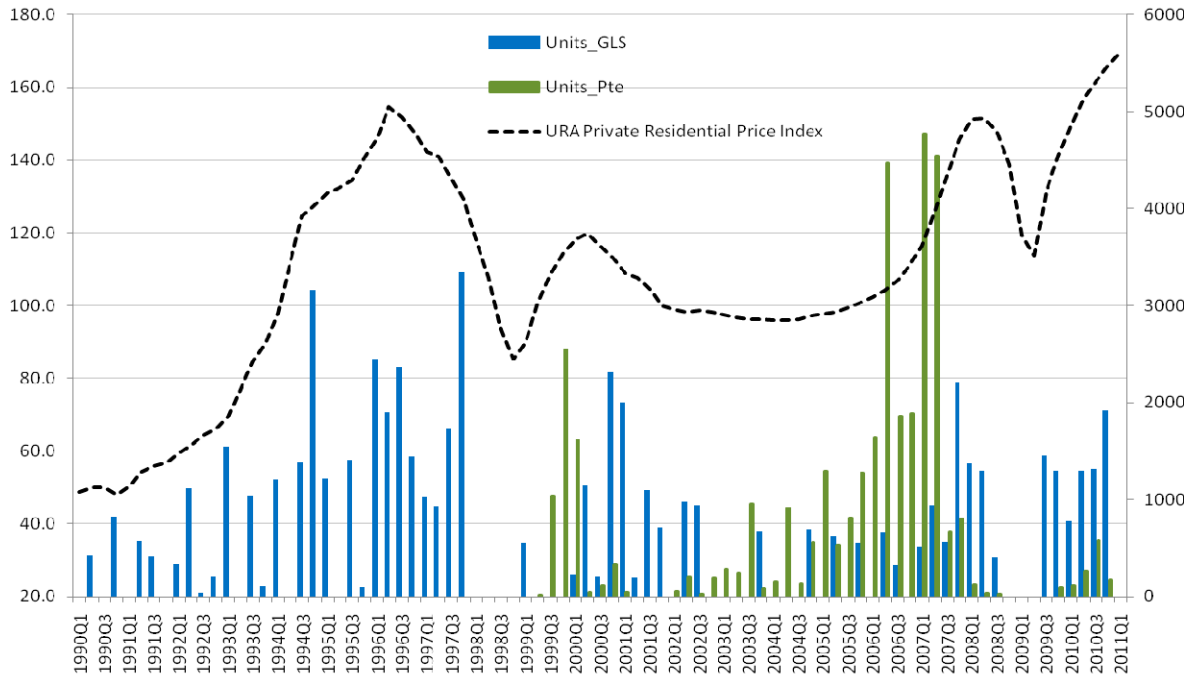
Given the hierarchical structure of the Singapore housing market, excess demand for public housing spilled over into the lower-end private residential segment. However, land for private housing development was in short supply as the state had suspended its GLS program since 1982 and private land banks were increasingly becoming depleted. Concerned with the steep run-up in house prices, the government resumed selling state-owned sites in 1991.

Figure 3 shows that annual increments in the land supplied failed to cool down the overheated housing market. Instead, benchmark prices for state land continued to be set at each successive sale due to intense market competition and the government came under criticism for exacerbating the real estate price cycle. Despite the imposition in 1994 of a 5% booking fee for the option-to-purchase that was raised to 10% of the property price a year later, demand grew unabated as capital gains were untaxed and mortgage financing was readily available: some loans were geared at an LTV ratio of 103% to cover not just the purchase price of the property but the stamp duty as well.

Between 1986 and 1996, the private residential market experienced a nominal price growth of 540% that far outpaced rental increases (see Figure 4) and the conventional wisdom was that prices could only continue to appreciate in a land-scarce booming city-state.



Figure 3. The Supply of State-owned Land Under the GLS, the Supply of Privately-owned Land and the URA Private Residential Price Index (Q4:2001=100)



To dampen speculation, the government implemented a market cooling package in May 1996 that included for the first time, prudential and fiscal measures. For every sale of residential property within three years of purchase, the capital gains would be taxed as income<sup>58</sup> and stamp duty would be levied on the vendor (in addition to the buyer)<sup>59</sup>. Financing was limited to 80% of the purchase price or valuation, whichever was lower, and the 20% down-payment must be cash-funded. Non-residents and non-Singapore companies were prohibited from Singapore-dollar housing loans while a permanent resident was limited to one such loan to purchase a property for owner-occupancy. The anti-speculation measures decreased both the transaction volume and prices in the private residential market while the prudential limits on housing loans moderated credit growth from 20% per annum before the curbs to 14% in 1997.

Investor confidence was further eroded with the onset of the AFC and funds flowed out from the region. As an oversupply situation began to build up in the private housing segment, the government attempted to resuscitate the market. It reduced the supply of state land for 1997, allowed developers who had bought state-owned sites to defer housing completion<sup>60</sup> and exempted sellers of private dwellings from payment of stamp duty. Under a Deferred Payment Scheme (DPS) introduced in October 1997, developers were also allowed to offer purchasers of uncompleted properties the option to defer progress payments till completion<sup>61</sup>. In practice, buyers need not prove that they had

<sup>58</sup> 100%, 66% and 33% of the capital gains were taxable if a property was sold within 1 year, 2 years and 3 years of its purchase respectively.

<sup>59</sup> This was payable on signing the Sales & Purchase Agreement instead of at completion.

<sup>60</sup> In November 1997, the stipulated completion time for projects where units had not been launched for sale was extended to 8 years (up from 30 months imposed in May 1996) subject to a premium of 5% of the land price payable per year of extension.

<sup>61</sup> Under a normal progress payment scheme, buyers normally secure a housing loan early as they are billed by the developer in stages, according to the progress of the project's construction. With the DPS, buyers paid only 10%, or more typically 20%, of the house price with the next payment due on completion, a few years down the road.

sufficient funds or were able to secure adequate loans from banks before they bought a property. As this presented adverse selection problems, default risk would be more concentrated in developers and in turn, their lenders, if prices were to collapse.

As part of the cooling measures in 1996, the government also reduced the flexibility of public housing owners to upgrade. The time-bar to reapply for another new flat was doubled<sup>62</sup> and access to HDB concessionary loans was tightened to prevent abuse: a borrower was limited to two subsidized loans and was subject to credit assessment for the first time<sup>63</sup>. Unlike in the private housing market however, these measures had no appreciable impact on new HDB flat demand or resale prices in the short term.

As the AFC propagated through the region, Singapore faced the full brunt of its spillover effects in 1998. To avert a precipitous drop in private housing values from negative GDP growth and rising unemployment, the government instituted various off-budget measures and reversed many of its earlier policies including deferring stamp duty payments and suspending the GLS program.

### **The 2006-2007 Housing Boom and the GFC**

The period leading up to the GFC can be characterized as one of financial liberalization amidst wider economic restructuring efforts to diversify and grow Singapore's economic base. At the same time, the openness of its trade-oriented economy and capital markets meant that Singapore was particularly exposed to the vagaries of a very fluid global economy. In particular, American monetary policy was transmitted to Singapore through financial market linkages and an exchange rate that is managed in part against the US dollar. As a result, the housing sector became increasingly volatile and saw frequent policy interventions. The key ones are described below.

From end 1998 to mid-2000, private housing prices rebounded by 40% and prompted the state to resume its GLS program<sup>64</sup>. Over the same period, the resale flat market also recovered but to a lesser extent due to reductions in the quantum of CPF housing grants and a ruling that restricted the second HDB concessionary loan to only borrowers who upgraded to larger flats. However, the primary HDB market suffered the greatest impact from the AFC: demand fell sharply in 1998 as applicants dropped out of the new flat queue or opted to buy resale flats instead of waiting. New demand was also weak as the prices of new flats saw only marginal corrections compared to the price declines in the private and resale markets. Figure 2 shows that while the demand for new flats did increase in late 1999, it was substantially lower than pre-crisis demand levels and could not absorb the completions from a pipeline that had been ramped up in the mid-1990s. By end 1999, there was an overhang of about 31,000 unsold flats that not only curtailed new construction but would take another 7 years to whittle down.

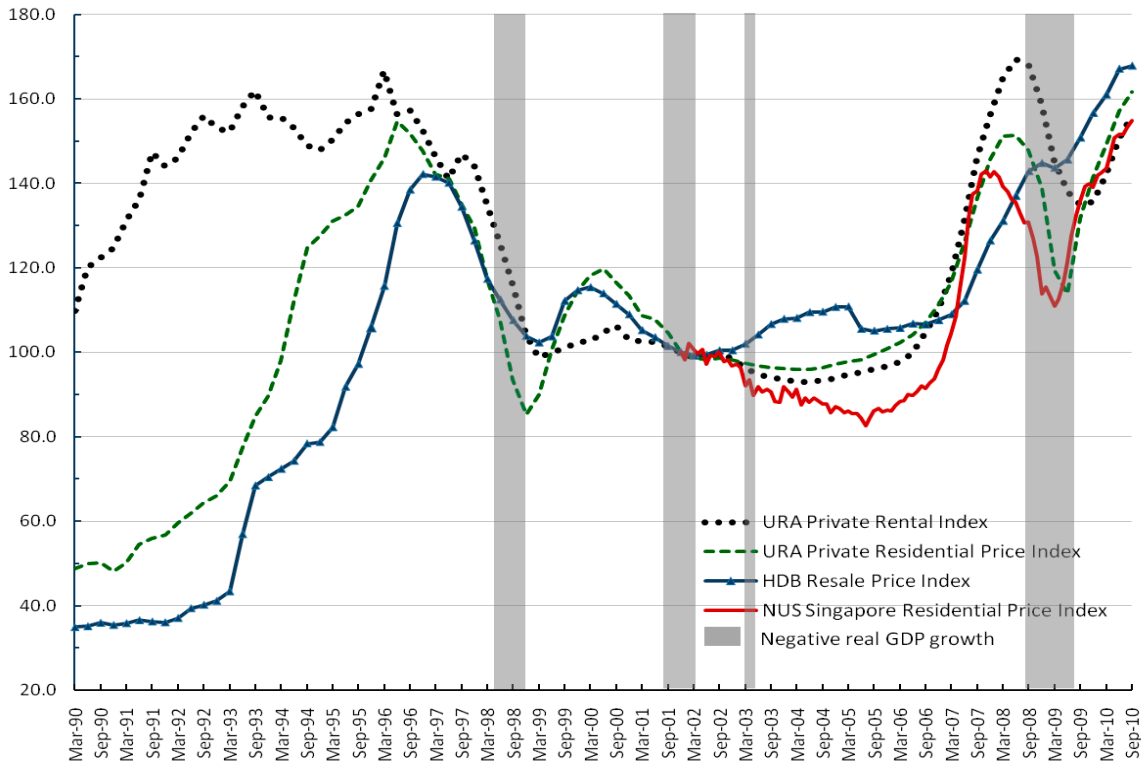
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<sup>62</sup> The time bar was increased from 5 to 10 years to shorten the HDB queue. The resale levy was simplified to only the graded resale levy scheme with buyers of new flats and ECs having to pay higher levies.

<sup>63</sup> The credit assessment imposed a 40% ceiling on the debt service to income ratio. In September 1997, HDB owners could book a private unit only after a 5-year occupation period in their flats.

<sup>64</sup> In June 2000, land was released for 9000 units of private housing.

Figure 4. The HDB Resale Price Index (Q4:2001=100), the NUS SRPI (Dec 2001=100) and the URA Private Residential Price and Rental Indexes (Q4:2001=100)



In 2001, a global electronics slump and a sharp slowdown in the US economy following the dot.com bust precipitated a synchronized downturn across most countries. The Singapore housing sector was hit by one of the worst recessions on record. This triggered a revamp of the GLS program in June: in addition to a confirmed list of sites that have been earmarked for periodic sale based on medium term projections, stand-by parcels would be placed on a reserve list to cater to demand shocks. A reserve site would only be triggered for sale if the state received a bid that exceeded its (undisclosed) reserve price<sup>65</sup>. With a reserve supply, the quantum of land released under the confirmed list was reduced. The state also changed the way new flats were sold from a first-come first-served queue system to a build-to-order (BTO) system under which building would commence only if most of the flats to be built on proposed sites had been booked with a downpayment<sup>66</sup>. While the earlier registration system would overstate actual demand, the BTO system was likely to err on the conservative side as demand was measured by the number of committed sales. Following September 11, the government attempted to boost demand by lifting the capital gains tax on private housing and allowing foreigners access to Singapore dollar loans for buying private residential properties. In addition, the sale of sites under the confirmed list was suspended in October.

Between 2003 and mid-2005, the sale of confirmed land sites remained suspended and stamp duty rates were reduced by 30%. The state further relaxed its restrictions on both the subletting and resale

<sup>65</sup> Under the Reserve List system, the government would only release a site for sale if an interested party submits an application to release the site with an offer of a minimum purchase price that is acceptable to the state. The successful applicant must undertake to subsequently bid for the land in the tender at or above the minimum price offered in the application.

<sup>66</sup> Under this system, buyers ballot for the chance to select a flat and pay a downpayment to secure a booking. The HDB proceeds to build when the majority of flats are booked.

of flats<sup>67</sup> with the most notable being the reduction of the minimum occupation period for buyers who had not received any form of subsidy: they could resell their units after a year rather than 2.5 years. This would have important consequences later since shortening the holding period reinforced the attractiveness of public housing as a low-risk investment and even speculative vehicle, particularly for those without credit constraints.

In 2005, a resilient US lifted the world economy and Asian bourses were boosted by foreign capital flows into emerging markets in search of higher yields. This and an announcement in April that two mega integrated resorts would be built in Singapore renewed investor interest in properties. However, private housing prices were still declining, albeit slowly, and the downtrend was arrested only when a package of measures to inflate the market was announced in July that included:

- raising the maximum LTV ratio of housing loans from 80% to 90% and reducing the cash downpayment from 10% to 5%;
- lowering the minimum lease period of properties that could be purchased with CPF savings from 60 to 30 years;
- allowing non-related CPF members to use their CPF savings to jointly purchase private housing units;
- relaxing restrictions on foreign ownership of units in low-rise apartments<sup>68</sup>; and
- reinstating private residential properties as allowable investments under the state's Global Investor Program for a foreigner seeking to qualify for permanent residence.

Based on the SRPI, private house prices bottomed in July and appreciated 4% by year end. With strong growth of the global economy in 2006, Singapore experienced robust economic expansion and the highest rate of private house price appreciation of 11% in Asia. In late 2006, the government withdrew an earlier concession to defer payment of stamp duty and announced the resumption of confirmed land sales for 2007, six years after it had been suspended.

By early 2007, Asian economies with strong fiscal positions were seeing large speculative capital inflows. This stemmed from 3 factors: bullish sentiment on the back of sustained growth and low inflation expectations; abundant liquidity in the global financial system; and increasing concerns about the sustainability of US economic growth given its cooling housing market. The capital inflows kept domestic interest rates and risk premia low and encouraged more risk-taking in property markets. Record job creation and the rapid influx of foreigners as a direct consequence of Singapore's liberalized immigration policies also drove demand. Particularly after 2006, the pace of immigration picked up as the government made it easier for foreign workers to gain PR status and for permanent residents to become citizens. Table 2 shows the substantial growth in the non-resident population from 2006 to 2008. Non-citizens accounted for 25% of the total residential sales in 2007, the highest level in 13 years. Finally, urban development policies and the sale of state-land for iconic projects aimed at branding Singapore as a culturally vibrant global city have also boosted the housing market.

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<sup>67</sup> Since October 2003, flat owners could sublet their whole flat after a 15-year MOP or after 10 years if they had paid off their home loan. In March 2005, these time bars were reduced to 10 years and 5 years respectively. The MOP before buying another subsidized flat was decreased from 10 to 5 years.

<sup>68</sup> Foreigners could buy any non-landed property but all other properties such as vacant residential land, landed homes and whole buildings or condominiums are restricted and require state approval.

Table 2. Singapore Population Size and Growth by Residential Status

Year	Number ('000)					Average Annual Growth (%)				
	Total	Singapore Residents			Non-Residents	Total	Singapore Residents			Non-Residents
		Total	Citizens	PRs			Total	Citizens	PRs	
1990	3,047.1	2,735.9	2,623.7	112.1	311.3	2.3	1.7	1.7	2.3	9.0
2000	4,027.9	3,273.4	2,985.9	287.5	754.5	2.8	1.8	1.3	9.9	9.3
2005	4,265.8	3,467.8	3,081.0	386.8	797.9	2.4	1.6	0.8	8.6	5.9
2006	4,401.4	3,525.9	3,107.9	418.0	875.5	3.2	1.7	0.9	8.1	9.7
2007	4,588.6	3,583.1	3,133.8	449.2	1,005.5	4.3	1.6	0.8	7.5	14.9
2008	4,839.4	3,642.7	3,164.4	478.2	1,196.7	5.5	1.7	1.0	6.5	19.0
2009	4,987.6	3,733.9	3,200.7	533.2	1,253.7	3.1	2.5	1.1	11.5	4.8
2010	5,076.7	3,771.7	3,230.7	541.0	1,305.0	1.8	1.0	0.9	1.5	4.1

Notes: For 1990 and 2000, growth rate refers to the annualized change over the last ten years. "Total" refers to the total population comprising Singapore residents and non-residents. Resident population comprises Singapore citizens and permanent residents. Non-resident population comprises foreigners who were working, studying or living in Singapore but not granted permanent residence, excluding tourists and short-term visitors.

Source: Singapore Department of Statistics, *Population Trends 2010*

In the 12 months to end November 2007, private house prices increased a massive 53% according to the SRPI. Hence, it was somewhat surprising that only two measures were implemented to keep private house prices in check and that these came in October when there were already signs of an incipient economic slowdown. The first was the withdrawal of the deferred payment scheme, which immediately depressed builder stocks but boosted bank equities. The second was the enactment of more stringent rules governing collective or *en bloc* sales of housing developments owned by multiple parties<sup>69</sup>. Escalating house prices, particularly of high-end properties, had created strong demand for prime land. This triggered a wave of collective sales in the first half of 2007 of older, centrally located residential projects for redevelopment. *En bloc* sales not only set increasingly higher benchmark prices for land but, by removing existing stock from the market amidst a fast growing immigrant demographic, created excess demand for accommodation. As a result, rents increased by 41% in 2007 and led many to buy rather than lease. However, the new rules to moderate *en bloc* sales activity had limited efficacy as they had been generally anticipated and an unexpected increase in betterment tax earlier in July had already reduced expected profits.

The short supply situation was exacerbated by the suspension of sales of confirmed state-owned land since 2001. When the program was resumed in 2007, the key sites released were intended to advance the prevailing planning intent of developing new non-CBD commercial regions. Unlike the prime land sold through collective sales, most of the state-owned residential sites offered for sale were not centrally located and were placed on the reserve list. Triggering a reserve site for auction was onerous as a developer needed to submit a minimum bid above the state's reservation price and if accepted, place a deposit of 5% of the bid amount. This focused attention and intense competition on a few select plots that set record prices for suburban land, which in turn fuelled expectations of

<sup>69</sup> In an *en bloc* sale, owners of fragmented interests in land would amalgamate their combined interests in either strata-titled units or adjoining single-family units for sale and eventual redevelopment (Lum et al., 2000).

higher future selling prices. Although the amount of residential land was increased in October, the reception was dampened by the removal of the DPS and increased uncertainty about profit margins given escalating building costs amidst a global commodity boom<sup>70</sup>. Further, there were resource constraints due to the synchronized construction of various landmark projects that had been deferred to the mid-2000s when economic recovery was expected to be on a firmer footing.

The public resale market had been languishing for several years but began to pick up in Q2:2007. Indeed, a key impetus for the capital appreciation came from the state itself when it substantially relaxed its flat subletting policy in March. By reducing the minimum occupation period before a flat could be rented out to 5 years (3 years) for subsidized (non-subsidized) units and by delinking the eligibility to rent from the loan status<sup>71</sup>, the government directly fuelled investment demand for its flats. The excess demand from expatriates and middle income families who had been priced out of the private market filtered down to the HDB sector in the second half of 2007. Given the tight housing market conditions then, HDB flat rentals rose (by as much as 21.2% for five-room flats in the third quarter) but their lower prices meant higher rental yields compared to those for private housing, making HDB flats an attractive play. As a result of the high resale prices and a public housing supply program that had been substantially scaled down, much of the remaining unsold public housing stock was cleared in 2007. By year end, resale prices had risen 17% while applications for new flats had increased about 50%. Increasing concerns about housing affordability led the government to announce that more new HDB flats with a larger proportion of smaller units would be released for sale over the next six months.

Just as the government stepped up its GLS and HDB building program for 2008, the US subprime mortgage crisis precipitated a credit squeeze that marked the onset of the GFC. Given its strong external orientation, the impact of the crisis on Singapore was severe and its economy contracted 10.1% during the year to Q1:2009. Over the same period, no state-land sales were concluded and the private housing market fell 20% to hit a post-GFC low in March 2009. As mitigation, the state suspended the confirmed list for its 2009 GLS program and allowed various concessions for residential developers to phase the construction and sale of their private sector projects<sup>72</sup>.

In contrast, the public housing sector remained firm with demand for new-build units overwhelming the limited supply. According to brokerage reports, market rents of HDB flats continued to rise while the official HDB Resale Price Index gained 10% in the year to end March 2009, buoyed by relatively stronger demand for larger units. The main concern among policy-makers then was on providing assistance to targeted groups affected by the recession. The measures include implementing a lease buyback scheme for low-income elderly lessees that would pay them an annuity stream, providing rental rebates and enhancing grants that now reached the middle income group and that boosted demand for the smaller flats.

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<sup>70</sup> Construction costs increased by 20% to 30% in Q4:2007 (year-on-year) and by early 2008, had overtaken the land cost for some 99-year leasehold sites. To ease inflationary pressure on the construction sector, the government shelved S\$4.7 billion of public sector projects until 2010 and beyond.

<sup>71</sup> This was a major change from the HDB's prevailing policy and was intended to help home owners monetize their homes as well as to enlarge the rental market.

<sup>72</sup> The measures in the 2009 Budget included: allowing developers who bought GLS sites and foreign developers who owned private residential land a one-year extension to commence development; allowing developers to resell the land or dispose of their interest in it before 21 Jan 2010; and giving foreign developers 2 more years to dispose of the units or up to 4 years to rent out unsold apartments. (In the past, they were required to sell all the units in their project within two years of completion and were not allowed to rent out unsold units.)

## The Post-GFC Housing Boom and Market Cooling Measures

Following concerted fiscal, monetary and other stimulus measures by governments across the world, the GFC began to ease in early 2009. Given the sound macroeconomic and financial fundamentals of Asian economies, the region was expected to outperform the global economy and attracted capital flight to quality. Singapore was a beneficiary of these developments, having built up its wealth management capabilities in line with its ambition to be a financial hub. This, coupled with an earlier move by the Monetary Authority of Singapore (MAS) that raised the pace of Singapore dollar appreciation to counter imported inflation, helped attract foreign funds to flow back into the local market and kept interest rates and borrowing costs low. Indeed, the excess liquidity helped to fuel an even stronger bull run in the Singapore property market post-GFC.

Rebounds of the Singapore private housing sector had always lagged wider economic recovery in the past. However, the prospect of a V-shaped economic upturn combined with ample liquidity and expectations of continued low interest rates set off a sharp increase in private house prices in April 2009 ahead of positive GDP growth. By then, escalating resale flat prices had narrowed the price gap between the largest HDB units and entry-level private housing. This, coupled with developer discounts, boosted transaction volumes of private units that were perceived to be reasonably priced<sup>73</sup>. The sector also benefitted from credit tightening measures in China and Hong Kong that diverted some buying attention to Singapore. Unlike the pre-GFC boom when luxury units dominated transactions, the majority of the new private sector units sold comprised either small or mid-market homes for middle income buyers, many of whom capitalized on high resale flat prices to upgrade. Such entry-level private housing are often built on state land parcels in suburban areas but the state elected to suspend the confirmed list of the GLS program for the rest of the year as there were ample reserve sites. However, only two reserve sites had been triggered for sale in mid-2009 and indicated that either the reserve list system was not well primed to respond to demand shocks or that reservation prices may have been too high relative to bids.

Only after private house prices had surged 19% from March to August 2009 did the government intervene to cool the housing market in mid-September. It announced that the confirmed list would be reinstated for the 2010 GLS program, a move that did not immediately change the status quo in terms of land supply. Further, the MAS banned financial institutions from offering interest-only housing loans to buyers of uncompleted private housing units. As the loans either entirely eliminated or substantially lowered regular installment payments for private housing buyers in the first few years before the properties were completed, they could encourage speculation. Their removal was intended to encourage prospective buyers to consider carefully their long term affordability.

Despite these measures, the speculative momentum in the property market continued to escalate and necessitated a new round of measures in February 2010. First, sellers of residential properties or land bought on or after 20 February and sold within one year from the date of purchase were required to pay stamp duty. Second, the MAS lowered the LTV limit for housing loans from 90% to 80% but HDB concessionary loans were exempted to promote home ownership amongst first-time flat buyers and upgraders. Third, a record quantum of state land was made available for sale in the GLS program for the first half of 2010 although the bulk was in the reserve list. To facilitate triggering reserve sites for sale, the government reduced the deposit payable by a successful applicant. It would also auction a site if it attracted sufficient market interest which meant that at least two bids were received that were within the ballpark of the state's reservation price. By end May, only four of 34 reserve sites had been sold and this prompted the government to increase the supply of land for the rest of the year and to raise the proportion of land offered under its confirmed list.

In March, new measures to curb speculation in the HDB resale market were also announced. Most no

<sup>73</sup> From 953 housing units in Q4:2008, sales soared to 10,120 units in Q2:2009 and 11,518 units in Q3:2009.



table was the reversal of a long-standing policy of granting a second HDB concessionary loan to those who bought a larger unit only: due to concerns that this had encouraged leveraged overconsumption of housing, a second subsidized loan would be extended to all eligible buyers regardless of flat size but a requirement to use the sale proceeds from the first flat translated into lower loan quantum. To reduce the incidence of flipping resale flats, buyers must now occupy their flats for at least 3 years rather than a year (for unsubsidized units) or 2.5 years (for unsubsidized units bought with a concessionary loan).

While Singapore had enjoyed strong economic growth in the first half of 2010, growth was expected to moderate in the second half of the year. However, property price inflation continued and it became clear that the market cooling measures in February and March had failed again: private house prices rose 6% while HDB resale flat prices grew 4% - its eighth straight quarter of growth - to achieve record levels in Q2:2010. To quell increasing disquiet about housing affordability, a slew of new policies were announced a day after the Prime Minister assured Singaporeans in a National Day Rally speech that the government would prevent housing prices from rising beyond their reach. The measures introduced on 30 August include:

- extending the holding period for the imposition of stamp duty on sellers of residential land and houses from a year to three years<sup>74</sup>;
- raising the minimum cash payment from 5% to 10% of the lower of property value or property price and lowering the LTV cap for housing loans from 80% to 70% for buyers with at least one outstanding housing loan at the time of the new housing purchase;
- barring HDB flat owners from owning both private property and an HDB flat at the same time during the minimum occupation period (MOP); and
- increasing the MOP for non-subsidized flats from 3 to 5 years.

The immediate impact of the policies was uncertainty about the ambit of the measures pertaining to ownership of public and private housing. Apparently, private residential property owners who buy resale HDB flats must now dispose their house(s), in or outside Singapore, within 6 months of purchase of the HDB flat - a rule that had not existed before but that would apply for locals and foreigners alike. This effectively bans private property owners from buying HDB resale flats for investment purposes. Those who had bought a non-subsidized HDB flat were required to sell off their private property, wherever it was located, within six months from 30 August. Similarly, buyers of non-subsidized HDB flats would not be allowed to invest in any private property before the MOP is up although they were previously allowed to do so. The new rules were meant to 'ensure equitable treatment' of all flat owners during the stipulated occupancy period although the rationale for prohibiting ownership of overseas properties, even when the houses were bequests, was inscrutable to many.

Continued strength in the housing market in late 2010 necessitated a fourth installment of prudential and fiscal measures on 13 January 2011 that would:

- increase the holding period for the imposition of stamp duty on sellers from three years to four years;
- raise the stamp duty rates to 16%, 12%, 8% and 4% for residential properties bought on or after 14 January 2011 and sold within the first, second, third and fourth year of purchase respectively;
- lower the LTV to 50% on housing loans for property purchasers who are not individuals; and
- lower the LTV limit on housing loans from 70% to 60% for property purchasers who are individuals with one or more outstanding housing loans at the time of the new housing purchase.

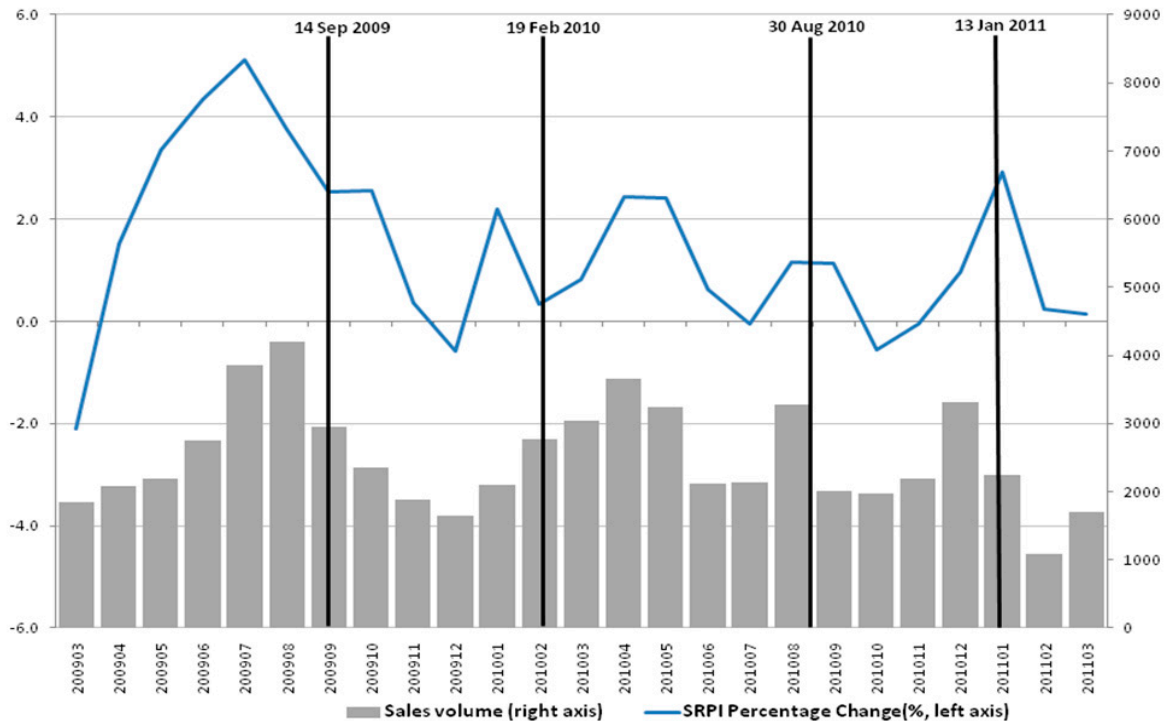
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<sup>74</sup> This applies to any transfer or disposal of interest (including sale and gifts) on or after 30 August 2010 within three years of purchase. Specifically, the full stamp duty rate (1% for the first \$180,000 of the consideration, 2% for the next \$180,000, and 3% for the balance) will be levied if the properties are sold within the first year of purchase. This goes down to 2/3 (1/3) of the full rate for a sale within the second (third) year of purchase.



Figure 5 below shows the percentage change in private house price as measured by the SRPI, total transaction volume of non-landed residential units and the policy dates of the four market cooling interventions. Other than the February 2010 package, the rate of house price appreciation and the sales volume have declined following each policy date. However, these declines have been temporary and suggest that other drivers of house price and transaction activity may have overwhelmed the prudential measures.

Figure 5 Monthly Changes in the SRPI, Transaction Volume and Policy Dates of Market Cooling Measures



Besides dampening speculative and investment demand for housing, the government has promised more help for first-time home buyers and significantly raised the supply of new HDB flats and state land for premium public housing units. Indeed, record private housing and resale flat prices have obliged the state to continue affordable housing provision and even expand housing concessions in the interest of securing continued political support. However, there is a practical limit to how much the government can afford to give producer and demand subsidies, particularly when the capital subsidies that were originally intended to benefit select groups have been transferred (eventually) to private housing and other assets. In order to comply with various affordability benchmarks<sup>75</sup> and yet keep subsidy levels manageable, the state may build marginally smaller units in future. This would mirror the recent trend in the private housing market where developers have been selling shoebox dwellings of less than 600 square feet to ensure that the absolute price remains affordable to buyers.

## Concluding Remarks

The government's objective is to ensure a stable and sustainable property market where prices move

<sup>75</sup> The HDB sets new flat price at between 5 to 6 times household income. The proportion of income and the CPF savings utilized to pay for both the downpayment and mortgage installments should be around 25% to 30% of household income. A third indicator of affordability is the application pattern.

in line with economic fundamentals. How well it can achieve this would depend on its ability to conduct timely surveillance and the effectiveness of its policy levers. Curtailing demand has proven to be difficult given the openness of the Singapore economy and property market to foreign capital inflows. Further quantitative easing by the Fed could potentially be transmitted to Singapore directly through property funds and via a cheaper real cost of finance that would stimulate more property buying. In this regard, policy makers have expressed confidence that the Singapore financial system is capable of handling the capital flows. The government has also perceptibly tightened its immigration policies but although total population growth has slowed, residential rents have not materially softened due to construction bottlenecks from projects to pump-prime the economy when the crisis hit.

On the supply side, the state has expanded public housing production but it may need to re-examine the effectiveness of the BTO system at measuring demand. Land supply has also been increased but the GLS program should be re-evaluated. Although it is a market-driven instrument for housing market stabilization, policymakers enjoy unfettered latitude in determining the quantum and location of land to be sold and the timing of the sale. Each year, the land sales program is planned based on national development imperatives and an assessment of the mid- to long-term demand for the various types of properties. This being the case, the assumptions about market conditions that prevailed when the plan was initially conceived and which justified its provision may have materially changed by the time the land was actually released. Given the lag in actual housing delivery, the GLS may need to be re-calibrated to improve its responsiveness to demand shocks.

The state also decides on the selling price of each parcel but without a transparent land sales rule, discretionary land supply may be problematic in a manner raised in Kydland and Prescott (1977). Ostensibly, the state favors gradual house price appreciation and will combat any surprise inflation by releasing more land for housing. However, land sales provide a substantial source of revenue and in the absence of a rule, there may be a temptation to generate a little more price inflation to boost public coffers. In setting bid prices for land, developers may build in inflationary expectations, as would other market participants in their decisions. In the past, the timing of public land sales often coincided with boom episodes in the property market when record prices for residential land have been set by keen market contests for state land releases. As private land banks in Singapore become more depleted and housing supply becomes more dependent on state-owned land, policy makers must guard against supply-side rationing in the land market that could amplify price pressures on the housing sector.

The demand-supply imbalances in the housing sector have also been partly due to the uncoordinated policies of different governmental agencies pursuing their separate agenda. It is clear that the rapid expansion of Singapore's population base beyond the absorption capability of its housing market (and other infrastructure) has contributed to the appreciation of housing rentals and capital values. At the same time, the synchronized construction of mega-projects imposed cost pressures and construction bottlenecks that limit supply elasticity. There is still a lack of consumer protection for house buyers and home loan borrowers, particularly for pre-completion sales where units are sold off-plan and where underwriting standards may be compromised. Finally, the liberalization of public housing resale and sublease rules through shortened occupation periods and the perception that the state would ensure continual enhancement of HDB flat values promoted a speculative mindset towards public housing that is unsustainable.

Housing has appreciated faster than GDP expansion since the GFC with house price levels as at end March 2011 exceeding their historical maxima in the second quarter of 1996 as well as their pre-GFC peaks. Such rapid price growth has significantly eroded affordability levels. Despite four sets of cooling measures, the Singapore housing market remains buoyant, supported in part by record-low housing finance costs. In a country where the homeownership rate of resident households is close to 89% and in which housing purchases are often leveraged, many households are potentially vulnerable to house price corrections and/or increases in the cost of debt. Negotiating these risks would require continued vigilance from as well as more effective policy co-ordination among state agencies. <Link to the author's homepage> <http://www.rst.nus.edu.sg/staff/rstlumsk.htm>

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