Mortgage Securitization in Asia: Gains and Barriers

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June 13, 2007

Prepared for 18th Annual East Asian Seminar on Economics

Financial Sector Development in the Pacific Rim

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ABSTRACT

This paper provides a conceptual basis for the price discovery potential for tradable market instruments and specifically the development of mortgage securitization in Asia. We argue for the particular importance of securitization in Asia because of its potential role in increasing the transparency of the financial sector of Asian economies. We put forth a model explaining how misaligned incentives can lead to bank generated real estate crashes and macroeconomic instability. We examine the banking sector's performance in Asia compared to securitized real estate returns, to provide evidence on the contribution of misaligned incentives. We discuss how the addition of MBS helps to inoculate markets from the shocks arising from bank-financed mortgage lending. We conclude with a brief discussion of current MBS markets in Asia.

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1. Introduction

This paper provides a conceptual basis for the price discovery potential for tradable market instruments and specifically the development of mortgage securitization in Asia. We argue that securitization in Asia may be particularly important because it may help bring transparency to the financial sector of Asian economies. We put forth a model explaining how misaligned incentives can lead to bank generated real estate crashes and macroeconomic instability. We provide new comparative data on the banking sector's performance in Asia compared to the performance of securitized real estate returns, to provide evidence on the potential contribution of misaligned incentives to the magnitude of the declines in the real estate sector. In particular, we show both theoretically and empirically that the banking sector suffers relatively low losses following a negative demand shock compared to the losses experienced by the real estate sector. The evidence suggests that the fact that banks' shares are publicly traded does not discipline the bank lending officers who are driven by origination fees and market share and does not prevent underpriced lending,

As a remedy to the inability of public ownership of banks to prevent underpriced lending, we discuss how the addition of freely tradable market instruments backed by loans (MBS) helps to inoculate markets from the shocks arising from bank-financed mortgages, through price signaling. Securitizing mortgage loans can then enforce greater discipline on bank underwriting and lead to improved lending evaluation standards.

Real estate equity securitization can independently assist in the rationalization of investment decisions, since investors have the ability to track tradable equity securities' returns. In addition, the transparency and governance imbedded in the REIT structure can further increase market discipline. In part for this reason, there are efforts underway throughout Asia (and elsewhere) to introduce these new instruments. Nonetheless, banks' mispricing of debt, as we will show, can artificially and temporarily drive up prices for both direct real estate investments and for the REIT sector, destabilizing the sector and the economy. Therefore, the focus of this paper is on gains derived from mortgage securitization.

The paper proceeds as follows. Section 2 provides a context of bank funding of the real estate sector and its role in past real estate and financial crises. Section 3 presents a theoretical model of lending and development activities that demonstrates how banks can provide underpriced financing and nonetheless avoid large losses following a negative demand shock. Section 4 presents empirical results that indicate the impact of bank underpriced lending on real estate markets is severely negative, but that the banks themselves are impacted to a far lesser extent. Section 5 interprets the findings and concludes.

2.0 Context

Mera and Renaud (2000) demonstrate that the phrase "Asian Financial Crisis" was misleading. Green's (2001) review of the book noted[1]:

[1] Much of the discussion of the Asian financial crisis below closely follows Green (2001).

> [Asian Financial Crisis] suggests homogeneity: that "Asia" is one place, and that the financial crises faced by various countries there in the late 1990s were fundamentally similar. The fact that so many countries that were geographically close faced crises that were temporally close makes it easy to conclude that the crises had common roots.

Nevertheless, real estate did have a role in many of the countries that experienced a crisis, and the size of that role likely explains differences in the relative magnitudes of the crisis. In Japan, crises resulted in part from changing demographics and central bank regulatory and monetary policy, but also because of poor commercial (and residential) real estate underwriting.

In Taiwan, land prices rose and then stabilized, and never crashed as they did in other Asian Economies. In Hong Kong, land prices fell, but because of the lending system there, which required property investors to use substantial equity funding, real estate prices did not fall as much as elsewhere and the decline had little effect on the overall health of the economy. The Chinese office market became badly overbuilt—especially in Shanghai—but the economy there continues to chug along, for now. But in Indonesia and Thailand, poor understanding of real estate fundamentals, along with collapsing currencies, caused real estate markets to fail. In contrast, Korea's crisis arose largely from an unsustainable system of corporate lending; real estate likely played a relatively small role in Korea's crisis. It is worth spending a little time talking about the large real estate crises in Japan, Thailand and Indonesia, as well as the ability of Korea to avoid a crisis of similar magnitude.

Edelstein and Paul (2000) explain the sources of the extraordinary run-up in land prices in Japan in the 1980s, and the government's response to that crisis. They maintain that the run-up in land prices from 1984 to 1991 was the product of fundamentals of the Japanese economy, although in their (and others') description of their scenario, elements of a speculative bubble are clearly in play. As Mera (2000) points out, Japan managed to survive many challenges to its economy quite well, including the second oil shock and the Plaza accords of 1986, which caused the yen to appreciate substantially and thus rendered Japanese exports less competitive. At the same time that Japanese incomes were rising sharply, interest rates in the country remained quite low. If we think about the Gordon Growth Model, i.e. R = i-g, where R is the capitalization rate, i is the discount rate and g is the growth rate, we would expect rents to be capitalized into high property values.

Moreover, as Edelstein and Paul point out, land in Japan is much scarcer than it is in other places: Japan's population is a little under half of the United States', yet its land area is only 4 percent that of the United States, and its habitable land in an even smaller percentage than that. Japan's population density is thus 25 times larger than the United States', and its GDP per square mile is 15 times large. Again, this is entirely consistent with Japanese land price levels being substantially higher than in the United States.

The property bust arose, according to both Mera and Edelstein and Paul, because of changing fundamentals and government policy. With respect to fundamentals, we know that the Japanese economy slowed sharply in the 1990s. Part of the reason for this had to do with broader issues facing the Japanese economy, but part of the reason for this had to do with real estate problems in the banking system. As to the latter, Edelstein and

Paul note that banks in Japan were allowed to count corporate stock holdings as reserves. This, of course, is the exact opposite of how banking is supposed to operate: reserves are supposed to be assets in which the financial institution has a risk-less position, such as cash and high quality government securities. Instead, Japanese banks counted very risky assets--equity--as reserves. Much of the underlying value of that equity was in the form of real estate, some of which was highly leveraged. Consequently, even a small downward turn in real estate markets had a profound effect on the banking system, which in turn had large repercussions for the financial system as a whole.

Making things worse was the fact that Japanese banks failed to recognize their real estate losses on their balance sheets: non-performing assets effectively drove equity levels in Japanese banks to levels below zero, and consequently created perverse incentives for Japanese bank managers.

At the same time, as the Japanese economy slowed, changes in expectations led to an increase in the underlying capitalization rate for real estate and other assets, and therefore caused the values of all those assets to decline sharply. The existence of leverage exacerbated this phenomenon further.

The most spectacular failures in the banking system with respect to real estate: Thailand and Indonesia, and especially Indonesia. Chapters by Bertrand Renaud (on Thailand) and Dominique Fischer (on Indonesia) give us harrowing stories of how poor underwriting, abetted in part by the "unholy alliance" between lenders and developers, can lead to a full fledged financial crisis.

The US has no cause to be smug about this, of course, as it invented the process with the Savings and Loan crisis of the 1980s. Both the Renaud and Fischer stories can

be told simply enough: lenders assume rent and property value growth at some extremely high rates, which in turn produces very low capitalization rates. This in turn causes appraisers to assign high values to properties. These high values provide the support lenders need to advance loans, which typically have higher loan-to-value ratios. The high-loan-to-value ratios are justified by the fact that property values "always" rise, and that therefore the equity in the loan will quickly get sufficiently large to discourage default. At the same time, the financial institutions had reason to believe that governments (or NGOs) would prevent them from failing, meaning that the downside risk to the risky loans was attenuated. This led to a classic moral hazard problem, where risk was not appropriately priced.

The problem with this, of course, is that sometimes values and rents stop rising, particularly when building outpaces demand. All that needs to happen is for the real estate sector to grow more rapidly than the economy; at that point, everything can come unglued. And so it did: interruptions in rising rent trajectories caused real estate loans to become delinquent. But then things got even worse. The embryonic financial crisis in Thailand and Indonesia caused foreign, and especially Japanese, capital to flee. This led to currency devaluations. Because real estate loans were often denominated in foreign, rather than home currencies, the debt obligations of borrowers got much larger, which in turn led to more defaults. It was thus the combination of poor underwriting and a lack of understanding of currency risk that contributed to the downfalls of the two economies. In Indonesia, GDP fell by a stunning 15 percent in just one year.

What is remarkable is how quickly Thailand seemed able to put its problems behind it. Renaud points to an agency Thailand created to behave as the Resolution Trust

Corporation did in the United States. The Financial Restructuring Agency seized the assets of failed financial institutions, and sold properties at substantial discounts to replacement cost. While it is open to question as to whether either agency managed to recoup as much as they could, they brought liquidity back to their respective real estate markets. By 1999, Thailand was back on a growth path, although at a lower level than 1965-1995.

Kim (2000) maintains that in Korea in contrast to Japan, where depressed property values both caused and were caused by the slowing economy, "the real estate sector could not have been a major cause of the economic crisis…" He gives three reasons for this.

First, Korean financial institutions were prohibited from advancing loans for real estate development, aside from land loans for housing development. Thus the financial services sector in Korea was not remotely as sensitive to changes in property values as it was in other countries. Second, it is clear that it was the corporate sector, rather than the real estate sector, that became over-leveraged over the course of the early-to-middle 1990s, and thus it was corporate lending and not real estate lending that set the stage for the collapse.

But most important, real estate likely did not cause the economic crisis in Korea because the value of real estate in Korea collapsed years before the economy (briefly) shrank. In the early 1990s, the Korean government reformed—indeed rationalized—land use policies to allow housing supply to better respond to demand. It was this key economic fundamental—housing supply—that depressed property values in Korea. It was clear at the time that the policy change happened that it was correct policy: housing

had been until that point in very short supply and was very expensive in the secondary market. The rationalization of the Korean housing market accomplished both of its goals: it increased the supply of available housing and made housing more affordable. The net effect of this on the overall economy was almost surely positive.

Of course, while Korea was able to avoid a serious real-estate related financial crisis, it only was able to do so because of an underdeveloped real estate lending sector. This is presumably not a helpful lesson for countries looking to avoid future real estate crises.

The question going forward, then, is whether financial markets can provide real estate with adequate liquidity while assuring that the melt-downs that happened in Japan, Thailand and Indonesia do not happen again. Our view is that securitization might help.

We can return to the United States Savings and Loan crisis to gain some historical perspective. The ignition of inflation in the late 1960s and 1970s altered the ability of depositories to fund long term, fixed rate mortgages: inflation pushed up nominal interest rates and required higher returns on deposits while asset returns were fixed at the low levels of historical fixed rates on long term mortgages which made up most of the thrift industry portfolios. Inadequately capitalized depository institutions (S&Ls) then advanced unsustainable commercial mortgages. Because these institutions often had no equity to protect, their managers had large incentives to make high-risk loans. If the loans failed, the institutions and their depositors were no worse off.[2] If they paid off, however, the institution would return to solvency. Because S&Ls were not required to mark their assets to market, they were able to hide their distress until loans began defaulting.

[2] Depositors has the benefit of FSLIC Deposit Inurance.

By the late 1980s, poor real estate underwriting produced overbuilding in the U.S. commercial real estate market. This led to high vacancies (the average Class A Office Vacancy Rate in 1990 was 20 percent) and declining rents. Buildings generated insufficient cash flow to meet debt services, and default rates rose dramatically. The poor quality of assets on Savings and Loan Balance sheets could no longer be hidden.

Congress and the Bush Administration bit the bullet by passing the Federal Institutions Reform, Recovery and Enforcement Act of 1989; this legislation liquidated insolvent Savings and Loans, and turned their assets over to the Resolution Trust Corporation, whose function was the disposition of the assets; cash raised from the sales would be used to off-set the costs of the S&L failure to US taxpayers. At the same time thrift portfolios were restructured by exchanging below market mortgages for MBS that could be sold and the losses amortized rather than realized immediately. Thrifts solved their asset liability mismatcy by selling fixed rate mortgages in to the secondary market for securitization into by MBS underwritten by one of the US secondary market agencies.

Thompson (2006) has a good description of what happened next:

> Wall Street surveyed the mountain of defaulted S&L loans taken over by the federal Resolution Trust Corporation (RTC) and saw an opportunity to get into real estate investing in a big way. Morgan Stanley's experience is typical of other investment banks at the time. "We got into the investing side of the business primarily because the opportunity was there to buy nonperforming loan portfolios from the RTC," recalls Slaughter. From a merchant banking standpoint, Wall Street barely paid attention to commercial real estate prior to 1990. Since then,

almost every major Wall Street firm has become active in real estate private equity. "Morgan Stanley alone has gone from zero dollars under management to almost $40 billion over the past fifteen years," says Slaughter.

Wall Street helped the RTC solve another big problem: how to dispose of billions in S&L loans that were not in default. The agency came to Wall Street with a proposal to sell loan packages rather than one property at a time, an impractical approach given the volume of loans on the RTC books. Wall Street responded by creating commercial mortgage-backed securities (CMBS), which are similar to, but more complex than, the mortgage-backed securities long used to bundle and sell packages of residential loans. "Commercial mortgage-backed securities did not exist in 1990 and were not thought to be viable," says Slaughter. Today, CMBS represent a $550 billion market.

It's hard to overestimate the impact of this market restructuring. In fifteen years, the public equity and debt markets for commercial real estate have gone from financial infancy to trillion-dollar status.

At the same time thrifts restructured their portfolios by exchanging fixed rate mortgages for MBS to be sold to US secondary market agencies. The government encouraged this through allowing the losses to be amortized rather than realized immediately (Wachter, 1990). Thrifts then solved their asset liability mismatch going forward by holding in their portfolios newly available adjustable rate mortgages. For a time in the US it appeared that the short term adjustable rate mortgage would become common in the US. But with inflation under control by the early 1990s, relatively flat

yield curves, secondary market agency (Fannie Mae, Freddie Mac and Ginnie Mae) guarantees, and the liquidity derived from large standardized market trading of MBS resulted in competitive FRM pricing in the US. Elsewhere, in the absence of secondary market institutions, adjustable rate mortgages remained far more common (Green and Wachter, 2005). While banks solve their asset liability mismatch problem by offering ARMs, these convey larger credit risks in the long run should economic shocks cause higher interest rates.

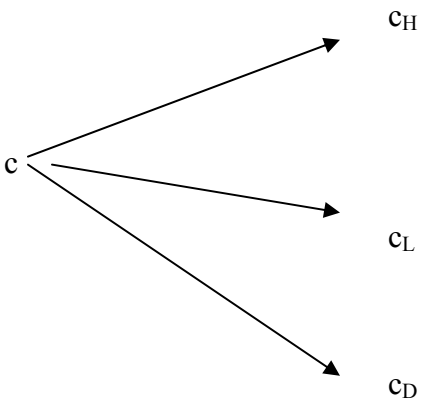
The question remains, however, why the banking sector, in the US and elsewhere, drove itself into near bankruptcy with severe consequences for the economy. This maybe because the banking sector lacks incentives to curtail or even monitor risky lending activities. Basel II and many commentators are newly looking to market based monitoring of banks (Barth, Caprio and Levine, 2006) to ensure soundness and financial stability. This requires a reliance on market forces, and the threat of lost fees and profits, to align bank managers' incentives to market outcomes. In the following sections we present a theoretical model and empirical evidence of bank lending and development activities that demonstrate how banks can provide underpriced financing and nonetheless avoid the appearance of large losses even following a negative demand shock, that is in part induced by the banks' own behavior.

3.0 A Model of Lender and Developer Behavior

In this section we propose a simple one-period model with zero-profit rational developers who bid on land prices in period 1, and supply developed real estate in period 2. (Both assumptions are for ease of exposition and can be modified.)These developers

face an upward sloping supply of land function in Period 1, and a downward sloping real estate demand function in Period 2. The developers know the parameters of the demand functions and choose the optimal level of development in Period 1.

The uncertainty in the model is given by the intercept of the real estate demand function in period 2. We assume it can take one of three values high (H), low (L), and disaster (D):



with probability δ_H, δ_L, and δ_D, respectively.

There are two types of developers, safe and risky, who are identical in all respects except that the safe developers default only in the disaster state, *D*, while the risky developers (strategically choose to) default in states *L* as well as *D*.

Lenders can correctly identify the type of developer (for example, higher loan to value borrower), and price the zero-equity loans appropriately. We show below that if all loans are priced correctly, then lenders have zero expected profits and the lending activity has no impact on the underlying real estate market development or pricing.

To gain market share (and to book more short term fees), lenders can engage in underpricing by lending to some of the risky borrowers at the safe rate. If that occurs,

risky borrowers take advantage of the cheap financing, bid up land prices in period 1 above their prior levels, and overdevelop. As a result, prices are lower in period 2 in all states, lenders have negative expected profits, safe borrowers also have negative expected profits, and risky borrowers have zero expected profits.

We further model the profits of the lenders and their ability to hide small losses due to the overall randomness of the lender's activities in sectors other than real estate. If this is the case, lenders do extend some underpriced loans to risky borrowers, with all of the negative consequences this generates. Importantly, *reported* proportional bank losses are smaller in case of outcome (D) than the losses to real estate investors. The compensation of bank managers is rationally maximized.

3.1 Safe Developers and Rational Lenders

In period zero, developers will build given the following *supply* function:

$$q = \frac{P - a}{b} \tag{1}$$

where P denotes the price of land for development in period 1, q denotes the quantity of land that is developed for period 2, and is determined in period 1, and a and b are constants specifying the supply function.

In period one, the price of the asset is given by the following *demand* function:

$$P_S = c_s - dq \tag{2}$$

where c_s denotes the intercept of the demand function for each state of nature ($S = H, L,$ *or* D), P_s denotes the price of developed land in period 2 in each state of nature, and d is a constant specifying the slope of the demand function.

Good borrowers default only in the case of disaster, (D). The price they are willing to pay is given by:

$$RP = \frac{\delta_H P_H + \delta_L P_L}{\delta_H + \delta_L} \tag{3}$$

where R denotes 1 + interest rate charged on the safe loans. Solve for q:

$$q = \frac{(c_H - aR)\delta_H + (c_L - aR)\delta_L}{(d + bR)(\delta_H + \delta_L)} \tag{4}$$

The zero-profit for a risk-neutral bank is:

$$(\delta_H + \delta_L)(R-1)P = \delta_d (P - P_D) \tag{5}$$

Solve for q:

$$q = \frac{(a - c_D)\delta_D + a(R-1)(\delta_H + \delta_L)}{(d + bR)(\delta_H + \delta_L)} \tag{6}$$

Equate q in expressions (4) and (6) to solve for R, substitute into (4) or (6) to find the equilibrium quantity of real estate developed, q^*:

$$q^* = \frac{c_H \delta_H + c_L \delta_L + c_D \delta_D - a}{b + d} = \frac{\overline{c} - a}{b + d} \tag{7}$$

where $\overline{c}$ denotes the expected intercept of the demand function in period 2. This is exactly the quantity real estate developed one would find in the absence of lending, where full equity investors take on all gains and losses, $P = \delta_H P_H + \delta_L P_L + \delta_D P_D$.

Substitute q^* into Equations (1) and (2) to find the equilibrium current and future price:

$$P^* = a + b\frac{\overline{c} - a}{b + d} \tag{8}$$

and

$$P_s^* = c_s - d\frac{\overline{c} - a}{b + d} \tag{9}$$

Investor expected profits are zero:

$$\frac{\delta_H P_H + \delta_L P_L}{\delta_H + \delta_L} - RP = 0 \tag{10}$$

3.2 Risky Developers and Rational Lenders

Risky developers default even in moderate losses, i.e., in the case of state (L) in period 2. The price they are willing to pay is given by:

$$R_B P = P_H \tag{11}$$

The lender's zero-profit condition is:

$$\delta_H (R_B - 1)P = \delta_L (P_L - P) + \delta_D (P_D - P) \tag{12}$$

Solve for equilibrium quantity of real estate developed following the method of Equations (3) - (7):

$$q^* = \frac{\overline{c} - a}{b + d} \tag{13}$$

This solution is identical to the optimal development quantity under no lending. Therefore, *if properly priced*, lending to risky borrowers does not in itself affect the real estate markets. In this situation the bank takes all losses, and charges an appropriate interest rate. Therefore, for ease of exposition, in what follows, we assume the bank lends only at the safe rate. Otherwise, the bank can directly invest in real estate and not go through risky investors.

3.3 Risky Developers and Underpricing Lenders

Assume in this section that the lender makes a certain proportion, *h*, of the loans to risky borrowers at the safe rate. (Below we explicitly model the lender behavior and how that might occur). Since risky developers would find the ability to borrow at the safe rate very attractive, the quantity real estate developed then becomes:

$$q_u^* = (1+h)q* \tag{14}$$

where q_u^* denotes the quantity developed in the underpricing case. The current price of real estate increases, as given by Equation (1), and the future price of real estate in each of the three outcomes declines, as given by Equation (2). Importantly, this new lower price of real estate affects even safe investors and reduces their expected profit:

$$\frac{\partial\left(\frac{\delta_H P_H + \delta_L P_L}{\delta_H + \delta_L} - RP\right)}{\partial h} < 0 \tag{15}$$

Since current price, *P*, is higher under underpricing, and future price in each state, P_S, is lower under underpricing for all *s*, real estate markets decline more in economies that underprice. Specifically, following an outcomes *L* or *D*, the percent price decline in real estate is:

$$1-\frac{P_L}{P}=1-\frac{c_L(b+d)-d(E(c_S)-a)(1+h)}{a(b+d)+b(E(c_S)-a)(1+h)}$$
$$1-\frac{P_D}{P}=1-\frac{c_D(b+d)-d(E(c_S)-a)(1+h)}{a(b+d)+b(E(c_S)-a)(1+h)} \quad (16)$$

which is increasing in h because $a<<E(c_S)$ (intercept of the supply function is far smaller than the intercept of the demand function).

3.4 Lender behavior

The bank can underprice by lending to the risky borrowers at the safe rate, R. Let k denote the percent of real estate loans relative to the total lending activity of the bank. Let h denote the percent of real estate loans to risky borrowers. Because the default rates on loans in other industries in which the bank participates is noisy, the bank is able to hide losses of g or less in the real estate sector. For instance, g can be two standard deviations above the average loss on the bank portfolio.

If the bank lends only to safe borrowers, bank profits on real estate loans, π, are given by:

$$\pi=\begin{cases} rP & if\ \ H\ or\ L \\ P_D-P & if\ \ D \end{cases} \quad (17)$$

If the bank lends to risky borrowers and safe borrowers at the safe rate, bank profits on real estate loans are given by:

$$\pi = \begin{cases} (1+h)rP & if\ \ H\ or\ L \\ (P_L - P)h & if\ \ L \\ (P_D - P)(1+h) & if\ \ D \end{cases} \tag{18}$$

We assume management compensation, *M*, is proportional to the loans originated:

$$M = (1+h)Pkm \tag{19}$$

where *m* denotes the origination fees the management of the bank receives as a compensation.

Therefore, managers maximize compensation by setting *h*:

$$(P - P_L)hk = g \tag{20}$$

or,

$$h = \frac{k(c_L - E(c_S) + \sqrt{4kg(E(c_s) - a) + k^2(E(c_s) - c_L)^2}}{2k(E(c_s) - a)} \tag{21}$$

which is an increasing function in *g*. For $g = 0$, $h = 0$, i.e., if the bank cannot hide any losses, the optimal amount of loans to the risky borrowers is zero.

Following a *D* outcome, the *reported* unexpected bank losses on real estate loans, as a proportion of originated loans, are:

$$\frac{(P-P_D)(1+h)-g}{(1+h)P} = 1-\frac{P_D}{P}-\frac{g}{(1+h)P} \tag{22}$$

which is smaller than the losses to real estate investment, $1-\frac{P_D}{P}$. Therefore, the reported proportional losses to the banking sector are smaller than the proportional losses to the real estate sector. If the bank cannot hide any losses, then $g = 0$, $h = 0$, and the proportional bank losses are the same as real estate losses. Under loan securitization, the bank cannot hide any losses, and both the real estate and the banking sectors are protected.

4.0 Data Description and Empirical Results

The first data set we utilize is the Global Property Research Indices (GPR) compiled by Eichholtz, et al. (1998) and refined and extended by Dr. Christopher Shun, Menang Corporation, Malaysia.[3] These data include property indices for 25 countries over 20 and 12 years for developed and emerging countries, respectively. The GPR 250 Global Property Stocks index only includes property companies with a minimum of USD $50mn of freely available market value and high liquidity in terms of average last-year stock trading volume. As of December 2002, the securities included in the GPR 250 index had a combined available market value of USD$194 bn. This data set has a number of advantages. In particular, it has the deepest history and the largest cross-sectional span across the globe of any real estate property database. Since the returns are based on

[3] For further information, see the bibliography for Eichholtz (1998) and Sun (2005).

publicly traded and liquid securities, the data quality is high, available at a monthly frequency, and is consistent through time.

The second data set we use is the financial return data from the Global Financial Database, these data are compiled for 120 industries in more than 200 countries. The Global Financial Database (GBF) has a collection of more than 200,000 entries and offers accurate and verified historical world market financial data. The financial return data refers to the return of the financial sector within each market and is provided as monthly data.

We also make use of correlation results that are derived from previous work in Pavlov and Wachter (2007). Pavlov and Wachter (2007) develops a symptom of loan underpricing in an economy. This symptom is the negative relationship between the change in lending spread and asset returns before the crash. We use the property returns data to measure the total price decline during the crash for each market as indicated above, and we calculate the correlation of the lending spread with this return, to identify economies which experience lending induced real estate crashes. The lending spread for each market is calculated by the lending rate minus the deposit rate. These data are collected from the World Bank World Development Indicators (WDI) website.

Table 1 provides descriptive statistics of the GPR data used. We identify 12 countries which have experienced a market decline of 20% or more during any period in the past. Thus we focus on these countries for our empirical tests, using both the GPR and GBF databases. For each country, we compute the correlation between changes in the lending spread and asset returns *before* the market decline. This is our underpricing symptom. Figure 1 is replicated from Pavlov and Wachter (2007), Figure 1. The vertical

axis depicts the total percent decline in the property market, from top to bottom. This is over one or more years and is specific for each country. According to Pavlov and Wachter (2007), negative correlation between price changes and changes in the lending spread is a symptom of underpricing, and thus we expect this negative correlation to be associated with larger losses during a market downturn, as it is. Countries that do not exhibit the symptom of underpricing have zero or positive correlation, and their respective property market declines are relatively modest, as the results indicate. We replicate this figure because it illustrates that loan underpricing can have devastating effect on the underlying real estate markets.

To test the theoretical implication of our model (above) that the banking sector experiences smaller proportional declines than the real estate sector, we plot the same underpricing symptom against the total decline, top to bottom, of the financial services sector in the same 12 countries in Figure 2. While the relationship is as expected, i.e., lenders in countries that underprice experience larger losses following a real estate negative demand shock, it is not statistically significant and very modest economically. This suggests that while underpricing hurts the financial sector following a negative demand shock, the magnitude of this effect is modest relative to the real estate sector declines.

Finally, Figure 3 reports the relationship between real estate returns and financial sector returns. While the relationship is positive and significant, i.e., markets that experience large real estate losses also experience significant banking losses, very clearly the financial services sector losses are far more modest. Furthermore, while we only

have a few data points, it appears that real estate returns need to fall by 60% or more before the financial services sector starts to experience significant losses.

There are four countries that experienced real estate market crashes but very limited banking losses or even substantially positive returns: Hong Kong, New Zealand, Belgium, and Norway. First, while substantial, the real estate crashes in these countries represent the lowest four real estate market declines in our dataset. Second, each one of these countries had a particularly strong banking sector that did not appear to engage in underpricing and fared the real estate losses quite well.

Hong Kong used particularly strong underwriting standards, with very low LTV ratios and close scrutiny of loan applications. New Zealand and Belgium have always had very stable and closely monitored banking systems, and while default losses did increase during the real estate market crashes in the two countries, these increases were modest and well managed. Finally, the Norwegian financial system, while exposed to real estate, was also stable and fared relatively well during the real estate downturn for two reasons. First, the Norwegian banking system experienced a major crisis during the 1988-1993 period which had a cleansing effect on its loan underwriting mechanisms. Second, during the period of the Norwegian real estate market decline, 1997 – 2001, oil prices increased from about $16 to over $30 per gallon, which helped the entire Norwegian financial system.

In summary, the banking sector of countries with strong financial systems and solid, consistent underwriting standards, fare real estate market crashes well. On the other hand, countries that are likely to engage in risky, underpriced lending tend to experience larger real estate market declines, which are translated into financial sector

declines. Nonetheless, these declines are relatively modest, even though banks tend to be highly levered.

5.0 Conclusions and Implications for Alternate Financial Structures

In previous work we have demonstrated the role that bank lending plays in generating boom and bust cycles in real estate. Rational economic behavior dictates that banks charge borrowers higher interest rates, origination fees, or mortgage insurance for their imbedded put option to default. While the presence of demand deposit insurance undermines market discipline, where are the shareholders? Why can't they monitor lending officials' behavior?

In this paper, we develop a model to explain why underpricing of risk is not detected or curtailed by bank shareholders. As a result, underpricing persists undeterred and results in compression in the spread between lending and deposit rates, lending booms, inflated asset prices, excess building and real estate crashes.

The link between bank lending and real estate crashes is enabled by the absence of short selling in real estate, which allows optimistic investors to drive prices up (Herring and Wachter, 2002). But this is an insufficient explanation for sustained underpricing episodes since optimists still need financing to buy real estate if they are not to be constrained by their own limited assets which will eventually go to zero due to their misjudgments. We argue here that this optimist led pricing is enabled and heightened by banks that supply funds to the optimists at rates that underprice risk. The model that we put forth here is based on the very nature of banks, their diversification which makes the

identification of the signals of the underpricing of risk difficult except with considerable delay.

Such underpricing behavior forces a race to the bottom across lending institutions, with market wide consequences. The longer the underlying real estate cycle, the greater the value of the put option, the inelasticity of the supply of real estate and the elasticity of demand for bank loans, the greater the probability that the market will enter into an equilibrium in which all banks underprice risk with market-wide consequences that will be discovered (Pavlov and Wachter, 2006). Even then with forbearance of regulatory authorities and the intervention of governments, banks may be bailed out, mitigating the consequences for shareholders. Nonetheless, the fundamental factor which explains why episodes of bank underpricing of risk are likely to occur is the inability of banking shareholders to identify these episodes promptly and incentivize correct pricing. While the underlying prices of traded real estate assets do respond to the depth of the real estate crisis, banking shares do not appear to suffer as much.

The major conceptual rationale for the banking sector, the diversification of risk is precisely the mechanism which makes it impossible to track and deter mispricing in one sector.

Governments around the world have attempted three basic solutions to the principal-agent conflict in bank lending: regulation of banks, public (rather than government) ownership of banks, and mortgage securitization. Barth, Caprio and Levine point out that regulated public ownership is superior to government run banking systems; nonetheless, the regulation of publicly owned banks is not sufficient to deter destabilizing lending activities. Thoughtful regulatory oversight of lending activities of the financial

intermediaries can help to mitigate the principal – agent problem and to ensure that lenders have sufficient capital to absorb potential losses. While Basel I and II have helped to lessen problems in bank lending, regulators are still outsiders and unable to precisely observe the risk of the bank lending activities. Furthermore, our empirical evidence from the Asian financial crisis suggests that public ownership of bank equity does little to prevent risky and/or underpriced lending.

The owners of financial intermediary equity shares, unlike securitized mortgage debt, have to take into account the entire current portfolio of the lender, as well as their future growth prospects in determining the share price. Securitization of mortgages can mitigate the principal-agent conflict because the information signal is stronger.

Traditionally arguments for the development of markets to securitize mortgage debt are based on the benefits derived from geographical arbitrage and geographical diversification. These are important but can be served by banks as well. A far more salient argument for securitization is the solving of the mismatch between short term deposits and the access of longer term funding to support long term lending. But this too can be provided by a banking system borrowing using long term debt, without securitization. Thus the major benefit to securitization is the gains from trading on information and the increased transparency this could bring to the financial sector of Asian economies. The issuance of tradable securitized assets whose performance can be linked to the revenue flows from the underlying assets encourages the evaluation of credit risk, the creation of standards for credit evaluation, the development of ratings systems and the direct monitoring of the financial risk of these assets over time.

This rationale for securitization has been recognized in Asia and efforts have been made to develop institutions supporting new securitization vehicles. Initiatives to support the securitization of mortgages and the securitization of equity, such as real estate investment trusts, have been and are continuing to be implemented.

Linking assets to specific debt is of course the hallmark of collateralized lending; however the key factor that differentiates asset securitization from traditional asset based lending is that marketable securities are created out of the assets' cash flows which are legally segregated from the originators credit condition (Giddy, 2000). This legal separation is exactly what allows the direct impact of market conditions to be wholly reflected in returns.

Around the world securitization has been growing rapidly, besides the US, new asset backed bonds are proliferating in the Eurobond market. Asian countries initiating securitization include Japan, Hong Kong, Malaysia, and Australia (Giddy). Nonetheless, the process has been slow. The required steps to tradable securitized assets are conceptually simple, beginning with creating a special purpose company that it is bankruptcy remote from the company originating the loans and preparing pools for securitization by screening assets for inclusion. However, these necessitate an infrastructure and appropriate legal basis to support special purpose vehicles, as well as the basic market conditions for functioning mortgage and bond markets. In particular, mortgage backed securities' pricing depends on a benchmark yield curve; although in the absence of an active government bond market, it is possible that MBS trading could help develop liquidity to support government debt borrowing. While conceptually straightforward, the process of securitizing assets requires accounting, tax, technological

and operational challenges. Incentives to undertake this large scale institution building are also required. The direct incentive to do so often derives from the desire for additional funding to support growth of lending. But in today's world, awash in liquidity, such an incentive is lacking. There is also a chicken and egg quality to the discussion of how to grow MBS, since an efficient MBS market depends on liquidity and pricing and performance revelation over time to reduce uncertainty and transactions costs, exactly what nascent markets cannot deliver.

But it appears that there is another larger problem in the incentives to develop MBS. In the absence of brokers who might originate loans to be packaged as MBS, the raw material for MBS is derived from the banking sector itself. Brokers cannot by themselves supply mortgages to be packaged into MBS unless a facility exists to pool these loans, again a secondary market institution which would not exist if there were not a market for MBS. Mortgages being generated by banks are for the most part short term adjustable rate instruments, perfect to hedge against interest rate increases, when liabilities are, as is the case for banks, deposits. As Sing and Ong.(2004) point out:

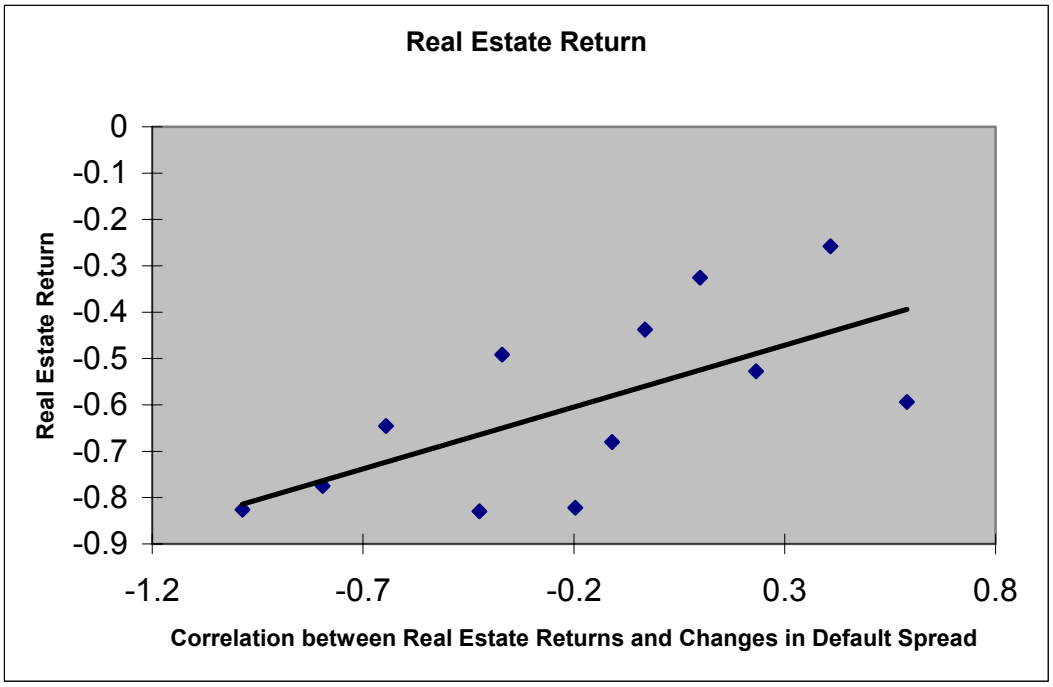
> "The key feature of Asian housing finance system is the dominance of uncapped adjustable rate loans, which have been attractive during a phase of declining short-term market rates, but which convey larger credit risk in the long run, should any adverse economic shocks result in rising market rates… [These mortgages are] regarded as the "golden geese"—one of the most lucrative and low risk assets, in the balance sheet of commercial banks and finance companies in Singapore. They are reluctant to part with their residential mortgages via securitization."

The very problem which makes Asian economies subject to a credit shock, their reliance on adjustable rate mortgages, is also intricately linked to the lack of incentives for developing a more robust system to detect and deter mispricing of risk which would itself cause a credit shock. Banks are indeed less exposed. However, this also lowers their incentives to push for securitization of their assets. Such securitization has the potential to align lenders' incentives and reduce the vulnerability of the overall economy to real estate shocks.

Table 1: Descriptive Statistics

	Correlation	*RE % decline*	*Fncl % decline*
Mean	-0.19	-0.60	-0.16
Standard Error	0.14	0.06	0.13
Median	-0.15	-0.62	-0.20
Standard Deviation	0.48	0.20	0.44

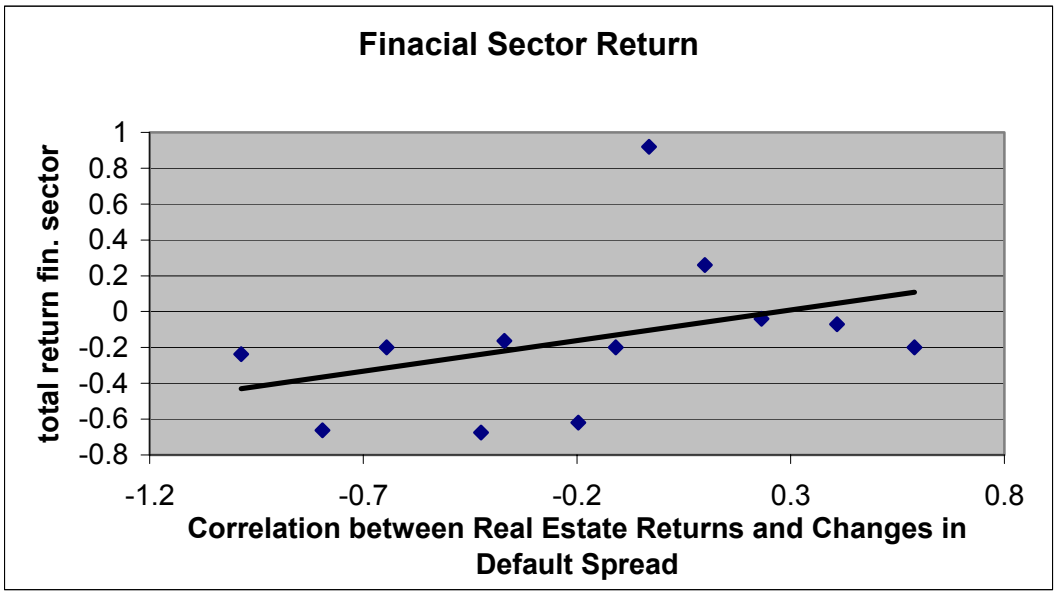
Figure 1



	Intercept	Slope	R^2
Estimate	0.55	0.27	0.42
t-statistic	11.30	2.72	

The correlation is computed between the total index return, including dividends, and the change in the spread of lending over deposit rates. In this figure, we compute the correlation using data before the crash, i.e, from the beginning of our data set to the peak of the property market. The vertical axis depicts the real estate return. This is over one or more years and is specific for each country. According to our theory, negative correlation is a symptom of underpricing, and is associated with larger losses during a market downturn. Countries that do not exhibit the symptom of underpricing have zero or positive correlation, and their respective property market declines are relatively modest.

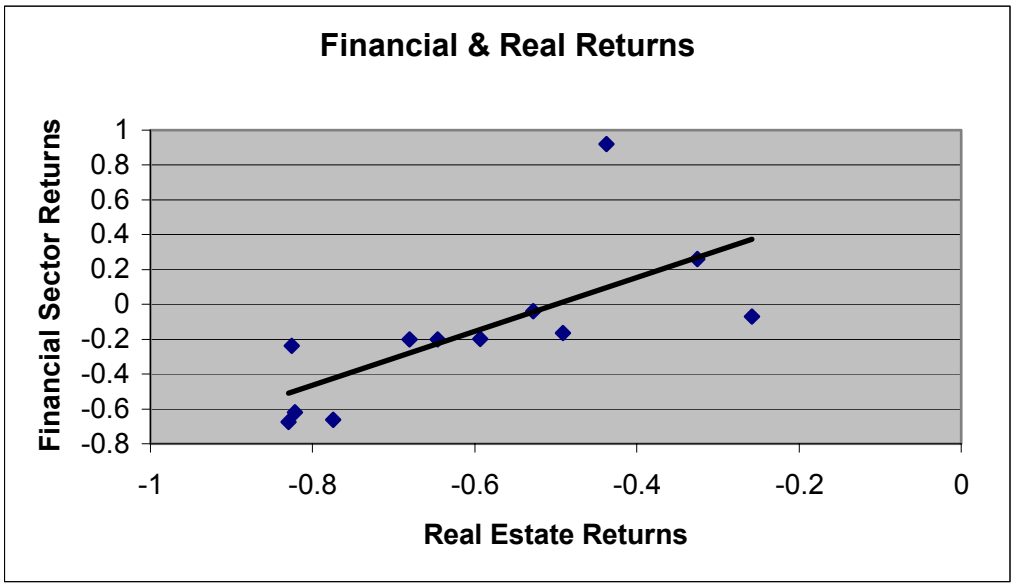
Figure 2



	Intercept	Slope	R^2
Estimate	-0.09	0.15	0.14
t-statistic	-0.71	1.28	

The correlation is computed between the total real estate index return, including dividends, and the change in the spread of lending over deposit rates. The vertical axis depicts the financial sector total return over the period of the real estate market crash. This is over one or more years and is specific for each country. According to our theory, negative correlation is a symptom of underpricing, and is associated with larger losses in real estate markets during a market downturn. Countries that do not exhibit the symptom of underpricing have zero or positive correlation, and their respective property market declines are relatively modest. This figure shows that the financial sector returns are also negatively impacted by underpricing but by a far more modest extent than real estate returns. The relationship is not statistically significant, and of smaller magnitude.

Figure 3



	Intercept	Slope	R^2
Estimate	0.77	1.54	0.48
t-statistic	2.43	3.06	

This figure depicts the total real estate returns vs. the total financial sector returns following the real estate market crash. Real estate returns and financial sector returns are positively correlated. However, financial sector losses are generally more modest than real estate losses. Furthermore, the financial sector does not seem to experience any significant losses until real estate losses reach 60% or more.

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