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The Canary in the Coal Mine: Subprime Mortgages, Mortgage-Backed Securities, and the US Housing Bust

Introduction

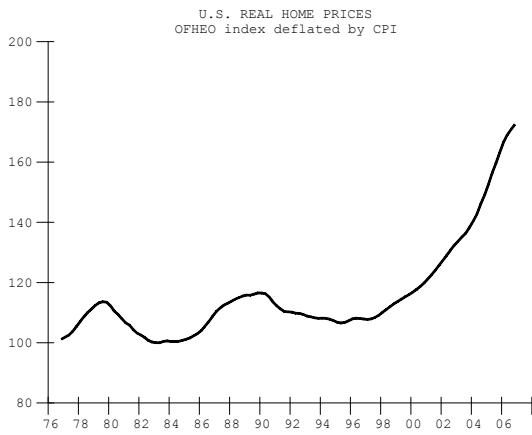
Recent events in the residential mortgage industry have verified what many of us expected all along: that the bursting of the housing bubble is already exerting dramatic and wide-ranging pressure on the US economy. As the housing market continues to decline, consumer spending will contract and financial institutions will suffer as housing-related financing instruments take the plunge.

Based on much of the analysis available today, it is tempting to blame the housing market's duress on the recent implosion subprime lending industry. However, we believe the decline of subprime mortgages is merely the weakest link in a long and tangled financial chain. In this paper, we hope to explore the causes and effects of the housing boom and bust, identify the impact on the market at large, clarify the nature and magnitude of the troubles on the horizon, and, in so doing, show why the subprime mortgage collapse is merely the most visible canary in the dangerous coal mine of the US housing finance market.

The US Housing Boom – A Fragile Bubble

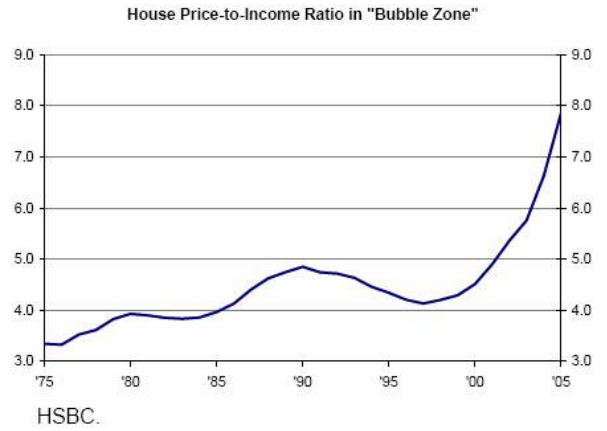
The recent housing boom – the unprecedented increase in US home prices and home ownership – was primarily caused by a combination of the Federal Reserve's aggressively easy monetary policy, the widespread abandonment of sensible lending practices, and an exponential increase in mortgage securitization, which was largely unregulated. As a result of these factors, US home prices, whether measured in real terms or in relation to incomes, rose to multiple standard deviations above the norm: up 98% from 1998 to 2006 on average. Similarly, home ownership increased from 64% to 69% of households (Figures 1-3). Intuitively, this should not have happened. As housing became more expensive, home ownership should have gone down, not up. In reality, therefore, this housing "boom" was actually a bubble of unreliable construction and unsustainable proportions.

Figure 1



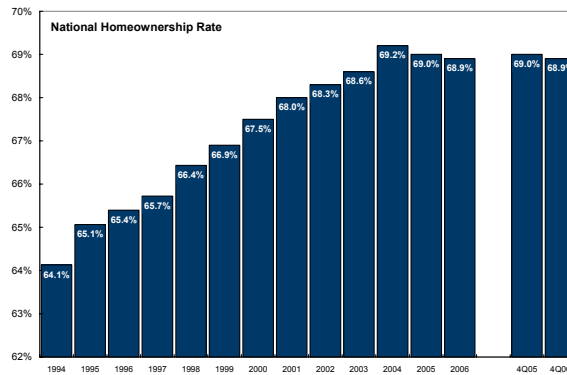
Source: OFHEO and ISI Group

Figure 2



Source: HSBC and ISI Group

Figure 3



Source: Credit Suisse

This bubble was perpetuated by the widespread issuance of cheap, low-standard debt, which caused many homebuyers to engage in reckless overleveraging. And today, the dangers of this imprudence are becoming clear. Despite the continuation of benign US economic conditions (long term interest rates and unemployment near 50 year lows), mortgage delinquencies and defaults are currently rising at alarming rates. Home prices are falling across the country. According to the *High-Tech Strategist*, unsold new home inventories are at 16-year highs (an estimated 8 months supply), while sales of new homes are the slowest in nearly eight years. A near-record level of 3.75 million existing homes are on the market, more than 25% higher than a year ago. Building permits are down 30% year over year and are near recession levels.

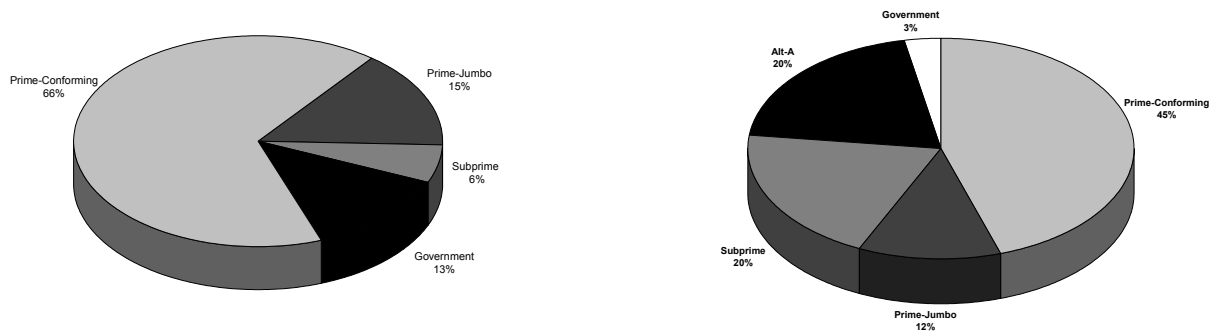
2007- The Canary in the Coal Mine: Subprime Mortgages, Mortgage-Backed Securities, and the Housing Bust

Subprime and Alt-A Mortgages

There are a variety of ways to approach a discussion of the housing bubble and its decline. For our purposes, it will be helpful to start by focusing on residential mortgage debt. As mentioned previously, one of the bubble's primary causes was the increase in mortgage debt outstanding, which in turn was facilitated by wanton disregard of credit standards and a massive increase in securitization. In recent years, the growth in residential mortgage debt has been truly impressive: according to UBS, it increased at an 11% CAGR between 1997 and 2006, including rates of growth of 14% in 2004 and 15% in 2005. Residential mortgage debt outstanding of \$10.2 trillion is now more than twice the US Treasury debt outstanding.

During the growth of the housing bubble, subprime and Alt-A¹ mortgages – extremely high-risk forms of mortgage debt – comprised an increasing percentage of total mortgage originations. Credit Suisse estimates that between 2002 and 2006, subprime mortgages increased from 6% to 20% of purchase dollar mortgage originations, while Alt-A mortgages increased from 5% to 20%. See Figure 4 below.

Figure 4



Source: Credit Suisse

In other words, 40% of purchase mortgage originations in 2006 were the result of dubious lending practices. At the end of 2006, subprime mortgages made up 12%-14% of outstanding residential mortgages, while it is estimated Alt-A mortgages accounted for between 11% and 27% of mortgages outstanding.²

¹ A classification of mortgages where the risk profile falls between prime and subprime.

² This wide range of estimated percentages is a result of the specific characteristic of Alt-A loans. Unlike subprime loans, Alt-A loans are not required to be reported by lenders. That is why there is such a large discrepancy in estimates of outstanding Alt-A loans. In reality, there is no hard and fast cut-off point for subprime loans either, with lenders using differing FICO scores in the low-600 range. There is a possibility that both categories are understated.

Before we continue, a brief word on Alt-A versus subprime loans. In reality, there is very little difference between the two. Both categories share virtually the same risky features: no or low documentation, piggyback borrowing, option ARM, interest only, etc. as shown in Figure 5.

Figure 5

Alt-A Loans Share Subprime's Risky Features

	<u>Subprime</u>	<u>Alt-A</u>
ARM share	92%	63%
Interest-only share	22%	27%
Neg am share (option ARMs)	0%	32%
Average debt-to-income	42%	38%
Piggyback loan share	55%	54%
No or low documentation share	50%	81%
Prepayment penalty share	70%	48%
Non-owner occupied share	10%	22%
Average FICO score	627	710

Sources: Loan Performance, Lehman, Fannie Mae, UBS, Fitch.

Source: ISI

While Alt A loans have higher FICO scores than subprime loans, more than 80% of Alt-A's are low or no documentation loans, which almost renders the FICO score meaningless. As lenders and securities holders are finding out, a FICO score is a credit history, not a credit analysis. Alt-A loans, therefore, are far more risky than ratings agencies would have investors believe.

To further illustrate how subprime and Alt-A loans fall far short of traditional lending standards, we can contrast the requirements for these loans – which are minimal to nonexistent – with the requirements for a typical borrower in the mid-‘90s. Before the housing bubble, the criteria for a residential loan approval included a down payment of at least 20%, three years of W-2s, one year of bank and brokerage statements (to ensure that the down payment was not wired in by a friend or relative), verification of employment and an appraisal of the property. In the subprime and Alt-A universe, these standards are vastly less stringent, resulting in a dramatic increase in default risk.

Therefore, in today's bubble-deflating marketplace, it is no surprise that the decline of the subprime lending industry (and, by inference, the Alt-A lending industry) is among the first harbingers of a widespread housing market collapse. But, as previously asserted, we believe this is merely the tip of a large and perilous iceberg. The mostly unseen yet extremely hazardous majority of this iceberg consists of the rampant securitization of these high-risk subprime and Alt-A loans.

The Rise of RMBS

Concurrent with the increase in residential subprime and Alt-A mortgage debt, the *securitization* of this debt into residential mortgage-backed securities (RMBS) also experienced phenomenal growth. Between 1997 and 2006, total RMBS increased at an 11% CAGR to \$5.7 trillion, driven by 20% compound growth in non-agency RMBS, the majority of which are comprised of subprime and Alt-A loans.

RMBS are bonds that have been created by highly questionable structured finance techniques. These bonds are divided into tranches that are rated by the ratings agencies from AAA thru BBB- depending upon the amount of collateral of each tranche and the sequencing of the cash flows for the mortgages in that collateral. There is an unrated “equity” tranche below the BBB- tranche.

What is troubling about this arrangement is that, through the black art of structured finance, RMBS have turned low-quality, high-risk subprime and Alt-A loans into AAA rated securities through the sequencing of their cash flows in a highly leveraged structure. Grant’s Interest Rate Observer uses the analogy of waterfalls and termites to describe the cash flow sequencing that can “alchemize” low quality loans into AAA rated securities: the first dollar of income goes to the AAA rated tranche, then income cascades down to the lower rated tranches, while the first dollar of losses is borne by the unrated “equity” tranches then migrates up the capital structure.

In addition to repackaging subprime and Alt-A loans into high-rated securities, the securitization process also reinforced the very process by which subprime and Alt-A loans came into being. Securitization of subprime and Alt-A loans into RMBS caused a further abandonment of lending standards because it freed lenders from holding a loan to maturity. Since, after an initial period, the lender of a securitized loan was only on the hook for a small residual value of the loan, there was no incentive for a lender to maintain rational lending standards. Historical due diligence processes virtually ceased. Therefore, as housing prices ratcheted higher, lenders began to progressively abandon standards with the goal of boosting loan volumes, fees and earnings; standards were also relaxed in order to bridge the widening affordability gap for the marginal homebuyer. As volume demands increased, there was no time or rationale for doing a traditional appraisal and credit analysis, as the marginal buyer would likely not qualify and the lender would not be on the hook if or when trouble hit. Therefore, it is easy to see how the relationship between securitization and subprime/Alt-A lending has created a dangerous feedback loop within the residential mortgage industry.

The Rise of CDOs

Collateralized debt obligations (CDOs) are the next increasingly hazardous rung in the rickety ladder of housing loan securitization. CDOs “re-securitize” RMBS in a highly

leveraged structure, thereby further repackaging and obscuring the risks inherent in subprime and Alt-A loans.

The ultra-low interest rates in the early part of this decade, and today's persistently low long-term rates, have created enormous demand for CDOs from yield-starved investors. As a result, these securities have grown exponentially. CDO issuance increased almost sevenfold between 2001 and 2006 to approximately \$500 billion. According to the Securities Industry and Financial Markets Association, structured finance (which includes RMBS, CMBS, CDOs, and other ABS) accounted for 60% of the collateral pools backing 2006 CDO issuance. Yet, as pointed out by Joseph R. Mason and Joshua Rosner in their paper "How Resilient Are Mortgage Backed Securities to Collateralized Debt Obligation Market Disruptions?" these securities are complex, non-standardized, non-transparent and highly leveraged. They are traded "over-the-counter" and are "marked-to-model" not "marked-to-market". Because of their complexity, they are highly dependent on rating agency ratings: something Mason and Rosner feel is beyond the agencies' scope.³

There are two forms of CDOs: cash and synthetic. Cash CDOs are bonds divided into tranches that are backed primarily by the lower rated tranches of RMBS. Using the same "waterfall/termite" cash flow sequencing as RMBS (with income cascading down and losses migrating up), the ratings agencies "alchemize" bonds backed primarily by low rated RMBS into tranches with a range of ratings from AAA through BBB-. CDOs also have an unrated equity tier. According to Mason and Rosner, 77% of the funding structure of a typical CDO is rated AAA in order to ensure the lowest funding costs, while the un-rated equity portion only makes up 8% of the structure.

Synthetic CDOs are bonds backed by the cash flows from the sale of credit default swaps. They sell default insurance on mortgage securities. However, as *Grant's Interest Rate Observer* points out, synthetic CDOs, unlike traditional insurance companies, are not required to hold reserves against the insurance they have written. They also are mostly unfunded as senior lenders are not required to put up the majority of their capital until losses force a capital call. Synthetic CDOs increased the supply of credit default swaps (CDS), which lowered the price of insuring mortgage securities thereby helping to increase demand for those securities. Synthetic CDOs tranches have ratings similar to those of cash CDOs and RMBS.

While CDOs – both cash and synthetic – have grown exponentially and are crucial to mortgage securitization, they are as opaque, illiquid and lightly regulated as their constituent parts. CDOs have been described as debt acquisition vehicles whose primary purpose is to provide a bid for the lower rated tranches of RMBS. Without the CDO bid, the RMBS market would be a lot smaller. But, while RMBS are static pools whose composition does not change, CDOs are managed pools whose assets can change

³ This paper is a must read and can be found at:
www.hudson.org/index.cfm?fuseaction=HUDSON_upcoming_events&id=350

dramatically during their term, with some CDOs closing before the asset pool is complete. CDOs are heterogeneous: some hold as little as twenty assets while others can hold several hundred. What's more, investors' ability to do due diligence on these asset pools is restricted, leading to an over-reliance on the rating agencies. CDO secondary market trading is also limited, leading to "mark to model" valuation, which can lead to sudden write-downs by holders. Most importantly, Rosner and Mason point out that only "qualified investors" have access to CDO documents and performance reports. Currently none of the bank regulatory authorities in the US, including the Federal Reserve, the FDIC and the Office of the Comptroller of the Currency, are considered "qualified investors". (Astounding, is it not?)

CDOs and RMBS – Risks That Lie Beyond the Subprime Decline

What, then, are the big-picture ramifications of this CDO/RMBS house of cards? To return to the idea originally postulated by this paper, the collapse of CDOs and RMBS is the larger disaster presaged by the implosion of the subprime (and Alt-A) lending industry.

Before we discuss the specific dangers of the CDO/RMBS situation, it is important to remember that mortgages, as a group, have many obvious risks. Mason and Rosner describe three specific risks that make mortgages exceedingly difficult to value: credit risk, interest rate risk and prepayment risk. A mortgage investor could lose, therefore, if the borrower defaults (credit risk), if interest rates rise (interest rate risk) or if interest rates fall (prepayment risk). Given the extremely lax credit policies of the past several years, credit risk is surely greater now than it has ever been, making extrapolations of historical default rates unreliable. Furthermore, Mason and Rosner describe the relationship between interest rate risk and prepayment risk as a "double-edge sword" that creates a non-linear estimation environment. Yet despite these risks and complexities, mortgages have been packed into opaque, highly leveraged CDOs and RMBS.

The crux of the matter is this: we believe these mortgage securities could magnify the deflation of the housing bubble as easily as they magnified its inflation. Given their highly leveraged structures, CDOs and RMBS are extremely sensitive to home prices, as illustrated in the following table from Paul Singer of Elliott Associates as portrayed in *Grant's Interest Rate Observer* (Figure 6).

Figure 6

Mortgage Schematic*				
house prices, mortgage defaults and CDO loss transmission mechanism				
<u>home price**</u> <u>appreciation</u>	<u>mortgage pool</u> <u>cumulative loss</u>	<u>most senior MBS</u> <u>class written off</u>	<u>loss to</u> <u>CDO</u>	<u>most sr. CDO</u> <u>class written off</u>
+7% to +10%	2%	none	0%	none
+4% to + 7%	4	BB	3	none
0% to + 4%	6	BBB-	39	AA
0% to – 4%	10	BBB+	84	AAA (partial)
- 4% to – 7%	12	A	100	AAA
- 7% to – 10%	16	AA-	100	AAA

*assumes CDO constructed from BBB-rated tranches of subprime mortgage-backed securities;
rough approximation of estimated collateral losses and tranche write-downs

**cumulative appreciation over two years

Source: Paul Singer

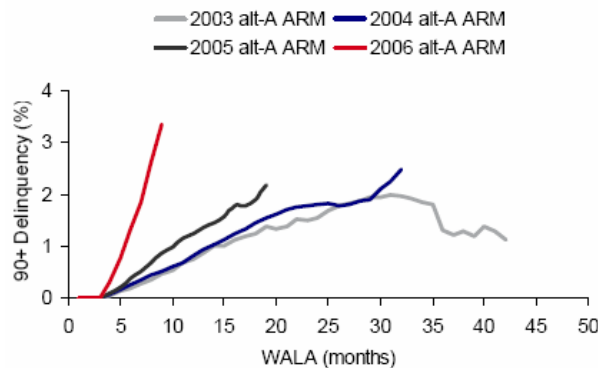
This table shows the estimated losses to the different tranches of a hypothetical CDO backed by the BBB-rated tranches of subprime mortgage-backed securities (MBS). If house prices are flat-to-down 4% over two years, the BBB+ tranche of the MBS will get written off, while losses will reach all the way up to the AAA tranche of the CDO, which will suffer a partial write down. If house prices depreciate 4-7% over the same two year period, losses reach all the way up to the A tranche of the MBS, which would be written off, while the CDO would be wiped out. Given the historic run-up in house prices, still-stretched affordability levels, and the coming credit contraction, a 4-7% two-year decline in house prices does not seem extreme. In fact, it seems like a reasonable base case. It is why Mason and Rosner conclude that even the investment grade rated tranches of CDOs will experience significant losses if house prices depreciate.

Before we examine the potentiality of an upcoming CDO-related injury to the housing market, it's helpful to look at the history of this financial instrument. CDOs backed by other collateral have run into problems in the past. Mason and Rosner point out that CDO issuance dropped off dramatically between 1998 and 2002 – from just under \$150 billion to about \$90 billion – as the economy weakened and problems arose in the collateral that backed the CDOs of that era. That “problem collateral” included corporate loans and bonds, manufactured housing and franchise business loans as well as aircraft leases. Deutsch Bank estimates that between 1999 and 2004, \$123 billion of AAA ABS were downgraded by at least one rating agency due to collateral performance problems. Given the current accelerating level of mortgage delinquencies and defaults, the same thing could happen to CDOs backed by RMBS. Many holders of senior CDO securities are limited to holding investment grade securities, thus they could be forced to liquidate in a falling market, if the securities are downgraded.

Today, as in the past, CDOs and RMBS are vulnerable because of the weakness of their underlying securities: subprime and Alt-A mortgages, which have fallen prey to a recent spike in delinquencies. According to First American Loan performance, 14.3% of securitized subprime loans were at least 60 days delinquent in January up from 13.4% in December and 8.4% a year ago. For securitized Alt-A loans, 60-day delinquencies rose to 2.6% in January compared to 2.3% in December and 1.3% a year ago. Recently both M&T Bank Corp and American Home Mortgage Investment Corp were forced to lower their earnings forecasts due to problems selling Alt-A loans into securitization as well as credit deterioration in their Alt-A portfolios.

Resets of adjustable rates are the likely cause of these growing delinquencies. In recent years, large quantities of poorly underwritten adjustable rate debt has been taken out at low teaser rates that are currently resetting in a flat-to-falling home price environment. According to both Goldman Sachs and Bank of America, this phenomenon is at the heart of the increase in defaults. Bank of America shows that Alt-A ARM delinquencies in 2006 ran at four-times historical averages (Figure 7), while Goldman estimates that subprime ARM delinquencies are over 400 bps higher than subprime fixed rate mortgages, and are accelerating at seven times the rate.

Figure 7



Source: Bank of America

Flat-to-falling home prices in 2006 are unmasking the incredibly lax lending policies of the last few years. Prior to this year, rising home prices allowed troubled borrowers to sell to avoid delinquency. However, approximately \$1.0-1.5 trillion of mortgages will reset this year and next, according to the Mortgage Bankers Association. This will increase the average monthly payment by 25% or more. With income per household flat or up only slightly, this incremental claim will stretch homeowner's budgets even further. As a result, it is reasonable to expect continued defaults to subprime and Alt-A loans,

with a resulting negative impact on mortgage-backed securities such as RMBS and CDOs.

The Future of the Subprime Residential Mortgage Industry

As previously discussed, the collapse of the residential subprime/Alt-A market will cascade into the RMBS and CDO industries, tripping the wire of a large-scale credit contraction. In our view, this credit contraction is only just beginning. As a result of the recent sharp spike in delinquencies, 59 subprime lenders have closed or been acquired in distress sales, including the third, fifth and seventh largest players in the industry. Subprime mortgage issuance is expected to fall 50% this year from over \$600B in 2006. Having been burned, lenders are raising teaser rates and requiring down payments and greater documentation for loans. Credit Suisse estimates that 21% of 2006 mortgage originations with the riskiest features – high cumulative loan to value, low credit scores and low or no documentation – will no longer be made (Figure 8).

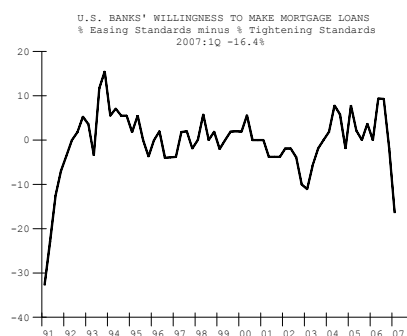
Figure 8

Product	Share of Purchase Market	Elimination Due to Standards	Impact on Total Market
Subprime	20%	50%	10%
Alt-A	20%	25%	5%
Prime & Government	60%	10%	6%
Total	100%		21%

Source: Credit Suisse

This 21% estimate could be low as it is only slightly more than half of the riskiest loans made last year. In the first quarter of this year, a Federal Reserve survey found that more banks are tightening mortgage standards today than at any point in the past fifteen years (Figure 9).

Figure 9



Source: ISI Group

It is not only the banks that have recently embraced a more rigorous approach to lending standards. Congress has also acknowledged the urgency of this matter and has intensified its focus on regulatory legislation. Congress has demanded that regulators specifically extend their recently released Intra-agency Guidelines on Non-traditional Mortgages to include the “2-28” loan, the most popular subprime loan that features a low teaser rate for 2 years. The guidelines require the lender to qualify the borrower on the fully amortizing rate and not on the teaser rate. Countrywide Financial and Washington Mutual, two of the largest mortgage lenders, testified at recent Congressional hearings that the new guidelines would cut their subprime issuance by 50%. Indeed, since the issuance of the new guidelines last September, non-traditional loan volume has fallen dramatically. (Figure 10)

Figure 10

**Nontraditional Loan Originations Fall Sharply in 3Q
as New Rules Took Effect**

Year Over Year Change in Origination Volume

2006	Option ARMs	Interest Only	Total Mortgage Originations
1Q	+43%	+49%	6%
2Q	+32%	+50%	1%
3Q	-12%	-17%	-14%
4Q	-14%	-21%	-9

Source: Inside Mortgage Finance and ISI Group

In addition to these new Congressional guidelines, legislators are now enacting or promising to enact harsh retribution for predatory loans (FKA affordability loans). During the housing boom, as home prices soared relative to incomes and housing affordability fell, lenders loosened standards dramatically. Ostensibly, these relaxed standards were put in place to qualify otherwise unqualified borrowers for the “American Dream” of home ownership; but they also served to feed the demands of the securitization machine and to fatten bottom lines of the lending institutions. National and local legislators are now denouncing these “payment stretching” loans as predatory lending and are holding hearings and beginning to undertake serious enforcement actions against lenders. Ohio, for example, has recently passed legislation that will empower a task force to investigate predatory lending with penalties ranging from criminal and civil prosecutions through monetary damages and stays and injunctive relief. The Ohio

attorney general is quoted in *Grant's Interest Rate Observer* as having said, "We're looking at jail time for some of these folks." As evidence of this legislation in action, Ohio has recently placed an injunction on all foreclosures in the state by New Century Financial, the now defunct subprime lender, until it can determine whether the loan violated existing law. If a violation is found, the stay will be extended until there is a satisfactory adjustment in the borrowers' favor.

The Future of CDOs and RMBS

Grant's quotes an analyst as saying that a mortgage without the ability to foreclose is an unsecured loan. So what is an RMBS backed by that same mortgage? And what is a CDO backed that RMBS? As the answers to these questions become increasingly obvious, the manner in which these mortgages are securitized is also coming into the legislative crosshair. A series of Congressional Hearings is underway as part of the process of drafting an anti-predatory lending bill. It will likely impose an obligation on lenders to ensure a loan is suitable for a borrower, similar to the fiduciary duty imposed on stockbrokers. Recognizing the major role that securitization played in the current housing bust, legislators are also examining an "assignee liability" provision which would hold investors that purchase RMBS liable for predatory loans. Needless to say, such a provision would limit demand for RMBS and CDOs in particular and the availability of mortgage credit in general. Investment banks and rating agencies will have to explain their roles in creating AAA rated securities backed primarily by subprime mortgage loans (RMBS) as well as AAA securities backed by the lowest rated tranches of RMBS (CDOs).

Conclusion

The bursting of the housing bubble is already well underway. Lenders are collapsing or raising lending standards, while regulators are cracking down on the imprudent lending that financed the marginal US homebuyer. Many of these imprudent loans will re-set this year and next, raising questions about the ability of these borrowers to re-finance. With the marginal buyer no longer able to get financing and a large inventory of homes for sale, US housing prices are likely to decline, possibly quite sharply, over the next several years. With the marginal homebuyer all but unfinanceable, and with the current dearth of first-time homebuyers, a decline in home prices seems inevitable. And the effect on the US economy will be profound: according to *The New York Times*, more than 20% of global private debt securities are tied to the US housing market. That is equivalent to \$7.5 trillion: a sum far larger than the US Treasury market. Even if house prices decline only modestly, a significant portion of these securities would still suffer substantial losses.

In light of the housing market's unstable present and perilous future, mortgage-backed securities have become a significant and largely underestimated danger. In our view, mortgage-backed CDOs and RMBS are analogous to termites in their ability to silently

wreak fatal, widespread and immediate havoc. Because of the manner in which they are structured, these instruments are capable of infecting unsuspecting financial institutions that, due to a blind over-reliance on the rating agencies' conclusions, have inadequately reserved for the liabilities associated with these products. Opaqueness and "mark to model" are no substitutes for proper due diligence and "mark to market" pricing. In 2007, many financial intermediaries with investments in mortgage-backed securities will learn this the hard way. The "subprime canary" has dropped – and that's very bad news for the rest of the coal mine.



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