

The Ongoing Financial Upheaval: Understanding the Sources and Way Out

Susan M. Wachter

Richard B. Worley Professor of Financial Management
The Wharton School
University of Pennsylvania

August 26, 2009

Executive summary

The present period of financial instability is also likely to become known as the end of an era, an era of economic calm and of policy consensus on how to maintain market stability. After World War II, the federal government operated on the Keynesian principles that the right mix of spending, regulation, and interest rates could tame economic cycles and eliminate surges of unemployment. In this period, now known as the Great Moderation, we assumed we knew how to prevent economic crises, such as the recurrence of the Great Depression. However, it is clear that those principles were erroneous as the economy has entered a lesser, but still severe downturn, the Great Recession. This paper looks at the sources of the ongoing economic crisis and points to the unique role in its origins of real estate asset bubbles and mispriced credit, not only in the origin of this crisis but of many financial crises. An analysis of the data points to the role of mispriced mortgage backed securities (MBS) in the spread of aggressive mortgage products and the unwarranted price speculation that resulted in massive foreclosures. In turn, the paper addresses the source of mispriced risk in MBS as incomplete markets in real estate and non-tradability of MBS and related securities which ultimately led to the collapse of financial system, threatening global economic health. The paper also suggests corrective measures that can and should be taken to assist the short and long term recovery.

The present period of financial instability is also likely to become known as the end of an era, an era of economic calm and of policy consensus on how to maintain market stability.

After a period of several decades known by macroeconomists as the Great Moderation, a period in which we assumed we knew how to prevent economic crises such as a recurrence of the Great Depression, we have experienced in the US, and in many countries, the worst and longest recession in decades. I will address where we are today, the source of the crisis, and what can be done in the short and longer run to assist in the recovery.

WHERE WE ARE TODAY

In the last quarter of 2007, the US economy entered into the worst downturn since the Great Depression. With credit flows seized up, a self-reinforcing adverse cycle developed. The eroding financial system upended the economy, putting further pressure on the financial system. This crisis differs from previous postwar recessions in the US not only in its severity but also in the collapse of the financial system itself. In response to this crisis, the Federal Reserve System and the Treasury vastly expanded their roles. In addition, an unprecedentedly large fiscal stimulus package was implemented. But more is needed for private credit flows to resume: confidence in the financial system must be restored. Restoring confidence requires an understanding of what went wrong as well as an effective response to reverse the decline.

Going forward, the economic outlook remains for the time being bleak. Although the spread between the three-month Libor and three-month T-bill rates, as shown in figure 1, has recovered, credit markets remain badly shaken, with no private-label MBS issuance and little issuance of emerging market and private corporate debt. As figure 1 also indicates, commodity and stock markets have been roiled, with US stock prices off about 30% to 40% from their peak in 2007. In the US, real GDP fell in Q4 of 2007 and again in Q3 and Q4 of 2008 and Q1 of 2009, at an annual rate of more than 6%, although as of Q2 this decline had moderated to 1%. Additionally, the economy has shed over seven million jobs so far on net (through July 2009), raising the unemployment rate by 4.6 percentage points to 9.5%.

Figure 1: Financial Series

DJIA and DJ-UBS Commodities Index (Left Axis)¹; TED Spread (Right Axis)

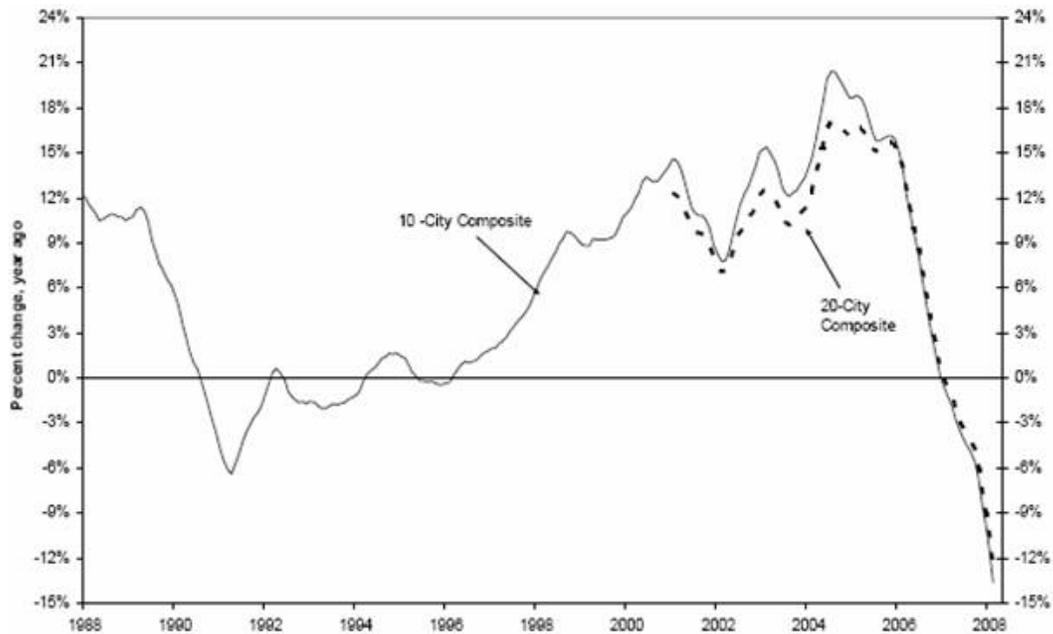


¹ Jan-95 = 100

Sources: WSJ, BBA, Federal Reserve, Bloomberg

Reduced availability of credit and declining wealth have been driving factors in the economic deterioration. Net worth has fallen by about \$15 trillion, more than \$6 trillion from a 30% decline in house prices, as shown in Figure 2, and \$8 trillion from the almost 50% decline in stock prices since their relative peaks.

Figure 2: Case-Shiller¹



¹ 2000 Q1 = 100

Source: Case-Shiller

Monetary and fiscal responses are also unprecedented. Monetary initiatives include a near zero federal funds target rate. The Fed has ramped up lending through credit facilities. Financial institutions can use securities as collateral to borrow from the Fed. Additionally, the Fed can now purchase almost all securities it deems necessary. As a result of the Fed's actions, Libor and commercial paper rates have fallen and the volume of new issuance of commercial paper has sharply increased, and Fannie/Freddie mortgage rates have fallen to approximately 5%, as of February 2009, near their lowest level in decades, but bank lending and private issuance of mortgage credit is limited to nearly nonexistent.

The goal of fiscal stimulus measures is to maximize the near-term boost to return to economic growth within two years. It has been estimated (Zandi, 2009) that, without fiscal stimulus, real GDP would decline for seven quarters, falling by 2.5% in 2009, and unemployment would exceed 10% with nearly five million jobs lost by mid-2010. Thus the nearly \$1 trillion fiscal stimulus plan in 2009, which it is hoped will curtail real GDP and job losses. Even so, the stimulus would allow the economy to reach full employment only by the end of 2012.

Nonetheless, the nature of the crisis is such that these responses cannot return the economy to growth.

UNDERSTANDING THE SOURCES OF THE ONGOING FINANCIAL UPHEAVAL

While these steps are necessary for recovery, they are not sufficient. The monetary authorities in the US have gone beyond traditional monetary policy to quantitative easing, since in the absence of continued direct funding to credit markets by the Fed, the Keynesian limits of pushing on a string have proven to be correct. Fiscal policy also has its limits due to long-term indebtedness concerns. The previous consensus on the difficulty of timing such stimulus so that it actually helps stem economic decline has been overcome both by the severity of the current event and the likelihood that the decline will be prolonged.

Thus, fiscal and monetary stimulus will not suffice. The lesson from Japan is that for growth to occur again, financial markets must function again. Banks' balance sheets have to be restructured, forcing the writing off of bad loans. The housing market needs to be dealt with so that nonperforming and underwater mortgages do not fuel an overshooting price decline, given the impediments to optimal workouts that currently exist in securitized pools.

Moreover, there needs to be confidence again that financial institutions are safe for investment and that there will be demand for their growth. Re-instilling confidence will require far greater certainty than exists today that the financial system will not expose investors to risks of unknown dimensions. For this we will need to improve our understanding of the source of the current crisis and therefore of the appropriate steps to prevent a recurrence.

While monetary policy reforms in many countries have helped to bring inflation under control, in past decades, asset price bubbles have worsened over time, with today's extreme debacle only one in a series that includes the Savings and Loan crisis in the US, the Asian Financial Crisis, and the earlier lost decade in Japan.¹ Thus, we must improve our understanding of the source of this macro-instability.

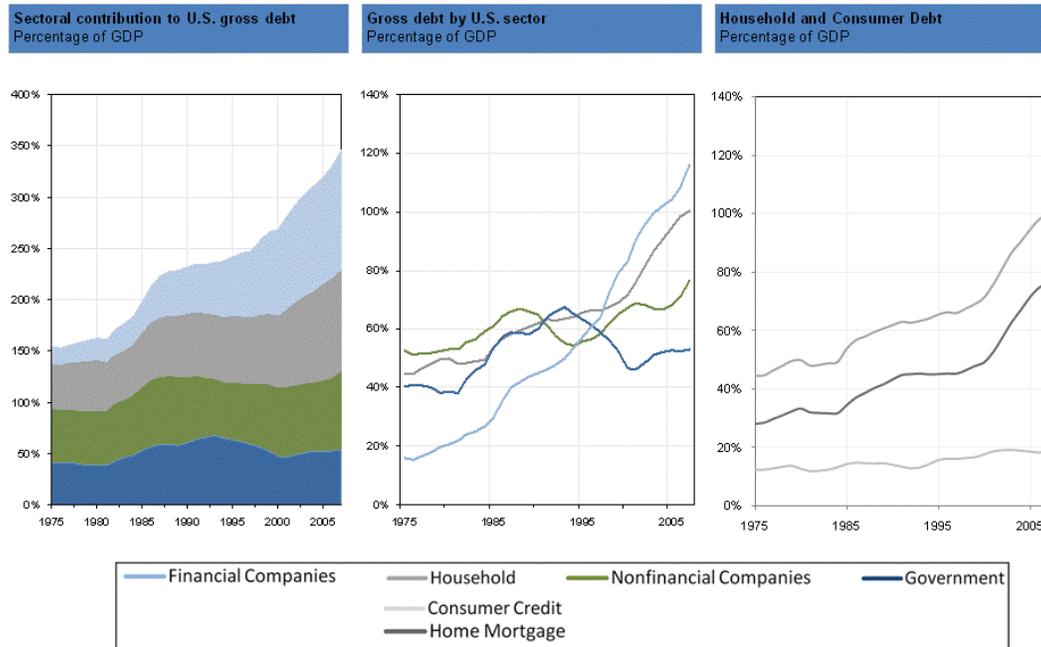
Each of these episodes was preceded by an unsustainable build-up of debt. In this crisis also, household and financial debt as shares of GDP were pushed to unprecedented heights, as shown in Figure 3. Mortgage debt in particular increased along with the seemingly rising value of the underlying collateral, the housing asset.² But the question that is not addressed by this description of the crisis is why and how did leverage rise to unsustainable heights? At the time that these chronic imbalances were developing, the response was that asset prices correctly reflected low interest rates and thus debt-to-asset ratios were not out of balance. If assets were correctly priced, it was argued, high debt-to-income ratios would

¹ See Allen and Gale (2000), which documents previous episodes (in particular, Nordic countries and Japan in the late 1980s to early 1990s) in which rapid expansion of credit and asset price boom-and-bust cycles are intertwined.

² For a discussion of the links between housing wealth and economic activity, see Mishkin (2007). Also, for a general discussion on the development of the literature of macroeconomics and housing, see the review by Leung (2004) and the references therein. Mishkin links current and past financial crises to periods of rapid financial change, and to lending booms which "outstrip the available information resources in the financial system." Pavlov and Wachter (2009) points to the role of the procyclical decline in lending standards and the resulting rise in housing prices, which, indeed, is in part due to inadequate information, as discussed further below.

not produce a crisis since loans would be repayable through refinancing or sale of the property, if necessary.

Figure 3: Chronic Imbalances



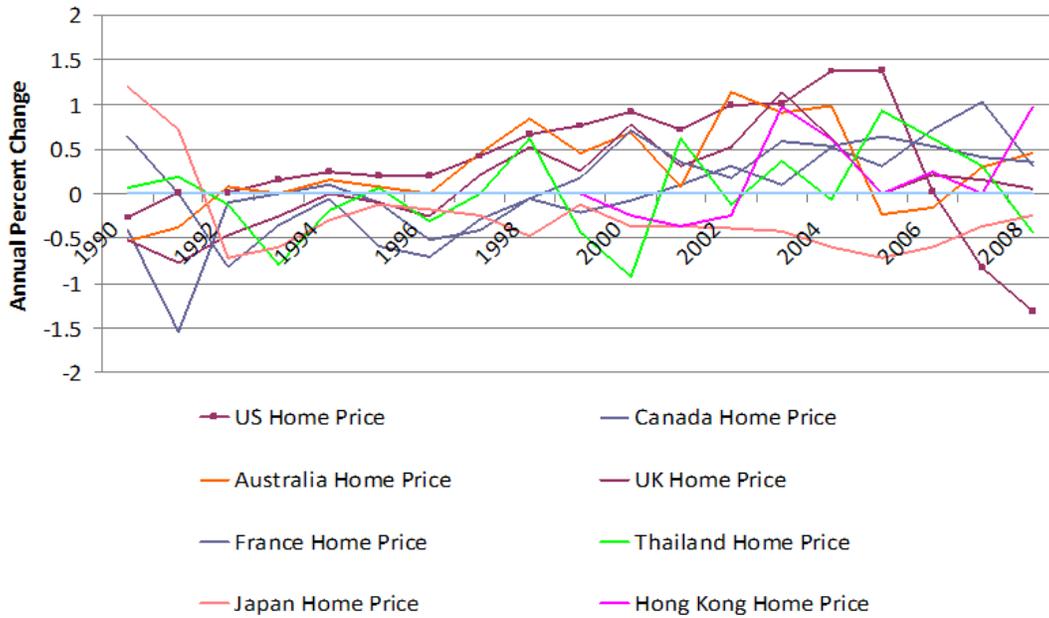
Source: Federal Reserve Board Flow of Funds

However the problem was not simply low interest rate debt, rather the problem was underpriced debt. As Pavlov and Wachter (2008) shows, inflated asset prices are the inevitable outcome of underpriced credit risk. If the default option in mortgage loans is underpriced, the inevitable outcome is an unsustainable rise in asset prices. When asset prices deflate, credit seizes up, and the high debt-to-income ratios become the immediate source of defaults. However, it is the asset price inflation and then deflation, and the mispriced credit, that is responsible for defaults and the ever-widening crisis. Households, in the aftermath of the bubble, are then exposed both to a higher cost of credit and to loans that they cannot repay due to the collapse in collateral values. The current crisis derives from a credit bubble which led to an asset bubble; in the absence of the credit bubble, the asset bubble would not have occurred. The credit bubble and asset bubble together are responsible for the severity of the global financial turmoil.

Although the crisis was preceded by a worldwide credit bubble, the US housing mortgage and housing markets are arguably at the center of the crisis. Abraham et al. provides evidence that the volatility adjusted run-up in US housing prices, particularly after 2003, exceeded price increases among US trading partners and that so far the downturn in US housing prices has been the most severe (Figure 4, see *Abraham, Pavlov and Wachter, 2008*). The US run-up in housing prices was itself induced by a credit bubble of historically unprecedented dimensions. The introduction of subprime and other nontraditional

mortgage (NTM) loans rapidly expanded after 2003 at terms that could not be repaid (Table 1). These aggressive loans allowed credit constraints to be overcome, expanding the demand for homes. The underpricing of the put option imbedded in these loans also increased the price of the housing asset collateralized by the newly affordable, easy to get, and cheap loans.

Figure 4: House Price Appreciation Controlled for Volatility



Source: Abraham, et al.

The market share of these loans grew from under 15% to almost half of originations by 2006 (the sum of the market share of HELOCs, Alt-A, and subprime, as shown in Table 1). Within these loan types, the consolidated loan-to-value ratios (CLTVs) also increased, as shown in Table 2. Also, as shown in Table 2, as systemic risk increased with higher CLTVs (and with the growth in market share of these difficult -to-repay loans), the price of risk did not increase. In fact the price of risk decreased, as shown by the decline in spreads.

Table 1: Mortgage Originations by Product

	FHA/VA ↓	Conv/Conf ↓	Jumbo ↓	Subprime ↑	Alt A ↑	HEL ↑
2001	8%	57%	20%	7%	2%	5%
2002	7%	63%	21%	1%	2%	6%
2003	6%	62%	16%	8%	2%	6%
2004	4%	41%	17%	18%	6%	12%
2005	3%	35%	18%	20%	12%	12%
2006	3%	33%	16%	20%	13%	14%
2007	4%	48%	14%	8%	11%	15%

Source: Inside Mortgage Finance 2008 Mortgage Market Statistical Annual

Table 2: Deterioration of Lending Standards

		ARMS									
Orig_Yr		CLTV	CLTV>80	Seconds	Full Doc	IO%	DTI	FICO<700	Investor	WAC	SpdtoWAC
Prime	2002	66.4	4.1	1.9	56.0	46	31.0	20.7	0.7	5.5	-
	2003	68.2	10.1	10.9	48.6	53	31.8	21.8	1.6	4.6	-
	2004	73.5	20.7	23.1	51.2	71	33.5	22.0	2.1	4.5	-
	2005	74.1	21.7	26.8	47.3	81	33.6	18.9	1.9	5.4	-
	2006	75.3	26.2	35.3	33.6	91	37.2	19.5	2.3	6.2	-
Alt A	2002	74.3	20.8	2.7	29.3	26	35.4	46.4	9.9	6.3	0.8
	2003	78.0	33.3	23.4	28.1	56	35.3	44.7	12.9	5.6	1.0
	2004	82.6	46.9	39.1	32.6	75	36.2	44.3	15.3	5.5	1.0
	2005	83.5	49.6	46.9	28.3	83	37.0	40.5	16.5	6.0	0.6
	2006	85.0	55.4	55.4	19.0	87	38.3	44.2	13.5	6.8	0.6
Subprime	2002	81.2	46.8	3.7	66.9	1	40.0	93.4	4.7	8.5	3.0
	2003	83.5	55.6	9.9	63.5	5	40.2	91.6	4.9	7.5	2.9
	2004	85.3	61.1	19.1	59.9	20	40.6	90.6	5.3	7.1	2.6
	2005	86.6	64.4	28.1	55.9	32	41.2	89.7	5.4	7.3	1.9
	2006	86.7	64.0	31.0	54.6	20	42.1	91.8	5.7	8.2	2.0

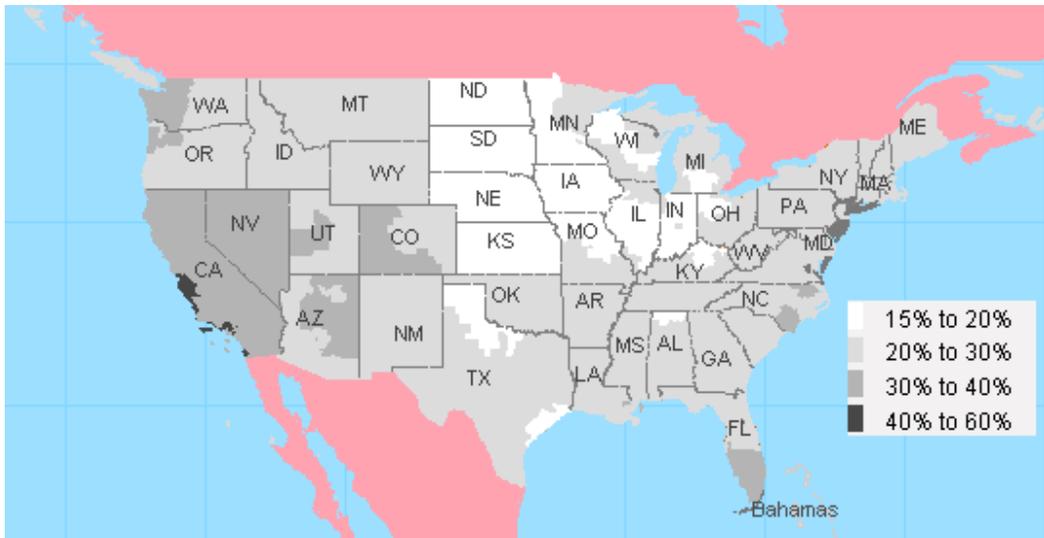
Spreads declined

CLTV, %>80 and use of Seconds increased
 % Full Doc declined
 Not much change in FICO or DTI

Source: Loan Performance data as of November 2006. UBS, April 16, 2007, Thomas Zimmerman, "How Did We Get Here and What Lies Ahead"

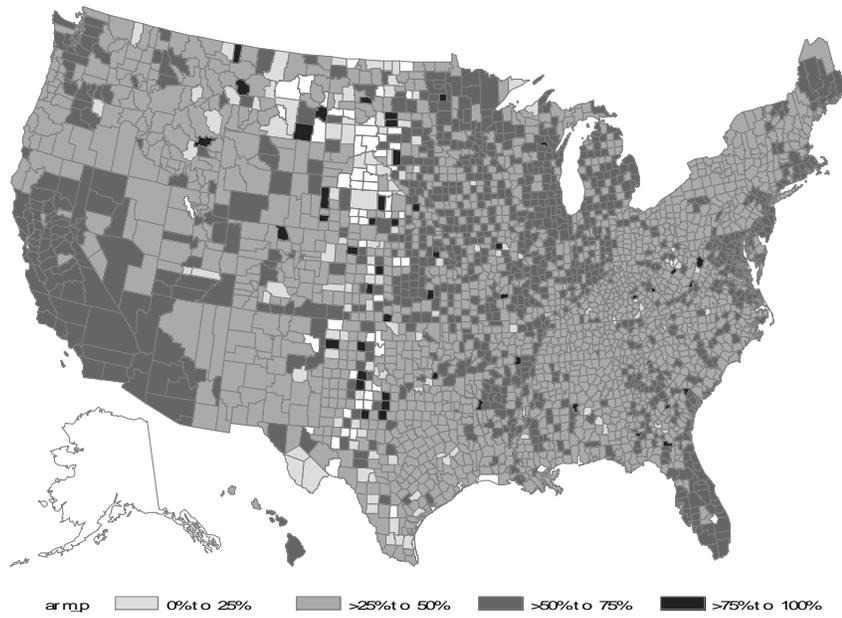
These loans were extended in states where mortgages were previously not affordable, thus expanding the market. Figures 5a, 5b, and 5c respectively show where housing was not affordable as of 2000, the concentration of subprime teaser rate ARMs, and of low documentation loans. When credit seized up in the spring of 2007, of course, it was these markets that were most vulnerable to declines. The same phenomenon of poorly underwritten, initially affordable but then unaffordable loans, such as teaser rate loans whose required payments could double, occurred (although to a lesser extent) throughout the United States. But it was in the high priced and difficult to develop, so-called sand states, that housing prices exploded with the wave of aggressive mortgage products and then imploded, as the tsunami receded (Figure 6).

Figure 5a: 2006 Census Tract—% Monthly Owner Costs with a Mortgage of 30 Percent or More



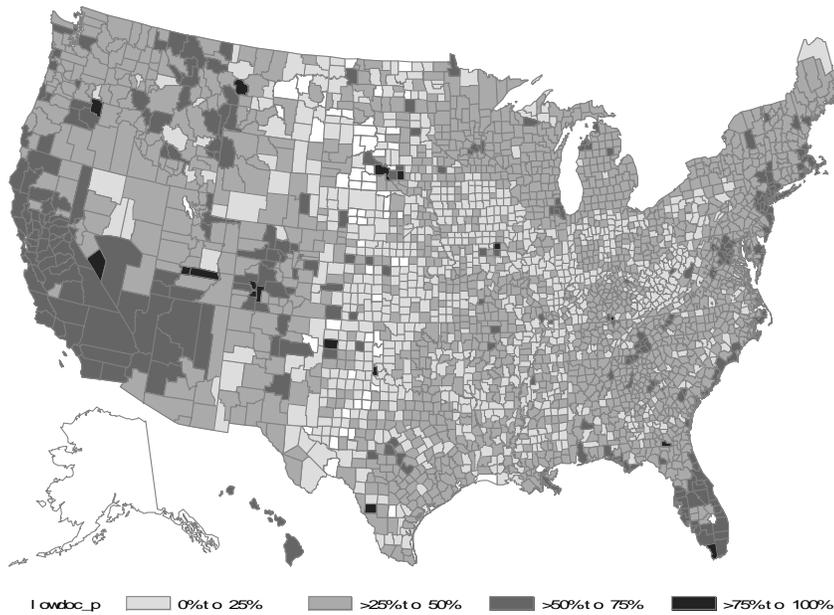
Source: SocialExplorer.com, 2000 U.S. Census

Figure 5b: 2006 – Percentage of all Loans – Adjustable Rate



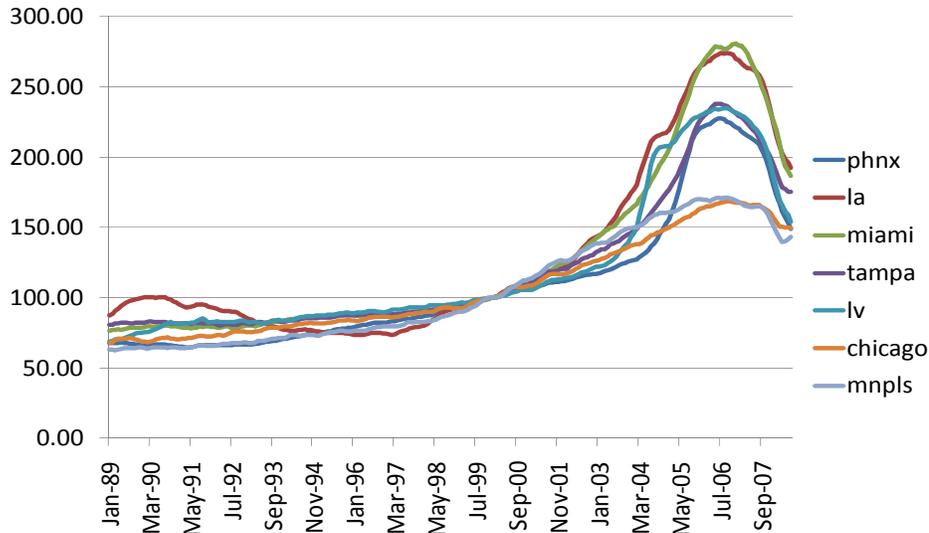
Source: Bostic et al.

Figure 5c: 2006 – Percent of all Loans – Low Documentation



Source: Bostic et al.

Figure 6: A Housing Bubble in 2003, Especially in the “Sand States”



Source: Case-Shiller

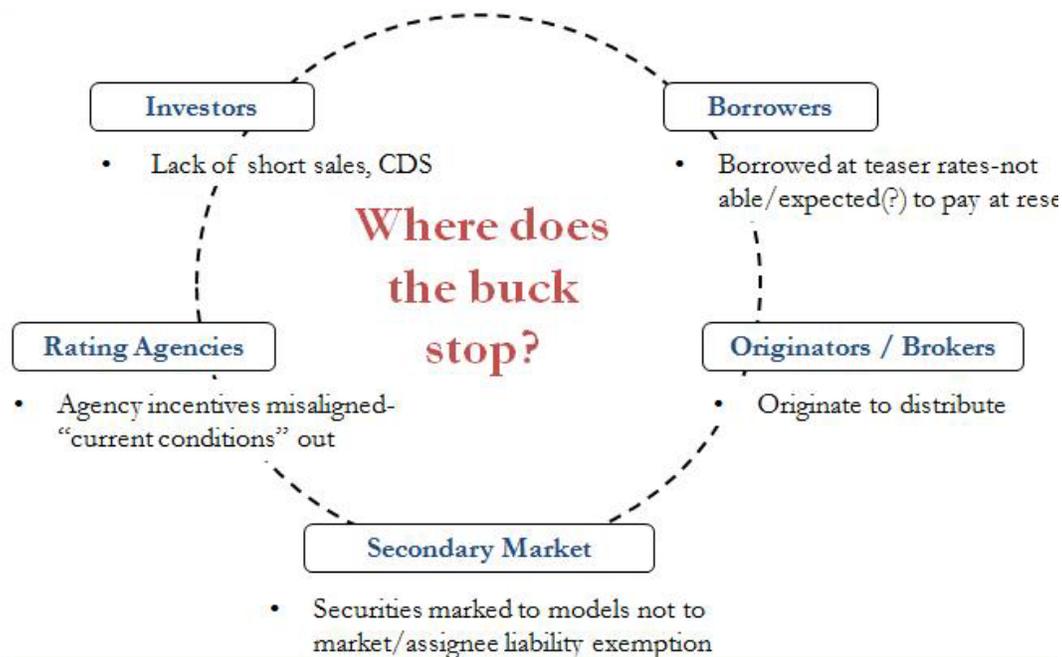
The problem of falling house prices and mortgage defaults and foreclosures was not confined to the subprime market. In fact, financial losses due to foreclosures in the far larger prime market may be greater in total dollar amount than those in the subprime market. The extension of credit increased the demand for all homes (and the overall indebtedness of the U.S. households) and the subsequent withdrawal of credit reversed this. These mortgages were originally underwritten generally using reasonable 80% loan-to-value ratios, but they are now also underwater. As home prices fall and as unemployment rises, borrowers default on these loans as well. It was not foreseen that there would be difficulty in repaying these loans because loan-to-value ratios were in fact reasonable, albeit at inflated market prices. With subprime and NTM credit no longer being extended, price collapses were inevitable, impacting the default rate for prime loans as well.

Today's crisis in the US emerged from a shift in the source and pricing of funding for mortgage backed securities. While securitization has played a large role in the US, in the trading of MBS, investors have historically only been exposed to interest rate risk. Mortgage default risk was contained by underwriting, not priced and not borne by investors. With the growth of the private-label subprime market, this all changed.

In the process, fees drove the demand for securitization at every stage of the newly functionally differentiated production of mortgages. Banks received fees to originate to distribute, the secondary market received fees to bundle mortgages, and rating agencies received fees to rate the pools. At each stage, entities were able to book fees without exposure to long run-risks. Ultimately investors purchased

MBS. But investors could hedge their risk also. With the purchase of newly available credit default swaps (CDS), their positions could be insured against possible loss. There was counterparty risk to be considered, but if this was evaluated, investors might have concluded that these instruments had to be backed up or the entire system would fail. The providers of the credit default swaps perhaps would have been viewed as—and certainly in this event were—“too big to fail.”

Figure 7: How did we get here?



Of course, fees were collected for the rapidly growing provision of credit default swaps as well.

The “too big to fail” entities behind CDS and the lack of observable market trading of CDS, or private label MBS more generally, allowed the expansion of these products without exposing them to better informed market observers who might have evaluated the pricing of these instruments and shorted them at their current prices. To reiterate (as shown in Table 2), as systemic risk increased, the price of risk did not.

A NEW PARADIGM: THE PRO-CYCLICAL PRODUCTION OF RISK

Lenders who are attempting to gain market share and increase their fees may do so by underpricing their competitors and expanding the universe of risky loans and/or by accepting additional risk. As they compete for product market share and expand their supply of risky loans, the average risk premium on these loans would increase if the premium correctly reflected the additional risk of the pool. However, as Table 2 indicates and as Pavlov and Wachter (2006) explain, in the production of nonrecourse loans

collateralized by real estate, this does not occur. Rather, due to incomplete markets, the price of risk decreases, as lenders compete for market share. The result is the underpricing of risk and the overpricing of assets (Pavlov and Wachter, 2008).

Table 3: The Pro-cyclical Production of Risk as Lending Increases

Lenders accept additional risk for increased initial fees and market share and rates decline

- Efficient Outcome: Risk premia increase and asset prices decrease
- Inefficient Outcome: Risk premia decrease and asset prices increase due to incomplete markets in real estate ,

Coexistence of real estate booms and banking busts

- Increased perceived bank capital
- Evidenced by the recent crisis in which property based asset booms accompanied increases in financial and systemic risk
- Others: S&L Crisis, Asian Financial Crisis, Japan's Lost Decade

Source: Pavlov and Wachter (2009b), Herring and Wachter

Due to heterogeneity and illiquid markets, mortgage backed securities and related derivatives traded infrequently, thus short selling these overpriced assets was infeasible. Mortgage backed securities were marked to model not to market and could not be traded to drive prices to fundamental levels through short-selling pressure.

The result of this underpriced risk and the lack of short selling was that asset price increases could persist and increase with further easing of credit. With artificially inflated asset prices, financial institutions' balance sheets were also artificially inflated (Pavlov and Wachter, 2009a and 2009b).³ Thus, the real estate assets' higher prices inaccurately reflected the risk of real estate loans on banks' balance sheets. As Herring and Wachter show, real estate booms and banking busts tend to go together. In fact, the current financial upheaval is only the most recent in a series of financial crises in which property-based asset booms are accompanied by financial system failure. Asset bubbles, in the absence of arbitrage, occur, and the result is increased systemic risk as liquidity providers who hold these assets are de-capitalized pro-cyclically.

Would derivative trading in these markets have made a difference and contained the asset bubble? In the US, derivative markets (the ABX) were introduced in 2006, which may have helped to contain the risk, although from the timing it is difficult to tell. It was not until March of 2007 that the ABX signaled mispricing, and even at that point aggressively priced subprime lending continued. Derivative trading in the UK, which was predicting a collapse in property markets prior to 2007, did not stop credit expansion in an overextended market. Short selling is not sufficient in the presence of too-big-to-fail buyers.

³ Thus the cycle mechanism operates through financial system. Iacoviello (2005) links the constraint and nominal debt contract features of mortgage contracts to a wealth effect that dampens the business cycle, in contrast Pavlov and Wachter (2009 a, 2009b) identifies this procyclical impact through the overcoming of the constraint and increased value of the put option with nonrecourse debt. See also Kyotaki and Moore 1997 which develops a credit cycle model of non-recourse debt to show the dynamic interaction between credit limits and asset prices and persistent fluctuations in output and asset prices.

HOW IS THIS TO BE AVOIDED?

The lesson appears to be that as long as credit is being extended by entities with a short-run view to maximizing profits and with the power and financial incentive to do so, even if mispriced for ultimate risks, they will do so. This clearly includes “too big to fail” entities which use demand deposit insured funds or other “protected” borrowing sources to garner short-term profits and market share (McCoy et al., 2008). The credit induced asset bubble covers up the deterioration in credit standards with the result of an extended period in which the bubble continues to form and in which the credit risk underpricing becomes more severe.

The symptom that identifies a credit induced asset bubble is the correlated easing of credit observed with non-fundamentally derived asset price inflation. Regulation and prudential supervision can limit bubbles in property markets that are the result of pro-cyclical deterioration in underwriting standards. In analyzing the Asian Financial Crisis, we present evidence that countries experienced a more moderate property crash where underpricing of credit was kept under control by prudential supervision of the regulatory authorities (Koh, et al. 2004). In particular, we show that the Monetary Authority of Hong Kong did accomplish this. Thus it is quite appropriate that this conference on property markets and finance is held at the Hong Kong Monetary Authority.

In order to take action to avoid property market bubbles induced by pro-cyclical erosion in credit standards it is necessary to observe that this is occurring. Without market indicators and understanding of this phenomenon, regulators will not be prompted to take appropriate prudential action. There is now an emerging consensus that balance sheets of banks and large non-bank entities must be kept well capitalized. But how is it to be known that capital that includes value deriving from property is sufficient?

In much cited work, Bernanke and Gertler (1999, 2002) discount the utility of inflation targeting to contain asset bubbles. But Cecchetti et al. (2000) show the utility of containing asset bubbles, if they entail liquidity crises. It is an open question as to the instrument that should be used to contain a credit induced asset bubble.⁴ The mechanism implemented must address the question of the potential sufficiency of the underlying value of the collateral, since this is the direct risk induced by the artificially inflated asset prices. When there is a heightened risk that an underpriced credit induced asset bubble is occurring, consideration should be given to instituting “speed bumps” that would require higher minimum capital reserves. But in order to observe the correlation of these risks, we first need to observe, measure, and track asset pricing and also the pricing and terms of financing. To quote Chairman Bernanke, “The events of the past year or two have highlighted regulatory gaps and deficiencies that we must address... As we recover from the current crisis, it will be important to address

⁴ The focus has been on the use of interest rates, although the literature suggests moves in contrary directions, see Cecchetti et al. (2000) and Faia and Monacelli (2007). It is an open question which instrument should be used but the central bank’s ability to use interest rates as a tool to contain inflation should not be compromised.

these issues as soon as possible, to develop a regulatory structure that will better respond to future economic challenges.” (*Wall Street Journal*, October 14, 2008) There is much work to be done.

Many of the academicians at this conference are advancing this work. I wish you well going forward in this important research.

Bibliography

- Abraham, Jesse M.; Andrey Pavlov; & Susan M. Wachter (2008), *Explaining the United States' Uniquely Bad Housing Market*, XII WHARTON REAL ESTATE REV., 24-41.
- Allen, Franklin and Douglas Gale (2000), "Bubbles and Crises," *Economic Journal*, 110 (460), 236-55.
- Bernanke, Ben and M. Gertler (1999), "Monetary Policy and Asset Price Volatility," *Federal Reserve Bank of Kansas City Economic Review*, 4th Quarter, 17-53.
- Bernanke, Ben and Mark Gertler (2002), "Should Central Banks Respond to Movements in Asset Prices?" *AER Papers and Proceedings* 2002.
- Bostic, Raphael; ; Souphala Chomsisengphet; Kathleen C. Engel; Patricia A. McCoy; Anthony Pennington-Cross & Susan M. Wachter (2009), *Mortgage Product Substitution and State Anti-Predatory Lending Laws: Better Loans and Better Borrowers?* Working Paper.
- Bostic, Raphael; Kathleen C. Engel; Patricia A. McCoy; Anthony Pennington-Cross & Susan M. Wachter (2000), *State and Local Anti-Predatory Lending Laws: The Effect of Legal Enforcement Mechanisms*, 60 J. ECON. & BUS. 47-66.
- Cecchetti, Stephen, Hans Genberg, John Lipsky, and Sushil Wadhvani (2000), *Asset Prices and Central Bank Policy*. London, International Center for Monetary and Banking Studies, 2000.
- Faia, Ester and Tommaso Monacelli (2007), "Optimal Interest Rate Rules, Asset Prices and Credit Frictions," *Journal of Economic Dynamics and Control*, 31(10), October 2007, 3228-3254
- Green, Richard K. & Susan M. Wachter (2007), *The Housing Finance Revolution*, 31st Economic Policy Symposium: Housing, Housing Finance, & Monetary Policy, Jackson Hole, Wyoming, Federal Bank of Kansas City, August 2007.
- Green, Richard K; Robert Mariano; Andrey Pavlov; & Susan M. Wachter (2007), *Misaligned Incentives and Mortgage Lending in Asia*, National Bureau of Economic Research Working Paper.
- Green, Richard K & Susan M. Wachter (2005), *The American Mortgage in Historical and International Context*, *JOURNAL OF ECONOMIC PERSPECTIVES* Vol. 19, No. 4, 93-114, Fall 2005.
- Herring, Richard & Susan M. Wachter (1999), *Real Estate Booms and Banking Busts: An International Perspective*. Group of Thirty, Washington, D.C..
- Iacoviello, Matteo (2005), "House prices, Borrowing Constraints and Monetary policy in the Business Cycle," *American Economic Review*, 95(3), 739-764.
- Kiyotaki N. and J. Moore (1997), "Credit Cycles," *Journal of Political Economy*, 105(2), 211-48.

Koh, Winston T. H. ; Roberto S. Mariano, Andrey D. Pavlov & Susan M. Wachter (2004), Bank Lending and Real Estate in Asia: Market Optimism and Asset Bubbles, *Journal of Asian Economics*, Vol. 15.6, November-December, 2004, 1103-1118.

Leung, Charles (2004) "Macroeconomics and Housing: a review of the literature," *Journal of Housing Economics*, 13, 249-267.

McCoy, Patricia A.; Andrey D. Pavlov; and Susan M. Wachter (2009), *Systemic Risk Through Securitization: The Result of Deregulation and Regulatory Failure* Connecticut Law Review, 41, 493-541.

Mishkin, Frederic S. (2007), "Housing and the Monetary Transmission Mechanism," NBER Working Paper Series, 13518.

Pavlov, Andrey D.; Zoltan Poznar; & Susan M. Wachter (2008), *Subprime Lending and Real Estate Markets*, in MORTGAGE AND REAL ESTATE FINANCE (Risk Books, 2008).

Pavlov, Andrey & Susan M. Wachter (2006), *The Inevitability of Market-Wide Underpricing of Mortgage Default Risk*, 34 REAL ESTATE ECON., 479-496.

Pavlov, Andrey D. & Susan M. Wachter (2008), *Mortgage Put Options and Real Estate Markets*, 38 J. REAL ESTATE FINAN. & ECON. 145, 89-103, January 2009.

Pavlov, Andrey D. & Susan M. Wachter (2009a), *Subprime Lending and House Price Volatility* Working Paper.

Pavlov, Andrey D. & Susan M. Wachter (2009b), *Systemic Risk and Market Institutions* Yale Journal on Regulation, Forthcoming.

Zandi, Mark (2009). "The Economic Impact of the American Recovery and Reinvestment Act." Moody's Economy.com. 21 Jan. 2009.