

## **The Development and Evolution of the Subprime Mortgage Crisis**

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## **ABSTRACT**

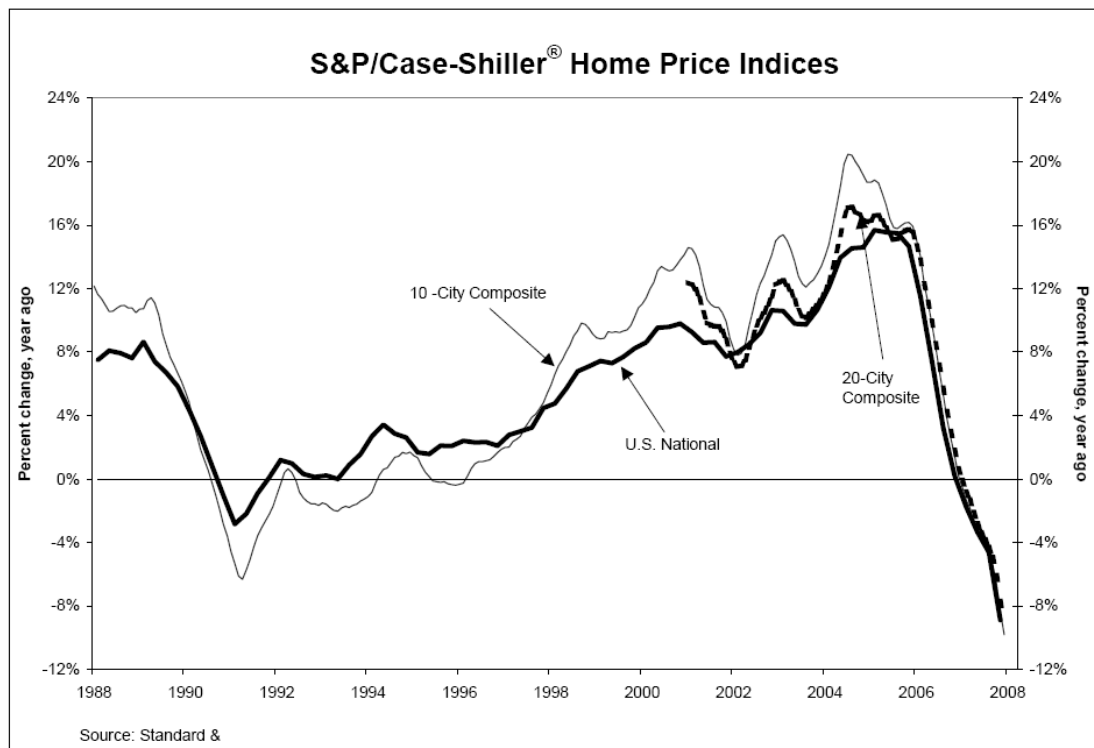
### **The Development and Evolution of the Subprime Mortgage Crisis**

Speculative bubbles are not new to finance and yet each time they occur, the general realization that they exist arrives belatedly. An information cascade associated with rising home prices fed by low interest mortgage and securitization created a feedback loop that led to an overextension of credit. The information cascade reversed when supply overtook demand and prices began slipping. Borrowers exercised put options rather than continue making payments on mortgages worth more than their homes. Proposed solutions to date have not adequately addressed the problem.

## Introduction

As the US economy recovered from the high tech stock bubble that peaked in 2000, capital moved to another sector of the economy; housing. Prices rose sharply with a brief pause in 2002 before moving further upward (Figure 1). Housing became more than a place to live. It was also an investment; an investment that could appreciate as rapidly as the stock market.

Figure 1



Source: [http://www2.standardandpoors.com/spf/pdf/index/CSHomePrice\\_Release\\_022603.pdf](http://www2.standardandpoors.com/spf/pdf/index/CSHomePrice_Release_022603.pdf)

Prospective buyers observed rising prices and saw that others were willing to pay those prices. Not only does that signal to prospective buyers that it is opportune to buy a rapidly appreciating asset but also that their own ability to qualify for mortgage approval was declining with each successive increase. Adding to the positive buy signals were appraisers pressured to justify ever higher home prices in order to complete mortgage loan transactions (Bajaj 2008). “Expert” signals of appraisers verifying that prices were reasonable provided feedback and resulted in more rising prices. New price levels were in turn reinforced by relaxed loan standards providing less qualified borrowers the means to buy homes. An information cascade was building propelling ever more prospective homeowners as well as speculators to buy houses. In a typical information cascade (Bikchanandani et al 1998), market participants are drawn to make decisions based on observations that may or may not be correctly conveying underlying valuation. In

extreme cases, market bubbles can occur. History is rife with examples of market bubbles that have resulted from information cascades (MacKay 1996). It is always difficult for participants involved to realize what is going on and if they do, many believe they can profitably extract themselves and turn a profit before the inevitable collapse.

Fueling the run-up in housing prices was the willingness of lenders to fund mortgages. That willingness was a function of the changing mortgage marketplace. What had been a business dominated by small lenders, most recently savings and loan institutions, was being transformed by the larger role of specialized mortgage lenders who instead of financing and retaining loans, took advantage of securitization. Securitization bundled mortgages into marketable assets. Investment bankers created new and more difficult to value investment vehicles including collateralized debt obligations (CDOs). CDOs divided the mortgages into risk classes and then sold sectors (tranches) of the bundled debt to investors. Valuation of the CDO is based on the probability of default of each underlying loan and the correlation between those default probabilities. These estimates of default likelihood and particularly low assumed correlations proved to be erroneous.

Underpinning the ability to sell mortgages in the secondary market was the ever rising price of housing. Lenders or later those who ended up owning CDOs had the house as collateral and with rising prices, it appeared that risk was minimal even when some of the mortgages had zero down payment.

The finishing touch to enhance CDO marketability was provided by bond rating agencies such as Moody's or Fitch Ratings (Pleven et al 2008) which frequently gave A ratings. It appears that some investment banks may not have been as forthcoming about the quality of the underlying mortgages when they sought ratings (Kelly et al 2008) but sorting that out will be a long-term legal process such as the litigation begun by NY state attorney general Andrew Cuomo. The investment grade ratings helped fuel the market with cash infusions providing capital for more loans further pushing up housing prices. Also contributing to those high ratings were mortgage insurers such as Ambac, which provided insurance for the bonds at low rates without fully understanding the risks. George Soros: "Securitization had the effect of transferring risk from people who are supposed to know risk and know the borrowers to people who don't" (Guha and Tett 2008). There was no shortage of buyers for CDOs although underlying mortgages were often subprime adjustable mortgages with little or no down payment and without documentation. Risky borrowers were less of an issue as long as prices continued to go up. Equity would cover the risk.

### **Historical Perspective**

In the past a minimum of 25-30% of income was required to support monthly loan payments, taxes and insurance or applications were denied. Down payments of 20% were common as a cushion to assure home buyers had sufficient equity in the house. Median incomes were not keeping pace with rising prices making the old qualification formulas seem exclusionary. A steady movement toward loosening credit terms began to include more borrowers who previously would have been rejected because of insufficient income or poor credit. With securitization, lenders had the ability to pass the risk of loans on to investors. Adjustable rate mortgages with teaser rates, i.e., interest rates initially well

below market rates brought buyers into the market who otherwise would not qualify. Sometimes teaser rates were so low that provisions were included for negative amortization that increased principal owed instead of reducing it with each payment. Teaser rates adjusted quickly, sometimes months after mortgage origination, resulting in steep monthly payment increases.

Subprime loan originations rose from less than 5% of mortgages in 1996 to 20% in 2006 (Weicher 2007). Loan to value ratios also rose from below 70% in 1996 to 90% in 2006 reflecting the laissez faire attitude toward down payments. Unscrupulous lenders such as Fremont Investment and Loan that specialized in “pulse products” that included teaser rates and 100% financing thrived (Blanton 2008). The information cascade became explosive as more speculators rushed to make quick profits by flipping homes and home buyers panicked rushing to make their purchases before they might be closed out of home ownership by escalating prices.

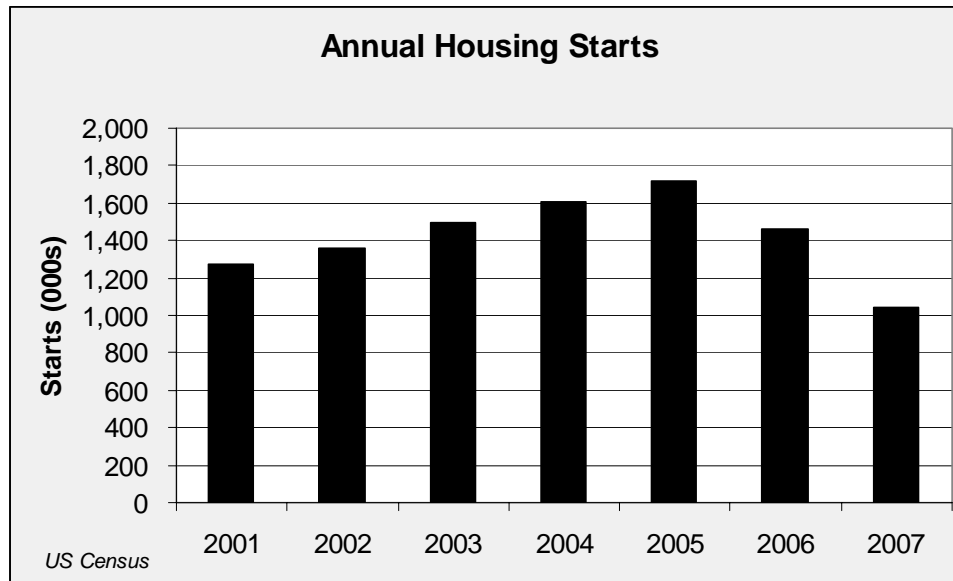
Higher commissions to mortgage brokers for subprime loans, 1.88% versus 1.48% on conforming loans, motivated more aggressive marketing (Brooks and Simon 2007). Mortgage lenders securitized everything, mixing lower risk with higher risk mortgages. The appetite for repackaged loans as CDOs in the secondary market increased as dealers made large profits.

In the past home owners dedicated their income to first making mortgage payments in times of cash shortages. Historical experience would not be a good predictor of subprime borrower behavior since these borrowers previously constituted a small minority mortgage holders. When mortgages required significant down payments, buyers had equity in their homes and would be less likely to miss payments.

### **Signs of Trouble**

Some of new homeowners were beginning to run into trouble. A few subprime borrowers missed payments quickly but most late payments arose when considerably higher adjusted payments kicked in. These defaulting borrowers sought a way out of economically impossible debt obligations by putting their homes up for sale. Speculators who were quickly flipping homes added to supply as did home builders. Builders had begun projects without locked in buyers when demand was high were bringing new houses online as demand began flagging. Housing starts had been rising steadily, peaking in 2005 (Figure 2).

**Figure 2**



Information on the ballooning housing supply was beginning to reach buyers. Borrowers were either defaulting more often and/or beginning to walk away from their loans. Foreclosures were starting to attract the attention of the media. The information cascade that had driven up home prices was about to reverse course. A small decrease in home values coupled with high and rising mortgage payments as adjustable rates kicked in led to more late payments in a vicious cycle. Predictions that borrowers would honor home payments first proved wrong under these new market conditions (Financial Times Feb 1, 2008).

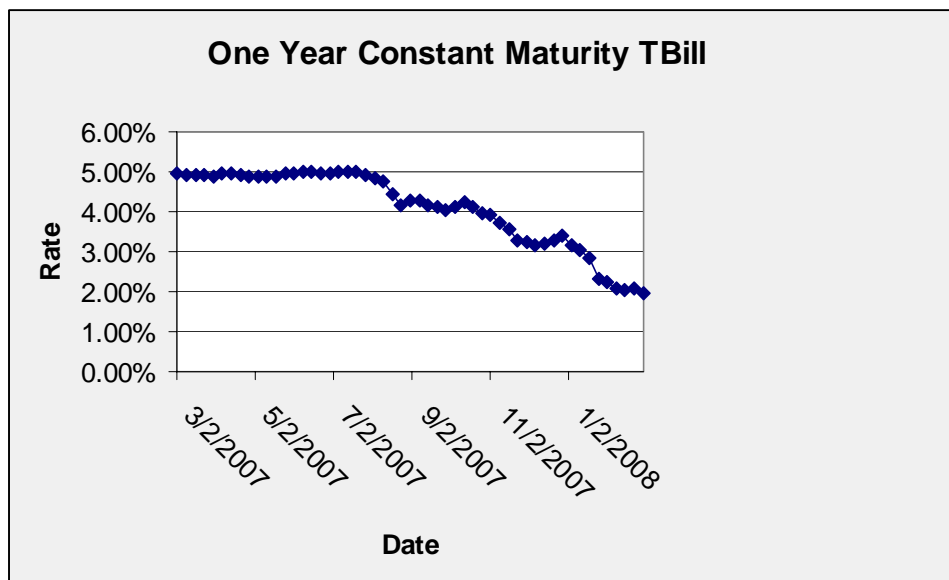
Option pricing explains a good portion of the willingness of borrowers to put off paying mortgages. Mortgagees have a put on the value of the home (Kau and Kim 1994, Gelinias 2008). The lower the down payment, in many cases no down payment, the more quickly the put is in the money as housing prices decline below mortgage debt. Lenders did not properly factor the value of the put they gave away with their mortgages possibly because the availability of securitization made those puts someone else's problem. The "new" information home owners were receiving was that it was okay to walk away from loans in which the house price had fallen below the mortgage. Arizona and California went so far as to specifically prohibit mortgage lenders from pursuing defaulted mortgagees while elsewhere the media had vilified lenders to such an extent that they had little incentive to seek recourse from defaulted borrowers (Gelinias 2008). With the vanishing threat of impaired credit the last impediment to default, more borrowers walked away from their obligations. Further downward pressure on housing prices pushed the information cascade in the opposite direction sending home prices sliding as can be seen in the precipitous drop subsequent to 2006 (Figure 1).

It was no surprise that subprime mortgages were defaulting earlier with bigger losses since the loan to value ratio was the best predictor of default (Capozza and Thomson 2006). When loans were worth more than homes, ignoring the monthly mortgage was a easy decision. Home owners did not always simply move out. They could remain in their houses effectively payment free while mortgage lenders started

foreclosure proceedings. For those holding securities on the defaulting instruments, lack of payments dropped valuations precipitously. The market for defaulted mortgage instruments was specialized and shrinking. Defaulted debts could have value at some future date if underlying assets, homes, were sold but few investors were interested in taking that risk. From the mortgagee's perspective, when a foreclosed home is sold the difference between the sale price and the value of the loan was taxable as a forgiven debt. A mortgagee owing \$200,000 with a foreclosed home that eventually sold for \$150,000 would be liable for taxes on debt forgiveness of \$50,000. The few mortgagees with knowledge of such a taxable situation may have hesitated to default. Effective December 2007 Congress with the president's signature eliminated any hesitation with HR 3648. This law ended taxable gains from forgiven debt on the sale of foreclosed homes. A penalty for homeowners exercising their mortgage put options was eliminated.

As problem loans surfaced, credit was effected. Mortgage originators could not replenish capital even as the secondary market for their mortgages dried up. Banks were reluctant to lend to other banks fearing these institutions might be holding subprime loans that would jeopardize repayment. Ben Bernanke, chief of the Federal Reserve, began cutting short term interest rates as well as making more federal funds available to banks. This policy was a balm to existing ARMs that were resetting rates against lower constant maturity Treasury Bill rates (Figure 3). Still, this did not address the problem of underwater mortgages, i.e., mortgages where loan to value ratios were above 100%.

**Figure 3**



### **Solutions?**

In early 2008 proposed solutions focused on suspending foreclosures or freezing payments for a period of time. On March 4, 2008, Bernanke suggested banks reduce principal owed by borrowers at least to the level of the value of the home. He did not offer government assistance in the write downs. Others argued that without borrowers having at least a 10% equity stake even this solution would be unlikely to succeed. Until

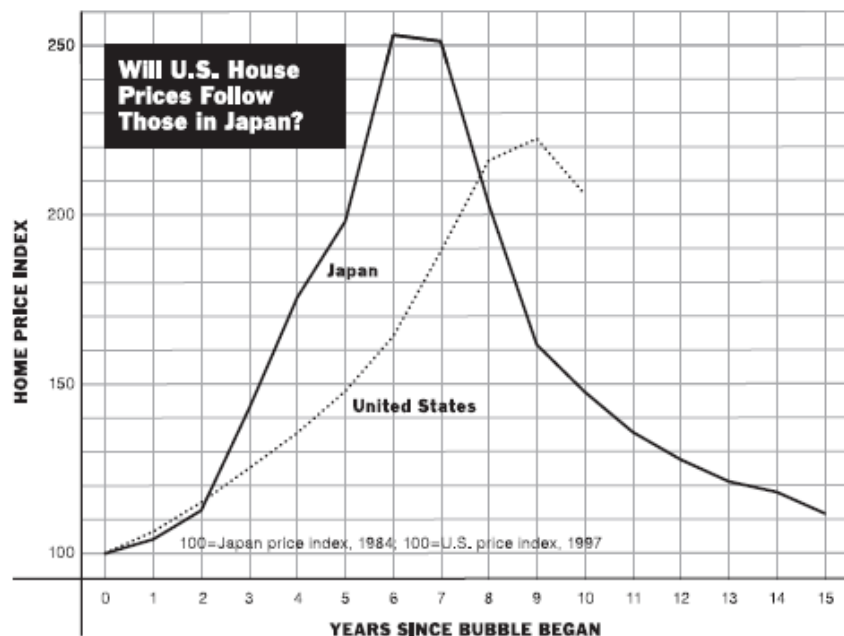
housing values improve or loans are well below home values borrowers will find it attractive to exercise puts on mortgage loans. Home owners strapped by high monthly payments could easily convince themselves that it was better to stop making those payments and staying in the house rent free until forced out or simply defaulting and becoming renters elsewhere.

The Home Owner Rescue bill that passed the House on May 8, 2008 is intended to rescue mortgagees unable to make their payments. Even if it finds sufficient support in the Senate, the president vowed to veto it. The underlying premise of the bill is that taxpayers will refinance borrowers (Wall Street Journal, May 12, 2008). The bill also requires lenders take a 15% write down of the mortgages they hold in order to be able transfer those debts to the Federal Housing Administration (FHA). There is a moral hazard for both borrowers and lenders.

### Conclusion

The Japanese had a real estate bubble of massive proportions (Figure 4) in the 1980s and 1990s. The dramatic price collapse effected the country's economy for many years. Shiller's home price index may not follow the same course Japan mapped out but it is falling and has dropped further since this chart was created. The underlying situations are not as parallel as the graph indicates but the chart does illustrate the seriousness of the situation.

Figure 4



Source: Statistics Bureau Japan, S.&P./Case-Shiller Home Price Index

What is clear is that political solutions are not easy to structure to satisfy multiple interests without creating moral hazards that could damage the housing market in new

ways. The Federal Reserve's actions seem to have headed off financial disaster but housing prices will take some time to stabilize. The nature of speculative bubbles is that they explode in information cascades with prices moving up and then down rapidly. Free markets with a dose of creativity, in this case securitization, will likely continue to create fad investing. Focusing on ways to forestall excessive market movements may provide the best antidote to future bubbles. Correcting this bubble whether legislatively or by letting the market sort it out could take years.

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