

**The 2008 Global Financial Crisis: Causes, Consequences, and Remedies**

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Inaugural Faculty Lecture, Tuesday, March 23, 2010

Pat Obi



## Abstract

This study examines the contributing factors and consequences of the 2008 global financial crisis. It points to excessive debt by households in the United States as the prime cause of the economic downturn. The study provides evidence of the imbalance between growth in household debt and disposable income in the six-year period before the mortgage crisis broke in late 2007. Together with unsustainable subprime credit, this imbalance between debt and income aggravated the massive delinquencies that led to the eventual collapse of the housing market. The extensive use of Wall Street-engineered financial *derivatives*, such as *collateralized debt obligations*, led to the crisis spreading globally. Billions of dollars from around the world poured into the US housing market through the sale of these financial products. There is empirical evidence that although the credit market showed signs of the impending crisis, the stock market failed to take this risk into account. As a result, investors suffered greatly. This disconnect between the credit and equity markets occurred in the same period that the imbalance between household debt and income existed. Proposed remedies include changing financial regulations to encourage a risk-based assessment of bank portfolios as well as borrowers' debt capacity.

## 1. Introduction

The 2008 global financial crisis was preceded by an unprecedented run-up in the price of homes in the United States. Federal Reserve data show that in the 10-year period ending in 2006, the median home price in the US doubled to a record \$263,000. The rapid rise in home prices was in part fueled by exceedingly low mortgage interest rates and liberal credit terms. At the peak of the housing bubble in the first quarter of 2007, it was possible in many parts of the country to obtain an adjustable rate mortgage for as low as two percent. Additionally, creative loan terms that included little or no upfront equity, subprime mortgage origination, loans with negative amortization, and the abundance of low cost variable interest rate loans encouraged an unparalleled demand for home loans and a consequent escalation in the price of homes.

The consensus view is that the problems with subprime mortgage were masked by the rapid pace of home price appreciation, in particular between 2001 and 2007. The widely-held notion that home prices would always rise dampened fears of the eventual delinquencies that would soon occur in the housing market. Many of the delinquencies in 2007 and 2008 were due to subprime mortgage loans. Most of these mortgages were financed with adjustable rate mortgages, which enticed many borrowers with initially very low interest rates on high loan-to-value ratios. These are loans where the homeowner borrowed more than 90 percent of the value of the home. Unfortunately, the incomes of those who originated subprime mortgages were often tied to loan volume rather than the credit worthiness of the borrower. Many

originators, therefore, were induced to focus on the quantity rather than the quality of the mortgages they sold. And because subprime loans were frequently packaged into difficult-to-understand investments, the resulting losses spread throughout the financial system.

While subprime lending was the ostensible cause of the crisis, excessive borrowing by individuals was arguably the leading cause. The level of consumer credit grew rapidly in the 1990s and 2000s, from a low of only \$15 billion in 1990 to annual levels exceeding \$130 billion in 2007. But the more serious problem was home mortgage borrowing. According to the Federal Reserve Flow of Funds Accounts, loans for home purchases grew to more than \$1 trillion over the same period, with outstanding mortgage debt approaching \$14 trillion, a level that nearly matched the gross domestic product of the United States in 2008!

If mortgage interest rates were low, as was the case between 1990 and 2008, the demand for home loans would generally rise. This occurs, especially, if borrowers expected a steady stream of income and/or a continued rise in the value of their properties. Under such conditions, the demand for mortgages would typically rise, but only to the extent of the available credit that banks are able to provide. If funds were limited, then banks would tend to ration credit either by increasing their lending rates or by tightening lending standards. Neither of these conditions occurred in the period leading to the crisis. Throughout the 1990s and 2000s, loanable funds were plentiful. There was an abundance of credit, made possible by various Wall Street-engineered *derivatives* (these are financial products whose values *derive* from the price of the underlying properties). In addition to traditional mortgage-backed securities packaged mostly by Fannie Mae and Freddie Mac, financial experts on Wall Street created *collateralized debt obligations* of sorts. These are bonds that are *collateralized* by the interest payments and principal repayments from the underlying loans.

Mortgage-backed securities (MBS) and collateralized debt obligations (CDO) were traded extensively just before the crisis erupted in 2007. Specific to the housing market were collateralized mortgage obligations (CMO) which were sold to attract additional loanable funds to the mortgage market. To manage the risk of loan default, credit default swaps (CDS) were created under the Commodity Futures Modernization Act of 2000. A CDS is a type of insurance that protects the lender against loan default. The seller of the CDS (the insurer) pays the lender (the bank) if the borrower (the homeowner) defaults on the loan. Under all but unusual circumstances, an instrument like a CDS should provide risk protection for the lender and a meaningful source of income to the seller. Ironically, the unregulated use of this derivative aggravated the financial crisis because unlike conventional insurance, the insurer was not required to maintain loss reserves to deal with possible claims. As the crisis unraveled, many mortgage and community banks were adversely affected when loans made to individuals and small businesses became delinquent. At the same time, investment banks, such as Lehman Brothers and Merrill Lynch, collapsed due to their over-exposure to failed credit derivatives.

The run-up in home prices also encouraged the entry of speculators into the housing market. The activities of these individuals who buy and re-sell properties in short order added to the exuberance of the market. At the same time, the commission-based loan origination business

encouraged many a loan officer to tout high risk mortgages at the expense of prudence. Their commissions were based on the volume of loans they sold without regard to loan quality. In the end, because growth in household income failed to keep pace with rising personal debt, the ability of many borrowers – especially subprime borrowers – to stay current in their mortgage payments was compromised. This led to widespread delinquencies and the inevitable rise in foreclosures as a result of which, home prices began to fall. This event began in the second quarter of 2007. And because home prices fell below outstanding mortgage balances, banks were unable to recover much of their principal, a condition that led to an industry-wide credit crunch and ultimately, the global financial crisis.

This study continues with a review of the topical literature on the financial crisis. It is followed by a detailed examination of the mortgage crisis and the collapse of the housing market in 2007. A description of the financial derivatives that inflamed the crisis is presented as a precursor to an empirical study on the wealth effects of the crisis. The empirical analysis also examines the interrelationships between stock market valuation and the risk indicators that often precede economic downturns. These indicators are measures of credit and market risks. The final section discusses some recommendations for staving off similar crises in the future.

## **2. Literature**

Virtually all the studies and commentaries on the financial crisis deal primarily with factors believed to have caused it. In some cases, the arguments are quite declarative. For example, Taylor (2008) blames the abundance of credit as the chief cause of the crisis. He finds that the Federal Reserve's unusually low interest rate policy in the late 1990s and 2000s was responsible for accelerating the housing boom and ultimately, the collapse that followed. According to Posner (2008), the movement to deregulate the financial services industry went too far "by exaggerating the resilience – the self-healing powers – of laissez-faire capitalism." He argues that the myopia and passivity of successive governments played a major role in allowing the economic recession to deepen.

Dell'Ariccia et al (2008) also blame the credit boom for the sharp increase in delinquency rates. They present evidence which shows that most major banking crises occurred in periods of extremely fast credit. At such times, loan delinquency rates tend to rise with the volume of loan origination. They, therefore, conclude that economic booms associated with fast rising real estate prices were more likely to lead to a financial crisis. This view was also expressed on March 7, 2001 by former Federal Reserve Chairman, Alan Greenspan, who, in a speech to the Independent Community Bankers of America pointed to "an unfortunate tendency among bankers to lend aggressively at the peak of a cycle," which is when most bad loans were made.

Barajas et al (2007) discuss the effects of monetary excesses but find that while most major banking crises in the US have occurred in periods of credit boom, not all credit booms are followed by banking crises. In their study, they show that only about 20 percent of boom periods have ended in a crisis. On the flip side, as much as half of the banking crises they

studied were preceded by lending booms. Additionally, Dell’Aricia et al (2008:2) find that larger and longer-lasting booms, as well as those coinciding with higher inflation and lower growth, were more likely to result in a financial crisis.

Demyanyk and Van Hemert (2008) blame Wall Street for the massive delinquencies. Their study shows that the so-called experts who constructed the financial derivatives that brought in much cash into the housing market were aware that loan quality had deteriorated well before the crisis flared up in 2007. In support of Barajas et al (2007) and Dell’Aricia et al (2008:1), they show that the rise and fall of the subprime mortgage market is consistent with a classic lending boom-bust scenario in which unsustainable growth in credit expansion leads to the collapse of the financial markets. Similar findings are made by Enoch and Ötoker-Robe (2009) in an examination of the effects of credit growth in Europe over the same period.

In an empirical examination of factors contributing to the rise in mortgage defaults, Mayer et al (2009) find that declines in home prices and poor underwriting standards were preeminent. Poor standards included increase in loan-to-value ratios and the share of mortgages with little or no documentation of income. Interestingly, their study also shows that the abundance of interest-only loans and teaser interest rates did not appear to have materially contributed to the widespread defaults, in part because borrowers could easily refinance into different mortgages.

Ho and Cross (2007) find that although no less than 23 states had enacted anti-predatory lending laws by 2004, these laws proved ineffectual because they were not strictly enforced. Bernanke (2008) finds that tying the incomes of subprime mortgage originators to loan volume rather than the quality of the underlying loans encouraged predatory and high risk lending. He also identifies the loosening of credit standards and poor risk-management by banks as additional factors that contributed to the financial turmoil.

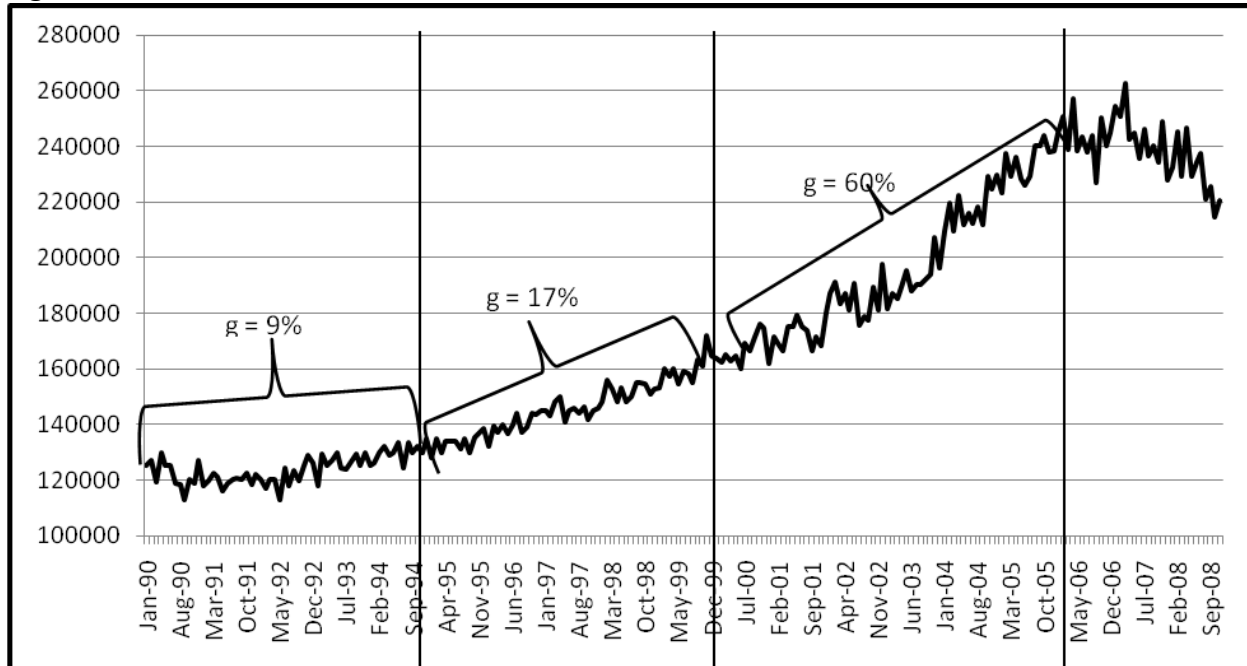
Finally, Rogers (2008) takes a more macroeconomic view and blames the rapid development of free market globalization for the eventual economic recession that followed the financial debacle. He argues that globalization produced two conflicting results. The first, a benefit, is a boost in economic growth. The second, a detriment, is a deepening wealth-poverty gap. To combat the latter, the US government encouraged subprime credit which, although was well intentioned, resulted in the transnational banking and economic crisis that followed.

These previous studies deal with either the regulatory pitfalls or the supply-side problems that contributed to the financial crisis. This particular study focuses on the flawed decisions made by consumers and investors. Arguably, a more prudent consumer and a more vigilant investor would probably have staved off the predatory conduct of lenders and therefore, avoided the crisis. This study identifies the disconnect that existed before the crisis between personal income and household debt as the key factor that led to the mortgage debacle. It also provides empirical evidence, which shows that the stock market failed to take into account the rising default risk that should have served as signal for the impending disaster.

### 3. The Housing Bubble

According to Federal Reserve data summarized in [Figure 1](#), the median home price rose by nine percent from 1990 to 1995 and by 17 percent from 1995 to 2000. The growth rate became dramatic between 2000 and 2006 when home prices rose by a whopping 60 percent. As the data show, the price of homes in the United States almost doubled from 1995 to 2006.

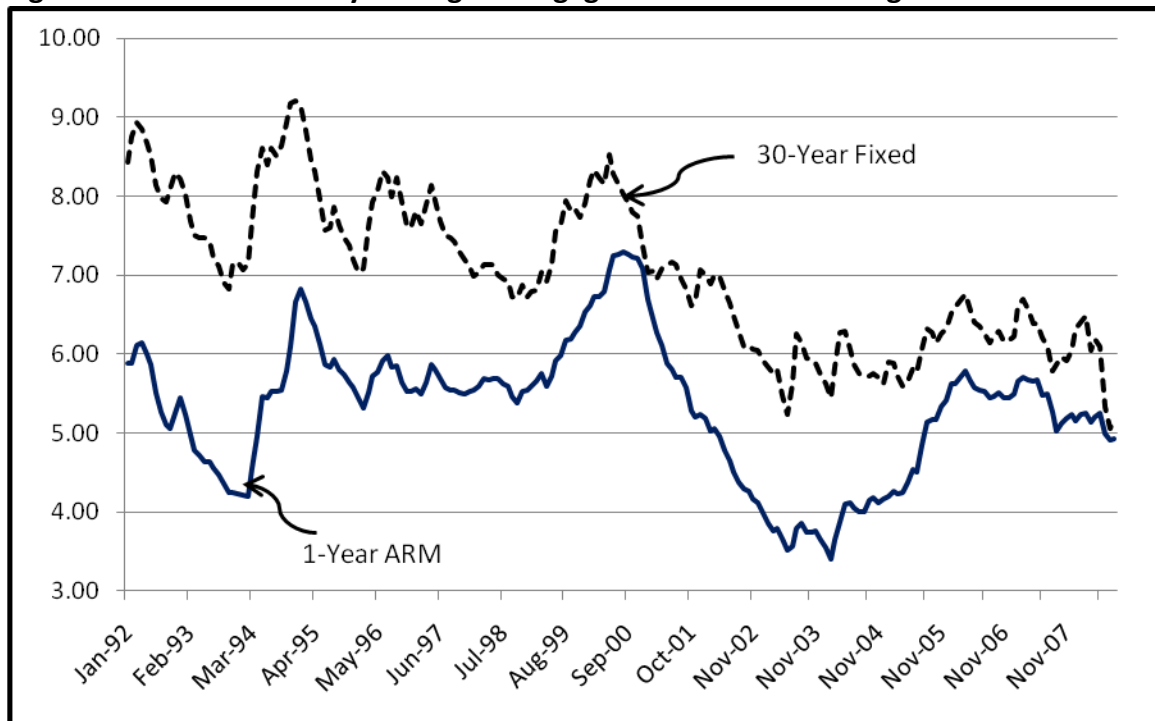
**Figure 1. Median U.S. Home Price: 1990-2008**



Source: Federal Reserve

Rising home demand, enabled by cheap and easy credit, was one reason for home price inflation. According to the Federal Home Loan Mortgage Corp (Freddie Mac), the national average mortgage rate on 30-year fixed rate loans between 2000 and 2009 was less than 6 percent even for non-conventional loans. For a while, the average rate on one-year adjustable rate mortgages (ARM) on 30-year loans dipped to less than 3.5 percent. These historic low interest rates were attractive enough even for many individuals with little or no equity to wade into the frenzy of home buying. As shown in [Figure 2](#), the spread between fixed and adjustable rate mortgages was at a maximum between 2002 and 2006. Many borrowers, especially those with subprime credit rating, thought it wise therefore to take out ARMs.

**Figure 2. National Monthly Average Mortgage Rates on Conforming Loans**



Source: Federal Home Loan Mortgage Corporation (Freddie Mac)

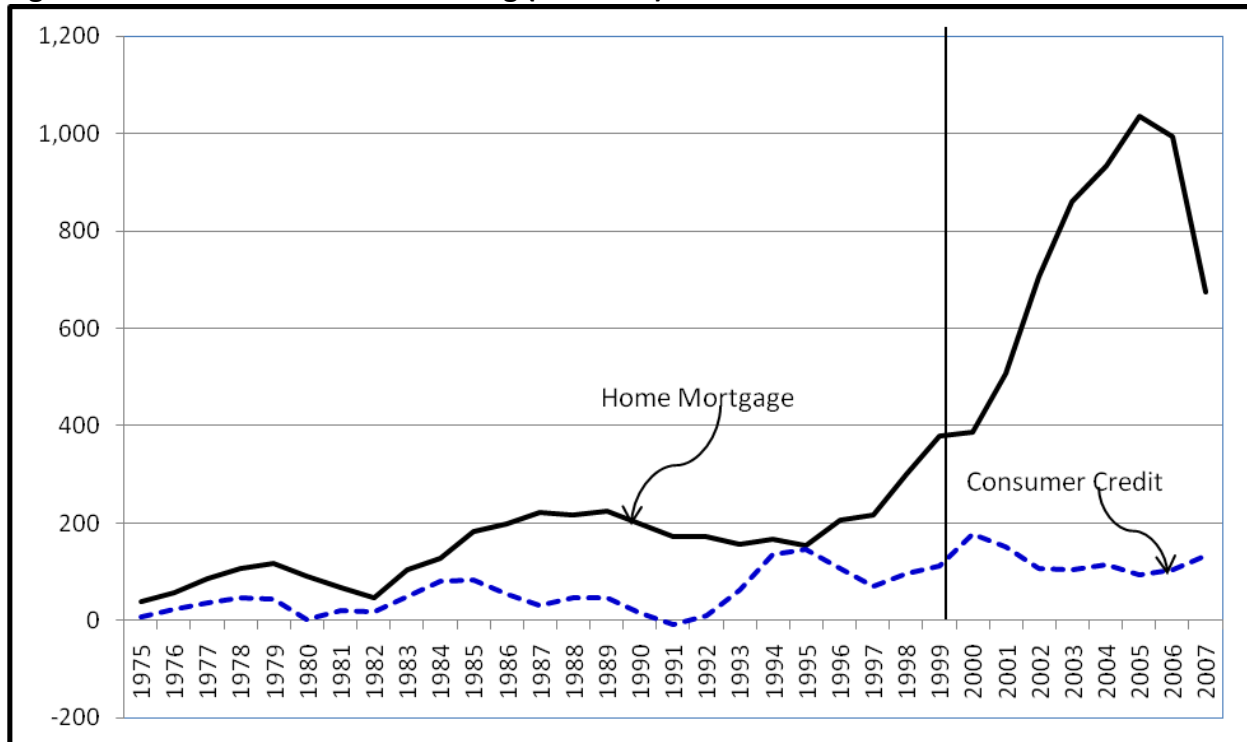
The rush to buy homes, encouraged by attractive interest rates and liberal lending terms, meant that home prices would rise to keep pace with rising demand. Of note is that the commission incentive and the lax regulation of mortgage loan origination, pushed mortgage brokers and loan officers to tout creative loan terms in order to cash in on the buying spree. Such innovative loan terms as interest-only mortgages, negative amortization, zero-to-low down payments, and the concept of 'bad credit, no credit, no problem' persuaded many unsuspecting borrowers to over-extend themselves in personal debt.

Speculators also found fertile ground in the real estate boom. The attractive mortgage terms also meant that opportunists could easily borrow cheaply, buy property and re-sell it in short order for a sizeable gain. For these *home flippers* as they were called, the odds of selling at a profit were very high due to the steady rise in property values. All of this created a cycle of buy and sell; more buying than selling, which accounted for the steady run-up in the price of homes. For these sky high prices to be sustained and not become a bubble, one of two conditions needed to prevail. One is that income growth would have to keep pace with the cost of credit to ensure that borrowers were able to make their mortgage payments in a timely manner. The other is that the market value of the property with which the loan is financed would have to keep rising in order to ensure that even if mortgage payments were not made, the collateral value (that is, the market value of that property) was greater than the mortgage balance. Unfortunately, neither of these two conditions prevailed.

### 3.1. Rising Household Borrowing

According to the Federal Reserve's Flow of Funds Accounts published in the third quarter of 2008, both consumer credit and home mortgage loans rose astronomically in the eight-year period ending in 2008. During this period, the average consumer credit rose by more than 180 percent while mortgage borrowing grew by a jaw-dropping 415 percent. The big problem, as shown in Figure 3, was home mortgage. From the mid 1990s to the peak of the housing bubble in 2006, home mortgage borrowings rose from \$300 billion to about \$1.2 trillion. The Federal Reserve also reported that more than half of the loans were created from derivatives, which included collateralized mortgage obligations (CMOs) and various mortgage-backed securities (MBS). About half of the MBS was sold by Fannie Mae and Freddie Mac.

**Figure 3. Annual Household Borrowing (billions \$)**



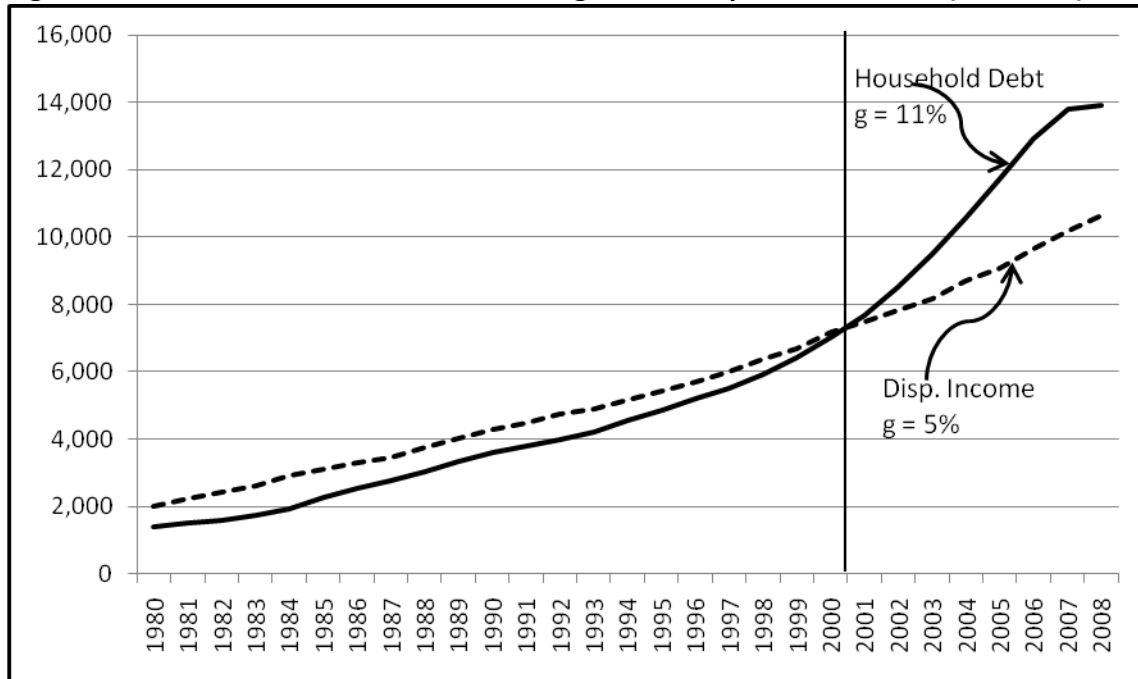
Source: Federal Reserve, Flow of Funds Accounts

### 3.2. Rising Household Debt

For many years, Americans had believed that home prices could only go up. Using leverage to purchase property was not considered unreasonable, based on that expectation. Even if the home was foreclosed due to the borrower's incapacity to service the debt, banks were usually able to recover at least the principal balance from the foreclosure sale. Unfortunately, in the six-year period ending in 2006, growth in personal disposable income – from which personal debt is serviced – failed to keep pace with growth in household debt (Figure 4). The annual compound growth rate of personal disposable income during this period was five percent while personal debt grew at a staggering 11 percent. With dwindling income to support the massive debt, the 60 percent home price appreciation during this period readily became a bubble.



**Figure 4. Total Household Debt Outstanding versus Disposable Income (billions \$)**



Sources: Bureau of Economic Analysis (income); Federal Reserve Flow of Funds (household debt)

Separately, the very low adjustable rate mortgages enticed many borrowers to choose variable rate loans over fixed. More often than not, ARMs are repriced at a much higher interest rate. For many subprime mortgage holders, the new adjustable rate was unaffordable. While ARMs accounted for more than 62 percent of all foreclosures in the third quarter of 2007, subprime loans of all types were responsible for over half of all foreclosures, as summarized in [Table 1](#).

**Table 1. Foreclosure Rate as of 3<sup>rd</sup> Quarter 2007**

	% Loans Outstanding	% Foreclosures
<b>Prime Fixed</b>	63.1%	17.6%
<b>Prime ARM</b>	14.5%	18.7%
<b>Subprime Fixed</b>	6.3%	12.0%
<b>Subprime ARM</b>	6.8%	43.0%
<b>FHA &amp; VA</b>	9.3%	8.7%

Source: Mortgage Bankers Association, National Delinquency Survey December 6, 2007

#### 4. The Financial Derivatives that Inflamed the Crisis

##### 4.1. Mortgage-Backed Securities

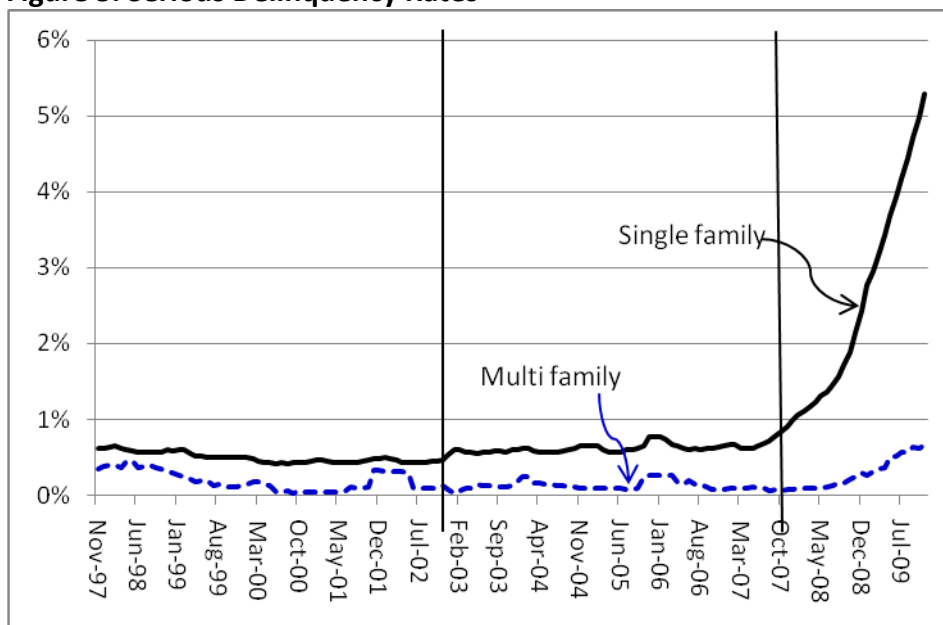
At the height of the housing bubble, there was an extensive trading of mortgage bonds that were secured by the underlying properties. These mortgage-backed securities (MBS) were created and traded mostly by two stockholder-owned government agencies: Federal National Mortgage Association (or Fannie Mae) and Federal Home Loan Corporation (or Freddie Mac).

Because these enterprises are government-sponsored, the mortgage-backed securities they sell are backed by the full faith and credit of the US government. Securities, such as these, are considered *derivatives* because they derive their values from the market prices of the underlying mortgages. As the market price of the homes with which they are financed falls, the price of these securities also falls.

The availability of subprime mortgage loans gained momentum from the mid 1990s when both Fannie Mae and Freddie Mac expanded their asset holdings to include high risk MBS. Three pivotal regulations in the 1990s influenced this expansion. In 1992, the Federal Housing Enterprises Financial Safety and Soundness Act required Fannie Mae and Freddie Mac to devote a percentage of their lending to support affordable housing by expanding their pooling and selling of mortgage-backed securities. In 1993, the Federal Reserve Bank of Boston published "Closing the Gap: A Guide to Equal Opportunity Lending" which recommended a series of measures to provide greater access to credit for low-income and minority households. Among other provisions, this guideline included lowering income thresholds for mortgage loans. Finally, the Community Reinvestment Act of 1995 created the basis to break down home loan data by neighborhood, income, and race. This law also paved way for Fannie Mae to receive affordable housing credit for buying subprime securities.

While these regulations were well intentioned, the massive default of subprime loans that gave rise to the mortgage crisis resulted in the collapse of Fannie Mae and Freddie Mac in 2008 and their takeover by the US government – pursuant to the guaranty provision. Figure 5 shows that throughout the 2000s, there was a remarkable increase in the rate of delinquencies on single family loans backed by Fannie Mae.

**Figure 5. Serious Delinquency Rates**



Source: Fannie Mae. "Serious Delinquency" refers to a mortgage that is 90 days or more past due.

## 4.2. Collateralized Debt Obligations

More complex derivatives were introduced by Wall Street in the 1990s and 2000s as a means to create additional loanable funds. These collateralized debt obligations (CDOs), as they are called, readily attracted willing investors from across the globe in part because they offered returns that were sometimes 2 to 3 percentage points higher than corporate bonds with the same credit rating. A variant of CDO are collateralized mortgage obligations (CMOs), which are synthetic mortgage-backed bonds that are collateralized by the interest and principal payments from the underlying mortgages.

The expectation that the US housing market would remain strong buoyed the CDO market. It did not matter that the method for constructing and rating the CDOs possessed complexity not easily understood by many, including those who traded them. The Securities Industry and Financial Markets Association (SIFMA) reported that the US market share of CDO reached 84 percent in the third quarter of 2006, which was when the housing bubble was at a maximum.

Interest and principal payments that fund CDOs are plowed into different *tranches*, each representing a specific maturity and risk class. The tranches at the top have the best credit risk rating while those at the bottom are the most likely to go into default. Accordingly, the yields for the top tranches are the lowest while those at the bottom, due to their high default risk, are the highest. According to SIFMA, \$200 billion in mezzanine CDOs were issued in 2006, with an average exposure to subprime credit of 70 percent. The massive delinquencies of the subprime mortgages also meant that the CDOs could not make interest or principal payments to their investors. As a result, the massive amount of delinquent CDOs sold around the world spurred the global contagion

## 4.3. Credit Default Swaps

In the many months before the crisis escalated in 2008, several lenders purchased credit risk insurance in the form of credit default swaps (CDS). The buyer of a CDS receives a credit protection on the default risk of a loan made to a borrower. The seller of the swap, acting as an insurer, guarantees the credit worthiness of the borrower and stands ready to honor claims in the event of default. The risk of default is therefore transferred from the lender (such as a mortgage bank) to the seller of the swap (the insurer). In this manner, the risk of default is *swapped* over to the insurer in return for a fee (the insurance premium). If the borrower becomes insolvent, the CDS buyer is compensated usually up to the face value of the loan.

The market for CDS is unregulated, thanks to the Commodities Futures Modernization Act of 2000. Many on Wall Street lobbied for this piece of legislation. The lack of oversight allowed *any* individuals to trade this derivative. Although the exact amount is unknown, it is believed that there were more than \$60 trillion in outstanding CDS transactions in 2008 – according to the International Swaps and Derivatives Association (ISDA). Most buyers of CDS actually had no financial connection with the original borrower. In reality, a CDS is a bet. You simply bought it in the hopes that the borrower will default on the loan. Unfortunately, this magnified the eventual cost of bankruptcies during the crisis since multiple claims by multiple parties were

made on the same loan default. This type of financial transaction can be likened to strangers buying insurance on your property and then pray that something bad happens to it!

Although a CDS is a type of insurance, there was no legal requirement that CDS sellers maintain reserves to cover claims. As a result, the use of credit default swaps did much to worsen the financial crisis. For example, Lehman Brothers, Bear Stearns, and the holding company of AIG sold many of these derivatives. But with Lehman Brothers going into bankruptcy, it meant that all of its credit default guarantees amounted to nothing. In effect, distressed banks like Washington Mutual that were heavily involved in subprime lending in 2005 and hedged their exposure by buying CDS protection from Lehman brothers suffered a double jeopardy – they could neither collect from their defaulted customers nor from the insolvent insurer.

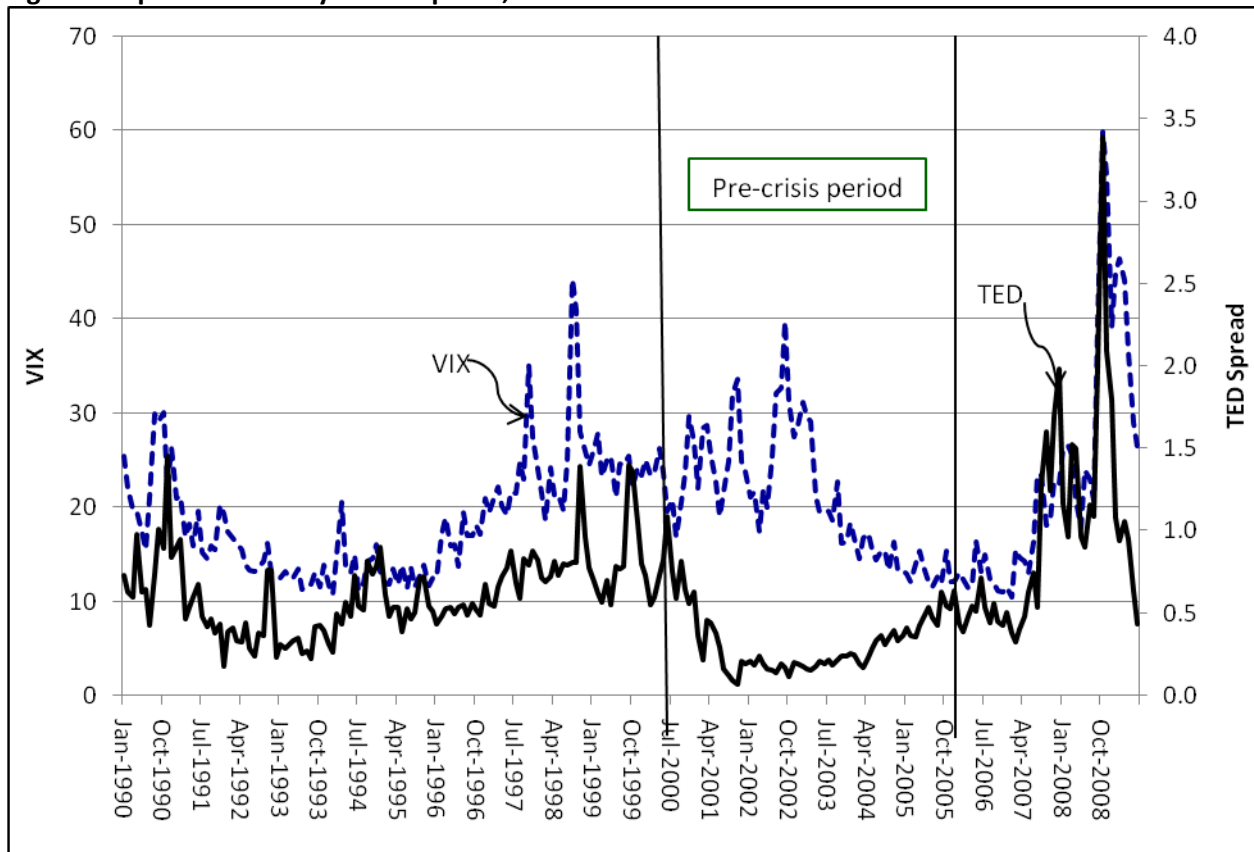
## **5. The Equity Market Effects of the Crisis**

The mortgage crisis had a belated impact on the stock market. Although the initial signs of the crisis were evident by the second quarter of 2007, the downturn in the US equity markets did not occur until the end of the third quarter. In a testimony to a Congressional committee on July 20, 2007, Ben Bernanke, Chairman of the US Federal Reserve announced that “credit losses associated with sub-prime have come to light and they are fairly significant...between \$50 billion and \$100 billion.” It was also about this time that Bear Stearns announced problems with its subprime loans exposure. Earlier on April 2, 2007, New Century Financial, specializing in subprime mortgages, filed for bankruptcy. And on July 11, 2007, Standard & Poor’s placed 612 securities backed by subprime residential mortgages on a credit watch. Thus, while the signs were fairly visible, it was not until the end of September 2007 that US equities began to react in any considerable manner to the worsening mortgage crisis. On September 29, 2008, the US stock market responded with the biggest one-day percentage drop since the 1987 crash. For the year, the broad-based US equity index, S&P 500, fell by 40 percent.

### **5.1. Long Run Dynamics**

In the financial markets, stock price risk (or market risk) and credit risk provide a means to gauge investor sentiments about possible future troubles in the economy. An important measure of market risk is one that is compiled by the Chicago Board Options Exchange, called the VIX. The VIX tends to rise as investor fear grows and declines as the market stabilizes. Credit risk is the risk of loan default. The Treasury-Eurodollar (TED) spread is a key credit risk indicator, rising as the likelihood of loan default increases. [Figure 6](#) shows the remarkable manner by which these two risk indicators have moved almost in tandem until about the end of 2000.

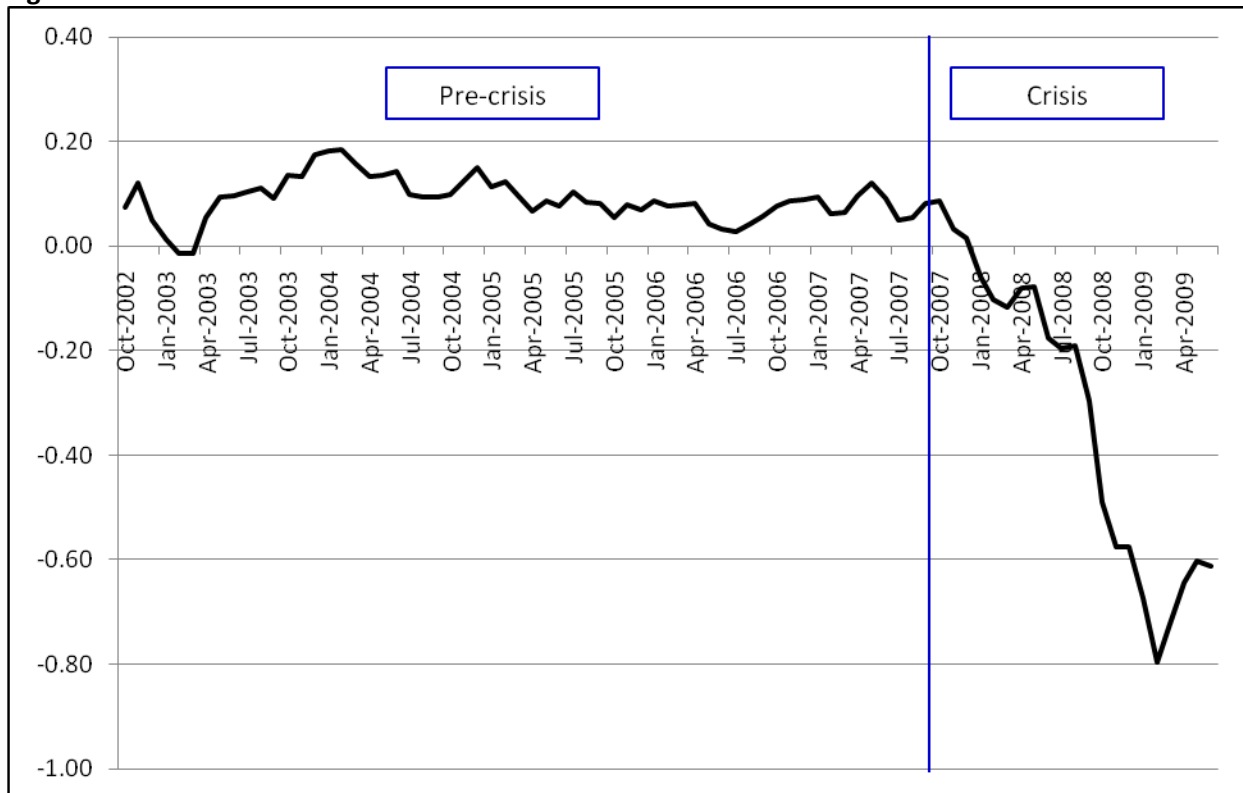
**Figure 6. Options Volatility v. Ted Spread, 2008**



VIX is the measure of market risk, calculated by the Chicago Board Options Exchange (CBOE) as the *implied options volatility* on the broad S&P 500 equity market index. TED is the *Treasury-Eurodollar spread*, which captures the credit risk associated with short-term borrowing.

Because VIX and TED spread are risk indicators, they are naturally positively correlated with each other but inversely correlated with the stock market. But as [Figure 6](#) also shows, these indicators drifted apart during the pre-crisis period. It is important to note that this was also the same period in which we experienced the rapid rise in home prices, excessive consumer and mortgage debt, and a growth in personal debt that outpaced household income. Expectedly, TED spread rose during this period in recognition of the rising default risk. Conversely, VIX actually fell for most of the period, indicating that the stock market ignored all the warning signs. The result was that when the crisis eventually hit home, equity investors suffered a total loss of up to 80 percent more than would normally have been the case if they had anticipated the crisis. The trend in cumulative abnormal stock price performance is shown in [Figure 7](#).

**Figure 7. Cumulative Abnormal Stock Returns in the United States: 2002 – 2009**



Abnormal stock market returns are calculated based on the S&P500 total return index

In financial studies, abnormal returns provide a means of measuring the unanticipated losses or gains from any investment, given the occurrence of an event.

## 7. Conclusions of the Study

This study began with an overview of what many believe to be the factors that contributed to the 2008 global financial crisis. These include the rapid growth and collapse of US home prices, decline in mortgage underwriting standards, and the mismanagement of financial risk by firms engaged in the trading of mortgages and financial derivatives. Many writers and commentators have also criticized Federal authorities for allowing exceedingly low interested rates, which enticed many unqualified individuals to take out mortgages they could ill afford. But this study points to the excessive borrowing by homeowners as the prime source of the crisis.

Between 2000 and 2006, personal disposable income in the United States grew at an annual rate of five percent. However, due to excessive borrowing made possible by easy and cheap credit, personal debt grew twice as much. This negative gap between income and debt made it difficult for many homeowners to service their debt. Borrowers that were most affected were those with subprime credit. Over 60 percent of mortgages that went into default in 2008 were those financed with adjustable rate subprime credit. The inability to service debt eventually led

to widespread delinquencies in the housing market, ultimately resulting in a virtual collapse of the banking system.

The rapid rise in home prices led to an increase in the home equity of many subprime borrowers. In many instances, these homeowners were able to refinance into more suitable mortgages. However when house prices began to stagnate and then fell, these borrowers found themselves trapped in mortgages they could ill afford, prompting even more foreclosures. The widespread sale of foreclosed homes forced home prices to fall off sharply. Many community and mortgage banks collapsed as foreclosure returns fell below outstanding loan balances. Further, many investment banks were distressed as many of the financial derivatives they either created or traded could not be redeemed due to the massive loan defaults. The financial derivatives that particularly inflamed the crisis were mortgaged-backed securities (MBS), collateralized debt obligations (CDO), and credit default swaps (CDS). Millions of dollars from around the world poured into the US housing market through the sale of these derivatives. Since their value, for the most part, depended on the value of the home mortgages, it meant that the default of the mortgage loans invariably led to the default of the derivatives.

Stockholders suffered heavy losses due to a market decline of 40 percent in 2008. In fact, the cumulative *abnormal losses* suffered by US investors dipped to about 80 percent by the first quarter of 2009. In financial studies, abnormal losses are those that exceed what investors would normally incur if they had anticipated the financial event.

Two measures of financial risk were used to evaluate how the stock market responded to the impending crisis. One is a measure of market risk and the other, a measure of credit risk. Because these are financial risk indicators, they tend to rise in advance of an economic downturn. Empirical evidence in this study shows that before the crisis unraveled in mid 2007, the credit risk indicator rose steadily, signifying rising default risk. Unfortunately, stock market investors ignored this signal and for that reason, the market risk indicator actually fell prior to the crisis. This complacency about the negative effect of excessive credit was undoubtedly the reason that equity investors lost a considerable amount of money during the crisis period. According to the Federal Reserve, between mid 2007 and end of 2008, more than \$13 trillion of household wealth was lost due to the financial crisis.

## **8. Suggested Remedies**

Some of the leading recommendations on how to avoid future crises of this nature are summarized in the following paragraphs. Insights are offered pursuant to observations made in this study. These recommendations target three sectors of the financial market system: regulatory authorities, financial services, and consumers. Most of the proposals are directed at the role of government in maintaining market discipline. It is obvious that for the free market experiment to remain successful, credit should be liberal and affordable – in so far as the benefits from the use of borrowed funds exceed the cost of the funds.

The many arguments that the exceedingly low cost of credit, encouraged by the Federal Reserve, led to the housing boom and the resulting bust are insightful. However, the danger in purposely maintaining a high cost of credit as the means to discourage the type of *irrational exuberance* that led to the crisis may be at the expense of capital expansion and productivity. As an alternative, financial market regulation could target the structural defects that resulted in the crisis in the first instance. These defects include excessive debt, poor credit standards, unregulated derivatives, and the non-risk-based compensation system in the financial services industry. In any event, any monetary or fiscal tightening designed to reduce the pressures of credit booms may not only be politically infeasible, but also, economically ineffectual, owing to the integrated nature of the global financial system (Ötoker-Robe, 2007).

The use of moral suasion by monetary authorities remains a potent regulatory tool, as Jingchun (2008) suggests. For example, at many instances after the 9-11 attacks and over the course of the 2008 financial crisis, the Federal Reserve employed this means to instill discipline and confidence in the financial system. Moral suasion is designed to encourage banks, for example, to engage in prudent lending, adhere to sound risk management practices, restrict incentive compensation to sustainable performance, and direct credit only to conforming loans.

Implementing a risk-based prudential and supervision process is a remedy proposed by Dell’Ariccia et al (2008). Such a regulatory regime includes intensive surveillance of potential problem banks, full disclosure of bank risk management policies, limits on sectoral loan concentration, tighter eligibility and collateral requirements for high risk loans, limits on foreign exchange exposure, and regulations on maturity mismatch of bank assets and liabilities. Posner (2008) also argues in favor of greater disclosure. Additionally, he supports raising credit-rating standards and adjusting reserve requirements to adequately reflect the riskiness of bank capital structures.

While these recommendations are insightful, they fail to address the demand side of credit, the very reason for the widespread delinquencies that led to the mortgage crisis. Even with greater transparency and supervision, excessive debt is what generates extreme uncertainty and systemic risk. One way to address this systemic flaw is to make *regulatory capital* more risk sensitive. Regulatory capital is the minimum amount of stockholder investment (equity) that banks must maintain in order to fully absorb any bad loans. Doing this should reduce the incidence of bank collapse, but it also forces lenders to reduce their predatory lending behavior which often entices unsuspecting borrowers to overextend themselves with debt.

Pursuant to *Basel II*, a higher percentage of regulatory capital should be required for banks with a disproportionate amount of doubtful loans (*Basel II* is a set of recommendations issued by the world’s top central bankers on bank regulation. The core proposal is that the greater the risk to which the bank is exposed, the greater the amount of capital the bank needs to maintain in order to ensure its solvency and stability). For banks in the United States, an overall higher threshold for capital adequacy should require a higher risk weight for residential loans. The risk weight is what determines how much equity capital that banks should set aside in order to fully absorb the specific default risk associated with each loan component. Essentially, this approach



recognizes that not all loans are created equal. The greater the risk of each group of residential loans (where risk is based on the credit rating of borrowers), the higher will be the amount of bank capital that backs it. To facilitate this regime, regular stress testing, designed to evaluate the impact of doubtful loans and sudden cash withdrawals by depositors, should be in place.

There has been considerable debate regarding the regulation of collateralized debt obligations (CDOs) and credit default swaps (CDS). Both instruments have served a very useful purpose over the years as additional sources of funds, especially for the housing market. Self regulatory organizations, such as financial exchanges, should be required to institute standardized methods for creating and rating CDO tranches. The exchanges would then be where the values of CDOs are determined. Like CDOs, credit default swaps should also be exchange-traded to ensure full disclosure. It would be unhelpful to restrict trading of these derivatives to only those with a financial interest in the underlying loans. Such a restriction would reduce market liquidity, which helps promote an efficient market place. Additionally, it reduces speculation, which is an important element in the price discovery and risk management process. Instead, exchanges should standardize these contracts in a manner similar to trades in futures and options. It should be noted that these more traditional derivatives could be traded by anyone, irrespective of whether or not the trader has a financial interest in the underlying asset.

In the financial services industry, it is important to align the financial interests of mortgage originators with those of investors of the CDOs. This may prove an effective way to mitigate *agency cost*. Agency costs result from a divergence of interests between investors of the CDOs (who supply the credit) and loan originators (who distribute the credit in the form of mortgage loans). Agency cost arises when loan originators concentrate on loan volume at the expense of quality, which is contrary to the best interest of the investors. This method of creating and distributing credit is commonly known as *originate-to-distribute*. To combat this agency cost and therefore align the interests of both parties, some writers such as Hull (2009) suggest that loan originators should maintain a financial stake in the CDOs by keeping a portion of each tranche they create. In the absence of such a financial stake, the loan originator is less likely to exercise prudence in marketing risky loans. In the same vein, a risk-based incentive compensation model should include a process where bonus payments are spread over several periods so as to discount future payments by any subsequent financial losses.

Notwithstanding its recent setbacks, there is merit to the expansion of anti-predatory lending laws. But the potency of such regulation should be judged by whether loan originators are held accountable for the full disclosure of the potential risk of all types of loans they sell. Complementary to this is a regulation that holds lenders – instead of borrowers – primarily responsible for loans that become delinquent. Such a regulation, not unlike South Africa's 2007 National Credit Act, focuses on goals such as:

- Preventing consumers from over-indebtedness
- Minimizing the granting of reckless credit
- Eliminating the exploitation of consumers by unscrupulous lenders
- Providing greater transparency and choice for the consumer seeking credit

- Mandating disclosure of the total cost of credit to the consumer
- Providing consumer education and awareness relating to credit
- Providing a mechanism of debt restructuring for consumers in distress.

At the time of its passage, many South African banks complained of over-regulation. But it is obvious that this legislation, which prevented them from engaging in high risk lending, is the reason that banks in South Africa did not suffer the same fate as those in the United States and Western Europe.

A robust regulatory review should include a careful re-examination of the incentive provisions of the 1992 Federal Housing Enterprises Financial Safety and Soundness Act as well as the 1995 Community Reinvestment Act. The core provisions of these regulations require Fannie Mae and Freddie Mac to devote a percentage of their lending to support affordable housing by including various subprime loans in their asset portfolio. The 1995 law paved the way for Fannie Mae to receive affordable housing credit for buying subprime securities. Since these institutions are ultimately taxpayer-supported (although stockholder owned), their portfolio risk should be limited in order to avoid the type of costly bailouts that followed their collapse in 2008.

Bearing in mind that over 60 percent of loans that went into early default in 2007 and 2008 were adjustable rate mortgages (ARMs), regulatory authorities should require that financial institutions restrict their sale so as to limit sectoral loan concentration on their balance sheets. Similar limits should be placed on subprime loans so as not to overly expose the lender to the risk of failure and possible taxpayer bailout. To aid this process, lenders should disclose to consumers the exceedingly high default rate associated with these types of loans. And for the reason that they have not served to strengthen the mortgage market, hybrid mortgage loans should be abandoned. These include loans with negative amortizations, interest-only loans, and loans with zero down payments.

Finally, a self-regulatory system in the financial markets should require a higher lending threshold. This process addresses the observed dissonance between household income and personal leverage that effectively led to the mortgage crisis. A lower loan-to-value (LV) ratio, combined with a lower overall mortgage payment as a percent of disposable income, reduces the possibility of financial distress for borrowers. This ensures a stronger household equity and a greater ability of homeowners to remain current on their loan payments even in a soft economy. A lower LV ratio also means that foreclosure sales, if they occur, will more likely generate sufficient returns to cover outstanding loans. A lower mortgage payment rate reduces the likelihood of unmanageable personal debt, especially if unemployment occurs.

While over-regulation of the financial services industry is a real danger, there is no doubt that the danger of continuing with the previous hands-off approach is far greater. It is such *laissez-faire* that Posner (2008) refers to as *a failure of capitalism*. A proper balance is established when lenders are sufficiently risk-averse, regulatory authorities mandate full disclosure along with consumer protection, and consumers exercise prudence in their choice of credit.

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## Acknowledgement

The following individuals contributed immensely to the editorial review of this paper: Professors Casimir Barczyk, Saul Lerner, and Shomir Sil – all of Purdue University Calumet. Assistant Professor Uche Onyebadi of Southern Illinois University provided helpful critique and editorial assistance with the initial draft. Professor Lerner gave considerable guidance on editorial style and research motivation. His encouragement and contributions are invaluable. This study is the result of the inaugural Faculty Lecturer Award from Purdue University Calumet in 2009. The formal presentation of the study was made on March 23, 2010. The Selection Committee was chaired by Professor Daniel Suson, Dean of the School of Engineering, Mathematics, and Sciences. Other Committee members were Professors Suzanne Degges-White, Renee Fife, Keyuan Jiang, Saul Lerner, Paolo Miranda, and Michael Zimmer. To all of these individuals, I owe a debt of thanks. Any errors in the study are of course mine.

## Biographical Sketch

**Pat Obi**, Professor of Finance at Purdue University Calumet, received his Ph.D. in Finance with a minor in Econometrics from the University of Mississippi. He has served as visiting scholar at the following universities: Vytautas Magnus University and Vilnius Technical University, both in Lithuania; Vaal University of Technology in South Africa; Kyung Hee University in Korea; Khon Kaen University in Thailand; and The Ghana Institute of Management and Public Administration. Since the financial crisis broke in 2007, he has given presentations on various aspects of the crisis and its economic impact. These presentations include a keynote address at the 2009 conference of the Global Business and Technology Association in Prague, Czech Republic, and invited lectures at Khon Kaen, Thailand; Vanderbijlpark, South Africa; Seoul, Korea; and a number of media forums at Purdue Calumet. Pat currently teaches the following courses at Purdue University Calumet: Corporate Finance, Derivatives, and Quantitative Methods. In addition to offering regular financial workshops at community centers in Chicago and Northwest Indiana, he also consults extensively for businesses and government in the region. Pat is the recipient of a number of teaching and research excellence awards. These include recognitions from Purdue University Calumet, Association for Global Business, Institute for Business and Finance Research, and Global Business & Technology Association. He has more than 30 scholarly publications, mostly on financial event studies and energy finance. He is the author of *Basics of Business Finance*, a Lithuanian language college textbook.

*March 23, 2010*