THE U.S. HOUSING BUBBLE AND THE GLOBAL FINANCIAL CRISIS: HOUSING AND HOUSING-RELATED FINANCE

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Executive Summary

An unprecedented bubble in U.S. housing prices began to inflate in the first quarter of 1998 and then popped in the second quarter of 2006. This study examines the causes of this bubble and the effects of its deflation on U.S. housing and housing-related finance by applying a seven-stage framework for analyzing asset bubbles developed by economist Charles P. Kindleberger. Future studies will analyze the global financial crisis that this bubble ignited on August 9, 2007 and offer lessons learned for policymakers.

The most important cause of the housing bubble was a massive credit expansion. An overly accommodative U.S. monetary policy from the second quarter of 2002 through the third quarter of 2006 when compared with the Taylor rule encouraged financial institutions to expand credit aggressively by reducing their short-term funding costs. At the same time, stable inflationary expectations and the exchange rate policies in the People's Republic of China and other Asian economies restrained long-term U.S. interest rates. U.S. housing prices soared as low long-term interest rates further stimulated the already strong demand among households for housing, while financial institutions enthusiastically supplied the necessary residential mortgage credit.

A number of well-meaning federal policies had the unintended consequence of encouraging financially marginal households that could not qualify for traditional fixed-rate fully amortizing residential mortgage loans to take out riskier alternatives (including adjustable-rate subprime residential mortgage loans with interest-only periods or negative amortization features) to buy homes just as housing prices neared their peak. Essentially, both these borrowers and their creditors were relying on rising housing prices rather than the borrower's income to repay these loans. After the bubble popped, delinquency and default rates increased to alarming levels among these borrowers.

The IMF forecasts housing-related credit losses will be $565 billion, while total credit losses will be $945 billion. As a result, the IMF concludes that the combination of the aftermath of the housing bubble and the credit crunch arising from the global financial crisis has tipped the U.S. economy into a recession. Whether or not this IMF forecast proves correct, economic growth in the United States has slowed dramatically during the last two quarters.

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U.S. HOUSING BUBBLE AND THE GLOBAL FINANCIAL CRISIS: HOUSING AND HOUSING-RELATED FINANCE

I. INTRODUCTION

An unprecedented U.S. housing bubble began to inflate in the first quarter of 1998 and then popped in the second quarter of 2006. The subsequent deflation of housing prices caused the delinquency and foreclosure rates for subprime residential mortgage loans to soar. As the performance of these loans deteriorated, investors grew uncertain about the value of the residential mortgage-backed securities (RMBS) and the collateralized mortgage obligations (CMOs) into which many subprime residential mortgage loans had been placed. Consequently, the market liquidity for these subprime-related derivative securities shriveled.

A number of well-intentioned, but often misguided federal policies and macro-economic supply factors in U.S. credit markets inflated an unsustainable bubble in U.S. housing prices:

- In retrospect, the Federal Reserve's monetary policy was overly accommodative from the second quarter of 2002 through the third quarter of 2006 when compared with the Taylor rule. By lowering the cost of funds for banks, other depository institutions, and highly leveraged non-depository financial institutions, this monetary policy encouraged these financial institutions to expand credit aggressively by extending loans and investing in debt and derivative securities.
- At the same time, macro-economic supply factors in U.S. credit markets reinforced this overly accommodative monetary policy by restraining medium- and long-term U.S. interest rates during the first half of this decade. Housing is the most interest rate-sensitive sector of the U.S. economy. Along with micro-economic factors relating to financial services, low long-term interest rates further stimulated the already strong demand for housing among households, while financial institutions enthusiastically supplied the necessary residential mortgage credit.
    - Globalization greatly intensified the price competition among tradable goods and services in the United States. This helped to channel the inflationary effects of monetary policy away from the prices of goods and services and into asset prices, especially housing. The inflation-suppressing effects of globalization on the prices of goods and services as recorded by the Consumer Price Index (CPI), the GDP Deflator, and the Personal Consumption Expenditure (PCE) Deflator combined with the Federal Reserve's successful disinflationary monetary policy during the 1980s and early 1990s to foster stable inflationary expectations. In turn, stable inflationary expectations dissuaded U.S. lenders from seeking high inflation premiums in medium- and long-term interest rates when monetary policy deviated from the Taylor rule.
    - After the Asian Financial Crisis of 1997-98, the People's Republic of China (PRC) intervened heavily in foreign exchange markets to maintain a fixed exchange rate between the Chinese renminbi and the U.S. dollar through July 20, 2005 and to suppress the appreciation of the renminbi relative to the dollar thereafter. Other Asian governments mimicked the PRC's foreign exchange to maintain the price competitiveness of their manufactured exports with China's. By buying U.S. dollars and selling their currencies simultaneously, central banks in the PRC, India, Indonesia, Japan, Malaysia, South Korea, Taiwan, and Thailand added $2.06 trillion to their foreign exchange reserves from December 31, 1997 to the peak of the U.S. housing bubble on June 30, 2006. About 2/3 of

these foreign exchange reserves were invested in U.S. dollar-denominated debt securities, mainly U.S. Treasuries and U.S. Agencies. By bidding-up the prices of U.S. debt securities, these massive purchases by Asian central banks helped to suppress medium- and long-term U.S. interest rates.[1]

- Federal policymakers adopted a number of policies to promote home ownership especially among financially marginal and minority households without regard to the suitability of home ownership for their economic circumstances or the conditions in the housing market;
- Federal policymakers failed to warn the public that the housing bubble was unsustainable and to discourage financially marginal households from taking on excessive non-conventional mortgage debt to buy homes as housing prices inflated.

Estimates for the global credit losses associated with subprime residential mortgage loans are staggering. In April 2008, the Organization for Economic Cooperation and Development (OECD) forecast that the global subprime-related credit losses will be $422 billion (which is equivalent to 3.05 percent of U.S. GDP in 2007).[2] This OECD forecast is line with similar estimates from the International Monetary Fund and private economists.

This study applies a seven-stage framework for analyzing asset bubbles developed by economist Charles P. Kindleberger to the U.S. housing bubble. Part one of this study examines stage one – displacement of existing expectations, stage two – credit expansion (monetary policy and other macro-economic factors), stage three – new economy, stage four – swindles, and stage five – overtrading, revulsion, and discredit – as they apply to the inflation and popping of the U.S. housing bubble. Moving beyond a narrow focus on housing and housing related finance, part two will analyze stage two – credit expansion (micro-economic factors relating to financial services) and stage six – financial panic and crisis management – as they apply to the resulting global financial crisis that arose on August 9, 2007 from the popping of the U.S. housing bubble. Part three will discuss stage seven – aftermath and then will offer some lessons learned to policymakers.

II. KINDLEBERGER'S FRAMEWORK FOR ASSET BUBBLES

Reviewing asset bubbles from 1720 through 1999, Charles P. Kindleberger identified the seven stages common to all asset bubbles:

1. **Displacement of established expectations**. Asset bubbles begin when significant, sudden, and unexpected events displace previous expectations about the future returns from certain assets. Through the centuries, various assets (e.g., bonds, commodities, currency, equities, and real estate) have become objects of speculation.
2. **Credit expansion**. Asset bubbles require a modern financial system to provide credit to households and firms to purchase the object of speculation. Displacement of established expectations causes financial services professionals to assume less uncertainty and more profits from investing in this object. Consequently, commercial banks and other depository institutions generously extend loans, while investment banks aggressively

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[1] For an extensive discussion, see: Robert P. O'Quinn, *Chinese FX Interventions Caused International Imbalances, Contributed To U.S. Housing Bubble* (Prepared for Joint Economic Committee, 110th Cong., 2nd sess., March 2008). Found at: http://www.house.gov/jec/studies/2008/Chinese%20FX%20Interventions%20Caused%20International%20Imbalances%20Contributed%20to%20U%20S%20%20Housing%20Bubble%20(2).pdf.

[2] *The Subprime Crisis: Size, Deleveraging, and Some Policy Options* (Paris: Organization for Economic Cooperation and Development, April 2008), pg. 2.

underwrite new debt and equities securities related to this object. Insurance firms, mutual funds, pension funds, and individual investors eagerly purchase these new securities. The rapid expansion of credit to invest in the object of speculation causes its price to rise – slowly at first and then increasingly rapidly. Paradoxically, the rising price of the object increases the demand for it. As commercial banks and other depository institutions extend more and more loans related to the object of speculation, the credit quality of the assets on the balance sheets of these financial firms may deteriorate as marginally qualified or even unqualified borrowers undertake debt to invest in this object.

3. **New economy**. As the object's price begins to rise, economists, government officials, financial services practitioners, and journalists proclaim that a new economic era has begun. Old valuation models are cast aside in favor of new valuation models that appear to have official sanction.

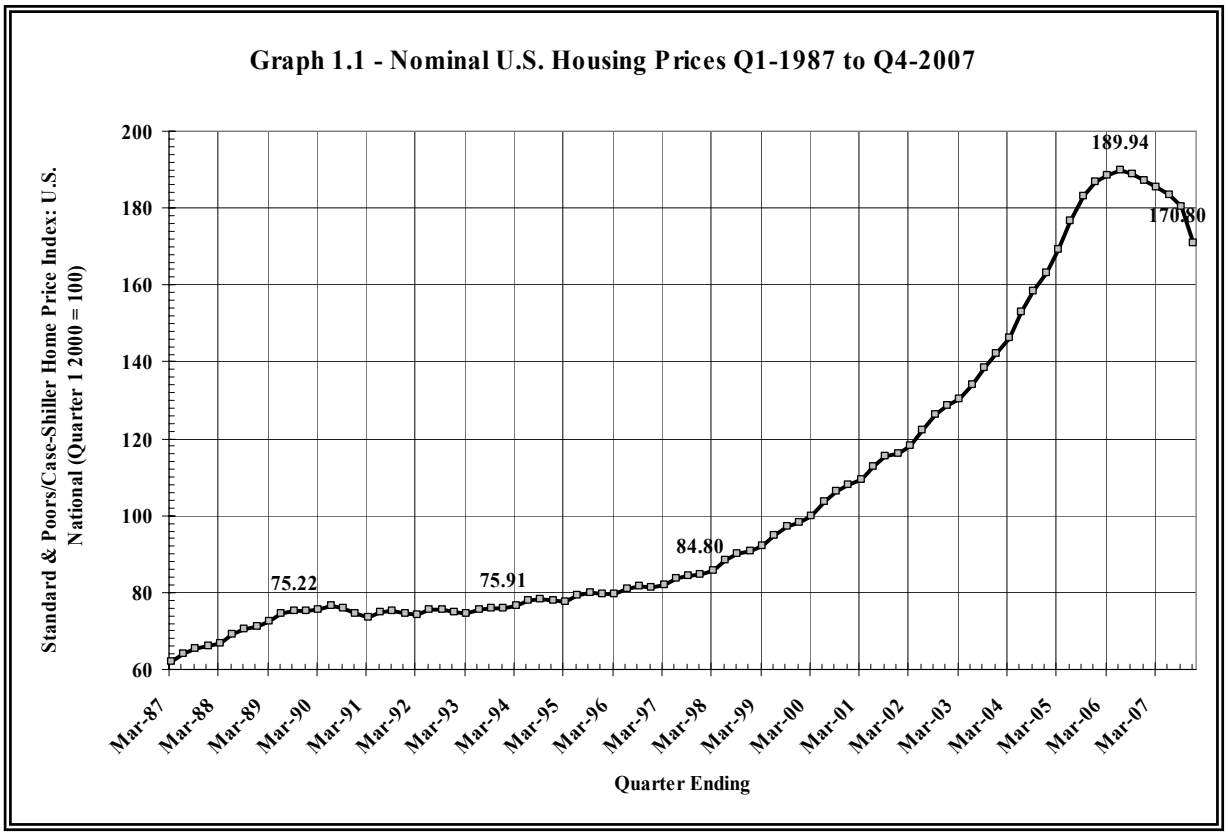
4. **Swindles**. As the object's price accelerates, market participants become euphoric, diminishing their skepticism of exaggerated claims. Spying opportunities, swindlers take advantage of market participants while their guard is down.

5. **Overtrading, revulsion, and discredit**. Ignoring the underlying fundamentals regarding an object's long-term profitability, market participants purchase additional units of the object based solely on its price momentum and often incur heavy debts to fund such purchases. As the existing market participants profit from their trades in the object, individuals and firms that do not normally trade in this object may undertake such purchases. Together these factors create a mania for the object. As the peak of the asset bubble approaches, expectations about the future profitability of trading in this object reach their zenith. This is the overtrading phase. Then, some unrelated events or sales of the object by insiders trigger a reappraisal. This is revulsion phase. Credit for additional purchases of this object may be curtailed, and interest rates may rise. Market participants that have borrowed heavily to invest in this object face growing financial difficulties because of high debt service costs. As the price of this object falls, highly leveraged market participants may be forced to sell their holdings of this object in "fire sales" to meet margin calls. This is the discredit phase.

6. **Financial panic and crisis management**. Market participants want to sell their holdings of this object at any price, but find few buyers. In extreme cases, asset markets may "seize up" and suspend trading. Financial services firms that lent to or bought debt and equity issues from participants in the market for this object will incur significant losses in their portfolios. If the losses are sufficiently large, some financial services firms may fail. Credit to individuals and firms unrelated to the object may become scarce and expensive. As economic damage from the collapsing price of this object spreads to other sectors, the financial panic may morph into a recession or even a depression.

7. **Aftermath**. Once the crisis abates, the public demands that firms and government make institutional reforms to make asset bubbles less likely in the future and to mitigate their economic damage.[3]

[3] See generally, Charles P. Kindleberger, *Manias, Panics, and Crashes: A History of Financial Crises* (1978; 4th ed., New York: John Wiley & Sons, 2000).



III. APPLYING KINDLEBERGER'S FRAMEWORK TO THE U.S. HOUSING BUBBLE

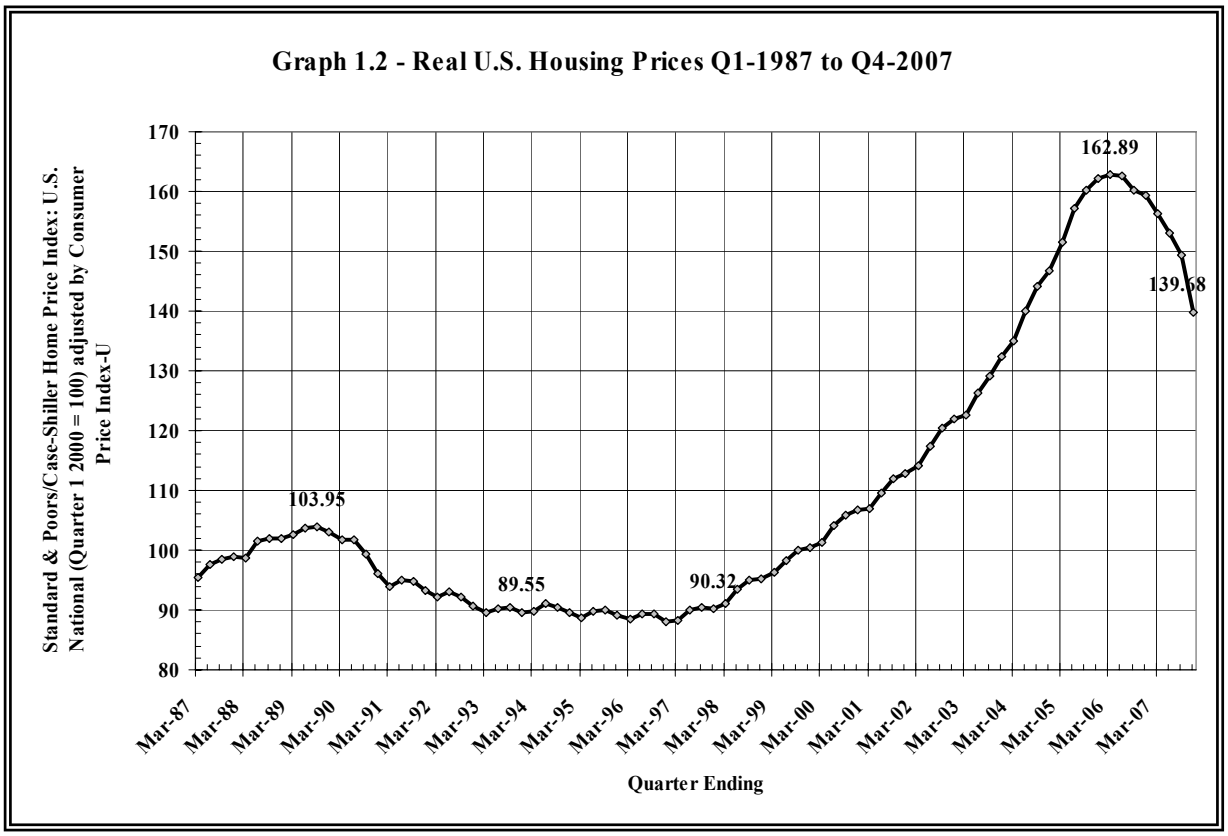
III.A. DISPLACEMENT OF EXISTING EXPECTATIONS

Some factors that had inflated the high-tech stock bubble during the late 1990s contributed to the housing bubble between 1998 and 2006. The Great Moderation, which refers to the combination of long and strong expansions, short and shallow recessions, and low inflation since 1983, increased the propensity for risk-taking throughout the U.S. economy.[4] Elevated rates of return on shares during the high-tech stock bubble conditioned many individuals to expect similar rates of return from other investments. After the high-tech stock bubble popped in the first quarter of 2000, many households turned to housing as a "safer" alternative that could still produce a high rate of return.

In testimony before the JEC, financial economist Robert J. Shiller, who authored *Irrational Exuberance*, observed, "The U.S. has, since the late 1990s, had its biggest national housing boom in history."[5] By all available measures, housing prices ballooned from 1998 to the second quarter of 2006. According to the Standard & Poor's/Case-Shiller U.S. National Home Price Index, nominal housing prices edged up by 0.9 percent from a peak in the third quarter of 1989 to the trough in the fourth quarter of 1993. When adjusted for inflation, however, real housing prices declined by 13.9 percent. During the next four years, nominal housing prices grew by 11.7 percent, while real housing prices edged up by 0.9

[4] U.S. expansions and contractions averaged 51 months and 11 months, respectively, in the seven complete business cycles between 1945 and 1982 as compared with 106 months and 8 months, respectively, in the two complete business cycles since 1982. Inflation, which had averaged 7.4 percent between 1968 and 1982, averaged 3.1 percent between 1983 and 2007.

[5] Written Statement of Robert J. Shiller before the Joint Economic Committee, Hearing on "Evolution of an Economic Crisis: The Subprime Lending Disaster and the Threat to the Broader Economy" (September 19, 2007), pg. 1.



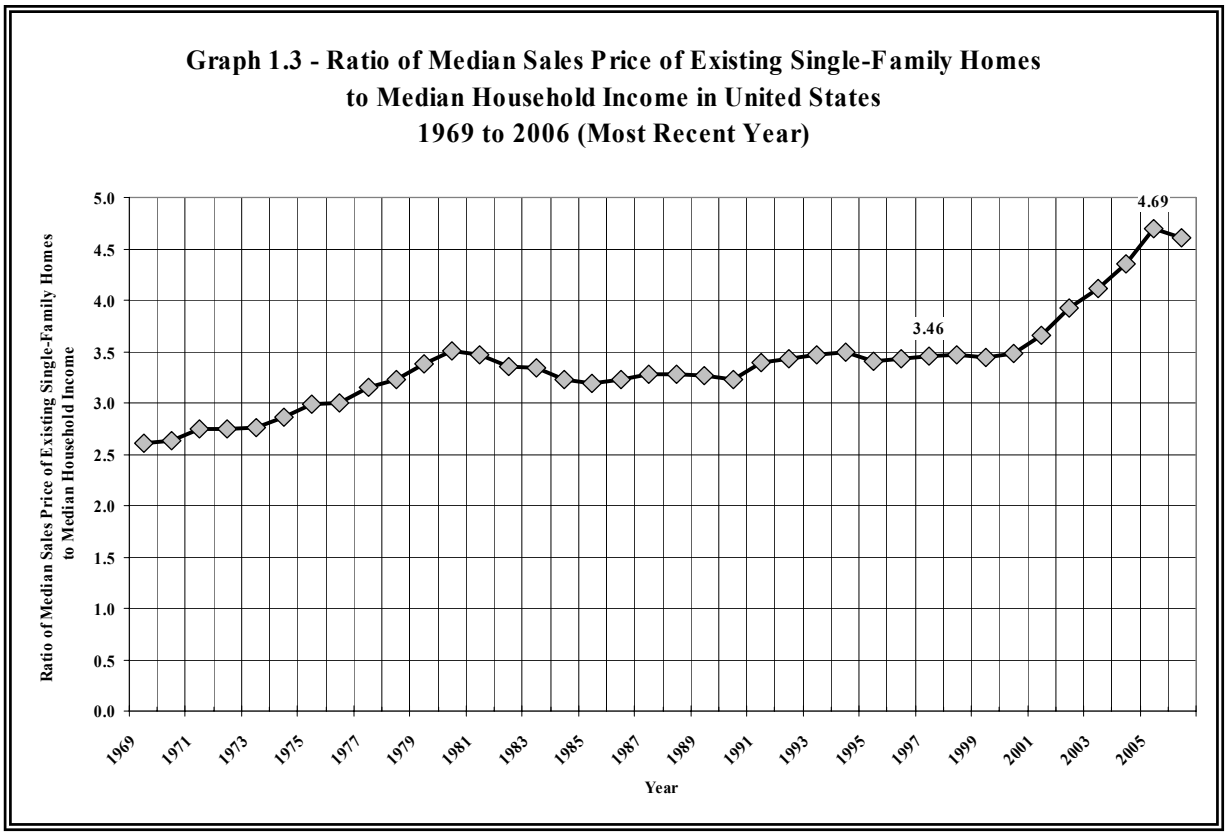
percent. From the first quarter of 1998, nominal housing prices increased by 101.2 percent to a peak in the second quarter of 2006, while real housing prices increased by 80.3 percent to peak in the first quarter of 2006 (see Graphs 1.1 and 1.2).[6]

Over the long term, housing demand is a function of household formation and household income growth. Not surprisingly, housing prices had a relatively stable relationship with household income for decades prior to the housing bubble. The ratio of the median sales price of an existing single-family house to the median household income averaged 3.19 from 1969 to 1997. Beginning in 1998, however, housing prices increased at a substantially faster rate than household income. The ratio of the median sales price of an existing single-family house to the median household income increased from 3.46 in 1997 to a peak of 4.69 in 2005, 5.4 times the standard deviation of 0.28 between 1969 and 2006 (see Graph 1.3).[7]

Because renting an apartment is a close substitute for owning a home, housing prices and rental costs should change at approximately the same rate over the long term. Indeed, housing price increases had matched rental cost increases for decades prior to the housing bubble. From 1982 to 1997, the median sales price of an existing single-family house increased by an average of 4.2 percent a year, while the rental costs for a primary residence grew by an average of 4.1 percent a year. Beginning in 1998, housing prices grew at nearly twice the rate of rental costs. From 1998 to 2006, the median sales price of

[6] S&P/Case-Shiller Home Price Index: U.S. National/Haver and Consumer Price Index-U: All Items/Bureau of Labor Statistics/Haver. Author calculated real index by adjusting nominal index by CPI. Author calculated percentage changes.

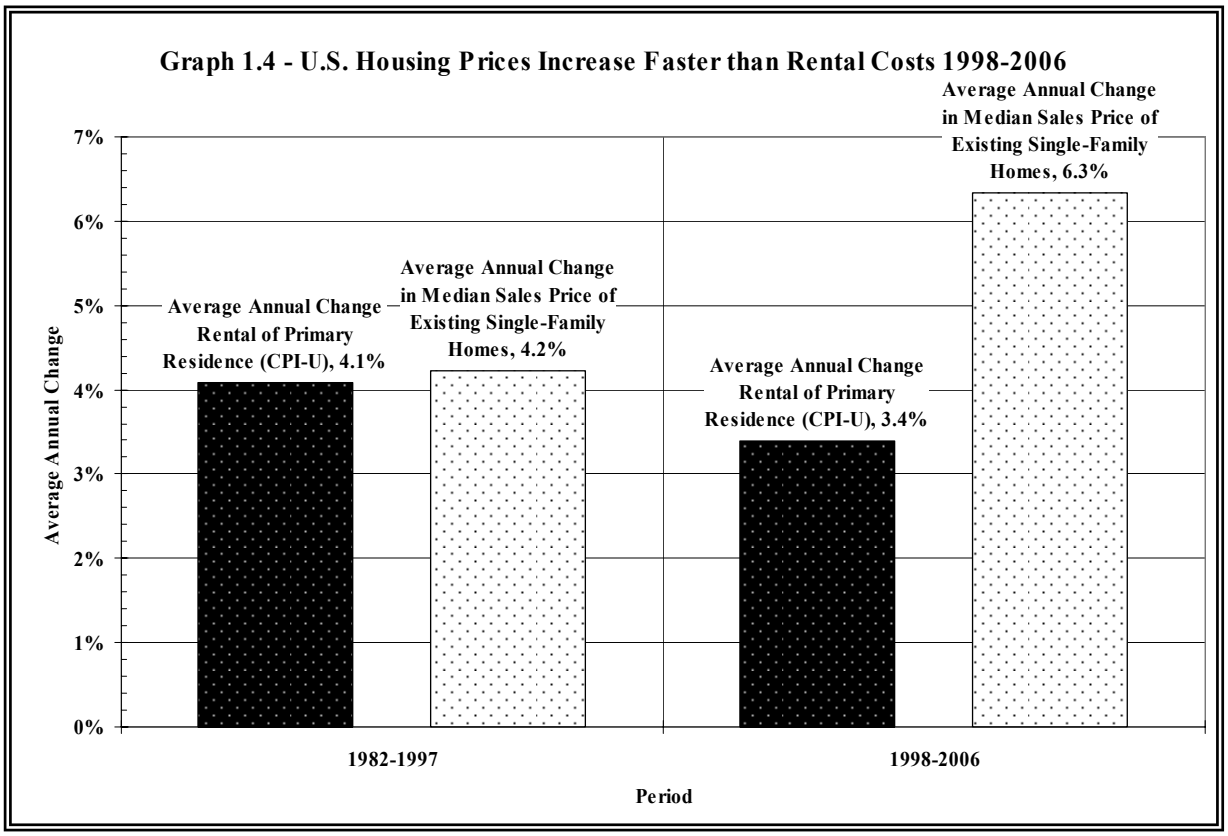
[7] Median Sales Price: Existing Single-Family Homes, United States (Current Dollars)/National Association of Realtors/Haver and Median Income of Households (Current Dollars)/Census Bureau/Haver. Author calculated ratios and standard deviations. N.B., 2006 is the latest year in which annual household income data are available.



an existing single-family house ballooned by an average of 6.3 percent a year, while rental costs increased by an average of 3.4 percent a year (see Graph 1.4).[8]

Because of the prospects for easy and quick profits in housing, many speculators began "flipping" homes (i.e., buying new condominiums, townhouses, and single-family houses while under construction or existing units that need some remodeling work in the hope of reselling them once they are ready for capital gains). Speculative demand accelerated the growth of housing prices during the bubble.

[8] Consumer Price Index-U: Rent of Primary Residence, Percent Change - Year to Year/Bureau of Labor Statistics/Haver and Median Sales Price: Existing Single-Family Homes, United States (Current Dollars) Percent Change - Year to Year/National Association of Realtors/Haver.

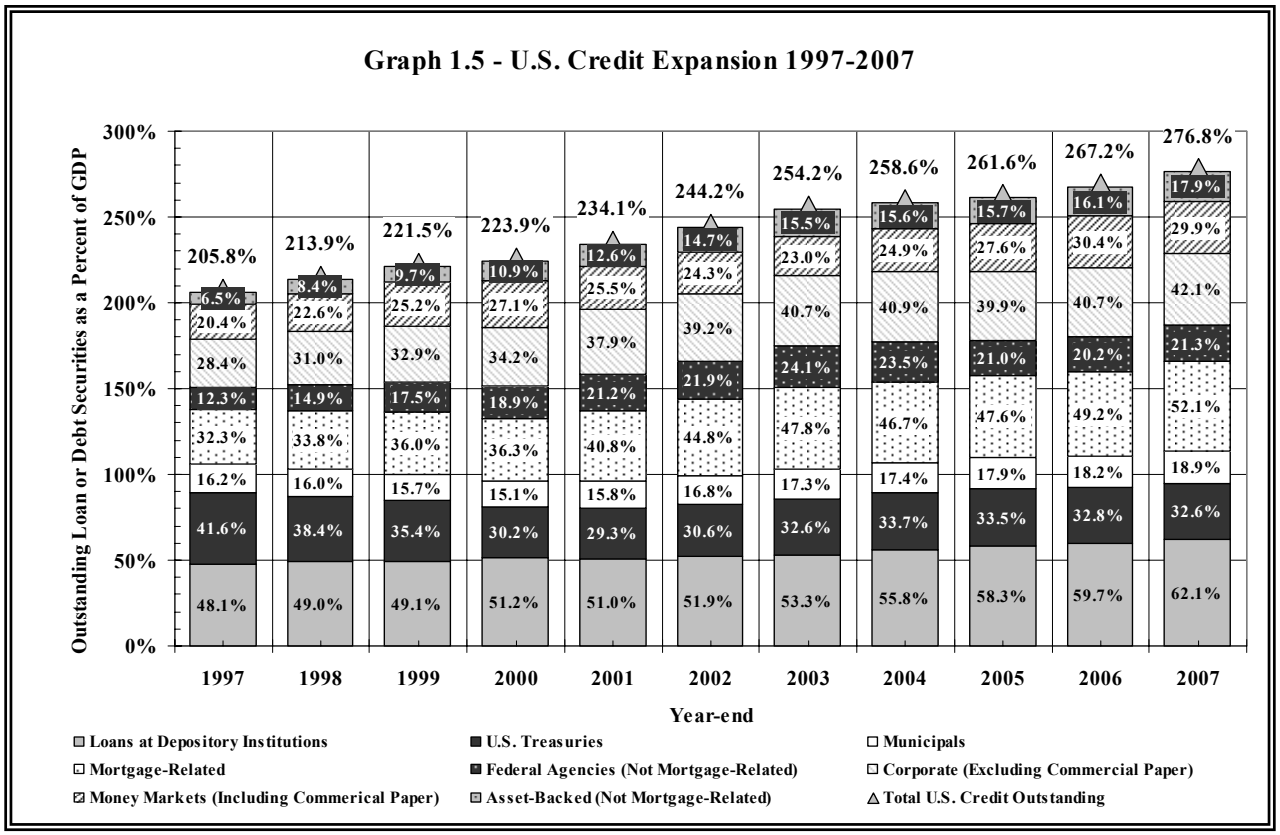


III.B. CREDIT EXPANSION

III.B.1. Size of the Credit Expansion

During the last decade, the credit available to U.S. households and non-financial firms grew much faster than GDP. Total credit outstanding including total debt securities outstanding in U.S. credit markets and total loans and leases outstanding at U.S. depository institutions grew from $17.088 trillion (equal to 205.8 percent of GDP) on December 31, 1997 to $38.325 trillion (equal to 276.8 percent of GDP) on December 31, 2007 (see Graph 1.5).

- Total debt securities outstanding in U.S. credit markets ballooned by 127.0 percent from $13.096 trillion (equal to 157.7 percent of GDP) on December 31, 1997 to $29.729 trillion (equal to 214.7 percent of GDP) on December 31, 2007 (see Table 1.A-1 in the Appendix). This growth was highly concentrated in three kinds of debt securities, two of which involve securitization:
    - Asset-backed securities outstanding increased by 361.4 percent from $536 billion (equal to 6.5 percent of GDP) on December 31, 1997 to $2.472 trillion (equal to 17.9 percent of GDP) on December 31, 2007 (see Table 1.A-1 in the Appendix).
    - Federal agency securities outstanding (other than mortgage-related) increased by 188.1 percent from $1.023 trillion (equal to 12.3 percent of GDP) on December 31, 1997 to $2.946 trillion (equal to 21.3 percent of GDP) on December 31, 2007 (see Table 1.A-1 in the Appendix).
    - Mortgage-related securities outstanding increased by 169.0 percent from $2.680 trillion (equal to 32.3 percent of GDP) on December 31, 1997 to $7.210 trillion (equal to 52.1 percent of GDP) on December 31, 2007 (see Table 1.A-1 in the Appendix).



- Total loans and leases outstanding at U.S. depository institutions increased by 115.3 percent from $3.992 trillion (equal to 48.1 percent of GDP) on December 31, 1997 to $8.596 trillion (equal to 62.1 percent of GDP) on December 31, 2007 (see Graph 1.5 and Table 1.A-2 in the Appendix).[9]

III.B.2. Macro-Economic Causes of the Credit Expansion

III.B.2.a. Overly Accommodative Monetary Policy

The Federal Reserve's monetary policy, which proved, in retrospect, to be overly accommodative from the second quarter of 2002 through the third quarter of 2006, is the most important cause for the credit expansion that fueled the U.S. housing bubble. By reducing short-term interest rates, this monetary policy decreased the cost of funds for banks, other depository institutions, and highly leveraged non-depository financial institutions.[10] Flush with low cost funds, banks, financial institutions aggressively expanded credit by extending loans and purchasing debt and derivative securities.

The Federal Reserve controls the aggregate money supply by increasing or decreasing the reserves available to commercial banks through (1) open market operations (i.e., the purchase and sale of

[9] Credit market data are from U.S. Department of Treasury, Federal Reserve System, Federal Agencies, Thomson Financial, Bloomberg, Securities Industry and Financial Market Association estimates. Nominal GDP data are from Bureau of Economic Analysis. Author calculated credit market data as a percent of GDP.

[10] Highly leveraged non-depository financial institutions (HLNDFIs) will be discussed in detail in part two. HLNDFIs include finance companies, financial government-sponsored enterprises (GSEs), hedge funds, investment banks, and bank-sponsored off-balance sheet entities (OBSEs).

government debt securities or foreign exchange) and (2) loans (historically referred to as discounts) to banks and other depository institutions (and recently primary dealers).[11]

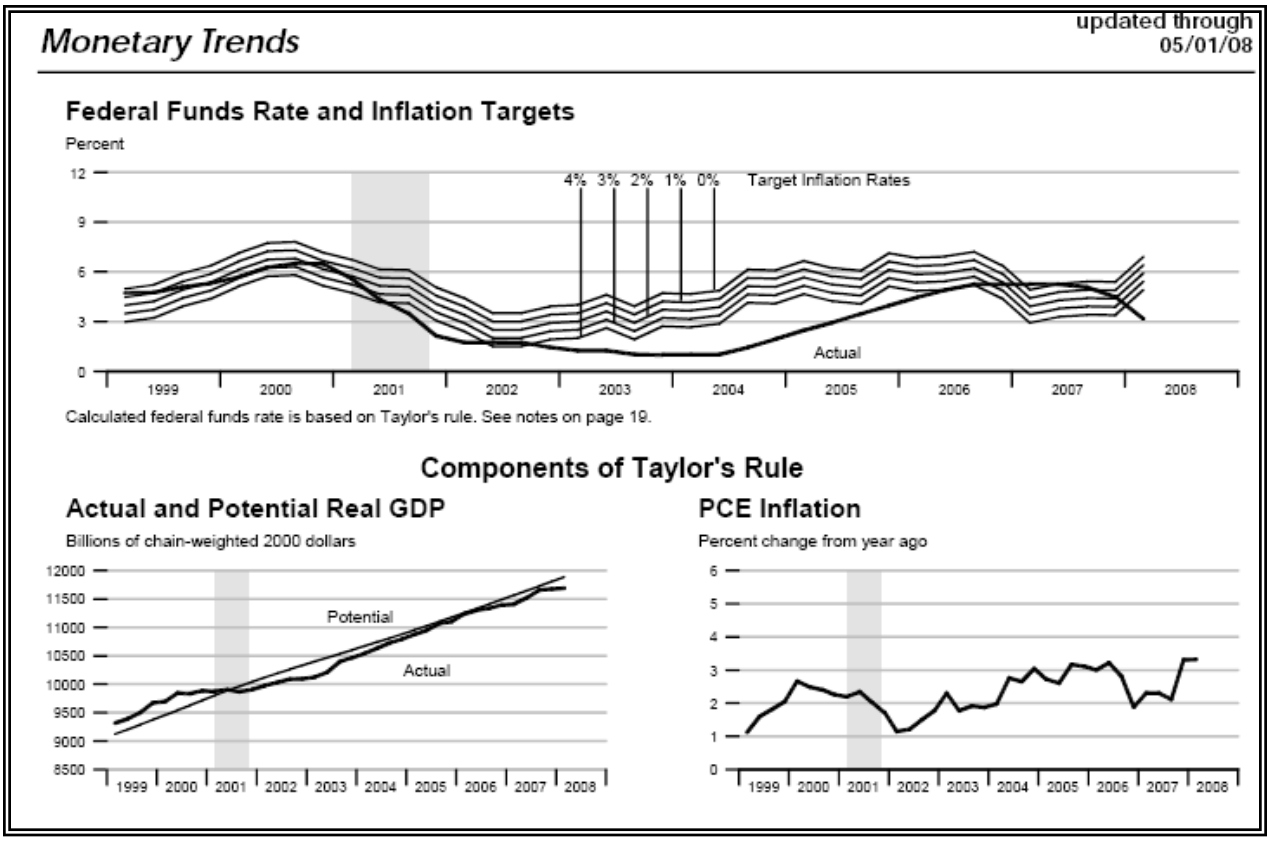
Inflation occurs when the Federal Reserve increases the aggregate supply of money faster than the growth of aggregate demand for money. Generally, inflation simultaneously increases the prices of both (1) goods and services (e.g., raw materials, intermediate goods, final goods, labor, and other services) used during the current period and (2) assets (e.g., equities, real estate, and other investments) held for long-term gains. Under certain circumstances, however, inflation flows mainly through the asset channel. Then commonly used price indices such as the CPI, the GDP Deflator, or the PCE Deflator that measure changes in prices of goods and services do not record all of the price inflation that is actually occurring in the U.S. economy.

Economist and former Treasury official John B. Taylor developed the widely respected Taylor rule, which provides an objective guide for the Federal Reserve on how to adjust its target for the federal funds rate to redress deviations of the actual GDP growth rate from the potential GDP growth rate and the actual inflation rate with a targeted inflation rate (usually measured in terms of PCE Deflator). A comparison between the actual federal funds rate with the target federal funds rate implied by the Taylor rule allows Federal Reserve officials and the public to determine whether the monetary policy is too accommodative or too restrictive to achieve the Federal Reserve's twin goals of price stability and maximum sustained real GDP growth.

Comparing actual data to data from a Taylor rule-consistent simulation, Taylor found that the actual federal funds rate was significantly below the Taylor rule-consistent target federal funds rate from the second quarter of 2002 through the third quarter of 2006. He concluded that "a higher federal funds rate path (consistent with the Taylor rule) would have avoided much of the housing boom." He also

[11] A primary dealer is a bank or securities broker-dealer that may trade directly with the Federal Reserve. A primary dealer is required to make bids or offers when the Federal Reserve conducts open market operations, provide information to the Federal Reserve's trading desk, and to participate actively in Treasury auctions. The current primary dealers are:

1. BNP Paribas Securities Corp.
2. Banc of America Securities LLC
3. Barclays Capital Inc.
4. Bear, Stearns & Co., Inc.
5. Cantor Fitzgerald & Co.
6. Citigroup Global Markets Inc.
7. Countrywide Securities Corporation
8. Credit Suisse Securities (USA) LLC
9. Daiwa Securities America Inc.
10. Deutsche Bank Securities Inc.
11. Dresdner Kleinwort Wasserstein Securities LLC.
12. Goldman, Sachs & Co.
13. Greenwich Capital Markets, Inc.
14. HSBC Securities (USA) Inc.
15. J. P. Morgan Securities Inc.
16. Lehman Brothers Inc.
17. Merrill Lynch Government Securities Inc.
18. Mizuho Securities USA Inc.
19. Morgan Stanley & Co. Incorporated
20. UBS Securities LLC.



observed a strong negative correlation between changes in U.S. housing prices and changes in residential mortgage delinquency rates since 1980.[12]

Similarly, the Federal Reserve Bank of St. Louis also found that the federal fund rate was consistently below a Taylor-rule consistent rate from the third quarter of 2006 through the third quarter of 2006 (see above).[13] These findings provide empirical support for the conclusion that in retrospect the Federal Reserve pursued an overly accommodative monetary policy during the most frenzied years of housing price inflation.

III.B.2.b. Macro-Economic Supply Factors in U.S. Credit Markets

Macro-economic supply factors in U.S. credit markets involving globalization, stable inflationary expectations, and the foreign exchange policies of the PRC and other developed and developing economies in east, southeast, and south Asia restrained medium- and long-term U.S. interest rates during the first half of this decade.

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[12] John B. Taylor, "Housing and Monetary Policy," Presentation to Jackson Hole Conference (September 2007). Found at http://www.stanford.edu/~johntayl/Housing%20and%20Monetary%20Policy--Taylor--Jackson%20Hole%202007.pdf.

[13] *Monetary Trends*, Federal Reserve Bank of St. Louis (May 2008, Data updated through May 1, 2008), pg. 10. Found at: http://research.stlouisfed.org/publications/mt/page10.pdf.

III.B.2.b.i. Stable Inflationary Expectations due to Globalization and the Federal Reserve's Anti-Inflation Credibility

Globalization refers to the simultaneous liberalization of international trade and investment and the integration of the previously autarkic economies of the PRC, the former Soviet Bloc, and India with the rest of the world. Globalization greatly intensified price competition among tradable goods and services in the United States. The "China price" (i.e., price for manufactured goods from the PRC) effectively capped the prices that competing U.S. firms could charge for similar manufactured goods for a decade. To remain competitive, U.S. firms pressed their suppliers for lower prices and invested heavily in productivity-enhancing, labor-substituting equipment, especially computers, computerized machinery, and software. By reducing the demand for workers with routine skills, computer-related business investments moderated the real growth of labor compensation that one would have otherwise expected given the strength of the expansions that began in March 1991 and November 2001.[14] Consequently, globalization had first, second, and third order effects that moderated inflation in the prices of goods and services. Thus, globalization helped to divert any inflationary effects of monetary policy into higher asset prices, especially housing.

The appearance of price stability (as measured by the CPI, GDP Deflator, and PCE Deflator) from globalization reinforced the Federal Reserve's hard-won credibility from its successful disinflationary monetary policy during the 1980s and early 1990s. Consequently, U.S. lenders had stable inflationary expectations during the first half of this decade. Because of these stable inflationary expectations, U.S. lenders did not seek higher inflation premiums in medium- and long-term interest rates when the Federal Reserve's monetary policy deviated from the Taylor rule from the second quarter of 2002 to the third quarter of 2006.

III.B.2.b.ii. Foreign Exchange Policies of the People's Republic of China and Other Asian Governments

The foreign exchange policies of the People's Republic of China and the shadow foreign exchange policies by other developed and developing economies in east, southeast, and south Asia following the Asian Financial Crisis of 1997-98 also helped to suppress medium- and long- U.S. interest rates. The PRC intervened heavily in foreign exchange markets to maintain a fixed exchange rate between the PRC's renminbi and the U.S. dollar through July 20, 2005 and to suppress the appreciation of the renminbi relative to the dollar thereafter. By reducing the cost of Chinese labor, this policy encouraged inward foreign direct investment by foreign multinational firms in the labor-intensive manufacturing of low-tech goods and the labor-intensive final assembly of medium-tech consumer goods from imported parts.

Governments in other developed and developing Asian economies generally mimicked the PRC's foreign exchange to maintain the price competitiveness of their manufactured exports with China's. By buying U.S. dollars and selling their currencies, central banks in the PRC, India, Indonesia, Japan, Malaysia, South Korea, Taiwan, and Thailand added $2.06 trillion to their foreign exchange reserves from December 31, 1997 to the peak of the U.S. housing bubble on June 30, 2006. About 2/3 of these foreign exchange reserves were invested in U.S. dollar-denominated debt securities, mainly U.S. Treasuries and U.S. Agencies. Massive purchases by these central banks bid-up the prices of U.S. debt securities and consequently held down medium- and long-term U.S. interest rates.

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[14] Robert P. O'Quinn, *Information Technology Increases Earnings Differential and Drives Need for Education*, Research Report 110-6 (Prepared for the Joint Economic Committee, 110th Cong., 2nd sess., March 2008). Found at http://www.house.gov/jec/publications/110/rr110-6.pdf.

III.B.3. Effects of the Credit Expansion on Housing Prices

In summary, the Federal Reserve's overly accommodative monetary policy from the second quarter of 2002 to the third quarter of 2006 reduced short-term U.S. interest rates. Flush with low cost funds, banks, other depository institutions, and highly leveraged non-depository financial institutions eagerly expanded credit through loans and investments in debt and derivative securities. At the same time, stable inflationary expectations (arising from globalization and successful disinflation during the 1980s and early 1990s) and the massive purchases of U.S. debt securities by Asian central banks helped to keep medium- and long-term U.S. interest rates low.

Housing is the most interest rate sensitive sector of the U.S. economy. Low long-term U.S. interest rates during the first half of this decade further stimulated the already strong demand for housing among households, while financial institutions enthusiastically supplied the necessary residential mortgage credit. Along with micro-economic factors relating to financial services that will be discussed in part two of this study, an overly accommodative monetary policy and macro-economic supply factors in U.S. credit markets fueled a massive credit expansion that helped to inflate an unsustainable bubble in U.S. housing prices.

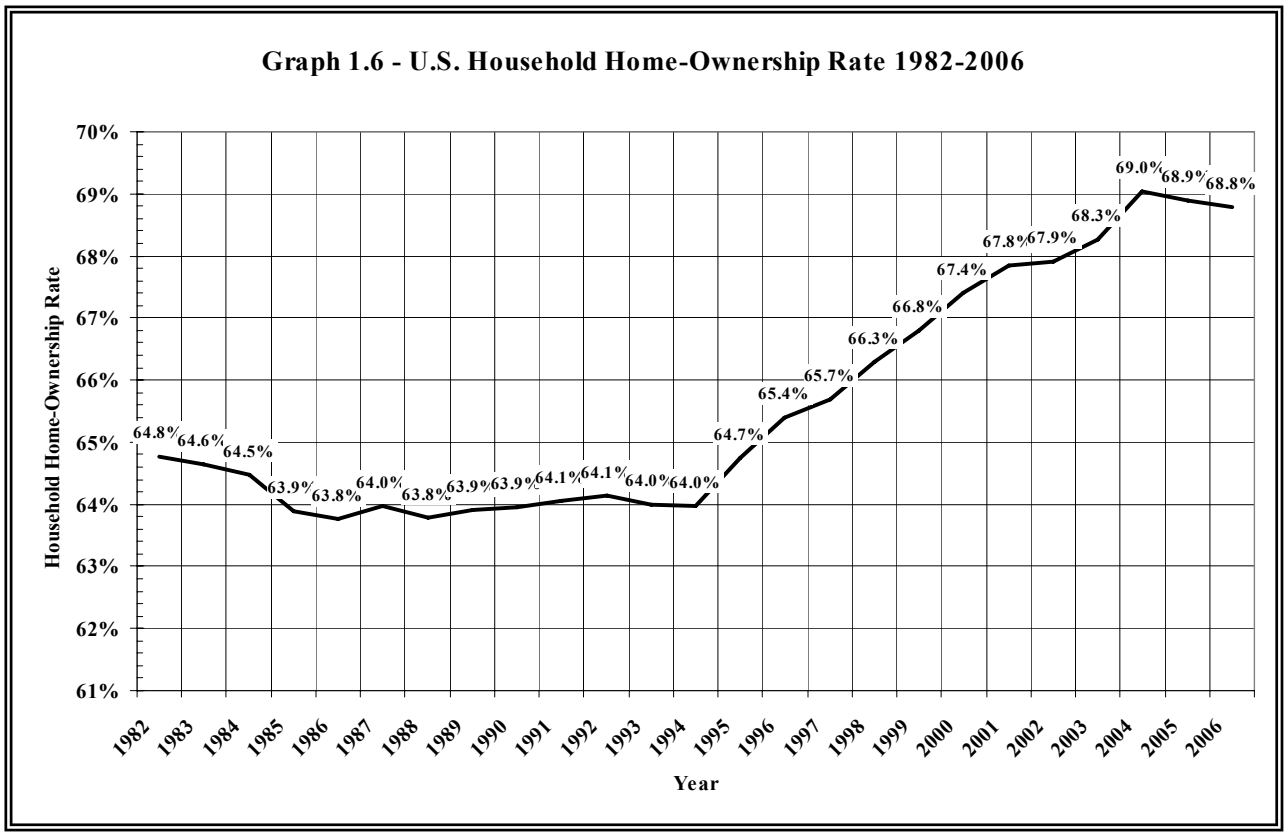
III.C. NEW ECONOMY

III.C.1. Promotion of Home Ownership to Financially Marginal and Minority Households without Regard to the Suitability of Home Ownership to Their Economic Situation

For decades, federal policymakers, realtors, developers, contractors, mortgage bankers, Fannie Mae, and Freddie Mac have promoted home-ownership as the fulfillment of the "American dream." Specifically, federal policymakers encouraged home-buying by:

- Enacting preferential income tax policies to reduce the cost of home ownership relative to renting (e.g., the deductibility of residential mortgage interest payments and real estate taxes without the inclusion of imputed rental value of owner-occupied housing as taxable income),[15]
- Chartering specialized financial institutions to channel funds to housing (e.g., savings banks, Federal Home Loan Banks, Fannie Mae, and Freddie Mac), and
- Offering FHA-insured residential mortgage loans with preferential interest rates and terms to financially marginal households.

[15] The mortgage interest and property tax deductions were introduced in the *Revenue Act of 1913*, which is also known as the *Underwood-Simmons Act* (ch. 16, 38 Stat. 116, October 3, 1913). Tax neutrality between home ownership and renting could be achieved either by (1) eliminating the deductibility of residential mortgage interest expense and related property tax payments, or by (2) adding an imputation for the rental value of owner-occupied housing to taxable income and then allowing the same deductions for an owner-occupied house as a rental house (including depreciation, residential mortgage interest payments, and property tax payments).



Both major political parties have promoted home ownership among financially marginal and minority households. In 1994, President Bill Clinton declared, "More Americans should own their own homes, for reasons that are economic and tangible, and reasons that are emotional and intangible, but go to the heart of what it means to harbor, to nourish, [and] to expand the American Dream."[16] According to Department of Housing and Urban Affairs (HUD) documents, Clinton's national home ownership strategy sought to "reduce down payment requirements and interest costs by making terms more flexible" and "increase the availability of alternative financing products in housing markets throughout the country."[17]

To pursue this strategy, the Clinton administration pressed depository institutions and mortgage banks to lower their credit standards and reduce down payment requirements. The Clinton administration promoted exotic alternatives to traditional fixed-rate fully amortizing residential mortgage loans, such as interest-only residential mortgage loans and negatively amortizing residential mortgage loans. These policies were intended to help financially marginal and minority households that could not qualify for traditional mortgage loans under normal credit standards to buy homes and thereby to increase the home ownership rate. The Bush administration left these Clinton administration policies in place.

The *Federal Housing Enterprises Financial Safety and Soundness Act* (also known as *the GSE Act*) was enacted in 1992.[18] Among other things, this act established the Office of Federal Housing Enterprise Oversight (OFHEO) in the Department of Housing and Urban Development as the federal regulator for Fannie Mae and Freddie Mac. The GSE Act also required the Department of Housing and

[16] Department of Housing and Urban Development, *Urban Policy Brief* (August 1995), pg. 1. Found at http://www.huduser.org/publications/txt/hdbrk2.txt.
[17] Ibid., pg. 9.
[18] 12 U.S.C. 4501 et seq.

Urban Development (HUD) to establish three affordable housing goals (Low- and Moderate Income, Special Affordability, and Underserved Areas) for Fannie Mae and Freddie Mac to help financially marginal and minority households to purchase homes. HUD has issued three sets of progressively more ambitious affordable housing regulations under the GSE Act: December 1, 1995 for the years 1996-2000; October 31, 2000 for the years 2001-2004; and November 2, 2004 for the years 2005-2008.

Before 2000, Fannie Mae and Freddie Mac purchased relatively few subprime residential mortgage loans for securitization. That year, Fannie Mae and Freddie Mac purchased about 12 percent of all subprime residential mortgage loans originated (mainly Alt-A) for securitization.[19] To meet their more ambitious affordable housing goals in the 2000 affordable housing regulations under *GSE Act*, Fannie Mae and Freddie Mac stepped-up their purchases of the AAA-rated tranches of subprime-related CMOs issued by investment banks during the 2001-2005 period. By increasing the demand for these subprime-related derivative securities, Fannie Mae and Freddie Mac unwittingly encouraged the origination of subprime residential mortgage loans by mortgage banks and accelerated the private issuance of subprime-related RMBS and subprime-related CMOs by investment banks.

Collectively, these policies encouraged many financially marginal and minority households to buy housing during the bubble. The home ownership rate, which had averaged 64.3 percent of all households from 1982 to 1997, thereafter climbed to a peak of 69.0 percent in 2004 (see Graph 1.6).[20] Because of frequent moves, poor credit histories, lack of financial assets, and income fluctuations, many of these new home owners were unprepared or unable to discharge their mortgage obligations over time. In the end, the unintended consequences of these well-meaning policies designed to help financially marginal and minority households to buy homes were (1) leaving these households with unaffordable subprime residential mortgage loans, (2) making these households vulnerable to foreclosure after the housing bubble burst, (3) undermining the global financial system, and (4) causing a serious downturn in U.S. economic growth.

III.C.2. Few Official Warnings

In free market economy, government officials cannot prevent individuals and firms from making foolish investment decisions. However, government officials should publicly warn individuals, especially those in financial marginally households, about the risks that they assume when investing in the object of speculation during an asset bubble. Such moral suasion is not unprecedented. In 2004, for example, the Reserve Bank of Australia warned Australian households that the rapid increase in residential mortgage debt was fueling an unsustainable bubble in Australian housing prices.

As early as 2000, economist Robert Shiller, who had warned investors about a high-tech stock bubble in the late 1990s, began issuing warnings about the inflation of an unsustainable bubble in the U.S. housing market. Instead of warning American households that it might not be the best time to buy a home, officials at the Federal Reserve, the Treasury, and HUD ignored or downplayed troublesome signs of a housing bubble.

III.C.3. Cultural Re-enforcement of the Housing Mania

Moreover, an explosion of television shows and even entire cable networks that promoted home-buying, remodeling, and speculation in housing (e.g., *Flip This House* and *Sell This House* on A&E, *Flip That House* on the Learning Channel, and the Home and Garden Network) convinced many households that:

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[19] Kenneth Temkin, Jennifer E. H. Johnson, and Diane Levy, *Subprime Markets, the Role of GSEs, and Risk-Based Pricing*, Urban Institute Report prepared for the Department of Housing and Urban Development (March 2002). Found at http://www.huduser.org/Publications/pdf/subprime.pdf.

[20] Census Bureau/Haver.

- Housing was an investment rather than an expense;
- Housing was "safe" investment because housing prices never go down;
- The use of leverage increased the potential for high rates of return;
- Households could safely stretch their finances to buy or remodel housing;
- Households that waited to save a substantial down payment before buying housing risked being priced out of the market; and
- "Flipping" was a good strategy to make money.

This media promotion of housing as an investment caused a surge in the speculative demand for housing during the first half of this decade.

III.D. SWINDLES

Not surprisingly, swindlers took advantage of the unsuspecting during the housing bubble. The swindles included:

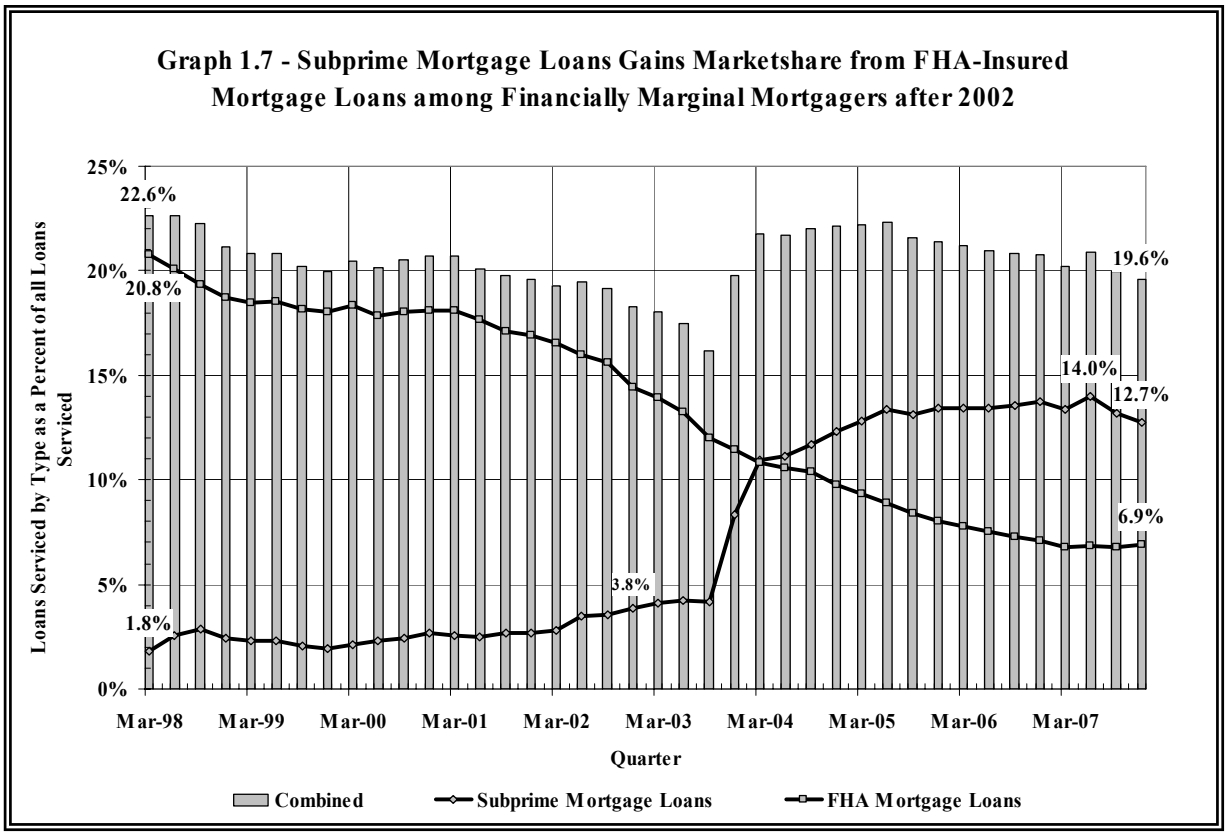
- Households that misrepresented their financial condition or committed other frauds to qualify for residential mortgage loans;
- Mortgage bankers that knowingly extended residential mortgage loans to unqualified households because securitization transferred the likely losses from poor credit standards and risky underwriting practices to the buyers of the derivative securities into which these loans were placed;
- Mortgage bankers that earned higher fees from issuers by pushing households that could qualify for prime residential mortgage loans to take out subprime residential mortgage loans instead; and
- Home builders and realtors that boosted their sales by encouraging households to take out subprime residential mortgage loans to speculate on housing.

Since the swindles associated with the subprime mortgage debacle have discussed extensively elsewhere, this study will not detail these swindles further.

III.E. OVERTRADING, REVULSION, AND DISCREDIT

Since the 1930s, financially marginal households that could not qualify for prime residential mortgage loans because of their inability to make a substantial down-payment, their high debt service-to-income ratios, their limited net worth, or their poor credit histories have obtained insured mortgage loans through the Federal Housing Administration (FHA) or Veterans Administration (VA) programs. For decades, most of the residential mortgage loans originated for financially marginal households were FHA-insured or to a lesser extent VA-insured.

During the housing bubble, the overall share of residential mortgage loans going to financially marginal households that could not obtain prime residential mortgage loans relatively remained stable. However, private subprime residential mortgage loans displaced FHA-insured residential mortgage loans as the primary source of mortgage credit for these households.

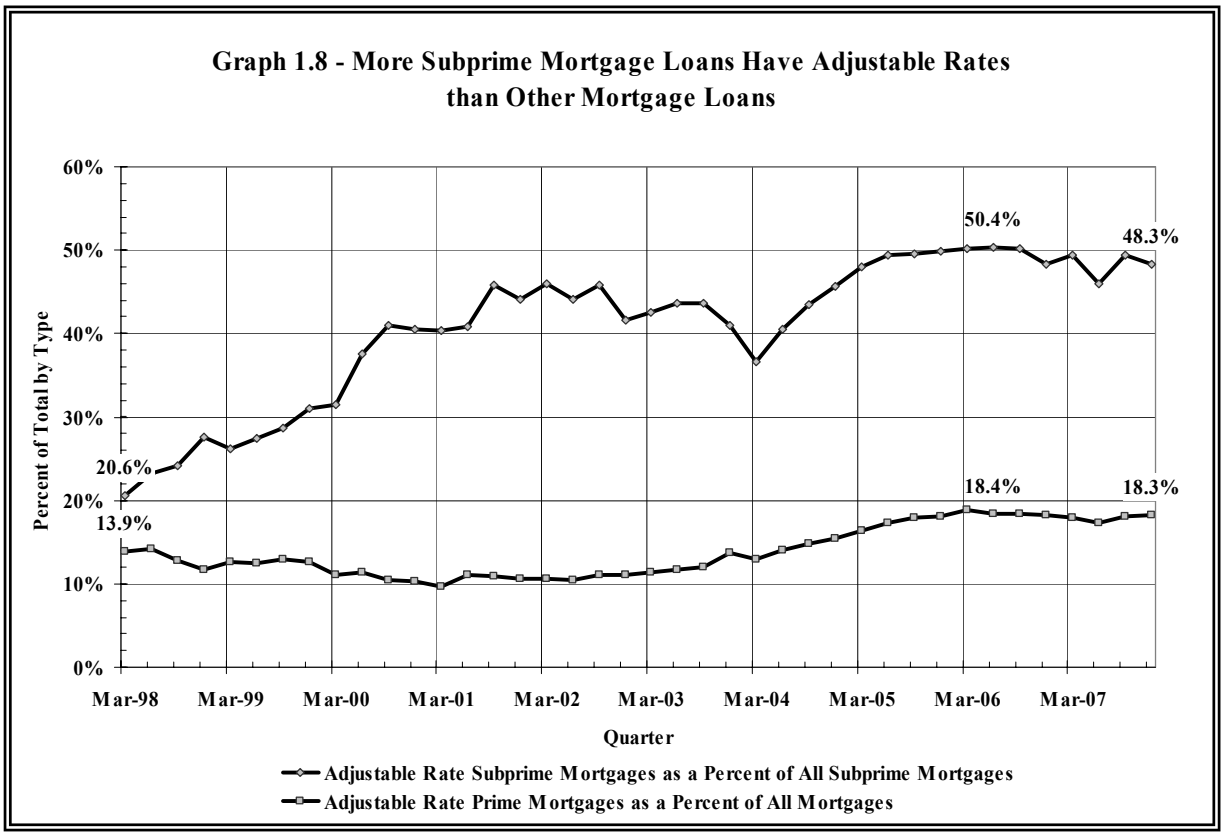


Several factors contributed to explosive market share growth in private subprime residential mortgage loans relative to FHA-insured residential mortgage loans. First, the decision of Fannie Mae and Freddie Mac to increase their purchases of privately issued subprime-related RMBS and AAA-tranches of subprime-related CMOs to meet their affordable housing goals under the 2000 regulations expanded the available funding for private subprime residential mortgage loans. Second, investment banks relaxed the credit standards for including subprime residential mortgage loans in RMBS and CMOs relative to the credit standards for FHA- or VA-insured residential mortgage loans. Mortgage banks began extending "no down payment" subprime residential mortgage loans and "no documentation" Alt-A residential mortgage loans, while the FHA and VA continued to require a down payment of at least 3 percent and the verification of income, assets, and liabilities to insure residential mortgage loans.

As a result, the market share of private subprime residential mortgage loans grew from 3.8 percent of all residential mortgage loans serviced in the fourth quarter of 2002 to a peak of 14.0 percent in the second quarter of 2007 before falling to 12.7 percent in fourth quarter of 2007. In contrast, the market share of FHA-insured residential mortgage loan market share fell steadily during the bubble from 20.8 percent in the first quarter of 1998 to a trough of 6.9 percent in the fourth quarter of 2007 (see Graph 1.7).[21]

To qualify as many financially marginal households as possible, mortgage banks and brokers promoted adjustable-rate subprime residential mortgage loans. These loans frequently had "teaser" provisions to reduce monthly payments during the first two years. These teasers included periods of low fixed interest rates, interest-only payments, or negative amortization. The share of adjustable-rate subprime mortgage loans increased from 20.6 percent of all subprime residential mortgage loans serviced in the first quarter of 1998 to 50.4 percent at the peak of the housing bubble in the second quarter of 2006.

[21] Mortgage Bankers Association/Haver.



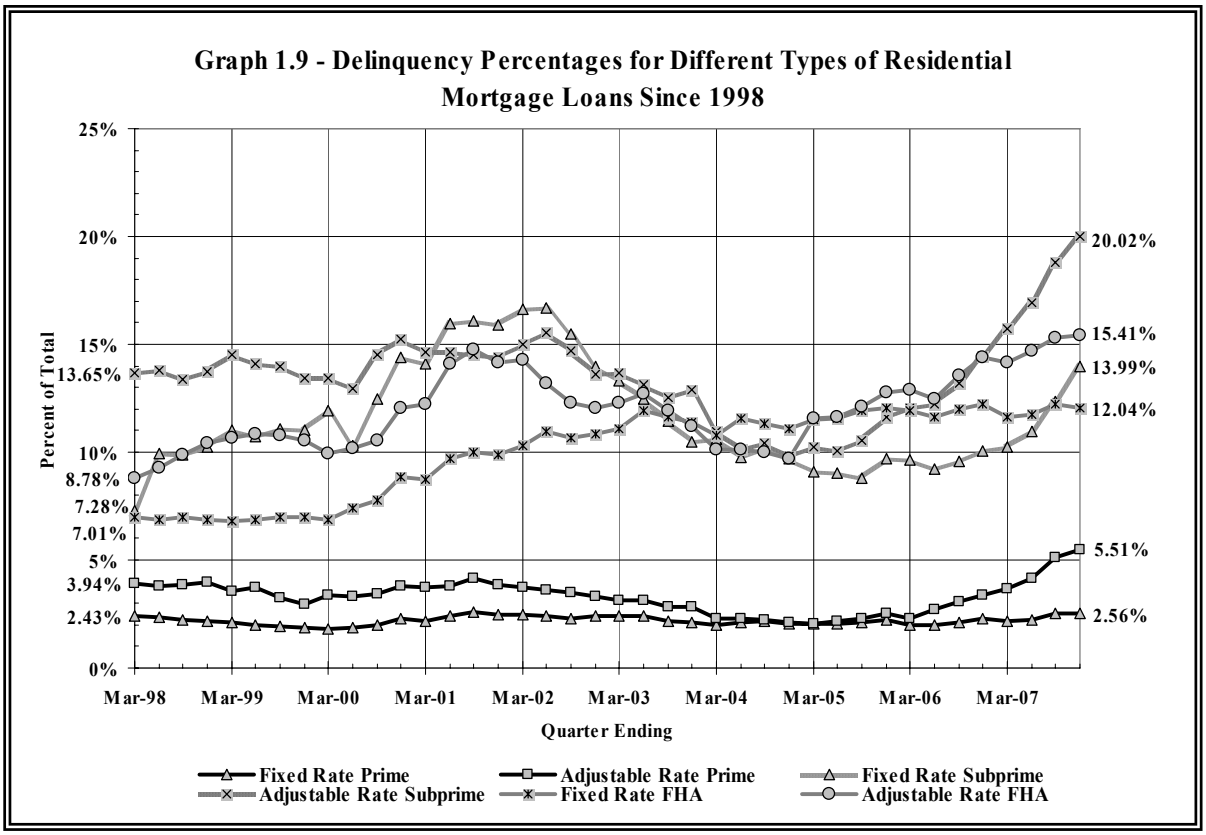
In contrast, the share of adjustable-rate prime residential mortgage loans as a percent of all prime residential mortgage loans increased modestly from 13.9 percent to 18.4 percent during the same period (see Graph 1.8).[22] As a result, interest rate risk became concentrated among financially marginal households that were least able to shoulder it.

III.E.1. Rising Delinquency and Foreclosure Rates among Subprime Borrowers

Before housing prices peaked, subprime borrowers could generally sell their homes at a profit or refinance them with another residential mortgage loan before the teasers expired, the interest rates adjusted and the monthly payments increased. Essentially, both subprime borrowers and their creditors relied on ever increasing housing prices rather than the borrower's income to repay subprime residential mortgage loans. After the peak, many subprime borrowers were unable to sell their homes or refinance their subprime residential mortgage loans. Subprime borrowers with adjustable-rate loans were especially hard hit as their interest rates reset and other "teaser" provisions that had lower monthly payments during the first two years expired. Delinquency and foreclosure rates for subprime residential mortgage loans soared.

From the fourth quarter of 2004 to fourth quarter of 2007, the delinquency rate for subprime adjustable-rate residential mortgage loans exploded from 9.83 percent to 20.02 percent, while the delinquency rate for subprime fixed-rate residential mortgage loans rose from 9.72 percent to 13.99 percent.[23] Delinquency rates for FHA-insured fixed-rate residential mortgage loans and FHA-insured adjustable-rate residential mortgage loans displayed similar increases. In contrast, the delinquency rates

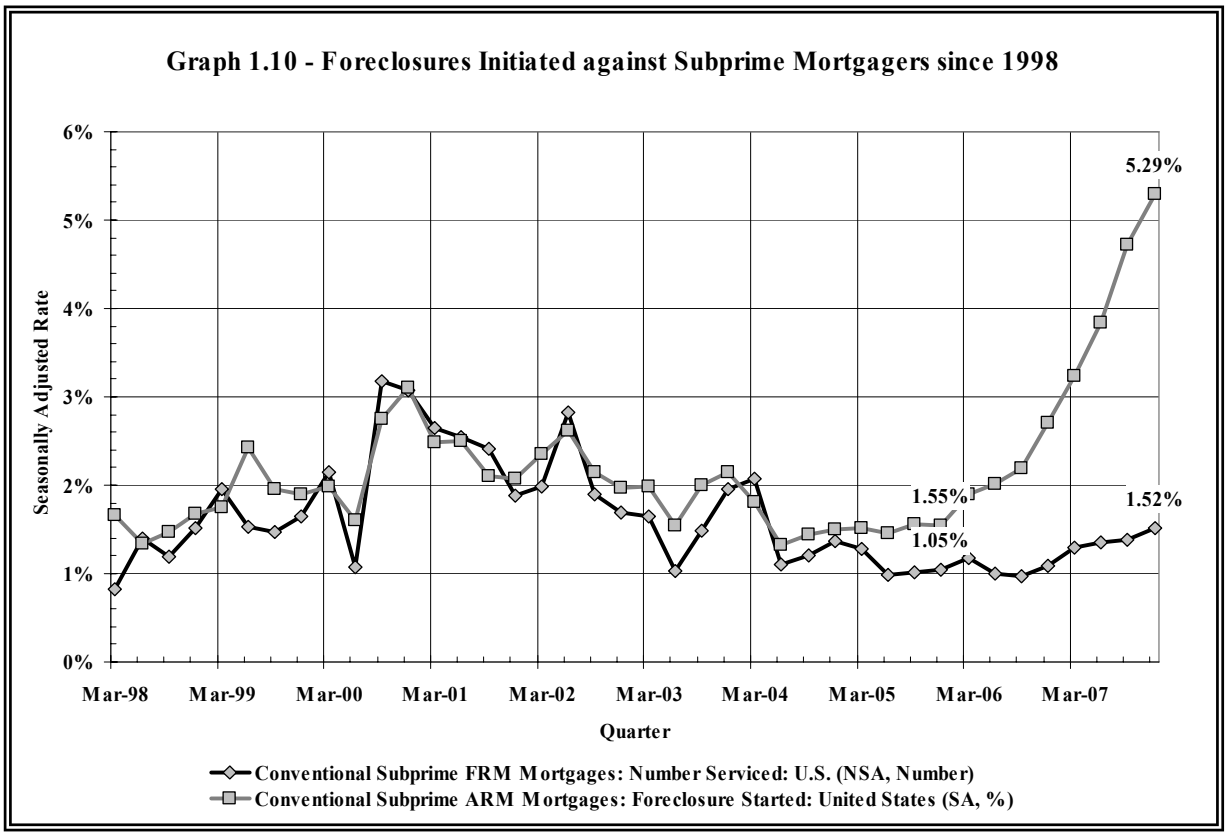
[22] Mortgage Bankers Association/Haver.
[23] Mortgage Bankers Association/Haver.



for both prime fixed-rate residential mortgage loans and prime adjustable-rate residential mortgage loans did increase, but remained well below comparable rates for both subprime and FHA-insured residential mortgage loans. The delinquency rate for prime adjustable-rate residential mortgage loans increased from 2.11 to 5.51 percent, while the delinquency rate for prime fixed-rate residential mortgage loans edged up from 2.04 percent to 2.56 percent (see Graph 1.9).[24]

From 2000 to 2005, foreclosure initiation rates gradually declined on both subprime fixed-rate residential mortgage loans and subprime adjustable-rate residential mortgage loans. However, delinquency initiations rates have subsequently risen rather dramatically. The foreclosure initiation rate on fixed-rate subprime borrowers increased from 1.05 percent in the fourth quarter of 2005 to 1.52 percent in the fourth quarter of 2007. More ominously, the foreclosure initiation rate for adjustable-rate subprime borrowers jumped from 1.55 percent in the fourth quarter of 2005 to 5.29 percent in the fourth quarter of 2007 (see Graph 1.10).[25]

[24] Mortgage Bankers Association/Haver.
[25] Mortgage Bankers Association/Haver.



III.E.2. Declining Value of Subprime CMOs

The rapid increase in delinquency and default rates reduced the value of subprime-related RMBS and tranches in subprime-related CMOs. The Markit ABX Indexes are indexes of credit default swaps[26] for twenty CMOs issued during preceding six months. Market participants use this index as a reference for the valuing tranches in specific CMOs. Each index is stated in terms of a percent of the face value of the underlying collateral. The ABX indexes in Table 1.1 depict declining implied values of subprime-related CMO tranches as delinquency and default rates among subprime borrowers rose. For example, Table 1.1 indicates that the implied value of the A tranche of any CMO in ABX 06(1) index fell from 84 percent of the face value of the underlying collateral in such CMO on September 7, 2007 to 33 percent on March 14, 2008.

Under Generally Accepted Accounting Principles, the owner of a tranche in subprime-related CMO must write down its value on the owner's financial statement by the loss implied from changes in the ABX indexes. This form of fair value accounting is often referred to as "mark-to-market" or "mark-to-model." While mark-to-market accounting and its economic effects will be discussed in detail in part two of this study, the last line in Table 1.1 displays the OECD's calculation of the global credit losses implied from a mark to the ABX index model on tranches of subprime-related CMOs during the past seven months.

[26] Credit default swaps (CDSs) are the most common form of unfunded credit derivatives. In a physical CDS, the seller agrees to purchase a defaulted reference asset at its face value from the protection buyer. In a cash CDS, the seller agrees to pay the difference between the face value of the defaulted asset and its current market value. A CDS is functionally equivalent to financial guaranty insurance.

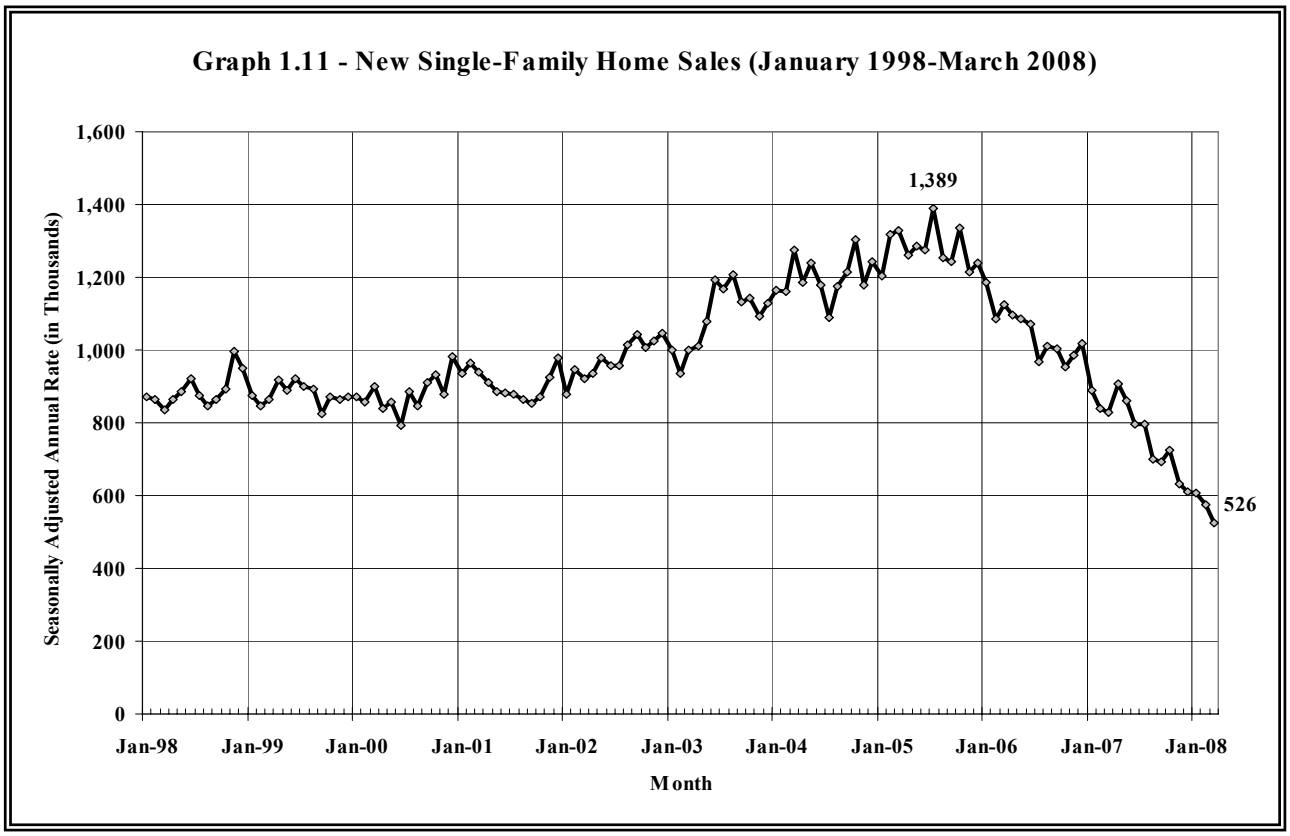
Table 1.1 – ABX Indexes and Implied Losses on Subprime-Related CMOs (ABX Indexes in Percent of the Face Value of the Underlying Collateral, Implied Losses in Billions)						
	7-Sep-07	19-Oct-07	30-Nov-07	11-Jan-08	22-Feb-08	14-Mar-08
ABX 06(1)						
AAA	98	98	95	94	93	86
AA	95	93	86	85	78	64
A	84	75	61	59	50	33
BBB	65	47	34	31	25	16
BBB-	57	38	30	25	19	15
Equity	0	0	0	0	0	0
ABX 06(2)						
AAA	97	94	87	84	78	71
AA	88	77	62	60	50	37
A	63	46	40	34	22	17
BBB	47	26	21	19	15	10
BBB-	40	24	19	18	13	10
Equity	0	0	0	0	0	0
ABX 07(1)						
AAA	95	91	77	73	65	56
AA	77	65	47	40	31	22
A	50	34	28	24	14	11
BBB	36	23	20	18	12	9
BBB-	33	21	19	17	12	9
Equity	0	0	0	0	0	0
ABX 07(2)						
AAA	95	92	72	70	63	52
AA	86	70	39	40	30	22
A	61	43	32	28	22	17
BBB	42	26	21	24	17	13
BBB-	39	24	21	22	16	13
Equity	0	0	0	0	0	0
Implied Loss (OECD)	**$292**	**$368**	**$568**	**$602**	**$715**	**$887**

Source: OECD, pg. 5.

III.E.3. Subprime-Related Credit Losses

In a study presented at the annual U.S. Monetary Policy Forum sponsored by the Initiative on Global Markets at the University of Chicago Graduate School of Business and the Rosenberg Institute for Global Finance at the Brandeis International Business School on February 29, 2008, Greenlaw et al. used a variety of methods to estimate the global credit losses from subprime residential mortgage loans, subprime-related RMBS, and subprime-related CDOs. The authors found that global subprime-related credit losses will be $400 billion.[27]

[27] David Greenlaw, Jan Hatzius, Anil K. Kashyap, and Hyun Song Shin, *Leveraged Losses: Lessons from the Mortgage Market Meltdown*, Presented at the U.S. Monetary Policy Forum Conference (February 29, 2008).



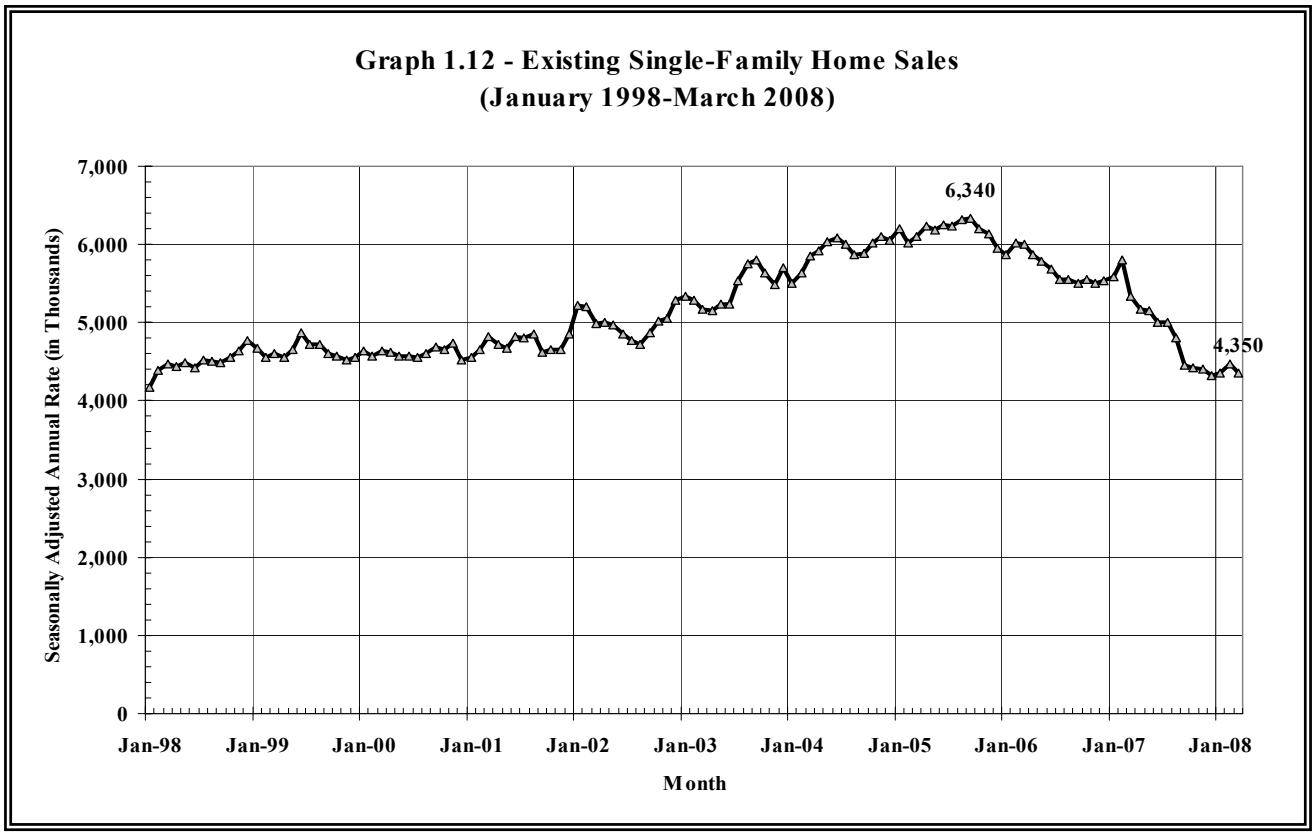
In April 2008, the OECD used a default loss model to estimate global subprime-related credit losses. Assuming a 40 percent recovery, the OECD forecast global subprime-related credit losses will be $422 billion.[28] The OECD discounted higher market assessments of $887 billion implied losses from mark to ABX index model and $702 billion implied from the reduction in market capitalization of major banks with subprime exposure because of price distortion during the current liquidity crisis.[29]

The Greenlaw et al. and OECD estimates represent only global subprime-related credit losses. The IMF, which does not break out subprime-related credit losses, forecasts the global credit losses all residential mortgage loans, RMBS, and CMOs of $565 billion for all residential mortgage loans, RMBS, and CMOs.[30] The global credit losses for all loans, debt securities, and derivative securities that have occurred as a result of the global financial crisis that the U.S. housing bubble triggered on August 9, 2007 are likely far higher.

III.E.4. Housing Sales, Construction, and Construction-Related Employment

As housing prices neared their top, sales of new single-family homes peaked at a seasonally adjusted annual rate of 1.389 million in July 2005 and have subsequently fallen by 62.1 percent to a seasonally adjusted annual rate of 526,000 in March 2008 (See Graph 1.11).[31] Existing single-family home sales peaked at a seasonally adjusted annual rate of 6.340 million in September 2005 and have

[28] OECD, pp. 7-11.
[29] Ibid., pp. 5-6.
[30] *Global Financial Stability Report* (April 2008), pg. 50.
[31] Census Bureau/Haver. Author calculated percent change.



subsequently fallen by 31.4 percent to a seasonally adjusted annual rate of 4.350 million in March 2008 (see Graph 1.12).[32]

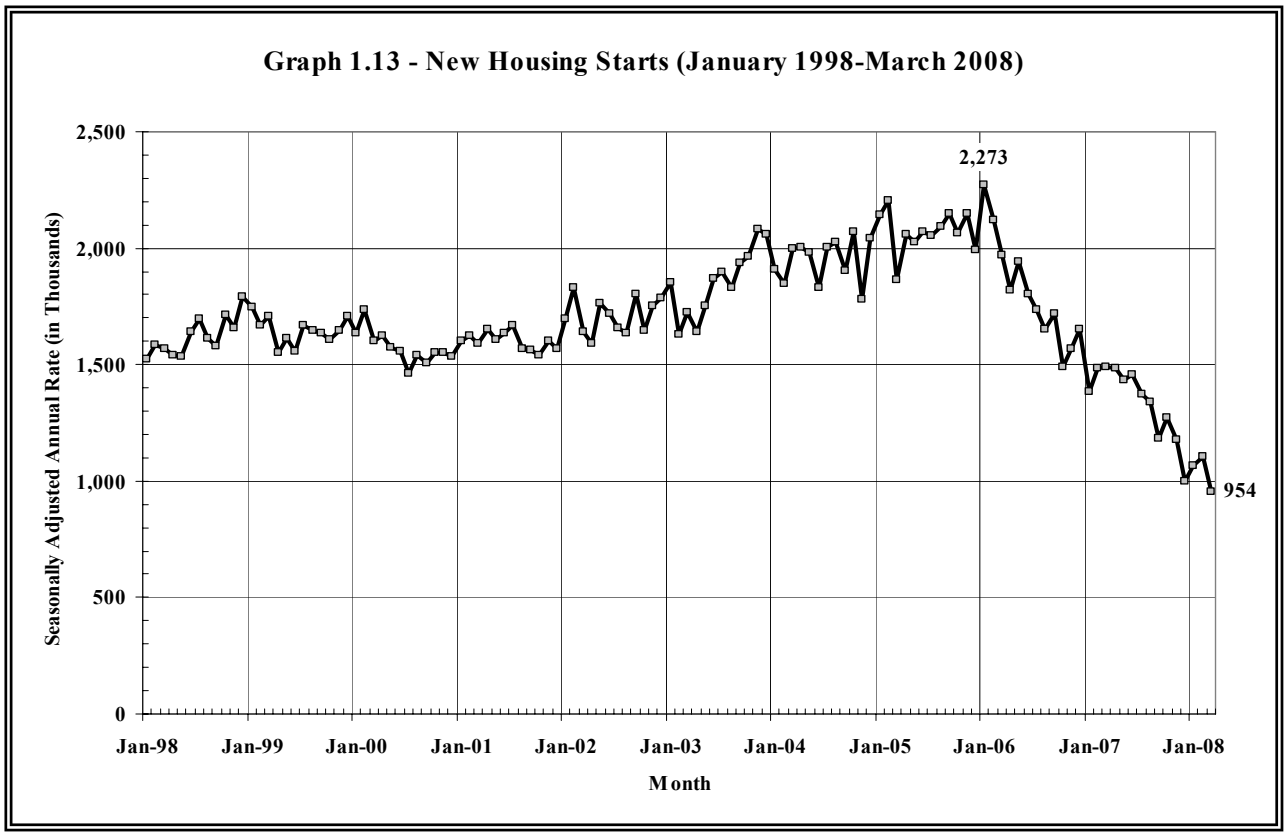
New housing starts also peaked at a seasonally adjusted annual rate of 2.273 million in January 2006 and have subsequently fallen by 58.0 percent to a seasonally adjusted annual rate of 954,000 in March 2008 (see Graph 1.13).[33] As a result, payroll employment in residential construction and related specialty trades peaked at 3.444 million in March 2006 and has subsequently fallen by 13.6 percent to 2.977 million in April 2008.[34]

III.E.5. Bankruptcies among Mortgage Banks

During 2007, at least twenty-five mortgage banks that had specialized in originating subprime residential mortgage loans filed for bankruptcy. On April 2, 2007, New Century Financial, reportedly the largest mortgage bank that had specialized in originating subprime residential mortgage loans, filed for Chapter 11 bankruptcy. On March 26, 2008, a report of the bankruptcy court examiner found "significant improper and imprudent practices related to its loan originations, operations, accounting and financial reporting processes," and alleged that the auditor KPMG helped New Century to conceal its financial problems during 2005 and 2006.

However, failures and near failures among mortgage banks were not confined to those that specialized in the subprime segment. American Home Mortgage Investment Corporation, the tenth largest mortgage bank with a 3 percent share of the origination market, filed for Chapter 11 bankruptcy on August 6, 2007. Soon afterwards, Countrywide Financial, which operated the largest mortgage bank with

[32] National Association of Realtors/Haver. Author calculated percent change.
[33] Census Bureau/Haver. Author calculated percent change.
[34] Bureau of Labor Statistics/Haver. Author calculated percent change.



a 17 percent share of the origination market, a federal saving bank, an investment bank affiliate (which is a primary dealer), and insurance affiliate, came under extreme financial stress when a run began on its saving bank. The major credit rating agencies slashed Countrywide's credit ratings, curtailing Countrywide's access to commercial paper and bond markets and raising its interest costs. On August 16, 2007, Countrywide narrowly avoid bankruptcy after securing an emergency $11.5 billion line of credit from a consortium of forty commercial banks. On August 23, 2007, Bank of America agreed to inject $2 billion of new capital into Countrywide in exchange for preferred stock. On January 11, 2008, Bank of America agreed to buy Countrywide for $4.1 billion, about one-sixth of its market value one year earlier.

IV. CONCLUSION

This JEC study examines the inflation, popping, and deflation of an unprecedented housing bubble in the United States and the resulting global financial crisis through a comparison with Kiddleberger's asset bubble framework. Part one of this study reviewed stage one through stage five as they apply to the U.S housing bubble.

A number of well-intentioned, but misguided federal policies and macro-economic factors in U.S. credit markets helped to inflate housing prices. In descending order of importance, they include:

- The Federal Reserve's monetary policy was overly accommodative from the second quarter of 2002 through the third quarter of 2006 when compared with the Taylor rule. By lowering the cost of funds for banks, other depository institutions, and highly leveraged non-depository financial institutions, this monetary policy encouraged these financial institutions to expand credit aggressively.
- At the same time, macro-economic supply factors in U.S. credit markets reinforced this overly accommodative monetary policy by restraining medium- and long-term U.S. interest rates during the first half of this decade. Housing is the most interest rate-

sensitive sector of the U.S. economy. Along with micro-economic factors relating to financial services, low long-term interest rates further stimulated the already strong demand for housing among households, while financial institutions enthusiastically supplied the necessary residential mortgage credit.

- Globalization greatly intensified the price competition among tradable goods and services in the United States. This helped to channel the inflationary effects of monetary policy away from the prices of goods and services and into asset prices, especially housing. The inflation-suppressing effects of globalization on the prices of goods and services as recorded by CPI, the GDP Deflator, and the PCE Deflator combined with the Federal Reserve's successful disinflationary monetary policy during the 1980s and early 1990s combined to foster stable inflationary expectations. In turn, stable inflationary expectations dissuaded U.S. lenders from seeking higher inflation premiums in medium-term and long-term U.S. interest rates.
- Since the Asian Financial Crisis of 1997-98, the People's Republic of China has intervened heavily in foreign exchange markets to maintain a fixed exchange rate between the Chinese renminbi and the U.S. dollar through July 20, 2005 and to suppress the appreciation of the renminbi relative to the dollar thereafter. Other Asian governments mimicked the PRC's foreign exchange policy to maintain the price competitiveness of their manufactured exports with China's. By buying U.S. dollars and selling their currencies simultaneously, central banks in the PRC, India, Indonesia, Japan, Malaysia, South Korea, Taiwan, and Thailand added $2.06 trillion to their foreign exchange reserves from December 31, 1997 to the peak of the U.S. housing bubble on June 30, 2006. About 2/3 of these newly acquired foreign exchange reserves were invested in U.S. dollar-denominated debt securities, mainly U.S. Treasuries and U.S. Agencies. Massive purchases by these central banks bid-up the prices of U.S. debt securities and consequently held down medium- and long-term U.S. interest rates

- Federal policymakers adopted a number of policies to promote home ownership especially among financially marginal and minority households without regard to the suitability of home ownership for their economic circumstances or the conditions in the housing market.
- Federal policymakers failed to warn the public that the housing bubble was unsustainable and to discourage financially marginal households from taking on excessive non-conventional mortgage debt to buy homes as housing prices inflated.

Part two of this JEC study will scrutinize Kindleberger's stage two – credit expansion (micro-economic factors relating to financial services) – and stage six – financial panic and crisis management as they apply to the global financial crisis that arose on August 9, 2007 from the popping of the U.S. housing bubble. Finally, part three of this study will examine stage seven – aftermath – and then will offer some lessons learned for policymakers.

Robert P. O'Quinn
Senior Economist

APPENDIX

Table A-1 – U.S. Credit Markets – Outstanding Debt Securities ($ in billions & as a percent of GDP)
Year-end 1997-2007

EOY	Total U.S. Treasury	% GDP	*Bills*	*% GDP*	*Notes*	*% GDP*	*Bonds*	*% GDP*	*TIPS*	*% GDP*	Municipal	% GDP
1997	**$3,456.8**	**41.6%**	***$715.4***	***8.6%***	***$2,106.0***	***25.4%***	***$587.3***	***7.1%***	***$33.0***	***0.4%***	**$1,348.5**	**16.2%**
1998	**$3,355.5**	**38.4%**	***$691.0***	***7.9%***	***$1,960.7***	***22.4%***	***$621.2***	***7.1%***	***$67.6***	***0.8%***	**$1,402.7**	**16.0%**
1999	**$3,281.0**	**35.4%**	***$737.1***	***8.0%***	***$1,784.5***	***19.3%***	***$643.7***	***6.9%***	***$100.7***	***1.1%***	**$1,457.2**	**15.7%**
2000	**$2,966.9**	**30.2%**	***$646.9***	***6.6%***	***$1,557.3***	***15.9%***	***$626.5***	***6.4%***	***$121.2***	***1.2%***	**$1,480.7**	**15.1%**
2001	**$2,967.5**	**29.3%**	***$811.2***	***8.0%***	***$1,413.9***	***14.0%***	***$602.3***	***5.9%***	***$140.1***	***1.4%***	**$1,603.5**	**15.8%**
2002	**$3,204.9**	**30.6%**	***$888.7***	***8.5%***	***$1,580.9***	***15.1%***	***$588.5***	***5.6%***	***$146.8***	***1.4%***	**$1,762.9**	**16.8%**
2003	**$3,574.9**	**32.6%**	***$928.8***	***8.5%***	***$1,905.7***	***17.4%***	***$564.2***	***5.1%***	***$176.2***	***1.6%***	**$1,900.5**	**17.3%**
2004	**$3,943.6**	**33.7%**	***$1,001.2***	***8.6%***	***$2,157.1***	***18.5%***	***$539.4***	***4.6%***	***$245.9***	***2.1%***	**$2,031.0**	**17.4%**
2005	**$4,165.8**	**33.5%**	***$960.7***	***7.7%***	***$2,360.2***	***19.0%***	***$516.4***	***4.2%***	***$328.6***	***2.6%***	**$2,225.9**	**17.9%**
2006	**$4,322.9**	**32.8%**	***$940.8***	***7.1%***	***$2,440.5***	***18.5%***	***$530.5***	***4.0%***	***$411.1***	***3.1%***	**$2,403.2**	**18.2%**
2007	**$4,516.8**	**32.6%**	***$999.5***	***7.2%***	***$2,487.4***	***18.0%***	***$558.4***	***4.0%***	***$471.4***	***3.4%***	**$2,617.4**	**18.9%**
10-year Δ	**30.7%**		***39.7%***		***18.1%***		***-4.9%***		*1328.5%*		**94.1%**	

Sources: Securities Industry & Financial Markets Association, Statistical Tables and Department of Commerce, Bureau of Economic Analysis, National Accounts

EOY	Total Mortgage-Related	% GDP	*Federal Agency Mortgage-Related*	*% GDP*	*Private Mortgage-Related*	*% GDP*	Federal Agencies (excluding Mortgage-Related)	% GDP	Corporate (excluding Commercial Paper)	% GDP
1997	**$2,680.2**	**32.3%**					**$1,022.6**	**12.3%**	**$2,359.0**	**28.4%**
1998	**$2,955.2**	**33.8%**					**$1,300.6**	**14.9%**	**$2,708.5**	**31.0%**
1999	**$3,334.2**	**36.0%**	***$2,954.2***	***31.9%***	***$380.1***	***4.1%***	**$1,620.0**	**17.5%**	**$3,046.5**	**32.9%**
2000	**$3,565.8**	**36.3%**	***$3,155.8***	***32.1%***	***$410.0***	***4.2%***	**$1,854.6**	**18.9%**	**$3,358.4**	**34.2%**
2001	**$4,127.6**	**40.8%**	***$3,631.5***	***35.9%***	***$495.9***	***4.9%***	**$2,149.6**	**21.2%**	**$3,836.4**	**37.9%**
2002	**$4,686.4**	**44.8%**	***$4,084.3***	***39.0%***	***$602.1***	***5.8%***	**$2,292.8**	**21.9%**	**$4,099.5**	**39.2%**
2003	**$5,238.6**	**47.8%**	***$4,496.4***	***41.0%***	***$742.2***	***6.8%***	**$2,636.7**	**24.1%**	**$4,458.4**	**40.7%**
2004	**$5,455.8**	**46.7%**	***$4,570.4***	***39.1%***	***$885.4***	***7.6%***	**$2,745.1**	**23.5%**	**$4,785.1**	**40.9%**
2005	**$5,915.6**	**47.6%**	***$4,798.2***	***38.6%***	***$1,118.4***	***9.0%***	**$2,613.8**	**21.0%**	**$4,960.0**	**39.9%**
2006	**$6,492.4**	**49.2%**	***$5,220.2***	***39.6%***	***$1,284.1***	***9.7%***	**$2,660.1**	**20.2%**	**$5,365.0**	**40.7%**
2007	**$7,210.3**	**52.1%**	***$5,889.4***	***42.5%***	***$1,320.9***	***9.5%***	**$2,946.3**	**21.3%**	**$5,825.4**	**42.1%**
10-year Δ	**169.0%**						**188.1%**		**146.9%**	

EOY	Total Money Markets	% GDP	*Bankers Acceptances*	*% GDP*	*Large Time Deposits*	*% GDP*	*Commercial Paper Subtotal*	*% GDP*	*Non-financial*	*% GDP*	*Financial*	*% GDP*	*Asset-Backed*	*% GDP*
1997	**$1,692.8**	**20.4%**	***$20.9***	***0.3%***	***$713.4***	***8.6%***	***$958.5***	***11.5%***						
1998	**$1,977.8**	**22.6%**	***$11.5***	***0.1%***	***$805.3***	***9.2%***	***$1,161.0***	***13.3%***						
1999	**$2,338.8**	**25.2%**	***$8.6***	***0.1%***	***$936.4***	***10.1%***	***$1,393.8***	***15.0%***						
2000	**$2,662.6**	**27.1%**	***$7.9***	***0.1%***	***$1,052.6***	***10.7%***	***$1,602.1***	***16.3%***						
2001	**$2,587.2**	**25.5%**	***$4.8***	***0.0%***	***$1,121.0***	***11.1%***	***$1,461.4***	***14.4%***						
2002	**$2,545.7**	**24.3%**	***$4.6***	***0.0%***	***$1,171.0***	***11.2%***	***$1,370.1***	***13.1%***						
2003	**$2,519.9**	**23.0%**	***$4.4***	***0.0%***	***$1,226.8***	***11.2%***	***$1,288.7***	***11.8%***						
2004	**$2,904.2**	**24.9%**	***$4.1***	***0.0%***	***$1,505.1***	***12.9%***	***$1,395.0***	***11.9%***						
2005	**$3,433.7**	**27.6%**	***$4.1***	***0.0%***	***$1,789.5***	***14.4%***	***$1,640.1***	***13.2%***						
2006	**$4,008.8**	**30.4%**	***$0.5***	***0.0%***	***$2,050.8***	***15.5%***	***$1,957.5***	***14.8%***	***$144.2***	***1.1%***	***$736.7***	***5.6%***	***$1,076.6***	***8.2%***
2007	**$4,140.2**	**29.9%**	***$0.3***	***0.0%***	***$2,352.1***	***17.0%***	***$1,788.1***	***12.9%***	***$166.2***	***1.2%***	***$804.3***	***5.8%***	***$817.6***	***5.9%***
10-year Δ	**144.6%**		***-98.6%***		***229.7%***		***86.6%***							

EOY	Total Asset-Backed Securities	% GDP	*Automobile Loans*	*% GDP*	*Credit Card*	*% GDP*	*Equipment Leases*	*% GDP*	*Home Equity Loans*	*% GDP*
1997	**$535.8**	**6.5%**	*$77.0*	*0.9%*	*$214.5*	*2.6%*	*$35.2*	*0.4%*	*$90.2*	*1.1%*
1998	**$731.5**	**8.4%**	*$86.9*	*1.0%*	*$236.7*	*2.7%*	*$41.4*	*0.5%*	*$124.2*	*1.4%*
1999	**$900.8**	**9.7%**	*$114.1*	*1.2%*	*$257.9*	*2.8%*	*$51.4*	*0.6%*	*$141.9*	*1.5%*
2000	**$1,071.8**	**10.9%**	*$133.1*	*1.4%*	*$306.3*	*3.1%*	*$58.8*	*0.6%*	*$151.5*	*1.5%*
2001	**$1,281.1**	**12.6%**	*$187.9*	*1.9%*	*$361.9*	*3.6%*	*$70.2*	*0.7%*	*$185.1*	*1.8%*
2002	**$1,543.3**	**14.7%**	*$221.7*	*2.1%*	*$397.9*	*3.8%*	*$68.3*	*0.7%*	*$286.5*	*2.7%*
2003	**$1,693.7**	**15.5%**	*$234.5*	*2.1%*	*$401.9*	*3.7%*	*$70.1*	*0.6%*	*$346.0*	*3.2%*
2004	**$1,827.8**	**15.6%**	*$232.1*	*2.0%*	*$390.7*	*3.3%*	*$70.7*	*0.6%*	*$454.0*	*3.9%*
2005	**$1,955.2**	**15.7%**	*$219.7*	*1.8%*	*$356.7*	*2.9%*	*$61.8*	*0.5%*	*$551.1*	*4.4%*
2006	**$2,130.4**	**16.1%**	*$202.4*	*1.5%*	*$339.9*	*2.6%*	*$53.1*	*0.4%*	*$581.2*	*4.4%*
2007	**$2,472.4**	**17.9%**	*$198.5*	*1.4%*	*$347.8*	*2.5%*	*$46.2*	*0.3%*	*$585.6*	*4.2%*
10-year Δ	**361.4%**		*157.8%*		*62.1%*		*31.3%*		*549.2%*	

EOY	*Manufactured Housing*	*% GDP*	*Student Loans*	*% GDP*	*Other*	*% GDP*	**Grand Total U.S. Credit Market**	**% GDP**
1997	*$19.1*	*0.2%*	*$18.3*	*0.2%*	*$81.5*	*1.0%*	**$13,095.7**	**157.7%**
1998	*$25.0*	*0.3%*	*$25.0*	*0.3%*	*$192.3*	*2.2%*	**$14,431.8**	**165.0%**
1999	*$33.8*	*0.4%*	*$36.4*	*0.4%*	*$265.3*	*2.9%*	**$15,978.5**	**172.4%**
2000	*$36.9*	*0.4%*	*$41.1*	*0.4%*	*$344.1*	*3.5%*	**$16,960.8**	**172.8%**
2001	*$42.7*	*0.4%*	*$60.2*	*0.6%*	*$373.2*	*3.7%*	**$18,552.9**	**183.2%**
2002	*$44.5*	*0.4%*	*$74.4*	*0.7%*	*$449.9*	*4.3%*	**$20,135.5**	**192.3%**
2003	*$44.3*	*0.4%*	*$99.2*	*0.9%*	*$497.7*	*4.5%*	**$22,022.7**	**200.9%**
2004	*$42.2*	*0.4%*	*$115.2*	*1.0%*	*$522.9*	*4.5%*	**$23,692.6**	**202.7%**
2005	*$34.5*	*0.3%*	*$153.2*	*1.2%*	*$578.2*	*4.7%*	**$25,270.0**	**203.2%**
2006	*$28.8*	*0.2%*	*$183.6*	*1.4%*	*$741.4*	*5.6%*	**$27,382.8**	**207.5%**
2007	*$26.9*	*0.2%*	*$243.9*	*1.8%*	*$1,023.5*	*7.4%*	**$29,728.8**	**214.7%**
10-year Δ	*40.8%*		*1232.8%*		*1155.8%*		**127.0%**	

Table A-2 – U.S. Depository Institutions – Outstanding Loans (in billions & percent of GDP)
Year-end 1997-2007

EOY	Commercial Banks	% GDP	Savings Banks	% GDP	Credit Unions	% GDP	Grand Total Depository Institutions	% GDP
1997	**$3,055.4**	**36.8%**	**$697.8**	**8.4%**	**$238.4**	**2.9%**	**$3,992.1**	**48.1%**
1998	**$3,309.3**	**37.8%**	**$720.5**	**8.2%**	**$252.3**	**2.9%**	**$4,282.5**	**49.0%**
1999	**$3,515.5**	**37.9%**	**$760.4**	**8.2%**	**$278.9**	**3.0%**	**$4,555.4**	**49.1%**
2000	**$3,887.3**	**39.6%**	**$827.0**	**8.4%**	**$309.3**	**3.2%**	**$5,024.2**	**51.2%**
2001	**$3,957.8**	**39.1%**	**$872.0**	**8.6%**	**$330.8**	**3.3%**	**$5,161.1**	**51.0%**
2002	**$4,183.0**	**40.0%**	**$895.9**	**8.6%**	**$355.2**	**3.4%**	**$5,434.6**	**51.9%**
2003	**$4,444.6**	**40.5%**	**$1,004.7**	**9.2%**	**$388.5**	**3.5%**	**$5,838.3**	**53.3%**
2004	**$4,886.9**	**41.8%**	**$1,206.3**	**10.3%**	**$428.6**	**3.7%**	**$6,522.4**	**55.8%**
2005	**$5,456.0**	**43.9%**	**$1,323.3**	**10.6%**	**$474.2**	**3.8%**	**$7,254.1**	**58.3%**
2006	**$6,129.8**	**46.5%**	**$1,237.0**	**9.4%**	**$511.1**	**3.9%**	**$7,878.5**	**59.7%**
2007	**$6,785.7**	**49.0%**	**$1,259.9**	**9.1%**	**$550.0**	**4.0%**	**$8,596.1**	**62.1%**
10-year Δ	**122.1%**		**80.5%**		**130.7%**		**115.3%**	

Sources: Federal Reserve Board, Flow of Funds and Department of Commerce, Bureau of Economic Analysis, National Accounts