

Financial Crisis Inquiry Commission

*Preliminary Staff Report*

THE MORTGAGE CRISIS

APRIL 7, 2010

This preliminary staff report is submitted to the Financial Crisis Inquiry Commission (FCIC) and the public for information, review, and comment. Comments can be submitted through the FCIC's website, [www.fcic.gov](http://www.fcic.gov).

This document has not been approved by the Commission.

The report provides background factual information to the Commission on subject matters that are the focus of the FCIC's public hearings on April 7, 8, and 9, 2010. In particular, this report provides information on the mortgage market. Staff will provide investigative findings as well as additional information on these subject matters to the Commission over the course of the FCIC's tenure.

Deadline for Comment: May 15, 2010

## CONTENTS

I.	<u>MORTGAGE ORIGINATIONS</u> .....	4
II.	<u>THE EXPANSION OF SUBPRIME AND ALT-A MORTGAGE-BACKED SECURITIES</u> .....	5
	A. DEFINITION OF SUBPRIME AND ALT-A MORTGAGES.....	5
	B. THE CHANGING MORTGAGE MARKET.....	7
	C. FHA AND VA MORTGAGES.....	9
	D. NON-TRADITIONAL MORTGAGE PRODUCTS.....	10
	E. MORTGAGE ORIGINATION.....	11
III.	<u>HOME OWNERSHIP</u> .....	12
IV.	<u>HOME PRICES</u> .....	13
	A. NATIONAL HOME PRICE INDEXES.....	13
	B. REGIONAL VARIATION IN HOME PRICES.....	15
	C. INTERNATIONAL HOME PRICES.....	16
	D. EMERGENCE OF THE BUBBLE.....	17
V.	<u>DELINQUENCY AND DEFAULT</u> .....	18
	A. SERIOUS DELINQUENCY IN THE UNITED STATES.....	18
	B. SERIOUS DELINQUENCY BY PRODUCT AND CHARACTERISTICS.....	19
	C. DELINQUENCY OF FHA AND VA MORTGAGES.....	23
	D. DELINQUENCY BY VINTAGE.....	24
VI.	<u>LITERATURE ON HIGH DEFAULT RATES DURING THE MORTGAGE CRISIS</u> .....	25
	A. DOUBLE-TRIGGER MODEL OF MORTGAGE DEFAULT.....	25
	B. EVIDENCE ON THE REASONS FOR THE INCREASE IN MORTGAGE DEFAULTS.....	25
	1. UNDERWRITING STANDARDS.....	26

2. HOUSING PRICES.....	27
3. INCOME SHOCKS AND UNEMPLOYMENT.....	27
VII. <u>REFERENCES</u> .....	27

## The Mortgage Crisis

The purpose of this preliminary staff report is to describe the recent mortgage crisis, which entailed a dramatic drop in home prices beginning in 2006 and a sharp rise in mortgage defaults beginning in 2007. Section I describes the origination of mortgages over the two decades leading up to the crisis. Section II documents some evidence on the expansion in subprime and alt-A lending in the 2000s. Section III describes the increase in home ownership over this period. Section IV describes the unprecedented run-up in home prices from 1998 to 2006 and their subsequent steep decline. Section V describes the increase in mortgage defaults from 2007 to 2009. Section VI briefly discusses evidence on the reasons for this increase in mortgage defaults.

### I. MORTGAGE ORIGINATIONS

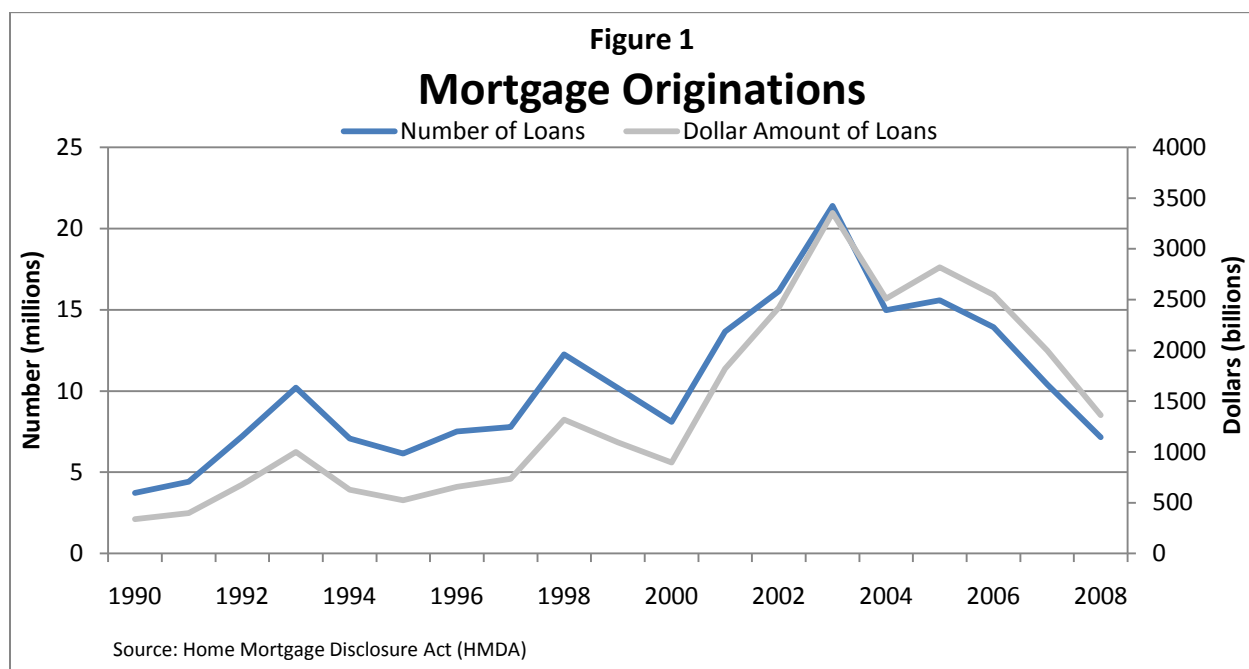


Figure 1 depicts the number and dollar amount of residential mortgage originations---the lending of money secured by homes---in the US from 1990 to 2008 according to data from HMDA. During the 1990s, mortgage origination grew moderately. Over that period, there was an average of 7.6 million annual loan originations with average annual dollar value of roughly \$736 billion. From 2000 to the peak of originations in 2003, mortgage activity increased rapidly, and it continued at an elevated pace through 2006 and into 2007. By 2008, originations had fallen back to historical levels.

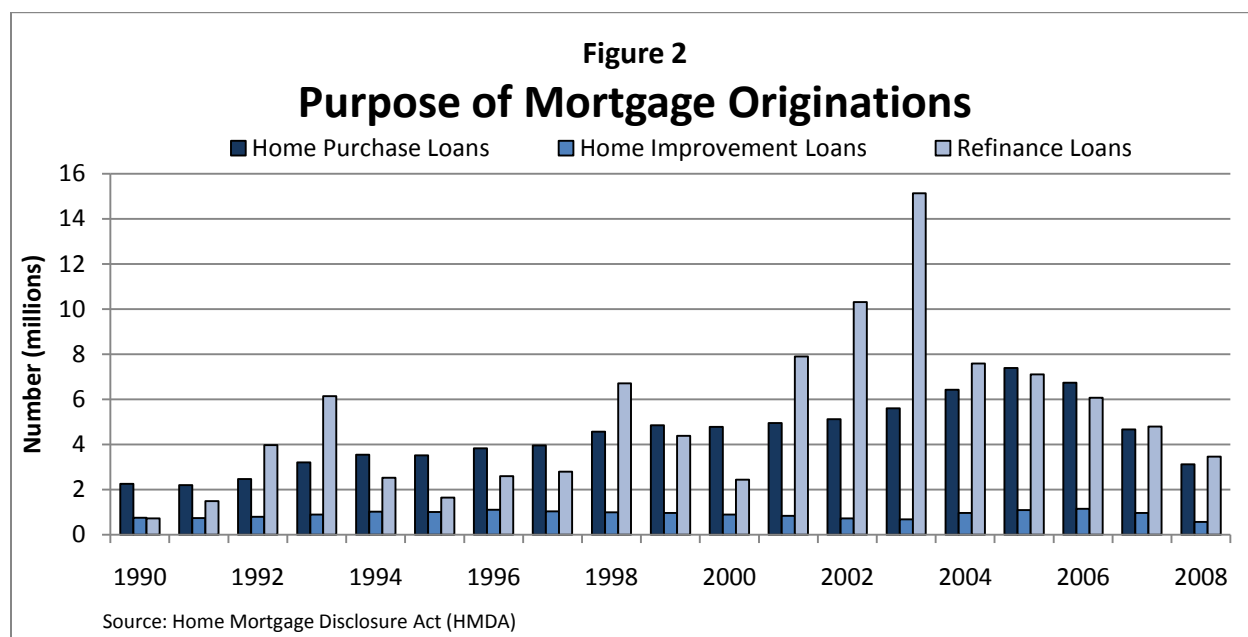


Figure 2 breaks down this activity into three categories of loans: home purchase loans, refinance loans, and home improvement loans. Home purchase activity rose steadily at a compounded annual growth rate of nearly 8 percent from 1995 until it peaked in 2005.

In response to low interest rates and house price appreciation, refinance activity peaked first in 1993, then again in 1998, and dramatically in 2003<sup>1</sup>. In 2003, over 15 million refinance loans were originated; compared to an estimated 50 to 55 million outstanding mortgages, that corresponds to nearly one in three US homes being refinanced in that year alone.<sup>2</sup>

## II. THE EXPANSION OF SUBPRIME AND ALT-A MORTGAGE-BACKED SECURITIES

The period leading up to the mortgage crisis saw a large increase in originations of *subprime* and *alt-A* mortgage-backed securities (defined below), which have higher default risk than mortgages labeled prime.

### A. DEFINITION OF SUBPRIME AND ALT-A MORTGAGES

In general, the term *subprime* refers to mortgage loans made to borrowers with relatively poor credit histories. These loans are therefore riskier than *prime* loans, which are made to borrowers with stronger credit. As a result, the marketing, underwriting, and servicing of

<sup>1</sup> The 30-year mortgage rate hit near-term lows of 6.83 percent in October 1993, 6.71 percent in October 1998 and 5.23 percent in June 2003. Mortgage rates were generally higher than their June 2003 level until government policies to push down mortgage rates were instituted in late 2008 (Federal Reserve Board H.15 Series).

<sup>2</sup> Mortgages may have been refinanced more than once in that year.

subprime loans is different than that of prime loans. However, the mortgage industry lacks a consistent definition of the subprime mortgage market. Subprime loans are typically identified in one of three ways: 1) as loans with interest rates above a given threshold; 2) as loans from lenders that have been classified as specializing in subprime loans; or 3) as mortgages that back mortgage-backed securities (MBS)---discussed below---that are marketed as subprime.<sup>3</sup>

The term alt-A refers to loans generally made to borrowers with strong credit scores but which have other characteristics that make the loans riskier than prime loans. For example, the loan may have no or limited documentation of the borrower's income, a high loan-to-value ratio (LTV), or may be for an investor-owned property. Typically, loans are identified as being alt-A by virtue of being in an MBS that is marketed as alt-A.

Since subprime and alt-A loans are often labeled as such based upon their associated MBS, we provide here a brief overview of the MBS market. MBS are securities that give the holders the right to receive the principal and interest payments from borrowers on a particular pool of mortgage loans. The market for MBS was pioneered by Fannie Mae and Freddie Mac, the government-sponsored enterprises (GSEs), which were created by the federal government to develop this secondary mortgage market. The GSEs purchase mortgages to hold in portfolio and to securitize into MBS that they guarantee against default.

Ginnie Mae plays a similar role in the secondary market for mortgages insured by the Federal Housing Administration (FHA) and the Department of Veterans Affairs (VA). FHA loans are made by private lenders and insured by the FHA. They are usually made to low- and moderate-income borrowers, often with weaker credit histories, and have smaller downpayments. Historically, the size limits on these loans were low. VA loans are offered to military personnel and are guaranteed by the Department of Veteran Affairs. These too require little or no downpayment.

MBS issued by the GSEs or Ginnie Mae are referred to as *agency MBS*. Other financial institutions also create MBS, referred to as *non-agency MBS*, which have a structure similar to agency MBS but typically have no guarantee against default risk. Much more detail on the securitization process is given in the Preliminary Staff Report titled "Securitization and the Mortgage Crisis," released on April 8, 2010.

When financial institutions sell MBS to investors, the MBS is given a label, such as prime, subprime, or alt-A, that represents characteristics of the underlying borrowers and mortgage loans that determine how risky the mortgage loans are.

An alternative to these definitions of subprime and alt-A loans is to use a definition that identifies loans with higher default risk based strictly on the characteristics of the borrower

---

<sup>3</sup> Mayer and Pence (2008) offer a more detailed discussion of the advantages and disadvantages of these different approaches.

and the loan. For example, loans could be categorized as “high risk” or “subprime/alt-A” based on borrowers’ credit scores and loans’ LTV ratios. A comparison of these approaches is presented later in this report.

## B. THE CHANGING MORTGAGE MARKET

Figure 3 shows mortgage originations by dollar volume for three groups of loans from 1990 through 2008 based on data from Inside Mortgage Finance (IMF).<sup>4</sup> The first category, *IMF:Alt-A/subprime/FHA*, includes loans labeled alt-A or subprime by the lenders in the IMF survey and loans that are insured by the FHA or VA. We refer to all other loans with loan amounts at or below the GSEs’ conforming size limit as *GSE/other* loans.<sup>5</sup> While some of these loans are held in banks’ portfolios, the great majority of them are purchased by the GSEs.<sup>6</sup> The remaining loans with amounts above the GSEs’ conforming size limit are referred to as *jumbo* loans.

Beginning in 2003, the amount of GSE/other originations dropped sharply from nearly \$2.5 trillion (over 60 percent of all originations) to roughly \$1.2 trillion (35 percent of originations) in 2006. In that period, loans in the IMF:Alt-A/subprime/FHA category gained substantial market share.

---

<sup>4</sup>The figures from IMF are based upon classification of the loans by reporting lenders or by the MBS in which the loan resides. HELOC loans from IMF are omitted. There is high correlation between the aggregate figures reported in HMDA and those reported in IMF. In general, institutions are required to file under HMDA if they have a presence in a Metropolitan Statistical area (MSA) and have made at least one home purchase or refinance loan in the given year. Data in HMDA is estimated to cover 80-85% of the US mortgage market in any given year.

<sup>5</sup> IMF refers to these loans as Conventional/Conforming.

<sup>6</sup> For example, according to the IMF data, in 2003, 62% of originations were GSE/other. Data from the Federal Housing Finance Authority, the GSEs’ regulator, shows that in 2003, 57% of originations were GSE mortgages, suggesting that in 2003 GSE mortgages were the great majority of GSE/other. A similar relationship exists in other years. The IMF data is used here, instead of the Federal Housing Finance Agency data, because the IMF data also report on non-GSE mortgages.

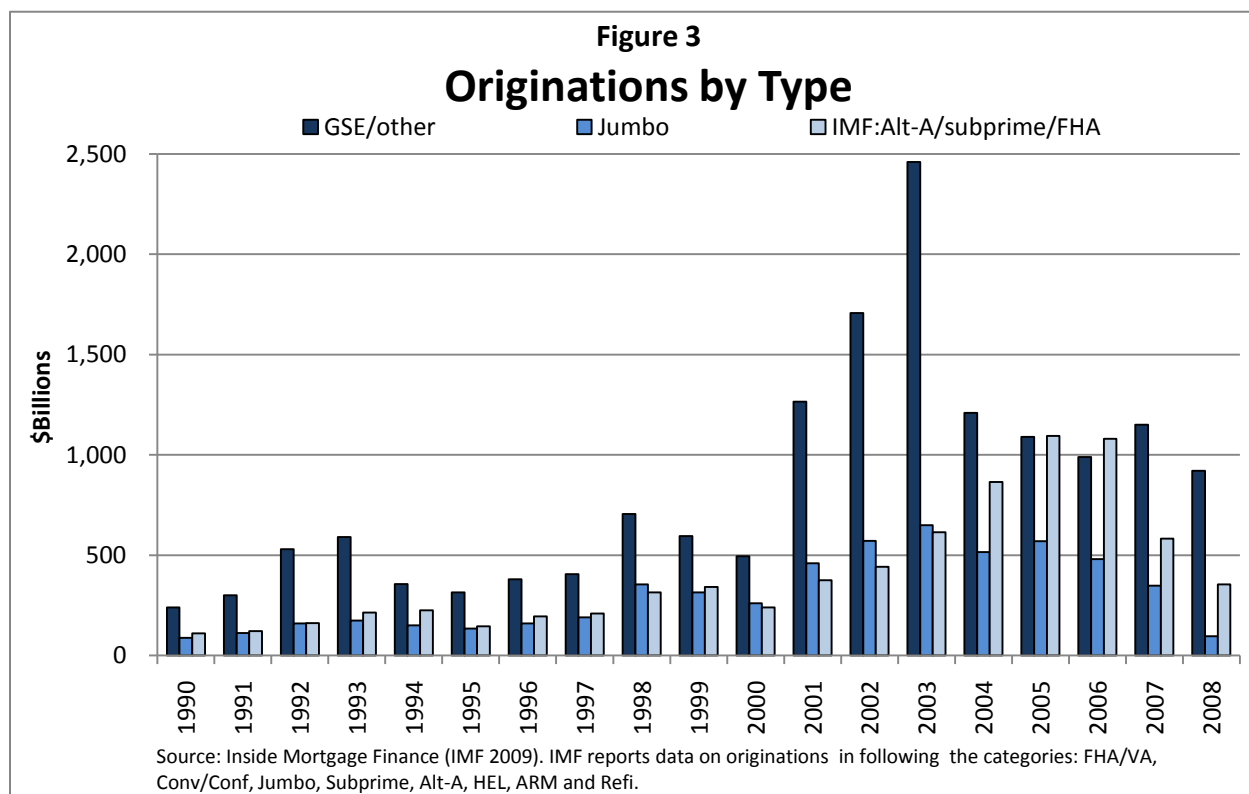
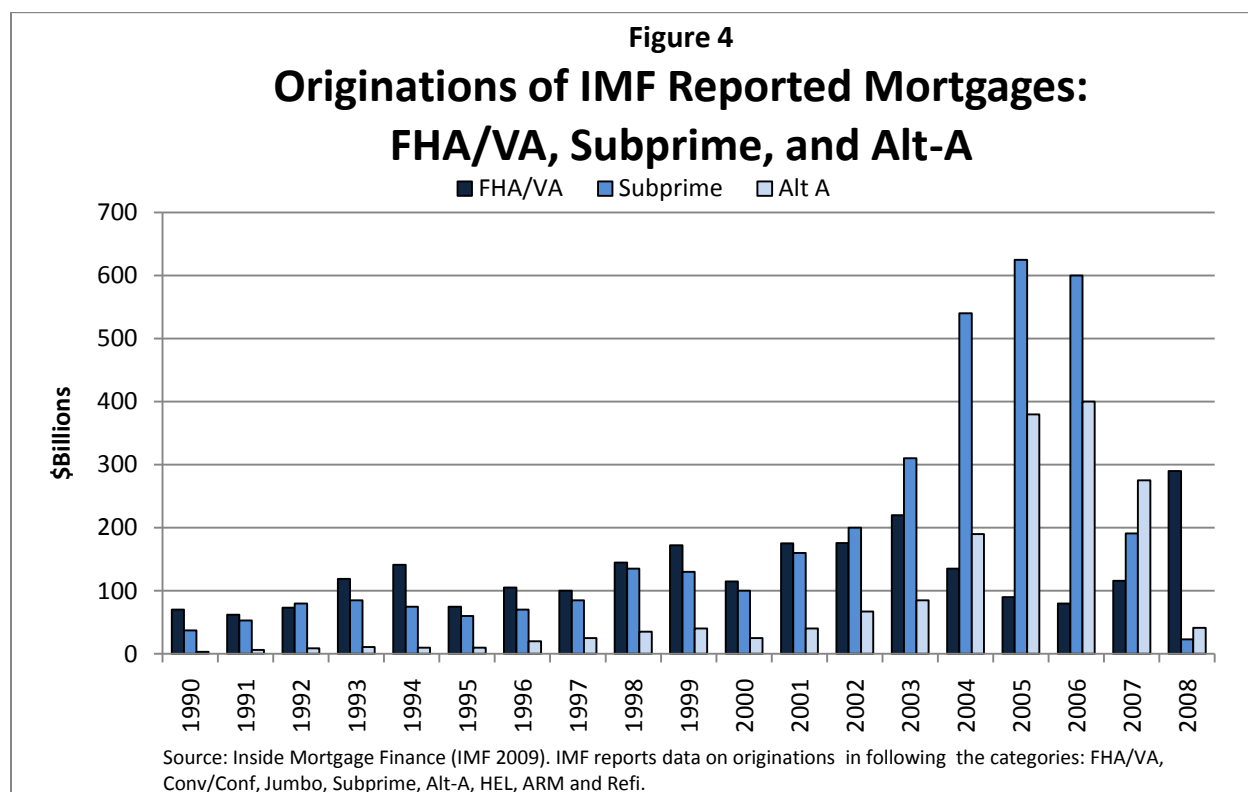


Figure 4 breaks down the IMF:Alt-A/subprime/FHA category into the subprime, alt-A and FHA/VA components as reported by IMF. In 1990, subprime loans as reported by IMF totaled \$37 billion or 9 percent of originations. At the peak in 2005, these loans totaled \$625 billion, or roughly 25 percent of total mortgage originations in that year (total originations is shown in Figure 3). Alt-A loans as reported by IMF were most prevalent between 2004 and 2007; in fact, the IMF alt-A volume doubled between 2003 and 2004 and again between 2004 and 2005. In 2006, volumes totaled nearly \$400 billion and comprised over 15 percent of all originations; alt-A and subprime originations reported by IMF together comprised nearly 40 percent of all origination activity.





Comparing these values to the earlier chart suggests that much of the refinance boom in 2002 and 2003 was due to borrowers not in the IMF:Alt-A/subprime/FHA category. A much greater proportion of the purchase and refinance activity from 2004 through 2007 involved loans labeled subprime and alt-A by IMF.

### C. FHA AND VA MORTGAGES

As a share of total mortgage originations, FHA and VA loans peaked in 1994 at \$141 billion, nearly 20 percent of all originations. From then to 2006, the market share for these loans slowly eroded, hitting its bottom at just around 3 percent. As the subprime market grew, offering higher LTV loans, the FHA alternatives became less attractive.<sup>7</sup> Indeed, as shown in Figure 4, the level of FHA and VA loans showed outright declines from 2003 to 2006. After the collapse of the mortgage market, FHA became a major source of support for the housing. The level of FHA and VA loans rose dramatically in 2007 and 2008. In 2008, over 20 percent of mortgage originations were guaranteed by the FHA or VA.

<sup>7</sup> See Jaffee and Quigley (2008) for a thorough discussion of the history of FHA and VA mortgages.

## D. NON-TRADITIONAL MORTGAGE PRODUCTS

The 2000s also saw a shift in the contractual form of mortgage loans originated. One common type of mortgage is a 30-year *fixed rate mortgage* (FRM), in which the interest rate is fixed for the entire term of the loan and the borrower is required to make a series of equal monthly payments until the loan is paid off. The fixed payment amount that results in the loan being fully paid off at the end of the term is called the *fully amortizing* payment amount. In contrast, an *adjustable rate mortgage* (ARM) has an interest rate that is specified in terms of a margin above some interest rate index. For example, “Prime + 3%” means that the borrower is charged interest based on an interest rate equal to the prime rate plus 3 percentage points. The interest rate on an ARM adjusts at regular intervals. Other mortgages are *hybrids* of FRMs and ARMs in which the interest rate is fixed for some introductory period and then adjusts at regular periods according to some interest rate index. Both 2/28 and 3/27 ARMs, 30-year loans with a fixed rate for two or three years, respectively, were common forms of hybrid loans before the crisis.

Other types of mortgages entail the borrower paying less than the fully amortizing amount each month. For example, a *balloon mortgage* is one in which the borrower pays less than the fully amortizing payment amount and must then pay some relatively large fixed sum at the end of the term---called a balloon payment---to pay off the mortgage. *Interest-only mortgages* allow the borrower to pay only the interest accrued each month and make no payments toward principal for some period. *Option ARMs*, also called *negative amortization ARMs*, allow the borrower to pay *less* than the interest charged for some period so that the balance on the loan grows over time before the required payment amount resets to the fully amortizing rate.

Table 1 shows the fraction of mortgages originated that were interest-only mortgages, option ARMs, balloon mortgages, or “traditional” mortgages (defined as all other types of mortgages) from 2004 to 2008. Interest-only mortgages grew from only 2 percent in 2004 to 20 percent by 2007. Option ARMs and balloon mortgages also grew in this period.

**Table 1: Market share of non-traditional mortgage products by year**

	Interest Only	Option ARM	Balloon	Traditional
<b>2004</b>	2%	5%	0%	93%
<b>2005</b>	15%	8%	0%	77%
<b>2006</b>	18%	9%	3%	71%
<b>2007</b>	20%	5%	2%	74%
<b>2008</b>	6%	1%	0%	93%

Source: Inside Mortgage Finance (IMF 2009)

## E. MORTGAGE ORIGINATION

Mortgages are originated by a variety of financial institutions. *Depository institutions*, which accept deposits from the public and lend that money to households and businesses, are one type of originator. Depository institutions include commercial banks as well as credit unions, savings and loan associations, and mutual savings banks. Depository institutions are regulated by a set of federal and/or state agencies charged with ensuring the safety and soundness of these institutions.

Non-depository institutions, called *mortgage companies* or *mortgage banks*, also originate mortgages. Mortgage companies borrow money from banks (or by issuing bonds) and lend that money to consumers in the form of mortgage loans. They typically then sell those loans to other financial institutions and use that money to originate additional mortgages.

Mortgage lenders are sometimes owned by holding companies or other financial institutions. Some mortgage companies are owned by depository institutions, and are therefore *subsidiaries* of a depository. Others are owned by holding companies that also own a depository institution and are therefore an *affiliate* of a depository. Mortgage companies that are not a subsidiary or affiliate of a depository institution are called *independent mortgage companies*.

Table 2 shows the percentage of mortgages originated by independent mortgage companies and by depositories or their subsidiaries or affiliates from 2004 to 2007. Panel A provides this breakdown for all residential mortgages and shows that depository institutions and their subsidiaries accounted for about 60 percent of all mortgage originations from 2004 to 2006, with affiliates of depositories accounting for 10 percent and independent mortgage companies accounting for about 30 percent. In 2007, the market share of depositories grew to 73 percent, while the market share of independent mortgage companies dropped to 19 percent.

Panel B shows that independent mortgage companies play a greater role in the market for *higher-priced* mortgages, which are disproportionately subprime mortgages,<sup>8</sup> accounting for about half of such mortgages from 2004 to 2006, before their market share dropped to 21 percent in 2007.

---

<sup>8</sup> Higher-priced mortgages are mortgages with annual percentage rate (APR) spreads above the reporting threshold. The APR spread is the difference between the APR on the loan and the yield on a comparable-maturity Treasury security. The reporting threshold for first-lien loans is a spread of 3 percentage points; for junior-lien loans, it is a spread of 5 percentage points. Higher-priced loans are generally made to subprime or Alt-A borrowers, since these borrowers pose greater risk of default and risk of prepaying loans early (prepayment risk). See Avery, et al (forthcoming) for more detail.

**Table 2: Percentage of Mortgage Originations by Year of Origination and Originator Type**

	<b>Independent mortgage company</b>	<b>Depository or subsidiary</b>	<b>Affiliate of depository</b>
<i>Panel A: All mortgages</i>			
<b>2004</b>	28	63	9
<b>2005</b>	31	60	10
<b>2006</b>	31	60	10
<b>2007</b>	19	73	8
<i>Panel B: Higher-priced mortgages</i>			
<b>2004</b>	51	37	12
<b>2005</b>	52	36	12
<b>2006</b>	46	41	13
<b>2007</b>	21	62	18

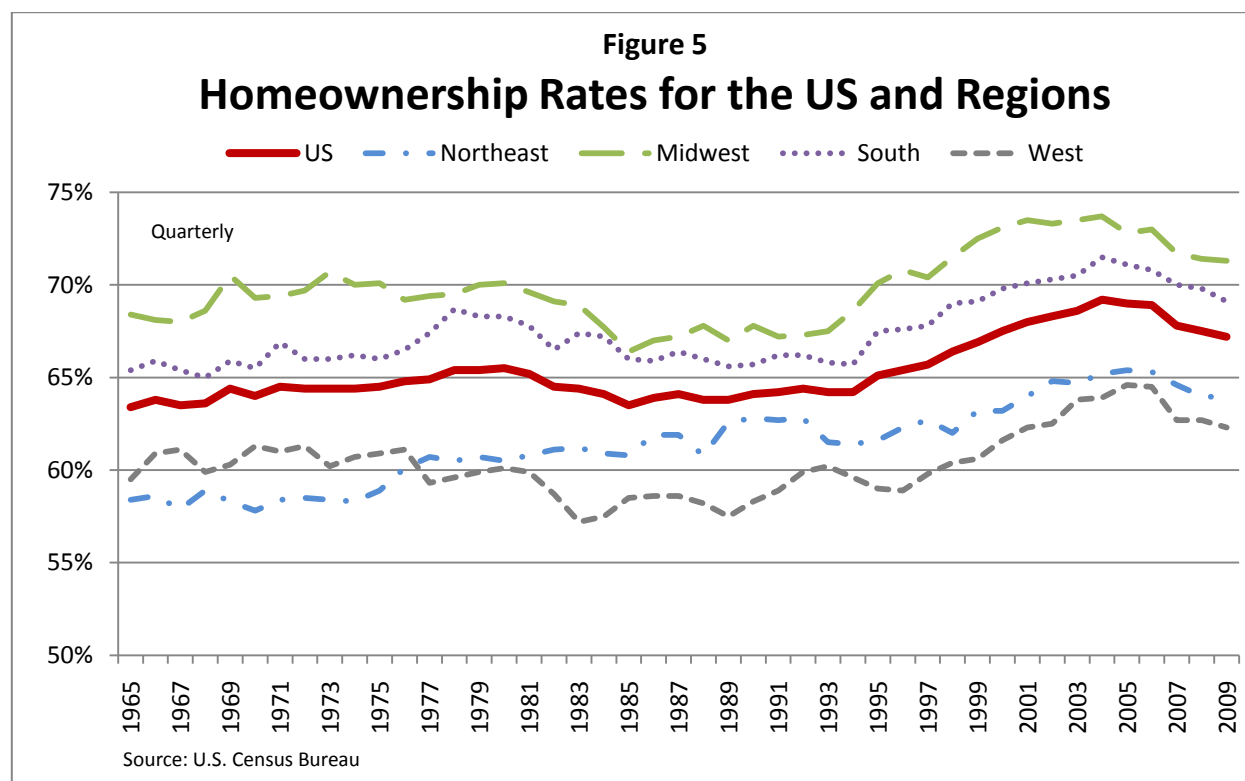
Source: Home Mortgage Disclosure Act data (HMDA)

Notes: Higher-priced mortgages are mortgages with APR spreads above the reporting thresholds defined by HMDA. See footnote 7 for more detail.

### **III. HOME OWNERSHIP**

Figure 5 shows the home ownership rate for the US and for four regions in the US from 1965 to 2009. Between 1965 and 1995, home ownership rates varied between about 63 and 65 percent. From the mid-1990s through 2004, the rate of home ownership in the United States rose steadily peaking at 69 percent in late 2004. It then declined to 67 percent in 2009, still somewhat above its historical levels.

While there are substantial differences in the level of home ownership in the various regions of the country, the increase during this period occurred across the country. The Midwest peaked a bit earlier than the national average and the West a bit later.



#### IV. HOME PRICES

An important feature of the mortgage crisis was a dramatic increase in home prices followed by a national decline in home prices beginning in 2006.

##### A. NATIONAL HOME PRICE INDEXES

Figure 6 shows the inflation-adjusted home price series, developed by Robert Shiller, from 1920 to the present.<sup>9</sup> There are several noteworthy features of these data. First, before World War II home prices were relatively steady, but just after the war home prices rose to a new, fairly steady level. Second, at both the end of the 1970s and at the end of the 1980s, housing prices rose modestly before declining again.

Finally, and most importantly, the dramatic increase in real housing prices beginning in the late 1990s and subsequent fall from 2006 is striking and unprecedented. The size of the increase from 1998 to the peak in 2006 is substantially greater than any previous increase.

<sup>9</sup> Shiller(2006). Data from <http://www.econ.yale.edu/~shiller/data>

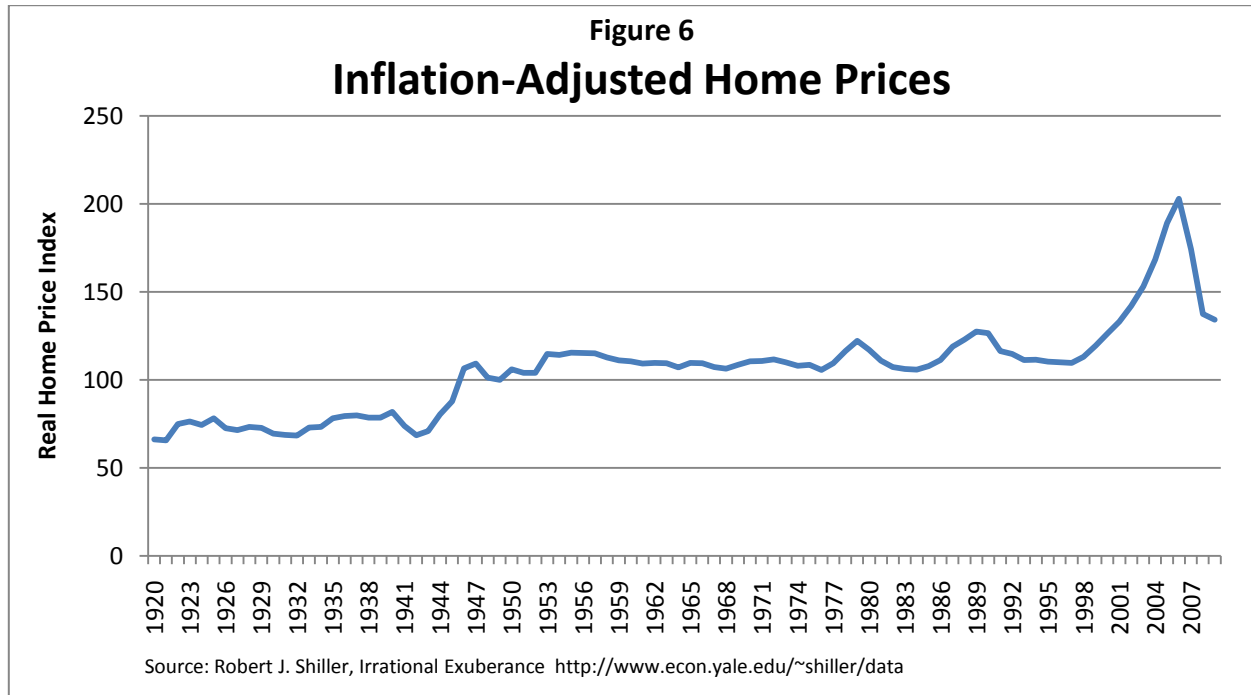
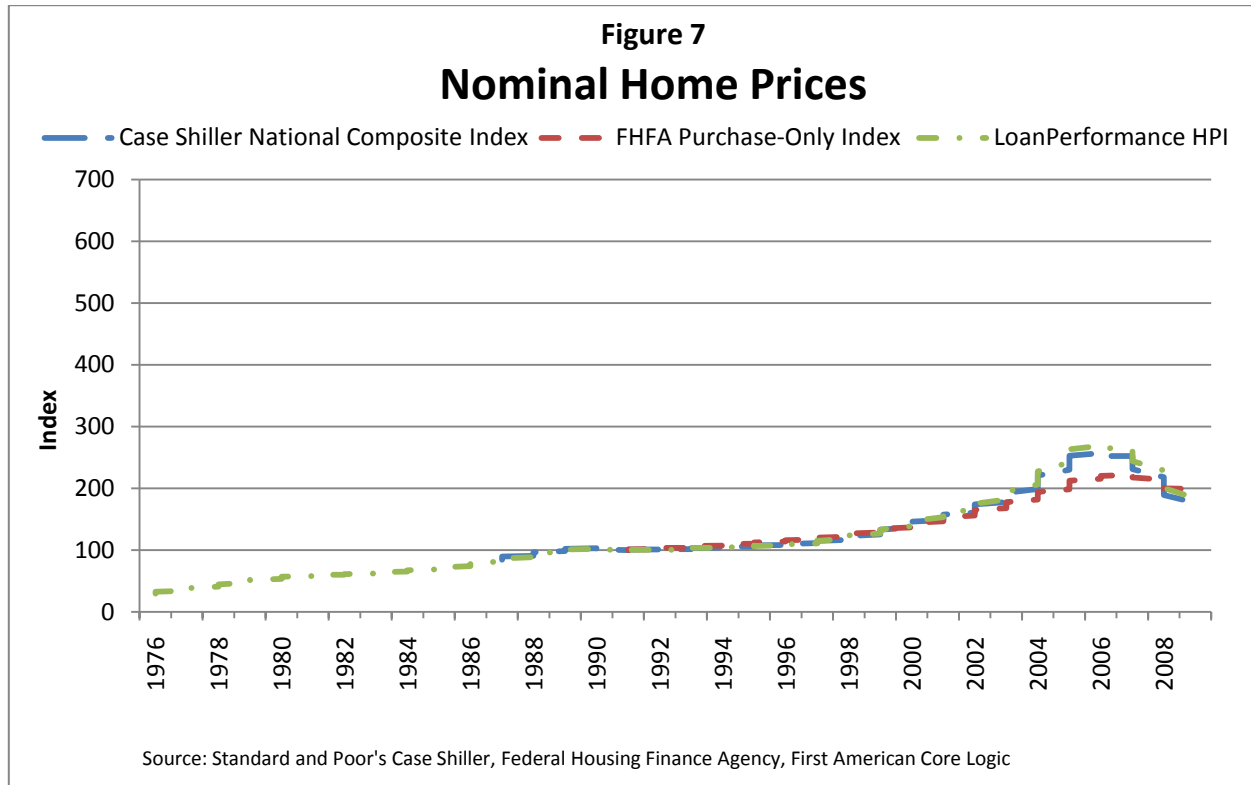


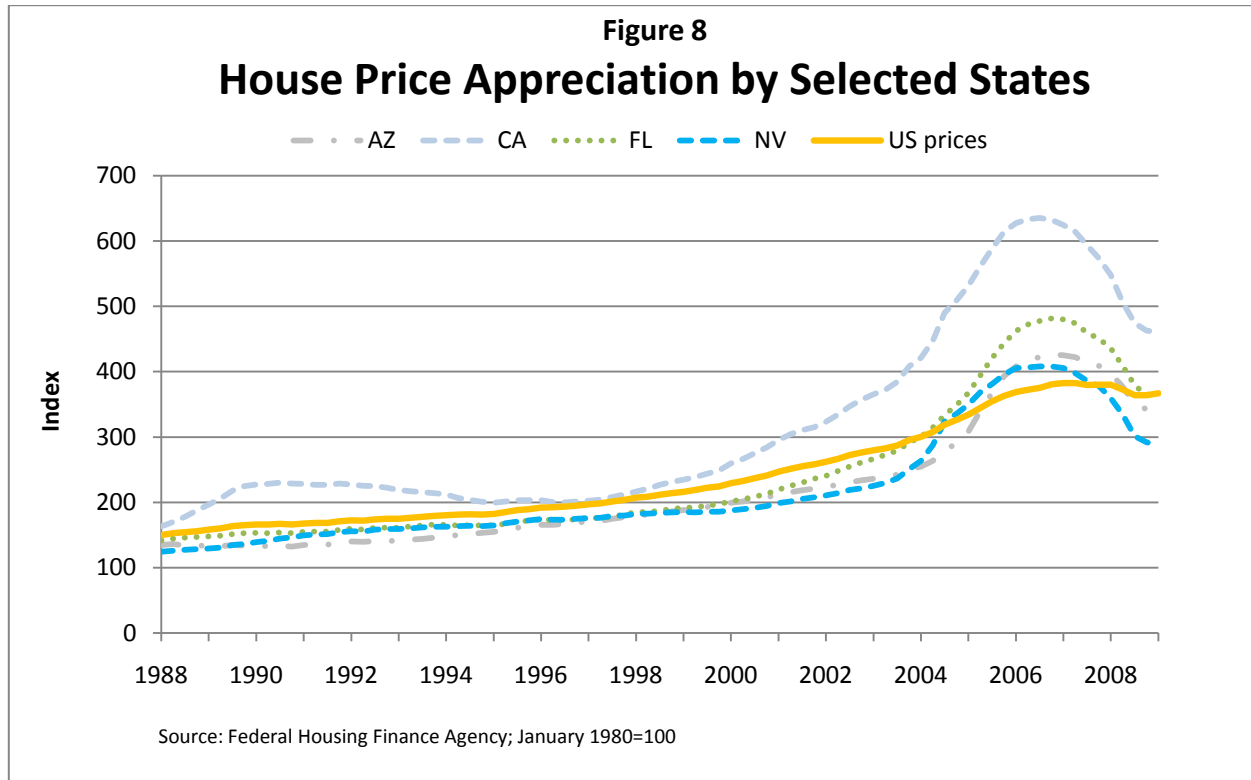
Figure 7 shows *nominal* home prices (i.e., not adjusted for inflation) from 1976 to 2009 using three national indexes.<sup>10</sup> After a long period of steady and moderate increases, home price growth began to accelerate in the late 1990s. All of the series peak during 2006 and then show a marked decline.

<sup>10</sup> A thorough comparison of the Case Shiller and FHFA series can be found in Leventis (2008).



**B. REGIONAL VARIATION IN HOME PRICES**

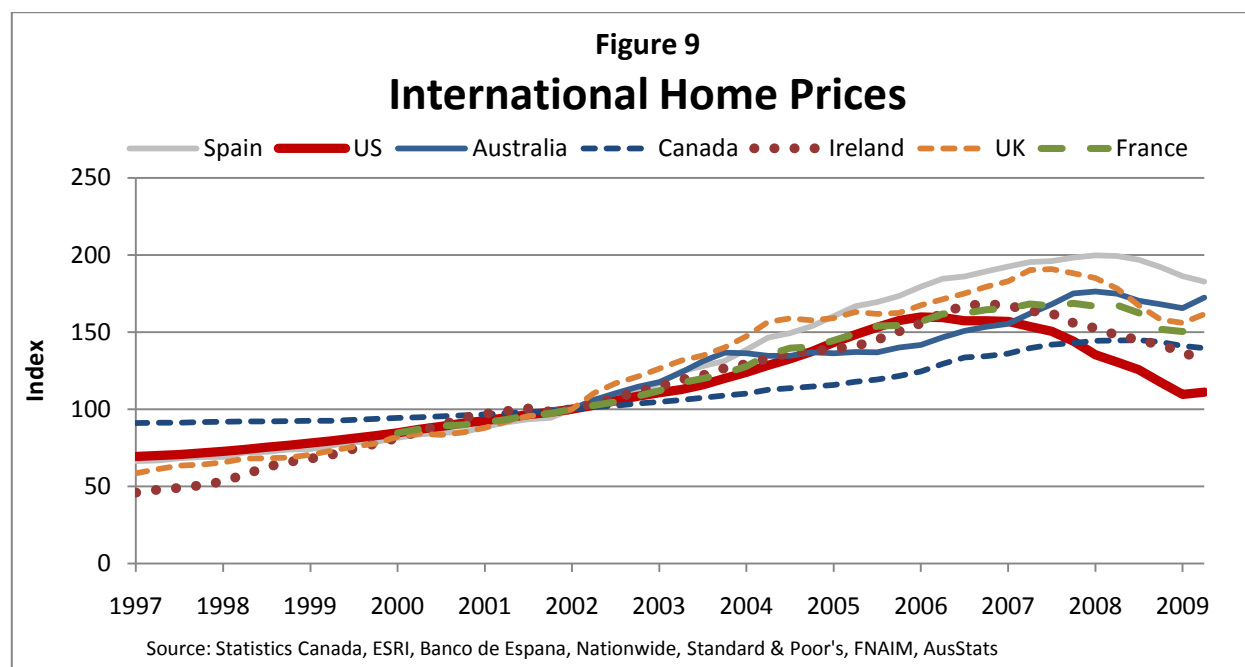
These national indexes mask substantial variation in home price patterns across the country. Figure 8 shows the FHFA house price indexes for the “sand states” (namely California, Arizona, Nevada and Florida) and for the US as a whole. The sand states, and especially California, had dramatically larger spikes and subsequent declines in housing prices than did the US as a whole. Looking at a finer level of detail, such as the MSA or county, would show even greater variation in the pattern of house prices over this period.



**C. INTERNATIONAL HOME PRICES**

Figure 9 shows that the housing bubble was not limited to the United States. The UK and Ireland, in particular, experienced a dramatic increase in home prices from 1997 to 2007, followed by large declines. Some other countries, however, did not experience a bubble. Canada, for example, experienced steady but moderate increases over the period with housing prices flattening and then only slightly declining in 2009. The fact that other countries experienced a housing bubble suggests that the US housing bubble cannot be explained exclusively by idiosyncratic features of the US housing market but rather was in part due to broader trends and practices.





#### D. THE EMERGENCE OF THE BUBBLE

During the run-up in housing prices from 1998 to 2006, there was considerable debate about whether this increase in home prices was based on fundamental economic changes---for example, a change in income and demographics---or whether the increase in house prices represented an asset bubble. An *asset bubble* exists “if the reason that the price is high today is only because investors believe that the selling price is high tomorrow---when ‘fundamental’ factors do not seem to justify such a price.”<sup>11</sup> In housing, a bubble might exist when homebuyers are willing to pay inflated prices for houses today because they expect housing prices to appreciate in the future.<sup>12</sup> Such asset bubbles are unsustainable---if expectations about the future change, then housing prices can decline rapidly.<sup>13</sup>

Economists writing in 2005 in the *Journal of Economic Perspectives* concluded that “[a]s of the end of 2004, our analysis reveals little evidence of a housing bubble.”<sup>14</sup> In contrast, other analysts such as Shiller and Paul Krugman argued that the increase in housing prices did represent a housing bubble.<sup>15</sup>

<sup>11</sup> Stiglitz (1990).

<sup>12</sup> Himmelberg, Mayer, and Sinai (2005).

<sup>13</sup> Shiller (2006, 2009)

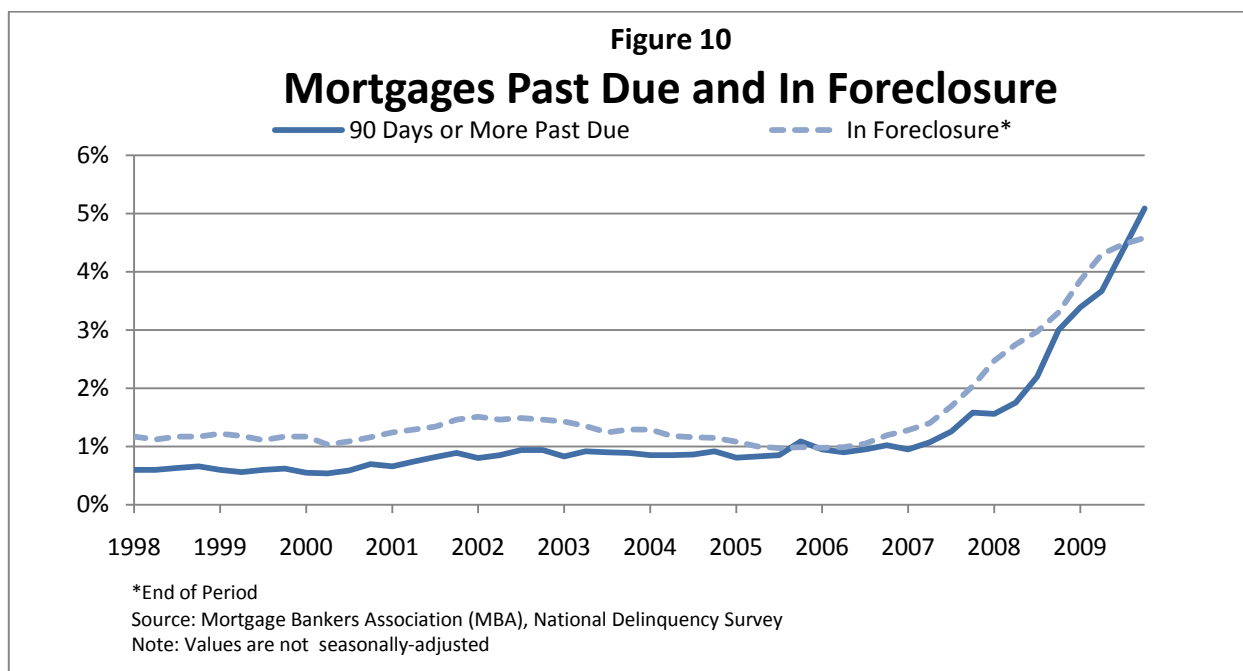
<sup>14</sup> Himmelberg, Mayer, and Sinai (2005, p. 68).

<sup>15</sup> See, e.g., Robert Shiller, “The Bubble’s New Home,” *Barron’s*, June 20, 2005 and Paul R. Krugman, “That Hissing Sound,” *The New York Times*, August 8, 2005.

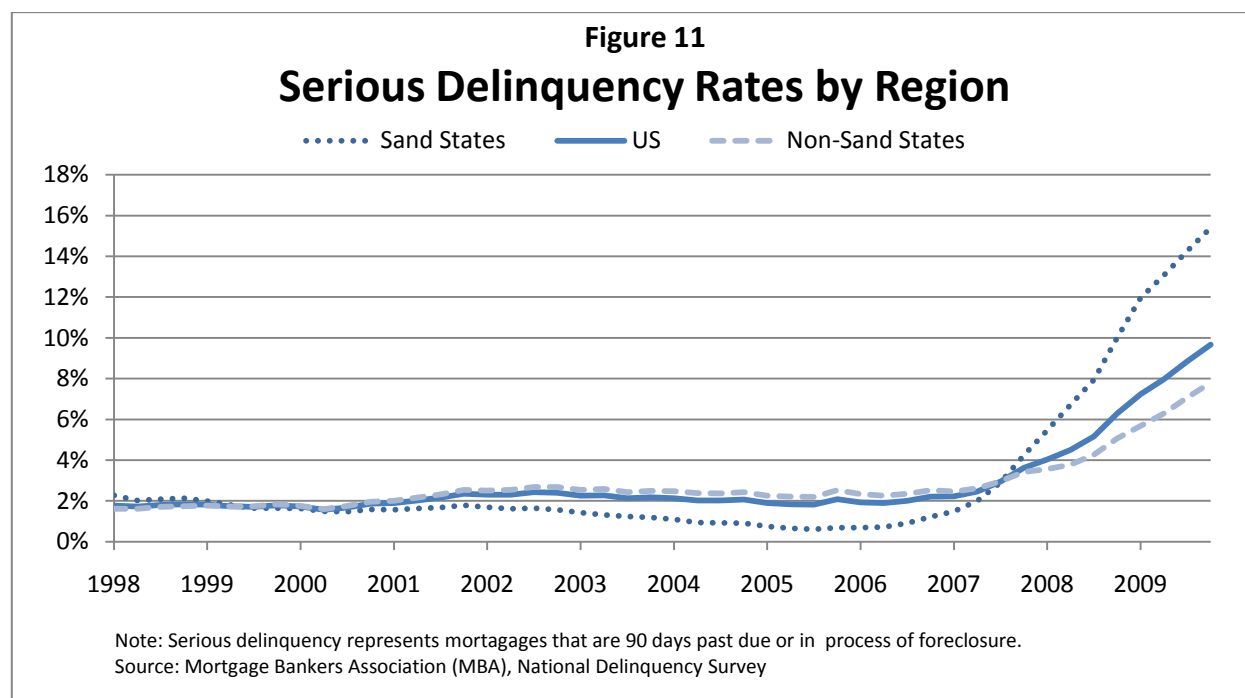
**V. DELINQUENCY AND DEFAULT**

**A. SERIOUS DELINQUENCY IN THE UNITED STATES**

Soon after the peak of house prices in early 2006, delinquencies and foreclosures began to rise. As shown in Figure 10, both the percentage of loans 90 or more days delinquent and the percentage of loans in the foreclosure process hovered around 1 percent up until 2006. Late in that year and early in 2007, early payment defaults from mortgages originated in 2006 began to appear. After that point, both indicators show a sharp increase as the default and foreclosure crisis emerged.



As with house prices, the rate of serious delinquency, which includes loans 90 or more days past due and those in the foreclosure process, also varies widely across the country. Figure 11, based on analysis by the Mortgage Bankers Association, shows the rate of serious delinquency for the “sand states” (California, Arizona, Nevada and Florida), for the remaining states, and for the entire nation. In the sand states, serious delinquency is nearly 16 percent, double the rate in other areas of the country. For the years immediately preceding the crisis, these states had lower rates of delinquency, likely due to the fact that house price appreciation enabled borrowers to sell their homes rather than default on their mortgages.



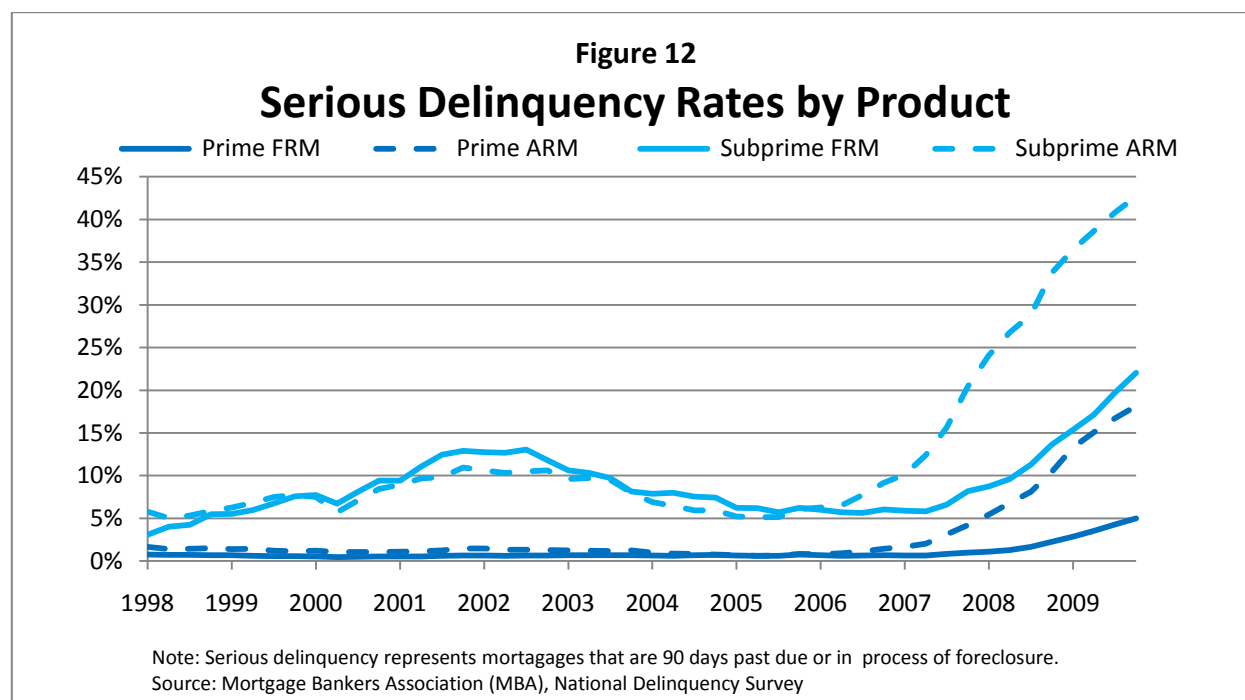
## B. SERIOUS DELINQUENCY BY PRODUCT AND CHARACTERISTICS

Figure 12 shows the percentage of loans seriously delinquent for four product categories as reported by the Mortgage Bankers' Association: prime fixed rate mortgages (FRMs), prime adjustable rate mortgages (ARMs), subprime FRMs, and subprime ARMs. In this dataset, subprime loans are identified as such by the loan servicers.

First, note that in the last recession, in 2001, subprime loans performed poorly but prime loans were largely unaffected by the downturn. Serious delinquency on both subprime ARMs and FRMs rose above 10 percent from 2001 to 2003.<sup>16</sup>

Second, delinquency rates during the recent mortgage crisis are much higher than those during the 2001 recession, with even prime loans' delinquency rates increasing substantially. Subprime loans performed much worse than prime loans, and for both categories, ARMs performed worse than FRMs. Subprime ARMs were the worst performing category, with serious delinquency rates over 40 percent by the third quarter of 2009. They are followed by subprime FRMs at over 20 percent delinquent, prime ARMs at 18 percent delinquent, and prime FRMs at about 5 percent delinquent, all as of the third quarter of 2009.

<sup>16</sup> It is important to note that the data regarding subprime mortgage performance before 2003 is sparser, and of somewhat lesser quality, than in later years.

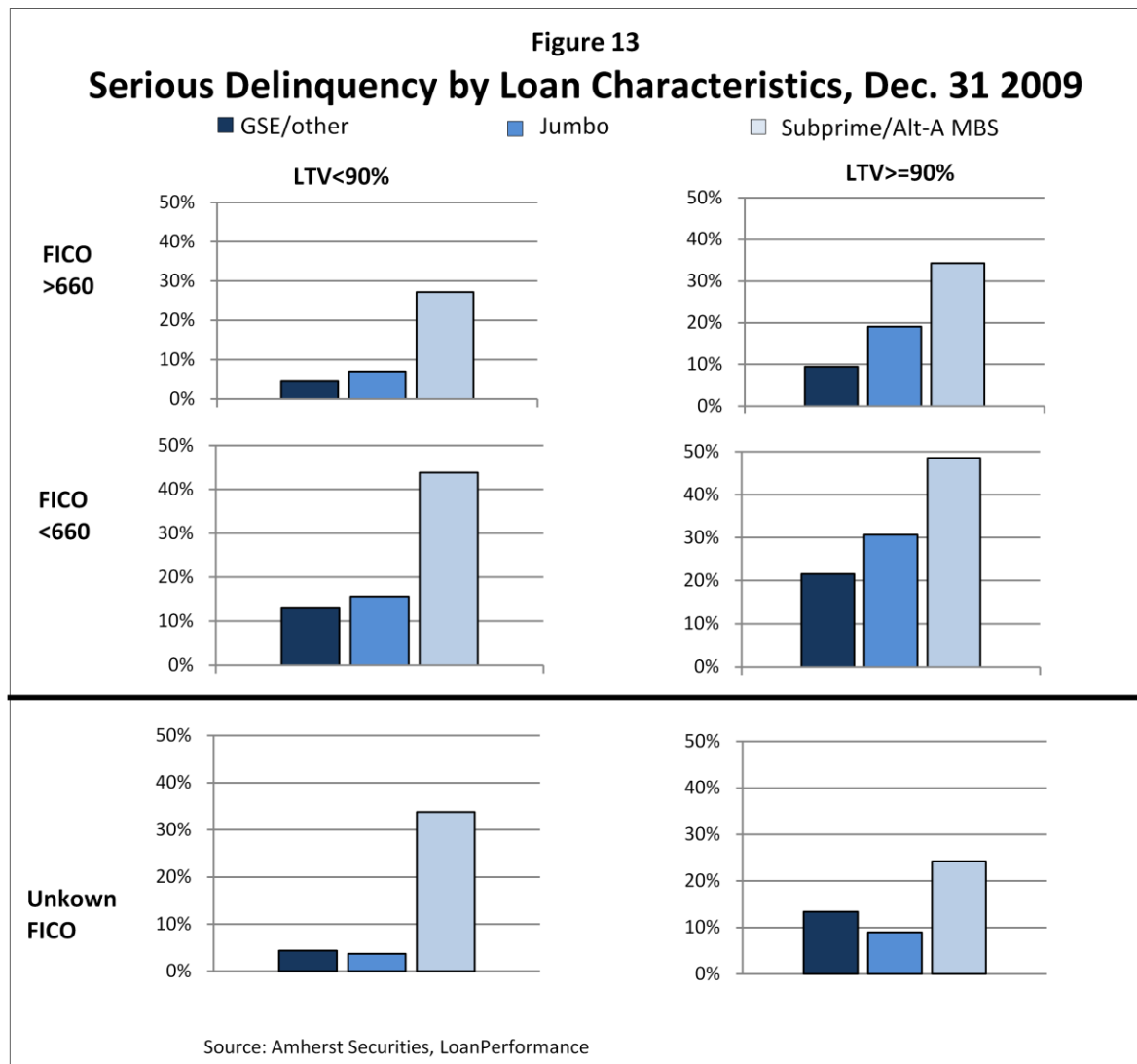


Deterioration in these categories of loans started at different times. Subprime ARMs began to show increases in serious delinquency in early 2006 just as house prices were peaking. In contrast, prime ARMs begin to show weakness more than a year later, at about the same time as subprime FRMs. Prime FRMs (again, as reported by the Mortgage Bankers' Association) show a slow and steady increase in serious delinquency that coincides with the increasing severity of the recession and the increase in unemployment in 2008.

As discussed above, the definition of a subprime loan, or an alt-A loan, is not very precise. Some have suggested that a more definitive, and arguably objective, measure based on the characteristics of the loan be used to identify high risk mortgage loans.<sup>17</sup> For example, loans could be categorized as "high risk" or "subprime/alt-A" based on borrowers' FICO credit scores and the loans' LTV ratios.<sup>18</sup>

<sup>17</sup> See e.g. the recent work by Ed Pinto (<http://www.aei.org/docLib/Pinto-Sizing-Total-Exposure.pdf>). In his analysis, all loans with a FICO score below 660 are described as subprime by characteristic and of the remaining loans, those with LTV above 90%, or with certain features such as negative amortization or IO provisions, are described as Alt-A by characteristic.

<sup>18</sup> Credit scores are numerical values meant to represent the credit risk posed by a prospective or current borrower. FICO credit scores are based upon the proprietary formulas developed and used by Fair Isaac Corporation.



The chart above shows risk characteristics for three categories of mortgages: GSE/other and jumbo and loans in subprime and alt-A MBS.<sup>19</sup> Alt-A/subprime MBS are loans that are held in MBS that were labeled alt-A or subprime MBS. All other loans are classified as GSE/other if they were for amounts below the GSEs’ conforming loan limits, and jumbo if not. The great majority of loans in the GSE/other category are held by the GSEs or in GSE MBS.

The chart shows the percentage of various loan-risk groups based on FICO and LTV that were seriously delinquent as of year-end 2009. With two thresholds, there are naturally

<sup>19</sup> For this graph, FHA and VA loans are omitted from the Alt-A/subprime MBS category since the data were not available when this report was produced. Revised versions of this preliminary staff report submitted to the Commission will reflect analysis using a more comprehensive and detailed dataset on the mortgage market.

four risk groupings, displayed in the top four panels. The least risky group, those with low LTV and high FICO scores is displayed in the upper left panel. The lower right panel displays the information for the riskiest group, those with high LTV and low FICO scores. The other two panels in this group of four have low FICO and low LTV in one panel (in the bottom left) and high FICO and high LTV in the other panel (upper right).

There are two other groups containing loans where the FICO score is unavailable, displayed at the bottom of the figure. For each risk group, the colored bars represent the rates of serious delinquencies for the three categories: GSE/other, jumbo and alt-A/subprime MBS.<sup>20</sup>

**Table 3: Percentage of Portfolios**

		LTV<90%	LTV>=90%
<b>FICO &gt;660</b>	<i>GSE/other</i>	66.1%	7.5%
	<i>Jumbo</i>	86.2	3.2
	<i>Alt-A/subprime MBS</i>	46.3	6.8
<b>FICO &lt;660</b>	<i>GSE/other</i>	11.8	3.7
	<i>Jumbo</i>	6.2	0.6
	<i>Alt-A/subprime MBS</i>	35.6	10.6
<b>Unknown FICO</b>	<i>GSE/other</i>	9.2	1.6
	<i>Jumbo</i>	3.6	0.2
	<i>Alt-A/subprime MBS</i>	0.1	0.5

As shown in Table 3 above, most GSE/other loans and jumbo loans are in the greater than 660 FICO and below 90 percent LTV group (the upper left group of Figure 13 and in the table). Nonetheless, roughly 25% of GSE/other loans in this dataset have a FICO below 660 or an LTV greater than or equal to 90 percent. Similarly, while most of the alt-A/subprime MBS loans have one of these two loans characteristics (FICO below 660 or an LTV greater than or equal to 90 percent), 46 percent of these loans are in the group with FICO above 660 and LTV at or below 90 percent.

For each of the four risk groups, the delinquency rate is substantially less for loans in the GSE/other group compared to the alt-A/subprime MBS group. In both the low FICO-low LTV group and the high FICO-high LTV group, the rate of serious delinquency for the GSE/other loans (13 percent and 9 percent, respectively), is less than one-third the rate for alt-A/subprime MBS loans with the same characteristics (43 percent and 34 percent,

<sup>20</sup> The GSE/other portfolio is very similar in composition to the yearend 2009 portfolio in the Fannie Mae single family guarantee book as described in the Fannie Mae Credit Supplement. Using a slightly different tabulation (breakpoint at FICO=620) that better aligns with information provided in that report shows that the distribution of loans in the four buckets is very similar for these two portfolios. Serious delinquency at Fannie Mae, on average, was 5.4 percent compared to 6.1 percent in this portfolio.

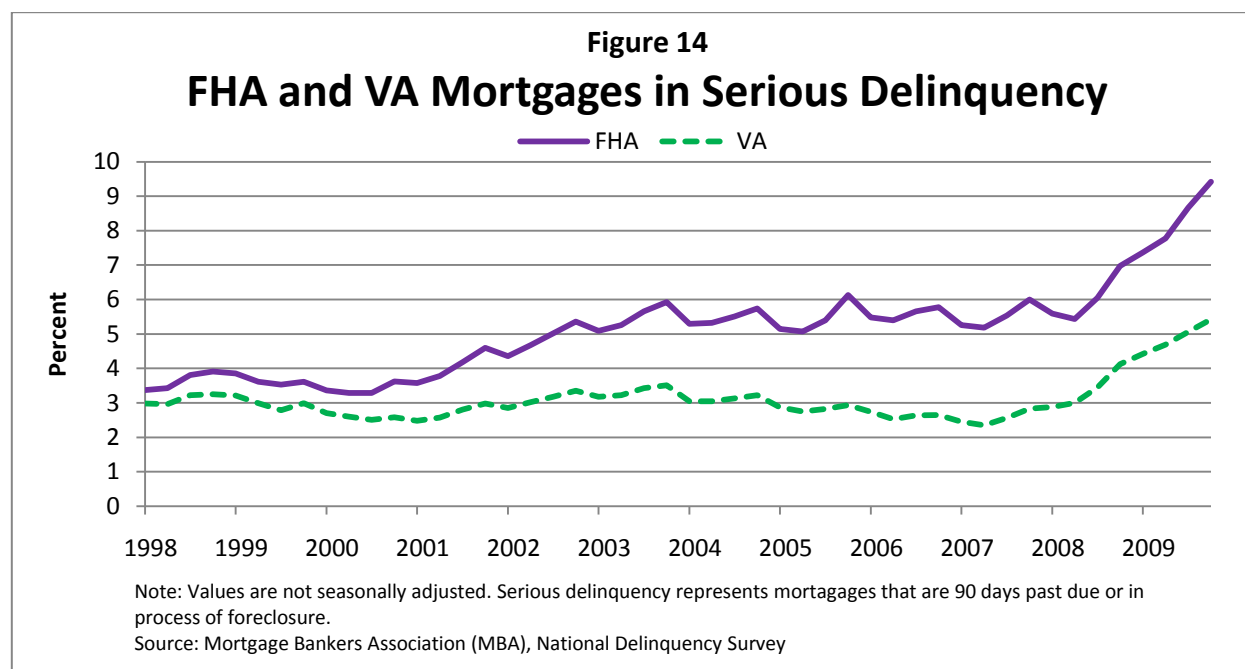
respectively). In both of these groupings, the rate of serious delinquency for GSE/other loans is near the national average of roughly 10 percent.

For the riskiest group, those loans with high LTVs made to borrowers with low FICO scores, the rate of serious delinquency is just over 20 percent for the GSE/other loans, compared to nearly 50 percent for the loans in alt-A/subprime MBS. For the least risky loans, the difference is most pronounced; serious delinquency is roughly 5 percent for the GSE/other loans compared to nearly 30 percent for the alt-A/subprime MBS. Overall, the roughly 20 percent rate of serious delinquency within the worst performing group of GSE/other loans is still less than the roughly 28 percent rate of serious delinquency in the best performing group of loans in alt-A/subprime MBS.

Loan characteristics such as LTV and borrower characteristics such as FICO are clearly related to performance. As discussed below, evidence suggests that the increased number of loans with high LTVs was one of the reasons for the high default rates. The market's classification of the loans is also important: loans in subprime and alt-A MBS performed much worse than those the market labeled prime, even when they were in the same grouping of FICO and LTV.

### C. DELINQUENCY OF FHA AND VA MORTGAGES

Figure 14 shows the progression of serious delinquency rates in loans guaranteed by the Federal Housing Administration (FHA) and the Department of Veterans Affairs (VA). A mortgage is considered to be in serious delinquency when payments are 90 or more days past due. From the second quarter of 2008 to the fourth quarter of 2009, FHA-backed mortgages in serious delinquency rose from 5.4 percent to 9.4 percent.



#### D. DELINQUENCY BY VINTAGE

Mortgages originated during various years have performed differently during the crisis. Analysis by Yuliya Demyanyk and Otto Van Hemert (2009) shows that subprime mortgages originated in later years have higher rates of serious delinquency than those originated earlier. This pattern may be driven by several factors, including:

- First, the characteristics of the mortgages originated in each year could be changing so that, for example, the distribution of FICO scores and LTV ratios for the loans originated in 2006 was substantially different than for loans originated in earlier years.
- Second, even with the same observable characteristics, mortgages written in the later years could be somehow “riskier” in ways that are not readily apparent.
- Third, the differences in default may be driven by the fact that the different vintages of loans experienced different house price appreciation. The value of the homes secured by loans originated in 2001 experienced large increases in their value over the first 60 months after the loans were originated. In contrast, the homes securing loans originated in 2006 lost value quickly. Because falling home prices result in increases in mortgage defaults, these two vintages can be expected to have very different default rates over any given period since origination.



Either of the first two factors could be described as a “decrease in underwriting standards” and are often cited as explanations for the foreclosure crisis. In contrast, the third explanation relies on home price declines as a major factor. The next section describes some of the research done to date that attempts to measure these effects.

## **VI. LITERATURE ON HIGH DEFAULT RATES DURING THE MORTGAGE CRISIS**

As described above, mortgage delinquencies and foreclosures rose dramatically beginning in 2006. This section discusses some of the current research that examines the reasons for these increases.

### **A. DOUBLE-TRIGGER MODEL OF MORTGAGE DEFAULT**

A standard model of mortgage default is known as the *double-trigger* model: borrowers typically default on a mortgage only if they have both *negative equity*---i.e., they owe more on the house than it is worth---and they experience some sort of *income shock*, such as job loss, that makes it difficult to continue making payments on the mortgage.<sup>21</sup>

The reason negative equity is thought to be a necessary condition for mortgage default is that, if a borrower has positive equity he can sell the house and pay off the loan, keeping any equity left after selling costs. This is better for the borrower than simply walking away from the house and defaulting because the borrower’s credit score is preserved and he gets his equity back (minus selling costs).

Some sort of income shock is also thought to be an important contributing factor for most defaults for several reasons. First, borrowers have economic incentives to continue paying even if their house is “underwater,” (i.e., they have negative equity) because defaulting on a mortgage can have a negative impact on their credit score. Moreover, borrowers may hope that housing prices will rise, resulting in their equity turning positive. Finally, some borrowers may feel a moral obligation to continue paying on their mortgage debt so long as they are able.

### **B. EVIDENCE ON THE REASONS FOR THE INCREASE IN MORTGAGE DEFAULTS**

Mayer, Pence, and Sherlund (2009) examine the reasons for the increase in mortgage defaults in 2007 and conclude that “[s]lackened underwriting standards ... combined with stagnant to falling house prices in many parts of the country appear to be the most immediate contributors to the rise in mortgage defaults.”<sup>22</sup> This conclusion is consistent with the double-trigger model discussed above. The sharp drop in housing prices beginning in 2006 left many borrowers with negative equity. Furthermore, borrowers with high initial LTV ratios, which became more prevalent as underwriting standards

---

<sup>21</sup>FN: Vandell (1995) and Foote, et al (2008) discuss the double-trigger theory.

<sup>22</sup> Mayer, Pence, and Sherlund (2009, p. 47-48).

slackened, are more sensitive to housing price declines because they have a smaller equity buffer before their mortgage is underwater. Moreover, borrowers with low FICO scores may be more at risk of income shocks due to job loss and other reductions in earnings. As a result, these borrowers are more likely to experience income shocks at the same time that they are underwater – thus experiencing the “double-trigger” that leads to default.

1. *Underwriting standards.*

Table 4 shows some of the attributes of the mortgages underlying subprime and alt-A MBS issued from 2003 to 2007. There are two important trends. First, from 2003 to 2006, median combined LTV, which is the ratio of total debt outstanding on the house and the value of the home (times 100), rose from 90 to 100 for subprime mortgages and from 90 to 95 for alt-A mortgages. A borrower with combined LTV of 100 has no equity in his house.

Second, from 2003 to 2006 the percentage of borrowers who offered the originator low or no documentation of their income and assets rose from 32 to 38 percent for subprime mortgages and from 63 to 80 percent for alt-A mortgages. Generally, when borrowers apply for a mortgage, they must provide the lender documentation of their income and assets, for example by providing income tax statements and bank statements. For these low and no documentation loans the borrower provided less than the standard set of documents, and such loans have higher default risk than full documentation loans. Finally, note that median FICO scores, which measure how strong the borrower’s credit history is, show little change over the period.

**Table 4: Characteristics of Home Purchase Mortgage Loans in Subprime and Alt-A MBS**

	<i>Mortgage type</i>	2003	2004	2005	2006	2007 (Jan-June)
Median Combined LTV	Subprime MBS	90	95	100	100	100
	Alt-A MBS	90	90	90	95	95
Median FICO score	Subprime MBS	615	615	618	616	613
	Alt-A MBS	710	706	708	701	707
% with low or no documentation	Subprime MBS	32	34	36	38	34
	Alt-A MBS	63	62	69	80	81

Source: Mayer, Pence and Sherlund (2009) analysis of First American LoanPerformance data.

Mayer, Pence, and Sherlund (2009) conclude that the increase in combined LTV and in low or no documentation loans were substantial contributors to the poor performance of loans during the mortgage crisis.

## 2. *Housing prices*

Mayer, Pence, and Sherlund (2009) cite housing prices as a second major contributor to the increase in defaults during the mortgage crisis. As documented above, housing prices experienced a dramatic run-up from 1998 to 2006, but then fell at an average annual rate of 10 percent from mid-2006 to mid-2008.<sup>23</sup> Mayer, Pence, and Sherlund (2009) observe that states with particularly large rises and falls in house prices---namely, California, Florida, Arizona, and Nevada---experienced default rates of roughly twice the national average.

## 3. *Income shocks and unemployment*

Another contributor to the increase in mortgage defaults was a rise in unemployment. Even in normal times, households may face unexpected reductions in income, perhaps from job loss, or an unexpected increase in expenses, such as medical bills. When housing prices go down, some of those who lose their job will be underwater on their mortgage and consequently at high risk of default. As the unemployment rates goes up, the frequency with which this occurs will naturally increase. As Mayer, Pence, and Sherlund (2009) note, some of the earliest defaults were in the industrial Midwest, where difficult economic conditions had led to increased unemployment for several years. This spread to other parts of the country as the financial crisis and ensuing recession took hold.

## VII. REFERENCES

Avery, Robert B., Neil Bhutta, Kenneth P. Brevoort, Glenn B. Canner, and Christa N. Gibbs, Forthcoming, "The 2008 HMDA Data: The Mortgage Market during a Turbulent Year," *Federal Reserve Bulletin*, available at <http://www.federalreserve.gov/pubs/bulletin/2009/pdf/hmda08draft.pdf>

Barth, James, 2009, *The Rise and Fall of the US Mortgage and Credit Markets*, John Wiley and Sons: Hoboken, NJ.

Demyanyk, Yuliya and Otto Van Hemert, 2009, "Understanding the Subprime Mortgage Crisis," *The Review of Financial Studies*, May 2009.

Foote, Christopher L., Kristopher Gerardi, and Paul S. Willen, "Negative Equity and Foreclosure: Theory and Evidence," *Journal of Urban Economics* 64: pp. 234-245.

Himmelberg, Charles, Christopher Mayer, and Todd Sinai, (2005), "Assessing High House Prices: Bubbles, Fundamentals and Misperceptions," *Journal of Economic Perspectives*, 19(4).

---

<sup>23</sup> Mayer, Pence, and Sherlund (2009, p. 45).

Jaffee, Dwight M. and John M. Quigley, 2008, "Mortgage Guarantee Programs and the Subprime Crisis," *California Management Review*, 51(1).

Leventis, Andrew (2008), "Revisiting the Differences between the OFHEO and S&P/Case-Shiller House Price Indexes: New Explanations," available at <http://www.fhfa.gov/webfiles/1163/OFHEOSPCS12008.pdf>

Mayer, Christopher and Karen Pence, 2008, "Subprime Mortgages: What, Where, and to Whom?" FEDS Working Paper Series 2008-29, available at <http://www.federalreserve.gov/PUBS/FEDS/2008/200829/200829pap.pdf>

Shiller, Robert J., (2008), *The Subprime Solution: How Today's Global Financial Crisis Happened, and What to Do about It*, Princeton University Press.

Shiller, Robert J., (2006), *Irrational Exuberance*, Currency/Double-day.

Stiglitz, Joseph E., 1990. "Symposium on Bubbles," *Journal of Economic Perspectives*, 4(2).

Vandell, Kerry D., 1995, "How Ruthless is Mortgage Default? A Review and Synthesis of the Evidence," *Journal of Housing Research* 6: pp. 245 -264.