



**TITLE: THE LAST FINANCIAL CRISIS. CREDIT RISK RELATED
PROBLEMS**

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ABSTRACT

In 2008, the worst financial and economic crisis in recent history, which was originated in the United States, put the world's economic system in danger. Ten years after the catastrophe, many studies have been conducted in order to understand what happened. The purpose of this project is to evaluate the different causes of the crisis in the U.S., to identify which were the solutions proposed at the time mainly by American institutions, and to determine whether the changes implemented during the crisis can prevent a similar meltdown in the recent future.

After the revision of different academic articles, important books on the crisis written by financial experts, Governmental Reports and Governmental data sources, and articles in relevant and trustworthy newspapers, the focus is placed on the role of Mortgages and the subsequent Securitization of these mortgages carried out in financial markets as one major cause of the crisis. This approach allowed me to identify a special causal relationship between the type of the mortgages given to borrowers before the crisis, the default rates on these mortgages and, therefore, the transmission of these default rates to the financial markets through the new financial instruments created before the crisis that had mortgages as underlying assets.

Finally, the last part of the project is an in-depth analysis of the measures taken to prevent a similar crisis again, which leads to my conclusions supporting the possibility of a crisis of similar dimensions to happen again although, in all probability, for different reasons, at least in terms of mortgage lending and securitization. The conclusion after the analysis is that the U.S. Government's post-crisis actions will successfully prevent a crisis from happening due to the same reasons, even if Trump's administration is pushing, again, for deregulation. Also, what is important is to consider the mental change that the crisis entailed for the population, which is now, theoretically, less likely to behave irrationally when it comes to borrowing. In addition, the conclusions also emphasize the importance of the U.S. electoral calendar, which is likely to constrain Republican's deregulatory actions before the elections in 2020. Lastly, the study doesn't disremember the potential severity of the next financial crisis, which is estimated for the year 2020, and could have devastating effects in the economy as Governments are very indebted and would not be able to develop similar solutions as the ones carried out in 2008.

STRUCTURE OF THE STUDY

In this section prior to the study, I present a summary of the structure and methodology used throughout the study with the aim of helping the reader follow my argumentation. First things first, it is important to mention that all images, figures and tables are to be found in the Appendix, as it is required by the Autonomous University of Barcelona. Also, what is worth highlighting is the fact that there is an abbreviation list at the beginning of the document that will help the reader all over the reading of the study.

Right after the abbreviation list, the reader will find a brief introduction on the subject where I explain why have I particularly chosen to focus on Mortgages and Securitization. After the brief introduction, I have proceeded with the analysis of the main reasons that drove the economic system to the crisis. This is to be found in sections 1 and 2, where a deep bibliographic review has been carried out in order to understand which were the main causes of the crisis. In this sections, the main sources of information encompass academic articles, books on the crisis written by financial experts, Governmental Reports and Governmental data sources, and articles in relevant and trustworthy newspapers. More precisely, section 2, which has also been based on a deep bibliographic analysis, explains which were the reasons for excessive mortgage lending and the subsequent securitization of these mortgages.

Subsequently, sections 3 and 4 deal with the dawn of the crisis itself. Whereas section 3 copes with the incidents happening immediately before the beginning of the crisis, namely, the burst of the housing bubble, section 4 explains how this bubble was transmitted to financial markets in such a devastating way that the Government had to intervene with the TARP program.

Following sections 3 and 4, the last two sections (5 and 6) evaluate the during- and post-crisis actions carried out by the Government with the aim of preventing a similar crisis to happen again. More precisely, section 5 is an in-depth analysis of the actions carried out by the government, and section 6 evaluates the probability of a similar crisis to happen again given the corrective actions mentioned in section 5.

Lastly, the reader will find the closure of the study, which is a summary of all the causes and consequences of the crisis, and also of the conclusions reached in sections 5 and 6.

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LIST OF ABBREVIATIONS

- ABS – Asset-Backed Security
- ARM – Adjustable Rate Mortgage
- CDO – Collateralized Debt Obligation
- CDS – Credit Default Swap
- CFMA – Commodity Futures Modernization Act
- CFPB – Consumer Financial Protection Bureau
- CFTC – Commodity Futures Trading Commission
- CMO – Collateralized Mortgage Obligation
- FED – Federal Reserve
- FHA – Federal Housing Administration
- FIO – Federal Insurance Office
- FSA – Financial Service Authority
- FSOC – Financial Stability Oversight Council
- GSE – Government-Sponsored Enterprise
- HPI – House Price Index
- IMF – International Monetary Fund
- KDB – Korea Development Bank
- LIBOR – London Interbank Offered Rate
- MBS – Mortgage-backed Security
- NINJA – No Income, No Jobs and No Assets
- OTC – Over the counter
- PMI – Private Mortgage Insurance
- SEC – Securities and Exchange Commission
- SPE – Special Purpose Entity
- SPV – Special Purpose Vehicle
- TARP – Troubled Asset Relief Program

INTRODUCTION

The financial crisis has been a widely discussed topic in the last ten years given the direct impact that the economic meltdown had in all levels of the economic system, starting by the individuals and corporations, and ending by the Governments. For this reason, many specialists have focused on identifying which were the main reasons that set the favourable environment for such a crisis to happen.

In that sense, after having repeatedly appeared in many studies as the main causes of the crisis, some of these causes appear to be commonly recognized as the origins of the 2008 financial crisis. Many experts blame the expansionary monetary policy conducted by the Federal Reserve (Fed) right after the Dot-com crash and the September 11 attacks for being one of the causes that pushed individuals to start borrowing money and banking institutions to start conceiving new creative ways to get high profits given that the low interest rates provided little revenues (Zurita González, J., Martínez Pérez, J. F., & Rodríguez Montoya, F, 2009, pp. 17-27.). Also, experts highlight the importance of deregulation of financial markets as one of the main causes of the crisis. Others blame the greed of (leveraged) investors and also of speculative borrowers as the main cause of the crisis. Finally, there are those who blame bullish stock markets for reinforcing investors' favourable attitude towards risky investing. In any case, all these facts appear to be causes of the crisis.

In order to reduce the scope of the project, I have focused on the role of Mortgages and the subsequent Securitization of these mortgages carried out in financial markets as one major cause of the crisis. The choice of these two main variables has been made because they seem to represent the straightforward relationship between financial markets and individuals affected by the system in general. More precisely, I have decided to evaluate how individual decisions like getting a mortgage were affected by mortgage lenders' and banking institutions' greed and, later, how this greed turned against them and society in general, affecting even the Government.

Notwithstanding, for the sake of having a proper understanding of the two main causes of the crisis on which I have decided to focus, it is necessary to properly comprehend why actions like excessive mortgage lending and the securitization of these mortgages

were possible. For this reason, I have developed the section ***CRISIS ORIGINS: THE LEGAL AND GOVERNMENTAL FRAMEWORK THAT GAVE BIRTH TO THE CRISIS*** with the aim of explaining which were the regulations and actions that enabled the system to move in the direction it moved right before the big meltdown in 2008. Moreover, by studying how the legal and Governmental framework precipitated the crisis, many of all the possible causes of the crisis mentioned earlier will be evaluated.

1. CRISIS ORIGINS: THE LEGAL AND GOVERNMENTAL FRAMEWORK THAT GAVE BIRTH TO THE CRISIS

In this section, an approach to the potential origins of the crisis is developed. More concretely, the focus will be on determining which parts of the American legal framework contributed to a financial crisis.

However, in order to better understand why could a crisis of such dimensions take place, it is interesting to check some economic indicators that also show that the economy was overheated.

1.1. A picture of the economy before the crisis

The first main indicator that can be used to explain both a general economy overheating (and the economic situation in general) and a housing bubble is the House Price Index (HPI). As it can be calculated from ***Figure 11 - Freddie Mac House Price Index***, Annual House Price Appreciation from 2001 (base year; HPI = 100) until 2007 was of 10%, a growth rate that drove the Freddie Mac HPI up to 160 in 2006-2007.

In addition, as it is mentioned by David Brett, an investment writer at Schroders, and Matt Phillips, from The New York Times, there was a bull market right before the crisis, from October 2002 (the S&P 500 hit 776.76) to October 2007 (the S&P 500 hit 1,565.15, according to Caroline Valetkevitch from Reuters). The stock market indexes grew around 101% at a 15% CAGR.

Finally, another relevant factor to consider is the monetary policy conducted before the crisis. As mentioned Ricard Murillo from CaixaBank Research, “monetary policy was excessively accommodative in the years leading up to the financial crisis” (below 2%)

because “the interest rate set by the Federal Reserve between 2002 and mid-2005 was indeed well below that suggested by Taylor’s rule” (around 4%).

In any case, as about all the crisis and economic meltdowns, what can certainly be stated about the last financial crisis is that it could not have been caused by a unique reason. Moreover, we cannot assert that the causes of the crisis were only originated by the actions of companies of the private sector either. For this reason, a study of the possible causes coming from the public sector is presented.

1.2. The Legal Framework That Gave Birth to The Crisis

Among the legal reasons that could have given birth to the financial crisis, many options have been discussed since 2008. Nevertheless, although there are legal actions and Acts that were thought to have a minor influence in generating the crisis, one Act comes forward as one of the main causes. This is the Commodity Futures Modernization Act.

1.1.1. *The Commodity Futures Modernization Act; its role in the crisis*

Signed by Bill Clinton the 21st of December of 2000, the Commodity Futures Modernization Act (CFMA) had the main purpose of legalizing trade of over-the-counter¹ (OTC) derivatives. Thanks to this Act, OTC derivatives would no longer be neither regulated as futures (Commodity Futures Trading Commission – CFTC) nor as securities (Securities and Exchange Commission – SEC).

More precisely, the CFMA has been blamed for allowing “unregulated” trade of Credit Default Swaps (CDS)². Specialists like senior editor of *Newsweek* Michael Hirsh³ argue that CDS deregulation opened a new market for Wall Street, where they could start trading Mortgage-Backed Securities⁴ (MBSs; many of them having subprime mortgages as underlying assets) together with a hedge against a possible default by borrowers

¹ According to Thesaurus Dictionary, over-the-counter refers to “unlisted on or not part of an organized securities Exchange”.

² According to expert Kimberly Amadeo, a Credit Default Swap is a contract that guarantees against bond defaults. To be seen in depth in section *The securitization process*. Basically, it works like an option that pays the holder when the underlying asset defaults.

³ Hirsh, M. (2009, March 20th). Interview by M. Block. 2000 Commodities Act Paved Way For Problems. *National Public Radio (NPR)*. Available at <https://www.npr.org>. Accessed 21 October 2018

⁴ According to Thesaurus, Mortgage-backed Security or *MBS* is a security created when a group of mortgages are gathered together and bonds are sold to other institutions or the public; investors receive a portion of the interest payments on the mortgages as well as the principal payments; *usually* guaranteed by the government.

(CDS). For an example of the increase in derivatives trade, see the global increase in OTC derivatives in *Figure 1 - Global OTC derivatives (2006 - 2009)* in *APPENDIX*.

According to Justin Fox (2010), “it (CFMA) effectively banned regulators from sticking their noses into over-the-counter derivatives like Credit Default Swaps. There's no guarantee that regulators would have sniffed out the dangers in time. But banning them from even looking sent a pretty clear anything-goes message to OTC derivatives markets”.

Therefore, one can conclude that the CFMA was nothing but a push for the main cause of the crisis, i.e., excessive mortgage (including subprime) lending and securitization of these mortgages. More precisely, the CFMA fostered securitization because it made easier to trade mortgage-related assets such as CDSs.

1.2.2. *The repeal of the Glass-Steagall Act by the Gramm-Leach-Bliley Act.*

Apart from the CFMA, another measure that is thought by some experts like Joseph Stiglitz and Paul Krugman to have had an influence in the generation of the financial crisis was the repeal of The Glass-Steagall Act.

The Glass-Steagall Act was passed in 1933 in order to avoid future problems as the ones occurred during the Great Depression. Basically, its aim was to prevent commercial banks from investing in stocks so that, in case of market failure, there were not bank runs⁵. Essentially, investment banks and commercial banks were legally separated to protect deposits from risky investments.

Nevertheless, because of excessive regulation, the American Banking industry claimed that overregulation prevented them from competing with international financial companies because the returns they were offering were smaller. This was because they were only allowed to perform low-risk investments, which always bring lower returns. Thus, one of the options was to repeal the Glass-Steagall Act.

⁵ Bank runs occur when a significant number of individuals withdraw their money from a bank.

Obviously, with the repeal of the Act, commercial banks were again entitled to invest their deposits in stocks. This entailed that investment and commercial banking activities could now blend together.

As a result, many commercial banks and investment banks merged to such an extent that they became “too big to fail”⁶, which provided them with incentives for risk taking given the assured Government bailout in case of failure or bankruptcy.

Accordingly, the repeal of The Glass-Steagall Act may be presented as a factor that made the crisis worse because it fostered risky investing.

1.3. The Government-Sponsored Enterprises (GSE)

Another governmental decision that contributed to generating a housing bubble, and to the American citizens’ fulfilment of the American Dream was the fact that they chartered Fannie Mae (Federal National Mortgage Association) and Freddie Mac (Federal Home Loan Mortgage Corporation) as government-sponsored enterprises (GSEs).

Fannie Mae and Freddie Mac had the purpose of increasing the availability of mortgages for American citizens. They did not do it directly but, rather, their function was to provide liquidity to the mortgage lenders by buying them the mortgages they previously originated. As Kristy Demshki from Penny Mac explains, “Fannie Mae and Freddie Mac did this [providing liquidity] by purchasing most of the home loans in the United States. They then held them as their own investments, or packaged them into mortgage-backed securities that were sold to investors in what is known as the secondary mortgage market” (which is the same where they bought the mortgages in the first instance).

Basically, as a compensation for providing liquidity, they received a portion of the mortgage payments, or they got income by selling MBSs in the secondary mortgage market. Besides the sale, they also offered an implicit government insurance to cover against losses on mortgages forming the MBSs, i.e., the government would implicitly

⁶ Economic concept that describes a situation in which an entity is so big, that its failure would have dramatic consequences for the economy, reason why they would require Government bailout in case of bankruptcy.

cover Fannie and Freddie's debt, that's why they are called Agency-MBSs. Overall, by increasing the lenders' liquidity, they fostered credit flows and, consequently, the issuance of mortgage loans.

In that sense, their liquidity-providing activities wouldn't have implied the creation of a crisis *per se*. However, the subsequent securitization of the purchased mortgages was a cause of the crisis in a sense. As, Freddie Mac and Fannie Mae were making outstanding profits (see **Figure 2 - Big Profits before the Crisis: Fannie Mae and Freddie Mac** in **APPENDIX**) out of the securitization process, Wall Street players wanted to enter the game.

Of course, the entrance of Wall Street players implied that the size of the market for securitized mortgages grew, increasing at the same time the economy's exposition to credit default (see **Figure 3 - Mortgage Bonds issued by Banks and Private Institutions**). Nevertheless, this may not had been a problem if credit had been given to reliable borrowers. Instead, once most reliable borrowers were already indebted, subprime lending started, which dramatically increased the risk on all the financial institutions' portfolios and the risk of the newly created securitized mortgages. As Greg Wood from the BBC states, "if a sufficiently large number of homeowners delayed the payment of the mortgage, then the value of these mortgage-backed securities would collapse". In addition, as the borrowers behind the mortgages inside the MBSs created by Wall Street did not qualify for being bought by GSEs, then, the new MBSs were non-Agency or Private Label MBSs, which meant that the government did not even guarantee them implicitly. Thus, non-Agency MBSs were riskier than Agency MBS (see **Figure 4 - Agency vs. Non-Agency (%) US MBS - Amount Outstanding**).

Fannie and Freddie, in turn, didn't want to lose market share, which made them start to purchase AAA rated, non-agency securities (see **Figure 5 - The Growing Role of Fannie Mae and Freddie Mac in the US Mortgage Market**) and, therefore, increase their exposure to risk. This, as will be explained later in the document, was a crucial factor to explain why Fannie Mae and Freddie Mac had to be bailed out by the Government after a dramatic increase in delinquency rates for mortgages backed by them (see **Figure 6 - Delinquency for Fannie-, Freddie- backed mortgages**) and for non-agency MBSs in their portfolio.

2. MORTGAGES AND SECURITIZATION

As stated previously in the document, the main causes of the financial crisis were the excessive mortgage lending (including Alt-A⁷ and subprime lending), and the subsequent securitization of these mortgages.

2.1. Mortgages

2.1.1. *Reasons for Mortgage Lending*

Excessive mortgage lending was not an isolated cause but, rather, was the consequence of a parallel housing bubble that made housing supply outpace demand by far (see *Figure 7 - Housing demand and housing supply*, *Figure 8 - Nominal residential investment from 1950 to 2008*, and *Figure 9 - Residential-construction-related employment* to see increases in supply and employment in construction).

For this reason, mortgage lenders had incentives to write as many mortgages as they could in order to make money with fees, which made homeownership rate increase (which implicitly reflects an increase in demand), as it is shown in *Figure 10 - Homeownership Rate for the United States*, from 64% in 1992 to almost 70% in 2005.

This huge increase in demand made house prices dramatically increase as well, as it can be seen in *Figure 11 - Freddie Mac House Price Index*. From the beginning of the century, until 2007, prices steadily grew as a result of diverse causes, which contributed to the growth of the bubble and fostered housing investments by regular Americans. Many of them had more than one mortgage.

Nevertheless, huge lending wouldn't have implied a crisis if credits had been paid back. Here's where bad risk management practices come into play. First of all, what was important was the reduction of the standards when it came to mortgage lending. Normally, mortgage borrowers required a FICO⁸ score of at least 620, and were obliged to make a 20% down payment. However, once trustworthy borrowers had already gotten their mortgages, lenders accepted FICO scores lower than 620 with no down

⁷ Mortgages with a risk profile between subprime and prime.

⁸ According to Yuliya Demyank, FICO (Fair, Isaac and Co.), developed by Bill Fair and Earl Isaac, became a standard measure of consumer credit risk in 1989.

payment because verification processes, as Peter Henderson, Tim McLaughlin, Andy Sullivan and, Al Yoon assert, ‘took too long’ and ‘paperwork became the enemy of speed’. Also, as Alejandro Justiniano, Giorgio E. Primiceri, and Andrea Tambalotti express in their study *The Mortgage Rate Conundrum*, “the fraction of borrowers presenting full income documentation drops quite substantially from 73 percent in 2000 to 43 percent in 2007”.

This latest fact (mortgages with no or low documentation) was more important than the reduction of FICO scores because the reduction of these ones was modest as Christopher J. Mayer, Karen M. Pence, and Shane M. Sherlund present in their study *The Rise in Mortgage Defaults*; “the median FICO score in subprime pools was 615 in 2003 and 613 in 2007”. On its turn, mortgages with no or low documentation defaulted at much higher rates than fully documented loans, which was dangerous because, as seen before, borrowers presenting full documentation dropped from 73% to 43%.

As Henderson et al. also assert, “a credit score and a written, unchecked statement of income have often been enough to get a loan. That provided the fuel that kept the housing boom going as huge demand for homes met a seemingly endless and unchecked supply of money”. These loans that required few if any verification are informally known as NINJA loans, which are given to people with No Income, No Jobs and No Assets.

Not only this, but what had to be taken into account were the kind of mortgages and interest payments that were offered to new borrowers. As it may be recalled from previous sections (see *The Government-Sponsored Enterprises (GSE)*), trustworthy borrowers were already indebted, so in order to keep the “profit-making machine” running, new types of mortgages were created to be offered to less reliable borrowers (some of them NINJA).

2.1.2. New mortgage types

If historically, mortgage interests used to be fixed, during the boom, lenders started providing new mortgage types (which had different interest payment requirements) to borrowers. The most important ones were: Interest-only mortgages, 40 or 50 year

fixed-rate mortgages, Dignity Mortgages, and Adjustable Rate Mortgages (ARMs). Among these ones, ARMs were the most used by lenders.

These ARMs offered low interest rates at the beginning (also known as ‘teaser rate’), which increased later (depending on the specific ARM type: forms like 2/28 ARM⁹, 3/27 ARM, or 5/5 ARM) with changes in the six-month London Interbank Offered Rate¹⁰. As Michael Burry specified in an e-mail, “Take something like NovaStar, which was an ‘originate and sell’ subprime mortgage lender. 2/28 ARM interest only ARM mortgages were 5.85% of the pool in early 2004, but by late 2004 they were 17.48% of the pool and by late summer 2005 25.34% of the pool” (Lewis, 2010, p. 98 [ePub version]).

In order to see how the mortgage industry transformed, it is recommended to check *Table 1 - Summary statistics for 30-year, first-lien mortgages on owner-occupied houses in the PLSD. Averages or share of total per year*. As Justiniano et al. assert, “table 1 paints the picture of a transforming mortgage finance industry, in which non-traditional mortgage products become gradually more popular, at least until 2007”.

2.1.3. *Subprime lending*

The appearance of loans to be offered to low score borrowers gave birth to subprime lending (see *Figure 12 - Subprime Mortgage Origination* to check subprime lending increase since 2000). ARMs were a clear example of **subprime mortgage**, which is a type of mortgage offered to people with low credit ratings whose default risk is higher than standard.

Subprime lending was considered as an option by lenders mostly because the market was booming, which meant that they expected defaulting borrowers to be able to sell their house at a higher price than the one they originally paid for the house, allowing them, therefore, to repay the loan in case of default. Another scenario they considered as viable was the one in which defaulting borrowers refinanced to keep their homes, so lenders kept making fee money from them. These two scenarios in a booming situation

⁹ A 2/28 ARM mortgage is a 30-year mortgage in which the rates remain stable in the first two years, and then float according to an index plus a margin. They were the most common form of ARM.

¹⁰ London Interbank Offered Rate is abbreviated as LIBOR and is the rate of interest at which banks lend to each other in the interbank market. It is also used as a benchmark to define the interest rate on other loans.

made lenders give mortgages for a higher percentage of the value of the purchased asset, which is represented by higher loan-to-value ratios and combined loan-to-value ratios¹¹ during the period (see *Table 2 - Median Combined Loan-to-Values for Mortgages in Subprime and Alt-A Pools*).

As Steve Eisman (FrontPoint Partners) argued, “they were making loans to lower-income people at a teaser rate when they knew they couldn’t afford to pay the go-to rate. They were doing it so that when the borrowers get to the end of the teaser rate period, they’d have to refinance, so lenders can make more money off them” (Lewis, 2010, p. 182 [ePub version]). However, other experts assert that the problem was not that they knew they couldn’t afford the go-to rate, but that borrowers underestimated the potential increases of their interest rates (Bucks and Pence, 2008).

Moreover, another important factor to be taken into consideration is the fact that lenders were not the only actor interested in generating new mortgages no matter the type. On their side, borrowers were interested in getting new mortgages in order to buy new houses because of three main exits they could take in case of default, two of which have been slightly mentioned before. These exits are the following:

- 1) As the housing market was booming, in case of default, they expected to be able to sell their house at a higher price than the one they originally paid for it, which will allow them to repay the loan.
- 2) As the mortgage lenders and operators were interested in receiving fees by giving more loans no matter the type, borrowers expected to be able to refinance in case they defaulted.
- 3) Borrowers could enter a foreclosure process in case of not being able to keep up with the mortgage payments. A foreclosure process is a process by which the lender (of a mortgage in this case) takes over control of the house (which is the collateral used to back the mortgage) by foreclosing on the mortgage. Basically, in the case of mortgage lending, borrowers not being able to pay the mortgage

¹¹ Combined loan-to-value ratios include first and second mortgages (refinancing).

could simply enter a foreclosure process that will end with them abandoning the house, which will be then in possession of the lender. By doing so, they would be exempt from paying the mortgage but they would have lost the residence.¹²

In any case, what borrowers, lenders and financial entities behind them did not consider were neither a housing market crash nor a rate increase. This proved to be huge mistake because experts assure there were \$625 billion in subprime mortgage loans by 2005, out of which \$507 billion were packed into mortgage bonds (Lewis, 2010, p. 87 [ePub version]), placing the financial system in a difficult position in case of credit default.

2.2. Securitization

As also mentioned before in the document, securitization was, together with excessive lending, the main cause of the crisis. However, neither of these two causes can be seen in isolation as each of them reinforced the other. Clearly speaking, there was more mortgage lending because financial actors securitizing mortgages required more mortgages to securitize in order to get more profits (see *Figure 13 - Securitization market activity*).

Moreover, not all the steps of the securitization process were financially dangerous, which raises the need to deeply specify how the securitization process was before the 2008 financial crisis. For this reason, the document will proceed with a specification of the securitization process.

2.2.1. *The securitization process and its consequences*

For the sake of simplicity and easier understanding, the process will be divided into different steps.

Step 1: People's willingness to fulfil the American dream, Government Help, and Bank's interests made mortgage lending easier. Therefore, Americans asked for mortgages.

¹² For extension purposes, the foreclosure process is not explained in great detail.

Step 2: To be able to generate more mortgages, the mortgage lender sold the previously originated mortgage in the secondary mortgage market to mortgage securitizers like Fannie Mae or Freddie Mac (40% of all U.S. Mortgages) and other private institutions like investment banks. This step is normally referred to as pooling.

A further problem to be mentioned is the fact that investment banks were borrowing huge amounts to be able to buy more mortgages. This situation was enabled by the SEC, the organism which “relaxed” the limits on leverage (see *Figure 14 - Investment Bank Leverage 2003 vs. 2007* to check the increase in investment banks’ leverage). What this implied was that the leverage ratio¹³ of investment banks increased up to 33:1 in some cases, putting banks in huge danger because “a tiny 3% decrease in the value of their asset base would leave them insolvent” (Daniel Alpert, Managing Director of Westwood Capital in *Inside Job*, 2010). We will later see that this was a problem because they decided to buy and keep many of the securities they were creating, which later plummeted and caused their failure.

Step 3: After buying the mortgages, the mortgage securitizers (normally Investment Banks in this case) created what are known as Special Purpose Vehicles (SPVs) or Special Purpose Entities (SPEs), which are companies created with the only purpose of holding the previously bought mortgages. The SPVs held thousands of mortgages and issued shares known as Mortgage-backed security (MBS)¹⁴.

Even if there was a real default risk for each individual mortgage, the risk that all the mortgages within a same MBS defaulted at the same time was very low, which allowed mortgage securitizers to obtain triple-A ratings from rating agencies for their MBSs.

We can see that SPVs were created with the only purpose of eliminating the bought mortgages from the Bank’s balance sheet.

Anyway, as the business kept growing, these mortgage securitizers started demanding more and more mortgages to securitize (because of the huge profits they were making

¹³ Leverage Ratio = borrowed money/bank’s money

¹⁴ They are called MBSs because the value of the security is “backed” by the value of the underlying mortgages.

from securitization), which implied that borrower trustworthiness had to necessarily diminish. Therefore, these securitizers were now buying subprime mortgages that were, again, put together into new MBSs. Nevertheless, these latest MBSs were riskier than the ones created before because the default risk of borrowers was higher.

This, of course, implied that the default risk for the whole pool of mortgages forming the new MBSs was higher than before, which didn't allow mortgage securitizers to obtain triple-A ratings. On its turn, not obtaining triple-A ratings would limit the number of clients willing to buy the new MBSs because some investors like pension funds are not allowed (by law) to invest in risky assets.

Thus, in order to be able to sell these new and riskier MBSs whose underlying assets were less likely to be paid back, they sliced the MBSs into different layers or "tranches" based only on the probability of mortgages being repaid. These tranches were:

1. *Senior Tranche (AAA)*: they are paid first and have less risk. To compensate for the lowest risk, their return is lower.
2. *Mezzanine Tranche (BBB)*: they get paid if there's money left from paying the senior tranche. To compensate for a higher risk than the one of the *senior tranche*, their return is a bit bigger.
3. *Equity Tranche (Not rated)*: paid if there is money left. To compensate for the highest risk, their return is the highest.

The less risky and better rated tranches were issued and sold separately from riskier tranches to investors that must perform safe investments (like pension funds) in the form of independent MBSs. On the contrary, the tranches that were less likely to be bought because of risk issues, those with *BBB* or no rating, were repackaged in a new financial product known as Collateralized Debt Obligations (CDOs).

CDOs were nothing but an evolution of Collateralized Mortgage Obligations (CMOs), a form of MBS. These financial securities were based in tranches as well, which allowed investors to choose the level of risk they were willing to take for a given MBS.

CDOs were not only formed by lower tranches from subprime mortgages but, rather, also included other debt like auto loans, credit card debt or university loans (also given

to subprime borrowers). As time went by, however, CDOs were mostly formed by subprime or Alt-A mortgages with high default risk.

Again, to obtain good ratings, SPVs used the argument they were using before. Even if the default risk of the independent debt items forming the CDO was high, the risk that all debtors of the debt items forming the CDO defaulted at the same time was very low. This, again, allowed them to obtain triple-A ratings thanks to the concept of diversification of risk.

We must notice that rating agencies made profits out of the fees that investment banks paid them for rating their products (see ***Figure 15 - Rating Agency Profits (in Billions)***). As a result, there was an incentive for rating agencies to positively (AAA) rate these CDOs even if they did not know what kind of mortgages formed the tranches of the MBSs that formed them. As Frank Partnoy (Professor of Law and Finance at the University of California) states in the documentary *Inside Job* (2010), “triple-A rated instruments mushroomed from just a handful to thousands and thousands”, what can be seen in ***Figure 16 - New AAA Ratings 2000 - 2006***.

In addition to that, as the new financial instruments to be rated by rating agencies were relatively new and had never been evaluated in a crisis period because they didn't exist or were not vastly used in the last financial crisis, the records that rating agencies had for the values of these assets didn't allow them to correctly rate them. Moreover, the complex mathematical models used by rating agencies to determine the ratings for such financial products were not prudent because they didn't consider the fact that the data available on the evaluated financial products was positively biased because no crisis periods were reflected.

Moreover and in addition to the complexity of CDOs, financial engineers thought that it would be interesting to divide these CDOs into tranches (not MBSs as before) so that the *Mezzanine* and *Equity* tranches of a CDO could be put together into a new security called CDO-Squared. Of course, this procedure worsened the situation once borrowers of underlying mortgages defaulted.

Step 4: The mortgage securitizers were, then, able to sell the triple-A rated CDOs and CDOs-Squared to hedge funds, (other) investment banks, pension funds, insurance companies, banks (which could now invest in risky securities) or wealthy individuals.

Step 5: After more subprime mortgages were introduced in the CDOs, some experts like Michael Burry understood that the risk that all these newly created CDOs and MBSs defaulted was really high (given that most of the mortgages forming the CDOs were given to subprime borrowers, and were ARM and other risky types of mortgage).

For this reason, a need to get insurance in case of mortgage default arose, which fostered the use of the so-called Credit-Default Swaps (CDSs), which guaranteed payment in case of default by the borrower paying the underlying mortgage. Insurance companies issuing CDSs issued them because they didn't consider the fact that the market would fail, which implied that they didn't consider the option of actually having to pay for all the CDOs and MBSs for which they issued CDSs.

Most of these CDSs were issued by the insurance giant AIG, which was given a triple-A rating by rating agencies, implying that they were almost risk free. As a result, investors in CDOs and CDSs were almost certain that they would receive their money back. Nevertheless, as CDSs were not legally specified as an insurance policy, insurance companies issuing them (like AIG) didn't need to demonstrate that they had the capital requirements to back all the CDSs they issued.

In addition to that, however, one of the problems of CDSs was the fact that they allowed speculators to bet against the CDOs that the CDSs were insuring. In this sense, it is said to "bet against" because such speculators were actually waiting for CDOs to fail so that they got paid by insurance companies like AIG. Therefore, the problem here was that anybody could insure a CDO, meaning that a CDO failure would increase the losses in the system because not only one insurance would need to be paid but many.

Step 6: The appearance of CDSs gave CDO managers the opportunity to create an even more complicated financial product: the synthetic CDO. Instead of being backed by bonds, student loans, car loans, or mortgages like regular CDOs; synthetic CDOs were backed by derivatives like the CDSs. These synthetic CDOs were divided into tranches

that received payments based on the cash flows of CDSs, thereby simulating the underlying mortgages of a regular CDO.

Nevertheless, the effect of synthetic CDOs was smaller so its mention in the previous paragraph is made in order to understand the complexity of the financial engineering activities that took place during the housing and financial bubbles in the early 2000s.

Overall, in order to make the securitization process more visual and easy to understand, **Figure 17 - Securitization process** has been elaborated. The next step is to understand how both excessive lending and securitization led to a devastating crisis.

3. THE (SUBPRIME) CRISIS

In the following section, the reasons that explain how excessive lending and securitization resulted in the Great Recession are presented.

As stated in previous sections, lending and securitization were very closely related because the mortgages given were those assets backing the securities issued by investment banks and other entities. This implied that at that moment, the housing market and the financial market were more related than ever. As a result, a simple mortgage rate increase or a house price reduction could have dramatic effects for both the housing and financial markets.

For this reason, the whole economic system was now very sensitive to changes in macroeconomic factors, whose sum ended up in the subprime crisis in 2008.

3.1. Factors Originating the Crisis

The first factor affecting mortgage payment was the increase of interest rates. Under this idea, Mayer, C. et al. found in their study *The Rise in Mortgage Defaults* that “the share of these loans that were short-term hybrids (ARMs) grew as well to roughly 80 percent of all subprime loans originated in 2005—or more than 1.5 million mortgages with teaser rates that would expire in 2007 and 2008”. This implied that many of these mortgages, together with many more originated in the previous years, would have their rates adjusted with the LIBOR, which rose from under 2% in 2004 to 5.5% in 2006.

As Mayer, C. et al. very well define, “these interest rate changes imply that a typical borrower with a subprime adjustable-rate mortgage whose teaser period ended in mid-2006 could see a 25 percent increase in monthly payments at the time of the mortgage rate reset”. Therefore, if we consider the type of borrowers to whom these mortgages were given, we can easily foresee that the default probability highly increased due to interest rate increases.

Another factor that contributed to the subprime crisis was house prices. First, house prices fostered the creation of a bubble and, later, they contributed to the creation of a crisis.

As it can be seen in **Figure 18 - S&P / Case - Shiller U.S. National Home Price Index**, home prices grew 80% from 2000 till 2006. This created an environment in which all types of borrowers (including subprime) were interested in getting mortgages as long as the value of the houses kept increasing. As a result, tons of these mortgages were originated in that period (recall **Figure 12 - Subprime Mortgage Origination**). Nevertheless, when house prices started to stagnate and fall in 2005 and in 2006, many of these borrowers were affected.

3.2. The Bubble Burst And the Default Wave

The story of how house prices fell in the US is a clear example of a domino effect. Due to excessive house building derived from the housing bubble, there was a housing surplus that could not be satisfied by an equal demand. As a result, house prices stagnated (during late 2005 and early 2006) and fell (late 2006) as it can be seen in **Figure 18 - S&P / Case - Shiller U.S. National Home Price Index**. To this house price reduction, we have to add the interest rate increases.

As we saw before, interest rate increases boosted default probability for those borrowers with lower credit scores. In fact, these borrowers made no down payments, which implied that they didn't have equity¹⁵ in their properties or that, in some cases, they had negative home equity¹⁶. For this reason, instead of trying to sell or refinance, these

¹⁵ In a strict meaning, home equity is the part of the property really owned by the borrower. By definition, therefore, home equity can increase due to loan repayment or by house appreciation over the value of the loan.

¹⁶ Negative home equity happens when the value of the mortgage loan exceeds the value of the house.

borrowers were better off by defaulting and/or entering foreclosure processes. As shown in **Figure 19 - Delinquency Rate on Single-Family Residential Mortgage, Booked in Domestic Offices, All Commercial Banks**, delinquency rates started to increase in 2006.

As a consequence, not only did these borrowers bring more houses into the market, but also they stopped creating demand, which implied that the traditional laws of supply and demand entered the game and house prices had to decrease even more. However, this didn't only affect subprime borrowers but, rather, also affected trustworthy creditors who thought that it may have been better to sell at that particular moment at a gain. As a result, many homes and second homes went into the market pushing further the supply over the demand. This decrease in home ownership can be seen in **Figure 10 - Homeownership Rate for the United States**.

4. TRANSMISSION TO FINANCIAL MARKETS

The important feature of this mortgage crisis was the fact that it could be easily transmitted to financial markets. Mortgage default implied that cash flows produced by MBSs and CDOs to investors would diminish. However, if investors had been the only ones who lost money due to MBS and CDO plummet, the effects on the economy wouldn't have been so devastating as they were. The problem was that many of the investment banks and other mortgage securitizers like Fannie Mae and Freddie Mac that were originating these financial instruments, also invested in them or kept them in their balance sheets because they were providing huge interest rates compared to Treasury Bills.

Apart from investing in MBSs, however, the problem was that, as mentioned before, they increased dramatically their leverage ratio, becoming as a result more sensitive to changes in the value of the assets in their balance sheet because "excessive leverage is a source of great fragility" (Admati, 2011). Therefore, when the value of such assets started to decrease, the value of their debt was higher than the value of their assets.

This started to become real in the financial system in 2007 when HSBC, a big mortgage security holder, wrote down its portfolio by \$10.5bn (BBC, 2008) and “blamed U.S. subprime defaults for its first-ever profit warning” (Reuters, 2008).

In addition to that, another important representation of the mortgage crisis was the fact that around 50 lenders filed for bankruptcy by April 3rd 2007, being New Century Financial (a big size lender) one of them. These lenders failed because they got so much indebted to give mortgages that, when they couldn’t keep lending and selling the mortgages because investors did no longer trust MBSs, they were “left with no way to pay its creditors” (Cho, 2007).

The collapse continued with the failure of two Bear Stearns hedge funds in July 2007. Previously in that year, the returns of the High-Grade Structured-Credit Strategies Fund and of the Enhanced Leverage Fund sank because of the slowdown in the mortgage market. In order to stabilize the situation, Bear Stearns bailed out the High-Grade Structured-Credit Strategies Fund with a collateralized loan of \$3.2bn.

However, “as the market downturn accelerated the funds were left with billions of dollars of money losing securities that were unmarketable” (Rayback, 2009). In a letter sent to investors, Bear Stearns said that losses in their High-Grade Structured-Credit Strategies Fund and in their Enhanced Leverage Fund reflected “unprecedented declines in the valuations of a number of highly-rated (AA and AAA) securities” (Siew 2007, *Reuters*).

These hedge funds used huge amounts of leverage (debt) to purchase CDOs, and these CDOs were used as a collateral for the loans. This meant that lenders panicked and asked Bear Stearns to put up additional collateral, which placed Bear Stearns under the need to sell more bonds (even at a fire-sale¹⁷ price) to raise cash. Eventually, Merrill Lynch, a big lender of these hedge funds, seized \$850 M in CDOs and tried to sell them (only sold \$100 M), which pushed the prices of these assets even further down.

¹⁷ Fire-sale refers to a sale at very discounted prices.

In the end, the two hedge funds failed, which dramatically affected Bear Stearns' reputation in financial markets. By suffering from their hedge funds' failure, lenders stopped trusting Bear Stearns and, therefore, they stopped lending to them. This implied that Bear Stearns didn't have enough cash to keep their operations, which added to the fact that the value of their MBS portfolio was decreasing.

Overall, all these factors explain why Bear Stearns had to be bought at \$2 a share in March 2008 by JP Morgan in order to avoid the effects of its collapse.

Later in August 2007, BNP Paribas announced that they would stop their activity in three hedge funds dealing with US mortgage debt because they had no clue on how to value CDOs inside them. By doing that, they made public the risk of exposure that they and many other financial institutions had to mortgage markets. As Larry Elliot (Economics Editor at The Guardian) mentioned, "this was the moment it became clear that there were tens of trillions of dollars worth of dodgy derivatives swilling round which were worth a lot less than the bankers had previously imagined".

Basically, these two hedge fund-related events set the starting point of the financial crisis because they made financial institutions become aware of the quality of the assets that they had in their books and that they had sold to investors. One consequence of this awareness was the loss of trust inside financial markets, which implied that banks did not trust each other and that, thus, credit and repo markets¹⁸ dried up.

From that moment on, the value of the MBSs and CDOs kept decreasing and this affected all the financial sector including GSEs. The steps that followed in the downfall of the financial system were the definitive failure of Bear Stearns, which had to be rescued with the help of the government through a loan to Merrill Lynch (who bought Bearn); the intervention of the Government to put the GSEs into Conservatorship because they were so important in the economy that their failure would have had dramatic consequences worldwide; the failure and bankruptcy of Lehman Brothers, which the government let fail because they didn't want to deal with the wave of criticism that its bailout would have implied; and the bailout of AIG given that its

¹⁸ Repo markets are markets where banks in need for cash trade bonds with investors through repurchase agreements, which are essentially short-term loans for such banks.

failure would have affected clients in 140 countries (and whose collapse would have provoked a chain reaction, as well as other devastating consequences as shown in *Image 1 - Consequences of an AIG Failure*).¹⁹

Notwithstanding, this last governmental solution (the bailout of AIG) did not stop banks and investors from losing confidence on the system, which, ultimately, resulted in the creation of the Troubled Asset Relief Program (TARP).

4.1. The Troubled Asset Relief Program

As mentioned earlier and in the section **THE SNOWBALL EFFECT (EXTENDED)**, the whole sequence of events harassing the financial system during September 2008 originated what is known as a credit crisis. As Andrew Ross Sorkin, Diana B. Henriques, Edmund L. Andrews and Joe Nocera explain in their article “*As Credit Crisis Spiraled, Alarm Led to Action*”, all actors in the financial system lost confidence.

The loss of confidence implied that hedge funds and other big investors started running to the banks where they had money and pulled it out, and that banks wouldn’t lend to other banks. Also, some investors decided to buy credit-default swaps to cover for potential Investment Banks’ failures because there was the fear that, after Lehman Brothers’ bankruptcy, the other big investment banks could fail. Consequently, this situation was putting the financial system (and the whole economy) under big pressure, so the state of affairs required some governmental intervention aimed at reducing the fear that there may be a catastrophe in the economy.

One could add to this an explicit extension of the fear of the entire economic system as a result of the failure of the Reserve Primary Fund (they “broke the buck”; they were exposed to Lehman Brother’s toxic assets because they bought Lehman’s commercial paper).

This fund was a money market fund and, therefore, was specialized in money markets. Money market funds are a critical actor in such markets because they are the ones to

¹⁹ For extension purposes, all these events are further explained in the section **THE SNOWBALL EFFECT (EXTENDED)** that can be found in the *APPENDIX*.

provide funding (short-term) to big corporations through the purchase of the companies' commercial paper. As a result, the Reserve Primary Fund's failure made investors stop trusting commercial paper and money markets (which were seen before as safe investments).

Consequently, money markets also dried up and the whole economic system was in danger as companies may not even be able to pay wages, freezing commerce in general as a result. Again, what the situation required was a governmental intervention, which came in the form of the TARP.

The TARP was the result of the Economic Stabilization Act (signed in October 3, 2008) and it worked through several programs affecting five different areas with the aim of "stabilizing the financial system, restart economic growth, and prevent avoidable foreclosures" (U.S. Department of Treasury). According to the U.S. Department of Treasury, the TARP funds were divided as follows:

- \$250bn were used to stabilize banking institutions (\$5bn cancelled).
- \$27bn were used to restart credit markets.
- \$82bn were used to stabilize the U.S. auto industry (\$2bn cancelled).
- \$70bn were used to stabilize AIG (apart from the \$85bn loan; \$2bn cancelled).
- Around \$46bn were used to help families facing foreclosure.

The total TARP funds accounted, in the end (and after the Dodd-Frank Act was passed) for \$475bn, although the initially authorised amount was of \$700bn. What must be noted is that most of the beneficiaries of these funds have already repaid the borrowed quantities and have stabilized their situations, for example, as Robert J. Samuelson asserts in his opinion article *Why TARP has been a success story*, "the bank rescue has roughly broken even".

In this sense, the TARP is thought to have been, at least partially, successful. As Robert J. Samuelson believes, even if the TARP has a very unpopular image because it implied that tax payers' money was to be spent in the private institutions that originated the crisis, it was clearly successful when it comes to stabilizing the whole economy and restoring trust in the financial and banking systems.

Also, not only did it imply a restoration of trust in the mentioned systems, but it also helped control the potential haemorrhage that failures of the auto industry's biggest companies could have caused nationwide speaking.

In any case, the TARP was just a temporary and emergency solution to the huge problem that was affecting the US economy at that time. For this reason, other solutions and changes had to be implemented thereafter, as it is the case of the new changes in the mortgage industry or the financial system.

Nevertheless, prior to checking which were the changes in the mortgage industry or in the financial system, it is worth to check some economic indicators that will show how the economy experienced a slowdown.

4.2. A picture of the economy after the burst of the bubbles

In this section, in order to be able to compare the during-/post-crisis situation with the economic situation before the crisis, we will take the same economic indicators used in section *1.1 A picture of the economy before the crisis*. As for the HPI, against the 60% increase seen between the years 2001 and 2007, we could highlight that it fell from 160 in 2007 to 130 in 2010 and 120 in 2011.

Analogously, the S&P 500 went from 1,565.15 in October 2007 to 676.53 in 2009. This was after the index had fallen a 38.49 percent during 2008, "its worst yearly percentage loss" (Valetkevitch, 2013).

Finally, by comparing the monetary policy before and after the crisis, we can also see some changes. Before the crisis (2002) we said that monetary policy was "excessively accommodative" because interest rates were around 2%. However, during the period going from 2004 until 2007, interest rates increased (as it has been mentioned through the study) from 2.06% in Nov 26, 2001 to 5.25% in Jul 16, 2007. Notwithstanding, when the crisis expanded and the economy required some institutional action, we can see that the U.S. Government decided to apply a drastic expansionary monetary policy by keeping interest rates at 0.09% (Dec 22, 2008) with the aim of fostering economic activity.

5. LESSONS LEARNT AND TODAY'S PRACTICES

Once the main consequences of the crisis have been summarized and we have seen the effects of the financial meltdown and the solutions suggested, as well as some of the changes in some key economic indicators, what is left is to analyse how the whole system that brought the economy to the history's biggest crisis has changed.

In order to conduct such analysis, it may be appropriate to distinguish among changes in the mortgage market and changes in the financial markets, which have been the two main areas of interest throughout the study.

5.1. Changes In The Mortgage Industry

As we may recall from section *Mortgages*, during the housing bubble which was one of the causes of the crisis, “lenders accepted FICO scores lower than 620 with no down payment” and “borrowers presenting full documentation dropped from 73% to 43%”. Moreover, there were various types of available mortgages like 40 or 50 year fixed-rate mortgages, Interest-only mortgages, Dignity Mortgages, and Adjustable Rate Mortgages (ARMs) that made it very difficult for borrowers to be able to afford mortgage payments in the long term.

The consequences of these risky mortgage types and the loose control on borrowers' ability to repay, as it has been stated, were the housing bubble burst and the transmission of the housing market crisis to the financial markets. In order to avoid possible similar situations, the rules of the game changed and loan approval standards tightened right after the crisis.

Overall, lenders started caring again about the borrowers' ability to repay and not just about the fees that they could generate by offering the mortgage and then selling it in the secondary mortgage market. These lenders' interest was represented by new tighter rules when it came to asking for a loan. The rules and requirements are presented below.

5.1.1. *Down payment*

As for down payments, according to Bank of America, “different loan programs require different percentages (of down payment), usually ranging from 5% to 20%”. This situation is different from that which originated the crisis, when no down payments were required in many cases, which didn’t incentivise people to keep paying their mortgage in case of financial trouble because they had little or no equity invested in their homes.

Normally, down payments are also dependent on credit scores, and the minimum down payment requirement is of 3.5% (according to the Department of Housing and Urban Development) whenever credit scores are higher than 580, provided that the loan is Government-insured (Federal Housing Administration – FHA). In case that the credit score for an FHA loan is lower than 580 (500 – 579), a 10% down payment will be required.

On the other hand, for non-government-insured loans, credit scores required tend to be higher, so are down payments. These down payments, as stated before, range from 5% to 20%. Moreover, according to Bank of America, lenders may require borrowers to purchase Private Mortgage Insurance (PMI) whenever down payment is lower than 20%. This is because the loan-to-value ratio will be higher than 80%, implying that there is more risk for the lender in case of mortgage default.

Basically, as it can be seen, down payment requirements have tightened in comparison to pre-crisis levels.

5.1.2. *Credit (FICO) Scores*

As it has happened for down payment requirements, FICO score (credit score) standards have also tightened. As Mayer, C. et al. present in their study *The Rise in Mortgage Defaults*; “the median FICO score in subprime pools was 615 in 2003 and 613 in 2007”. Now, it is still possible for someone to get a loan having a FICO score lower than 620, however, the loan that such person will be entitled to get will be different from the one that someone with a 750 FICO score can get.

As presented in The Lenders Network's article *Credit Score Needed to Buy a House in 2018*, "the minimum credit score you need to purchase a home will depend on the type of home loan you qualify for". The different types of loans, however, could be better addressed as different types of loans according to different loan issuers or insurers/guarantors, which are presented in **Table 3 - Loan Types** in the **APPENDIX**. Accordingly, the different credit scores required for the different types of loans are:

- For FHA regular Loans, 580 FICO scores are required. Also, there's the possibility to get an FHA loan with a credit score between 500 and 579 provided that a higher down payment is made.
- For VA Loans (loans for Veterans), at least 620 FICO scores are required.
- For USDA Loans (Rural area loans), at least 640 FICO scores are required.
- For FHA 203K loans, at least 620 FICO scores are required.
- For Conventional loans, at least 620 FICO scores are required.

As it can be seen, FICO score requirements have been tightened so that required scores are higher than the scores that averaged during the pre-crisis years. However, there are also more positive signs regarding FICO scores because they have hit a new high in 2018. According to Zack Friedman from Forbes, the average FICO score is 704, which implies a "stronger financial health".

5.1.3. Documentation

As mentioned earlier in the text, income verification was painful for lenders because any time spent in verifying the income of a potential borrower, was time that couldn't be used to generate a new mortgage and, therefore, more fees. As a result, in the years previous to the crisis, lenders ended up requiring few if any income verification to offer a mortgage to a client. This resulted in loans offered to NINJA people, who couldn't pay their loans in the short-term and, therefore, contributed to the acceleration of the housing bubble burst.

In order to avoid a similar problem, after the Great Recession, borrowers are required to justify their income by presenting data on tax returns (at least two years), pay check stubs, and their bank statements (deposits, etc.). Nevertheless, the precise documents asked by the lender may vary according to the company.

In addition, most mortgage lenders check the debt-to-income ratio in order to see if recurring debt (credit card payments, car payments, etc.) accounts for an excessively big percentage of potential borrower's income, reducing therefore their ability to pay. In that sense, according to Brandon Cornett from the Home Buying Institute, lenders would not normally allow debt-to-income ratios higher than 43%.

Overall, by verifying the potential borrowers' income, mortgage lenders are reducing the default risk, and therefore, potentially avoiding a similar meltdown of the mortgage market.

5.2. Changes In The Financial System

As it is mentioned in previous sections, one of the causes that contributed to the generation of the Great Recession was deregulation in financial markets. Also, what was very important was the relationship between regular mortgage markets and financial markets via mortgage securitization. Therefore, in order to prevent financial institutions and actors from acting in the pre-crisis manner, the Obama Administration managed to pass a new law that regulated financial markets. This was the main regulatory response after the financial crisis given the scope of the topics treated in the act (it has an influence in 16 areas).

This new act received many contributions of U.S. Senator Christopher J. Dodd and U.S. Representative Barney Frank, which explains why it was named after them as the *Dodd-Frank Wall Street reform and Consumer Protection Act*. As mentioned before, the Dodd-Frank Act impacted many areas of the financial system. The most important implications of the new act are explained below.

5.2.1. The Dodd-Frank Act – Investment Banks' activities

One of the main components of the Dodd-Frank Act is the Volcker Rule, which returned regulation on banking to the field established by the Glass-Steagall Act. The

most important premise of the Volcker Rule is the fact that it restricts banking firms from investing in a speculative way to have a profit. Basically, the rule prevented banking institutions “from using or owning hedge funds for their own profit” (Amadeo, 2018) by trading securities, derivatives, commodity futures and options on these instruments. On the contrary, the rule allowed banks to keep funds that accounted for less than 3% of revenues.

The main purpose of the Volcker Rule was to offer protection to customers by preventing banking institutions from using customers’ money (deposits mostly) to make speculative investments, which is what happened before the crisis, when banks like Lehman Brothers or Bear Stearns heavily invested their own funds in CDOs and other very risky assets.

Nevertheless, one of the problems of this rule is that it is currently in the Trump Administration’s agenda. The current administration is trying to loosen the requirements to be met by banks. One of the principal reasons for the Trump administration to loosen requirements on this matter is the fact that banks claim that they’re less competitive in comparison to foreign companies because of the limitations on risky investments (which provide higher returns). Highly influential individuals like Timothy Keenan have literally said that the Volcker Rule is a “drag on the economy”. Furthermore, as claimed by the International Monetary Fund (IMF) and the Fed, the Volcker Rule may be diminishing liquidity in the bond market, which is another reason in favour of modifying this law as seen from the Trump Administration point of view.

As mentioned by Emily Flitter and Alan Rappeport in their article *Bankers Hate the Volcker Rule. Now, It Could Be Watered Down*, the Trump Administration may not necessarily eliminate the rule because it will be very difficult, will require many Congress supports and, mostly, will entail making a huge step back when it comes to banks’ actions safety. Nevertheless, what is suggested by these two authors is that the Trump Administration will push hard to change the Rule and, thus, allow banks to enlarge their trading activities, which will still be a huge step back in terms of regulations’ influence.

5.2.2. *The Dodd-Frank Act – Regulation of the Derivatives that caused the crisis*

Besides the Volcker Rule, which is one of the main components of the Dodd-Frank Act, there are many other regulations as stated in the mentioned Act. In that sense, another very important provision of the law refers to the regulation of risky derivatives.

As mentioned by Mark Koba from CNBC, the new Dodd-Frank Act required that complex derivatives like CDSs were regulated by the SEC or the CFTC depending on the type of derivative as the U.S. Securities and Exchange Commission well explains. Basically, the SEC will have authority over “security-based swaps”, which is essentially referring to CDSs given the nature of the latter. Then, the CFTC will be in charge of regulating all other swaps except for those that are “mixed swaps”, i.e., “security-based swaps” with a commodity component, for which responsibility is shared.

In addition, the law fostered the creation of a pseudo-exchange where derivatives were supposed to be traded, implying that trades of such derivatives are made public. In any case, the effect of the SEC and the CFTC’s intervention thanks to the Dodd-Frank Act has been present ever since the law was passed and is represented through many rules as proposed by the SEC and the CFTC. To see the complete list of rules proposed by the regulating agencies, it is suggested to check the publication on derivatives made by the U.S. Securities and Exchange Commission, which can be found in the references.

5.2.3. *The Dodd-Frank Act – Wall Street Reform*

Another important area where the Dodd-Frank Act put its focus was Wall Street. As seen in previous sections, some Wall Street companies became “too big to fail”, implying that its failure would have dramatic effects on the country’s economy. As a result of the crisis, some of these companies failed and, to avoid the mentioned dramatic effects on the economy, had to be rescued by the government (see *The Troubled Asset Relief Program*).

Therefore, what the new Obama Administration wanted to tackle with the Dodd-Frank Act was the fact that the government had to put at risk tax payers’ money in order to save private entities that gambled with their money. Thus, in order to solve this

situation, the Dodd-Frank Act formed the legal framework upon which the Financial Stability Oversight Council (FSOC) was based.

The purpose of this council, which was formed by nine members, including the Fed and the SEC among others, was and is to assess the different risks that affect the financial system. In that sense, one of the main premises for the FSOC is to control whenever any of the firms that are supervised gets “too big to fail” according to the council’s standards. In such case, if a company is deemed “too big to fail”, the FSOC is then totally entitled to ask the mentioned company to increase its reserve requirements and to make it be regulated by the Fed, which will therefore reduce the risk for the company to go bankrupt in case of business slowdown given a lower leverage.

Nevertheless, one of the drawbacks of having this regulatory council in place is the fact that, sometimes, competitive companies are deemed as “too big to fail” when they shouldn’t, as it is thought by the Trump Administration. Following this reasoning, the Trump Administration is working on reducing Fed’s influence when it comes to the supervision of large companies. As it happened with the Volcker Rule, the reasoning of the Trump Administration is based on the fact that they believe that, due to the Dodd-Frank Act, there’s a reduction of the competitiveness of these companies in comparison to foreign competitors.

5.2.4. *The Dodd-Frank Act – Control of Rating Agencies*

In addition to the previous regulations, the Dodd-Frank act attempted to tackle another big problem that contributed to the generation of the crisis, that is, rating agencies. Via the Dodd-Frank Act, the Office of Credit Rating was created at the SEC, which allowed the SEC to require agencies’ rating methodologies submission.

Therefore, in the current framework, the SEC can require the credit rating agencies to present the methodologies used so as to avoid them using biased and not prudent methods as they did before the crisis.

What this regulation appears to have implied according to R. Christopher Small’s paper *Impact of the Dodd-Frank Act on Credit Ratings* (Harvard Law School Forum on Corporate Governance and Financial Regulation) is a change in the *modus operandi* of

Credit Rating Agencies in the sense that, in order to avoid legal and regulatory actions by ruling organisms, they have started to make more conservative ratings to “protect reputation”.

On its turn, this new way of working by Credit Rating Agencies has meant a potential loss of information. Therefore, this new situation has given room to the debate about how to regulate Credit Rating Agencies in order to avoid conservatory ratings that have as a last consequence a potential loss of information in the market.

5.2.5. *The Dodd-Frank Act – Other minor relevant provisions*

Last but not least, it is worth to mention other relevant measures that contributed to an extended regulation of the financial system through the Dodd-Frank Act. These are the following:

- Increasing control on Executive Compensation, which was one of the controversial topics during the crisis given the excessive compensation that Wall Street Executives received.
- Requiring Asset-Backed Security (ABS; MBSs included) creators to retain, at least, 5% of the risk of the created securities so that securitizers also suffer losses in case the value of these assets diminishes. In so doing, they reduce the incentive for these securitizers to create ABSs with risky underlying assets just for the sake of receiving fees from these ABSs' sales.
- Requiring all hedge funds to register with the SEC as well as requiring them to provide data on their trades and portfolios. By doing that, the SEC could assess the market risk.
- Insisting on the fact that borrowers understand the terms of risky mortgage loans (as mentioned by Mark Koba, consumers should be provided with “plain English information”), and requiring that lenders check credit history and verify borrowers' income. These actions are carried on by the Consumer Financial Protection Bureau (CFPB), which has the main aim of ending with risky lending and with lenders' bad practices.

As the creation of the CFPB implies many restrictions for lenders, the Trump Administration has already reduced the competencies of the Bureau by not allowing it to investigate finance companies.

- The Federal Insurance Office (FIO) was established so that insurance companies creating risk to the system are identified (as it was the case of AIG).

With all these measures, together with the ones seen in isolation in previous sections, the Obama Administration aimed to set a framework that made it more difficult for a crisis similar to the Great Recession to happen again. However, the risk of having a crisis originated by the same reasons cannot be reduced to zero, which is currently raising the question of whether a new Great Recession could happen again or not.

6. COULD A SIMILAR CRISIS HAPPEN AGAIN?

As indicated above, being ten years away from one of the worst economic crisis in history has raised the question of whether it can happen again. For this reason, the following section is an evaluation of the different current settings that may or may not give birth to a crisis similar to the one in 2008.

There are several viewpoints regarding the likelihood of a similar crisis to happen again. In order to understand the different standpoints regarding the probability of having a crisis of similar dimensions, we have to take into consideration the opinion of economic experts like Nouriel Roubini, and also of financial survivors of the last financial crisis like JP Morgan. It appears to be a fact, according to the assertions made by experts like Roubini or analyzers of the models used by JP Morgan to predict economic cycles, that there will be a recession period in 2020. Nevertheless, there are different opinions regarding the potential impact that this recession may have.

One of the advocates of a plausible repetition of the financial crisis is Professor Victor Li from the Villanova School of Business, who bases his arguments on the fact that too-big-to-fail banks are bigger now than before the 2008 crisis, the fact that the Trump's Administration is going backwards in terms of regulation, and, finally and related to deregulation, the fact that Trump's appointees in the regulatory agencies have strong

ties to Wall Street and, therefore, defend Wall Street's interests. He also mentions problems with economic variables like inflation and interest rates.

The main argument behind Li's opinion is the fact that a sudden deregulation may make banks start operating like before, i.e., taking riskier initiatives in order to have higher profits. The issue behind these riskier initiatives is not that banks act in a riskier manner, which is a problem *per se*, but that banks are now much bigger than before, which therefore implies that a failure of one of these banks would have much bigger effects on the overall economy than the failure of one of the 2008's banks.

Similar is Nouriel Roubini's opinion as expressed in his article *We are due a recession in 2020 – and we will lack the tools to fight it* for *The Guardian*. Even if he goes further in the evaluation of the reasons that may lead to the next financial and global crisis, he believes that “the next crisis and recession could be even more severe and prolonged than the last”. The reasoning behind this statement is that governments won't have the necessary tools and resources to stop the bleeding as they had in 2008, mostly because of the huge level of public indebtedness (see **Figure 23 - Public Debt of the United States from 1990 to 2018* (in billion U.S. Dollars)**).

On the other hand we find JP Morgan's intuition based on their model used to predict economic cycles. Even if it has been mentioned earlier in the text that JP Morgan predicts a global economic recession for 2020, their guess is that its consequences will be smaller than the consequences of the 2008 financial crisis. For example, they have predicted an average fall in the U.S. Stock Indexes of 20%, which contrasts with the 54% fall in the S&P 500 during the 2008 crisis. Nevertheless, they don't strongly position themselves as advocates of a weaker crisis because they recognize the fact that governments “lack the necessary monetary and fiscal space” to shorten a recession nowadays (J.P. Morgan strategists John Normand and Federico Manicardi).

In any case, it appears to be that, if there is a crisis to happen and dimensions are to be similar to the ones of the 2008 financial crisis, the reasons behind the new crisis will, *a priori*, be different from the reasons of the 2008 financial crisis. We can elaborate on this idea by looking at the changes that there have been since the last financial crisis, see sections ***Changes In The Mortgage Industry*** and ***Changes In The Financial System***.

As for the changes in the Mortgage Industry, what we can foresee is that individuals won't exert the same pressure on the mortgage markets for many different reasons. As it has been mentioned earlier in the text, the boom in housing was one of the reasons that caused the financial crisis because it opened a whole new system through which mortgage lenders could re-sell the mortgages to banks that would securitize them and sell them to investors. In order to deal with the excessive mortgage lending that was derived from a high demand for mortgages coming from securitizing companies, new requirements and regulations were put in place for consumers to comply with when asking for a loan or mortgage. In that sense, with the new requirements in terms of FICO scores, down payment and documentation, it is clear that it is rather unlikely that lending reaches the pre 2008-crisis levels.

Moreover, as it is shown in ***Figure 24 - Household Debt Has Surpassed 2008 Levels***, American households have increased the level of indebtedness reached during the crisis of 2008. Of course, this has some implications. First of all, if the households are more indebted, it will be more difficult for them to get a new loan or mortgage given the harder requirements mentioned before. Of course, this will reduce the pressure on the mortgage market and, therefore, make it more difficult for the new crisis to have its roots in excessive lending.

In addition, not only will it be more difficult for households to obtain new loans, but their willingness to obtain such new loans and mortgages is likely to be reduced. The reasoning behind this argument is the fact that the 2008 crisis was so devastating that, following common sense, households would try to avoid any activity similar to the ones that led to the 2008 crisis, also considering that many households had to refinance during the crisis in order to be able to keep their homes. In any case, even if some of these households were to ask for new mortgages, they would have first to comply with the new requirements that prevent risky borrowers from getting mortgages and loans.

Overall, what can be said about the mortgage market is in line with what Jude Landis, Vice President of Credit Risk Management in Fannie Mae, says: "In 2018, market players, including borrowers, are behaving in ways that are rational and in keeping with understandable cycles". Of course, this does not prevent a possible new downturn in the housing market, but it does make the market more prepared as Jude Landis well asserts.

In the case of the Financial Industry, the outlook is quite different because there has been huge pressure from the Trump Administration with the aim of eliminating some of the regulations on financial markets that were put in place to prevent a similar financial meltdown to the one in 2008. It has been mentioned earlier in the section *Changes In The Financial System* and earlier in the current section ***COULD A SIMILAR CRISIS HAPPEN AGAIN?*** that Trump Administration's push for deregulation could make banks and financial institutions start operating in a riskier manner. Nevertheless, the following two aspects have to be taken into consideration regarding Trump's deregulation of financial markets:

First of all, it has to be recalled that intervention on financial markets was made mostly through the Dodd-Frank Act. Regarding this act, it has to be taken into account that it will be rather difficult for the Trump Administration to eliminate important propositions of the law without the support of the Democrats. This assertion is based on the fact that the Democrats took control of the United States House of Representatives in the mid-term elections of November 6, 2018 with 235 seats against the 198 Republican seats (it must be noted that 218 seats are needed for majority). Being the United States House of Representatives the lower chamber of the Congress and the Senate the upper chamber, a law needs to be evaluated by both chambers before it is passed, which therefore makes clear that the Trump Administration actions are constrained by the Democrats' majority in the United States House of Representatives. Overall, this means, therefore, that Trump may be able to eliminate some minor propositions with the support of the Democrats but not all of them.

On the other hand, the U.S. political calendar also needs to be taken into consideration. The following U.S. Presidential Election is scheduled for the Tuesday, November 3, 2020, which implies that the supposed following crisis may have already struck at that time. Therefore, if that is the case, not only will it constrain the Republican's political campaign, but also the measures taken right before the election.

Moreover, if this situation were not difficult enough for the political party in the White House, the different measures taken by Donald Trump can also be seen as another constraining factor. He has started a trade war, he has publicly positioned against

immigration and, finally, he has also positioned in favour of big corporations and Wall Street. This implies that, for the election and so as not to lose votes, the Republican's image would need to change, which will therefore diminish their possibilities of eliminating more propositions of the Dodd-Frank Act in favour of Wall Street.

Overall, after evaluating the current situation and the factors that gave birth to the previous crisis, one can say that the possible reasons of a crisis in the near future (maybe 2020) are likely to be different from the reasons that originated the previous economic meltdown. However, it seems clear that the fact that Governments, Corporations and Individuals appear to have learnt from past mistakes will not prevent a new crisis to happen. In that sense, as for the next crisis, what the conclusions of this study show is the need for Governments and regulatory agencies to soften as much as possible the effects of the crisis as it is intrinsically impossible to prevent it given the cyclic nature of the economic system.

CONCLUSION

The financial crisis may have had many different causes because, as it has been seen, the financial system affects and is affected by many sectors, economic trends and individuals. However, after having performed the study, it seems to be widely accepted by many experts to assert that the housing bubble that led to excessive mortgage lending, and the subsequent securitization of the mortgages generated during the bubble were two very important causes of the financial crisis.

Following these lines, it is also crucial to highlight the importance of the new mortgage types created during the housing bubble that allowed people who were not previously entitled to obtain a mortgage loan to obtain it. Of course, the way to ensure that these people were entitled to get the loan was, as it has been seen, to reduce the standards to be met when asking for a mortgage. The effects of this reduction of the standards became economically traceable when the housing bubble burst as a result of a housing surplus together with the increase in the interest rates for many newly generated mortgages, making it rather difficult for mortgage borrowers to repay the loans. The impossibility of these borrowers to repay the loans, which also contributed to the housing bubble burst by bringing many more houses into the market, is known as the subprime mortgage crisis and it was transmitted to financial markets through the recently created securities whose underlying assets were, among others, risky mortgages.

This transmission to financial markets affected many “too big to fail” companies and dried up the whole economic system in such a way that Governmental intervention was required. The U.S. Government acted immediately through the TARP and, later, by increasing control over the Mortgage and Financial industries.

Theoretically, the measures adopted by the Government were aimed at reducing the possibilities for individuals and financial institutions to act as they did in the years prior to the crisis. As for individuals, new regulatory actions required that they provided down payments of close to 20% (requiring individuals to purchase PMI if the down payment was below this percentage), that individuals willing to borrow had higher FICO scores, and that they justified their income by presenting the required

documentation. Following the same lines, the changes in the financial system aimed at preventing banking institutions from using customers' money to make speculative investments, at regulating risky derivatives like CDSs, at ensuring that "too big to fail" enterprises have the necessary reserves, and at controlling the rating methodologies used by rating agencies among others.

In that sense, the question of whether a new crisis could happen because of the same reasons has been analysed. After evaluating the current regulatory framework and the possibility of having a new recession, the analysis seems to suggest that it is rather unlikely that the same factors that gave birth to the 2008 financial crisis could be the cause of a crisis projected for the near future. Mostly, the fact that the causes of a new crisis are unlikely to be the same as those for the previous one can be explained by the changes in both Mortgage and Financial industries.

On the one hand, the changes in the mortgage industry imply that individuals are compelled to behave more rationally when it comes to getting indebted given that the requirements that they have to fulfil are tighter. On the other hand, the changes in the Financial industry have modified the behaviour of the main actors that caused the crisis, as it is the case of investment banks or rating agencies. Moreover, even if the Trump Administration is willing to carry on some loosening of the regulations applied in Financial Markets, it is rather difficult that they come to fruition because they will be constrained by the Democrat majority at the United States House of Representatives and the U.S. Electoral calendar.

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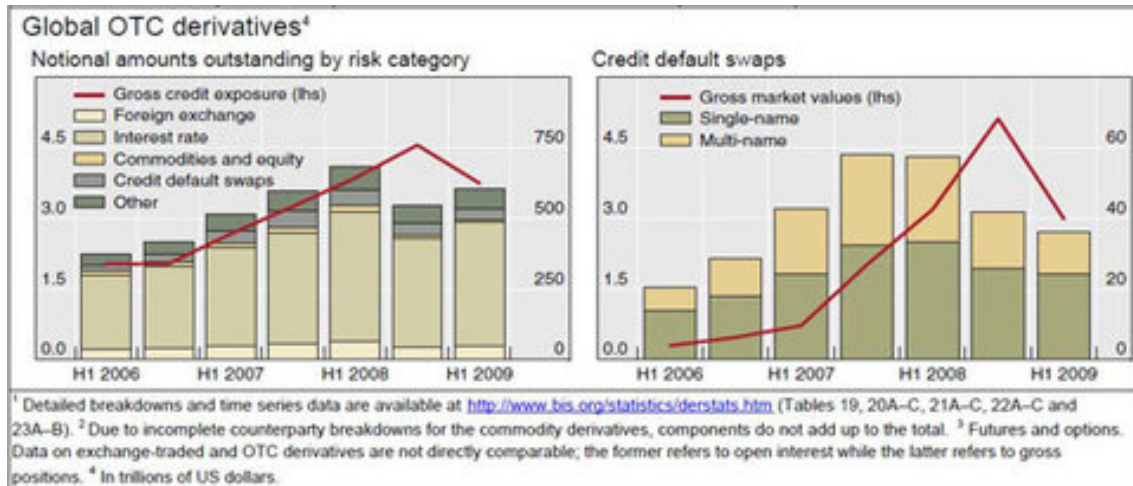
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APPENDIX

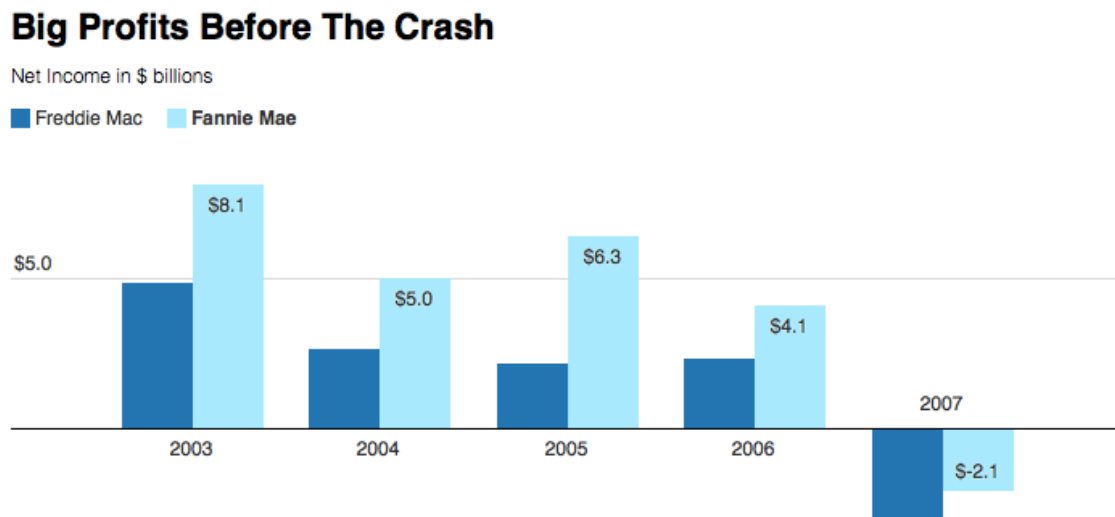
FIGURES

Figure 1 - Global OTC derivatives (2006 - 2009)



Source: *Business Insider*, from Bank for International Settlements.

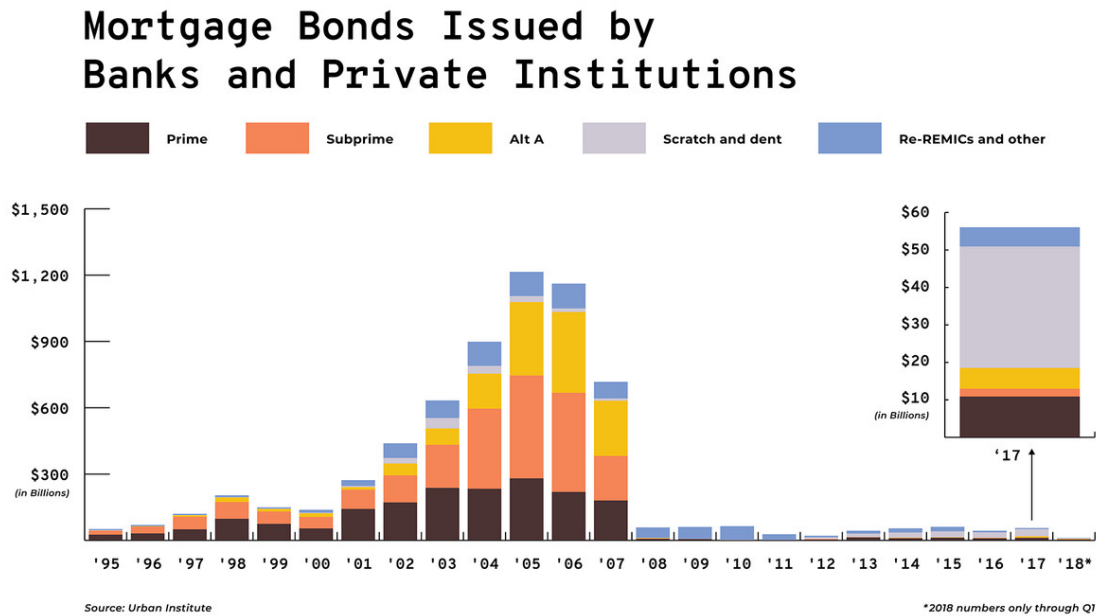
Figure 2 - Big Profits before the Crisis: Fannie Mae and Freddie Mac



Source: Company Annual Reports • Created with Datawrapper

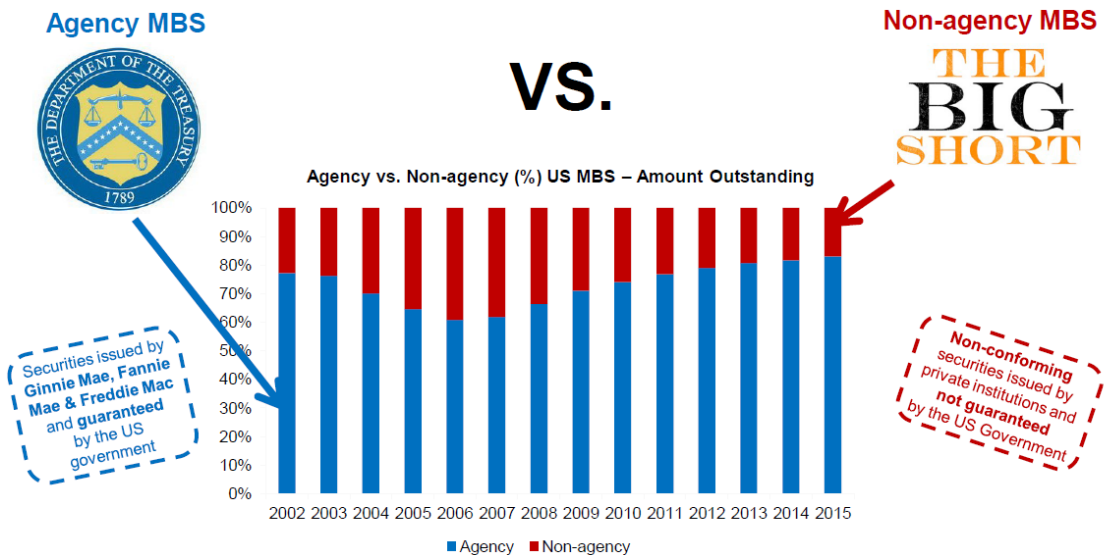
Source: *Investopedia*. Created from company's official Annual Reports.

Figure 3 - Mortgage Bonds issued by Banks and Private Institutions



Source: Urban Institute.

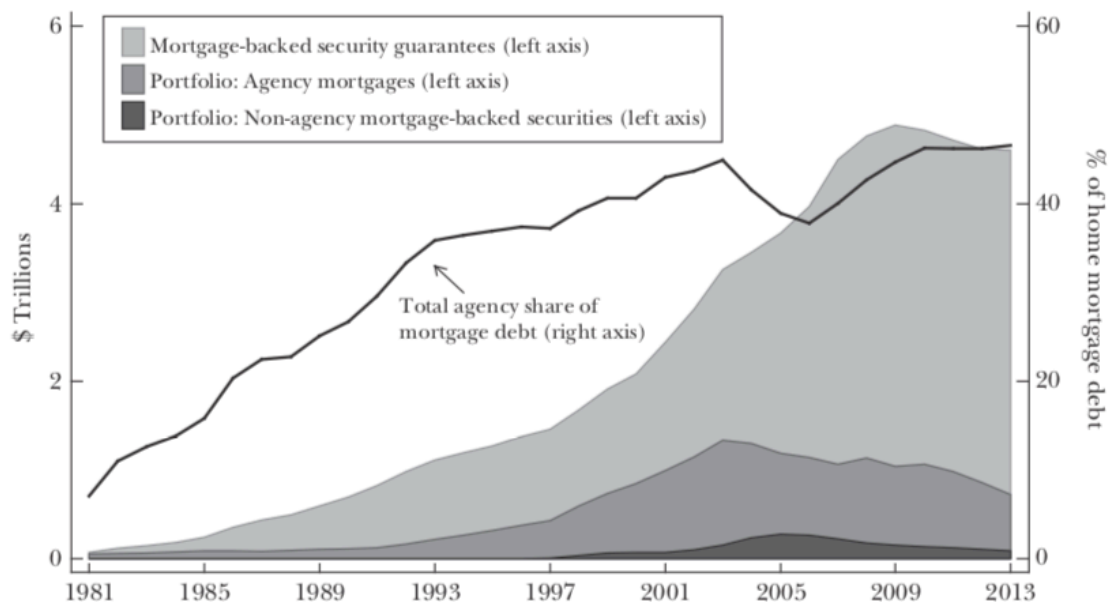
Figure 4 - Agency vs. Non-Agency (%) US MBS - Amount Outstanding



Source: BNP Paribas Flexi I US Mortgage, from Industry & Financial Markets Association (SIFMA), data as of end December 2015.

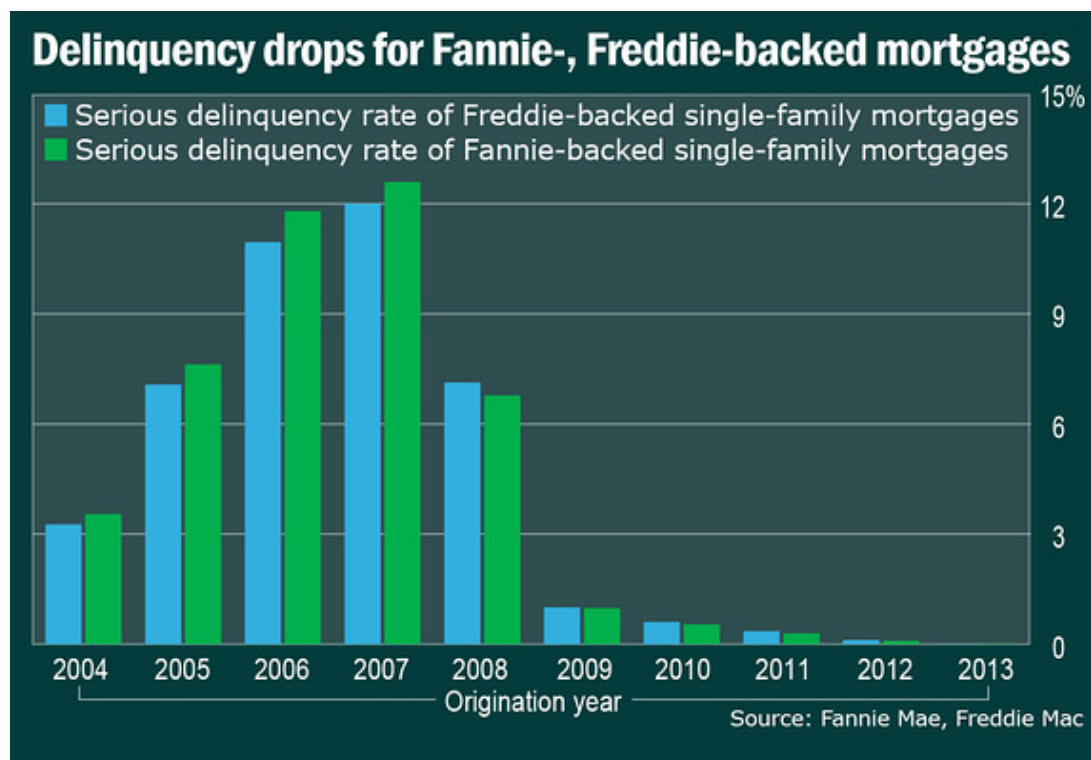
Figure 5 - The Growing Role of Fannie Mae and Freddie Mac in the US Mortgage Market

The Growing Role of Fannie Mae and Freddie Mac in the US Mortgage Market



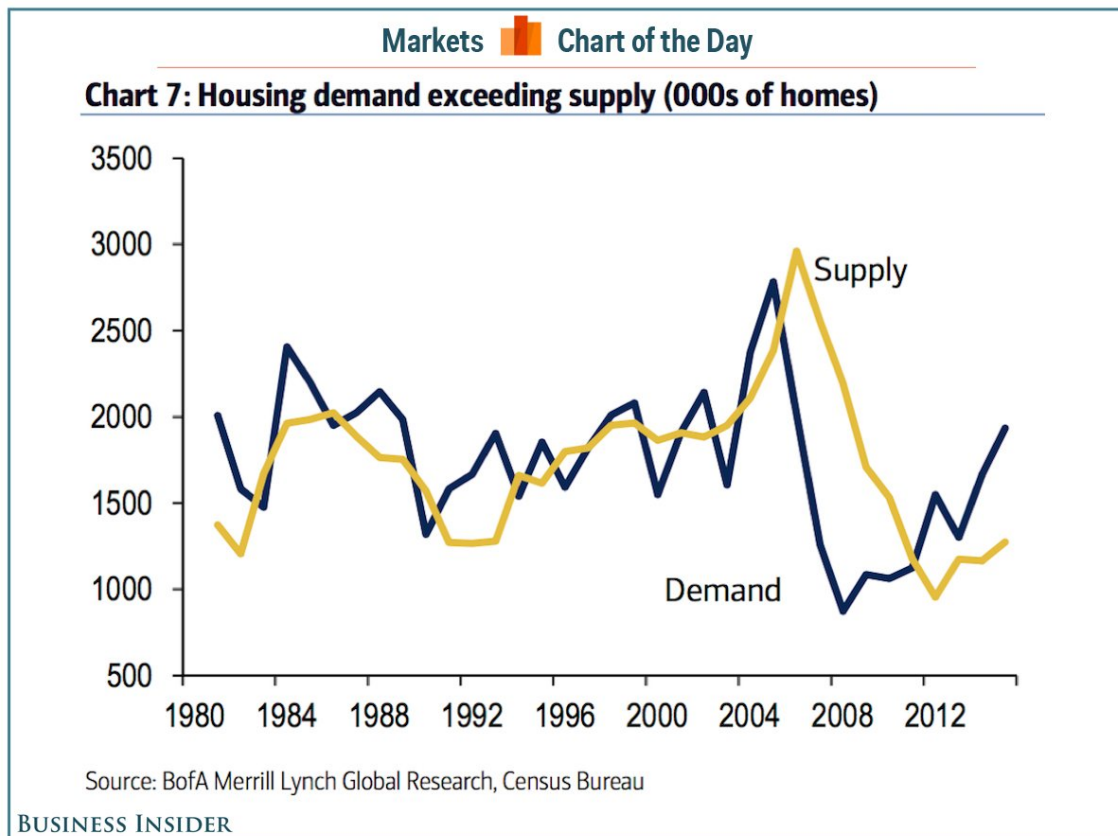
Sources: *The Rescue of Fannie Mae and Freddie Mac*, from US Federal Housing Finance Agency (2014) Annual Report to Congress, Federal Reserve Flow of Funds

Figure 6 - Delinquency for Fannie-, Freddie- backed mortgages



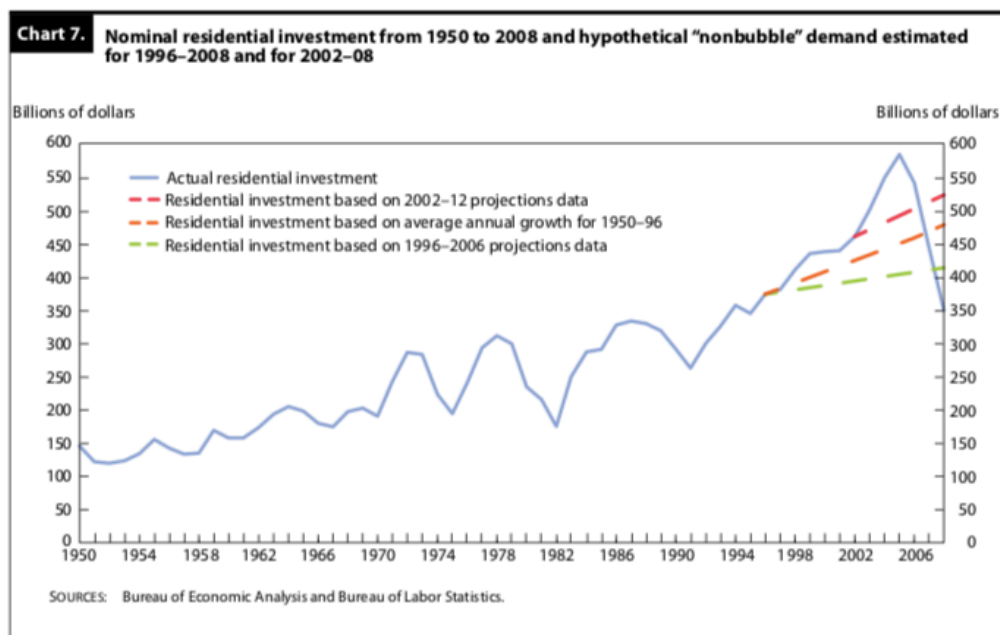
Source: *Marketwatch*. Created from data from Fannie Mae and Freddie Mac

Figure 7 - Housing demand and housing supply



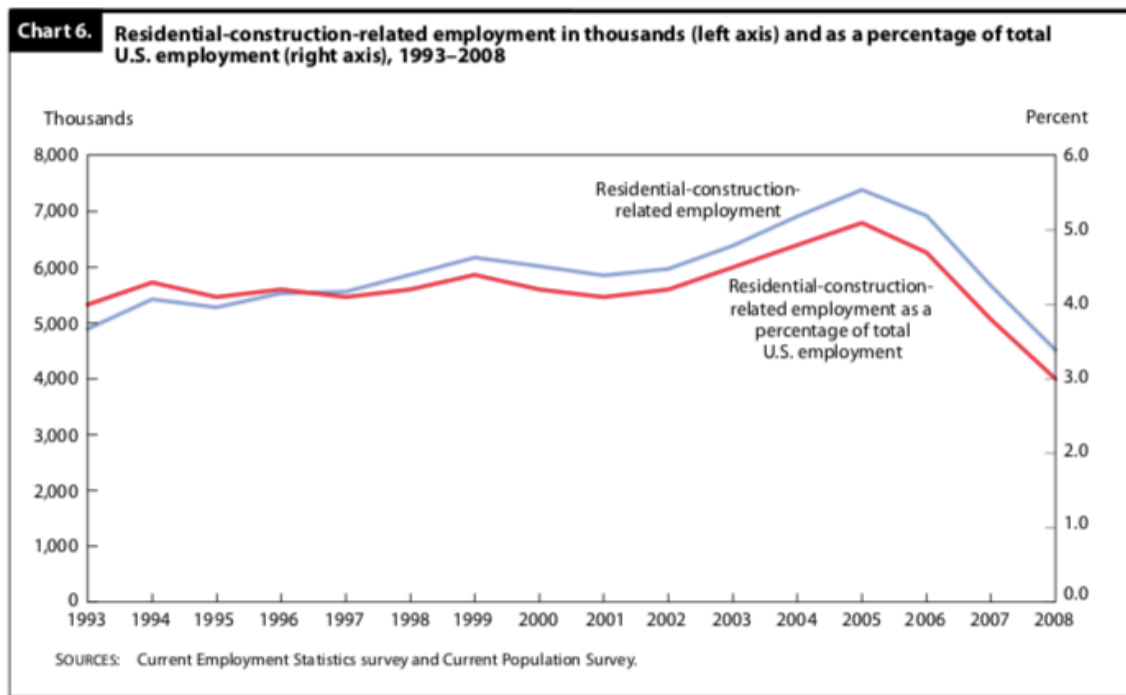
Source: *Business Insider*. From Merrill Lynch Global Research.

Figure 8 - Nominal residential investment from 1950 to 2008



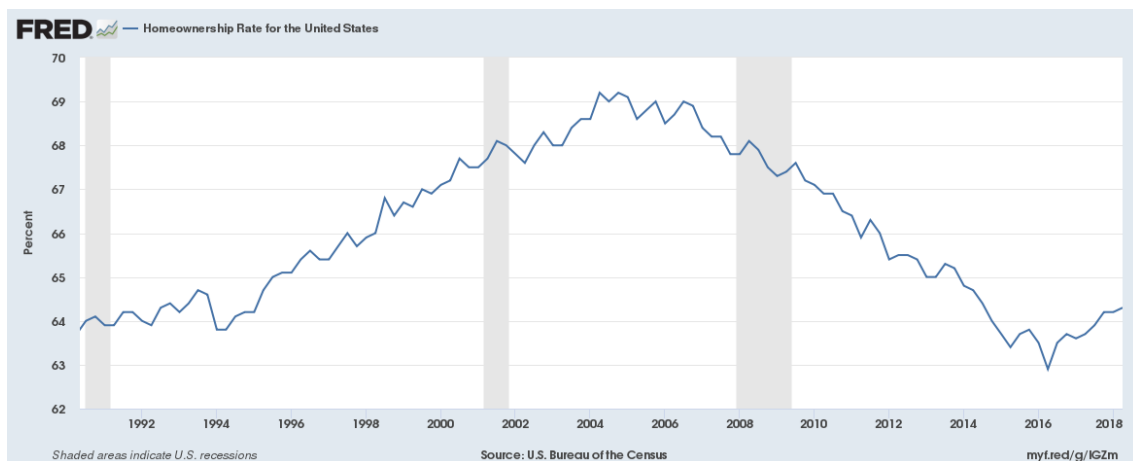
Source: *Monthly Labor Review*, December 2010. From Bureau of Economic Analysis and Bureau of Labor Statistics.

Figure 9 - Residential-construction-related employment



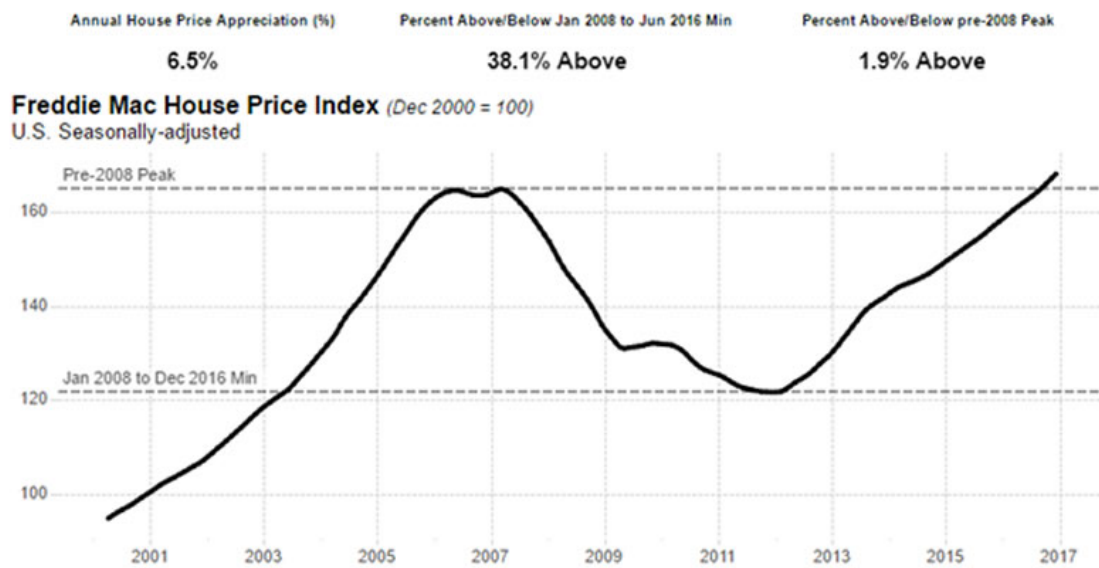
Source: *Monthly Labor Review*, December 2010. From Current Employment Statistics survey and Current Population Survey.

Figure 10 - Homeownership Rate for the United States



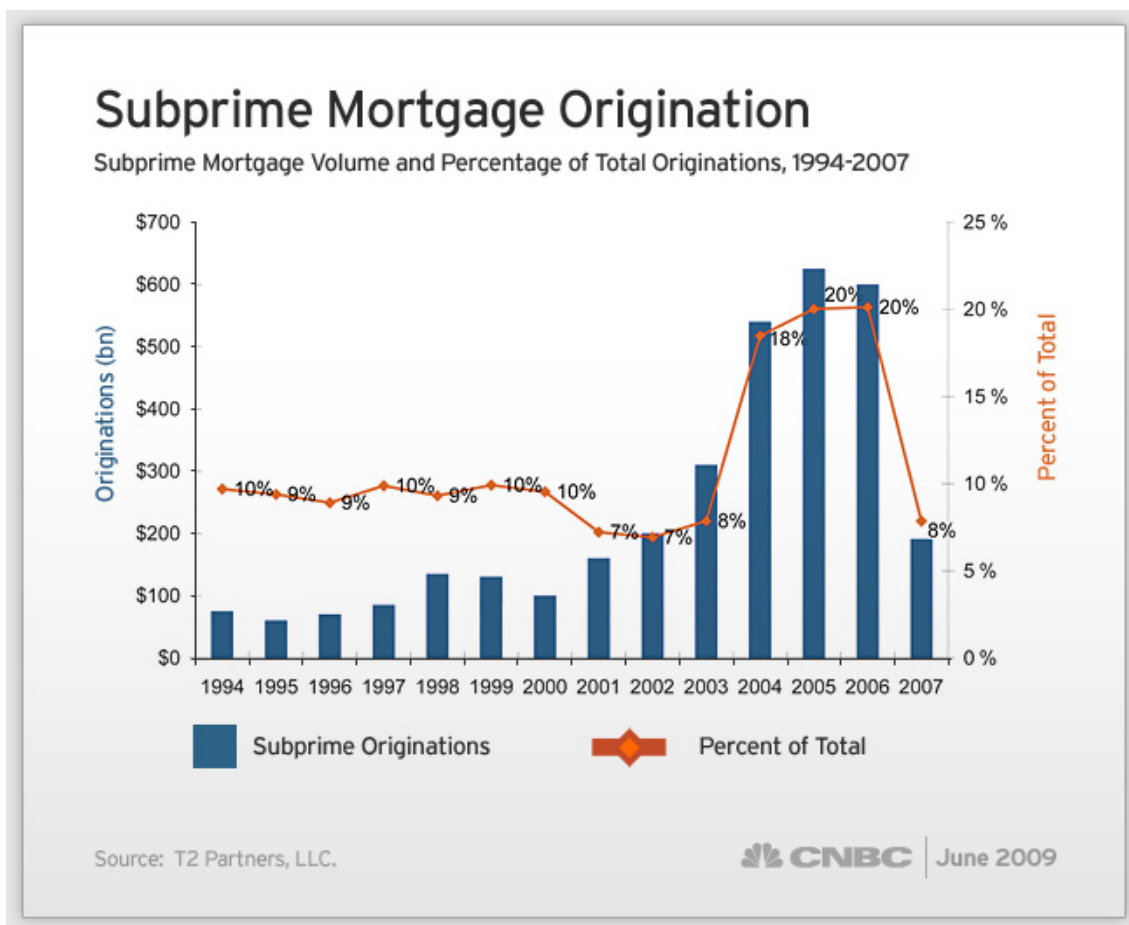
Source: *Federal Reserve Economic Data (FRED)*. From U.S. Bureau of the Census.

Figure 11 - Freddie Mac House Price Index



Source: *Freddie Mac*.

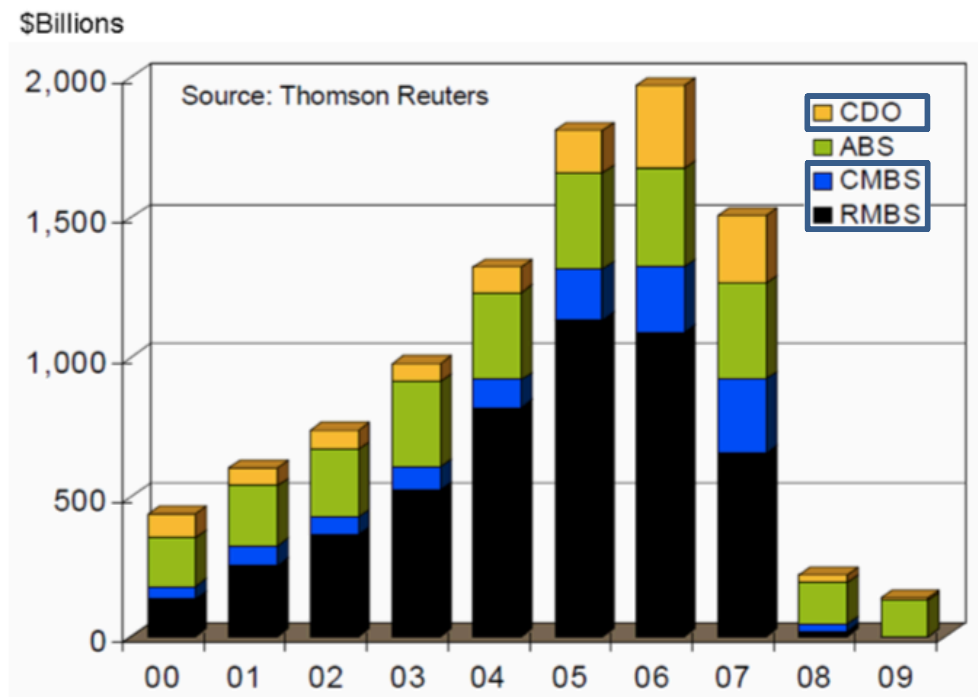
Figure 12 - Subprime Mortgage Origination



Source: *CNBC*, from T2 Partners.

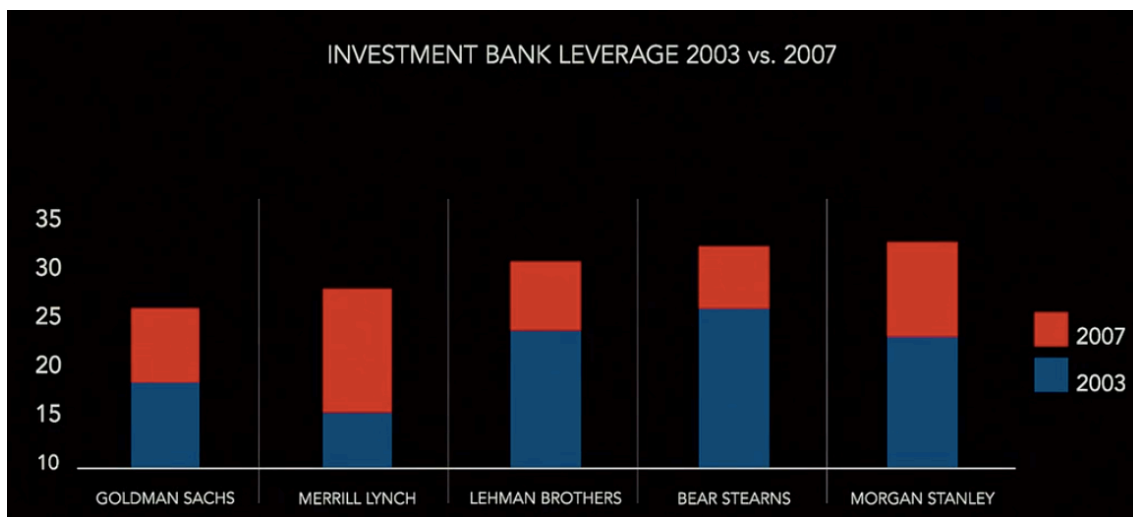
Figure 13 - Securitization market activity

Securitization Market Activity



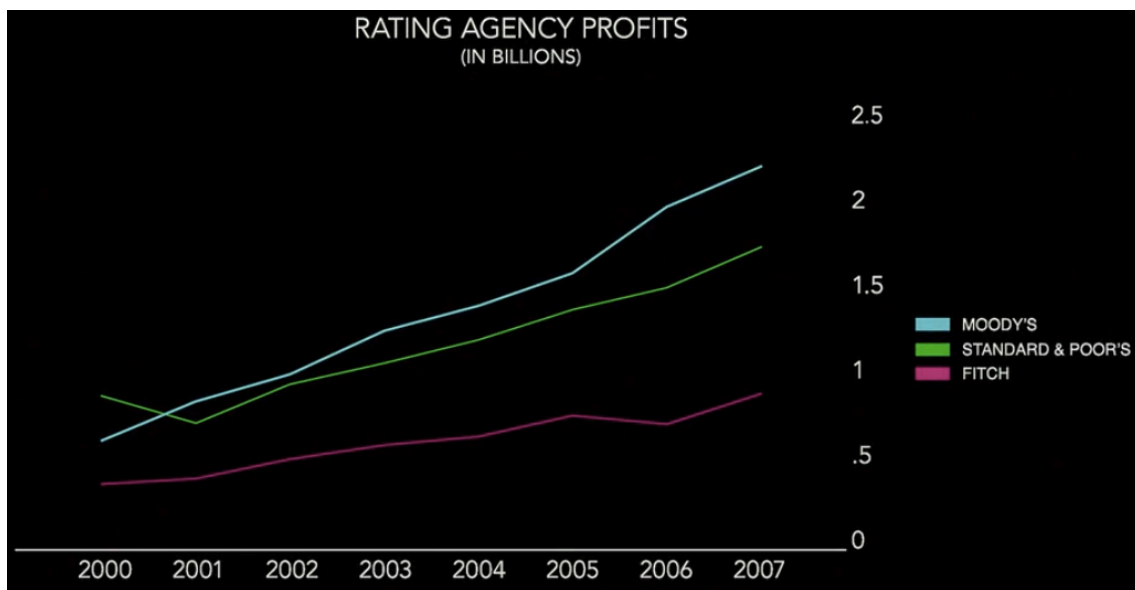
Source: *Thompson Reuters*.

Figure 14 - Investment Bank Leverage 2003 vs. 2007



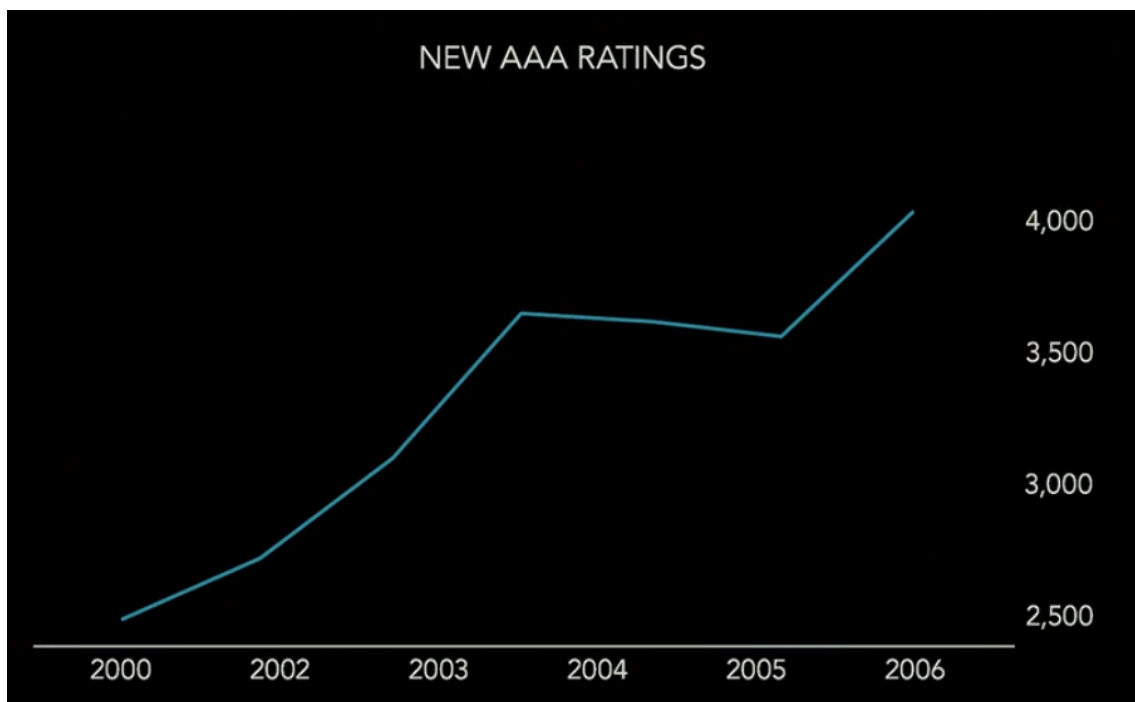
Source: *Inside Job*, Documentary.

Figure 15 - Rating Agency Profits (in Billions)



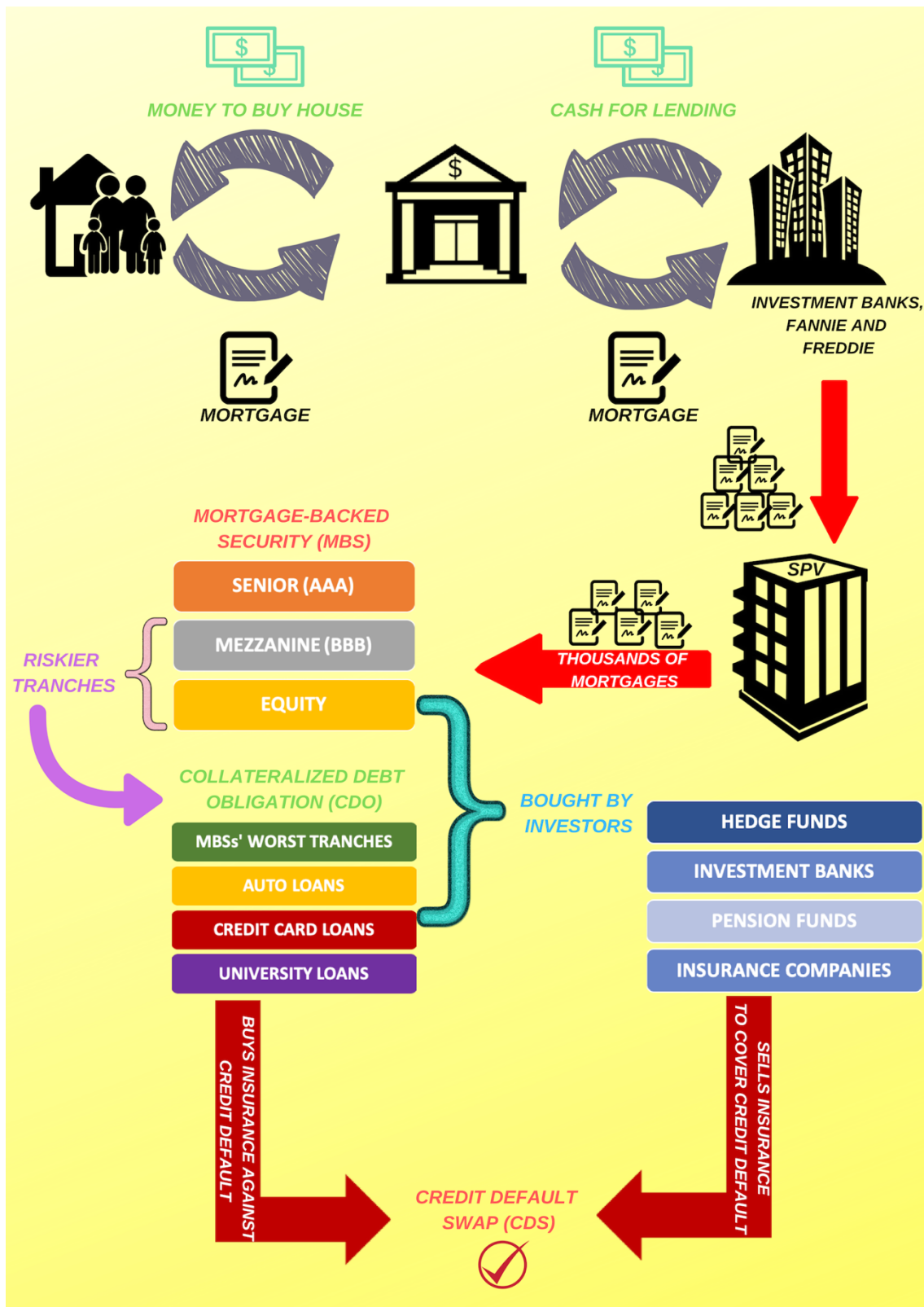
Source: *Inside Job*, Documentary.

Figure 16 - New AAA Ratings 2000 - 2006



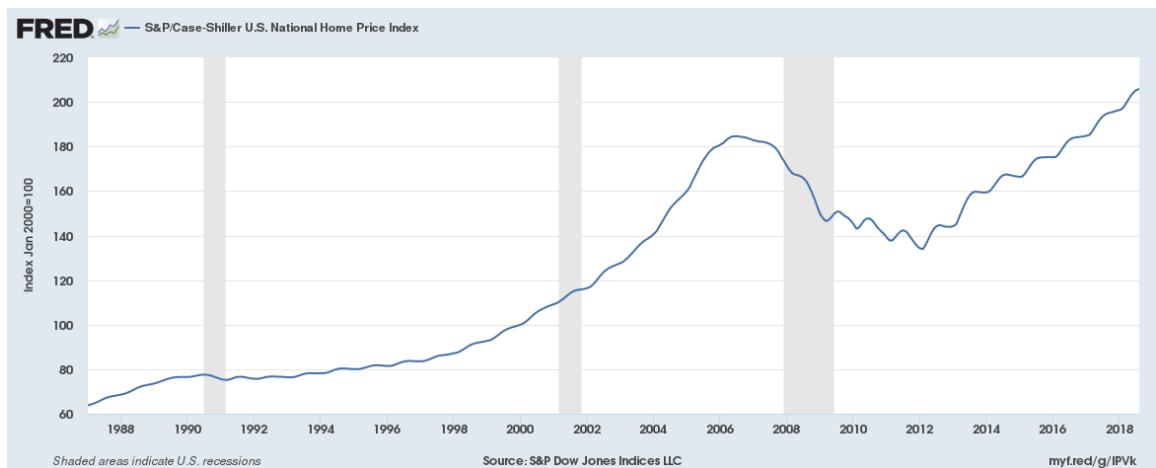
Source: *Inside Job*, Documentary.

Figure 17 - Securitization process



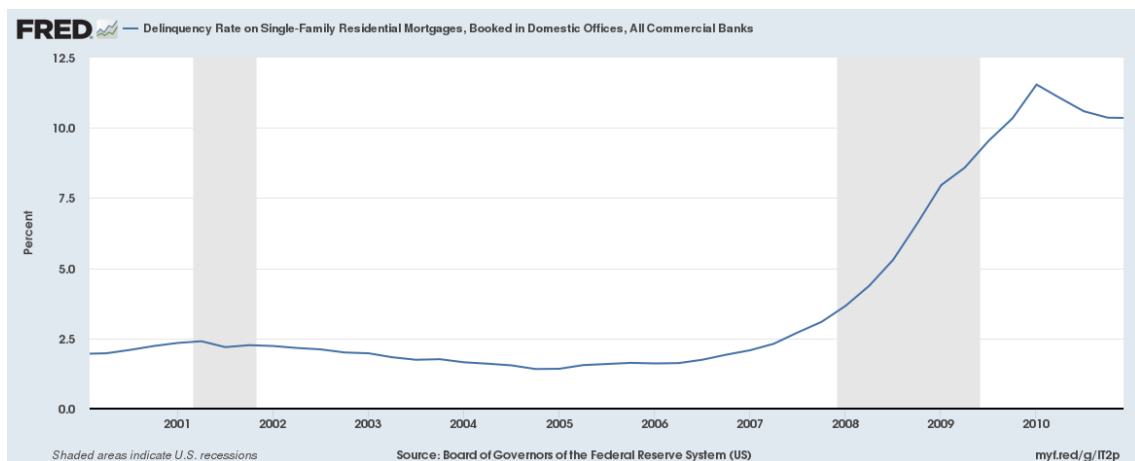
Source: Own creation with www.canva.com.

Figure 18 - S&P / Case - Shiller U.S. National Home Price Index



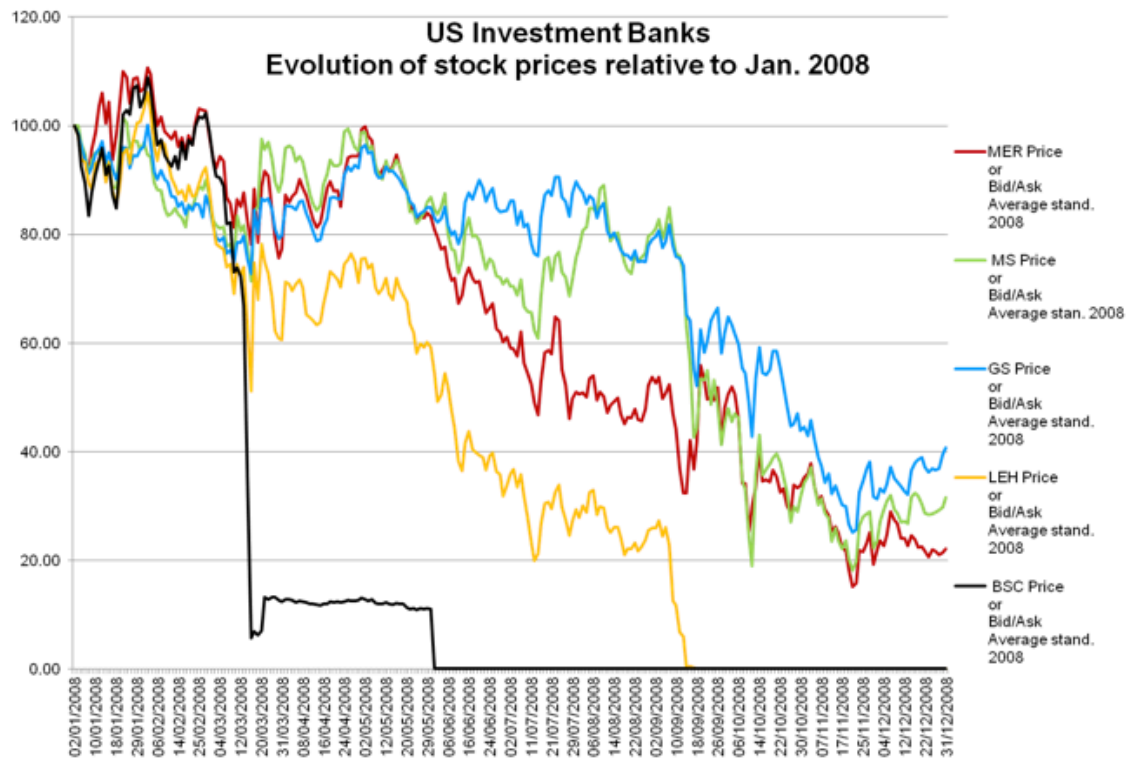
Source: Federal Reserve Economic Data (FRED). From S&P Dow Jones Indices LLC

Figure 19 - Delinquency Rate on Single-Family Residential Mortgage, Booked in Domestic Offices, All Commercial Banks



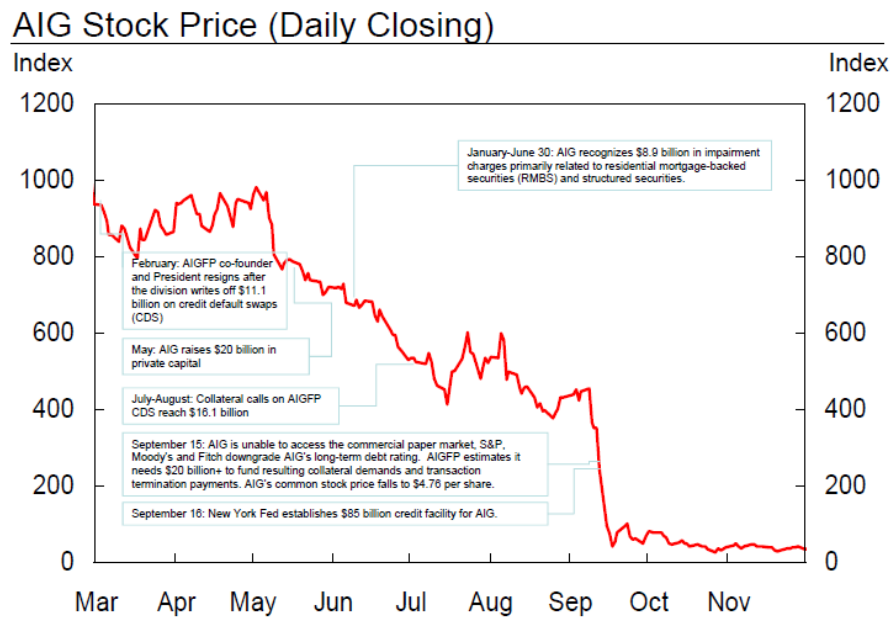
Source: Federal Reserve Economic Data (FRED). Board of Governors of the Federal Reserve System (US)

Figure 20 - US Investment Banks Evolution of Stock Prices relative to Jan. 2008



Source: VOX, Center for Economic Policy Research.

Figure 21 - AIG Stock Price (Daily Closing)



Sources: Google Finance; Federal Reserve Bank of New York.

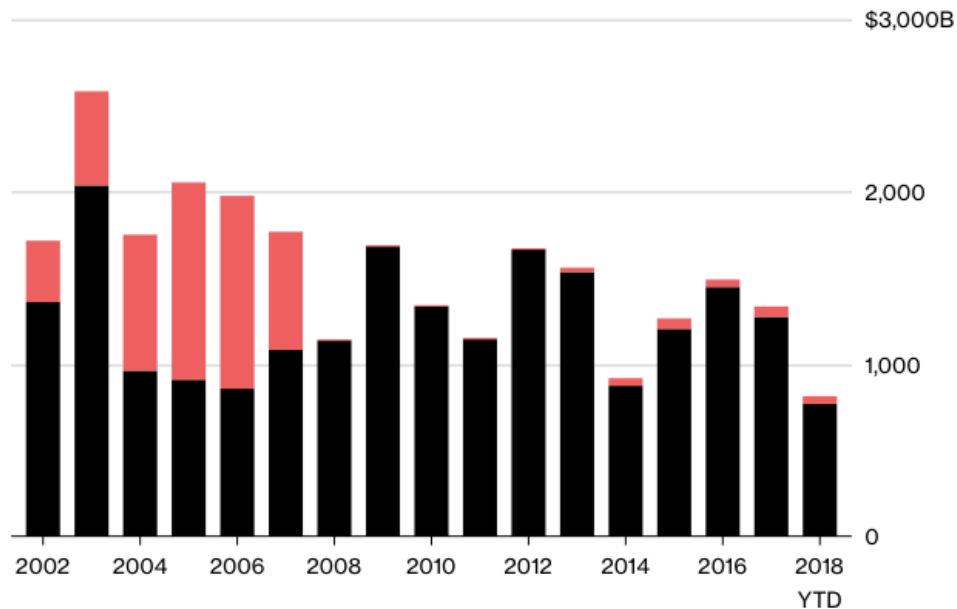
Source: Google Finance; Federal Reserve Bank of New York

Figure 22 - Where the wild things were; Non-agency share of issuance has yet to recover post-crisis

Where the Wild Things Were

Non-agency share of issuance has yet to recover post-crisis

■ Agency MBS ■ Non-Agency MBS

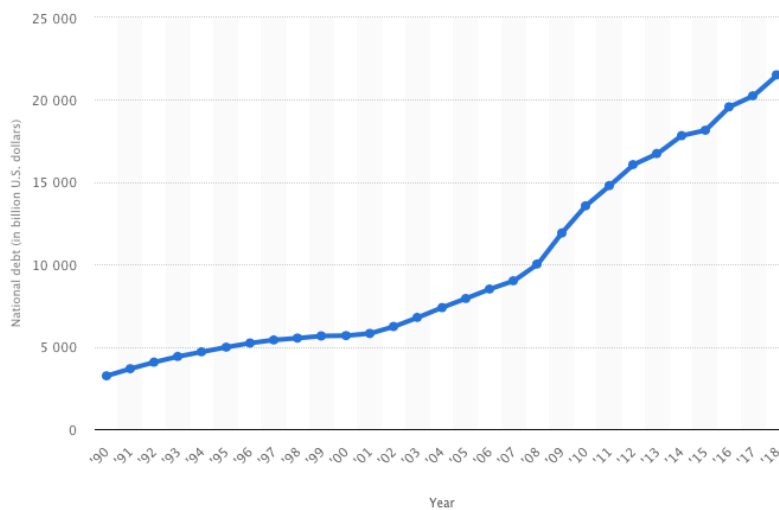


Source: JPMorgan Chase & Co.

Source: Bloomberg, from JP Morgan Chase & Co.

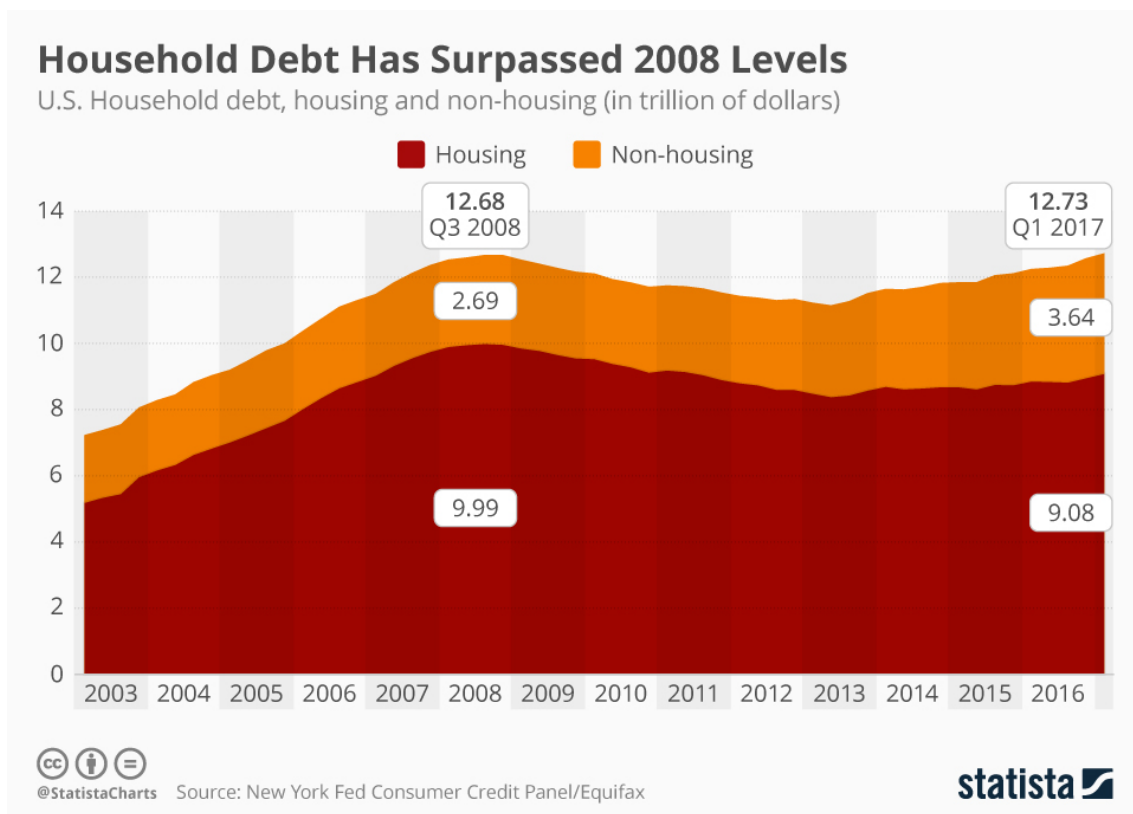
Figure 23 - Public Debt of the United States from 1990 to 2018* (in billion U.S. Dollars)

Public debt of the United States from 1990 to 2018* (in billion U.S. dollars)



Source: Statista.

Figure 24 - Household Debt Has Surpassed 2008 Levels



Source: Statista, from the New York Fed Consumer Credit Panel/Equifax.

TABLES

Table 1 - Summary statistics for 30-year, first-lien mortgages on owner-occupied houses in the PLSD. Averages or share of total per year.

Year	2000	2001	2002	2003	2004	2005	2006	2007
Interest Rate (%)	10.1	8.8	7.8	7.0	6.6	6.7	7.7	7.4
Loan-to-value ratio (%)	78.5	77.9	77.8	78.6	78.9	77.9	78.3	77.1
Borrower's FICO score	625	645	649	650	649	657	653	673
Origination amount (log)	11.7	12.1	12.1	12.1	12.2	12.3	12.3	12.6
Full documentation (%)	73	71	67	60	58	52	47	43
Prepayment penalty (%)	58	53	58	59	60	58	59	46
Jumbo (%)	24	36	32	25	21	22	20	35
Collateral Type (%)								
Prime	16	25	22	18	11	8	7	16
Alt-A	12	15	16	15	24	33	34	41
Subprime	72	60	62	67	65	59	59	42
Purpose (%)								
Purchase	47	38	34	34	41	44	44	34
Refinance w/cash-out	41	43	44	46	46	46	46	47
Refinance	12	20	22	20	12	10	10	19
Contract Type (%)								
Fixed Rate	41	48	39	36	22	20	22	28
ARM (not back loaded)	33	25	30	27	28	25	18	12
Interest Only (IO)	1	1	5	9	22	31	27	35
Balloon	0	0	0	0	0	3	17	14
Option ARM	2	0	1	0	5	10	8	7
Other	23	26	25	26	23	11	9	3
N (thousands)	320	541	792	1,315	2,152	2,833	2,403	706

Source: Reprinted from *The mortgage rate conundrum*, *Staff Reports* 829 (p 11), by Justiniano, A. & Primiceri, G E. & Tambalotti, A. 2017. Federal Reserve Bank of New York.

Table 2 - Median Combined Loan-to-Values for Mortgages in Subprime and Alt-A Pools

Panel B: Median Combined Loan-to-Values for Mortgages in Subprime and Alt-A Pools							
Collateral type	Loan purpose	2003	2004	2005	2006	2007 (Jan-June)	All
Subprime	Purchase	90	95	100	100	100	95
	refinance	80	80	80	80	80	80
Alt-A	Purchase	90	90	90	95	95	90
	refinance	74	75	75	79	79	76

Source: Reprinted from *The Rise in Mortgage Defaults* (p 33), by Mayer, C J. & Pence, K M. & Sherlund, S M. 2008. Federal Reserve Board, Washington, D.C.

Table 3 - Loan Types

LOAN TYPE	DESCRIPTION
<i>FHA Loan</i>	<ul style="list-style-type: none"> • Government-Insured (by the FHA) loans. • Issued by FHA-Approved lenders. • Designed for low income borrowers. • Require minimum FICO Scores. • Low down payments.
<i>VA Loan</i>	<ul style="list-style-type: none"> • Made available by the Veterans Administration to U.S. Veterans through a guarantee. • No down payment required. • No PMI required. • Minimum 620 score required by many lenders.
<i>USDA Loan</i>	<ul style="list-style-type: none"> • 90% loan note guarantee to approved lenders with the aim of reducing the risk of extending 100% loans to rural homebuyers. • Helps approved lenders provide low- and moderate-income households with the opportunity to own a house in a rural area.
<i>FHA 203K Loan</i>	<ul style="list-style-type: none"> • A type of FHA home renovation loan including the cost of buying a home, and the costs derived from its renovation. • Given to those who choose to rehab a damaged or older home.
<i>Conventional Loan</i>	<ul style="list-style-type: none"> • Offered by private lenders that is not government-insured not guaranteed. • Known as conforming loans because they meet Fannie Mae's and Freddie Mac's criteria.

Source: The Lenders Network, U.S. Department of Veteran Affairs, and United States Department of Agriculture and Rural Development.

IMAGES

Image 1 - Consequences of an AIG Failure

If AIG had been allowed to fail and the parent company had filed for bankruptcy, the consequences and effects could have been severe:

- Many of AIG's insurance subsidiaries could have been seized by their state and foreign regulators, leaving policyholders facing uncertainty about their rights and claims.
- Seizure of AIG subsidiaries would likely have put a moratorium on claims and withdrawals and could have impaired those claims in the longer term.
- A run on AIG, in the form of a massive cashing in of insurance policies and annuities, would have strained the company's ability to meet its obligations to millions of policyholders.
- State and local government entities that had lent investment funds to AIG would have been exposed to losses in an already difficult and deteriorating municipal budget environment.
- Workers whose 401(k) plans had purchased guarantees in the form of stable-value contracts from AIG could have lost that insurance.
- Pension plans would have been forced to write down their AIG-related assets, resulting in significant losses in participants' portfolios.
- The resulting losses to money market mutual funds, to which millions of Americans entrust their savings, would have had potentially devastating effects on confidence and would have accelerated the run on various financial institutions.
- Global commercial banks and investment banks would have suffered losses on loans and lines of credit to AIG and on derivatives contracts and other transactions, potentially causing even greater constraints on the availability of credit to homeowners and businesses.
- Confidence in other insurance providers could have been impacted, leading to a possible run on the industry.

Given the unusual and exigent circumstances at the time, the potentially far-reaching consequences of an AIG bankruptcy compelled policymakers to take decisive action to intervene.

Source: Federal Reserve Bank of New York, Actions related to AIG.

THE SNOWBALL EFFECT (EXTENDED)

The Snowball Effect – Bear Stearns

As mentioned at the beginning of the section **TRANSMISSION TO FINANCIAL MARKETS**, Bear Stearns was under big pressure because they could not get credit and their portfolio kept losing value. Eventually, they run out of cash in March 2008 because they had to keep financing their operations, and because successive downgradings of their MBSs by rating agencies pushed investors to withdraw their money. As a result, the only solution for Bear Stearns was to file Chapter 11²⁰, which the Government didn't allow because of the dramatic effects that Bear Stearns' failure would have had in the American economy being the investment bank one of the biggest middleman "for billions of dollars in transactions" (Godoy, 2008).

Thus, the only solution left was to save Bear Stearns. Although a first option in which the Fed directly bailed out Bear Stearns was considered, the definitive course of action implied a \$30bn loan from the Fed to JP Morgan Chase in order to help the latter buy Bear Stearns and to avoid, therefore, a possible domino effect.

The Snowball Effect – GSEs and Lehman Brothers

As for GSEs, it can be seen in **Figure 6 - Delinquency for Fannie-, Freddie- backed mortgages** that delinquency rates for mortgages backed by Fannie and Freddie had been dramatically increasing, which implied that the value of their shares diminished. "Both companies incurred massive losses of \$14bn between September 2007 and September 2008" (Wood, 2009).

The GSEs' situation required that they raise capital in order to remain solvent because they were very close to bankruptcy. Moreover, Fannie and Freddie could not fail because as Henry Paulson (Secretary of Treasury) said, "Fannie Mae and Freddie Mac are so large and so interwoven²¹ in our financial system that a failure of either of them would cause great turmoil in our financial markets here at home and around the globe".

²⁰ According to United States Courts, A case filed under chapter 11 of the United States Bankruptcy Code is frequently referred to as a "reorganization" bankruptcy.

²¹ Fannie and Freddie together guarantee 50% of the US mortgage market and provide help to lenders to ensure that there is enough financing to give mortgages (they financed 80% of the new mortgages in the US).

Nevertheless, after Bear Stearns' failure and the subsequent loss of trust in any company's balance sheet, getting credit was very difficult even for GSEs of such importance in financial markets.

Therefore, the only remaining solution was for the Fed to intervene again and put the companies into Conservatorship by September 7. What this meant was that the companies were nationalized or taken over by the government, benefitting, as a result, from a \$187bn government bailout according to *Bloomberg Markets and Finance*.

This solution, however, did not stop financial markets from falling. The turn was now for Lehman Brothers. In September 10, the company reported their worst quarterly loss (around \$3.9bn), which was also the worst loss in US banking history. These losses were reportedly related to failures in the value of CDOs and other toxic assets held by Lehman Brothers. Moreover, rating agencies reviewed Lehman's rating and, together with the losses, this caused a dramatic stock plummeting before and after September 10, as it can be seen in *Figure 20 - US Investment Banks Evolution of Stock Prices relative to Jan. 2008*.

To this, it could be added the failure of the conversations between Lehman Brothers and Korea Development Bank (KDB). The conversations were carried out so that KDB bought a stake at Lehman but, as they failed, Lehman's possibilities to obtain cash in the short term were reduced. Moreover, not even Barclays (the purchase was not allowed by the British supervisor Financial Service Authority [FSA]) or Bank of America offered to take over Lehman. As a result, Lehman run out of cash expecting that the government would bail them out as they did with Bear Stearns, which didn't happen and forced Lehman to file for bankruptcy on Monday September 15.

The decision of the government not to bail out Lehman Brothers was more political than legal or institutional. Henry Paulson, Ben Bernanke and Tim Geithner "were unwilling to endure the intense criticism that would have followed a Lehman rescue" (Ball, 2018). However, they had not anticipated the effects of Lehman's failure on the financial system and the economy as a whole. The first direct effect was represented in the number of employees that lost their jobs as a result of Lehman's failure, accounting for a total of 25,000 in all Lehman's offices.

Also, Lehman Brothers' failure had dramatic effects on the liquidity in financial markets derived from a loss of confidence. More precisely, Lehman's failure contributed to increasing drying-up of the repo market, which was a very important source of liquidity for banks, and had been drying up since late 2007 (Gehrig, 2016)²².

The Snowball Effect – AIG

As mentioned, what followed wasn't better. Now the problem was in AIG's balance sheet, more precisely, in their liabilities. They underwrote so many CDSs (which brought huge revenues when the CDS market was booming) that they didn't have enough resources to pay CDS holders when the underlying CDOs failed.

In order to be able to pay such liabilities, AIG tried to obtain a bank loan. However, after banks' negative response, the only solution for AIG to obtain funding was by getting Governmental help. What this implied, therefore, was that the US Government had to evaluate AIG's situation, which proved to be dramatic because AIG's failure would have implied the subsequent failure of investors all over the globe and would have provoked a huge chain reaction.

Their survival was "crucial at the time when there was stress all over the financial system" (Andrews, de la Merced, Williams Walsh. 2008). An example of how big could have the devastating effects of AIG's failure been is the fact that 75% of the credit default swaps that A.I.G. listed at midyear were held by European Banks. These banks would have lost the insurance on the bonds they were holding and, as a result, they would have had to reduce the value of such bonds, raising a need for capitalization. Therefore, AIG's collapse would not have only had effects on the US economy but worldwide.

As shown in ***Image 1 - Consequences of an AIG Failure***, the consequences of AIG's failure would have been devastating because they had customers in 140 countries. Moreover, the customer types ranged from policyholders to banks and financial

²² It must be mentioned that Lehman Brothers misused repos by using Repo 105, a way of removing toxic assets from the balance sheet when reporting quarterly results by recording transactions as sales and not as loans.

institutions, passing through state and other local government agencies, which meant that the consequences would have affected all parts of the economy.

As a result of the evaluation, Treasury Secretary Henry Paulson and Fed chairman Ben Bernanke decided in September 16, 2008 to bailout AIG through a two-year loan of \$85bn, which gave the government close to 79.9% ownership of the insurer because, in exchange of the loan, they received warrants to be transformed to common stock.

Notwithstanding, this last governmental solution did not stop banks and investors from losing confidence in the system, which, ultimately, resulted in the creation of the Troubled Asset Relief Program (TARP).