Czech University of Life Science Prague

Faculty of Economics and Management

Department of Economics

Bachelor Thesis

Analysis of Financial Crisis 2007-2008 in the US

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

BACHELOR THESIS ASSIGNMENT

Thi My Hanh Nguyen

Business Administration

Thesis title

Analysis of Financial crisis 2007-2008 in the US

Objectives of thesis

The US financial crisis that started in 2007-2008 has been labeled as the worst economic crisis in history. The incidence and extent of economic damage of this crisis is enormous, especially in the context of international economic integration. Why a crisis in the US could create a huge wave and influence to other countries in the world? How we can deal with a similar event happening again in the future? This is the reason why I selected the topic ”Analysis of financial crisis 2007-2008 in the US” in the process of studying Business Administration with two aims of this thesis: analyze the causes lead to financial crisis in the US and predict what will happen in the US till 2020.

Methodology

For Literature review part, there are methods to collect, aggregate and use documents such as abstraction, synthesis, deduction and induction. For practical part, the following methods are basic statistic, regression calculation, quantitative, and qualitative from the general to the particular.

The proposed extent of the thesis

40 pages

Keywords

financial crisis,subprime mortgage, bankrupt, housing market,United State

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Recommended information sources

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Expected date of thesis defence

2016/17 SS – FEM

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Declaration

I declare that I have worked on my Bachelor thesis titled “Analysis of Financial crisis 2007-2008 in the US” solely and completely by myself and I have used only the sources mentioned at the end of the thesis.

In Prague,

…….....

Nguyen Thi My Hanh

ACKNOWLEDGEMENT

I would like to express my gratitude to my family members, Mom and my brother, and all Vietnamese friends who have been on my side, helped, supported, and given me the possibility to complete this Bachelor Thesis.

I would also like to express my sincerest gratitude to my supervisor Ing. Petr Procházka, MSc, Ph.D for giving sincere advice to help me build ideas for this Bachelor Thesis. The information and feedbacks that he has given me were very useful and valuable to help me complete this Bachelor Thesis.

Then, I would like to express my most sincere thanks to Sosathya Pok who has also given me advice and communicated experiences. Through his examples and providing me useful materials which made me find out more knowledge in doing thesis.

Finally, I would like to dedicate my deepest gratitude to all lecturers.

Analysis of Financial Crisis 2007-2008 in the US

Analýza Finanční Krize 2007-2008 v US

Summary

With many policies are planned, the US has maintained its position as an economy with high competition, high yield and the most influential in the world. US population is only 4.5% of the world population but the Total Domestic Product (GDP) is 1/5 globally.

As a country with the largest economy and the highest yield in the world, but the United States faced the Great Depression 2007-2008 makes 2008 was the year of the tragic world economy. The financial crisis broke out in the US and global spread, leading to the collapse of many institutions simultaneously enormous financial, stock market subversive.

The worst financial crisis "appear once in hundred years", according to Alan Greenspan, former chairman of the Federal Reserve (Fed), has been known about it since 2006. However, predictions and analysis of many economists were not enough to convince the most powerful of financial institutions in the United States to precaution.

So what is the reason for the US - a monument to the world of economy to collapse so quickly and severely affected the world economy so much? Has the world prepared that in the future there will be a similar crisis is dragging on or not?

This bachelor thesis was chosen for the aimed of analyzing the US financial crisis 2007-2008. The first objective of this thesis is to find out and show how dependency all the factors of GDP from 2000-2015. To make it influenced, there are key factors such as GDP, GDP growth, Industry sector, Import and Export, interest rate and so on. Base on those factors, it is important to estimate whether it is strong or not. The second objective is to forecast on GDP, GDP per capita, and GDP growth annually from 2016-2020. This objective is designed to predict about the future of US Economics.

Keywords: financial crisis, subprime mortgage, bankrupt, housing market, United State

Souhrn

Díky dobré státní politice si ekonomie USA drží svou vedoucí pozici i ve vysoké světové konkurenci a je nejvlivnější ekonomií světa. Přestože populace USA tvoří pouze 4,5% z celkové světové populace, její HDP tvoří 1/5 celosvětového HDP.

Ale i země s nejvyspělejší ekonomikou a nejvyšším výnosem na světě jako je USA, čelila v letech 2007 – 2008 Velké hospodářské krizi. Rok 2008 pak byl rokem, kdy světová ekonomie propadla a stagnovala. Tato finanční krize vypukla v USA a jejím rozšířením do světa způsobila kolaps mnohým institucí a také enormní finanční a burzovní propad.

Podle Alana Greenspana, bývalého předsedy Federálního rezervního systému, který již v roce 2006 predikoval tuto krizi, tak velká finanční krize nastane ‚jednou za sto let'. Ale i přes varování několikerých ekonomů se ani největší finanční instituce na tuto možnost kolapsu nikterak nepřipravily.

Co vlastně bylo důvodem tak rychlého kolapsu tak monumentální ekonomiky jako je ta USA, a proč tato událost ovlivnila světový trh v takové míře? Poučily se světové ekonomiky a připravují se na možnost opakování tak velkého kolapsu?

Tato bakalářská práce je zaměřena na analýzu Velké hospodářské krize USA v letech 2007-2008. Prvním cílem práce je zjistit a ukázat závislost všech faktorů HDP od roku 2000 do roku 2015. Klíčovými faktory jsou HDP, růst HDP, různá odvětví průmyslu, dovoz/vývoz, úrokové sazby a tak dále. Na základě těchto faktorů bude určeno jestli krize byla hluboká anebo ne. Druhým cílem je předpověď HDP, HDP na obyvatele a roční růst HDP od roku 2016 do roku 2020. Tento cíl je navržen tak, aby předpověděl budoucnost americké ekonomie.

Klíčová slova: finanční krize, hypoteční, konkurzu, trhu s bydlením, Spojené státy.

Contents

1. Introduction

In twenty-first century, there are more opportunities, chances and risks. To developing a new and modern economic is based on humans' knowledge and technology system. United State is one of the masterminded in both economical and political system. In 2008, there was a nightmare in economical system. Because of mistakes in financial position, there was an economic crisis which spread around the world. Most people who put money in the bank could not pay back on time, and debtors became the hottest issue for the banks. During that time, most people were afraid of losing their value of money, so that was the reason why in 2008 people stopped putting money into the banks, buying stocks, investing into markets, and GDP growth was falling down surprisingly.

The reasons why most economists are interested in financial crisis are because of prevention this situation in the future. Nearly 10 years already that economic crisis was solved. The banks 'system has been working normally. Business starts to grow, and GDP is increasing. This is the positive impact in the future while more economists have been taking good care of economical situation.

2. Objective and methodologies

2.1. Objective

The first objective of this thesis is to find out and show how dependency of all the factors with GDP from 2000-2015. To make it influenced, there are key factors. Base on those factors, it is important to estimate whether it is strong or not. The key factors are

- GDP per capita
- GDP growth annual in percentage
- Agriculture sector in trillion USD
- Industry sector in trillion USD
- Real interest rate in percentage
- Import in trillion USD
- Export in trillion USD
- Household consumption in trillion USD

The second objective is to forecast on GDP, GDP per capita, and GDP growth annually from 2016-2020. This objective is designed to predict about the future of US Economics. This method is different from the first objective.

Research Questions

- How strongly did the GDP per capita influence GDP in US in the whole period from 2000-2015?
- How strongly did the GDP growth annual in percentage influence GDP in US in the whole period from 2000-2015?
- How strongly did agriculture sector influence GDP in US in the whole period from 2000-2015?
- How strongly did real interest rate influence GDP in US in the whole period from 2000-2015?
- How much did trade (Import and Export) of US influence GDP for whole period from 2000-2015?
- How much household consumption of US did influence GDP for whole period from 2000-2015?

Hypothesis

- GDP per capita had a positive influence on GDP in the whole period from 2000-2015 in US.
- GDP growth in percentage had a positive on GDP in the whole period from 2000-2015 in US.
- Agriculture sector had a negative on GDP in the whole period from 2000-2015 in US.
- Industry sector had a positive on GDP in the whole period from 2000-2015 in US.
- Real interest rate had a negative on GDP in the whole period from 2000-2015 in US.
- Import had a negative on GDP in the whole period from 2000-2015 in US.
- Export had a positive on GDP in the whole period from 2000-2015 in US.
- Household consumption had a negative on GDP in the whole period from 2000-2015 in US.

2.2. Methodologies

In this thesis, secondary data is used. Regression model analysis is used to fullfil the first objective and gives the answer to hypothesis on GDP for the whole period of 2000-2015 as the following of secondary data:

- GDP in trillion USD
- GDP per capita
- GDP growth annual in percentage
- Agriculture sector in trillion USD
- Industry sector in trillion USD
- Real interest rate in percentage
- Import in trillion USD
- Export in trillion USD
- Household consumption in trillion USD

The second objection is to forecast the future of GDP in US from 2016-2020. To fulfill this objective, it is solved in excel. Correlation matrix analysis is conducted to evaluate how strongly all the data (GDP, GDP per capita, GDP growth annual, Agriculture sector, Industry sector, Real interest rate, Import, Export, and Household consumption) correlated in the whole period from 2000-2015.

3. Literature Review

3.1. Overview of US trade

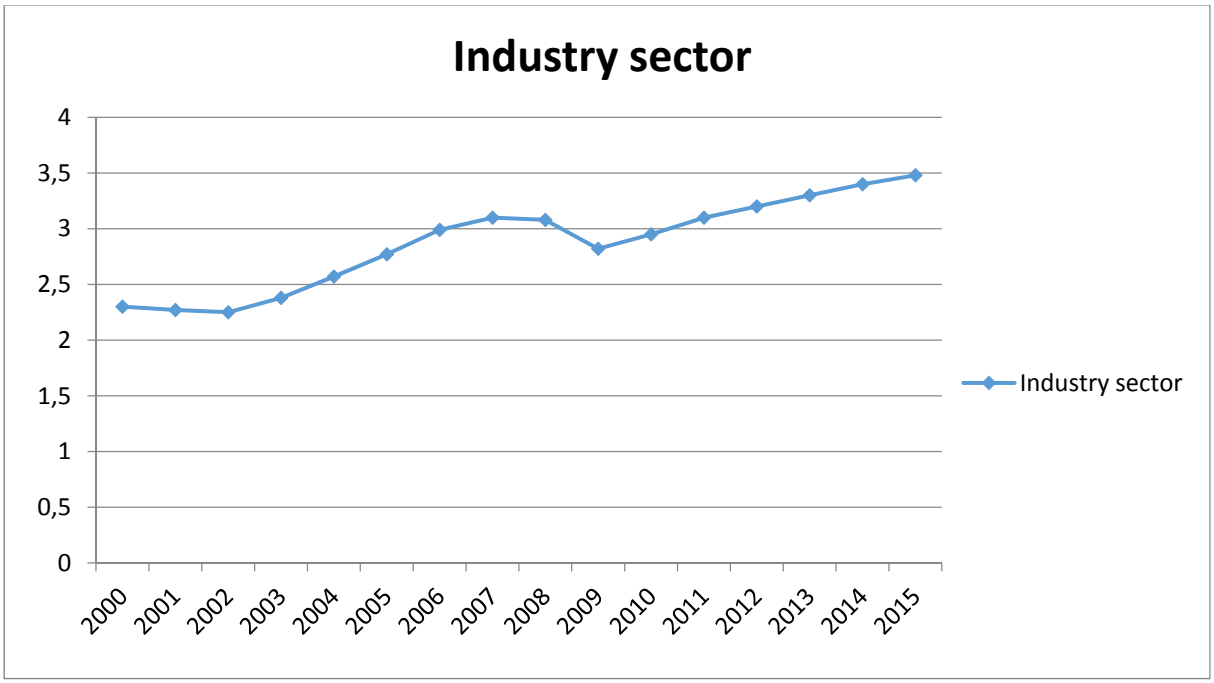
Energy, manufacturing, transportation, healthcare and agriculture are five main industries driving the US economy. Since 2000-2007, the US industry has increased sharply; the highest peak was 3.1 in 2007. During the crisis, the industry declined dramatically was 2.95 till 2010; some factors come from reduced energy prices, three largest automobile manufacturers are Ford, General Motors (GM), and Chrysler bankruptcy and so on. After dark period, the US is trying to bring the industry back to its heyday gradually, the rate in 2015 is 3.48 and it's also the highest rate since 2000.

Table 1 Industry Sector

Year	Industry Sector
2000	2.3
2001	2.27
2002	2.25
2003	2.38
2004	2.57
2005	2.77
2006	2.99
2007	3.1
2008	3.08
2009	2.82
2010	2.95
2011	3.1
2012	3.2
2013	3.3
2014	3.4
2015	3.48

Source: data.worldbank.org

Graph 1 Industry Sector from 2000-2015



United States ranks second in the export sector and also the largest import in the world economy. From 2000-2008, the highest rate of export was 1.84 even during the crisis period, and dropped in 2010. Next 5 years since 2010, the export sector in the US increases dramatically. For import sector, the situation is the same with export sector, the rate was not stable but still grow up in 2008 was 2.55 and stopped in 2 years 2009-1010.

Table 2 Trade in United States

Year	Import	Export
2000	1.45	1.08
2001	1.37	1
2002	1.4	0.98
2003	1.51	1.02
2004	1.77	1.16
2005	2	1.29
2006	2.22	1.46
2007	2.36	1.65
2008	2.55	1.84
2009	1.96	1.58
2010	2.35	1.85

2011	2.68	2.13
2012	2.75	2.22
2013	2.76	2.28
2014	2.85	2.34
2015	2.76	2.26

Source: data.worldbank.org

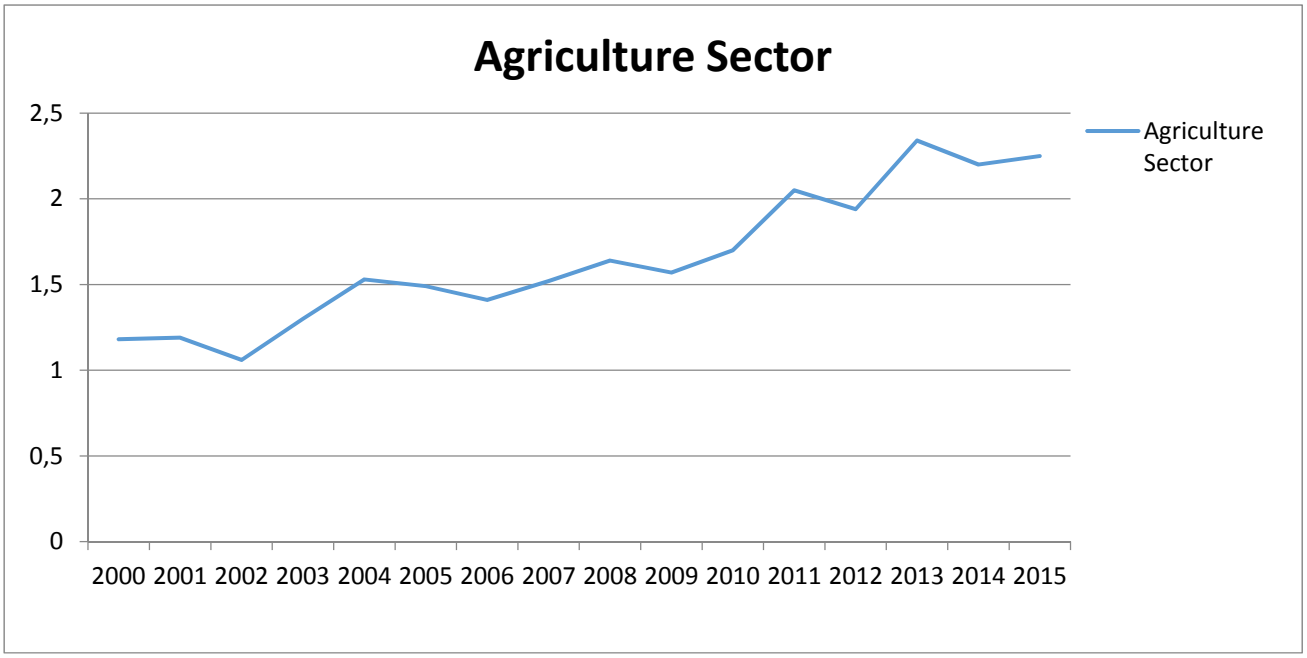
Since 2002-2004, Agriculture sector in the US has been increased from 1.06 to 1.53. But in the period 2005-2007, Agriculture has dropped; the crisis makes GDP in the US being lower, then affected on consumer spending on food. For farmers, banks might reduce lending to them because of the unstable of US financial markets. After the crisis, although Agriculture has the highest rate in recent years (2.34 in 2013) but it is not still progress when the rate is not stable.

Table 3 Agriculture Sector

Year	Agriculture Sector
2000	1.18
2001	1.19
2002	1.06
2003	1.3
2004	1.53
2005	1.49
2006	1.41
2007	1.52
2008	1.64
2009	1.57
2010	1.7
2011	2.05
2012	1.94
2013	2.34
2014	2.2
2015	2.25

Source: data.worldbank.org

Graph 2 Agriculture Sector from 2000-2015



Since 2000-2005, the interest rate has low rate at 2.87%. During the crisis from 2006 and 2007, the interest rate has been increased with highest rate was 5.24% since 2000 (6.8%). For the average low-income person who cannot pay debt on time, it's not a good signal to them. Raising US interest rates could mean higher debt repayments for emerging market governments and businesses. In 2008, the interest rate began to cool down from 3.06% to 1.38% till 2011.

Interest rates directly affect the credit market (loans) because higher interest rates make borrowing more costly. Just when interest rates drop (or decrease), consumer spending increases and this in turn stimulate economic growth.

(http://www.investopedia.com/university/inflation/inflation3.asp)

Table 4 Interest rate

Year	Real Interest rate in percentage
2000	6.8
2001	4.53
2002	3.09
2003	2.08
2004	2.54
2005	2.87
2006	4.73
2007	5.24
2008	3.06
2009	2.47
2010	2
2011	1.16
2012	1.38
2013	1.6
2014	1.43
2015	2.16

Source: data.worldbank.org

Graph 3 Interest rate annual from 2000-2015

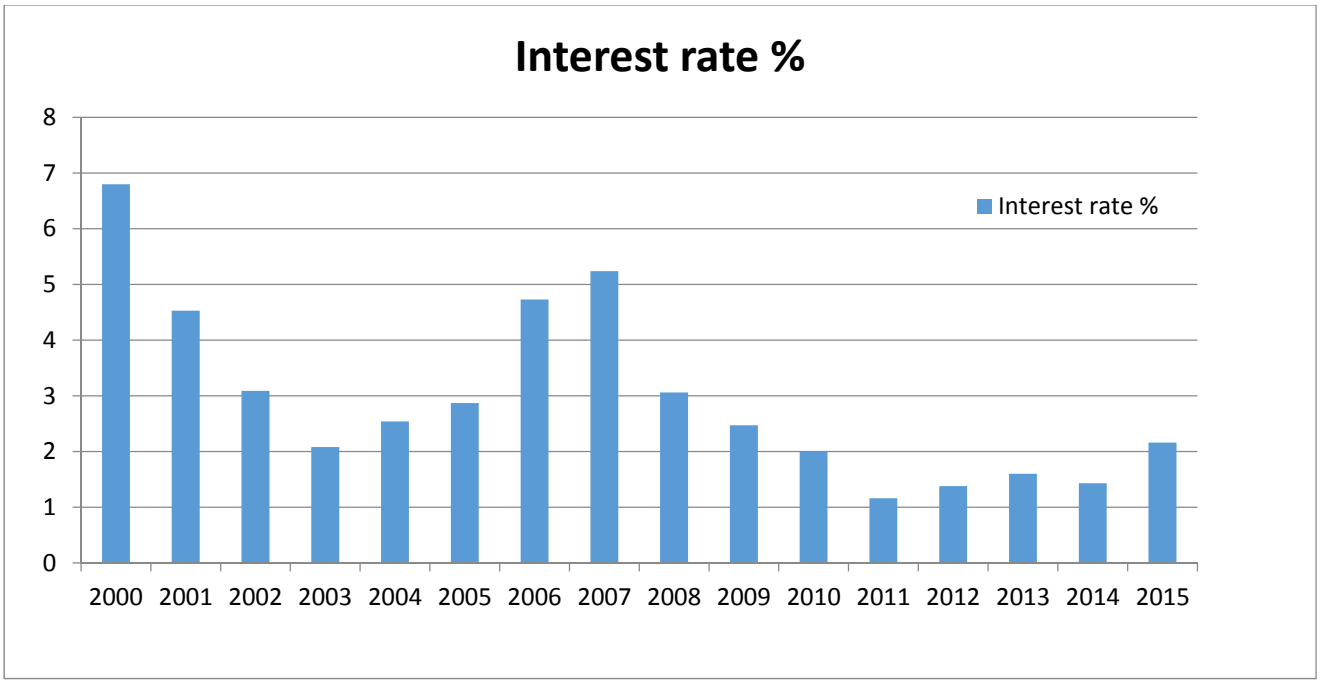


Table 5 Change in percentage of Interest rate

Year	Change in percentage of interest rate
2000-2001	-33.38
2001-2002	-31.79
2002-2003	-32.69
2003-2004	-25.96
2004-2005	86.36
2005-2006	64.81
2006-2007	10.78
2007-2008	-41.60
2008-2009	-19.28
2009-2010	-19.03
2010-2011	-42.00
2011-2012	18.97
2012-2013	15.94
2013-2014	-10.63
2014-2015	51.05

Source: own processing from table 4

As it shown in table 5, before economic crisis, the interest rate from 2000-2004 has been decreasing. In 2005, it was increasing again from 1.54 to 2.87, and it started to increase more and more till 2007 by 5.24. After that in 2008, the interest rate was dropped to 3.06 percent because of crisis period. So debtors had chance to pay debt to bank and the money system had been crashing because the bank could not pay back money on time to creditors. During that time US government came up with new ideas to deal with crisis. In 2009 till 2010, the interest rate was still drop to 2%. This was the solution to deal with financial problem, and it became lower and lower till 2011 by 1.16 percent. After 2011, the interest rate grown up again till 2013, and it was down again to 1.43 percent in 2014. Later on in 2015, the interest rate was 2.16 percent which mean it was growing up by 51.05% from previous year.

3.2. Evolution of Crisis

The first victim of the financial crisis was Countrywide Financial. Financial Group hold 20% of the market for US real estate loans. Just in few months, it has been pushed to the brink of bankruptcy due to bad debts in Jan.8.2007. By May.1.2008, the largest US bank in market capitalization and deposits, Bank of America bought the Countrywide Financial for $ 4 billion. A month later, Northern Rock, the fifth largest bank in the UK, was the next bank sued the Bank of England due to losses from mortgage real estate. On Feb.17.2008, Northern Rock was nationalized. Events of Countrywide Financial and Northern Rock were the harbinger of the storm about to pour down financial markets as well as the global wave of mergers, bankruptcies, and were taken over by the Government of financial institutions.

To date Feb.28.2008, DZ Bank of Germany was put on the list of the victims of the subprime crisis with the total value of assets. Devaluation was 1.36 billion Euros. Less than a month later, on Mar.17.2008, The Bear Stearns Companies, Inc. was a New York-based global investment bank, securities trading, and broker age firm failed because of the uncontrolled depreciation of the financial and property investments. It was subsequently sold to JPMorgan Chase for $240 million including its headquarter. At that time, the price per share of Bear Stearns was 2USD, while prices a year earlier were 170 USD.

On July.11.2008, The US federal authorities took control of Indy MacBan Corp Bank. This was one of the closing largest banks ever after depositors withdrew more than $1.3 billion within 11 days.

Financial earthquake actually happened on Sep.07.2008 when two groups which specialized mortgage lending were Freddie Mac and Fannie Mae. They were forced to takeover because

of avoiding bankruptcy by Government. The event continued sparked further breakdown with other big names. Dated Sep.15.2008, after 158 years existence of Lehman Brothers, the fourth largest investment bank, had been declared bankruptcy.

Exactly 10 days later, Washington Mutual Inc, which was the United States' largest savings and loan association, was the largest bank failure in American financial history with the total value of property damage amount 307 billion dollars.

Also due to financial crisis, Merrill Lynch was taken over by Bank of America on Sep.14.2008. The government forced to transfer $ 85 billion to AIG, the largest insurance group in the world, to avoid the financial markets not to have a worse outcome.

In September and October of 2008, Wall Street was in dark period when Dow Jones indexes lost 25% value after one month from the date of 15 Sept. Volatility on Wall Street became more unpredictable with many records exist in both increases and decreases for decades. Now they have been destroyed. Not just only Wall Street but there were many stocks such stock markets from Tokyo to Shanghai, Seoul and Hong Kong, the stock index plunge sharply had destroyed too from 15-21 Sept. In Europe, stock markets in Paris, London, Frankfurt, and Amsterdam had the same fate. Moscow's stock market also temporarily closed to wait for the storm to pass.

Financial market conditions worsened freeze led to Central Bank in the US, UK, Japan, EU and many other countries have cut interest rates to unfreeze series inflows. In United States since the beginning of 2008 until now there were 8 times already that the rate had cut, which mean that base rate decreased from 5% to 0.25%. The countries also pump money to support the liquidity of the financial corporations like stimulating consumer activity and lending.

Entering the fourth quarter of 2008, the global economic downturn may be more noticeable after the largest economic centers such as the US, Japan and the EU together in turn fell into decline. The US economy fell into recession at faster rate about minus 0.3% in third quarter of 2008.

Forecasting the federal budget deficit in fiscal year 2009 could reach 1 trillion USD. According to the US Labor Department, unemployment rate is up to 6.5% which is the highest percentage in 14 years. According to forecasts, the unemployment rate can be up to 8%, while reserve funds and real estate values dropped down.

On 11.Dec.2008, the whole world shaken when US authorities arrested the former chairman of the NASDAQ Stock Market in America, as well as a stock trader of the country legend, Bernard Madoff used sophisticated strategies to attract capital of investors and 50 billion USD of losses. There was a list of victim that was made by Bernard Madoff from US to EU and Asia. In this case must include Greenwich Group's 7.3 billion USD losses, Banco Santander with losses of 3.6 billion USD, Ascot Partners with losses of 1.8 billion USD etc.

According to the experts in economical field, the US economy in particular and the world will continue keep going down until mid 2009 and tends to gradually shift from inflation to deflation include the downturn in the market credit, housing, labor and consumer activity. In the United States from early 2008 to Nov 2008, CPI grew by only 1.7% compared to an increasing of 4.1% in 2007. In Europe, inflation is also declining sharply. Due to EU Statistical Office (Euro stat.), in the last 14 months inflation was decreasing from 3.2% to 2.1% in Nov 2008.

Poor strata of the world were one of the subjects which suffered the most base on impact of price fluctuations and financial crises. The Food and Agriculture Organization shown that food prices had been rising, and the recession had made number of hungry people about 40 million increasing in 2008 while the total number of hungry people worldwide was 960 million. If inflation threats seriously to their life, then deflation is also harmful effects. Related to this problem, food prices fell, and investment and development became limited area of cultivation and tight supply.

In Asia, most developing countries were likely affected by the crisis. Most major economies in Southeast Asia were exported oriental and highly dependent on foreign trade and investment. Initially, the field export, stock market and currency markets were influenced strongly of the financial crisis.

Japan which was the second largest economy in the world official announced fall into recession after 18. Nov.2008 because of negative growth ventures in second and third quarter of 2008.

China's economy was considered as a growth engine of the world economy. After years of growing at double-digit rates, the trend economy was reduced by 9% in the third quarter of 2008. The World Bank said China's GDP growth increased only by 7.5% in 2008. It was the lowest level in 19 years. Industrial growth rate had declined from 16% in June to 8.2% in 10. May.2008 which was the lowest rate in 7 years. Export declined due to financial crisis

primary because forecasts will be even more difficult in 2009 led to the decline many other manufacturing industries and increased unemployment.

3.3. Causes of Crisis

3.3.1. Subprime mortgage lending in the US

3.3.1.1. Crisis Origin

Low interest rate: In late 2001 when the US economy fell into decline recession, the Federal Reserve has repeatedly cut interest rates. Monetary Policy expansion has been promoting activities economy. By mid-2002, the economy was better than previous year. Concerning about recession could be returned, so Federal Reserve Chairman Alan Greenspan and his colleagues decided to keep steering interest rates at 1% during 2003 and 2004. Based on the "signal" of the central bank, interest rates in most financial markets had dramatically declined. In particular interest rates in 30-year fixed loan at 4-5%. It was the lowest in 40 years.

Abundant cash resources: In response to the monetary policy, it was eased by the Federal Reserve. The money supply in the US economy had increased extremely. The volume of lending of all types Bank credit had been growing steadily. Promoting on Monetary expansion was taking place.

The increase in credit volume was also fueled by inflowing foreign capital into stable flow nail. The Federal Reserve did not implement in any measures to neutralize the impact of the line capital of the money supply because they believed the economy was still in the process of economic recovery. With the increasing strong of economy growth at the end of 2002, personal income and corporate profits have increased significantly.

House prices rise continuously: In late 2002, because of increasing personal income, the operation of the housing market in vibrant place was growing. At the same time, the interest mortgage loans was decreasing, and credits was increasing which meant that participants will want to take advantage of profit. It led to all entities market.

The people rushed to buy the house in order to make a profit because they believe that home prices would be rising higher. Many speculators have gained big words simply by buying and reselling houses even when the house has not been completed and put to use. The mortgage brokers eager to accelerate and conclude the transaction to collect the charges and move to the next transaction. Later, people began to realize that many home buyers qualify mortgages.

In this target groups, they become subprime loans because those intermediaries collect higher fees from this category to buyers.

Lenders felt safe because default risk was reduced over time as house prices continued to rise. Value property of the homeowners also increased correspondingly. Most subprime loans were in the form of mortgage loans with adjustable rate mortgage (ARM). Traditionally, buyers often wanted a mortgage with fixed interest rate rather than interest rate flexibility. They will have to pay monthly interest at an interest rate fixed for 30 years. However, ARM interest rates were very low for 3 to 5 years. Therefore, it has attracted buyers with low incomes. However, the amount of interest payable monthly has increased over time due to higher level of lending rate.

Misperception of risk: In general, all market participants have misjudged the true level of risks and until they realize the risks have turned into a crisis.

These buyers do not feel the risks because of the continuous increasing in house prices allowed them to repay very easily by borrowing more. Lenders also didn't maintain their loans in books that they sold their loans to investment banks, so the banks took turn them into assets securitized. They sold to investors in securities in order to make money work. As a result, mortgage lenders had continually to get cash and continue to create the same debt, pushing prices higher and a new cycle begins.

Cracks appear: However, in early 2006, the housing market began to decline. New houses have not sold, and consequently the prices began to plummet. The cause of this situation was reversed to the Federal Reserve monetary policy. The US economy had entered the 4th year of continuous growth. That was a signs of sharply rising inflation appeared. A variety of other price indices also increased. The Federal Reserve responded by repeatedly raising interest rates.

Tight monetary policy of the Federal Reserve had made the ARM interest rate increased. Interest rates rose surprisingly for subprime borrowers. Due to the financial situation was tight, and many people cannot afford to pay. The ratio of overdue debts and defaults began to soar. This was in contradiction with the fundamentals of the economy remained well because although interest rates tended to increase but in history it was still low.

3.3.1.2. Mortgage lending mechanism

Mortgage lending standards were loans to purchase real estate with high quality. It was determined carefully by a loan officer and was secured by the borrower's documents to prove its solvency to banks including annual income, occupational profile, previously borrowed documents, assets and liabilities.

Subprime mortgage loans were low-quality loans with high risk. These loans weren't being scrutinized and often secured by little or no proof of financial capacity of the borrower. Traditionally, a borrower must submit a bank loan application. This application was reviewed by a loan officer and the review must be clearly expressed in writing. At the same time, the borrower must provide the documents related to income, occupational profile, assets and debts. The Bank may agree to a mortgage with a fixed interest rate for 30-year mortgages or interest rate can adjust ARM. The majority of borrowers choose the form of fixed-rate loans.

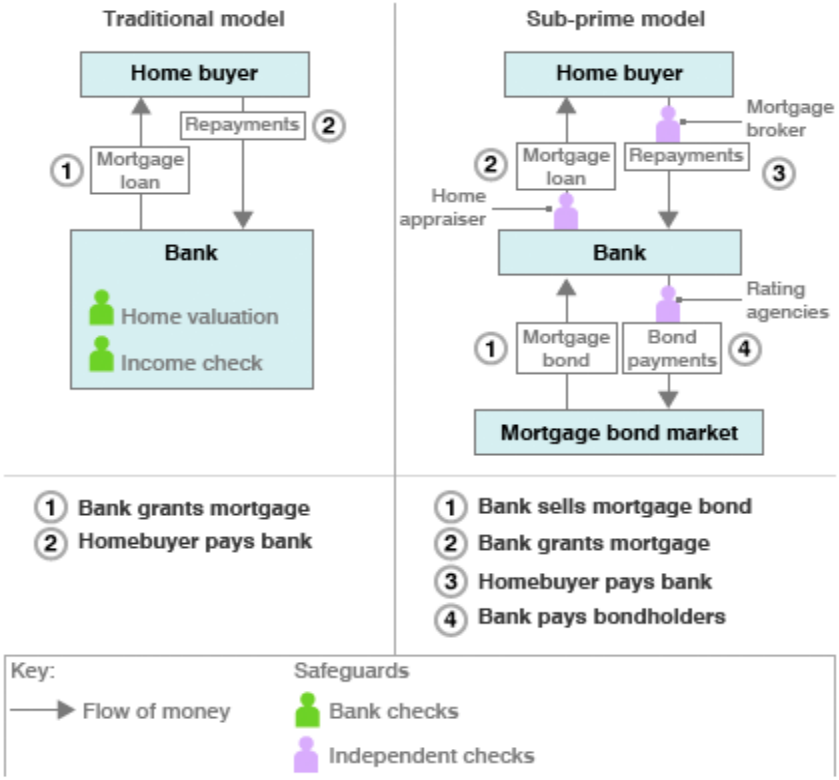
In the 1980s, when the number of enterprises increased rapidly, the bank said that the procedure for traditional loans were inefficient. Hence, they started applying credit scoring mechanism for customers. Each American citizen had a credit score from 300 to 850 to reflect the historical personal payment. There were three credit institutions to collect information on the payment profile of each customer. Banks took the average of the three organizations to determine the appropriate credit rating. Although the borrowers still had to make the papers on the income, career profiles, assets, but they were simple. Credit employees performed their lending decisions based on credit scores.

In the early years of the twenty-first century, when the explosion of housing prices became peak, the number of papers had been minimized to the lowest level. These loans were also known as "non-papers" because they were almost not guaranteed by any documentation. Credit scores became the sole criterion. If the credit score personal used of a low, took the form of loans subprime (This was a loan with a lower quality than standard loans, which were loans to complete the necessary paperwork). To offset the higher risk, these loans were high-interest loans. In other hand, there were borrowers of ARM interest rate loan with a lower initial interest rate. They were adjusted gradually to the higher levels.

The broker on compromise risk loans also required higher fees. Thus, the operation of the whole system was driven by a high volume of credit, low credit standards, higher interest rates and fees. Most lenders didn't realize that they were entering the trap. At the same time,

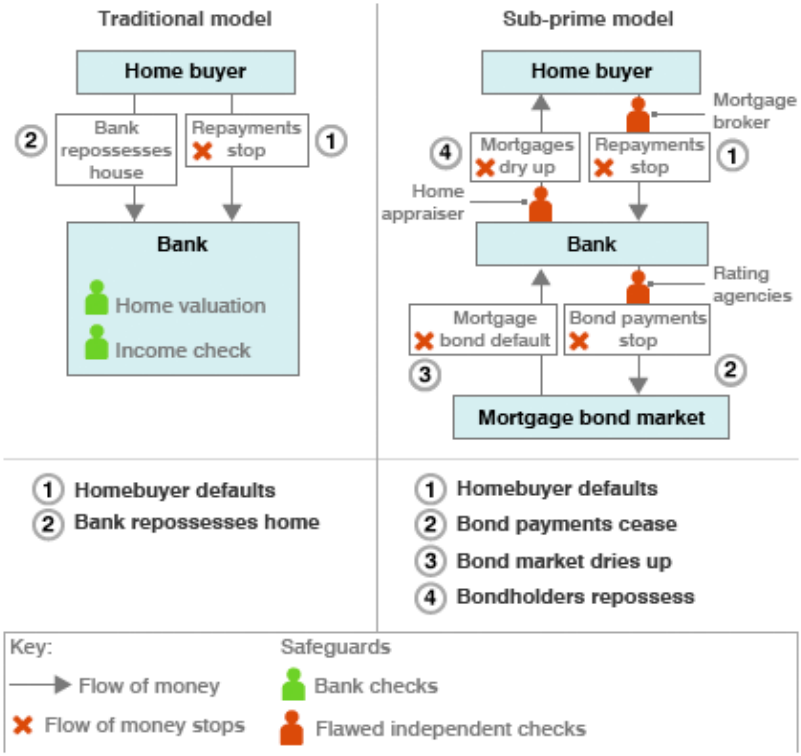
many borrowers took advantage of the easy lending environment for speculation. They did not buy a house to stay, but only way to keep a time and resell it to others to make a profit.

Figure 1 The new model of Mortgage Lending



Source: http://news.bbc.co.uk/2/hi/business/7073131.stm

Figure 2 How mortgage lending went wrong



Source: http://news.bbc.co.uk/2/hi/business/7073131.stm

3.3.1.3. Mystic power of Finance

The originate-and-hold model:

Traditionally, if home buyers earned $ 50,000 a year, the bank would lend $ 150,000. They required detailed proof of income, stable employment, credit history and current debt, with the information other related news. Bank enforced this principle because they wanted to guarantee that they would get their money back. The median home price ratio compared to the median income was below 3.5:1 until 2001. This was the "originate and hold" model of mortgage Lending. Banks applied loan for loyal customers then hold until the loan was repaid. Banks memo loans on the books collected monthly interest and principal payments. In the case of customer financial difficulties, they could go to the bank in order to avoid the extension of insolvency or seizure of property. The agreement was beneficial for both parties. Borrowers avoided losing their homes. However, this model was discarded in the 2000s. Banks also didn't want to become a landlord in any given situation because this was not their business model. Most of the banks sold part to determine their loan portfolio to National Mortgage Association Federation (Fannie Mae) or the Association of Government National

Mortgage (Ginnie Mae). These two agencies sponsored by the US government (GSE) and were responsible for increasing the liquidity of the mortgage market. By reselling this, banks may have more capital to lend more and thus met the government's aim to encourage people to own houses.

The originate-and distribute model:

In the 1990s, major financial instruments had emerged. Those were shares that guaranteed by mortgage loans (The Mortgage Backed Securities, MBS). A group of investment banks created financial instruments as proposed by FNMA.

Creating mechanisms of financial instruments were as follows: A large number of mortgage loans were combined and transferred to a financial management company. The banks used mortgage loans to secure the release of MBS. Each share valuable of MBS was issued a total cash generated by mortgage loans also known as the fund divided by the total number of shares issued MBS. Most of such mortgage loans were classified as good quality. And these securities were sold to investors worldwide.

The Collateral Mortgage Obligations, CMO:

MBS had caused the boom in the housing market when the debts had low liquidity in the balance sheet securitization banks to capital market transactions. Not only underestimating the historic importance of this invention, the other financial instruments like bonds "low" (junk bonds-type bonds with high risk and high profit margins) by Michael Milken in the 1980s, had also appeared.

When the number of mortgage loans were combined (packaged) or increased exponentially, many of these loans were subprime. Therefore, the total loan fund included quality components was not the same. There were parts of absolute safety such as few medium qualities, and the rest were filled with risks.

Meanwhile, investors in the market tended to accept the level of risk was not the same. Mutual funds, funds of salary (pension Funds) were only allowed to buy high-quality assets. The other investors which mainly hedge funds (hedge Funds) were allowed more flexible financing. Therefore, a fund mortgage loans were structured in bonds secured by mortgage loans with 3 different packages CMO:

- Superior package (The super tranche): This type was classified as AAA and the highest position in the order of priority to receive cash from mortgage payments.
- Intermediate Pack (The mezzanine tranche): This package had a lower credit score, located next to receive the payments.
- Property package (The equity tranche): This was the most high-risk packages and ranked last in the payment chain, after two packages above.

Due to the different risk levels, each package had a different rate of return. Property package was the highest risk, and the rate of return was the largest. In the opposite, super package (rate of return) was the lowest risk.

The Collateralized Debt Obligations, CDO:

CMO satisfied the investment needs of the investor group with the ability to withstand various risks. During the same period, "Financial engineering" became increasingly more complex and sophisticated. Along with the mortgage, security property group also included adding a large number of company loans, auto loans, credit cards, and even LBO debt. "Humanoid monster" (hybrid monster) were called bonds secured by secured creditors CDO. Its structure was extremely complex. The package was split by multiple payment standards. Each package had characteristics and different risks.

The structure of the new financial instruments was so complex that it was created not by experts but by banking group doctorate in mathematics, statistics, finance and science. This structured process was performed on the host computer during the holiday weekend.

3.3.1.4. Booming subprime crisis

The commercial banks and brokers subprime lending had made the loan early, and then these loans were given to the investment banks to convert into MBS, CMO, CDO.

The commercial bank was relieved when the asset was put outside the accounting balance sheets by selling loans. That way, they avoided the burden of holding required reserves under Basel I. The amount recouped banks can continue lending or investing. Some banks retained the right to dividend payment for mortgage securities, so it can reap the substantial service charges.

Most CMOs and CDOs were sold to hedge funds which were a kind of private investment tools cater to wealthy investors. Thanks to a team of sophisticated clients should hedge funds were not regulated too strict, they were not given the financial statements, and little was

known about their investment strategies. Customers of financial forms this strange spread across the globe, from Europe, Asia (especially China) and the Middle East.

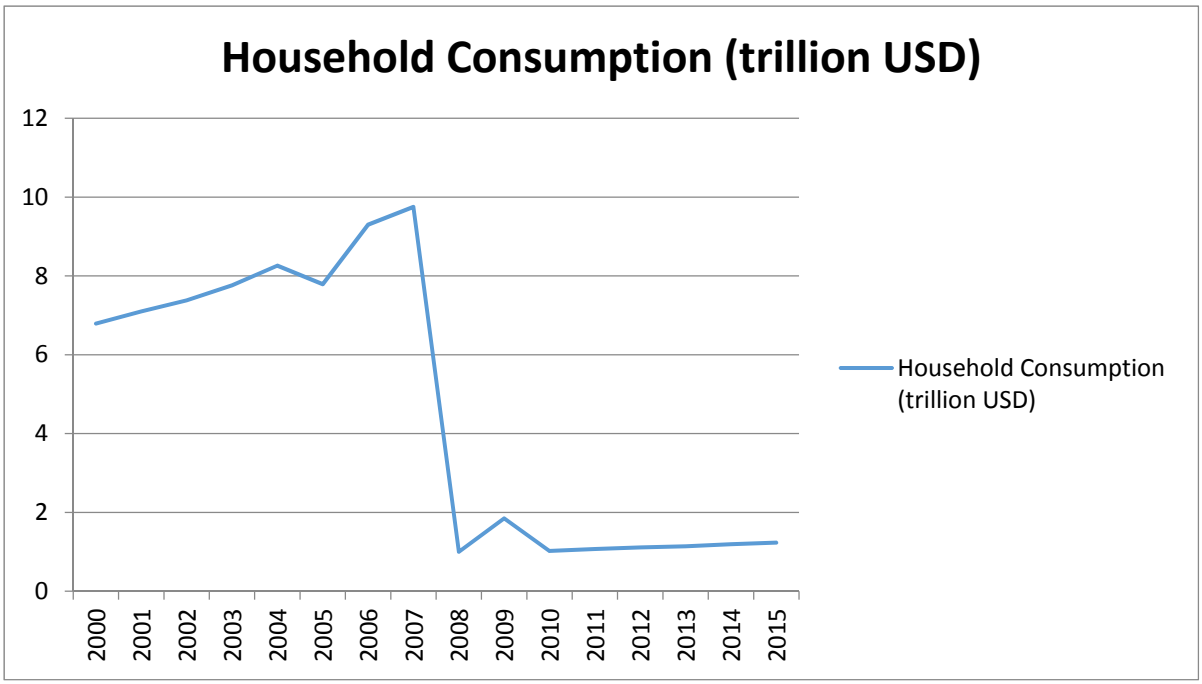
In 2007, Interest rate, GDP growth, and market performance have been freeze or even started to decline. The main cause of this situation is that tighter monetary policy pushed interest rates up. (As it shown in table 6)

Table 6 Household Consumption annual

Year	Household Consumption in trillion USD
2000	6.79
2001	7.1
2002	7.38
2003	7.76
2004	8.26
2005	7.79
2006	9.3
2007	9.75
2008	1.001
2009	1.85
2010	1.02
2011	1.07
2012	1.11
2013	1.14
2014	1.19
2015	1.23

Source: data.worldbank.org

Graph 4Household Consumption



As a rule of corporate finance, when market interest rates rise, the value of these securities would decline in fixed income. Because the portfolio of hedge funds included a large proportion of the CMO and CDO so their values were also falling. This caused investors to withdraw capital. Hedge funds became less liquidity and must suspend payment. Panics covered all markets. The value of this portfolio even further weakened.

The investment banking business noticed growing securitization volumes which were declined because new mortgage loans were declining. The bank itself also had major investments in mortgage-backed securities during the boom of the market with very attractive income. The decreasing in the value of the portfolio led to losses in the balance sheet of banks.

As the market became increasingly weakened, many organizations had tried to pull it up. But a rule of financial survival was not selling in a market that lacks liquidity. Lack of liquidity meant that there were little or no buyers. In the language of trade, the market was sparse (thin market). In a market so there would be very few transactions were made and the value of many securities markets would not be determined objectively. This was "breaking point" (breakdown) in the process of determining prices. The volatility and uncertainty of the process of determining the transaction would make the market froze and paralyzed.

Like in the game "music chairs", the music stops is the dangerous period. In 2007, the music stopped (or at least weaker) on the market. Doubts about the value of all the security should

begin to appear. Asset valuation process collapsed, and it disorientated while market performance was collapsed too.

3.3.2. Global imbalances

American families borrowed too much money and spending more than earned in a long time. They withdrew the own capital from house and expenditure to maintain living standards which even their income was also not stable. They were encouraged to do that because of low interest rates for a long time, nurturing bubble made them feel richer than reality.

In the years leading up to the crisis, the world economy depended heavily on unsustainable consumption of the US population. Filling gaps of demand in the world, United States were willing to borrow money from other countries with high interest rate.

The other hand, credit is transferred more in real estate and creating asset bubbles to attract more investment, more debt, and more risks. Irresponsible lenders also ready provided cash, and then sold the mortgage to banks on Wall Street. The money from securitization was taken.

The Financial Instability Hypothesis by Hyman Minsky described this process correctly. Minsky argued that the capital markets were not efficient, but would go through periods of euphoria when businesses and households increased borrowing to take advantage of investment opportunities. In the time of outbreak, they moved from financing hedging to sponsor "speculation". They can cover interest but still needed to have capital gains to liquidate debts. If the outbreak continued, many debts turned finance into the "Ponzi", mean that they have to borrow more by satisfying their needs. Minsky found that the process changed from insurance to speculation and then to Ponzi was promoted by financial creations. In 1980s, outstanding creativity was junk bonds and leveraged buyouts. In the 1990s, the rise of the mysterious derivatives led to the failure of the Long-term Capital Management Company and Enron Corporation. The creativities behind the crisis 2008 were CDO and CDS.

After the crisis ended, asset prices plummet. Ponzi’s borrowers cannot repay the debt. They transferred their property to the weakening market, underpriced faster, and lead to more bad loans. If the process "debt inflation" was serious enough, reducing asset prices would lead to bank failures, tightening credit and the overall recession, or Great Recession.

There is a method how to increase profitability in the low interest rate situation which is called collecting fee from CDO and other derivative instrument. The other method is to bet bigger. Loans increased to a certain level due to house price boom: when the net worth of households rose during the boom and lending activity also increased. But it is also the result of excess liquidity, funding more lending activity without raising interest rates.

Financial innovation also played a role. The bank set up special funds called the Structured Investment Vehicle (SIV) to hold assets like CDOs. These funds were outside the banking book, they were not official in the debt ratio of the bank. They were also designed to survive 364 days so that the credit limit was considered to be short-term and didn't increase the official rate of bank debt. Of the $3 trillion of stock market companies, banks provided about $1.1 trillion credit limit for SIV.

The tragedy took place. Banking profit increased from 2% in 1986 to 16% in 2006. The bank didn't have a better bet, but it was definitely bigger.

3.3.3. Inequality

As said, the Americans assumed the role of "consumers" after the financial crisis in East Asia. The developing countries in Asia and oil exports increased domestic savings rates and put money into foreign exchange reserve. US consumers reduced their savings and increased debt in order to maintain a high level of their expenditure. They loaned home and increase credit card debt, and they expected to have profits when housing prices rose.

But that was not the whole story. One of the reasons that American households borrowed too much to maintain high consumption due to their income was not increasing. Since the 1970s, income inequality in the US has increased dramatically. The median income remained the same, though the Americans work more hours than earlier stage (and double European workers). Meanwhile, the income of the top group increased by 60% while income of the richest Americans increased by 700% from 1980 to 2007. Salary rate between CEO and manufacturing workers is 16: 1 in Japan, 21: 1 in Sweden, 31: 1 in UK, and 44: 1 in the US. When inequality increased, the social movements also decreased: the descendants of Americans didn't have higher incomes than their parents with the descendants of Europeans.

Financial sector also contributed to income inequality. Between 1973 and 1985, the financial sector was never over 16% of total US trade profits. But in 1986, this figure rose to 19%, and in the 90s decade it was between 21 and 30%. Between 2000 and 2009 the proportion of finance in corporate profits was 41%. Profits were soared and helped bank executives to pay

generous salaries for themselves. Huge income also gave bankers the political power, and they used it to achieve loose policy for bank and financial.

Whether there was any further explanation about the rising inequality, the impact was still depending on debt to maintain the high standard of living. Banks and finance companies promoted this demand by reducing credit standards debt. Liquidity from savings generated in East Asia and oil producing countries transfer to the poor and Middle American class. More than a trillion dollar to be reborn from Asian savers for the subprime market in the US, that money served the poorer parts of society with a bad credit rating and repayment capacity was limited.

There were many poor families who are attractive by subprime market. They still can borrow money even if they didn't have income and no capital with low interest rates. It sounds like they had a good deal, but they did not mind that themselves didn't have enough income. The ability to repay debt was zero, and the game cannot continue when house prices stopped and began to decline. This subprime immediately aware of the problem: their debt exceeded the value of the house they bought.

In June 2009, there were 15.2 million mortgages. Total homes were foreclosed in 2010, and there were more than 3.8 million cases. 1.9 million Cases began to decline in 2011.

3.3.4. The complementary strategies and self-prophecy arising on financial markets

In order to make an investment succeed, it required each investor in financial market to predict the actions of other investors. George Soros found out ways how to guess the intentions of others as ''reflexivity''. Similarly, John Maynard Keynes compared the financial market as a beauty contest game in which each participant would try to predict the pattern that the other participants would arguably the most beautiful. In many cases, investors had an incentive to coordinate the selection of them. For example, if someone thought other investors bought USD because they forecast prices would rise, and so people were also motivated to buy USD. Economists called this as imitated strategic motives of others, or the other name was the Strategic complementarities. Economists also said that if people are motivated enough to do things similar that they expect others to do the same, so the self-fulfilling prophecies will occur. For example if investors expect USD to rise, this will make the USD appreciation, and if the depositors that the bank will go bankrupt, this will make the

bank insolvent. The issue of inflation in some country also had similar properties which they called inflation expectations.

3.3.5. Financial Leverage

Financial leverage means to borrow finance for investment. Financial leverage has also often been criticized as a factor contributing to the financial crisis. When investors used their money to invest, and then if loss in the worst case scenario, this person just lost his money only. But when borrowing to invest, the results can make potential income to rise but also losing more than what investors expected.

Therefore, financial leverage can amplify income but can also create risks bankruptcy. If bankruptcy occurs, it means that the company has failed to meet the promise and repay debts to other companies which mean that the financial troubles of the company can be spread to the other companies.

3.3.6. The incompatibility between asset and liability

Another factor that was believed to have contributed to the financial crisis is an incompatibility between the asset and liability. For example, commercial banks offer deposit accounts to withdraw money at any time such as family or business with long-term loans. The incompatibility between current liabilities and long term assets of banks was considered one of the reasons that the bank run occur (when depositors panic and decided to withdraw their money faster than banks consumers can recover the loan). For example, bank Bear Stearns had collapsed in 2007-2008 because it could not restructure short-term debt that was used for long-term investors in mortgage securities.

Standing at the national level, some governments in emerging economies for some reason or another were unable to sell bonds denominated in local currency. Instead they sold bonds denominated into foreign currencies. This can create the incompatibility between denominated foreign currencies of debt to asset, or earning income, or revenue tax by the currency. So the government will meet default risk national if rates have fluctuations in power or when reserves foreign currency weak.

3.3.7. Uncertainly and herd mentality

Many analyzes of the financial crisis had emphasized the role of investment mistakes caused by ignorance and imperfections in human argument. Kindleberger and Aliber (2003) have shown that crises often arise after the financial innovation and technical revolution. The

innovation enabled investors to find new investment opportunities was called "conversion" of the expectations of investors. Some examples such as Indonesia Balloons Company (Sea Bubble) and Mississippi Bubble in 1720 as a consequence of the creation of the stock company with the characteristics alien to many people at that time, or the collapse of financial markets in 1929 as a result of new inventions in transportation and electricity, the collapse of the dot-com bubble in 2001 due to "irrational exuberant nature" of the internet technology, the 2008 crisis were also the hallmark of the complex derivative securities swaps as credit risk (credit default swaps or CDS).

The strange of the financial innovations and techniques that can help explain why investors overestimated of property values. For example, some investors saw the potential of the internet should have invested in dot-com companies. The head profit is created due to the increase of dot-com share price. Other investors quickly jumped to find similar profits although these people had very limited information about the potential of dot-com companies. Herd mentality had made the share price increased from the beginning, and the fact that they had profit. Stock prices soared beyond the true potential that the industry could go up to a certain time and then the collapse was inevitable. Meanwhile, just a small number of investors recognized the problem and started selling it immediately. It caused a wave of sell-off and resulting in the collapse of the market.

3.3.8. Failure to regulate

The government tried to eliminate or mitigate financial crises by regulation for financial sector. A major aim of the regulation was to increase transparency: forcing financial institutions declare financial reports regularly and in accordance with accounting standards. Another objective of the regulation was to ensure that financial institutions had sufficient assets to meet its financial obligations under the contract, such as reserve requirements, capital requirements, and other limits of debt.

Some financial crisis broke out due to lack of an effective regulatory system. For example, according to former IMF Managing Director, Dominique Strauss-Kahn, the 2008 crisis broke out due to "the failure of the regulatory system to against acts of excessive risk in the financial system, especially in the US''. The New York Times argued that the lack of regulation for Credit Default Swap contracts (CDS) was a cause of the crisis. However, sometimes the excessive regulation can be also criticized as a cause of the financial crisis. Such as Basel II often criticized because of requiring banks raised equity capital when risk

increased, but this could force banks to drop lending when borrowers cannot raise equity, but its consequences may be the financial crisis.

3.3.9. Deceive

Deceive plays an important role in the collapse some financial institutions. For example, many companies absorb investment with false promises about investment opportunities, or cover up the results of his actual income. For example, Charles Ponzi plan in Boston in the early 20th century, the collapse of the MMM investment fund in Russia in 1994, the collapse of Madoff Investment Securities in 2008.

Deceive in the real estate financing mortgages had also been criticized as a possibility to cause the subprime credit crisis in 2008. Government officials revealed on 23.Dec.2008 that the FBI was looking for evidence of the ability of deceived of some real estate company as Fannie Mae, Freddie Mac, Lehman Brothers, and AIG Insurance Corporation. Similarly, it was thought that many financial companies went bankrupt during the crisis due to their directors cannot (or do not want to) perform the tasks entrusted.

3.4. Minsky's Theory

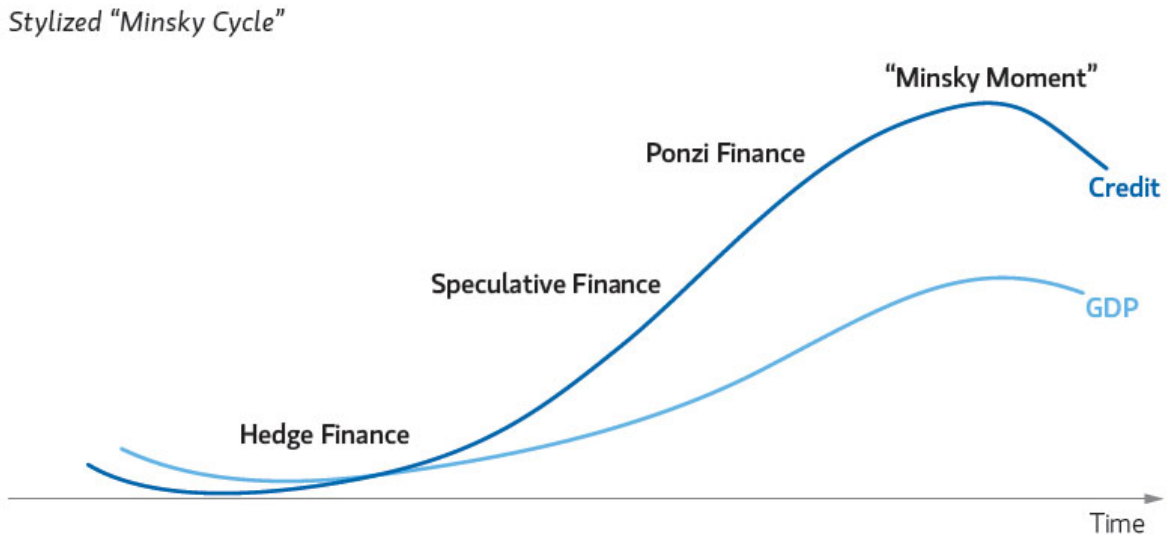
Hyman Minsky (1919 - 1996), a Keynesian, he was known for the financial instability hypothesis. According to Minsky, there is a moment at which the financial system moves from stable to crisis (or called the Minsky moment). In other hand, Minsky moment is when investors are forced to sell the best assets to repay debt, leading to a sharp decline in financial markets. In any cycle of business or credit, Minsky moment is the moment at which investors have cash flow difficulties caused by the financial investments with high risk.

According to Minsky, vulnerability is a fundamental characteristic of any capitalist economy does. The higher vulnerability will lead to the risk of financial crisis quickly. Minsky split the financing method of the business into 3 sections with the different risk levels, which is ''hedge finance'', ''speculative finance'', and ''Ponzi finance''. In this case, Ponzi finance makes the financial system become the most vulnerable.

- For ''Hedge finance'', income stream was expected to solve the financial obligations in all cases, including both principal and interest.
- For ''Speculative finance'', income stream was expected only to pay interest, it was not able to repay the principal.

- For Ponzi finance, income could not even pay the interest, so companies had to borrow more or sell assets simply to pay debts. Just hope that the price of assets or income would increase at a level sufficient to pay principal and interest.

Figure 3 Stylized 'Minsky Cycle'



Source: https://economicsociology.org/2015/08/24/chinas-minsky-moment-stability-leads-to-instability/

After the recession, the lost company would choose the defense way. When the economy began to rebound, and profits began to rise, companies tend to believe that they can participate in activities speculative nature. But they also knew that the profit was not always enough to cover the interest. However, these companies still believed that profits would increase, and the debt would be repaid easily without any difficulty. Borrowing more would make investment increase and after that there was an economic growth. And then lenders also believe that they would easily recover debts without any significant obstacles. Therefore, creditors began to strengthen lending to businesses without any guarantee of success. The banks also knew that businesses would have difficulty to repay. However, the banks believed that enterprises would be able to refinance when their return was expected to rise. This was form of Ponzi finance. In this way, the economy already contained too much credit risk. Banks began to understand the real risks in the economy, or restricted, or stopped lending to easy terms. Refinancing became impossible for many insolvent businesses. If there was not enough money flowing into the economy to help this refinance process continues, a real

economic crisis would start. During the crisis, companies began to return to defense plans, and the economic cycle closed.

3.5. The impact of Crisis

3.5.1. For United States

The crisis had put the United States to enter a worst period in history since the Great Depression 1930s. Series top banks in the world such as Lehman, Merrill Lynch etc declared bankruptcy or sold to government pushed the US economy into hunger credit.

In 2009, the US economy experienced negative growth of 2.76% which was the lowest since 1946. Credit hunger affecting production area made enterprises to narrow production and lay off workers to reduce input import contracts. The unemployment rate created negative impact on income, household spending reduces lead to enterprises cannot sell goods, after that the general prices of the economy dropped steadily, leading to high inflation.

The crisis had made the leading industry of automotive industry with the events of three bankrupt famous cars is General Motors (GM), Ford Motor, and Chrysler in United States. Business situation became worse. In Feb 2008, GM announced that the company lost 38.7 billion dollars. Ford lost business in 2007. It was 2.723 billion dollars. Despite receiving government loans, but these companies still turn declared bankrupt

.

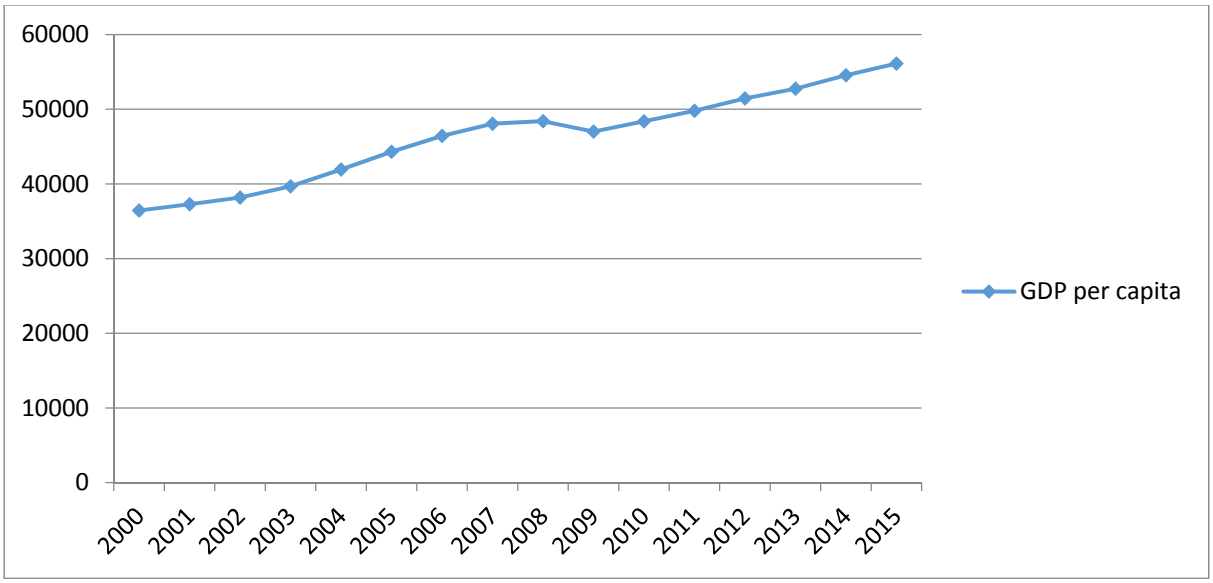
Table 7 GDP, GDP per capita, and GDP Growth

Year	GDP in trillion USD	GDP per capital	GDP growth annual %
2000	1.03	36449.86	4.09
2001	1.06	37273.62	0.97
2002	1.09	38166.04	1.79
2003	1.15	39677.2	2.81
2004	1.22	41921.81	3.79
2005	1.3	44307.92	3.35
2006	1.38	46437.92	2.67
2007	1.44	48061.54	1.79
2008	1.47	48401.43	-0.29
2009	1.44	47001.56	-2.76
2010	1.49	48374.09	2.53
2011	1.55	49781.8	1.6
2012	1.61	51433.05	2.22
2013	1.66	52749.91	1.68
2014	1.73	54539.67	2.37
2015	1.8	56115.72	2.6

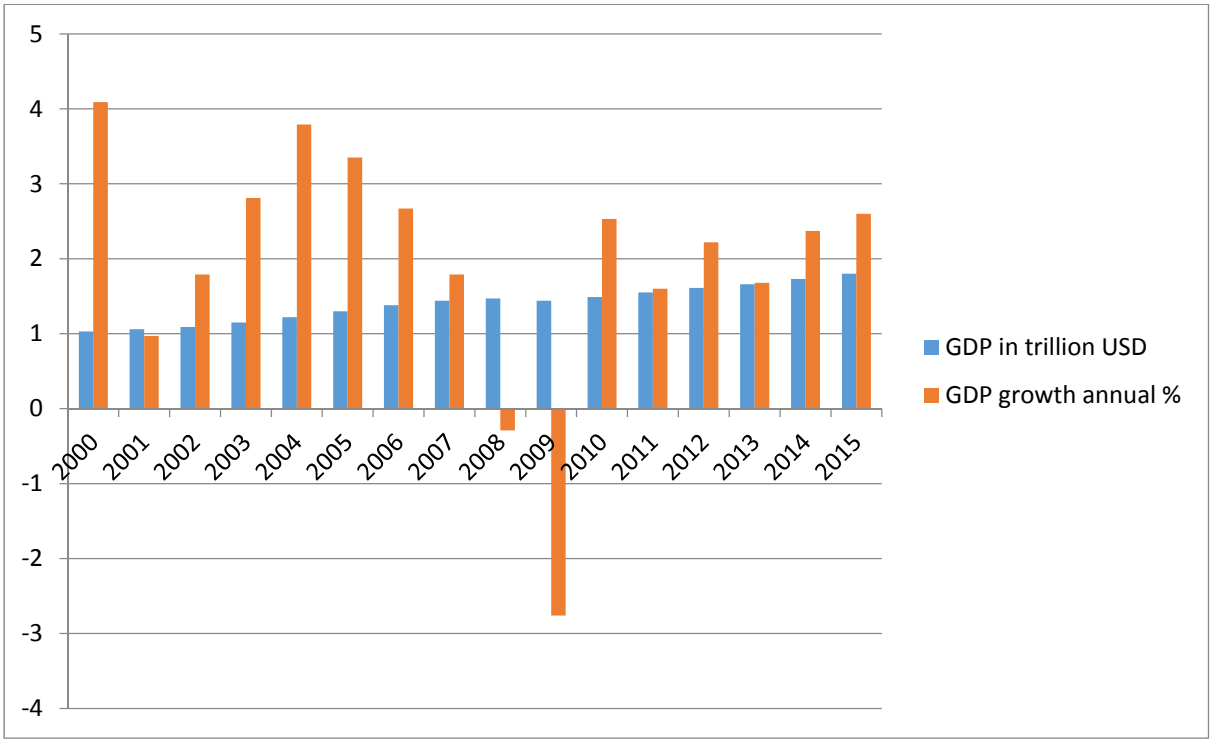
Source: data.worldbank.org

From 2001 to 2008, the US economy can be divided into two phases. Since 2001 - 2004, the US economy achieved high growth rate annually, means that next year higher than last year and peaked in 2004 with GDP growth reaching 3.79%. However, the period since 2005-2008, the US economy goes against previous periods, i.e. GDP decreases with each year and become lowest rate at -2.76% in 2009.

Graph 5 GDP per Capita



Graph 6 GDP and GDP Growth



Since 2001-2006, GDP per capita in the US increased rapidly, but was dropped in the period 2007-2009 due to the financial crisis in this country. Starting in 2010, the US has implemented policies aimed at developing the country stabilized again.

3.5.2. For the World

The United States was an important export market for many countries, so when the economic downturn, the export of many heavily affected countries, especially in East Asia. Japan, Taiwan, Singapore and Hong Kong fell into recession, other economies are slowing growth.

Europe which had intimately economic relations with the United States severely impacted both financially and economically. Many financial institutions went bankrupt to the extent of becoming the financial crisis in some countries such as Iceland, Russia. Germany and Italy fell into recession. UK, France, and Spain were reduced growth. Official euro zone fell into economic recession first since its founding.

Latin America also negatively affected when the short-term capital flows that were removed from the area and oil prices fell sharply at the same time. Ecuador stood on the brink of a debt crisis.

The cost for remedial world in this crisis was 11900 billion dollars according to the International Monetary Fund (IMF). That meant that if the crisis did not happen at that time the average person would have 1799 dollars in 6.7 billion populations in the world.

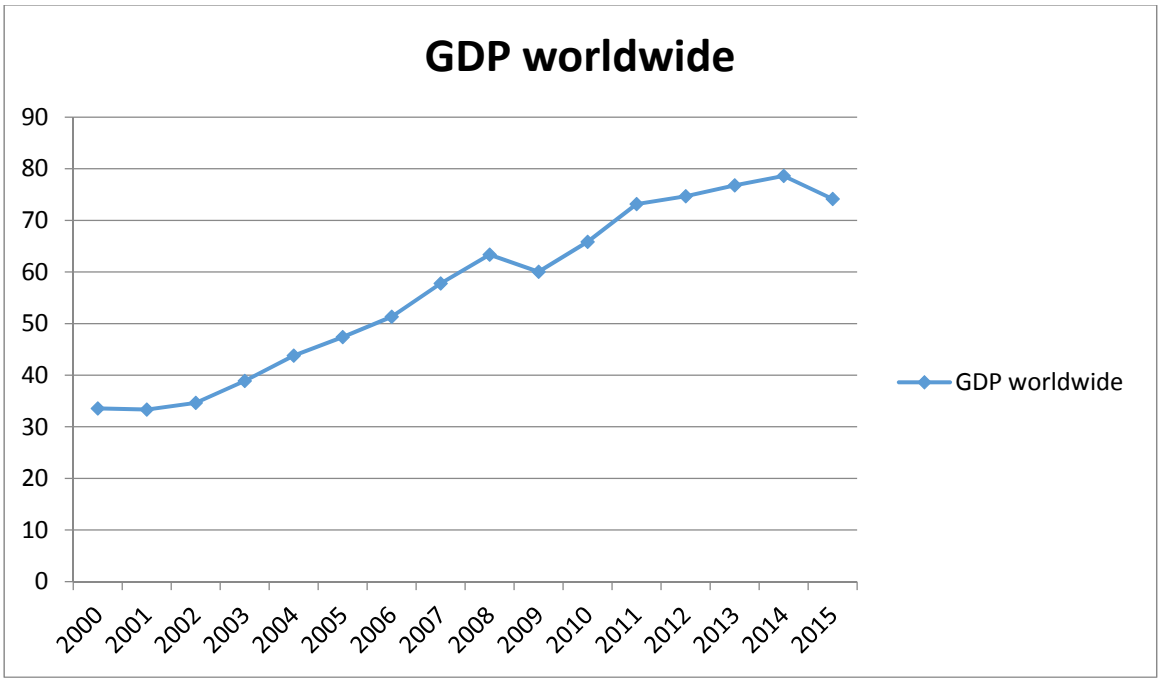
Table 8 GDP of Worldwide

Year	GDP of worldwide (trillion USD)
2000	33.55
2001	33.34
2002	34.62
2003	38.88
2004	43.78
2005	47.39
2006	51.31
2007	57.76
2008	63.35
2009	60.04
2010	65.85
2011	73.17
2012	74.68
2013	76.78
2014	78.63
2015	74.15

Source: data.worldbank.org

From 2000-2008 the GDP of worldwide had been growing, meanwhile in 2009 it was dropped because of economic crisis appeared in 2008. After the revolution of crisis, the GDP started to grow again.

Graph 7 GDP worldwide



3.6. The solution to deal with crisis

3.6.1. Federal Reserve

As soon as the housing credit crisis erupted, the Federal Reserve began to intervene by lowering interest rates and increased to purchase MBS. Until the development of the financial crisis of August 2007, the Federal Reserve had continued to conduct monetary easing measures to boost liquidity for financial institutions. Specifically, the lending rates of banks fell from 5.25% to 2% only in less than 8 months (18.Sept.2007-30.Apr.2008). This interest continued to be reducing and only 0.25% to date 16.Dec.2008.

The Federal Reserve also conducted mortgage lending to financial institutions in the amount up to 1.6 trillion dollars on Nov 2008.

3.6.2. Government

The US government had proposed a plan to support the housing market. Specifically: the housing mortgage lending required three conditions: First, the credit risk was acceptable; Second, there were loans incurred from 01.Jan.2005 to 31.Jul.2007; Third was proven that they were living in their homes and if the interest rate was adjusted higher than they would have no ability to pay the debts, then they would be use to a fixed interest rate in 5 years.

The US Treasury and the Federal Reserve also issued new rules more closely monitor for lending companies in the areas of housing, and set standards sticker for lending.

Besides, President Obama had been approved that the US Congress used the 800 billion dollars to rescue the US economy. The first was to create the confidence of the people in the monetary system. Second was to prevent unemployment rising. Third was to stimulate market demand and increasing supply in order to create jobs for people.

4. Practical Part

The following table is the main data used for correlation matrix, regression analyze, forecast. (In trillion USD)

Year	GDP	GDP per capita	GDP growth annual %	Agriculture Sector	Industry sector	Real interest rate (%)	Import	Export	Household consumption
2000	1.03	36449.86	4.09	1.18	2.3	6.8	1.45	1.08	6.79
2001	1.06	37273.62	0.97	1.19	2.27	4.53	1.37	1.005	7.1
2002	1.09	38166.04	1.79	1.06	2.25	3.09	1.4	0.98	7.38
2003	1.15	39677.2	2.81	1.3	2.38	2.08	1.51	1.02	7.76
2004	1.22	41921.81	3.79	1.53	2.57	1.54	1.77	1.16	8.26
2005	1.3	44307.92	3.35	1.49	2.77	2.87	2	1.29	7.79
2006	1.38	46437.92	2.67	1.41	2.99	4.73	2.22	1.46	9.3
2007	1.44	48061.54	1.78	1.52	3.1	5.24	2.36	1.65	9.75
2008	1.47	48401.43	-0.29	1.64	3.08	3.06	2.55	1.84	1.001
2009	1.44	47001.56	-2.76	1.57	2.82	2.47	1.966	1.58	1.85
2010	1.49	48374.09	2.53	1.7	2.95	2	2.35	1.85	1.02
2011	1.55	49781.8	1.6	2.05	3.1	1.16	2.68	2.13	1.07
2012	1.61	51433.05	2.22	1.94	3.2	1.38	2.75	2.22	1.11
2013	1.66	52749.91	1.68	2.34	3.3	1.6	2.76	2.28	1.14
2014	1.73	54539.67	2.37	2.2	3.4	1.43	2.85	2.34	1.19

Source: Combine of table 1 2 3 4 6 7

4.1. Correlation Matrix Analysis

Table 9 Correlation matrix

	GDP	GDP per capita	GDP growth	AS	*IS*	RR	I	E	HC
GDP	1								
GDP per capita	**0.997635**	1							
GDP growth	-0.25461	-0.24159	1						
AS	**0.925694**	**0.911076**	-0.10799	1					
IS	**0.975985**	**0.985946**	-0.18324	**0.881589**	1				
RR	-0.57411	-0.55154	0.137857	-0.65129	-0.43437	1			
I	**0.971851**	**0.975713**	-0.1478	**0.905368**	**0.984336**	-0.4895	1		
E	**0.97097**	**0.958892**	-0.21035	**0.942775**	**0.942054**	-0.52981	**0.969806**	1	
HC	**-0.7129**	**-0.67248**	0.434396	**-0.73731**	-0.5949	0.600134	**-0.66982**	**-0.78942**	1

AS- Agriculture Sector

IS- Industry Sector

RR- Real Interest Rate

I- Import

E- Export

HC- Household Consumption

Source: Own Processing from Excel

Table 10 P-value of Correlation Matrix

	GDP	GDP per capita	GDP growth	AS	*IS*	RR	I	E	HC
GDP	1								
GDP per capita	**0.000001**	1							
GDP growth	0.38	0.406	1						
AS	**0.000002**	**0.000005**	0.7135	1					
IS	**0.000001**	**0.000001**	0.5307	**0.00003**	1				
RR	0.0317	0.0409	0.6385	0.0116	0.1207	1			
I	**0.00000001**	**0.000001**	0.6140	**0.000008**	**0.000001**	0.0756	1		
E	**0.00000001**	**0.00000006**	0.4705	**0.0000004**	**0.0000004**	0.051	**0.00000001**	1	
HC	**0.0042**	**0.0084**	0.1207	**0.0026**	0.0248	0.023	**0.0087**	**0.00078**	1

AS- Agriculture Sector

IS- Industry Sector

RR- Real Interest Rate

I- Import

E- Export

HC- Household Consumption

Source: Own Processing computed from http://danielsoper.com/statcalc/related.aspx?id=44

4.2. Regression Analysis (Ordinary Least Square Method)

Dependent variable (Y) = GDP

Independent variables:

X1 = GDP per capita

X2 = GDP growth %

X3 = Agriculture sector

X4 = Industry sector

X5 = Real interest rate %

X6 = Import

X7 = Export

X8 = Household consumption

Table 11 Regression Analysis

Model 1: OLS, using observations 2000-2014 (T = 15)				
Dependent variable: GDP in trillion USD				
	coefficient	std. error	t-ratio	p-value
constant	−0.258579	0.040695	−6.354	0.0007 ***
GDP per capita	3.13E-05	6.35E-06	4.927	0.0026 ***
GDP growth annual	0.000649	0.000935	0.6942	0.5135
Agriculture sector	−0.0199252	0.019682	−1.012	0.3504
Industry sector	0.106496	0.122712	0.8679	0.4188
Real interest rate	−0.00583214	0.004113	−1.418	0.206
Import	−0.123318	0.050059	−2.463	0.0489 **
Export	0.137793	0.037292	3.695	0.0101 **
Household consumption	−0.00114574	0.000921	−1.244	0.2599
Mean dependent variable	1.374667	S.D. dependent variable	0.224177	
Sum squared residual	0.000084	S.E. of regression	0.003743	
R-squared	0.999881	Adjusted R-squared	0.999721	
F(8, 6)	6278.132	P-value(F)	3.41E-11	
Log-likelihood	69.40789	Akaike criterion	−120.8158	
Schwarz criterion	−114.4433	Hannan-Quinn	−120.8837	
rho	−0.347782	Durbin-Watson	2.684282	

Source: Own Processing from Gretl

4.3. Forecast of GDP and GDP growth of 2016-2020

Table 12 Forecast of GDP and GDP Growth

Year	GDP in trillion USD	GDP per capita	GDP growth annual %
2000	1.03	36449.86	4.09
2001	1.06	37273.62	0.97
2002	1.09	38166.04	1.79
2003	1.15	39677.2	2.81
2004	1.22	41921.81	3.79
2005	1.3	44307.92	3.35
2006	1.38	46437.92	2.67
2007	1.44	48061.54	1.78
2008	1.47	48401.43	-0.29
2009	1.44	47001.56	-2.76
2010	1.49	48374.09	2.53
2011	1.55	49781.8	1.6
2012	1.61	51433.05	2.22
2013	1.66	52749.91	1.68
2014	1.73	54539.67	2.37
2015	1.8	56115.72	2.6
2016	1.828	57081.48825	1.34425
2017	1.879	58302.01081	1.5138125
2018	1.9273	59435.43731	1.326409375
2019	1.9717	60460.37366	1.201560156
2020	2.0152675	61436.48317	1.210088398

Source: Own Processing from Excel

5. Result and Conclusion

5.1. Result

Due to the result of correlation matrix from table ... compare to two tailed probability or p value of 0.01

- The correlation between export GDP and GDP per capita is at rate of 0.9976, which is 99% statistical significant.
- The correlation between Agriculture sector and GDP is at rate of 0.9256, which is 99% statistical significant.
- The correlation between Agriculture sector and GDP per capita is at rate of 0.911, which is 99% statistical significant.
- The correlation between Industry sector and GDP is at rate of 0.975, which is 99% statistical significant.
- The correlation between Industry sector and GDP per capita is at rate of 0.9859, which is 99% statistical significant.
- The correlation between Industry sector and GDP per capita is at rate of 0.9859, which is 99% statistical significant.
- The correlation between Import and GDP is at rate of 0.971, which is 99% statistical significant.
- The correlation between Import and GDP per capita is at rate of 0.975, which is 99% statistical significant.
- The correlation between Import and Agriculture sector is at rate of 0.905, which is 99% statistical significant.
- The correlation between Import and Industry sector is at rate of 0.984, which is 99% statistical significant.
- The correlation between Export and GDP is at rate of 0.97, which is 99% statistical significant.
- The correlation between Export and GDP per capita is at rate of 0.958, which is 99% statistical significant.
- The correlation between Export and Agriculture sector is at rate of 0.9427, which is 99% statistical significant.
- The correlation between Export and Industry sector is at rate of 0.9420, which is 99% statistical significant.

- The correlation between Export and Import is at rate of 0.969, which is 99% statistical significant.
- The correlation between Household consumption and GDP is at rate of -0.712, which is 99% statistical significant.
- The correlation between Household consumption and GDP per capita is at rate of -0.672, which is 99% statistical significant.
- The correlation between Household consumption and Agriculture sector is at rate of -0.737, which is 99% statistical significant.
- The correlation between Household consumption and Import is at rate of -0.669, which is 99% statistical significant.
- The correlation between Household consumption and Export is at rate of -0.789, which is 99% statistical significant.

According to another result of table regression analysis

$Y = -0.2585 + 3.13E\text{-}05X1 + 0.00065X2 - 0.02X3 + 0.106X4 - 0.005X5 - 0.123X6 + 0.137X7 - 0.001X8$

P-value is 0.10. If any independent variables are below 0.1, they are significant, if they are above 0.1, they are not significant. Base on the result of regression, there are constant and 3 independent variables which are GDP per capita, import, and export are significant while the others are not. Goodness of fit $R^2 = 0.9998$ and Adjusted $R^2 = 0.9997$.

So we are 90% confident that

- If X1 (GDP per capita) increases by 1USD, GDP increases by 3.13E-05 trillion USD.
- If X2 (GDP growth annual) increase by 1 percent, GDP increases by 0.0006 trillion USD
- If X3 (Agriculture sector) increase by 1trillion USD, GDP decreases by -0.02 trillion USD.
- If X4 (Industry sector) increase by 1 trillion USD, GDP increases by 0.106 trillion USD.
- If X5 (real interest rate) increase by 1 percent, GDP decreases by 0.005 trillion USD.
- If X6 (import) increase by 1 trillion USD, GDP decreases by 0.123 trillion USD.
- If X7 (export) increase by 1 trillion USD, GDP increases by 0.137 trillion USD.

- If X8 (household consumption) increase by 1 trillion USD, GDP decreases by 0.001 trillion.
- If X1, X2, X3, X4, X5, X6, X7, X8 are zero, GDP decreases by 0.2585 trillion USD.

Base on the result shown above:

- GDP per capita had a positive influence on GDP in the whole period from 2000-2015 in the US is proved.
- GDP growth in percentage had a positive influence on GDP in the whole period from 2000-2015 in the US is proved.
- Agriculture sector had a negative influence on GDP in the whole period from 2000-2015 in the US is proved.
- Industry sector had a positive influence on GDP in the whole period from 2000-2015 in the US is proved.
- Real interest rate had a negative influence on GDP in the whole period from 2000-2015 in the US is proved.
- Import had a negative influence on GDP in the whole period from 2000-2015 in the US is proved.
- Export had a positive influence on GDP in the whole period from 2000-2015 in the US is proved.
- Household consumption had a negative influence on GDP in the whole period from 2000-2015 in the US is proved.

According to the table Forecast of GDP and GDP growth above

- In 2016, GDP is increasing gradually 1.8 in 2015 to 1.828 trillion USD. While GDP per capita is increasing 56115.72 in 2015 to 57081.48 USD in 2016. But GDP growth has signaled go down from 2.6% in 2015 to 1.34% in 2016.
- In 2017, GDP is increasing gradually 1.828 in 2016 to 1.879 trillion USD. While GDP per capita is increasing 57081.48 in 2016 to 58302.01 USD in 2017. And GDP growth has signaled go up from 1.34% in 2016 to 1.513% in 2017.
- In 2018, GDP is increasing gradually 1.879 in 2017 to 1.927 trillion USD. While GDP per capita is increasing 58302.01 in 2017 to 59435.43 USD in 2018. But GDP growth has signaled go down from 1.51% in 2017 to 1.32% in 2018.

5.2. Conclusion

The main goal of this thesis was to analysis of financial crisis in the US 2007-2008, to find out and show how dependency of all the factors with GDP from 2000-2015 by using documents such as abstraction, synthesis, deduction and induction. The second objective is to forecast on GDP, GDP per capita, and GDP growth annually from 2016-2020. This objective is designed to predict about the future of US Economics. The literature review was written based on the famous bibliography and have the figures for specific explanation.

For practical part, secondary data and Regression model analysis are used to fulfill the first objective and give the answer to hypothesis on GDP for the whole period of 2000-2015. Correlation matrix analysis is conducted to evaluate how strongly all the data (GDP, GDP per capita, GDP growth annual, Agriculture sector, Industry sector, Real interest rate, Import, Export, and Household consumption) correlated in the whole period from 2000-2015. Prediction in the future of GDP in the US from 2016-2020 solved in excel.

Nearly 10 years already that economic crisis was solved. The banks 'system has been working normally. Business starts to grow, and GDP is increasing. This is the positive impact in the future while more economists have been taking good care of economical situation. The financial crisis of 2007-2008 will be a lesson and also valuable experiences for the United States in improving and developing financial markets in this country.

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