AMERICAN UNIVERSITY OF BEIRUT

UNITED STATES MONETARY POLICY: A FORTY YEARS ANALYSIS 1970 - 2012

by
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AN ABSTRACT OF THE THESIS OF

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Analyzing United States economy is not only about a single country; it is about seeing the effects and the interactions that every single macroeconomic movement of the world's largest economy can be spread to every nation. The economic steps taken by the most important financial center, with the world predominant currency and the second most important trade center need to be taken into consideration by every economy. U.S. like every other economy, experienced several periods of instability and recessions, the first and most memorable one until 2008 was the stock market crash in 1929 known as the great depression. Although still occupying the higher place in the economic podium, the hegemony of U.S. is being gradually reduced especially after the Sub-prime crisis in 2008 and the emergence of new economic global players like Japan and China, with an important contribution to the world growth. Yet, Fed's permanent goal is to sustain economic growth in the United States, and the U.S. monetary policy is the most important tool used to achieve it. However, it is normal to question monetary operations during tragic developments of the economy: several discussions about the Fed's operations were raised, especially after the Dot-Com and the Sub-Prime crisis. This thesis mainly aims to analyze U.S. monetary policy for the past forty years. It will depict three different periods following the macroeconomic environment of instability and recessions that United States experienced from 1970 to 2012. Chapter I give a general introduction of the thesis topic. Chapter II provides a literature review of U.S. monetary policy and its evolution the past 40 years. In Chapter III, we will briefly explain the history and importance of money and talk about the transmission mechanisms of Monetary Policy. Recent and current stance of monetary policies will be discoursed while focusing on the Federal Reserve roles and proposals in the last forty years. Information about recent crisis will be provided and the monetary policies applied at that time. Also a comparative analysis that will be conducted between Fed's actions implemented during the years of the Dot-com bubble and Fed's adopted policies. In Chapter IV, in an attempt to statistically estimate the impact of the real GDP and nominal interest rates on the U.S. Monetary policy, this chapter will describe the methodology and the data used for the empirical analysis. It will depict a statistical analysis of the data and will thereafter provide an empirical analysis of an econometric model relative to the three periods will be executed to know the degree of stability, the target and the goal of U.S monetary policy during those periods. Finally, chapter VI concludes the thesis with the Fed performance review; analyze growth, employment, prices and interest rates in the United States.

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INTRODUCTION

On December 23, 1913 the Federal Reserve System was created in response to a series of financial crisis most notably the 1907 sever panic that knocked the United States economy. Since then the Fed authorities and roles have been expanded to face economic crises and challenges. Nowadays its responsibilities include conducting the nation's Monetary Policy, directing and regulating banking institutions, stabilizing the financial system and providing financial services to depository institutions, the U.S. government, and foreign official institutions.

The Fed consists of the Board of Governors in Washington, D.C., and twelve Federal Reserve District Banks and it is independent within the government. To control its economy and be liberated from politics the U.S. government placed the Federal Reserve in charge of "Monetary Policy".

Monetary Policy is the measurements taken by the Central Bank (The Fed) to achieve national economic goals. Two basic strategies of monetary policy are usually applied; Expansionary and Contractionary policies. Expansionary Policy is a macroeconomic policy that seeks to expand the money supply to encourage economic growth. The U.S. Federal Reserve employs expansionary policies whenever it lowers the benchmark fed funds rate or discount rate or when it buys Treasury bonds on the open market, thereby adding capital directly into the economy. Contractionary Policy is used to slow down the economy. The U.S. Federal Reserve employs contractionary policies to

reduce the money supply and ultimately the spending by increasing interest rates, increasing banks' reserve requirements or by reducing money supply.

Three key objectives for monetary policy in the Federal Reserve Act are maximum employment, stable prices, and moderate interest rates.

Since the Fed can't control prices or affect employment directly; instead, it affects them indirectly, primarily by raising or lowering interest rate and that is called the "federal funds" rate. Usually, it does this through open market operations in the market for bank reserves, identified as the federal funds market.

Three main tools are used to affect the economy: *Open Market Operations*, *the Discount Rate* and *Reserve Requirements*. The Federal Open Market Committee (FOMC) is responsible for implementing open market operations, while the Board of Governors manages the discount rate and reserve requirements.

The *Open Market Operations* is the process of buying or selling of bonds by the Federal Reserve in the open market (the Fed's predominant policy tool). If we have an expansionary policy, the Fed buys bonds (gives banks new reserves) and with a contractionary one, the Fed sells bonds (drains reserves from banks). Moreover *the Discount Rate* is the rate of interest charged to banks that borrow from the Federal Reserve. If we have an expansionary policy, the Fed lowers discount rate and with a contractionary one Fed raises discount rate.

Additionally *Reserve Requirements* is a tool designed to change the minimum amount of reserves the bank must hold. If we have an expansionary Policy, Fed lowers the reserve ratio and with a contractionary one, Fed raises the reserve ratio.

This thesis mainly aims to analyze the United States Monetary Policy for the past forty years. In order to understand how the monetary policy has been conducted during these years to maintain the position of a nation that can affect the world. It will depict three different periods following the macroeconomic environment of instability and recessions that U.S. experienced from 1970 to 2012.

A literature review of U.S. Monetary Policies, its evolution the past 40 years, its crucial effects and influences not only on the degree of liquidity in the system, but also on the general equilibrium of the economy will be provided. The history of the U.S banking system will be briefly discussed (1970 – 2012).

Recent and current stance of monetary policies will be discoursed while focusing on the Federal Reserve roles and proposals in the last forty years. Information about recent crisis will be provided and the monetary policies applied at that time.

A comparative analysis will be conducted between Fed's actions implemented during the years of the Dot-com bubble and Fed's adopted policies in tackling the Sub-prime crisis exists in order to highlight Fed's meaningful developments and undertaking direction and to have a better understanding on how the future will look like.
Then the thesis sheds light on how the Fed executes Monetary Policy in addition to a small comparison between monetary and fiscal policy.

Also an Econometric model relative to the three periods: 1970 to 1986, 1987 to 2000 and the last period from 2000 to 2012, will be executed to know the degree of stability, the target and the goal of U.S monetary policy during those periods.

Finally, the thesis concludes with the Fed performance review, and an economic prediction on the long and short run will analyze growth, employment, prices and interest rates in the United States.

CHAPTER II

LITERATURE REVIEW

A. Theoretical Background (1970 – 2012)

In the last 40 years, Paul Samuelson and Robert Solow (1960) estimated that inflation of 4-5% would be needed to bring the unemployment rate down to 3% in subsequent years but cautioned that this relationship might change over time. The early 1970 fall down of the Bretton Woods system allowed monetary authorities to attach a higher weight to the level of domestic economic activity relative to price stability under floating exchange rate frameworks. The resulting tolerance of higher inflation against the background of the 1973 oil embargo on the United States, led to a period of elevated inflation and high unemployment, also dubbed "The Great Inflation" (Mishkin (2006)). The high inflation reality was reflected in the academic work of Robert Lucas who said: "[…] given that the structure of an econometric model consists of optimal decision rules of economic agents, and that optimal decision rules vary systematically with changes in the structure of series relevant to the decision maker, it follows that any change in policy will systematically alter the structure of econometric models" (Lucas (1976)).

Later on, Kydland and Prescott (1977) showed that there is an inflationary bias to unrestricted monetary policy in an economy with rational expectations, if policymakers try to minimize deviations of both inflation and output from their targets taking inflation expectations as given. This is due to the fact that the socially optimal policy is in this case time inconsistent as policymakers have at every point in time an incentive to deviate from

the optimal policy path trying to exploit a perceived trade-off between "unexpectedly" higher inflation and unemployment.

Moreover, as also confirmed by Barro and Gordon (1983) in an extended model including an explicit expectation formation mechanism, although average inflation exceeds the optimal rate in the discretionary (time-consistent) equilibrium, the unemployment rate is actually invariant to monetary policy, that is, monetary policy has no impact on real economic activity. The realization concerning the crucial role of inflation expectations and risks related to "absolute" discretion led to the conclusion that monetary policy should be conducted in accordance with a fixed nominal anchor/simple policy rule. As a result, to bring increased inflation under control, the U.S. Fed began to report annual target growth ranges for the main monetary aggregates and bank credit in 1975.

This approach was in line with the recommendation of Milton Friedman in his 1967 presidential address at the meeting of the American Economic Association when he stated that: "I believe that a monetary total is the best currently available immediate guide or criterion for monetary policy" (Friedman (1968), p.15).

In addition, the longer-term relationship between money supply and price stability seems to have become less pronounced since the 1980s. Estimating multivariate VARs including nominal income, inflation and broad monetary aggregates for the U.S. and West Germany, Estrella and Mishkin (1996) found that in the period since October 1979, lagged measures of broad money growth did not appear to be significant determinants of either nominal income or price developments in the two countries. They argued that in periods of low nominal income, inflation and broad money growth, the signal-to-noise ratio of

monetary developments was likely to be low due to frequent shifts in velocity. This argument was supported by De Grauwe and Polan (2005) who examined 30-year (1969-99) averages of money (M1 and M2), consumer prices and output growth in more than 100 countries and found that in the sample of low money growth countries (lower than 15% p.a.), money growth did not appear to have a statistically significant impact either on inflation or on output growth.

In the early 1990s, national central banks started to switch to inflation targeting (IT) which according to Svensson (1999a, p. 82-83) has the following three main characteristics: "an explicit quantitative inflation target, a framework for policy decisions, inflation-forecast targeting, which uses an internal conditional inflation forecast as an intermediate target variable, and a high degree of transparency and accountability." It should be taken into consideration that all real-life inflation targeting regimes also attach some weight to the stability of the real economy, i.e. reduction in output variability (by having some flexibility regarding the time horizon under which their inflation targets should be met) and can thus be described as flexible IT, as compared to strict IT which would exclusively focus on stabilizing inflation (Svensson (1999)).

The Fed goal of price stability, moderate long-term interest rate and maximum employment was set in 1977. Yet, the Fed did not implement any quantitative definition of price stability until January 2012 when the Federal Open Market Committee (FOMC) announced that in its view: "[…] inflation at the rate of 2 percent […] is most consistent over the longer run with the Federal Reserve's statutory mandate".

Nevertheless, there remained vital aspects of monetary policy on which views continued to differ. Considering the 2008/09 global financial crisis, the most relevant of those open issues seems to have been the so called "lean-versus-clean" debate, that is, whether monetary policy should respond asymmetrically to asset price bubbles as opposed to busts. Alan Greenspan (Chairman of the U.S. Fed from 1987 to 2006) defended the view that it was not evident that monetary policy could pre-empt the build-up of asset price bubbles without inducing a substantial contraction in economic activity. As a result, monetary policy should in his view rather mitigate the fallout from the burst of a bubble if and when it occurs (Greenspan (2004)).

Greenspan adopted the “risk-management” approach to monetary policy. He believes that policymakers should "consider not only the most likely future path of the economy but also the distribution of possible outcomes about that path" (Greenspan (2004)). They should then make a decision regarding costs and benefits of various possible results under alternative policy choices to avoid especially adverse outcomes. In 2003, Greenspan explains that such considerations forced the Fed to adopt an easier policy stance that limited the risk of deflation in the aftermath of the bursting of the "dotcom bubble" even though such an outcome was not foreseen by the baseline forecasts. He claimed that although seemingly discretionary and judgmental, the risk-management paradigm was better suited for policymaking than simple rules which cannot take into account significant and shifting uncertainties about the economic environment (Greenspan (2004)).

The Fed has loosened its policy stance considerably already in the run-up to September 2008 escalation of the financial crisis, decreasing the federal funds rate from

5.25% in September 2007 to 2% in late April 2008. Subsequently, the target was further reduced to 1.5% in October, 1% in November and finally to 0%-0.25% in December 2008. When analysts' valuation of intrinsic values based on fundamentals is different than the market values of equities, the conclusion is that equities in the market are mispriced. Moreover, when prices in the market exceed those of the fundamentals, then there is a market bubble. A market bubble cannot be detected when analysts are not able to value equities based on fundamentals.

Based on their market study, both Shiller (1989) and Sagle (1997) argued that a market recession or bubble cannot be detected easily before it occurs. In other words, problems in economy are usually identified on an ex post basis rather than previous to their existence or on ex ante basis. One example was the NASDAQ collapse in 1990s; no one predicted such a decrease in its price prior to the bubble in the market.

According to Ceccetti (1998) the central bank should closely watch the asset prices because their prices are a key indicator of what will happen in the economy. By monitoring the asset prices, economic situation could be more controlled and performing better. Cecchitti was not the only one who believed in the importance of asset prices, Genberg, Lipsky and Wadhwami argued the same.

Another argument was suggested by Bernanke and Gertler (1999, 2001); by which they believe that no matter what the market is facing – a bubble in the prices or not-, the Fed should keep its policy regarding the target inflation stable. Stated differently, the Fed should pursue the target inflation in the marked despite prices in the markets. Bernanke and

Gertler argued that if through the interest rate monetary policy of the Fed they could reach the target inflation which will also cause assets prices to stabilize.

According to Blanchard (2000) the Fed was aware of the bubble in the stock market, a fundamental valuation of the stocks was obviously showing that the prices were not reflecting their true intrinsic value; therefore a decrease in the prices of the stocks towards their intrinsic value was expected. Although Blanchard found that Bernanke and Gertler argument regarding inflation is strong, he thought that their argument cannot be generalized. He argued that it is true that Bernanke and Gertler strategy will work when the price bubble affects some components of spending more than the others yet it could have the opposite effect if the price bubble is occurring is general. Blanchard explanation was the following: if the economy is booming, spending will increase demands for goods will increase which will eventually push prices up and cause inflation and in order to control inflation the Fed will interfere and follow a restrictive monetary policy.

Nonetheless, when a market bubble boosts investments, consumption will decrease because individuals prefer to invest instead of consuming when they belief that they will get a higher return, so the intervention of the Fed in this case to keep its target inflation constant, will only lead to an excessive capital accumulation. Consequently, this excessive capital accumulation will only discourage firms from investing. Lower investments will eventually delay economy growth. Hence, as per Blanchard the strategy of Bernanke and Gertler to work only on the target inflation will not lead to the desired results as it cannot solve the bubble impact on the market and at the same time solve the problem of a long term excessive capital accumulation and slow economy growth.

Moreover in response to Bernanke and Gertler (1990), Bordo and Jeanne (2001) discussed the strategy stated by Bernanke and Gertler. They saw that any attempt by the Fed to reverse the asset prices following a bubble may lead to costly results because output may decline and they give the decrease in output in the 1930s as an example. Instead, Bordo and Jeanne suggested that the Fed should try to control the growth in the price bubble and refrain it as a traditional monetary policy will not be effective when it comes to correcting price bubbles.

In (1999), Cogley explained that trying arbitrary to correct asset price bubbles may had negative effects on the economy and could worsen the economy instead of boosting it. Cogley believed that hazard monetary policy could have the same consequences as bad as a crisis.

Mishking (2000) was more general when he discussed the relation of economic recession with financial instability. In his argument, Mishkin's stated that any monetary policy should prevent financial crisis and stock market crashes so historical events do not recur again. In his theory Mishking did not specify or discus specifically how the stock market could impact the economy.

Moreover, Cecchetti and Krause (2000) went more deeply in studying the markets. They looked more globally to the economy. Stable asset prices was not the only indicator, they studied the connection between critical changes in financial prices with fluctuating asset prices. The study was made on several countries. Following their study, they were able to conclude that fluctuating prices were a major contribution to the economy growth and inflation.

Filardo (2000-2001) did an extensive study on the market. He tried to discover the effect of a certain monetary policy on the economy during an asset bubble through anticipating several simulations on his macroeconomic model. His conclusion was: the Fed should respond by implementing a new monetary policy when asset prices diverge. However, if the Fed is not quite sure about the results of implementing a new monetary policy, no action should be taken and the Fed should keep its neutrality regarding the bubble in the asset prices.

Finally, in 2002 Goodfriend stated there is no stable correlation between short term interest rate and the change in assets price. The absence of such a correlation makes it harder to predict how the interest rates will move when equity prices are changing.
As a conclusion, monetary policy should be implemented to help the economy overcoming a price bubble and a recession. Although, many argue that it is hard to prevent an economic crisis because a bubble is not easy to detect and information regarding its size and effect are vague. However, if the Fed is foreseeing a quick rise in asset prices then an intervention is requested to stop it. On the other hand, if the Fed is uncertain about the size of the bubble, a neutral reaction should be maintained.

In our recent history economists discussed the economic end result on the labor market:

According to Brad Delong (2009), the unemployment rate should have increased by 8% instead of 10% during the recession which is more convenient with the GDP decrease. Economist Uchitelle (2010) also gave a figure of unemployment rate lower than the real figure (7.4% instead of 9% at the end of 2010). Some economists argued that using the

Gross Domestic Income is a better tool to predict unemployment rate than GDP, Wolfers is one of the economists who supported this assumption.

In 2010 Gordon believed that 1986 Law of Okun's is not reliable anymore as the economy was under different circumstances. People were losing their jobs, as the negative economic growth and unemployment were highly correlated. During the same year (2010) Fatas and Mihov (2010) argued the year 2009 was an outlier of the normal distribution of employment growth. According to them the 2009 was an outlier because of the change in the credit term.

B. U.S. Central Banking

1. History of the U.S. Central Banking System:

a. The First Bank of the United States: 1791-1811

In the United States, the First Bank was chartered by the Congress for a term of twenty years on February 25, 1791. Nevertheless, the First Bank had to satisfy some nonnegotiable conditions starting by being a private company. In addition, it had to perform a mandatory rotation of directors. The First Bank was also denied the right to buy government bonds, and neither issue notes nor be indebted more than its actual capitalization. The conditions also state that foreigners should be forbidden from voting although they can become stakeholders in the bank. The Secretary of the Treasury would on a weekly basis remove the government deposits, inspect the books, and enforce the receipt of statements regarding the bank's condition.

Alexander Hamilton became the first Secretary of the Treasury. He regarded the national bank as a necessity in enhancing the nation's credit, and the handling of the financial business under the new legislative constitution of the United States. Hamilton maintained some goals regarding the government financial state. The goals included paying off war debts which would allow them henceforth to save money, and to create a unified currency. He also believed in the establishment of a federal excise tax. After leaving the office in 1795, Alexander Hamilton was succeeded by Oliver Wolcott, Jr. After his appointment to this position, Wolcott concluded the bank needed more money because of the government financial state. He presented two options to resolve the incurred situation. The first consisted of selling the government's shares of stock in the bank, whereas the second was mainly raising taxes. Wolcott was in favor of the first option which got the approval of the Congress. In 1811, the bank's charter lasting for twenty years had expired, bringing an end to the United States First Bank.

b.The Second Bank of the United States: 1816-1836

In 1811, inflation hit the United States. Five years later, James Madison charted the Second Bank of the United States which he kept under the conditions, duties, and goals similar to the First Bank. The Second Bank had branches spread out across the country. The bank contributed to a better economy by financing entrepreneurs, small size companies, and farmers through loans while restraining bank notes from state and private lenders.

Despite this strategy, the Second Bank of the United States was deprived from its full success due to poor management and fraud. In 1823, Nicholas Biddle became the

Second Bank's president. He started with reformation acts which managed to restore some financial stability and control of the money supply.

In 1828, Nicolas Biddle's presidency was over. Anti-Bank candidate Andrew Jackson had been elected. Under Jackson's management, the possibility of a national financial crisis diminished. Jackson also enforced laws on the entire banks to keep enough gold and silver reserves to meet their credit obligations to the U.S. Treasury since it affects their lending strategies. This law met strong opposition due to the disapproval of the banks which number had increased from 31 in 1801 to 788 in 1837.

In the election of 1832, Bank President Nicholas Biddle and pro-bank National Republicans led by Henry Clay clashed with the "hard-money" Andrew Jackson administration and eastern banking interests. In 1836, the Second Bank became a private corporation since it has failed to receive recharter; hence, it underwent liquidation in 1841.

c. Free Banking: 1837-1862

State-chartered banks had long existed since 1781 and been running in parallel with the U.S. banks. Starting year 1837, and throughout the twenty-five years of the Free Banking period, these banks were autonomous in terms of issuing bank notes against reserve of gold and silver, determining the interest rates for loans and deposits. As well, these banks used to set their own reserve necessities along with the capital ratio. An act

Period	% Change in Money Supply	% Change in Price Level
1832–37	+ 61	+28
1837–43	− 58	−35
1843–48	+102	+ 9
1848–49	− 11	0
1849–54	+109	+32
1854–55	− 12	+ 2
1855–57	+ 18	+ 1
1857–58	− 23	−16
1858–61	+ 35	− 4

Figure1: Change in Money Supply and Price Level

issued by the state of Michigan gave banks full legislation for automatic recharter as long as they are meeting their requirements.

Since 1837, the rate of unstable banks grew higher due to the negligence in supervision of the states which have adopted this law. This explains the spike in the number of banks which increased from 24 banks in 1797 to 712 by the end of the Free Banking period. However, suffering from this instability, banks did not live long in comparison to today's banks. On average, a bank would last five years before closing down or declaring bankruptcy. The real value of a bank bill was often lower than its face value, and the issuing bank's financial strength generally determined the size of the discount.

d.National Banks: 1863-1913

This period of banking started with an effort build a new organization of National banks. This new system was backed up by the National Banking Act in 1863. To deal with previous instabilities of the banking system, this act set higher standards to the laws that regard the reserves and business practices. An office of Comptroller of the Currency was founded to manage these banks which printed notes to guarantee uniform quality and prevent counterfeiting. All banks were required to accept each other's currencies at par value as a precaution to eliminate the risk of loss in case they fail to meet their legal obligation of debt payment. The National did also provide loans during the civil war, so they had to back up their notes with Treasury securities. This loan support strategy improved the market growth with an increase in its liquidity.

Gesham's law states that: "soon bad money from state banks drove out the new, good money; the government…" The 10% tax that was enforced on the state banks pressured them so they had to convert to national banks. This fact had even boosted the number of the national banks to reach 1,683 by 1870 where, on the other hand, only 325 state banks remained stable. The next twenty years had witnessed a comeback in the state banking due to the tax that led to the creation of checking accounts which covered 90% of the money supply.

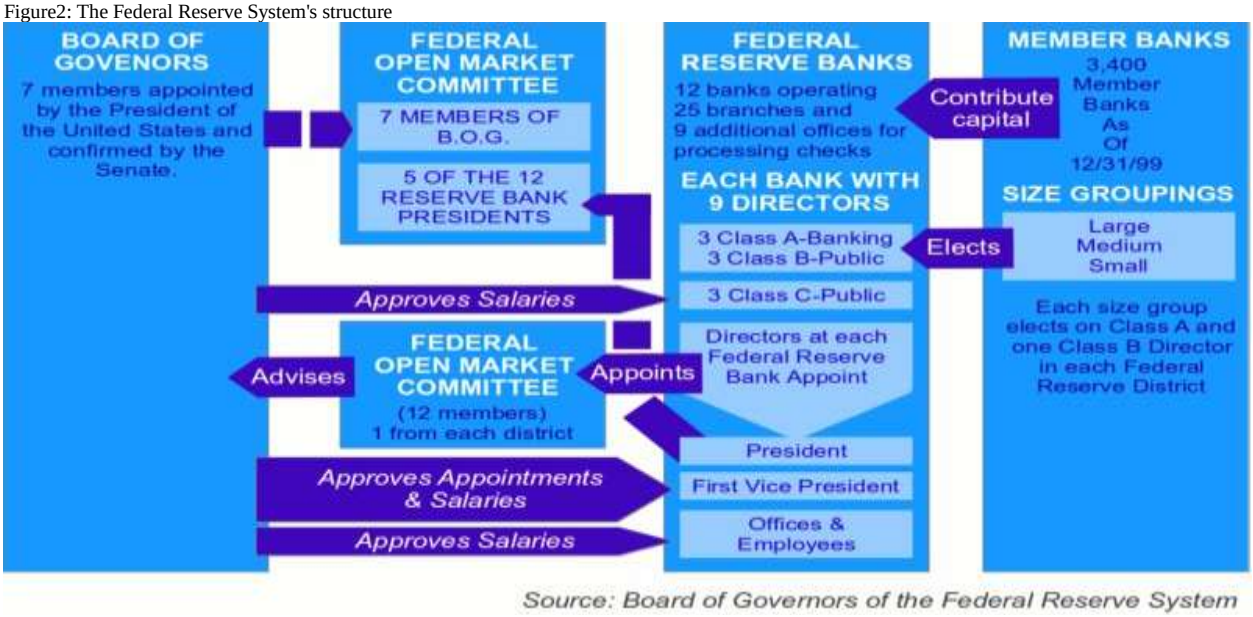
Still the banking sector had two problems to deal with, backing up the currency with the treasuries, and seasonal liquidity spikes generated by this new system. The first problem acted at the level of inter-banking business deals. During the fluctuation of treasuries values, the banks used to recall the loans from other banks. As mentioned above, this period observed high liquidity; this has led small banks to withdraw their deposits from larger banks which they needed to fund higher loans. As demand even grew larger, these banks again had to resort to other sources of financing. The high liquidity had aggravated the situation leading to banks runs which in turn led to severe disorders and depression, out of which we can list the Panic of 1907.

e. The Third Central Bank: The Federal Reserve System: 1913-present

The changes in these banking systems have finally led to the establishment of the Federal Reserve System in December 23, 1913. The Federal Reserve (the Fed) was the central banking of the United States. This initiative came to deal with the series of the financial crises which some of them were illustrated in the passages above, particularly as a

response to the server Panic in 1907 which ended the previous banking system. The enactment of the Federal Reserve Act, passed by Congress in 1913 and subject to Congressional amendment or repeal, has led to a new banking structure. The structure was composed of, firstly, a Board of Governors known as Federal Reserve Board (FRB) appointed by the president, secondly, the Federal Open Market Committie (FOMC) partially appointed by the president, thirdly, twelve regional Federal Reserve Banks not appointed by the president and are scattered in the principal cities of the country, lastly, numerous privately owned banks by U.S. members and advisory councils. The unprecedented and unique structure of the Federal Reserve System was labeled as independent within the government" rather than "independent of government". It describes the mixed nature of this system which is both publically and privately owned. The Federal Reserve is self-funded and derives its authority and goals from the Federal Reserve Act.

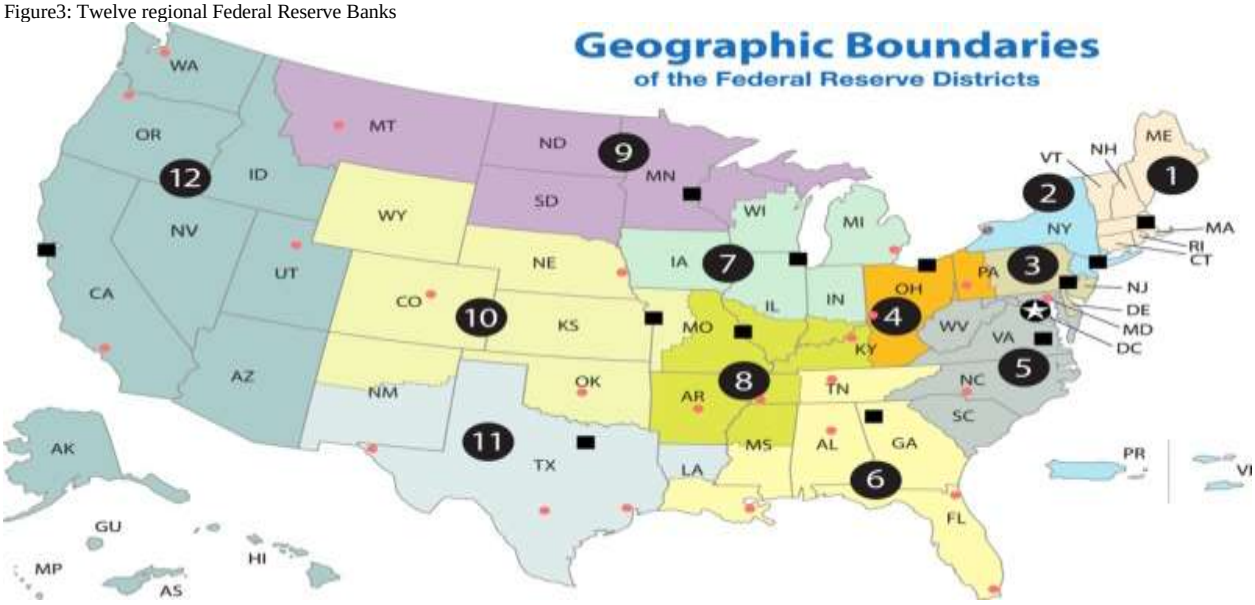
Figure2: The Federal Reserve System's structure



There Federal Reserve Banks that are located in the main area of the United States reside in the following twelve cities: located in Boston, New York, Philadelphia, Cleveland,

Richmond, Atlanta, Chicago, St. Louis, Minneapolis, Kansas City, Dallas, and San Francisco. Each of these banks takes has a president, acting as the chief executive officer. Each bank also has full charge of managing the member banks located in its district where the size of the district is varies based on the population distribution of the United States.

Figure3: Twelve regional Federal Reserve Banks



The independency of the Federal Reserve comes from the autonomous monetary policy decisions which are legislated and implemented without the approval of the United States president. The funding is not appropriated by the Congress and the same Board of Governors can serve for multiple presidential and congressional terms.

The creation of the Federal Reserve came after the banking panics and crisis which preceded it. Its purpose, as stated by its Act, is to: "to furnish an elastic currency, to afford means of rediscounting commercial paper, to establish a more effective supervision of banking in the United States, and for other purposes". Mainly, the Federal Reserve is at the basis of ensuring the stability of the financial system of the United States by avoiding economic crisis.

CHAPTER III

U.S. MONETARY POLICICES

A. The Recent and Current Stance of Monetary Policy

1. Importance of Money

- Brief History:

Money was created to overcome the shortcomings of barter which is people exchanging goods they possess with other goods they need from other people. Several problems arose from barter:

First, in order to be able to get what he wants, a person had to find another person that will accept to barter their goods with what is offered. In other words people should be able to match their needs in order to accomplish barter. This is what we call the double coincidence of wants.

Second, the value of products was not equal, for example a person who own a cow farm and needed bread would have to exchange it with bread, because cows cannot be dividable which also made barter even more complicated. This is the Indivisibilities problem.

Third, the notion of profit and loss did not exist, firms were not able to quantify their gains or losses during barter because they have no tool that can calculate the value of things. This is the Business calculation problem.

Based on the above, we can conclude that barter system is not flexible especially in an industrial booming economy. Although it was a primitive solution that somehow answered people needs, it was essential to find a more advanced and flexible medium of

exchange that answers a more advanced economy. Money was the answer and the solution to this problem and came to replace the old rigid system of barter. Money was a dividable, flexible tool that could be used by all traders and that have a common value for everybody which overcome the shortcomings of barter.

Money gained its value because people accepted to use it as a valid tool to exchange; this type of money is called fiat money. Fiat money has no intrinsic value by itself; it acquires this value through the trust of people in it as a tool to exchange.
Gold and Silver (silver previously now it is consider industrial) are also considered commodity money. What make them different from fiat money is that they have their own intrinsic value and do not gain it only through people trust and exchange.

Additionally, forty years ago, interests bearing checking accounts, savings account, money market mutual funds and credit cards became another acceptable medium of exchange. These new divisible medium of exchange were added to cash and interest-free checking accounts as assets.

- <u>Why people hold money:</u>

As money became the only tool available to buy products and services needed by individuals, it turned out to become a necessity for everybody to carry money and use it for several purposes:

1. Daily transactions: People are in need for money to buy goods and products for daily use, from their simplest need (food, home…) to more luxurious demands. As income increases, expenditures will also increase and therefore the demand

for money will also increase. Below are two graphs that show how a rise or fall in income will change the demand for money.

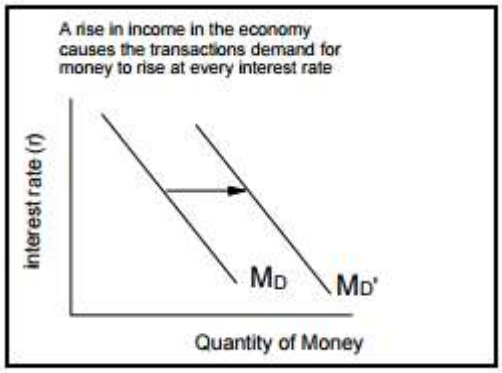


Figure4: A rise in income

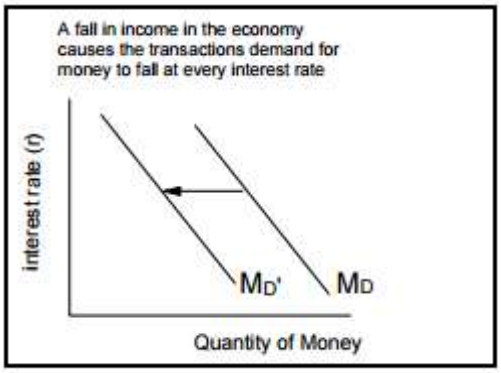


Figure5: A fall in income

2. A second motive to hold money is for precautionary reasons: People have the tendency to hold money in case something urgent came up especially if they are living in a time of uncertainty. For instance, if people are expecting a recession in the market or an increase in un-employment they tend to hold more money whereas if the market is giving signs of a high inflation then in order not to lose their money value when inflation strikes they will hold less money.

Holding money in cash or in checking account comes at the cost of earning the interest rate if this money was put in a saving account. Another opportunity cost of holding money is not investing in the market equities.

Moreover, when interest rate increases the price of bonds is low which make them a good investment for investors speculating that the interest rates will decrease eventually which will increase the prices of bonds and therefore, allow them to sell them later on at higher prices. Which let us conclude the higher the interest rates the higher the opportunity cost of holding the money which make the interest rate the price of holding money. Below

is a graph that illustrates the relation between interest rates and the quantity of money demanded.

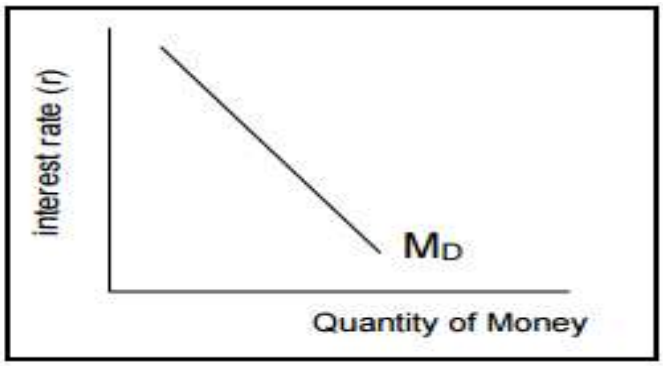


Figure6: The Demand curve

Following several major crises and a continuous increase in inflation, everyone in the world became concerned of money supply and other economic indicators of the market. Investors continuously check the latest figures of the economy and forecasts of the Federal Reserve.

- Definitions of Money:

Money is divided into three categories with different characteristics which are "M1", "M2" and "M3".

Under M1 falls money that is used as a medium of exchange, it covers the following:

- Currency either coins of paper and between 1 and 100 USD
- Non-interest bearing accounts, transactions account, demand deposits and any type of deposits that checks can be written on.
- Traveler's Checks

M2 includes M1 and assets that store their value, M2 cover the following:

- Saving Deposits either passbook savings accounts or statement savings that allow owner of these account to withdraw and deposit of money by mail.
- Savings certificates as long as their value is less than $ 100,000. These certificates have different maturity rages from 6 months to several years and answers investors needs when it comes to interest rate as they can be either bearing a fixed or a floating interest rate.
- Mutual Funds: the mutual funds the falls under M2 are money market mutual funds due to their investment only in short-term securities most of the time those maturing in 90 days and because they permit the writing of unlimited number of checks for a specified minimum value.

M3 includes M2 in addition to the following:

- Long term time deposits
- Money market funds where maturity exceed 24 hours

2. Transmission Mechanisms of Monetary Policy

Economists and policies makers need to study how the monetary policy transmission mechanism is working, it will help them to understand the effectiveness of their policies on the economy and if end results are those desired by the implemented policies. Studying the transmission mechanism will highlight mistakes and misperception which will be avoided in the future.

There are several terms that describes indicators of the economy: M = Money Supply, ir = Real Interest Rate, Pe = Expected Price Level, Πe = Expected Inflation I = Investments, Y = Real Output, E = Nominal Exchange Rate, NX = Net Exports, q = Market Value of Firms/ Replacements Cost of Capital, Pe = Stock Prices, W = Wealth, C = Consumption

- Traditional Interest Rate Channels:

Also known as the traditional Keynesian ISLM which can be explained through this formula: M↑ => ir↓ => I↑ => Y↑. The traditional Keynesian ISLM explains how the increase in money supply will lead to an increase in the aggregate demand and output. When the Fed set an expansionary monetary policy by reducing interest rates, money supply will increase and cost of capital will decrease as investors can borrow money with lower interest rates, therefore, to take advantage of low interest rates, investors borrow money in order to make more investments. Consequently, both employment and income will increase which will eventually lead to a higher aggregate demand and output.

Moreover, according to the traditional Keynisian ISLM when money supply increase, prices will increase which will push inflation higher than its expected level and thereby decreasing real interest rate even when they are equal to zero. Attracted by low interest rates investors will increase their investments which will also lead to a rise in aggregate demand and output.

- Exchange Rate Channel:

Derived from macroeconomics models built under Keynesian ISLM. The assumption under the exchange rate channel is when the domestic real interest rates

decrease, people decrease their deposits as the return is not that attractive and prefer to deposit their money in foreign currencies that pay more interest. When demand for the foreign currency increase while the demand on the domestic currency decrease the value of the domestic will depreciate. A lower value of a domestic currency makes local products and goods cheaper to exporters. Hence, exports will increase which will lead to a rise in the aggregate output.

- Equity Price Channels:

There are two theories describing equity prices that are necessary to the monetary Transmission mechanism the first theory is the Tobin's q theory of investments and the second one is Wealth effects on consumption.

- Tobin's q Theory of investments:

The Tobin's q principle is mainly a ratio that divides the market value of debt and equity to the replacement cost of total assets. The numerator market value of debt and equity which is the total capital is divided by the replacement cost of assets which take into account inflation. All else equal, when the productivity of the company's asset is higher Tobin's q is expected to be higher.

Stated differently, when q is high we can conclude the market price is high relative to its assets. A higher market value of the firm allows it to issue new equity with higher prices and therefore investing more as now management can issue high prices equity and make new investments with a relatively small issue of equity, therefore not affecting the value of the company.

Whereas, when q is low, the cost of equity is high. Issuing more equity will cause equity dilution without increasing the value of the company. Therefore, in this case and when q is low, management will seek merger or acquisition in another cheap firm in order to gain access to a cheaper capital.

The conclusion from the Tobin q is that when market equity prices of equity are high, investment spending will increase as companies have the opportunity to gain access to capital with lower cost. Subsequent to the increase in investment the aggregate output will increase.

- Wealth effects: (Discussed by Franco Modigiliani)

In his explanation to the wealth effect Modigiliani assumed that consumption is a function of lifetime resources including stocks. Therefore, an increase in stocks prices will lead to a rise in the value of the financial wealth. As a result of an increase in the financial wealth, the lifetime resources of consumers will increase which will eventually increase consumptions. Through his discussion about wealth effects Modigiliani did not apply this theory on stocks it can also be applied on real estate prices and their effect on the wealth.

- <u>Credit Channels:</u>

It leads to two information problems in the monetary transmission channel. The Bank Lending Channel and The Balance-sheet Channel.

In the Bank Lending Channel, investments will more stimulated by the monetary policy if the dependence on bank loans is higher. On the other hand, if the dependence on

bank loans is little investment might be simulated by a decrease in interest rate. So the effect of monetary policy on companies is not symmetric.

Balance-Sheet Channels, it can be accomplished through several techniques:

- Through Bet Worth of Firms:

Money supply increase leading prices to increase, both adverse selection and moral hazard which will eventually lead both net worth and lending to increase and therefore inflation and output will also increase.

- Through Nominal Interest Rates and Cash Flow:

Through this channel when money supply increase, interest rate increase which will be followed by a cash flow increase. Both Adverse selection and moral hazard will decrease that will lead lending, inflation and output to increase.

- Through General Price Level:

Through this channel money supply will increase and unanticipated prices will also increase. This will lead to a decrease in adverse selection and moral hazard which will eventually lead to an increase in inflation and output.

- Through Household Balance-Sheet Effect:

Through this channel money supply will increase and therefore prices and financial assets will increase which will lead to an eventual possibility of financial distress which will lower prices and therefore consumer expenditure will increase leading to output to increase.

3. Monetary Vs. Fiscal Policy

In order to control economic activities in a country, either the government or the Fed can intervene by implementing either expansionary or restrictive monetary and fiscal policy. The government possesses control over the fiscal policy whereas it is the job of the Fed to set the monetary policy.

As per the Congress decision the Federal Reserve became an independent entity, they assumed that monetary policy should not be stimulated by political influence; hence the Fed has solely the decision to set any monetary policy.

The purpose of the monetary policy is to control the economy and to achieve specific goals set by the Fed. In order to achieve certain objectives such as target inflation, increase employment, control exchange rate, price stability… the Fed will interfere either through interest rate, money supply and reserves requested from banks.

When it comes to the Fiscal policy it is decided by the Congress and the Administration. Unlike monetary policy, the federal government tools used to stimulate the economy is taxes and government spending.

Studies are made by the Federal Open Market Committee (FOMC) to determine the effects of a certain fiscal policy on the economy. In other works, the FOMC reviews how GDP growth, employment and inflation are responding to the fiscal policy.

When doing analysis on the economy, analyst should study the effect of both the monetary and the fiscal policy on the economy because fiscal policy could indirectly lead to certain conduct in the monetary policy. Analysts should study their results combined on the aggregate economy and output.

4. Overview on U.S. Monetary Policy

Being the Central Bank of the United States the Federal Reserve has a great role to play that will not only has impact on the US economy but also on the world. As the USA is the largest economy in the world, and the US dollar is the most currency traded in the world, any decision taken by the Fed will not only influence the US economy but the whole financial market will be impacted.

The role of the US Fed is to interfere in order to stimulate the economy and strengthen it. This could be done by detecting the problems that sluggish the economy and set the right policy to fight it. Furthermore, the Fed has an important role in regulation the banks, their reserves and risks. The intervention of the Federal Reserves is necessary in order to prevent either inflation or deflation or even more stagflation and in order to set the right interest rate. Last but not least, the Fed is also responsible of the wealth of consumers by protecting their rights and answering their liquidity needs.

By managing all of that, the Fed will be capable of controlling the economy and the stability of the financial system taking into consideration the systematic risk in the market i.e. the risk of financial assets in the market that is priced.

5. Federal Reserve's Roles & Proposals last forty years

During the last forty years (1970-2012) five Chairmen were appointed on the Federal Reserve.

In 1970 Arthur Burns was the Chairman of the Fed; he continued to manage the Fed until the end of January 1978. Burns was known by being close to politicians and therefore, his was largely influenced by politics. For instance, Burns accepted to close the gold

window as per Nixon's decision although he was not convinced which shows that the Fed during Burns management was not acting as an independent policy maker; on the contrary it was following decisions dictated by politics. During his rule, the Fed tried to follow an expansionary monetary policy in order to keep inflation within its target. Yet, the Fed did not succeed to implement its policy as inflation reached a very high rate 12.3% following the 1973 Opec crisis (oil price shock).

After Arthur Burns rule of the Fed, George William Miller was appointed as Fed Chairman in March 1978. When William Miller was designated the economy was still suffering from high inflation due to the Opec crisis. Miller decision was to keep interest rate as they are because according to his belief the inflation rate was not above average therefore there is no need to raise interest rates. He believed that the free economy will fix itself and market will correct itself without the intervention of the Fed. Nevertheless, his decision had a great impact on the value of the dollar which extremely decreased. The US dollar was losing its value against other currencies; it had fallen approximately 34% against the German Frank and 42% against the Japanese yen. Following this large decrease in the value of the dollar, Carter administration found itself oblige to implement a plan in order to save the dollar which was known at the time as a "dollar rescue package". The plan incorporated buying U.S. gold stock, borrowing from the International Monetary Fund (IMF) and sales of Treasury securities denominated in foreign currencies. Although Carter administration strategy to rescue the value of the dollar has a positive short-term result, inflation was increasing again afterwards which refrained economy growth. The economy

was deteriorating and the inflation was incontrollable, in other terms, the Fed failed to save the economy which lead to inflation reaching 14% in early 1980.

Paul Volcker was assigned as assigned as a chairman of the Federal Reserve. During his lead of Fed Paul Volcker took several decisions to lower inflation and boost the economy. Mainly, he increased the federal funds rate, from its average 11.2% in 1979 to 20% in June 1981 to reach its peak. Following this noticeable increase in the federal funds rate, the prime rate was also impacted it reaches 21.5 % during the same period. This increase in interest rate had major consequences on the economy especially on employment that was furthered to over 10%. Eventually, in 1983 inflation was controlled and declined to 3.2% following a peak in 1981 of 13.5%. Due to the huge impact of the restrictive monetary policy followed by the Federal Reserve, the US economy gained growth after, hence, the Fed decide to change its restrictive monetary policy after 1982.

Alan Greenspan was elected as Federal Reserve Chairman after Paul Volcker in 1987. By this time, Volcker was convinced that following the crash of the stock market in 1987, the Fed was now ready to set an expansionary monetary policy by increasing the liquidity in the market. Moreover, Volcker adapted the Taylor rule theory by which they had to regulate the interest rates in order to boost the economy in the short term while keeping the long term growth positive. Consequently, as per Greenspan decision the interest rates were increased several times. Greenspan monetary policy practice between 1987 and 2000 was named The Greenspan Put.

Bernanke was appointed as Chairman of the Federal Reserve in February 1, 2006. Bernanke approach was to decrease interest rates. Bernanke assumed that by lowering

interest rate, the Fed will stop market from falling. For instance, in October 8, 2008 interest rate was decrease by 50 basis points followed by a further decrease in December 2008 to reach a rate 0% and 0.25%. By doing that Bernanke was trying to implement a similar put to the Greenspan put. Following the 2008 financial crisis that was cause by mortgage back securities and the bankruptcy of several banks and firms; The Bernanke decided to start quantitative easing in order to boost the economy.

Following Ben Bernanke, Janet Yellen was elected as the new Chairman of the Federal Reserve in October 9, 2013 and still leading it.

B. Crises between 1970 and 2012

Several Crisis aroused between 1970 and 2012, these crises has direct effect on the US economy,

1. The OPEC oil price shock (1973)

OPEC crisis and the rise in the price of oil barrel was the result of the embargo that Organization of Arab Petroleum Exporting Countries (OAPEC) did on the United State. This embargo was made on October 1973 and caused an economic crisis and recession in the United States. USA was prohibited to import oil from all the exporting nations under (OAPEC). Subsequently, oil production decrease, supply decreased and as a result oil prices rose from $2.9 the barrel to $ 11.65 the barrel in January 1974.

The American oil industry was incapable to deal with such a crisis; they could increase their supply, hence, oil prices continued to rise while providers of oil where in decline.

The impact of the embargo was not on the US economy solely. As the price of oil was in dollar and the value of the dollar started to decrease in the early 1970s, the nations under OPEC began to suffer themselves from the embargo. These nations were under the pressure of finding a solution to this problem in order to halt the decrease in their revenues from selling oil. The solution they found and decided on was backing the price of oil to gold. The graph below shows the OPEC net oil Export revenues between 1972 and 2007.

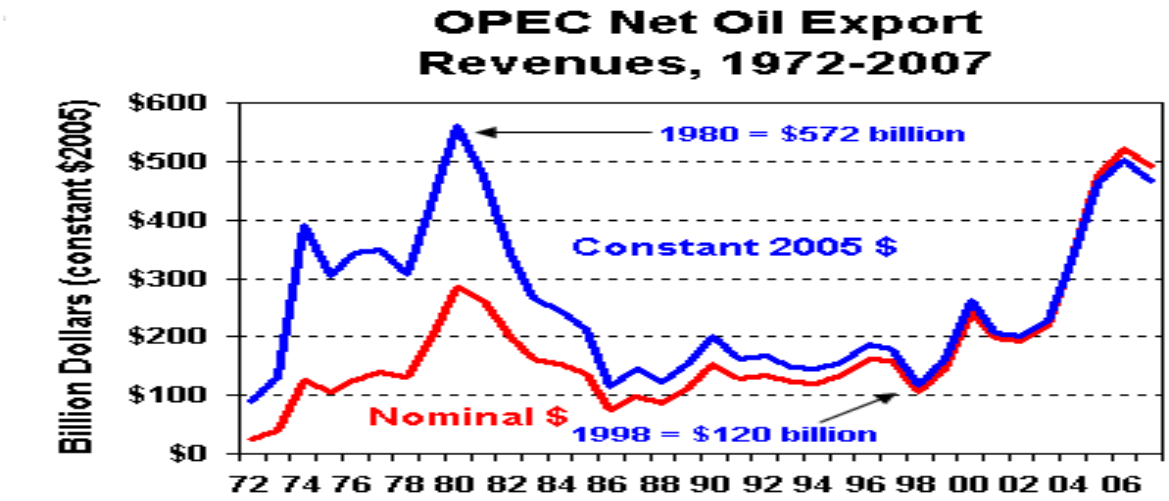


Figure7: OPEC Net Oil Export Revenues, 1972-2007

Yet again, gold prices also increased from $35 to $455 by the end of the 1970s. In March 1974 diplomacy and politics were able to solve disagreements between the OAPEC and USA and as a result the embargo ended. However, the end of the embargo did not lower oil prices. The high price of oil was defensive and did not react positively following the removal of the embargo on the contrary it stayed at his high level.

The oil price has such a huge effect on the market and economy because sometimes the Fed is unable to certain problems. In this case, the Fed do not have access to natural resources in respond by producing oil and cover the lack of oil supply from OAPEC. Small

measures can be taken but they will not stop the effect of such a supply shock on the economy. Stated differently, high oil prices will definitely cause inflation no matter what the reaction of the Fed will be. When oil prices increase, the prices of commodities will increase, inflation will hit every product or service in the economy which will certainly lead to as slow growth. In 2004 chairmen Bernanke addressed this issue by explaining why the Fed cannot fight two problems together if they work in an opposite directions. For example, it is not possible to boost the economy, end recession and at the same time stop inflation. Actions taken by the fed to improve growth by lowering interest rate will encourage investments, employment, spending but also pushes prices and inflation up. The same goes on the prices of commodities it not possible to fight inflation when oil prices and commodities increase. According to Bernanke decision should made after balancing risks with objectives.

Nevertheless, during the crisis some measures were taken to survive the oil crisis:

Price controls: new discovered oil was sold at new higher prices whereas old oil was sold at the old lower prices. This purpose of this measure was to encourage more investment. Furthermore, in order to diminish more the supply of oil, policy makers decided to withdraw the old oil from the market.

Odd-even rationing: Under this measure only vehicles with odd number (last digit) license plates were allowed to buy gas during the odd numbered days of the month whereas those that have license plates number that end with even numbers are only allowed to buy oil on even-numbered days of the month.

Speed limit: in order to reduce the oil consumption, the speed limit measure was implemented through the Emergency Highway Energy Conservation Act by which people cannot exceed a speed limit of 55 mph.

2. Black Monday (1987)

Black Monday is considered the biggest one day market event in history. Black Monday crash occurred on October 19th 1987, during this day prices of indexes decreased incredibly for instance the Dow Jones index lost $500 billion dollars of its value in one day. The graph below shows the Dow Jones index price during that period.

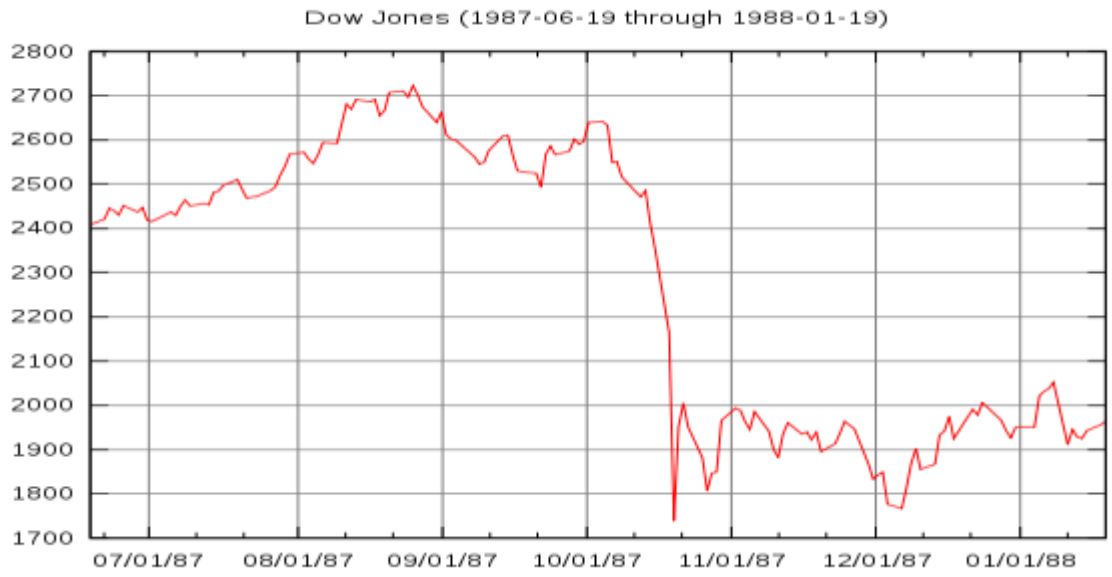


Figure8: Dow Jones (1987-06-19 through 1988-01-19)

Causes behind the Stock Market Crash of 1987:

Prior to the stock market crash of 1987, interest rates were very low. Investors took advantage of lower interest rates to increase their investment as the price of leverage was very low. Investors and firms managers were attracted by the market opportunities,

borrowing at lower cost to grow and increase their market share and power. Consequently, merger and acquisitions (friendly and hostile) increased immensely during that period which resulted in company growing by buying other firms. Certainly money was needed to accomplish acquisition and managers during that period had several options. They were either able to bring cash through increasing their debts: borrowing money at low interest rate, or increase equity by selling junk bonds yet paying higher interest rates to compensate for higher risk, or through IPOs (Initial Public Offering) that also became popular at that period as investor were willing to buy stock believing that value of stock market would only increase with time.

The growth in the market was not an organic growth, i.e. growth excluding the effect of acquisitions and divestures the companies were not growing instead growth was the result of conglomerate merger and acquisition which are less sustainable than organic growth. It was hard to stop this market bubble even by SEC (Securities and Exchange Commission). However, this high increase in economic and credit inflation was a bad signal to the Fed which took a decision to interfere in order to control the market. Fed's decision was to increase short term interest rates, subsequently due stock investment decreased as investors are now more attracted by interest rates on saving. Moreover, cost of leverage also increased which discouraged borrowing. Consequently, stock prices started to decline, and many financial firms began using portfolio insurance to protect their portfolio from any future decline in the stock market. Institutional managers, investors were all concerned about their positions in the market and tried to hedge their portfolio. All of the above lead to the Black Monday. On the 19th of October 1987, billions of dollars of equity

were to sell, and the futures market was deteriorating. The sell orders in the market resulted in an immediate decrease in the value of Dow Jones. News started to spread, and investors fearing an upcoming stock market crash put orders to sell their equities. However, their selling orders were not completed. Promptly, the Fed took action in order to stop a banking crisis and an eventual recession in the economy. Short term interest rates were lowered again which gave the stock market an immediate boost and started to quickly recover following the October crisis. Investors were optimistic and trusted the market once again.

In addition, companies repurchased their own stock from the market which gave positive signals to the market regarding the company equities. The bull economy continued to flourish and stock prices continued to increase and reach their peak. Nevertheless, new rules of regulations were implemented after the 1987 crash to avoid a similar crisis for instance a circuit breakers that automatically prohibit trading in stocks when selling orders exceed their limits was introduced to the financial market.

3. Savings and loan crisis of the 1980s and 1990s

After the great depression of banks in 1929, the Savings and Loans Crisis was the biggest bank collapse in that period. Chairman of the Federal Reserve Board Paul Volcker and as part of his monetary policy in October 1979 took actions to halt the growth of money supply. By doing that, interest rate extremely escalated. Within months short term interest rates rose from 9.06% to 15.2%. High interest rates had a great impact on the Savings and Loan industry which started to collapse and witness great losses at the beginning of the 1980s. It is believed that the Saving and Loan industry suffer from $9

billion losses. Moreover, the net worth of Savings and loans was negative almost by an amount equal to 15 percent of the industry's liabilities.

Causes behind the Savings and Loans Crisis:

At the beginning of the 1980s, investors were more attracted to money market accounts which resulted in savings reduction. As the number of savings was decreasing, investment was also decreasing as there is less money from saving to lend. As a result, the congress took action by removing previous restriction on banks in 1982. The purpose of the congress was to encourage savings; however the impact was much larger. Now that they can issue other types of loans than mortgages, banks start to sell in the market commercial and consumer loans. Risk was not control and there were no restrictions on lending which allowed bank to get more and more involved in risky financial activities hoping to increase more their profit for instance issuing junk bonds or issuing loans without a due diligent study of the customers. The graph below shows losses caused by the saving and loans crisis.

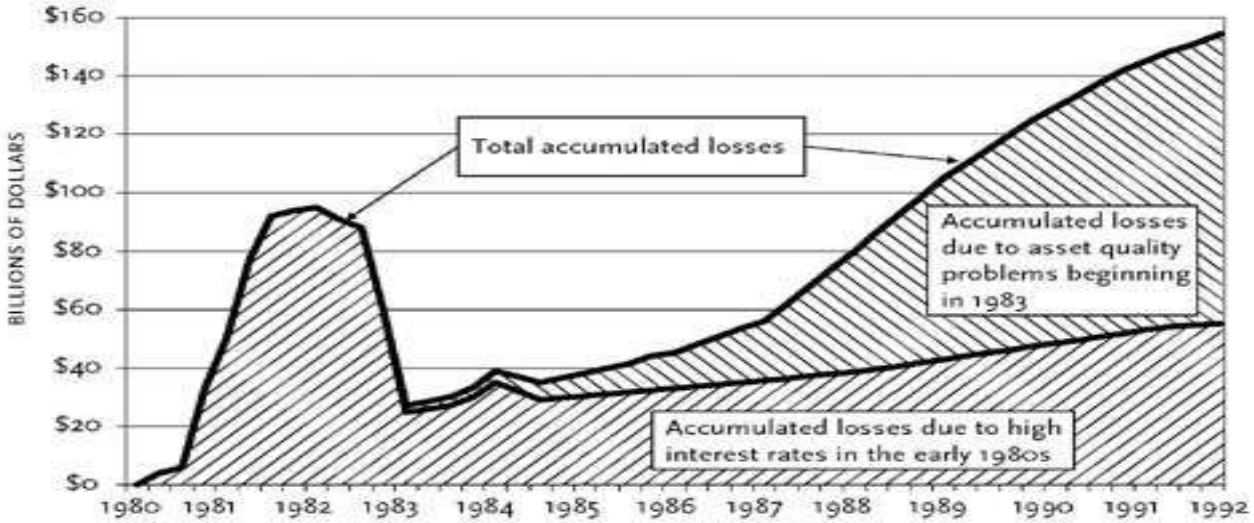


Figure 9: FSLIC/Resolution Trust Corporation's Accumulation of Losses during the 1980s and Early 1990s (quarterly estimates-June 30, 1980, to June 30, 1992)

This aggressive approach of the banks resulted in an eventual bankruptcy on the bank in the country as many people were defaulting on their loans and the banks sources of funds savings were shrinking. Moreover, a high percentage of the savings and loans were not profitable (35 percent). All of the above obliged several banks to close, and Federal insurance were running out of money. Saving and loans that didn't default were considered as bad loans which kept losses increasing.

By the end of the 1980, and under the presidency of George H.W. Bush the Congress was determined to intervene and save the market by implementing a new fiscal policy under which taxpayer were supposed to finance losses. A government agency was created – Resolution Trust Corporation (RTC), the role of this agency was to buy defaulting Loans from banks, and to issue bonds with no risk as they were backed by the trust of the government. Banks were again capable to provide money to their depositors when requested. Furthermore, and due to the large losses caused by this crisis; $50 billion dollars and banks bankruptcy, new regulations were implement to control the Savings and Loan industry to prohibit a new similar crisis from emerging.

C. Comparative Analysis

1. Dot-Com Bubble (2000)

In the late 1990s the world was witnessing a technological boom, the shape of industries was changing towards become more technological dependent. Everybody was relying on technology; technological industry was dominating and all investors seeking profit and sustainably found in the technology market the right place to invest. The elevated

number of investments in the technology industry pushed the price of its equity high. Yet, this increase in the equity market did not reflect the true intrinsic value of the stocks. An example that shows the high increase of the stock market in the price of NASDAQ Index who reached 5000 in 2000 after being 1000 in 1995, later on Nasdaq lost 78% of its value when it dropped again to 1114 in 2002. The graph below show the change of Nasdaq index during that period.

Figure10: The NASDAQ Composite index spiked in the late 90s and then fell sharply as a result of the dot-com bubble.

a. Major Events that caused the Dot-com Bubble

As previously discussed in the 1990s several investors were attracted by the technology market. They were looking for an industry that was booming. Technology industry was the right place to invest as its growth figures appealed investors believing that they will profit from such investment. Therefore, investment in all technological fields was humongous. Everybody wanted a share in companies providing technological services

such as internet, networking, information technology...etc. Investors were able to become shareholders in companies providing these services through IPO and secondary market.

Figure11: NASDAQ composite 1993-2002

Companies were able to sell immediately all their issued shares as people were eager to hold such stocks without a clear due diligence study on companies.

In reality, not all of these companies were successful, some of them started losing right after their initial public offering; and as speculators were blindly investing their money in this sector their losses started to accumulate. For instance, 1999, people witnessed 457 IPO, they were mostly related to the internet and technology industry. After one day of trading, 117 out of 457 IPO were able to double the price of their issued shares. Yet, two years later this boom in IPOs decreased dramatically to reach 76 in 2001 without major increase in their prices when investors start to trade their stocks.

This unusual and extreme boom in the equity market was the dotcom bubble. Some economists believe that this bubble was the resulting in investing blindly and immediately in firms that were not correctly priced by the market and that were promising an unreachable growth.

b.Actions taken by the Fed

In order to control the results of the Dotcom Bubble crisis on the market, the Federal Reserve had to interfere and change its monetary policy by modifying interest rates on several occasions.

The Fed continued to decrease the interest rate from 1995 until 1999. After 1999 the FOMC increased interest rate believing that a change in the monetary policy from restrictive to expansionary was essential to help the economy. Under the expansionary monetary policy followed by the Fed rates continued to increase for four years yet once again the Fed was moving towards a more restrictive policy in 2001 by decreasing interest rates quickly. During one year, interest rate reached 1.75 percent declining form 6 percent. This cycle of increasing and decreasing interest rates continued until the Fed was determined to stop its restrictive monetary policy in 2006 and the rate was stabilized at 5.25 percent.

c.End of the Dot-com Bubble

As in every crisis the Dot-com Bubble resulted in great losses on all levels. Investors and companies were immensely suffering from the drop in their capital value. These losses on investors and companies halted the growth of the economy that its recession was no less than the 1929 crash. Following this crash in the market, and in order to prevent more losses and similar crisis new rules and regulation to direct market trading were implement. These new regulations were a must so the market can recover and economy could start growing again. Examples of these reforms were setting a minimum amount of $25000 as deposits in banks so investors can trade. Corporate governance and

financial disclosure were applied on the companies. The work CEO and CFO were closely observed, they lost from the total freedom of making decisions. Companies had to disclose all the information related to their investments and projects so investors get a clearer view on where they are investing their money.

d.Criticism of the Monetary Policy

Actions taken by the Fed were highly criticized by some economists. They believed that the Fed took an ex-post action on the Dotcom bubble, whereas actions could have been taken previously as the market was showing real signs of an upcoming crisis. Moreover, even when the Fed decide to intervene at a later stage and after the crisis cracked the market, its action were not effective as the interest rates should not have been decreased more than 4 percent in one year. John B. Taylor argued that not only the Fed waited too long, but amount by which they decreased interest rates was more than needed.

e.Data Analysis of The Main Economic Indicators

i.GDP:

Economists measure the country output by using GDP which is the gross domestic product. GDP is the most important indicator of the economy status. According to many theories in economy, to consider that an economy is witnessing recession GDP growth should be negative during two or three consecutive quarters. As per the Bureau of economic research, recession is a description of a major decline in the economy decline for several months. Surprisingly, during the Dotcom bubble crisis between 2000 and 2001, the

GDP did not register three consecutive quarters with negative growth. Furthermore, starting 2002 the U.S economy was able to rebound and to recover on a slow pace. Growth in real GDD was 1.59% and all GDP figures during the quarters were positive. A year after the growth in the economy was happening on a faster pace. Growth in GDP reached 3.5 % in 2004. The graph below shows growth in GDP between 2000 and 2003.

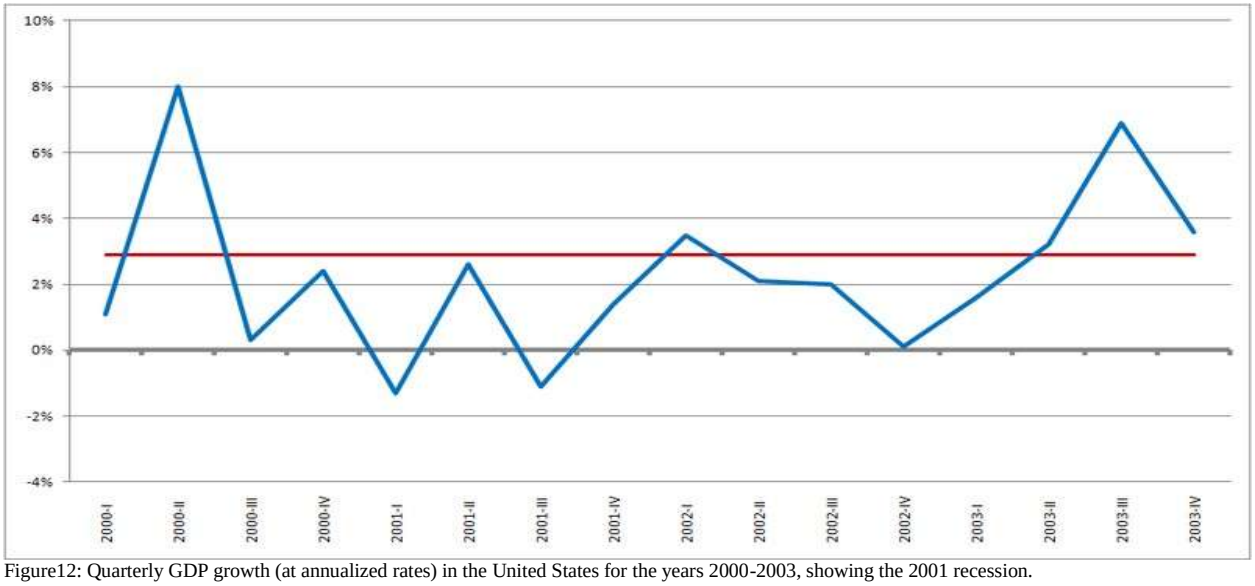


Figure12: Quarterly GDP growth (at annualized rates) in the United States for the years 2000-2003, showing the 2001 recession.

ii.Unemployment:

Another important indicator in the economy is unemployment. Unemployment is measured by the number of persons who wants to work, looking for a job opportunity but unable to find a job divided by the total workforce. In the U.S the non-farm payroll is a figure that was developed to count the number of employed and paid workers in the United States. This figure excludes government employees, private household employees, workers that assist individuals in nonprofit organizations and farm employees.

According to the numbers submitted by the Fed, in the beginning of 2000 non-farm payrolls figure was positive, showing 1,400,000 new jobs. However during the same year, companies started to lay off their employees and job offers were decreasing. Not surprisingly, the sector that was suffering the most during that period was the technology sector as the Dotcom bubble was striking. Non-Farm Payrolls decreased in June, 2000 by 46000 but due to the recovery in the market and the Fed intervention the non-farm payrolls was showing positive numbers again by the end of the year. In conclusion, year 2000 and despite the Dotcom bubble was showing positive employment rate. The change during this year was an increase of a total of 1,950,000 or 3.9%. The graph below shows unemployment rates in the US between 1998 and 2001.

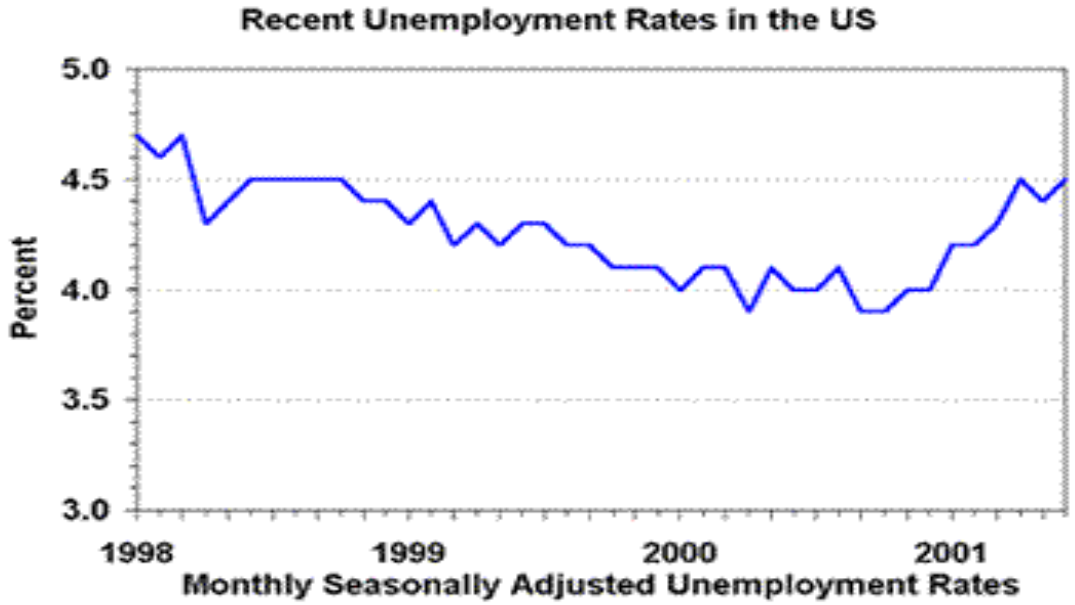


Figure13: Recent Unemployment Rates in the U.S (1998-2001)

The positive trend of employment in 2000 did not continue in the following year. The situation was worse. Non-farm payroll figures showed a how badly employment rate was decreasing. A shocking number of 1,700,000 jobs lost were witnessed by the market.

Unemployment rate increased above 5%. Fortunately, this negative trend did not continue during 2002 which witnessed despite being little but positive signs. In June 2002 as per the non-farm payrolls figure 7000 new jobs were created in the market. In 2003, the figures of unemployment continued to recover at a very slow pace yet showing new 87000 jobs in the market despite the fact that unemployment rate was at its highest in the second quarter of 2003 reaching a rate of 6.3%. The following years, the economy was recovering the employment rate was back to its normal level and 2,000,000 new jobs were offered in the market during each year.

iii.Equity Markets:

Equity Markets is the stock market where outstanding shares of companies are bought and sold.

To enter the market as a trader and become holder of stock, shareholders do that through a secondary market and over the counter markets. Investors can also buy shares when companies issue their shares through IPOs.

The equity market is a very important indication of the economy situation. It shows how much investors trust different companies stocks in order for them to invest their moneys in their stocks and become shareholders and owners in those companies. The purpose of buying an equity share is that investors believe that a company will witness growth which will allow them to see their capital appreciating. Therefore, an increase in the capital market is a signal that investors are predicting higher growth and higher profits in the market. In other words, the economy is forecasted to witness positive and strong

growth. Whereas, when equity market is decreasing, it is explained as a signal of an upcoming weak economy, negative growth and earnings.

The Dotcom bubble had negative effect on both S&P500 and Dow Jones indexes during 2000. This is due to investors being more pessimistic about future growth and expecting in decline in equities' value. Therefore, investors believing that the technology crisis will definitely hit negatively the market started to sell their shares. Due to the high number of investors wanting to sell their shares big indexed were witnessing large losses for example Dow jones lost 6% of its value, S&P lost 9% of its indexes in the first year of the crisis. These losses were larger during the second year to reach a range of 14 to 20%. Luckily at the end of 2002 and beginning of 2003 the negative trend was halting and economic recovery was starting. Indexes gained back their value for example S&P value increased by 29% and Dow Jones by 25%.

iv.The Debt Securities:

Debt securities are also economic indicators. They are several types of Debt Securities: Bonds, CDs, Treasury bills, zero coupon bonds, mortgages and asset backed securities...etc. Government issues debts securities in order to decrease money supply in the market, whereas, firm issue debt securities to raise capital especially when the cost of leverage is lower than the cost of equity. Debt securities are also known fixed income securities because of the income of investors is mainly determined through a fixed yield. Debts securities are structured such as they pay coupon or interest yield on their face value. Fixed income securities could be bough directly from the issuer on through the secondary

market. The price an interest rate on debt securities is directly related to the status of the economy. When the economy is weak and risk is high, interest rate on debts increase and the price of the underlying asset decrease, this is due to investors requesting higher revenues for holding riskier assets. Furthermore, when risk in the economy is increasing investors tend to invest in safe issues with better rating such as government bonds.

During the Dotcom bubble in 2000 long term interest rate were lower than short term interest rate, the highest yield (6.65%) was on 3 years note whereas the 10 year note was equal to 6.52%. The inverted yield curve was a natural sign of an upcoming recession in the economy and maybe a further decrease in interest rates. Pessimistic regarding the short term growth of the economy, investors were willing to move from their preferred habitat and started to invest in long term debts. Certainly, the Fed had to intervene in order to change the shape of the yield curve back to normal. As being responsible of the monetary policy, the fed immediately decreased short term rate below long term rates.

Following the intervention of the Fed, yield on 3 year note were 1.51% whereas 10 year notes had a rate of 3.33. When the Dotcom bubble ended, once again rates were increasing to reach the following numbers: yield 10 yeas U.S. Government note was 4.56% and yield on the 3 year note was higher by 20 basis points.

2.The Sub-Prime Crisis

The Sub Prime Crisis is the latest yet one of the most austere recessions in our modern history. The Sub Prime Crisis was the results of borrowers defaulting on their payments. During that period of time, interest rate were low which encouraged banks to

issue more housing loans than selling these loan to institutions who issued bonds to buy these loans and in return receive their payments. By doing that, banks were removing the risk from their balance which resulted in issuing housing loans to risky clients. Eventually, these clients were not able to pay their debts and the crisis started.

a. Reasons behind the Sub-Prime Crises.

As stated previously, the housing bubble during 2005 and 2006 was the major cause of the Subprime mortgage crisis that started in 2007. The loans were easily issued with terms that encouraged individual to borrow. Housing loan had long term trend, attractive interest rates…etc and banks were issuing these loans without a real study on the borrower financial situation. Simultaneously, banks were selling these loans to financial institution that were willing to buy these mortgages buy issuing bonds to investors who are willing to take the risk of these mortgages backed Securities (MBO) . In return, the payments of these loans where used to pay bonds investors their coupons and principal payments. Investors in these bonds thought that eventually a price increase in real estate will protect them against the risks of these loans.

When interest rates were low borrowers were even able to sell their homes and borrow at lower interest rates. However, in 2007 and following the increase in interest rates coupled with a decrease in the price of house, the crisis started. Borrower started to default because they were not able to make their payments the value of their houses started to decrease. It was better for them to default then to pay their loans as the mortgage value was higher than the house value.

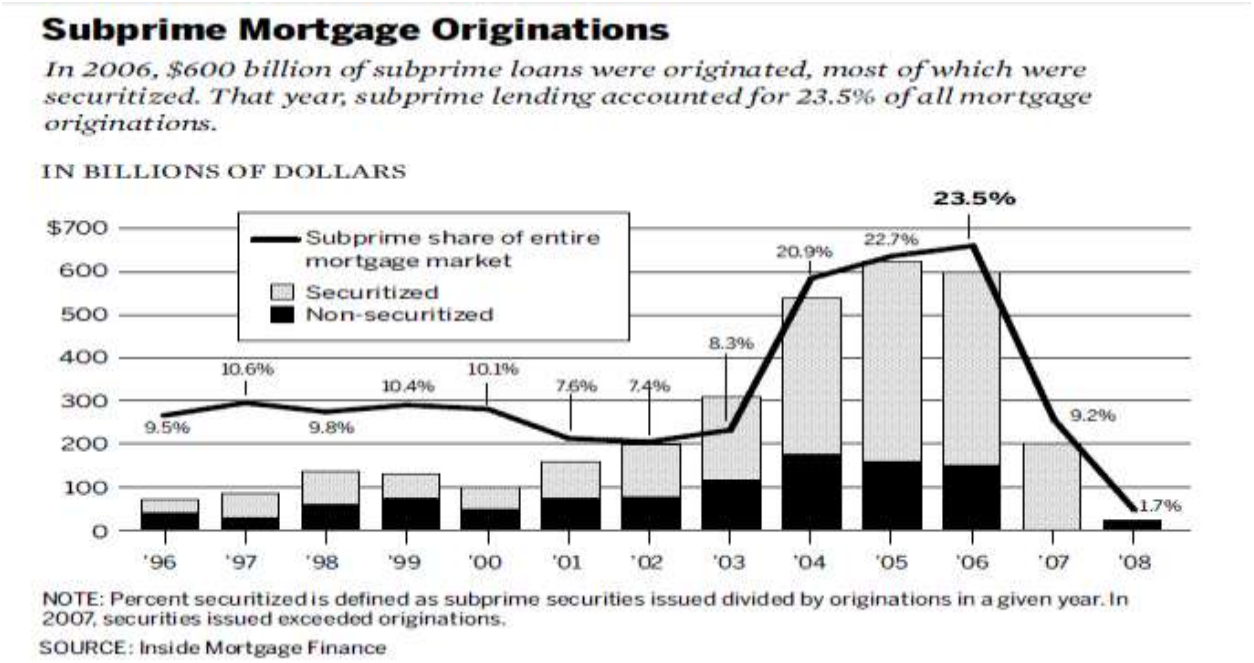


Figure14: Subprime Mortgage Origination

Soon afterwards, in April 2007, New Century Financial Corp. was the first leading subprime mortgage to announce bankruptcy. Other lenders were also closing, and credit agencies downgraded the rating of these mortgages due to their high credit risk of these mortgages was very high which lower. Lenders were not able to make their payments to all the tranches in the MBS not even to prime tranches. Without any doubt, following these events demand on housing loans decreased coupled with a decrease in the prices of houses. Fannie Mae and Freddie Mac, the two highly rated institutions backed by the full faith of the United States government were also suffering. The mortgages that were pooled to issue bonds from were also defaulting. Eventually, the US government as a sponsor to Freddie Mac and Fannies Mae had to seize them in order to protect their image as the only country rated default free in the world.

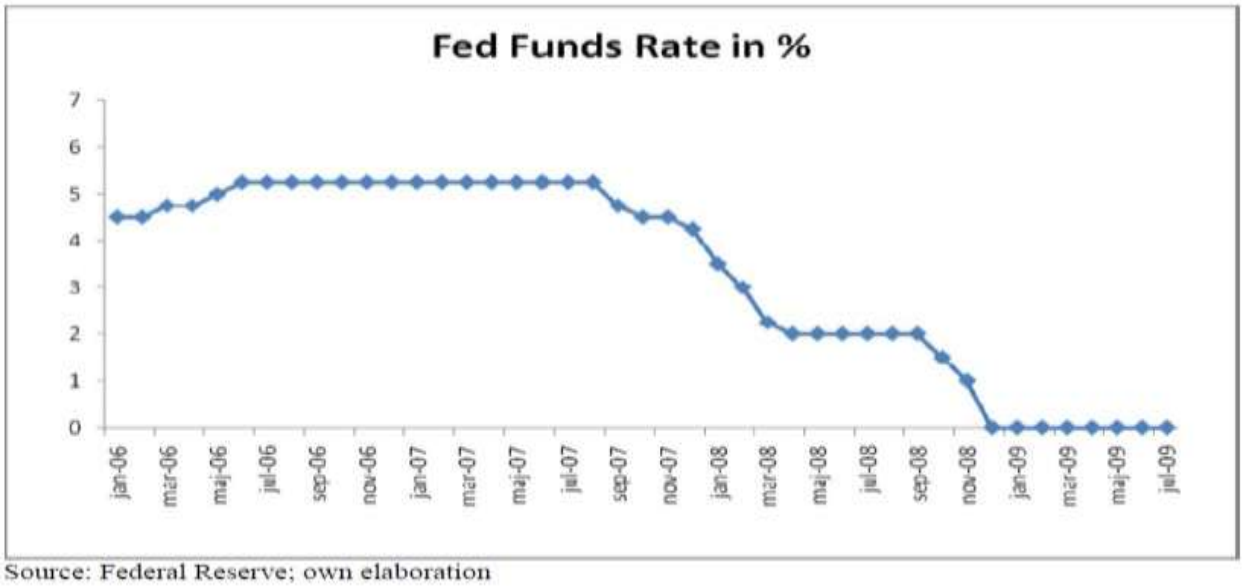
Moreover, as a natural response to this crisis, terms on housing loans were becoming stricter which decreased the demand on such loans even more. Borrowers were trying desperately to sell their homes in order to avoid legal action, but with low homes prices lenders were willing to accept an amount less the mortgage amount. It was like a domino effect, everything was collapsing.

b.Actions taken by the Fed

As a direct response to the crisis, the Fed took several actions to save the economy and this sector. First of all, the Fed lowered interest rates dramatically. Short-term interest rates were around zero in 2009. The Fed was also determined to lower long term interest rates to help the economy to boost.

Lowering interest rates was not the only step taken by Fed. Money supply was also another monetary tool used by the Fed that started to buy long term Treasury bonds to increase liquidity in the market and also started to buy the defaulting mortgages backed securities. Moreover the Fed started QE (quantitative easing) to fuel the market with liquidity. Through his intervention in the market the Federal Reserve was able to decrease unemployment levels while inflation remained low (Bernanke 2013; Yellen 2013). Along with other actions, in 2012 the housing market was improving. The amount of unsold homes was decreasing especially the during the crisis years, the amount of new constructions was little.

Eventually, construction started to increase along with a higher home price. Furthermore, the percentage of housing loan defaulting was back to its normal level (before the recession) in mid-2013. Below is a graph that shows interest rates during that period.



Source: Federal Reserve; own elaboration
Figure15: Fed Funds Rate in %

c. End of the Sub-Prime Crisis

A crisis such as Sub-Prime Crisis needed a very hard work from the Fed. The US economy was losing confidence and the whole world was affected from it. The Fed had to act quickly and effectively in order to fight this recession by helping the market to rebound from his recession. An emergency plan to supply the market with money in order to increase liquidity was an urgent need. 400 000 homeowners were insured with an amount of 300 billion dollars. Moreover, similar to any crisis new regulations were applied. Far more than that, new regulator was created, The Federal housing Finance Agency (FHFA) through the merge of the Office of Federal Housing Enterprise Oversight (OFHEO), and the Federal Housing Finance Board (FHFB). The role of FHFA was to supervise and regulate the operations of 14 housing government-sponsored enterprises including Fannie Mae and Freddie Mac.

In order to support the 14 housing government-sponsored enterprises, 800 000 billion dollars were added on the national debt ceiling.

Moreover, some solutions to the previous loans that were defaulting was issue new terms for instance giving a new 30 years to borrowers to repay their loans. Another solution was that homeowner had to share any price appreciation of their homes with the Federal Housing Administration whereas the lender will bear losses if he reduces the amount of the initial mortgage.

d.Criticism of the Monetary Policy

The Federal Reserve was criticized on not responding promptly and previously to the crisis. The Fed waited until 2007 to start lowering interest rates. Moreover, it was in the September 2007 after two and a half years of monetary tightening, that the Fed started its monetary expansion plan. Previous to these two years, the Fed was worrying about how to control inflation instead on focusing on the real problem at that point: growth and economic stability (Bosworth and Flaaen 2009). The Fed was prioritizing the inflation problem letting the economy to fall more and more in recession despite the fact that all the signs were pointing to the real problem.

The Fed was also being criticized by taking small actions to solve a huge problem. Some economists believed that more aggressive interventions by the FED should have been taken. They argued that the risks rising from some more aggressive interventions are sometimes a must to enhance the economy.

The late intervention of the Fed made was its major mistake, the housing bubble was reaching its peak, and the financial markets were suffering from bad debts and people defaulting before the FED took action.

e. Data Analysis of The Main Economic Indicators

i. GDP:

Due the housing bubble, the economy was suffering from recession that started at the end of 2007. The Gross Domestic Product (GDP) was decreasing. Figures showed a decreased by 0.2 percent which contradicts previous growth of 0.6 percent.

The GDP figure was a bit better during the first quarter of 2008, yet the following two quarters during the same year witnessed a negative growth in GDP. The GDP growth was significantly decreasing during the last quarter of 2008; it was equal to 1.6 percent. The first quarter of 2009 did not carry on good news; on the contrary the GDP figure was as bad as the previous. Since the World War 2, the US economy never suffered from such a decrease in the GDP which reflect the huge negative consequences of the housing bubble on the economy.

ii. Unemployment:

Along with a low GDP, job opportunities were decreasing and unemployment rates were increasing. Starting 2008 the market was witnessing a negative rate of jobs and the number was only getting worse. At the beginning of 2008 100 000 jobs losses were accounted per month, and this number increased to 681 000 per month in December During that year an overall number of 3 million lost job was accounted. The 2009 started to show

even worse numbers of unemployment, the first quarter witnessed around 700 000 jobs losses. In April 2009, although 540 000 employees were out of their jobs yet the Fed considered this number as a positive sign of an improving economy despite the fact that during that month, 70 000 jobs were created by the public sector.

iii. Equity Market:

With no doubt, markets in 2008 were suffering from the Subprime Crisis. The negative growth and the recession hitting the economy were only sending bad signals to the investors. Investors, started to lose confidence in the market and their first reaction was to starting selling their shares, fearing a large loss in the future.

During the beginning of 2008, the equity marked was not performing its best but was still working properly. Nevertheless, starting the end of September and following the bankruptcy of the Lehman brothers which was considered one the biggest investment bank in US, the market was under a shock. Investors lost trust in the market which resulted in a very sharp decrease in the prices of the main indexes: 30%.

All Controllers of the Economy: The Federal Reserve, the Securities and Exchange Commission (SEC) and the government were facing a major problem and their combined intervention was a most to save the market.

Fortunately, they all held responsibility. The SEC implemented new regulations, short selling restrictions. The government took action by buying defaulting loans and backing enterprises that were suffering. The FED was increasing liquidity in the market through heaving money supply.

iv. The Debt Securities:

All investors lost trust in the market due the financial collapse. The Lehman Brother bankruptcy was a major shock to all investors who were not willing to invest in debt securities anymore. Finding a difficulty in raising debts, banks and firms were unable to optimize their capital structure. Investors changed their preferences and started to invest in more secure fixed income securities such as Treasury bills and bonds. Commodities such gold were also considered as a safe investment. The following numbers show the yield on the T notes and other fixed income securities.

In early 2007, the yield on 10 years U.S. T-note 4.56% yield, it went down to reach 2.5% by the end of 2008. By the end of 2008 the yield was around 1%.

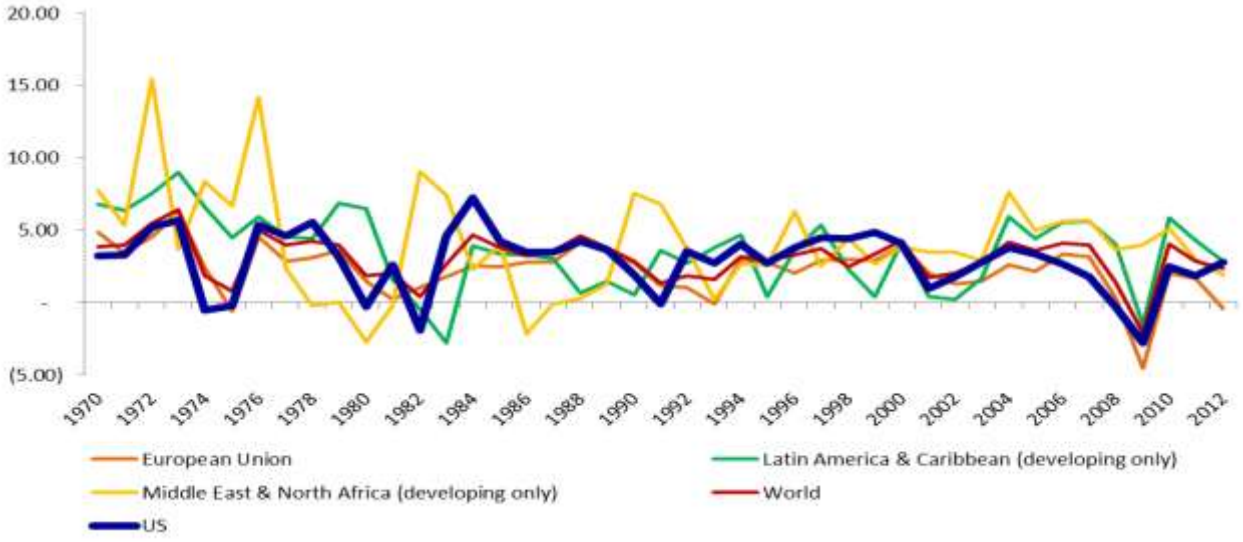
CHAPTER IV

EMPIRICAL MODEL

A. Econometric Model:

U.S. monetary decisions are watched and followed carefully by each and every single Central Bank in the world and taken into consideration by every economy, because somehow it is going to affect everyone. Graph 1.1 shows how most of the regions follow the economic performance of U.S., the World tracks the tendency of this hegemony that have been dictating the economic path since little after it independency.

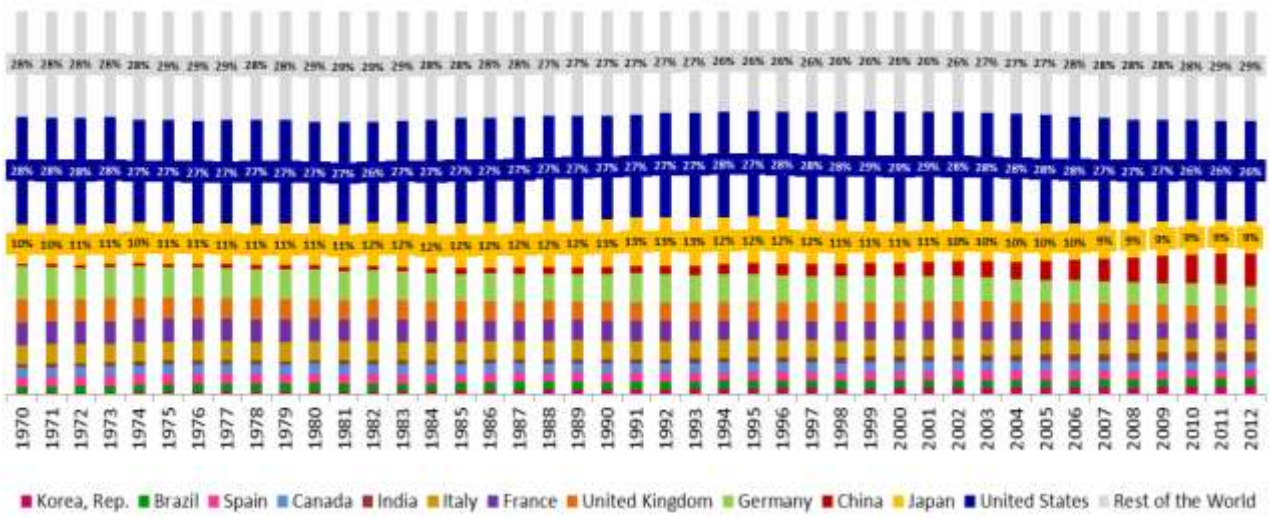
Graph 1.1 – GDP Growth (%)



Although still occupying the higher place in the economic podium, the hegemony of U.S. is being gradually reduced. In graph 2 it is clear that the participation of U.S. GDP in the total of the world slightly decreased, especially after 2008 event new players started to

assume major importance in the world growth, especially Asiatic countries like Japan and China.

Graph 2 – GDP Participation (constant 2005 US$)



Source: World Bank Data. Note: Graph elaborated by the authors

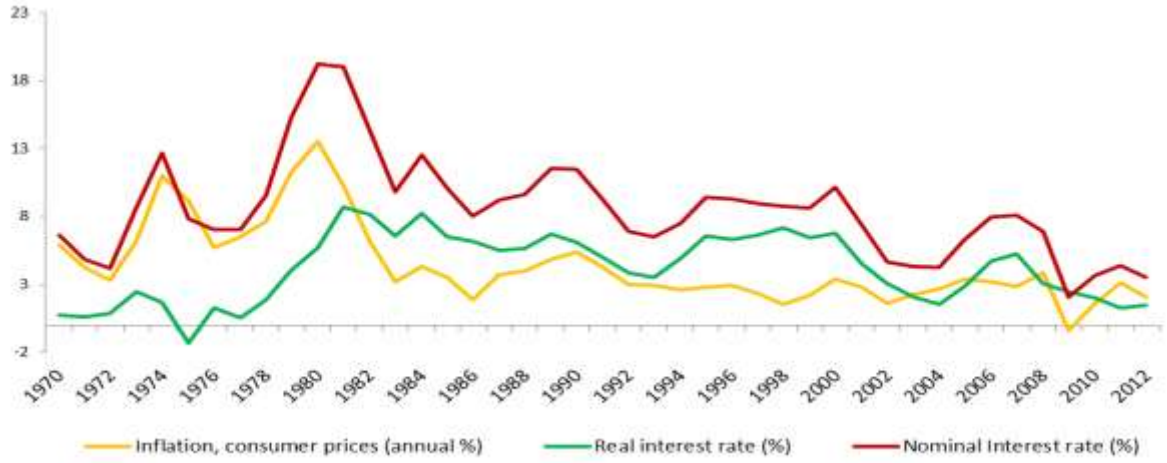
However it significance, U.S. is like every other economy, it experienced periods of instability and recessions, the first and most memorable until 2008 was the stock market crash in 1929, the first crises known as the great depression, a date to remember for all the nations and avoided to be repeated by all the Central Banks.

Taylor, J. (1999), identifies in his work three different eras for monetary policy in U.S., where he analyses the level of responsiveness of the interest rate. First from 1879 to 1914 where the short-term interest rate was unresponsive to fluctuations in output and inflation, so this era was defined by economic instability. Second from 1960 to 1979 where the short-term interest rate became more aligned to macroeconomic fluctuations, but the nominal interest rate did not response, so the country started to face more stability and

finally between 1986 and 1997 the nominal interest rate was totally responsive to the macroeconomic scenario and stability could be experienced.

In graph 3 it is clear the level of alignment between the variations of Inflation, real and nominal interest rates, where the gap between those variables reduced significantly along the years, just like mentioned by Taylor.

Graph 3 – Inflation, Real and Nominal Interest Rates series



Source: World Bank Data. Note: Nominal Interest Rate was calculated by summing Inflation and Real Interest Rate. Graph elaborated by the authors.

1. Methodology

In any econometric model to have and effective framework and reach an indicative inference a statistical testing of the time series and data employed must be applied.

The Dickey–Fuller test (ADF) is used for a larger and more complicated set of time series models. The augmented Dickey–Fuller (ADF) statistic, used in the test, is a negative number. The more negative it is, the stronger the rejection of the hypothesis that there is a unit root at some level of confidence

By not eliminating the null hypothesis, and determining that x and perhaps y are non-stationary series, we would have to change each series once, create a set of lagged and differenced variables and finally carry out the ADF test (testing the series stationary at its first-differenced value).

Differencing of a series normally transforms it from non-stationary to stationary.

Once all variables are stationary (rejecting the null hypothesis- a unit root test), an estimation of unknown parameters in a linear regression model by minimizing the sum of squared residuals will take place. This OLS linear regression model consists of a dependent variable (Y), a constant (C), a set of repressors – or predetermined variables (X), and an error term for residuals.

In this thesis, country specific studies to U.S. will be carried out using OLS to test for the relationship between U.S. Money Supply and macroeconomic variables such as Real GDP growth and nominal interest rates.

The following regression is employed in the econometric model:

Model: M/P = C (constant) + Real GDP Growth + Nominal Interest Rate

Money Supply (M/P), which is M1 extracted from IMF database divided by the Inflation Rate (P) that was extracted from World Bank database. The second variable is Nominal Interest Rate (R) that was calculated by summing up the Real Interest Rate (r) from the World Bank and P. Finally the last variable is Real GDP Growth also retrieved from the World Bank Database.

The regression model has the objective to predict FED's Targets, Instruments and Goals which delineates their monetary policy.

In case of a high Standard error of Regression, a small R squared, and an F-stat with a probability higher than 5% the LM is unstable .As such the FED should target interest rates. The instrument will be the monetary base and the goal will be GDP Growth along with price stability

In case of a low Standard error of Regression, a high R squared, and an F-stat with a probability lower than 5% the LM is stable .As such the FED should target Money Supply. The instrument will be the short term interest rates and the goal will be gradual disinflation.

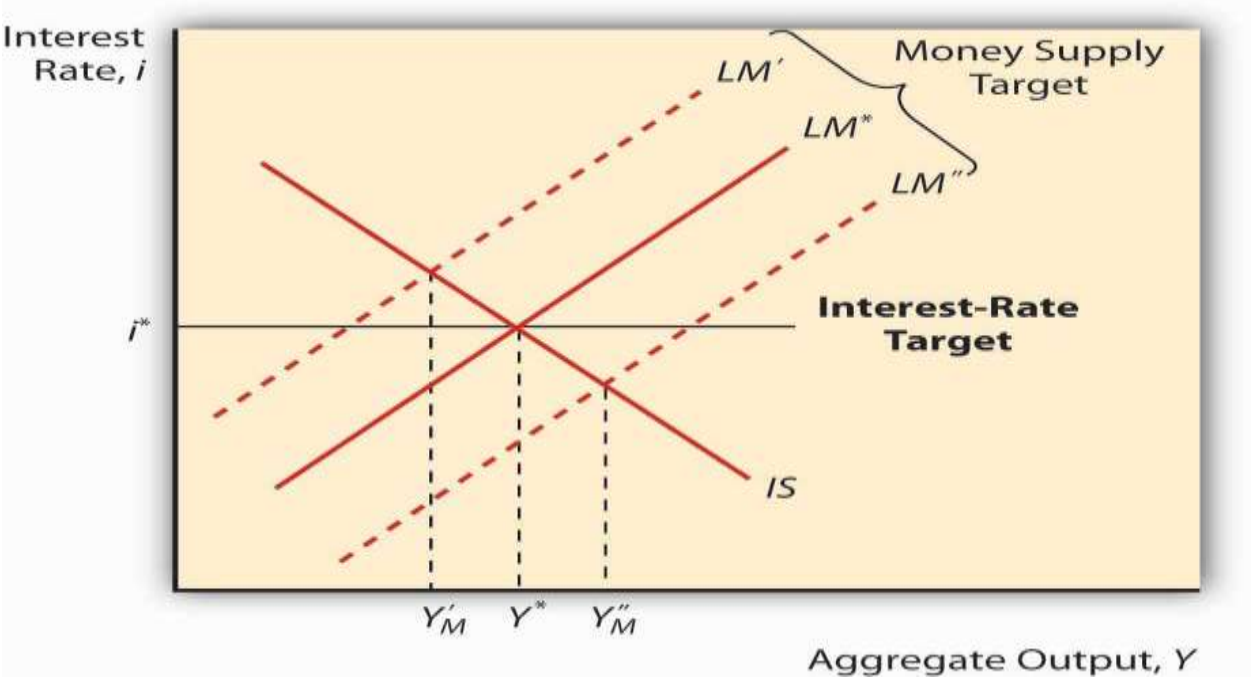
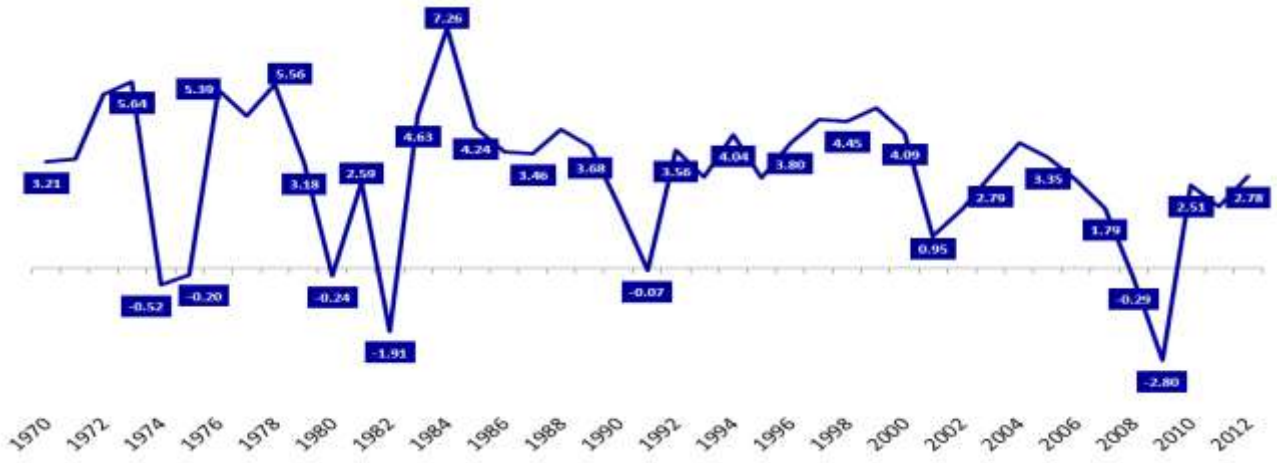


Figure16: Change in Money Supply Target

Graph 1.2 – GDP Participation



This paper is also divided in three different periods following the macroeconomic environment of instability and recessions that U.S. went through from 1970 to 2012, as can be seen in Graph 1.2, in order to understand how the monetary policy have been conducted in all these years, trying to maintain the position of a nation that can affect the world.

First period of analysis is from 1970 to 1986, because it was between 70's and 80's that this economy felt big ups and downs especially due to the Oil Crises and high inflation. The second period is from 1987 to 2000, where 90's can be considered a more stable period excluding 1978 Black Monday and the Savings and Loans crisis. Finally, the third period considers the range from 2001 to 2012, where it is possible to evaluate the effects of 2008 and 2009 when the country experienced the worst crises since 1929.

2. Additional Background Information

Before the analysis of the monetary policy it is relevant to present the evolution of some other macroeconomic elements that are essential to the understanding of the monetary scenarios presented above. One of the most important variables to the welfare of a nation is

the unemployment rate. This rate is the thermometer of the economy. Every time a country faces a recession this is the indicator that will show how deep and long this recession will be, even before the GDP Growth.

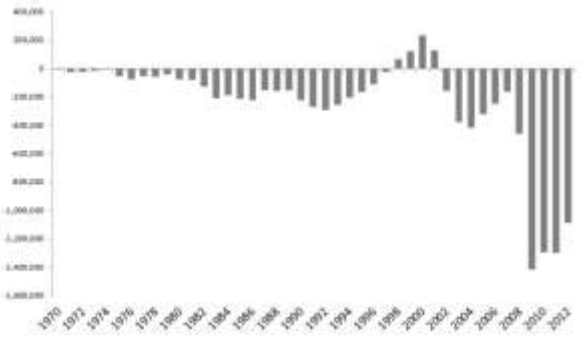
U.S. has experienced many recessions since the end of the postwar period in 1948, and this can instantaneously be translated in the variations of the unemployment rate along the years, as confirmed in Graph 4. The worst period according to this variable is also the period with the highest instability in the economy, when the country was constantly trying to overcome inflation and recession, between the 70's and 80's.

Graph 4 – Unemployment Rate (%)

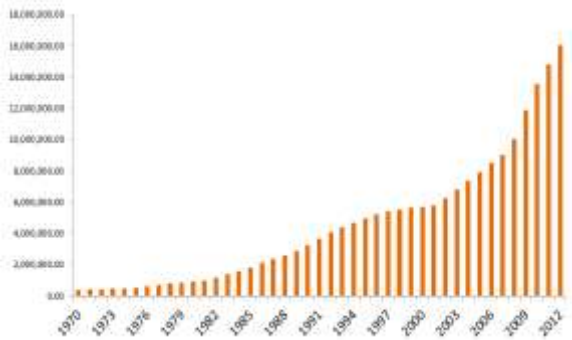
Source: Kenneth W. Smith Jr. and Dwuan June - The Washington Post.

The U.S. government has tried various methods over the years to turn around recessions and push back unemployment, including stimulus spending and tax cuts which, among other factors, led to the increase in the budget deficit during this period, and have been accumulated since then, as presented in graphs 5 and 6. During 2009-2013 Gross federal debts as a percentage of GDP has been the highest since the late 1940s. The debt has reached over 100% of GDP for the first time since the aftermath of World War II.

Graph 5 – US Deficit/Surplus



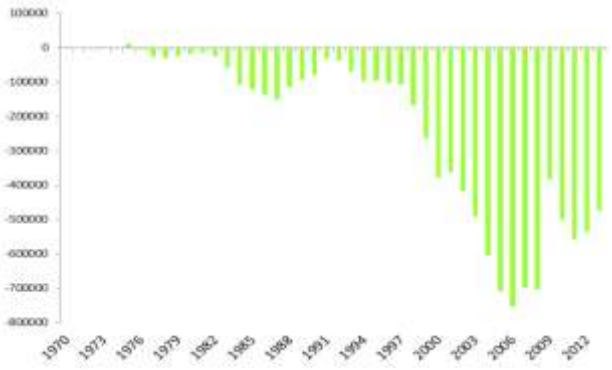
Graph 6 – Cumulative Debt (US$ Million)



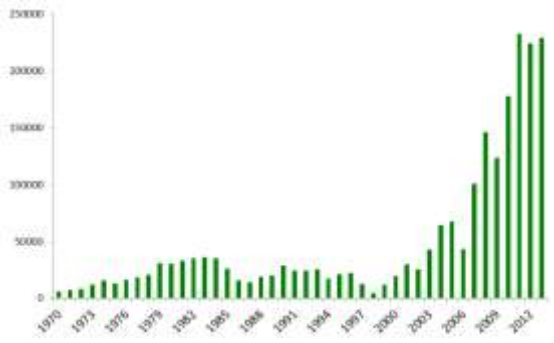
Source: White House Budget Historical & Treasury Direct

It was also during the 70's that many U.S. companies, in order to increase their profits, took the decision to manufacture goods in other countries with lower costs, leading to the ascending trajectory of many emerging countries to become exporters to the big nation. As a result of this practice since 1976 the U.S. has sustained increasingly merchandise trade deficits with other countries. The income account has been always positive, but unfortunately not enough to cover the negative influence of the good and services account that is the main determinant of the Current Account.

Graph 7 – Trade Account (US$ Millions)



Graph 8 – Income Account (US$ Millions)



Source: Bureau of Economic Analysis

3. First Period - 1970 to 1986

As mentioned before the first period of the analysis was known by the high inflation level, it was around 6.7% per year as presented in table 1, but in 1980 it reached 13.5%, the highest registered in this study. The inflationary history of U.S. date from earlier times and since late 50's early 60's the FED actuation over this matter with the growth of monetary supply have been decisive, although not the best according to Friedman.

Nelson, E (2007) summarized all Friedman's insights to monetary history, and one of them was the quote where he expresses clearly his opinion about FED's practice at that times. "Direct control of prices and wages does not eliminate inflationary pressure. It simply shifts the pressure elsewhere and suppresses some of its manifestations. The only way to stop inflation is to restrain the rate of growth of the quantity of money" Nelson, E., 2007, p.155.

This statement can indicate why wage-price policies in 1971 that started with a three months freeze did not prevent inflation to raise in the subsequent years. It was only in 1973 that the Central Bank decided to tighten the monetary policy, and according to Friedman that was when the 1974-1975 recession started[1], proving that there were other causes then the Oil shock of 1973.

In graph 10 it is possible to see the behavior of the main indicators during this period. The most interesting one, that clearly shows the monetary policy, is the monetary supply and it big oscillation during this year's. The tightening of the monetary supply in 73 deepened the recession of 74-75, like mentioned before, without promoting any effect on

[1] Nelson, E. (2007). Milton Friedman and US monetary history: 1961-2006. Federal Reserve Bank of St. Louis Review, 89(May/June 2007).

prices, what made the situation worst. The summary in table 1 shows the level of variation in monetary supply and although the high inflation and high nominal interest rate, the average rate of growth was as good as the second period and higher than the one in the last period, even when 2008 and 2009 were not considered, because of deflation.

It is also relevant to mention that was during this first period that the U.S. deficit started to increase, due, especially, to the post-war Keynesian policies that the government implemented in order to help the country recover from the negative effects that the war generated. This factor contributes for the growth performance, but also to the interest rate mismanagement and inflationary pressures.

Graph 10 – First Period Series

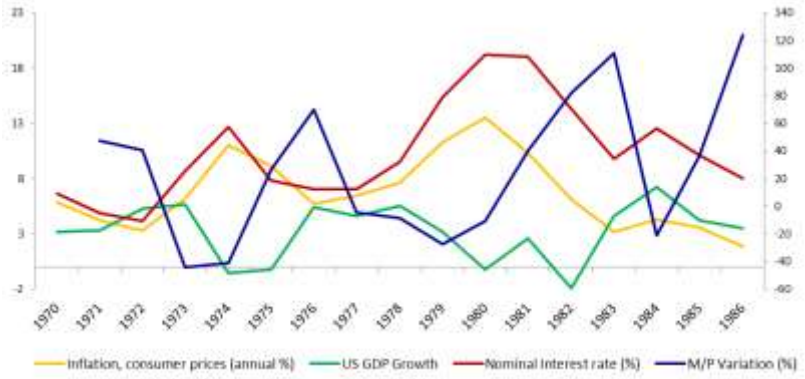


Table 1 – First Period Averages

1970-1986	Average
GDP Growth (%)	3.26
Inflation (%)	6.70
M1 Variation (%)	26.23
Nominal Interest Rate (%)	10.41

Source: World Bank Data – Inflation, US GDP Growth and Real Interest Rate. M1 Note: Total reserves comprise holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF

Only in 1975 the FED announced the practice of specifying growth rates for the monetary aggregates. "The FOMC (Federal Open Market Committee) could alter either its monetary growth targets or its prescription for the Federal funds rate if that appeared desirable in the light of information about the actual and prospective performance of the economy." (Mussa, M. L., Volcker, P. A., & Tobin, J., 1994, p. 88.). In the same year

nominal interest rate also dropped drastically in order to promote the recovery of the economy. So finally it is possible to affirm that inflation was the priority and monetary supply was the variable that should be controlled.

On 1979 all the efforts done so far by the FED were not able to control inflation, the constant rises in the discount rate and reserve requirements seemed insufficient to achieve their objective. In the end of 1979 the change in Fed's presidency to Paul Volcker brought new hope. The tight monetary policy and the recession finally brought inflation down, what finally led to a shift to an easier monetary policy again.

The first period regression does not show significant coefficients although they respect the expected sign of the Liquidity Effect View[2], where GDP is positive related to M/P and Nominal Interest rate is negatively related to the variable. The R-squared of regression 1 can be considered small proving that the monetary policy involving M/P in this period can be considered unstable, just like mentioned before by looking at the variable variation along the years.

Regression 1 – First Period

Dependent Variable: D(M_P,2)				
Method: Least Squares				
Sample (adjusted): 1972 1986				
Included observations: 15 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.34E+09	2.87E+10	-0.046631	0.9636

[2] "Money demand is a decreasing function of the nominal interest rate because the interest rate is the opportunity cost of holding cash (liquidity). So a decrease in the supply of money must cause interest rates to increase in order to keep the money market in equilibrium. We call this the liquidity effect view" (Monnet, C., & Weber, W. E., p.3, 2001)

D(NOMINALINTERESTRATE,2)	-9.11E+09	4.84E+09	-1.883392	0.0841
D(REAL_GDP)	72636896	1.23E+08	0.589661	0.5664
R-squared	0.266503	Mean dependent var		1.32E+10
Adjusted R-squared	0.144253	S.D. dependent var		6.28E+10
S.E. of regression	5.81E+10	Akaike info criterion		52.58427
Sum squared resid	4.05E+22	Schwarz criterion		52.72588
Log likelihood	-391.3820	Hannan-Quinn criter.		52.58276
F-statistic	2.179991	Durbin-Watson stat		1.690748
Prob(F-statistic)	0.155736			

Following the econometric model above and the conclusion of monetary supply instability, we can confirm that the target of the Central bank during this period was interest rate. In this situation the goal was price stability and the instrument is the monetary base. Although this result there is statements that during the 70 are FED adopted money target.

4. Second Period - 1987 to 2000

The second period of the analyzes is characterized as a more stable period, showing growth rate steadiness, better control of the monetary supply, lower levels of nominal interest rate and, the most important, effective control of inflation. It was also in this period that the fiscal discipline of the government resulted in budget surpluses and the unemployment rate gradually declined. [3]

The Greenspan era is considered a period of monetary policy success. Mankiw (2001) suggests that this period outcome also counted with a little bit of luck, because the economy did not experienced any heavy supply shock like the ones in the 70's that

[3] Mankiw, N. G. (2001). US monetary policy during the 1990s (No. w8471). National Bureau of Economic Research.

originated the inflationary pressure of the period. Mankiw (2001) adds that this period was also beneficiated by a positive supply shock, known as "new economy", where there was technological progress increased the role of information technology in the economy generating productivity growth, contributing to the decrease of prices and unemployment.

Graph 11 – Second Period Series

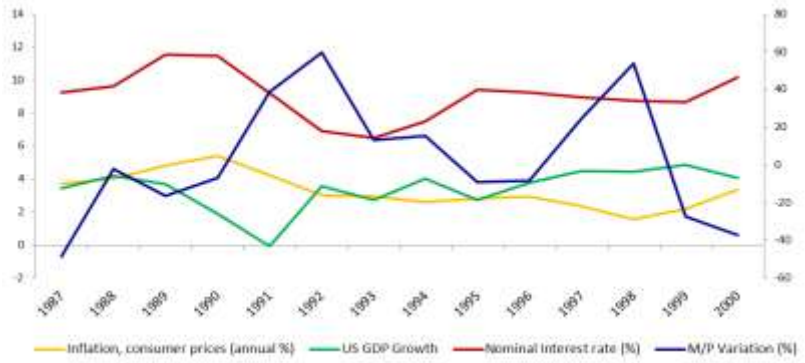


Table 2 – Second Period Averages

1987-2000	Average
GDP Growth (%)	3.42
Inflation (%)	3.28
M1 Variation (%)	3.52
Nominal Interest Rate (%)	9.09

Graph 11 clearly shows the stability of the macroeconomic variables in the second period. The only downturn in this series happened right in the beginning of Greenspan's mandate when a drastic drop in the stock market gave evidences of the start on a new recessionary period. Inflation started once again an upward path and in order to deal with it interest rates followed the same direction, this together with other factors, resulted in the recession of 1990[4]. This period survived the recessions in Mexico and Asia the breakdown of the former Soviet Union and still remained the best years for the economic performance of the country.

Mnkiw suggests that the success of the 90's is due to the fast and higher responsiveness of the interest rate variation to every oscillation in prices. He states that in 60's and 70's when the economy was suffering from spiraling inflation there was an

inadequate response of the interest rate to inflation, "when inflation rose by 1 percentage point, the federal funds rate rose by only 0.69 of a percentage point" (Mankiw, N. G., p. 38, 2001) later in the 90's, the situation was different, "when inflation rose by 1 percentage point, the federal funds rate typically rose by 1.39 percentage points" (Mankiw, N. G., p. 39, 2001). This finally was able to put inflation under control and adopt interest rate targets. This led Mankiw to a conclusion where "the U.S. experience with monetary policy during the 1990s teaches a simple lesson. To maintain stable inflation and stable interest rates in the long run, a central bank should raise interest rates substantially in the short run in response to any inflationary threat." (Mankiw, N. G., p. 39, 2001).

Regression 2 – Second Period

Dependent Variable: D(M_P,1)				
Method: Least Squares				
Sample (adjusted): 1989 2000				
Included observations: 12 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.53E+11	2.64E+11	0.959059	0.3626
NOMINALINTERESTRATE	-2.69E+10	2.87E+10	-0.939168	0.3722
D(REAL_GDP,2)	60721139	3.20E+08	0.189575	0.8538
R-squared	0.146635	Mean dependent var		1.05E+10
Adjusted R-squared	-0.043002	S.D. dependent var		1.24E+11
S.E. of regression	1.27E+11	Akaike info criterion		54.18567
Sum squared resid	1.45E+23	Schwarz criterion		54.30689
Log likelihood	-322.1140	Hannan-Quinn criter.		54.14078
F-statistic	0.773241	Durbin-Watson stat		1.700467
Prob(F-statistic)	0.489900			

In the second period regression the variables still follow the expected signs of the Liquidity Effective View but both of the coefficients remains insignificant.

With a R-squared of 0.146, that can be considered low, and a Prob (F-statistic) much higher than 5%, we can reach the conclusion that monetary supply was unstable meaning that although the changes in the monetary police along the years the Central Bank had as target the interest rate, as goal inflation stability and as instrument the monetary base. This corroborates the history presented above of the monetary policy practiced by Alan Greenspan.

5.Third Period - 2001 to 2012

In this period U.S. economy suffered the most destructive shock since 1929. In 2006 the country started to feel again the beginning of drawback of its economic performance and in October of 2007 this crises was spread to the whole world with the burst of the housing bubble when derivatives market and subprime mortgage where affected and the dollar value experienced dramatic fall.

The recession led to a reduction in record trade deficits, which fell from $840 billion annually during the 2006–08 periods, to $500 billion in 2009, as well as to higher personal savings rates, which jumped from a historic low of 1% in early 2008, to nearly 5% in late 2009. The merchandise trade deficit rose to $670 billion in 2010; savings rates, however, remained at around 5%.The United States economy experienced a crisis.

Graph 12 – Third Period Series

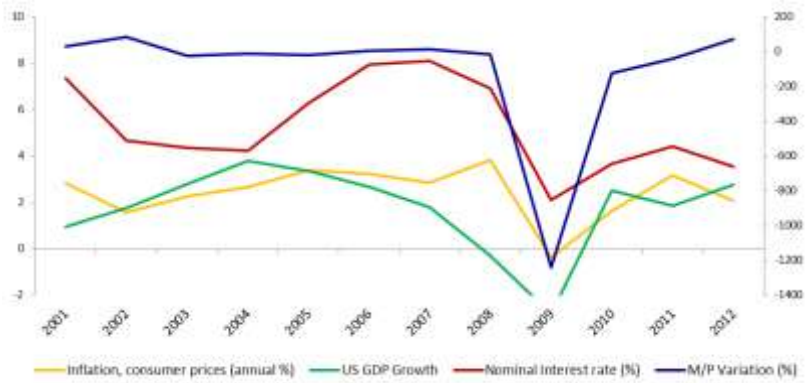


Table 3 – Third Period Averages

2001-2012	Average
GDP Growth (%)	0.97
Inflation (%)	1.84
M1 Variation (%)	(100.44)
Nominal Interest Rate (%)	4.79

After the year 2000 and more specifically between March and November 2001 the U.S economy faced a moderate recession largely due to the decline in stock prices following the Dotcom boom, several geopolitical uncertainties after the attack of September 11 2001, many corporate scandals in 2002 and the Iraq's Invasion in 2003.

As we can see in graph 12, after the positive evolution of the nominal interest rate in the beginning of the 2000's, there was a quick decrease in the federal funds rates after the 2001 recession from 6.5 % (late 2000) to 1.7 % (late 2001) and 1% (Mid 2003). Only in 2004 FOMC started to increase the rate again reaching 5% in 2006 and stabilizing it for a while afterwards.

During 2002-2006 Fed followed a low policy rates rule, accompanied many times by forward guidance on policy from the Committee. This explains the lower average of the nominal interest rate, table 3, from the three periods analyzed (4.79%). Inflation was finally controlled but growth reached the lowest values in the time series.

Since the crisis, the zero bound and quantitative easing were the main policies adopted. After the financial turmoil in 2008, the Fed cut the funds rate aggressively:

- First, by 50 basis points from 2% to 1.5% on October 7th in a coordinated action with other major central banks.
- Then, by 50 basis points 3 weeks later at a scheduled meeting on October 28th.
- And finally, by 75 basis points at the scheduled meeting on December 15th, bringing the funds rate to 25 basis points.

And as we know, the rise in unemployment, the fall in expected inflation and the decline in the neutral policy can fully account for the Fed's decision to go to the zero lower bound.

Beginning in September 2007, in a series of 10 moves, the federal funds target was reduced from 5.25% to a range of 0% to 0.25% on December 16, 2008, where it has remained since. So in the fall of 2008, after hitting the zero lower bound, the Fed announced in November 2008 an explicit, massive LSAP (large scale asset purchases) campaign to purchase MBS (Mortgage-Backed Securities) of up to $600 billion.

In March 2009, the FOMC decided to substantially expand its purchases of agency-related securities and to purchase longer-dated Treasury securities, with total asset purchases of up to $1.75 trillion. Gagnon and Neely (2010) provide an excellent overview of the design, implementation and the impact of the LSAP program on financial markets. The LSAP programs had an even more powerful effect on longer term interest rates on agency debt and agency MBS by improving market liquidity and by removing assets with high prepayment risk from private portfolios.

In December 2012, the Fed wanted to maintain exceptionally low rates at least as long as unemployment is above 6.5% and inflation is low.

On September 13, 2012, the Fed began a new round of quantitative easing, pledging to purchase mortgage-backed securities and Treasury securities each month until the labor market improves, as long as prices remain stable. On December 18, 2013, the Fed announced that it would begin to gradually reduce the rate of its monthly asset purchases. Debate is currently focused on the proper timing for ending unconventional policy measures and moving away from the zero bound.

To sum up, from 2008 till present and with the federal funds targets at ZLB (zero lower bound) and the additional monetary stimulus (through purchases of MBS) known as quantitative easing, the Fed's balance sheet quadrupled since the financial crisis began, reaching $4 trillion at the end of 2013.

Regression 3 – Third Period

Dependent Variable: M_P				
Method: Least Squares				
Sample (adjusted): 2003 2012				
Included observations: 10 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.34E+10	5.23E+11	0.082990	0.9362
D(NOMINALINTERESTRATE,2)	1.37E+11	3.84E+11	0.356905	0.7317
D(REAL_GDP,2)	1.84E+09	3.37E+09	0.545087	0.6026
R-squared	0.293970	Mean dependent var		1.04E+11
Adjusted R-squared	0.092247	S.D. dependent var		1.73E+12

S.E. of regression	1.65E+12	Akaike info criterion	59.34647
Sum squared resid	1.91E+25	Schwarz criterion	59.43724
Log likelihood	-293.7323	Hannan-Quinn criter.	59.24689
F-statistic	1.457295	Durbin-Watson stat	1.743119
Prob(F-statistic)	0.295721		

In this case the regression shows a relation that does not represent what the country had experienced in this period. It is possible to see evidence of an unstable money supply, but this period presented a more stable M1 as we can see in graph 12. On the other hand interest rate was constantly changing as a result of the monetary policy to increase growth.

Something new that this period shows is a change in the sign of the correlation between nominal interest rate and money supply. In this period those variables present a positive correlation that can be explained by the rational that "high inflation rates are associated with high money growth rates, the Fisher equation suggests that an increase in interest rates requires an increase in the money growth rate. We call this the Fisher Equation View." (Monnet, C., & Weber, W. E., p.4, 2001).

Based on the results presented above, we can say that money supply is unstable, meaning that the American monetary policy has an unstable LM curve and the target is interest rate. Following this rational the instrument of the Central Bank is money supply and the goal is GDP Growth, and as mentioned before, price stability.

CHAPTER V

CONCLUSION

A. Fed's performance review

1. Has the Fed monetary policy been successful?

To review the Federal Reserve performance we must first analyze the three main indicators (Fed's goals):

- Employment
- Price
- Interest Rates

Employment

It wasn't until year 2008 that the unemployment rate had declined severely after nearly 11 years of acceptable unemployment figures between years 1996 and 2007. The critical levels of unemployment continued through year 2009 as well. Despite the fact that the Federal Reserve is responsible of controlling dramatic decreases, it has been unable to do so due to the financial crisis Subprime.

Previously, the Fed lacked the usage of a specific framework to target inflation and hence the unemployment, however, Ben Bernanke (Chairman of the Federal Reserve) has identified the need to adopt a monetary framework dealing with explicit targets. Knowing that the political power, through its decision, plays a major role in heavily impacting the labor market, no particular mistakes can be identified on the Feds in dealing with the labor market issues.

Price

The Fed was able to control the inflation and maintain the prices of the consumer's goods. However, it failed to do so for other type of goods such as financial assets and real estate's. As a result, those two fundamental markets suffered from a major instability in prices.

There are two speculations explaining this situation. The first speculation revolves around the dot-com bubble where prices of the assets related to the explosion of the internet business reach unexpected numbers. In this case, it is unclear whether the Fed chose or was unable to cool down the prices. The second speculation involves the Subprime crisis which has affected the real estate prices at the beginning of the new millennium. This is a solid example where the price of a certain asset fails to be stabilized at the inherent fundamental value of the asset itself. This situation represents another example in which it is not in doubt that the prices of a certain asset, fail to be anchored to the fundamental value implied by the asset itself.

On that account, the Fed had failed to act upon its mission to maintain the prices in the stock market and real estate and therefore leading to two huge crises in the United States which stretched out to encompass the world.

Interest Rates

The interest rates were did not reach high levels since 1996. This was the result of the monetary policies and the globalization, starting in the middle of the nineties. The two causes combined together have aided in keeping low level of interests. The Federal Reserve

takes good credit in taking the risk associated with keeping the interest rates low after having found them to be crucial for the recovery of the economy.

2. Was the Fed Efficient?

To answer any question regarding the progress made by the Fed, all the results must be analyzed including the failures and success.

Failures of the Fed:

The Fed was accused of reacting late to the crisis in order to restore the situation back to its previous order.

It is normal and healthy for policy makers in the United States to hesitate in directing the economy during crisis. However, once the situation deteriorates drastically, the Fed immediate interference is needed in order to curb the contraction.

The Fed was also blamed of shifting their focus from the broad economic situation down to some economic indicators, and hence, failing to see the economic disequilibrium that was threatening the U.S. It wasn't until September 2007 that the Fed did their first action towards printing money while the indicators of the economic disequilibrium already existed.

According to Milton Friedman and Anna Schwartz, the Fed adopted a wrong restrictive monetary policy which has aggravated the Great Depression of 1929. They stated that after the stock market crash in 1929, the Fed did not stop from decreasing the money supply while also refusing the save the banks that were struggling dude to bank runs. This strategy was a mistake which has transformed what might have been just a mild

recession into a catastrophe. Friedman and Schwartz believed that the depression was "a tragic testimonial to the importance of monetary forces".

The mechanism that lies behind the statement made by Friedman and Schwartz began when people wanted to possess more money that was supplied by the Federal Reserve. In order for people to hoard this kind of money, they had to consume less which led to a contraction in the employment and production since prices were not flexible enough to immediately fall. Hence, they accused the Federal Reserve inefficiency at realizing that the situation imposes a raise in money supply. In their statement also, Friedman also continues by saying: "I prefer to abolish the Federal Reserve System altogether and replace it by a computer". Friedman condemns the incompetence of the Federal Reserve to do the obvious which, conversely, would have been accomplished by an automated system that would increase the money supply at some fixed rate. He had also stated that "leaving monetary and banking arrangements to the market would have produced a more satisfactory outcome than was actually achieved through government involvement".

Ben Bernanke, on November 8, 2002 said: "Regarding the Great Depression … we did it. We're very sorry. … We won't do it again."

Likewise, economists saw that the Fed contributed to the Subprime crisis. John B. Taylor thought that the Fed was fully or to some degree responsible of the United State housing bubble which befell the 2007 recession. Again, he disagrees with the Fed's decision to keep the interest rates too low. This housing bubble had agglomerated to become the worst financial crisis since the 1929 depression.

Finally, the decision regarding the economic situation was within the Fed's authority only. Its independence from the Congress left the latter incapable of reforming the relationships and connections with the central bank and therefore was unable to do any notable interventions.

For all of the above reasons, the role of the Federal Reserve was criticized and deemed inefficient.

Success of the Fed:

After being accused of slowness in decision making during the crisis of 2007, the Fed did improve its ability to make firmer and faster decisions. This has been reflected in the implementation of stronger policies and other actions such as making adjustments in the fund rate of fifty or more basis points. Contrariwise, the Fed had before seldom moved the fund rate with no more than twenty-five points. The prompt and resolute decision making had definitely acted in favor of the Fed.

The government's intent to let the Fed expand its controlling authority, mainly the systemic risk of the economy, bears within it the recognition of the government that the Fed lacked the former's explicit mandate to act in cases of economic disequilibrium. After the Subprime crisis, the government realized that there must be an independent authority to monitor the systemic risk and thought that the Fed is the most suitable organization to hold this role.

Ben Bernanke willingness to adopt an explicit inflation target and this intent had a positive effect on the economy.

3. Is the Fed monetary policy going in the right direction now?

The Subprime crisis has forced the world banks to execute aggressive strategies in monetary expansion. This economical disorder threatened the countries with severe recession which had to be resisted, thus, the central bank all around the world reacted by considerably decreasing the interest rates and injecting huge liquidity into the market.

The liquidity injection had already proved its success in the great depression. Similarly, the Federal Reserve and the world central banks have resorted to this strategy in response to the Subprime crisis. Nevertheless, it can only be said to be working so far whereas its future impact is still very much unknown. Excess of liquidity in the markets can and would eventually produce high inflation.

This aforementioned risk in the current situation has alarmed the regulators and the central banks. This global economy imposes difficulties in predicting the future and hence the need for an exit strategy to prevent what could come out in the future. On June 16 2009 Mario Draghi governor of the Italian central bank and president of the FCB (Financial Stability Board) stated that it is time to think about an exit strategy from this expansionary policy.

Some efforts have already been employed in this direction where the Fed and Obama administration are already working on devising some guidelines: The stress tests that all the major U.S. Banks had to take included a scenario analysis is a fine example. This demonstrates that the Fed and the other central banks have realized the necessity of an exit economic strategy to prevent further deterioration of the economic crisis.

The stress tests that all the major U.S. Banks had to take included a scenario analysis is a fine example.

B. Forecast: Economic Effects of Monetary Policy

The U.S economy has yet to fully recover from the Subprime crisis. Janet Yellen, Chair of the Board of Governors of the Federal Reserve, stated in April 16, 2014, that nonfarm payrolls increased after the addition of 8 million jobs. This number is almost equivalent to the jobs lost during the recession. The housing market has not yet been restored as much; however, it seems to have overcome a good deal.

The unemployment has decreased to reach 6.7%, three-tenth of 1 percentage less than what was recorded during the last year. The unemployment projection to the end of year 2016 is expected to drop between this range 5.2% to 5.6%.

Wages is another marker used by the economists to assess the labor market. Currently, wage gains are progressing despite the slow pace. On the other hand, the maximum level of employment relies greatly on the nonmonetary factors the affect the labor market. Metrics based on these factors are hard to be measured, and therefore, it is difficult to set a fixed goal for employment.

In terms of inflation, the FOMC (Federal Open Market Committee) set a 2% inflation run for the long-run. Currently, inflation has slowed annually of about 2-1/2% in early 2012 to less than 1% in February 2014. However, when inflation reaches such low rates, inferior to 2%, risk of deflation is posed. Another disadvantage is the fact that the Federal funds rate is approaching its lower limit. Accompanied with inflation, this could

translate into a higher real value for the Federal funds rate, and therefore, resulting in limitations on the capacity of the monetary policy to support the economy. Nevertheless, provided that the effects of the transitory factors diminish and labor gains continue, it is expected that the inflation will gradually catch up to 2%.

The committee agrees that the inflation rate of 2% is attainable and will be consistent on the longer run with the Federal constitutional mandate. Communicating this inflation goal clearly to the public, contributes in keeping the inflation expected target confidently fixed. In this manner, price stability can become more maintainable, long-term interest rates can be moderated, and the ability of the FOMC to promote maximum employment in the event of significant economic fluctuations can be improved.

In conclusion, the Committee is explaining how the supported policy will function in the period after liftoff. The Committee also highlights that the economic conditions might occasionally enforce keeping short-term interest rates below the levels that are regarded as normal in the long-run. In this regards, the FOMC members reasoned also of the possibility that, on average, the productive capacity of the economy will sometimes grow slower than it did before the crisis. Hence, the interest rates may be kept low to achieve the economic objectives. It is a strategy that is shared broadly across advanced economies including the United States.

If this forecast was to become reality, the economy would reach maximum employment and price stability for the first time in nearly a decade.

APPENDIX I

STATISTICAL

First Period Data - 1970 to 1986

Unit Root Test

M/P

Null Hypothesis: M_P has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		3.821026	1.0000
Test critical values:	1% level	-4.004425	
	5% level	-3.098896	
	10% level	-2.690439	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 14

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(M_P)

Method: Least Squares

Sample (adjusted): 1973 1986

Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M_P(-1)	1.386842	0.362950	3.821026	0.0034
D(M_P(-1))	-1.037955	0.529340	-1.960849	0.0783
D(M_P(-2))	-1.531113	0.471617	-3.246514	0.0088
C	-5.50E+10	2.39E+10	-2.297274	0.0445

R-squared	0.644065	Mean dependent var	2.25E+10
Adjusted R-squared	0.537284	S.D. dependent var	6.42E+10
S.E. of regression	4.37E+10	Akaike info criterion	52.07313
Sum squared resid	1.91E+22	Schwarz criterion	52.25572
Log likelihood	-360.5119	Hannan-Quinn criter.	52.05623
F-statistic	6.031661	Durbin-Watson stat	2.050947
Prob(F-statistic)	0.012962		

M/P is stationary only in the second difference

Null Hypothesis: D(M_P,2) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.377655	0.0058
Test critical values:	1% level	-4.057910	
	5% level	-3.119910	
	10% level	-2.701103	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 13

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(M_P,3)

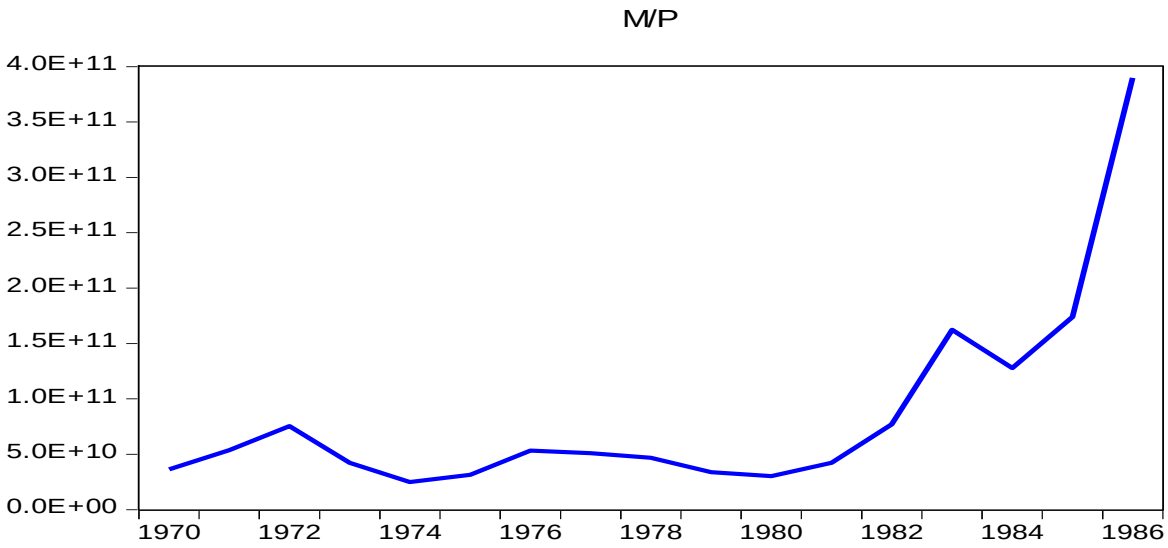
Method: Least Squares

Sample (adjusted): 1974 1986

Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M_P(-1),2)	-3.004801	0.686395	-4.377655	0.0014
D(M_P(-1),3)	1.297752	0.411140	3.156475	0.0102
C	1.53E+10	1.39E+10	1.098823	0.2976

R-squared	0.693764	Mean dependent var	1.73E+10
Adjusted R-squared	0.632517	S.D. dependent var	8.25E+10
S.E. of regression	5.00E+10	Akaike info criterion	52.30784
Sum squared resid	2.50E+22	Schwarz criterion	52.43821
Log likelihood	-337.0010	Hannan-Quinn criter.	52.28104
F-statistic	11.32730	Durbin-Watson stat	1.999406
Prob(F-statistic)	0.002693		



Nominal interest Rate

Null Hypothesis: NOMINALINTERESTRATE has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.496709	0.1355
Test critical values:	1% level	-3.959148	
	5% level	-3.081002	
	10% level	-2.681330	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 15

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(NOMINALINTERESTRATE)

Method: Least Squares

Sample (adjusted): 1972 1986

Included observations: 15 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NOMINALINTERESTRATE(-1)	-0.459035	0.183856	-2.496709	0.0281
D(NOMINALINTERESTRATE(-1))	0.464108	0.242004	1.917767	0.0792
C	5.070710	2.116856	2.395396	0.0338

R-squared	0.384624	Mean dependent var	0.212245
Adjusted R-squared	0.282061	S.D. dependent var	3.540299
S.E. of regression	2.999740	Akaike info criterion	5.211785
Sum squared resid	107.9813	Schwarz criterion	5.353395
Log likelihood	-36.08838	Hannan-Quinn criter.	5.210276
F-statistic	3.750135	Durbin-Watson stat	1.936836
Prob(F-statistic)	0.054305		

Nominal Interest Rate is stationary at second difference

Null Hypothesis: D(NOMINALINTERESTRATE,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.947246	0.0111
Test critical values:	1% level	-4.004425	
	5% level	-3.098896	

10% level	-2.690439	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 14

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(NOMINALINTERESTRATE,3)

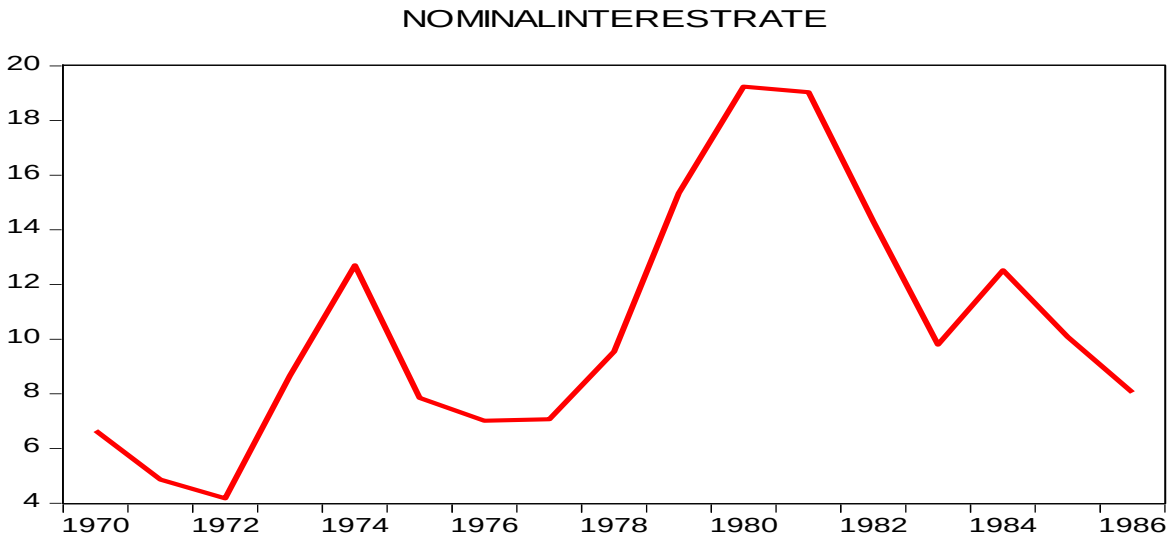
Method: Least Squares

Sample (adjusted): 1973 1986

Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NOMINALINTERESTRATE(-1),2)	-1.127595	0.285666	-3.947246	0.0019
C	-0.102442	1.232377	-0.083126	0.9351

R-squared	0.564914	Mean dependent var	-0.050643
Adjusted R-squared	0.528657	S.D. dependent var	6.716059
S.E. of regression	4.610872	Akaike info criterion	6.026275
Sum squared resid	255.1217	Schwarz criterion	6.117569
Log likelihood	-40.18392	Hannan-Quinn criter.	6.017824
F-statistic	15.58075	Durbin-Watson stat	2.024565
Prob(F-statistic)	0.001937		



Real GDP

Null Hypothesis: REAL_GDP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.551234	0.9829
Test critical values:	1% level	-3.920350	
	5% level	-3.065585	
	10% level	-2.673459	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 16

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(REAL_GDP)

Method: Least Squares

Date: 04/13/14 Time: 20:02

Sample (adjusted): 1971 1986

Included observations: 16 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REAL_GDP(-1)	0.028293	0.051327	0.551234	0.5902
C	25.41226	312.1234	0.081417	0.9363

R-squared	0.021243	Mean dependent var	195.9000
Adjusted R-squared	-0.048668	S.D. dependent var	164.0771
S.E. of regression	168.0224	Akaike info criterion	13.20254
Sum squared resid	395241.2	Schwarz criterion	13.29911
Log likelihood	-103.6203	Hannan-Quinn criter.	13.20749
F-statistic	0.303859	Durbin-Watson stat	1.678017
Prob(F-statistic)	0.590163		

Real GDP is stationary at the First Difference

Null Hypothesis: D(REAL_GDP) has a unit root

Exogenous: Constant

Lag Length: 3 (Automatic - based on SIC, maxlag=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.210091	0.0087

Test critical values:	1% level	-4.121990
	5% level	-3.144920
	10% level	-2.713751

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 12

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(REAL_GDP,2)

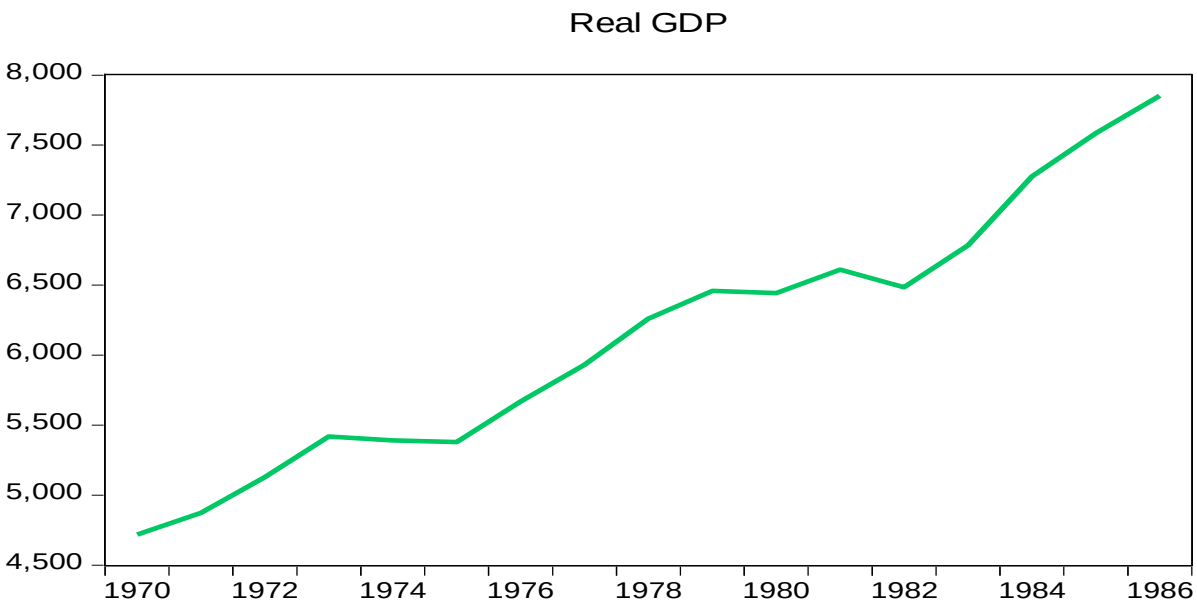
Method: Least Squares

Sample (adjusted): 1975 1986

Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REAL_GDP(-1))	-2.929672	0.695869	-4.210091	0.0040
D(REAL_GDP(-1),2)	1.806192	0.548228	3.294600	0.0132
D(REAL_GDP(-2),2)	1.388276	0.451450	3.075145	0.0179
D(REAL_GDP(-3),2)	0.908871	0.313342	2.900569	0.0230
C	512.4570	120.0830	4.267524	0.0037

R-squared	0.768129	Mean dependent var	24.53333
Adjusted R-squared	0.635631	S.D. dependent var	218.7424
S.E. of regression	132.0395	Akaike info criterion	12.89842
Sum squared resid	122041.0	Schwarz criterion	13.10046
Log likelihood	-72.39050	Hannan-Quinn criter.	12.82361
F-statistic	5.797285	Durbin-Watson stat	2.512952
Prob(F-statistic)	0.022142		



Second Period Data - 1987 to 2000

Unit Root Test

M/P

Null Hypothesis: M_P has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.465944	0.8638
Test critical values:	1% level	-4.200056	
	5% level	-3.175352	
	10% level	-2.728985	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(M_P)

Method: Least Squares

Sample (adjusted): 1990 2000

Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M_P(-1)	-0.141307	0.303270	-0.465944	0.6554
D(M_P(-1))	0.001196	0.389152	0.003073	0.9976
D(M_P(-2))	-0.937447	0.561139	-1.670616	0.1387
C	1.11E+11	9.77E+10	1.131717	0.2950

R-squared	0.537390	Mean dependent var	1.43E+10
Adjusted R-squared	0.339129	S.D. dependent var	1.30E+11
S.E. of regression	1.05E+11	Akaike info criterion	53.87603
Sum squared resid	7.78E+22	Schwarz criterion	54.02072
Log likelihood	-292.3182	Hannan-Quinn criter.	53.78483
F-statistic	2.710513	Durbin-Watson stat	2.269371
Prob(F-statistic)	0.125193		

M/P Stationary at the First Difference

Null Hypothesis: D(M_P) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.059770	0.0124
Test critical values:	1% level	-4.200056	
	5% level	-3.175352	
	10% level	-2.728985	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(M_P,2)

Method: Least Squares

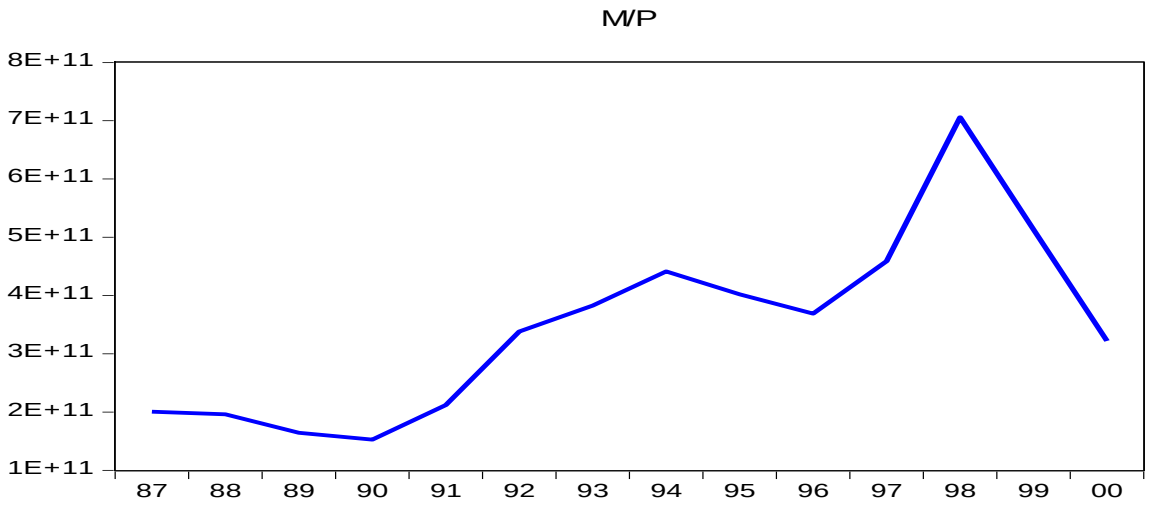
Sample (adjusted): 1990 2000

Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M_P(-1))	-2.226841	0.548514	-4.059770	0.0036
D(M_P(-1),2)	1.118963	0.383604	2.916973	0.0194
C	6.89E+10	3.72E+10	1.851587	0.1012

R-squared	0.688516	Mean dependent var	-1.45E+10
Adjusted R-squared	0.610645	S.D. dependent var	1.61E+11
S.E. of regression	1.00E+11	Akaike info criterion	53.72476
Sum squared resid	8.02E+22	Schwarz criterion	53.83327
Log likelihood	-292.4862	Hannan-Quinn criter.	53.65635

F-statistic	8.841760	Durbin-Watson stat	2.290280
Prob(F-statistic)	0.009413		



Nominal Interest Rate

Nominal Interest Rate Stationary at 5%

Null Hypothesis: NOMINALINTERESTRATE has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.190708	0.0464
Test critical values:	1% level	-4.121990	
	5% level	-3.144920	
	10% level	-2.713751	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 12

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(NOMINALINTERESTRATE)

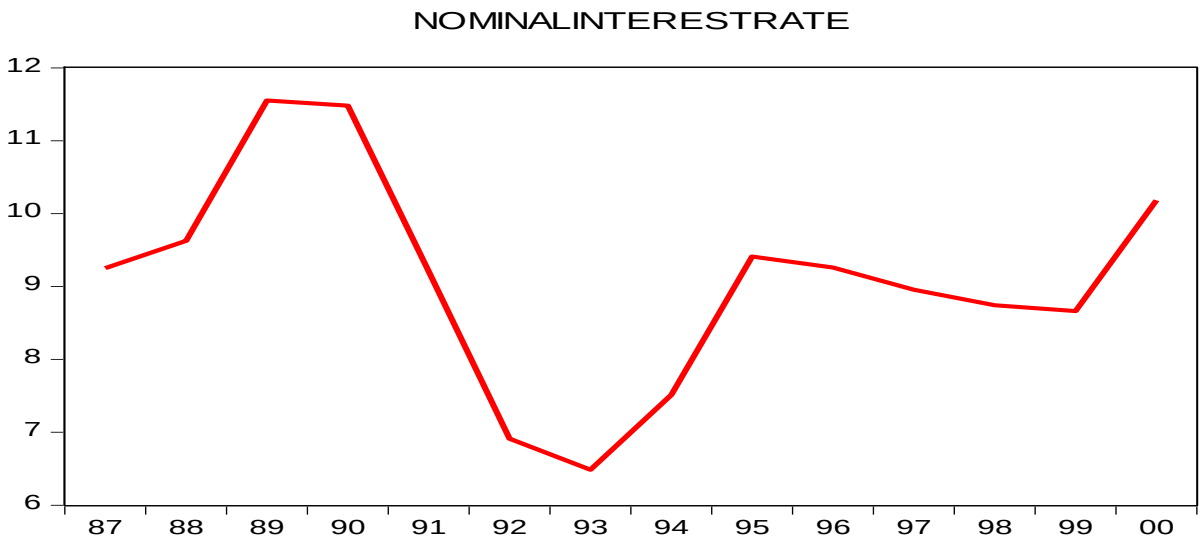
Method: Least Squares

Sample (adjusted): 1989 2000

Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NOMINALINTERESTRATE(-1)	-0.664918	0.208392	-3.190708	0.0110
D(NOMINALINTERESTRATE(-1))	0.758997	0.243964	3.111108	0.0125
C	6.057370	1.898037	3.191386	0.0110

R-squared	0.607092	Mean dependent var	0.046410
Adjusted R-squared	0.519779	S.D. dependent var	1.396169
S.E. of regression	0.967517	Akaike info criterion	2.984151
Sum squared resid	8.424806	Schwarz criterion	3.105378
Log likelihood	-14.90491	Hannan-Quinn criter.	2.939268
F-statistic	6.953057	Durbin-Watson stat	1.239472
Prob(F-statistic)	0.014939		



Real GDP

Null Hypothesis: REAL_GDP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		3.328565	1.0000
Test critical values:	1% level	-4.057910	
	5% level	-3.119910	
	10% level	-2.701103	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 13

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(REAL_GDP)

Method: Least Squares

Sample (adjusted): 1988 2000

Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REAL_GDP(-1)	0.088714	0.026652	3.328565	0.0067
C	-526.6223	262.7069	-2.004600	0.0702

R-squared	0.501797	Mean dependent var	341.6385
Adjusted R-squared	0.456506	S.D. dependent var	152.4370
S.E. of regression	112.3797	Akaike info criterion	12.42228
Sum squared resid	138921.2	Schwarz criterion	12.50920
Log likelihood	-78.74484	Hannan-Quinn criter.	12.40442
F-statistic	11.07934	Durbin-Watson stat	1.743009
Prob(F-statistic)	0.006728		

Real GDP stationary at Second Difference

Null Hypothesis: D(REAL_GDP,2) has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.445098	0.0003
Test critical values:	1% level	-4.420595	
	5% level	-3.259808	
	10% level	-2.771129	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(REAL_GDP,3)

Method: Least Squares

Sample (adjusted): 1992 2000

Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REAL_GDP(-1),2)	-2.550393	0.342560	-7.445098	0.0007
D(REAL_GDP(-1),3)	0.712711	0.256070	2.783266	0.0388
D(REAL_GDP(-2),3)	0.332539	0.148666	2.236822	0.0755
C	104.2817	23.29270	4.477014	0.0065

R-squared	0.964802	Mean dependent var	12.30000
Adjusted R-squared	0.943684	S.D. dependent var	268.1176
S.E. of regression	63.62717	Akaike info criterion	11.44506
Sum squared resid	20242.09	Schwarz criterion	11.53272
Log likelihood	-47.50277	Hannan-Quinn criter.	11.25590
F-statistic	45.68486	Durbin-Watson stat	2.622908
Prob(F-statistic)	0.000468		

Third Period Data – 2001 to 2012

Unit Root Test

M/P

M/P Stationary at 5%

Null Hypothesis: M_P has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.433988	0.0333
Test critical values:	1% level	-4.200056	
	5% level	-3.175352	
	10% level	-2.728985	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(M_P)

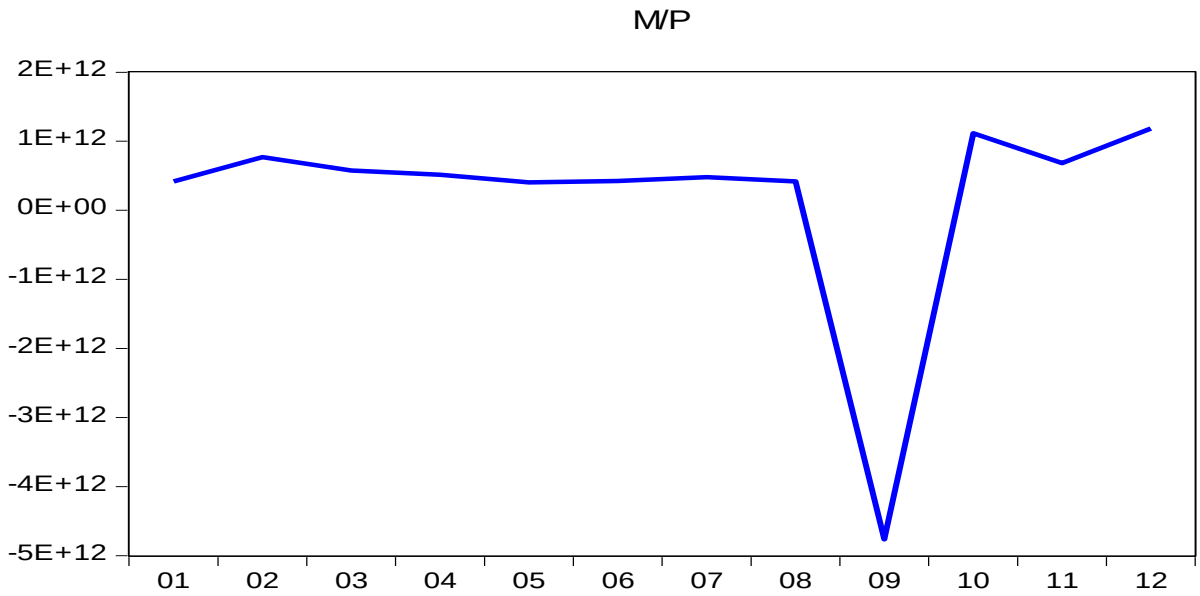
Method: Least Squares

Sample (adjusted): 2002 2012

Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M_P(-1)	-1.153391	0.335875	-3.433988	0.0075
C	1.79E+11	5.21E+11	0.342529	0.7398

R-squared	0.567147	Mean dependent var	6.95E+10
Adjusted R-squared	0.519052	S.D. dependent var	2.49E+12
S.E. of regression	1.73E+12	Akaike info criterion	59.35476
Sum squared resid	2.68E+25	Schwarz criterion	59.42711
Log likelihood	-324.4512	Hannan-Quinn criter.	59.30916
F-statistic	11.79227	Durbin-Watson stat	1.985267
Prob(F-statistic)	0.007461		



Nominal Interest Rate

Null Hypothesis: NOMINALINTERESTRATE has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.888002	0.3249
Test critical values:	1% level	-4.200056	
	5% level	-3.175352	
	10% level	-2.728985	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(NOMINALINTERESTRATE)

Method: Least Squares

Sample (adjusted): 2002 2012

Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NOMINALINTERESTRATE(-1)	-0.550944	0.291813	-1.888002	0.0916
C	2.662139	1.684525	1.580349	0.1485

R-squared	0.283699	Mean dependent var	-0.346159
Adjusted R-squared	0.204110	S.D. dependent var	2.032095
S.E. of regression	1.812886	Akaike info criterion	4.190683
Sum squared resid	29.57900	Schwarz criterion	4.263027
Log likelihood	-21.04876	Hannan-Quinn criter.	4.145080
F-statistic	3.564551	Durbin-Watson stat	1.392828
Prob(F-statistic)	0.091628		

Nominal Interest Rate Stationary at Second Difference

Null Hypothesis: D(NOMINALINTERESTRATE,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.573636	0.0321
Test critical values:	1% level	-4.420595	

5% level	-3.259808	
10% level	-2.771129	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(NOMINALINTERESTRATE,3)

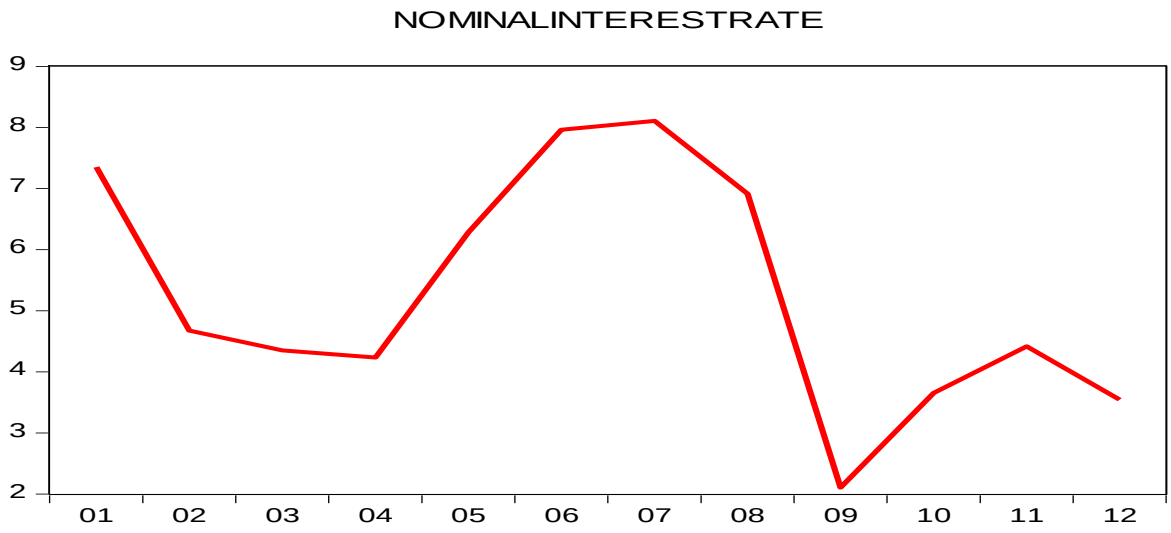
Method: Least Squares

Sample (adjusted): 2004 2012

Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NOMINALINTERESTRATE(-1),2)	-1.280087	0.358203	-3.573636	0.0091
C	0.046070	0.989167	0.046575	0.9642

R-squared	0.645944	Mean dependent var	-0.443076
Adjusted R-squared	0.595364	S.D. dependent var	4.620198
S.E. of regression	2.938953	Akaike info criterion	5.187114
Sum squared resid	60.46211	Schwarz criterion	5.230942
Log likelihood	-21.34201	Hannan-Quinn criter.	5.092534
F-statistic	12.77087	Durbin-Watson stat	2.123495
Prob(F-statistic)	0.009053		



Real GDP

Null Hypothesis: REAL_GDP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.242148	0.6150
Test critical values:	1% level	-4.200056	
	5% level	-3.175352	
	10% level	-2.728985	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(REAL_GDP)

Method: Least Squares

Sample (adjusted): 2002 2012

Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REAL_GDP(-1)	-0.120914	0.097342	-1.242148	0.2456
C	1962.020	1377.838	1.423984	0.1882

R-squared	0.146347	Mean dependent var	253.3000
Adjusted R-squared	0.051497	S.D. dependent var	266.3243
S.E. of regression	259.3762	Akaike info criterion	14.11740
Sum squared resid	605484.2	Schwarz criterion	14.18975
Log likelihood	-75.64571	Hannan-Quinn criter.	14.07180
F-statistic	1.542932	Durbin-Watson stat	1.399131
Prob(F-statistic)	0.245574		

Real GDP Stationary at Second Difference

Null Hypothesis: D(REAL_GDP,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.290121	0.0479
Test critical values:	1% level	-4.420595	

5% level	-3.259808
10% level	-2.771129

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(REAL_GDP,3)

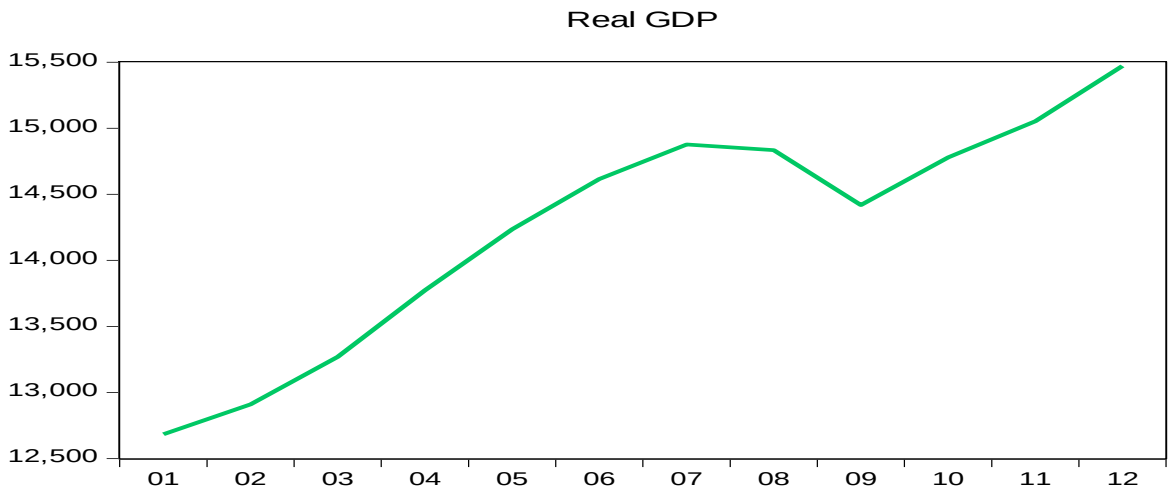
Method: Least Squares

Sample (adjusted): 2004 2012

Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REAL_GDP(-1),2)	-1.216109	0.369624	-3.290121	0.0133
C	7.589821	117.2001	0.064760	0.9502

R-squared	0.607291	Mean dependent var	1.144444
Adjusted R-squared	0.551190	S.D. dependent var	524.7556
S.E. of regression	351.5512	Akaike info criterion	14.75572
Sum squared resid	865117.6	Schwarz criterion	14.79955
Log likelihood	-64.40073	Hannan-Quinn criter.	14.66114
F-statistic	10.82490	Durbin-Watson stat	2.038316
Prob(F-statistic)	0.013300		


Real GDP
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