FINAL PROJECT

Does the Federal Reserve get ahead of events?

Analysis of the Monetary Policy of the Central Bank of United States

Bachelor's Final Project

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ABSTRACT

This thesis reflects an analysis in the execution of the monetary policy of the United States. Through its study after the period of the Great Recession until now. Includes a conjunctural analysis of the effects of monetary policies on macroeconomic variables, it intends to reach the conclusion that the Federal Reserve anticipates the events in the establishment of its monetary policies.

It contains a description of the functioning of the Federal Reserve and its main entities. It also presents an explanation of the execution of its objectives, and a historical summary of how these were carried out before the recession. As well as the valuation of its independence in the establishment of these objectives.

Next, it includes an annual analysis of the Monetary Policy reports of the Federal Reserve, which reflects the economic perspectives and the procedures that the Federal Reserve will fulfil. With these, it carries out a more exhaustive analysis of five selected variables, which are influenced by monetary policy variations: Government sector, household sector, external sector, labor market and prices.

Finally, it explains how monetary policy is carried out and the measures that were taken to overcome the crisis (2007-2014) and those that were taken when this crisis was solved (2015-present). This description, together with the analysis of the economic variables, will determine the veracity of the hypothesis raised during the work: The Fed acts ahead of the events.

Keywords: United States, Monetary Policy, Federal Reserve, Central Bank, interest rates, quantitative easing, Monetary Policy Reports.

Esta tesis refleja un análisis en la ejecución de la política monetaria de Estados Unidos. A través, del estudio de esta después del periodo de la Gran Recesión hasta actualmente. Incluye un análisis coyuntural de los efectos de las políticas monetarias en las variables macroeconómicas, pretende llegar a la conclusión que la Reserva Federal se anticipa a los acontecimientos en el establecimiento de sus políticas monetarias.

Muestra una descripción del funcionamiento de la Reserva Federal y sus principales entidades. Asimismo, presenta una explicación de la ejecución de sus objetivos, y una síntesis histórica de como estos se realizaron antes de la recesión. Así como la valoración de su independencia en el establecimiento de estos objetivos.

Seguidamente, incluye un análisis anual de los reportes de Política Monetaria de la Reserva Federal, dónde se refleja las perspectivas económicas y los procedimientos que llevara a cabo la Reserva Federal. A partir de ahí, realiza un análisis más exhaustivo de cinco variables seleccionadas, las cuales se ven influenciadas por los cambios en la política monetaria: Sector gubernamental, sector doméstico, sector externo, mercado laboral y precios.

Finalmente, se explica cómo se efectúa la política monetaria y las medidas que se tomaron para salir de la crisis (2007-2014) y las que se tomaron cuando esta crisis se determinó resuelta (2015-actualmente). Esta descripción, junto con el análisis de las variables económicas, determinarán la veracidad de la hipótesis planteada durante el trabajo: la Fed actúa adelantándose a los acontecimientos.

Palabras clave: Estados Unidos, Política Monetaria, Reserva Federal, Banco central, tipos de interés, expansión cuantitativa, Reportes de Política Monetaria.

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I. INTRODUCTION

Monetary policy aims to achieve economic stability, price control and maximization of employment by controlling monetary factors. These policies can be either expansive or contractionary and they produce a direct effect on citizens decisions.

The diversity of actions of central banks around the world are fully interrelated because of globalization. Differences in monetary policy provoke capital inflows or outflows, thus affecting the exchange rate and prices. This implies countries to follow the monetary policy of the country which they have more commercial links.

United States, being one of the main economies of the world, its monetary policy decisions affect many countries. As well, being the dollar, the main currency used around the globe, it is interesting to know how the Fed establishes monetary policy and what is its basis. Since its modifications affect the value of money. Therefore, it can occur that if the interest rates increase, the money becomes more expensive and therefore the credit is reduced. For instance, variables such as oil that are quoted in dollars also become more expensive, which quickly transfers its effect to other countries.

Central banks can act by applying monetary policy ahead of events, thus being able to avoid an economic recession. Or, they can act when the change in their objectives has taken place and by modifying their economic policy based on re-establishing these objectives.

After the recession, consumption, labor market, inflation and other indicators had worsened after the crisis. The European and American solution was the lowering of interest rates to 0% to stimulate consumption and encourage the growth of the economy. These policies proved effective in resurging the economy.

Thus, the United States finalized this aggressive monetary policy in 2015, where it started the progressive increase. On the contrary, Europe, twelve years after the crisis, continues to maintain this monetary policy.

The paths chosen by central banks depend on the evolution of macroeconomic variables and financial markets. One of the differences of the monetary policy of the United States is the greater amount of variations, being these more drastic than in other countries, like the mentioned Europe.

So, the main motivation of my work is to understand why the United States decided to raise interest rates in 2015 and verify that it acts in advance of the events predicted.

First, the origins of the Federal Reserve are provided to better understand what the citizens' need was for the creation of a central bank. This will help us to understand next the main functions of the Federal Reserve and how these are distributed among the three different entities: Federal Reserve Board of Governors, 12 Federal Reserve Banks and the Federal Open Market Committee.

Then, it explains the decision making of the Fed and the independence it has in its decisions. In addition, it contains an historical summary of monetary policy before the crisis, because of the variations in its execution. That is the reason because this thesis is focused on the period after the recession.

Afterwards, the analysis of the results of the Monetary Policy Reports begins. Starting with an annual chronological table, where it reflects the variation of several variables stipulated in the reports. On the other hand, an analysis is included of the main macroeconomic variables that are affected by changes of monetary policy.

The analysis will concentrate the characterization of the main variables that have reflected the hypothesis to be studied. The aim is to simplify the analysis to the real economic variables, incurring the risk of isolating macroeconomic issues from other transformations in monetary policy.

Finally, the variations of these variables analysed, together with the study of the monetary policies applied after the crisis, will lead us to the conclusion of the temporality in the establishment of the monetary policy of the United States.

II. OBJECTIVES AND HYPOTHESIS

Hypothesis

The monetary policy of the Federal Reserve acts proactively to avoid major changes in the economy. Therefore, it predicts the behaviour of the macroeconomic variables for the establishment of its policies.

Objectives

This thesis analyses how monetary policy is carried out in the United States, from the Great Recession to the present times. The main objective is to understand if the Fed is moving forward to the events that are going to occur

First, the objective will be to understand how the Fed was created, the main functions of its entities and how these functions are executed. Thus, facilitate the understanding of the subsequent explanation of monetary policy.

Next, I will focus on the analysis of several economic variables, choosing those that are affected by the changes in monetary policy. This will help to check my hypothesis, showing if these vary after the implementation of the policy or the variation had already occurred.

Therefore, the general objective of this thesis answers the question of: Is the Fed moving forward to the events? And to answer this, first I need to get the answer to smaller questions: How is the Fed organised? How the Fed sets monetary policy? Which are the main objectives of the Fed? What did it change after the great recession? How the Fed decisions affect economic variables?

III. BACKROUND: FUNDAMENTAL ASPECTS OF THE FEDERAL RESERVE

Before starting to analyse how the Federal Reserve conducts its monetary policy. We shall understand the purposes of the creation of the Fed and the functions that it entailed to take. This section will help you to understand what a central bank needs to be, and it will guide you to understand the rest of the thesis.

3.1. Origins of the fed and historical context

Former to the creation of the Fed, two previous central banks were created: The First Bank of the United States and The Second Bank of the United States. However, neither of them lasted more than 30 years. After the unsuccessful creation of a central bank, the era of Free Banks emerged. They were periods of high instability, speculations and numerous bank crisis, that quickly felt into economics depressions. The need of a central bank to avoid financial panics was arising in United States.

> In 1913 the Federal Reserve Act created the Federal Reserve system. It was *"An Act To provide for the establishment of Federal reserve banks, 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."*

The Federal Reserve Act also created the Regional Reserve Banks, distributed on twelve major districts on United States. Its district limits were based on predominant trade regions.

In 1929 high speculation caused a massive stock market crash, known as the Great Depression. United States entered to one of the most devastating recession of its history. It was a 12-year depression that affected all Western industrialized economies. It caused huge unemployment and several bank failures. The Fed was criticised by not avoiding the speculative lending or not applying the adequate monetary policy to alleviate the recession.

After the Great Depression, Congress designated the Banking Act of 1933 (Glass-Steagall Act). Its purpose was the separation of the commercial and investment bank. Also, installed the requirement to use government securities as a collateral for Federal Reserve notes.

The Banking Act also enabled the creation of the Federal Open Market Committee (FOMC) as a separate entity. Its purpose was to supervise the open market operations, which consist in the Fed's buying or selling of United States Treasury securities.

After the second World War, with the creation of the Employment Act, the Fed included as a priority maximize United States employment. In addition, in 1978 the Humphrey-Hawkins Act forced the Fed chairman to inform the congress two times per year about the objectives of monetary policy.

Since 1942 and onwards, Fed and Treasury tensions were originated, due to conflicts of interests. The Fed maintained a low interest rate as a request from the Treasury to achieve cheaper financing for the World War Two, which was causing high levels of inflation. These conflicts ceased with the creation of the Treasury-Fed accord in 1951, which became essential for the Fed's control of its monetary policy.

In 1980 the Monetary Control Act was created; its objective marked the beginning of modern bank history reforms. This Act required the Fed to set up reserve conditions for all financial institutions and to price its financial services to compete with private sector providers.

Moreover, on 1999 the Glass-Steagall Act of 1933 was substituted by the Gramm-Leach-Bliley Act, which allowed banks to offer different types of financial services.

The 90s were a period of decreasing inflation, very low unemployment and a rising economy. It was the season of the dotcom bubble, a period of intense growth but huge speculation on internet companies.

Essentially, these were the main historical events that shaped the actual Federal Reserve. Subsequently, I will make an extensive analysis by variables of the monetary policy variations after the great recession.

3.2. Functions and entities

As to continue to understand how the Federal Reserve conducts its monetary policy, we need to comprehend the functioning of each entity and its five general objectives. The Federal Reserve System it is segregated into twelve Federal Reserve Banks, a Federal Reserve Board of Governors and a Federal Open Market Committee (FOMC).

Figure 1. The Federal Reserve System
Source: Overview of the Federal Reserve system- Board of Governors of the Fed

3.2.1. The United States Central Bank

The United States Congress it is a bicameral legislature consisting in the House of Representatives and the Senate. The members of the House of Representatives serve to districts, its objective is to give voice to the citizens. The Senate represents each state with two members, without considering the region's population. The Congress oversees the Fed System and its entities.

The Federal Reserve System is the central bank of United States. It follows five main functions to promote the efficacy of the system.

Besides, the chair of the Federal Reserve is the head of the Federal Reserve System. It is designated by the president of the United States and it serves for four years. Since 1987 until 2006 Alan Greenspan was the Federal Reserve chairman who served for 19 years. After retiring, his descendant was Ben Bernanke since 2006 until 2014, who mandated during the Great Recession. Then, since 2014 until 2018, Janet Yellen was the chair followed by the actual chairman Jerome Powell.

The Federal Reserve Act refused to the idea of a single central bank. Therefore, they created a system with three main entities. These entities together with the five functions will be explained below.

3.2.2. Three key entities

The Board of Governors is in Washington D.C and it is and independent agency of the Fed. It is formed by seven governors, the Vice Chair and the Chair, all of them elected by the President and accepted by the Senate.

It guides the functioning of the Federal Reserve System to promote and accomplish the Federal Reserve Act. It supervises the twelve Fed Reserve Banks operations and gives advice for lending to depository institutions and the Fed government. Moreover, controls Fed Reserves Banks services to the U.S Treasury and together with them supervise certain institutions or financial activities.

Members of the Board of Governors deliver to the FOMC, which is the entity that sets monetary policy.

Federal Reserve banks are banks located in each of the twelve Federal Reserve districts as seen in the picture on the left.

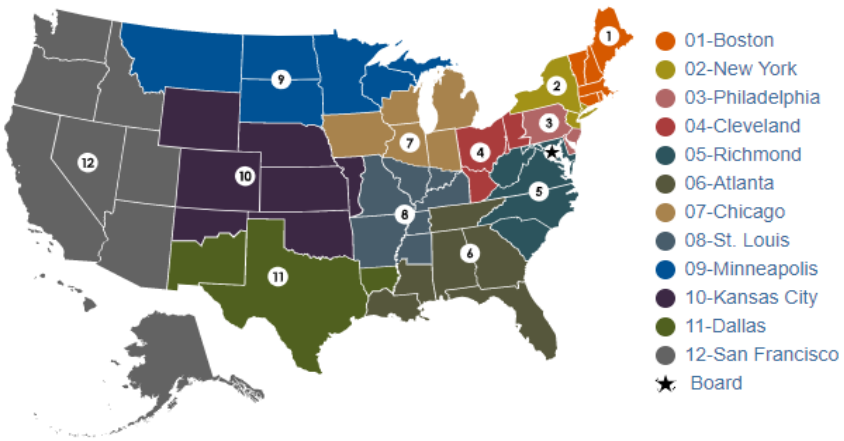


Figure 2. Federal Reserve Banks
Source: Federal Reserve Banks- Board of Governors of the Fed

Its board of directors is formed by nine members. Federal Reserve member banks can elect six directors and Fed Board of Governors can elect three. Every Reserve Bank has its own president, which must be approved by the board of governors and from voting members of the FOMC. The Chair and deputy Chair are designated by the Board of Governors.

Each Regional Bank is a private corporation and it controls its own stock. Federal Reserve Banks responsibilities are supervising and examining state member banks, lending to depository institutions to ensure liquidity in the financial system, providing key financial services which include the nation payments system and disposal of the nation's currency to depository institutions, and analysing certain financial institutions.

The FOMC is formed by its permanent participants which are the seven members of the Board of Governors and the president of the Federal Reserve Bank of New York, then its yearly rotative members formed by four of the Reserve Bank presidents. All members attend to meetings and discussions. However, only the presidents in Committee vote on policy decisions.

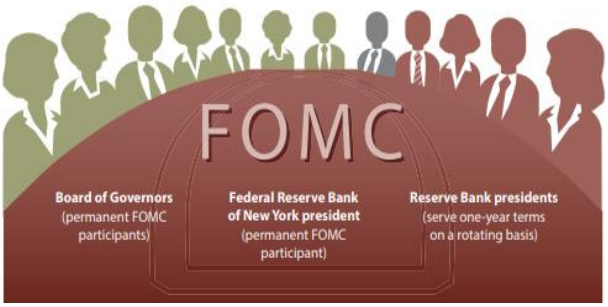


Figure 3. Composition of the FOMC
Source: Overview of the Fed- Board of Governors of the Fed

The FOMC analyses U.S. economic conditions and sets, together with the Board of Governors, the adequate monetary policy in agreement with its mandate from Congress. It searches to promote maximum employment, stable prices and long-term interest rates.

The FOMC considers how the economy is expected to evolve in the short and medium term, then which will be the suitable monetary policy and, which will be the effective way to communicate its agreements. I will go into more detail later when explaining the conduct of the monetary policy.

3.2.3. Five key functions

As I introduced before, The Fed performs five functions to assure the stability of the U.S. economy and the financial system.

First, the Federal Reserve **controls Monetary Policy**. The FOMC in agreement with the congress sets the monetary policy. Its main objectives are the promotion of maximum employment, stability of prices and balanced long-term interest rates. Maximum employment guarantees that all U.S. citizens that are willing to work will find a job. Moreover, it desires to maintain stable prices for all goods and services at a neutral level around 2%.

In the second place, the Fed advocates for the **stability of the financial system**. It ensures proper economic conditions by monitoring financial system risks. The financial systems are stable when the financial institutions and markets provide the resources, services and products that people or businesses need to invest in. Citizens perform as investors and savers or as borrowers and spenders. The Fed constantly monitors the financial system and interactions to build more resilient markets that can overcome difficulties, preventing the system from stopping.

As a matter of fact, **supervising and regulating financial institutions and activities** is the third key function of the Fed. Complexity in identifying potential threats has grown over the years due to more sophisticated and interconnected global financial systems. Therefore, it connects with other central banks and supervisory authorities to achieve global and U.S. stability.

In fourth place, Fed ensures the **efficiency and security of U.S. payment and settlement systems**. A payment system refers to money transfers between financial institutions. Because of these systems, purchases of goods and services by consumers and businesses are effective. Therefore, maintaining the integrity of the system is essential for stability.

Finally, the last function is **ensuring consumer protection and community development**. Guaranteeing a well-functioning and secure economy benefits all members and helps boosting

economic growth. The Fed does so by giving access to financial services and products to promote investments, savings or borrowing. The Fed makes sure that bank lenders and other financial institutions follow the law and regulations.

3.3. Independence of the Fed

The Central Bank of United States was created by the Federal Reserve Act of 1913 as an independent national authority.

Fed's objectives are addressed by the congress, but not the way to execute them. The president of the United States has no power to pursue any policy of the Fed. The power of the president is to elect the chairman of the Fed and the servers of the Federal Reserve Board of Governors. The chairman serves fourteen years as governor and four as chairman.

Although the president of the United States has any power in front of the Fed, he can elect the chairman and governors with his same ideals, and therefore influence its decisions. There is just one limitation, any nominee needs to be approved by the Senate. As soon as his position is guaranteed, they can act freely, the governors or chairman do not follow president mandates. Moreover, decisions are taken by consensus. Governors cannot be fired afterwards, it can only happen for inefficiency or negligence reasons.

As in the official page of the Board of Governors is stated, it is important to separate the Federal reserve monetary policy decisions from political influence. If the decisions are independent, they tend to bear better outcomes on inflation and growth, as proved by empirical studies[1].

Political decisions are affected by political business cycles, which induces to accelerated decision making when the end of the mandate approaches. A short-term decision to overstimulate the economy has no long-term benefit. Mostly, this rapid increase in demand creates inflation.

On the other hand, if the central bank is controlled by the government, it may be tempted to create money when public debt is high. This abuse by the government can lead to economic instability with increasing inflation and interest rates.

Furthermore, monetary policy was designated to the Federal Reserve because it is highly technical. Also, the Fed can apply policies to increase interest rates to reduce the risk of inflation. This policy aimed to reduce demand is of unpopular opinion, where congress and government refused to be part of.

> As Mark Spindel and Sarah Binder stated in their book (1987): *"Congress depends on the Fed both to steer the economy and absorb public blame when the economy falters…[ ] By centralizing power in the hands of the Fed, lawmakers can more credibly blame the Fed for poor economic outcomes, insulating themselves electorally and potentially diluting public anger at Congress."*

[1] Cukierman, Alex, Steven B. Webb, and Bilin Neyapti (1992). "Measuring the Independence of Central Banks and Its Effect on Policy Outcomes," World Bank Economic Review, vol. 6 (3), 353-98.
Alberto Alesina and Lawrence H. Summers (1993), "Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence," Journal of Money, Credit and Banking, vol. 25 (May), pp. 151-62.

Sylvester C.W. Eijffinger and Jakob De Haan (1996), "The Political Economy of Central Bank Independence (PDF)," Special Papers in International Finance, No. 19 (May), Princeton University.

Therefore, the perspectives of the independence of the Federal are questionable. The Fed must coordinate monetary policy with fiscal policy. When this occurs, the central bank must cooperate with the government.

Fiscal policies effect the goods market and monetary policy on the assets markets. Both policies are interconnected through interest rates and output. Its relation can be complementary or substitutive. If the fiscal force implements a contractionary policy, the monetary authority can follow (complementary) or can reverse the effect of the fiscal policy (substitutive).

When stated that these policies must be in coordination, they act independently as to achieve the final objectives. These would be the ideal situation. Although, on many occasions they seem to be uncoordinated. Then we must ask ourselves which policy is more appropriate. As we have seen, the government is affected by the political course. Therefore, the fiscal policy is more short-sighted since it has this governmental influence. Thus, we can reach the conclusion that monetary policies, not being affected by the political course, are more effective. Which would indicate that the fiscal policy should follow the monetary policy.

3.4. Fed monetary policy mandate

As we have seen, the Federal Reserve search to conduct five main functions. In this thesis I am going to focus only about the Monetary Policy management.

Monetary policy are the processes taken by the Federal Reserve to promote maximum employment, stable prices and moderate long-term interest rates. These three objectives are specified by the congress.

Monetary policy controls the level of short-term interest rates which influence the availability and costs of credit. We can observe that monetary policy has direct effects to interest rates whereas indirect effects to stock market prices, wealth and exchange rates. Through the variation of these variables, it reaches its influence to spending, investment, employment and inflation.

The means of implementing monetary policy have evolved over time. Further on, in this thesis, we will see how these changes had had its effects on the economy. Moreover, we will see how monetary policy was executed.

3.4.1. Two aims of monetary policy

"The success of monetary policy should be judged by the economy's performance against our statutory mandates of price stability and maximum employment." Jerome Powell

Price stability: The FOMC issued in 2012 the "Statement on Longer Run Goals and Monetary Policy Strategy", where it constituted the neutral level of inflation at 2%. This exact level of 2% is calculated as neither consumers worry of increasing consumption now because of higher prices later, neither worry because their money is losing value. Moreover, this level enhances to maintain the stability in long term interest rates. All this also improves long-run financial decisions of households and businesses to borrow or lend, or safe or invest.

Overall, maintaining inflation at 2% results in a well-functioning economy. Therefore, keeping the economy productive leading to increases in employment and greater standards of living.

Thus, price stability appears to be highly linked with the second objective of monetary policy: maximum employment.

Maximum employment: Monetary policy aims to determine full employment. We must consider that other factors like population, different requirements of jobs skills, among others affect employment. This is the reason why FOMC does not have a target for employment, rather considers different indicators projections. They announce the expected unemployment rate based on their estimations in their Summary of Economic Projections four times per year, it normally states around 4,5 to 6%.

Thus, both objectives must be followed by the FOMC. It can occur that price stability and maximum employment appear to be complementary. This happens when inflation is lower than its objective and employment is high, therefore FOMC can apply low interest rates to stimulate the economy. However, this policy is distorted when whenever inflation its above its target and employment is low. In this situation, it would follow a balance approach.

3.5. Decision making of monetary policy: FOMC meetings

Monetary policy mainly affects the availability and cost of money or credit in the economy. FOMC adjusts the federal funds rate according to the changes produced in the economy. These changes are collected by each regional Bank of the Federal Reserve and summarised in the Beige Book.

On the other hand, the FOMC with these materials, makes forecasts of the economic perspective and establishes economic policy proposals for the resolution of these perspectives. It considers the possible evolution of the U.S. economy in the short and medium term and the appropriate policy for this evolution to meet the objectives of 2% of inflation and maximum employment.

In Washington DC, the governors of the Federal Reserve and the Presidents of the Reserve Bank offer their evaluations on the economic prospects to be carried out. Each bank president offers his point of view of his district outlook. All participants are invited to this meeting, but the final resolution comes from FOMC.

These reunions are carried out eight times per year, the final decision is carried out by the Federal Reserve Bank of New York by buying or selling securities.

In general, when making monetary policy decisions, many other factors must be taken into account. The United States economy is increasingly complex, therefore, not only the evolution of monetary policy affects employment and interest rates. Some influences are easily incorporated such as fiscal policies, but others are difficult to assimilate due to their uncertainty. In addition, because policies affect inflation and employment late, policymakers evaluate the effects of variables that will react faster to changes in monetary policy would have. Besides, the actions of the other central banks are considered due to their influence on international trade and exchange rates. In summary, they use statistical models in which they take all these variables into account.

3.6. Application of monetary policy

After explaining how the meeting process goes, I would go into more detail in how the objectives mentioned before which FOMC tries to achieve, are implemented. This process is divided into two, the monetary policy that was carried out before the crisis and the one established to get out of it. I have focused my thesis on the policies applied after the crisis, so I will go into deeper description of them at the end of the thesis. Although, the policies implemented before are useful to mention in order to analyse this change.

The table below represents very well this differentiation of policies. As established in the Board of Governors of the Fed, Monetary policy main objectives are to promote maximum employment, to keep prices moderate and stable long-term interest rates. These are the three goals that Congress has forced the Federal Reserve to follow.

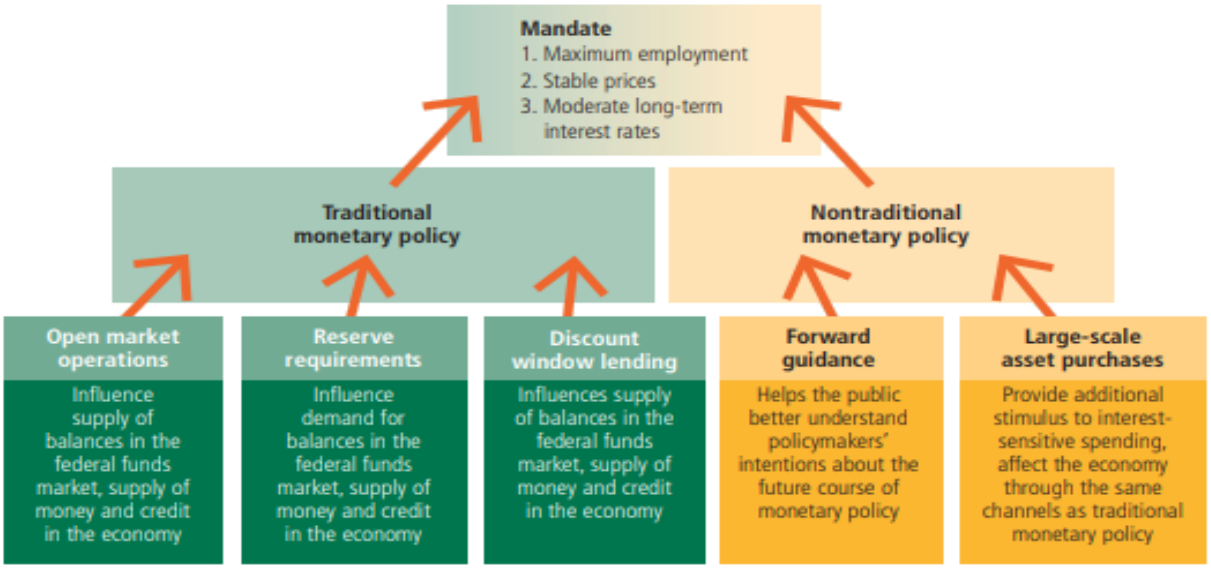


Figure 4. The Fed's statutory mandate
Source: Conducting Monetary Policy- Board of Governors of the Federal Reserve System

3.7. Monetary policy before the great recession

Traditional monetary policy had been used before 2007. Federal funds rate is the price of borrowing money, the price which banks lend money to commercial banks. Particularly, the Fed main objective is to keep inflation stable and to maximize employment. Therefore, if inflation increases the central bank needs to increase interest rates to reduce borrowing and thus, aggregate demand. Then, the economy slows down which reduces the inflationary risk.

Therefore, the Fed manages the level of the short-term interest rate and impacts on the availability and cost of credit. The movement of short-term interest rates indirectly affects long-term interest rates, currency exchange rates, and prices of equities and other assets, therefore, affecting wealth. These variables have an effect to household spending, business investment, unemployment and inflation. At the same time, as interest rates variate, foreign investors are expectant for the investment returns.

If the Federal Reserve wants to decrease economic activity it is called contractionary monetary policy, thus money supply will decrease and will cause interest rates to rise. The contrary, it is called expansionary monetary policy. There are three approaches:

The first procedure is **open market operations**, consists in the buying or selling by the Fed of short-term government bonds or agency securities in the open market. A government bond or called treasury bill is issued by the government, however, is the Federal Open Market Committee (FOMC) which regulates how many bonds to sell or buy. If the Fed buys bonds supports government spending and earns an interest, also when buying them it provides them liquidity, thus, increasing the money supply and reducing interest rates.

The Open Market Desk is in the Federal Reserve Bank of New York where it carries the buying or selling of bonds to maintain the federal funds rate at the established level by the FOMC.

Second, when we deposit in a bank, the bank holds a portion of it but loans the rest. This is called Fractional Reserve banking. The share that are required to hold is called **reserve requirements**, imposed by the Fed. Therefore, the Fed can change the money supply by changing this requirement. It does so, by adjusting the supply of reserves through open market operations.

Reserve requirements are set up by the Board of governors within the Federal Reserve Act requirements.

Third, the Fed is the lender of banks. Therefore, another way to modify the money supply will be changing **the discount rate** it charges banks. If the Fed decreases the discount rate it will be easier for banks to borrow and therefore it increases money supply.

Discount window lending is a Reserve Federal banks operation. However, the interest rate is determined by the Board of governors.

IV. METHODOLOGY

To begin my analysis, I will evaluate each semi-annual report since 2008. It will be divided by variables to observe their progress through the years and obtain an accurate description of the developing of monetary policy.

First of all, I completed a chronologic table with the variables I choose to analyse: GDP growth, the household sector, business fixed investment, the government and external sectors, labour market and prices. Also, the briefly conducting of monetary policy through the years focusing on the level of the federal funds rates and the balance sheet policies.

The table contains the status description of the variable in its corresponding year written on the monetary policy report. Also, the factors that can influence the behaviour of the analysed variable are included.

It should be noted that this is indicated by colours: red means that the state of the variable is negative for the growth of the economy, green that is positive and yellow that the effect is considered to be slightly negative or it depends on other factors to argue if it is negative or positive.

The conduct of the monetary policy has been established in yellow since it must analyse the effect it has on the variables evaluated above to argue whether the monetary policy was good or bad. This will be executed in detail later in the work.

After that, I will go into a deeper analysis on selected variables of economic developments. Each variable study will consist in an interpretation of its evolution since 2007 and the main factors that caused a change on its tendency. This will help us comprehend the outlook of the economy to find out why the monetary policy was implemented at that precise moment.

The Federal Reserve considers a huge set of economic and financial variables when conducting its statistical analysis on the formulation of monetary policy. In this thesis, I focused the analysis on economic developments. Its aim is to improve the political, economic and social welfare. Therefore, it should be noted that some explanations might be biased if we took into account more factors.

Approaching the end, I will explain how the monetary policy is carried out. This will help us to understand the actions taken by the Federal Reserve to combat inflation and unemployment. Also, to analyse the main hypothesis of the thesis: does the Fed gets ahead of events?

V. RESULTS: MONETARY POLICY REPORTS

Monetary policy report is a semi-annual description of the economic and financial outlook and the procedures that the Fed will take in order to stabilize the gross domestic product, maximize employment, obtain price stability and stable long-term interest rates. Monetary policy reports are written to inform the public of the actions of the Federal Reserve.

Is required by the Federal Reserve act and is addressed by the Congress. The Board of governors provides the Semi-Annual Monetary Policy report to the Congress, which oversees economic policy. Moreover, the Chair and other Board governors are required to participate periodically in front of the Congress to inform about the evolution of economic and financial markets and monetary policy.

5.1. Chronologic tables

	GREAT RECESSION		RECOVERY					DECEMBER INCREASE FED FUNDS		NORMALIZE BALANCE SHEET		
	July 2008	**February 2009**	**July 2010**	**July 2011**	**July 2012**	**July 2013**	**July 2014**	**July 2015**	**June 2016**	**July 2017**	**July 2018**	**February 2019**
Federal funds rate level	2%	0%	0%	0%	0%	0%	0%	0,25-0,5%	0,25-0,5%	0,75-1,75%	1,75-2%	2-2,75%
ECONOMICS DEVELOPMENTS												
GDP growth	Decreases	Fell at annual rate of 3,75%	Increased at annual rate of 2,75%- Businesses started to rebuild stocks	Increased at annual rate of 1.9%	Increased at a 2%	Increased at an estimated annual rate of 1,75 %	Transitory decline in first quarter but rebounded in the second quarter	Remains the same in first quarter but picked up in the second quarter	Moderate increase	Increased annual rate of 1,5% on first quarter and stepped back on the second	Increased at 2% on the first quarter	Increased at 3% on second half of 2017- noticeable pickup
Household sector												
House prices	Continued fall- Sales new homes decreased and rising foreclosures	House prices continued to fall	Steady- wealth-to-income ratio below levels of 2006-07	Further declines- Large inventory of unsold homes	Increases- Sales of homes increased supported by low home prices and low interest rate	Demand of houses increase- Prices increase	Increased- rapid recovery	Moved up further- Households net worth increased	Moved higher	Moved up further- Risen household net worth	Increasing average annual rate of 6% - Pace of construction not kept up with demand	Increased but the pace of growth moderated
Mortgage rates	Subprime loans unavailable- Total availability credit held down	Mortgage default increased	Declined- Fall in consumer credit	Historically low levels- but access mortgage credit restrained	Historically low levels- consumer credit expanded	Low- housing market recovery- reduced monthly debt payments	Increased on summer of 2013- Effects faded- Housing activity has yet to pick up	Increased- Balance with rising household income	Low interest rates and rising incomes- lower debt payments	Remained low- housing sector improving	Activity stabilized- Higher mortgage rates	Declining activity- Rising mortgage rates
Delinquency rates	Rise - growth rate subprime delinquencies slowed and prime delinquencies picked up	Moved up- specially on adjustable rate mortgages	High- signs of stabilize but remain at highest levels- prime and subprime had edged down	Decreasing- still large number- mortgage interest rates fell	Lower but high level - foreclosure continued near the peak	Indicators of distress declined- strict conditions for new mortgages- improving labor market	Ratios of loss reserves to delinquencies and to charge-offs edged up	Continued to improve -low interest rates and an easing mortgage credit	Continued to improve -low interest rates and an easing mortgage credit	Delinquency rates remained low - rising debt for subprime borrowers- mortgage credit available for solid profiles	Tighten conditions of credit- response to some upward move	Mortgage standards eased
Consumer spending	Slowed down- rising unemployment and increasing prices	Downshift- pullback purchase goods and services	Moved up- Picked up in household incomes	Slowed on the first half of the year and after modest increase	Moderate increase- Economic challenges - thigh access to credit- pessimism on job gains	Increased- despite tax increases- gains in house prices and equity values	Increasing- more gains in wealth- increase job gains	Increasing - improvement in the Labor market- income growth	Increasing- more gains in income- low oil prices boosting purchasing power	Increasing (only a bit slower than past years) - income and wealth gains	Increased- strong growth- however increasing less than gains on disposable income	Gains- Improvements labor market foster consumption

	GREAT RECESSION		RECOVERY					DECEMBER INCREASE FED FUNDS		NORMALIZE BALANCE SHEET		
	July 2008	February 2009	July 2010	July 2011	July 2012	July 2013	July 2014	July 2015	June 2016	July 2017	July 2018	February 2019
Business fixed investment	Decreased- economic and financial conditions deteriorated	Decreased- Deceleration of spending	Started to increase- Improvement in sales, production and profits	Increased- need to have more efficient equipment and capacity	Increased with caution- situation in Europe	Rising at a modest pace- borrowing credit conditions improved	Investment has been flat- low growth of businesses	Decreased- investment on energy sector dropped- slow business output growth with weak exports	Declined- weak foreign demand and stronger dollar	Recovered- net exports increased a bit- increased growth activity- easy asses to credit	Continue to pick up	Moderated after strong gains in 2018
Government sector												
Federal government deficit	Federal debt rose- increasing holdings of Treasury securities	Huge deficit	Deficit appears to begin stabilizing- Increased demand of treasury securities	Remains elevated - high levels Fed government financing	Remains high - increasing government income by rising tax as economy recovers	Decreases- Expected to decrease more- Fiscal policy changes and economy improvement	Similar levels- financed by purchases of Treasury and corporate securities by foreign investors	Narrowed- Spending cuts and increased taxes	Similar levels- no more positive effects of fiscal policy	Slightly increased- fiscal policy neutral effect on economic growth	Increased- fiscal policy more expansionary	Slightly increase - Federal fiscal policy actions raised economic growth
National Saving	Went below 0- Federal budget deficit widened	Fell- Deficit widened	Remains low by historical standards- High deficit still	Historically low level- increased Federal deficit	Extremely low- increased compared to past years- large deficit	Very low- Deficit has improved- economy still weak	"Not available information on reports"	"Not available information on reports"	"Not available information on reports"	"Not available information on reports"	"Not available information on reports"	"Not available information on reports"
External sector												
Net exports	Increased on the first quarter	Fall- Decline foreign economic activity	Strengthened - recovering	Increased- robust foreign demand and low value of the dollar	Increased- strong foreign growth, mainly to Canada and Mexico	Weakened- low foreign economic activity- Exports to Canada rise	Decline heavily first quarter- better on second quarter global slowdown in trade	High decline- appreciation of the dollar and transitory factors	Flat- slow foreign growth and appreciation of the dollar	Increased -surge in agricultural exports	Increased- neutral effect on GDP growth on the first quarter	Declined in the third quarter- subtracted from GDP growth
Real imports	Declined	Declined- Deteriorated US demand	Increased at annual rate of 2,75%- Businesses started to rebuild stocks	Increased- return normal pace of expansion	Rose less- slower growth in the US- mainly trade with major partners	Decreased- imports of oil declined further	Advancing slowly	Increased- supported by stronger dollar	Declined -despite appreciation of dollar- Increasing second quarter	Moderate growth	Slowed compared to last year- but increasing	Picked up in the second half
Labor market												
Unemployment	Increasing unemployment- Construction and manufacturing sectors	Increased and stabilized at 10%	Slightly below recession level- Still highest level since 1980	Stayed on levels of 9%- Danger of long-term unemployment	Diminished very slightly- remains elevated- plus high long-term unemployment	Declined to 7% on the second quarter- labor force participation rate (LFPR) declined	Decreased to 6% - LFPC little changed	Improve at a more gradual pace- reached 5% - LFPC still flat	Improved- held around 5%- slack: part-time workers that want to work full time is elevated	Around 4%- lowest level since 2000	Around 4%- below all FOMC estimates	Remained at 4%- increasing LFPR
Productivity	Gains- rapid change of technological change	Held up good levels- Efforts to use information technology	Rise- Because of his refusal to incorporate more workers for the uncertain economy	Increased less rapidly- starts to decelerate further	Gains are slowing- firms adding workers to relieve pressures on their existing workflow	Slow increases- change in unit labor costs low	Slows- reflect sustained weakness in capital investment	Weak-reflects weak capital investment despite recovery hours worked	Low- Labor gains with weak productivity growth- weakness capital investment	Slow growth- decreased capital investments	Decreased- debate remains about the reasons and its persistence	Continued slowdown
Wages	Not increased as much as prices	Moderate increase in real wages in 2008	Decreased on 2009 and got better in 2010	Restrained by the weak condition of the labor market	Moderate increase- improvement of the labor market	Slow gains- weak condition of the labor market	Slow gains- labor market slack	Began to increase- remain low- improved labor market	Increasing- expected to continue	Remained modest- employed cost index increased in the first quarter	Moderate increases- despite strong labor market	Picked up but remain moderate by historical standards

	GREAT RECESSION		RECOVERY					DECEMBER INCREASE FED FUNDS		NORMALIZE BALANCE SHEET		
	July 2008	February 2009	July 2010	July 2011	July 2012	July 2013	July 2014	July 2015	June 2016	July 2017	July 2018	February 2019
Prices	High	Inflation pressures diminished	Diminished further - Low levels under 1%	Increased- Stabilization of commodity prices	Lower- Long-term inflation expectations stable	Especially low - transitory factors - Long term inflation remain historical range	Consumer price inflation moved up- recovery of transitory factors	Decrease because of oil prices- Inflation near zero	Moved up from 2015 but remains under objectives	Moved up- remains lower 2%	Picking up	Close to 2%
Energy prices	Record high levels	Fallen dramatically	Fell	Rose first months of 2011 but then began to decrease- decline in crude oil	Increases- increased prices of crude oil but then turns down	Declines - global oil prices declined	Rose- Normalizing after sharp drop in 2013	Strong decrease- lower retail prices for gasoline	Lower rate of decline- led to declines in investment in the oil sector and cutbacks on production	Stable- remained above 2016	Increased-supply concerns	Dropped- surging oil productions and concerns of global growth
Food prices	Increased	Continued to rise rapidly	Moderate increase	Increased- emerging recovery	Slowed the last year effect on retail food prices dissipated	Unchanged	Higher wholesale prices for various food commodities	Falling	Rise in agricultural goods prices	Higher commodity prices	Low by historical standards	Remained low
CONDUCT OF MONETARY POLICY												
Federal funds rate	Decreased Fed funds rate to 2%	Aggressively to 0%, likely to remain for some time	Maintain at 0-0,25% for extended period	Maintain at 0%- Long period	Maintain at 0%- Announced until 2014	Kept forward guidance- unemployment still high and inflation below target	Kept at 0%- updated forward guidance	Kept target low- J. Yellen would determine the increase in a meetings basis	December 2015: FOMC raised the rate to 0,25-0,5%	Continually increasing target- progress over employment and inflation	Continued increasing- economic progress	Gradually increasing- FOMC patient determining future adjustments
Balance sheets		Increasing- Buying MBS and agency debt	Increasing- Buying MBS and agency debt	Increasing- Buying MBS, agency debt and Treasury securities	MEP Program- Buy long-term Treasury securities	Large scale asset purchases- significant increases- open market accounts increasing	Discussion of normalization of monetary policy with large balance sheet	Remained stable- maintaining existing policy of reinvesting agency debt and MBS	Remained stable- help maintaining accommodative financial conditions	Decrease reinvestments of principal payments- payments will be reinvested only if they exceed the gradually rising caps	Implement program to reduce balance sheet started in June 2017	Continued implement program to reduce balance sheet

Table 1. Personal elaboration with data from Monetary Policy Reports – Board of Governors of the Federal Reserve

5.2. Fed transparency and credibility

The Federal Reserve System tries to be as transparent as possible when shaping the Federal funds rate, since it enhances the effectiveness of monetary policy. Monetary policy has effects on all United States citizens lives. In fact, effects on the spending decisions of consumers and businesses. To communicate its policies, it issues written reports after every meeting.

Monetary policy operates with time lags, it is important that policymakers consider the future economic and financial directions in their decisions. These decisions affect the economy as soon as they are announced, even before they are implemented.

There are two different types of optimal policies that depend of the credibility of the central bank. Barro and Gordon focused on the importance of rules (commitment) versus discretion on 1983. First, Central Banks can work with commitment. Policymakers create a policy that has it effect on the future. Maintaining this promise makes households believe it and change their expectations today.

Central banks are committed to maintain low inflation in the long term. To accomplish it, they must maintain its objective and make it credible to the citizens. If the Fed can commit it lowers volatility with a slightly loss on output. Inflation returns rapid to target and the optimal policy neutralises effects of shocks. Thus, commitment is more effective reducing inflation volatility.

Discretion policies have more flexibility, Central Banks decide depending on the circumstances. Produces inflationary and stabilisation bias. Inflationary bias is the output of discretionary policies that lead to a higher inflation and no increase in output, however it makes inflation expectations increase.

If the central bank is subject to politics, these sporadic changes will be more common. These will cause that when the Fed establishes a policy of low inflation, will not be credible, and companies and citizens will increase their expectations for future inflation. Thus, increasing wages and prices without compensating the benefits in terms of higher production or employment.

> *"Economic planning is not a game against nature but, rather, a game against rational economic agents. We conclude that there is no way control theory can be made applicable to economic planning when expectations are rational." (Kydland and Prescott, 1977).*

5.3. Analysis of the economic developments

In this chapter, I will describe deeply the evolution of five selected variables: the government sector, the household sector, the external sector, labour market and prices. I will focus my analysis on economic developments, referred as the progress of economic, political and social outlooks.

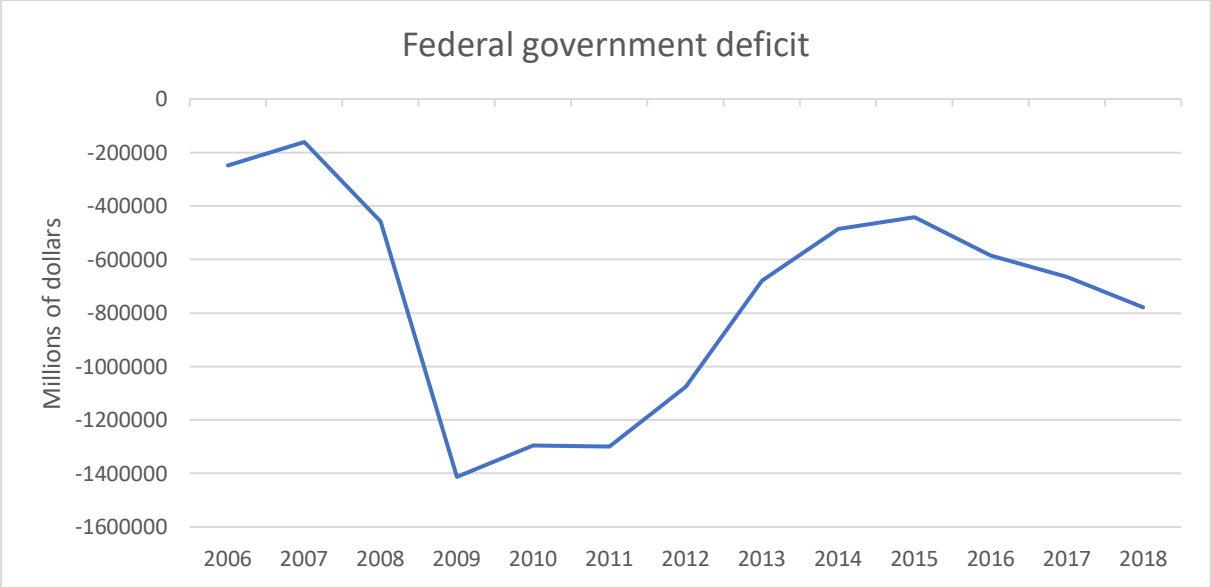
5.3.1. Government sector

Fiscal policy is the use of government expenditures and tax policies to influence economic promotion. As we have seen earlier in the section of the independence of the Federal Reserve, fiscal and monetary policy are independent, but closely linked. Several studies show (Ahrend, Catte and Price, 2006) that exist direct and indirect links between both.

The FOMC in their economic projections considers fiscal policy procedures which can influence GDP, employment or inflation. Therefore, there is an indirect effect between these two polices despite any of them can interfere in the other's executions.
Active policies are when both establish independent policies. And on the other hand, passive policies, when the execution is interrelated. Thus, the appropriate policy will be applied according to the type of demand and supply shocks it must solve.
Fiscal consolidation, when governments try to avoid an increase in the deficit and the decline in economic activity, is more likely to succeed if it is linked to a monetary policy that alleviates the initial stages of the episode.

We can confirm that during the years of the recovery from the crisis, monetary and fiscal policy went hand in hand to try to increase liquidity in the economy. Thus, recovering aggregate demand and stability.
Among these boosting programmes applied by the United States Congress, we find the Economic Stimulus Act of 2008. It consisted of an individual income tax rebate and two business provisions to encourage investment.
First, this income refund resulted in large reductions in tax retributions. I was a positive effect for consumers, but it had a great impact on the government's income. The purpose of this was to recover the economic activity of North Americans.
Moreover, incentives were also established to help the survival of companies. Among some of them were, the deduction of the annual investment cost and the depreciation allowance for certain assets.

As we can see in Graph 1, the increase in fiscal stimulus meant a huge deficit increase. The Economic Stimulus Act was intended to send $115 billion in refunds to households in 2008 and 2009.
If we analyse the effects of the Economic Stimulus Act, this accounted for 1% of the gross domestic product. This tax relief was an incentive for the expansion of the companies, but it did not become appealing for the creation of employment.



Graph 1. Personal elaboration with data from Federal Reserve Bank of St. Louis, Economic Data

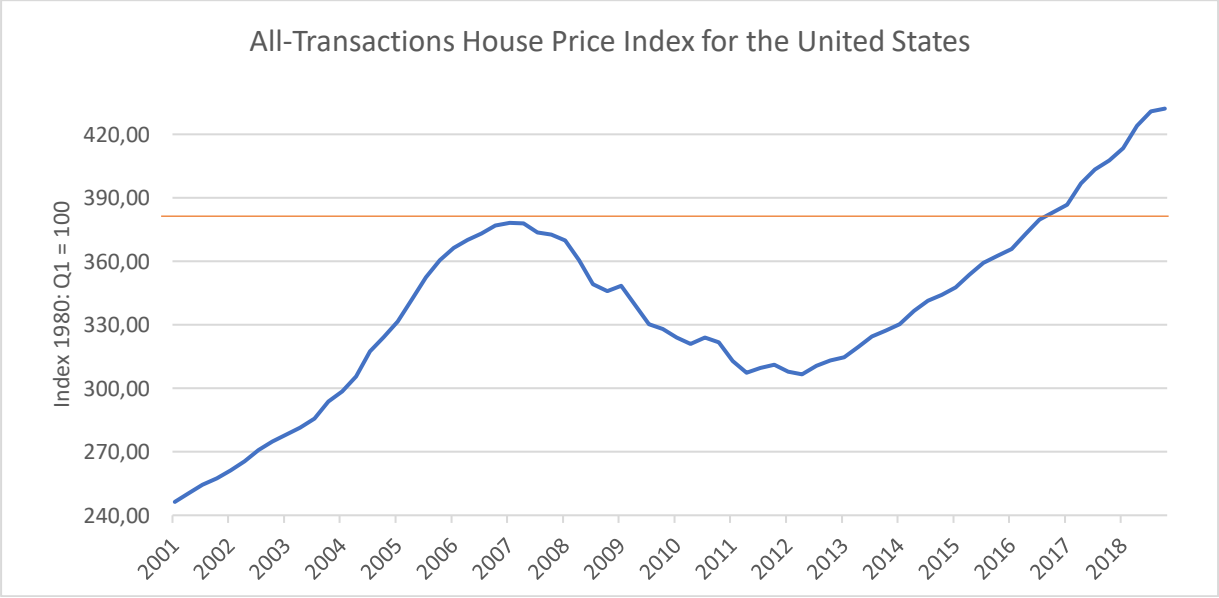
A year later, the American Recovery and Reinvestment Act of 2009 was introduced, an act that covered a variety of expenses. More than 80% of tax cuts for individuals were applied, in addition to smaller cuts subsiding investment on renewable energies and a large amount of provisions for companies.
Consequently, another year later, the "Reauthorization of the Tax relief unemployment insurance reauthorization and job creation Act" was introduced. The objective was to extend the tax cuts until 2012.
In 2013, fiscal policy incentives for economic growth were reduced. The tax cuts or the increase in several taxes caused a reduction on the Federal deficit.
Finally, around 2018 we can see that the deficit trend increased again. An expansive fiscal policy was applied to foster GDP growth.

5.3.2. Household sector

First, I would explain the evolution of the household sector starting in 2007 to nowadays. As we can see on the Graph 2, house prices were reaching maximums in 2007. This effect goes back to previous years with the creation of the greatest bubble on housing prices.

Around 2002, low interest rates encouraged families and businesses to raise their level of indebtedness. Families borrowed to buy houses, therefore encouraging a continuous overvaluation of this prices. Besides, as this demand was increasing, also encouraged investors to spend on the United States housing market because the return was high.

In 2004, FOMC decided to increased interest rates to control for higher inflation. The increase in home prices was still on the rise because the economy was growing fast and perspectives were also good.



Graph 2. Personal elaboration with data from Federal Reserve Bank of St. Louis, Economic Data

This risky environment could not hold longer when in 2007 it burst. Home prices broke the tendency to increase. Moreover, interest rates were very high. Households started to see the level of its mortgage increase and the value of their houses to decrease. As a result, these credits began not to be paid.

Delinquency rate started to increase in 2007 reaching extreme levels of 11% in 2010. With higher interest rates, mortgage credit was more expensive, and more consumers began to be unable to pay the fee. These effects cut down drastically the upward increase experienced in housing prices. Moreover, consumer spending slowed down because of this fall on liquidity and the decrease on the real value of household's homes.

To help defaulting banks, the Federal Reserve offered emergency loans. On 2009, central banks established a very expansive monetary policy, with an intervention interest rate at 0% and large increases in the balance sheet to preserve the stability of the international financial system and mitigate the crisis.[2]

House prices had a rapid recovery and were normalized around 2010, supported by low interest rates. Also, delinquency rates were at its highest point on 2010 but in 2013 were starting to decrease. In 2010, President Obama implemented the Dodd-Frank law, which prevented banks to take high risks. Moreover, it set up a consumer protection bureau to decrease predatory lending and to make loans understandable for all citizens.

Consumer spending began to recover around 2010 and maintained a growing progression to this day. This was favoured with the increase of liquidity by monetary policy and fiscal policy. In addition, was boosted because of the improvements in the obtention of credits and the unemployment.

As well as, increasing house prices increases household's wealth. Around 2015, as the economy as whole was experiencing a readjustment, consumption spending was increasing and surpassing by far the pre-crisis levels.

Also, the conditions eased to put back to normal the levels of interest rates. FOMC stablished a 0,25-0,5% increase each year, facing in 2019 levels of 2-2,75%.

On the other side, as we can see in the painted red line on Graph 2, in 2016 and onwards United States exceeded the levels of house prices it had when the bubble burst in 2007. This rapid increase and the rising levels of interest rates reminds of the same situation before the crisis.

However, we find ourselves in a different situation than in 2007. Housing supply is not increasing at the same levels as in the great recession. Therefore, an increasing demand due to economic growth and a low supply results in high house prices.

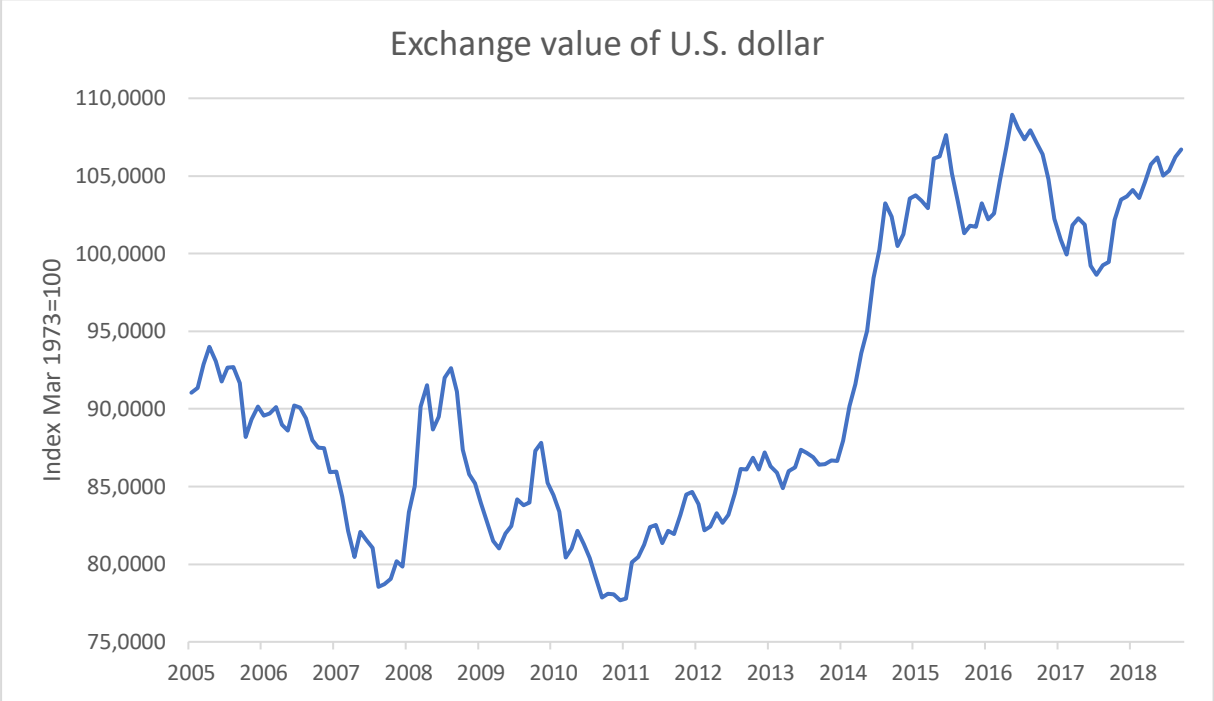
Instead, we find that levels of house supplies are very low. This relates to increasing home prices, decrease in construction and reasons related with the actual behaviour of citizens, as the existing homeowners are not selling, and as young adults do not have the desire to buy homes. Homeowners find themselves with declining mortgage rates, and therefore selling their houses will cause them to pay a higher mortgage on another house, thus, they do not sell. Also, house construction is limited because of the increase price of materials and the increasing regulatory costs.

[2] I would explain the explicit monetary policy measures taken by the Fed in chapters below.

Also, as I said, the outlook is rather different nowadays. One of the main causes of the great recession was the mortgage lending practices of bad quality and the subprime credits which are not present nowadays. Learning from these mistakes, today mortgage lending is very restricted, also softened by the Dodd-Frank law.

5.3.3. External sector

The evolution of the external sector for United States was negative after the crisis but recovered after it. Graph 3 shows a weighted average of the foreign exchange value of the U.S. dollar against a subset of the broad index currencies that circulate widely outside the country of issue. We can see that its value was low during 2010 to 2012. When the value of the dollar declines, its products are relatively cheaper for foreign countries and therefore it increases its exports.



Graph 3. Personal elaboration with data from Federal Reserve Bank of St. Louis, Economic Data

Therefore, during 2010 to 2012, both exports and imports showed an increase. We can see this recovery reflected on graphs 4 and 5, which show the top import and export partners for United States. Specially, during these years, exports with Canada and Mexico boosted.

During 2013 and onwards, both exports and imports slowed down due to a global decline in economic activity and a high growth of the value of the dollar. On the other side, imports increased due to this appreciation.

It all started to normalize around 2017, where all the major economies also experienced a recover. However, the value of the dollar maintained high levels.

Each country has its balance of payments formed by its current account and its financial account. Its current account contains the trade balance, plus income resulting from

investments and transfers. And its financial account is formed by loans, portfolio, foreign direct investment and reserves. U.S. is a country which needs investment from abroad because its current account it is in deficit, which means that its imports are higher than its exports. Mainly, United States is an attractive place for investors, so it is unlikely that it suffers from a balance of payments crisis.

As we know, exports depend on the economic situation of countries abroad. Moreover, the imports are related with the economic activity experiencing in the United States.

As we see in graph 4 and 5, the main top exporters and importers for United States are Canada, Mexico, China and the European Union[3]. For a better understanding of why these countries are the top partners, we can see in figure 5 trade agreements between countries. Trade barriers decrease with agreements between countries which facilitate trade. The most common accords are to eliminate tariffs, quotas or establish a mutual external trade policy or tariff.

NAFTA is a free trade agreement between United States, Mexico and Canada. That is why it is mainly importers and exporters are from Canada and Mexico.

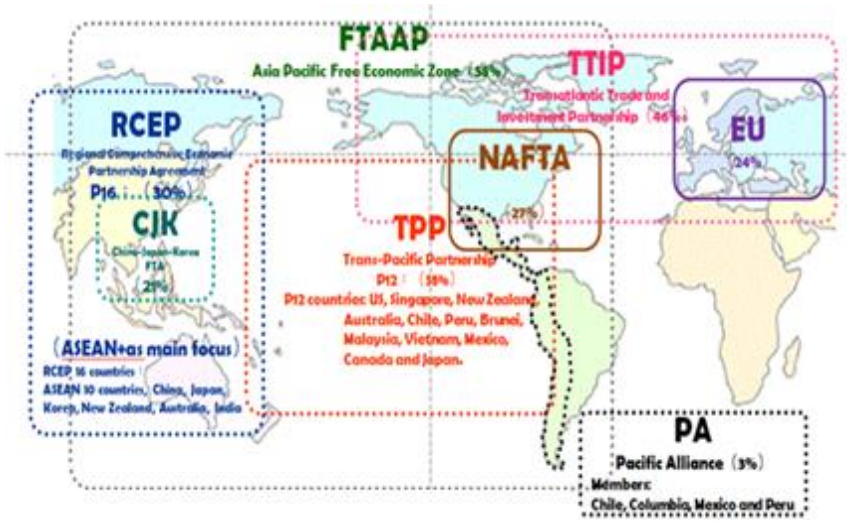


Figure 5. State of Global Economic Integration
Source: IMF, World Economic Outlook Databases (2013)
Note: figures in brackets for proportion of free trade areas of world GDP

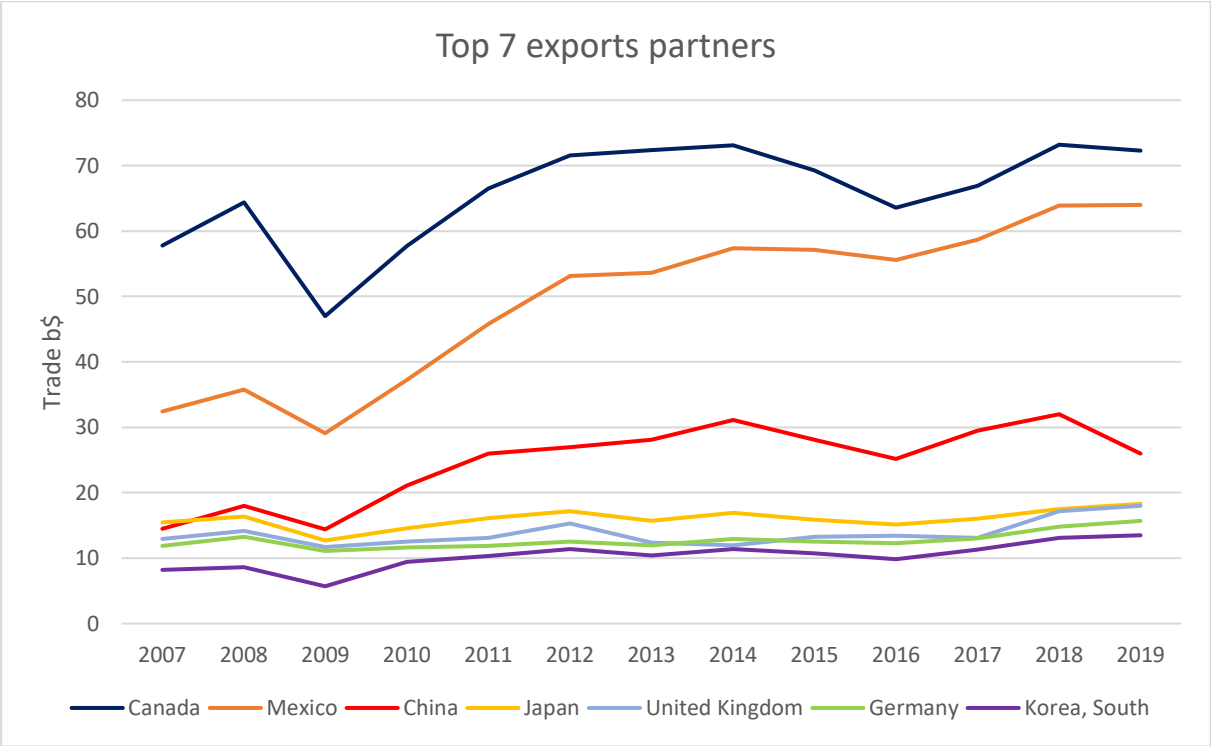
The three major economies are the United States, China and Europe. These trade with each other since they are the most productive economies and those that offer products with high external demand. United States has an agreement with the European Union: The Transatlantic trade and investment partnership. However, it does not have any trade agreement with China yet.

Trade conditions between China and United states are under pressure as president Trump was elected to power in 2017. Trump does not trust China's trade policy, blaming them to practice unfair trade and raising tariffs on specific products. The trade war started on 2018. As we can see on Graph 4 and 5, China is the third main country where United States is exporting. Reciprocally, China is the mainly importer from United States. Its exports and imports started to decrease due to these trade battle.

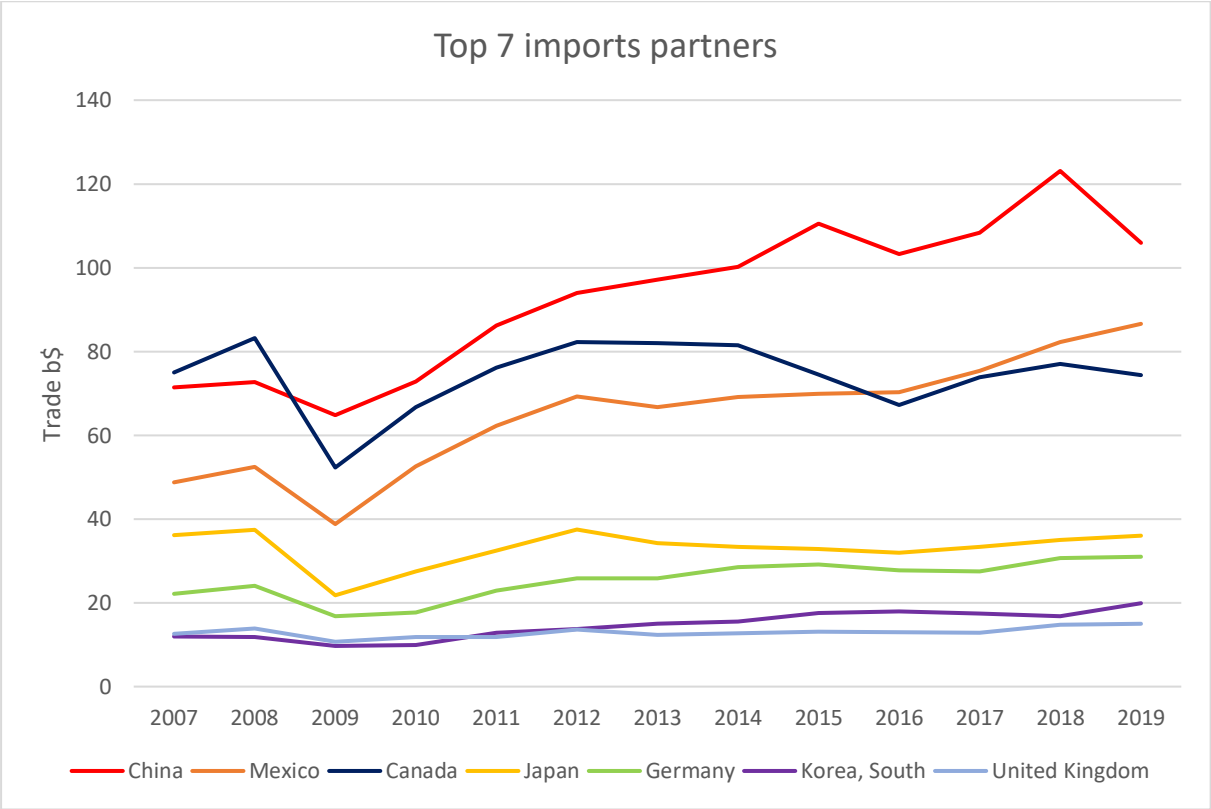
This war is dangerous for both economies, as they mutually are its main trading partners. Therefore, most economists think this war cannot hold any much longer.

[3] The European Union does not appear in Graph 4 and 5 because it is divided by countries.

As David Kelly, chief global strategist at J.P. Morgan Funds wrote in a report to clients on May 13th of 2019 *"Trade wars are simply bad economics, the silver lining is that they are so clearly detrimental to the American economy and American business that, despite current concerns, they are unlikely to be a long-term feature of our financial landscape."*



Graph 4. Personal elaboration with data from Federal Reserve Bank of St. Louis, Economic Data



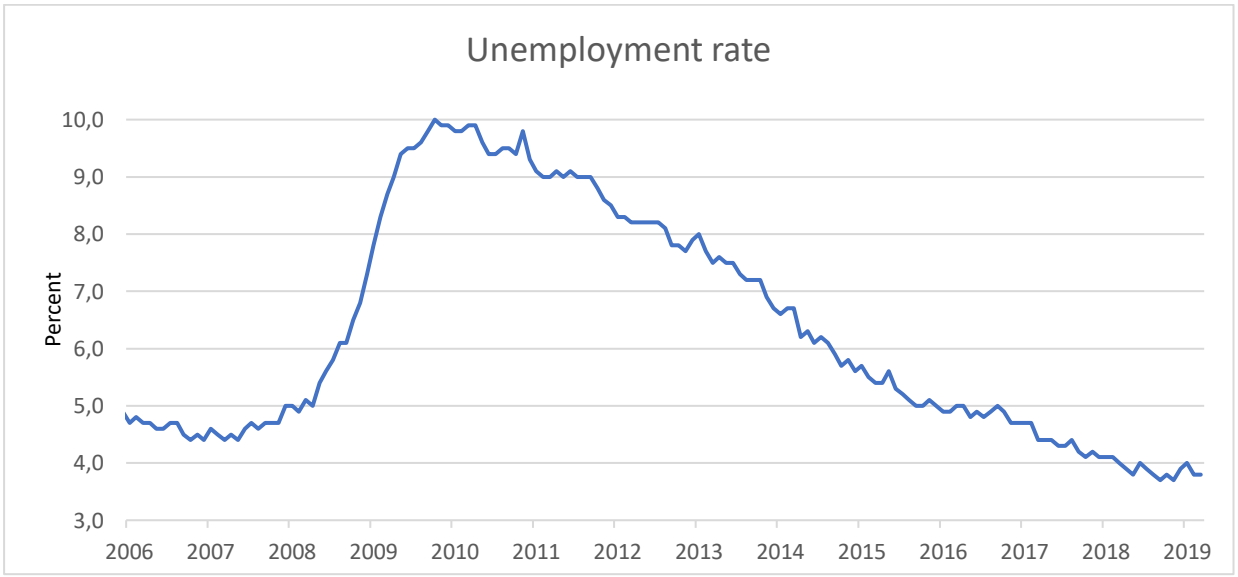
Graph 5. Personal elaboration with data from Federal Reserve Bank of St. Louis, Economic Data

5.3.4. Labor market

Analysing the unemployment rate in graph 6 we can see that long-term unemployment rate continuously improved since 2010. However according to 2015 Monetary policy report, labour force participation was lower than what was estimated and the increases in wages were moving slowly. Moreover, lack of work was prominent, where citizens were not looking for a job, but they would if the market were stronger. As FOMC stated, maximum employment was not yet reached but prospects were favourable. The following year, progress on employment was made and wages were growing faster but unemployment was still higher than before the crisis. Finally, in 2017, unemployment was back to the pre-crisis level.

More gains in the labour market were achieved in the later years. Payrolls were increasing but not as fast as before the great recession and unemployment was at its lowest level since 2000.

The natural rate of unemployment is determined by frictional unemployment, which is the time period that occurs since the employee leaves his previous job and obtains a new one. While low unemployment is obtained due to the government efforts to boost demand. If unemployment is below natural rate it would increase again generating inflation. That is, the Fed examines the fluctuations of employment around the natural rate to prevent inflation. Therefore, maximum employment is the ideal target where no price variations occur.

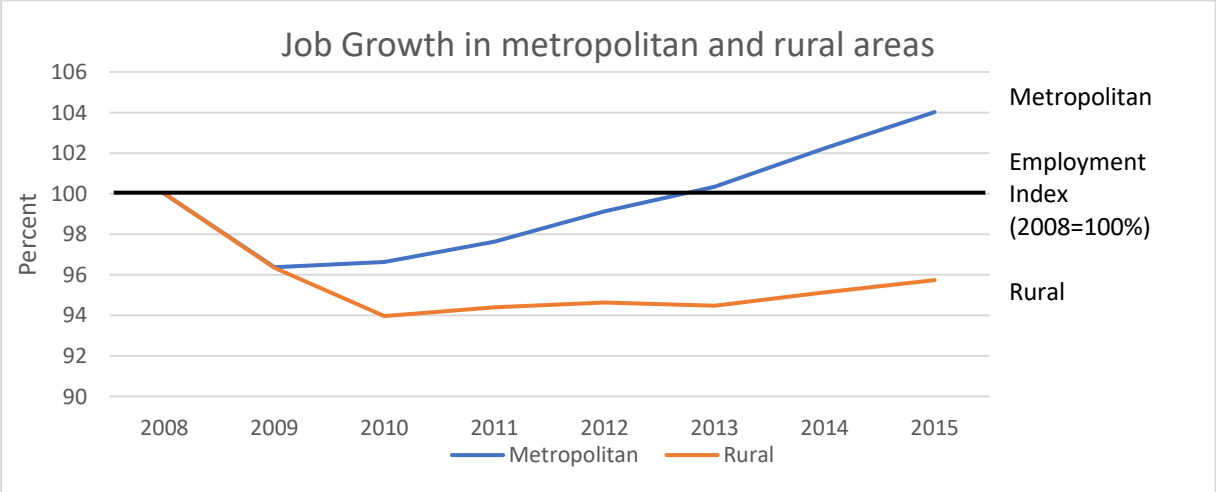


Graph 6. Personal elaboration with data from Federal Reserve Bank of St. Louis, Economic Data

Whereas wages rise, seeking employment also increases. However, employees are willing to employ less workers, consequently they increase the hours worked on the existing ones or invest in new equipment to foster productivity. The policymaker's aversion to inflation is what makes workers have less access to the labour market. That is, if labour market increase exponentially, consumption will increase and therefore inflation more likely will increase too. Therefore, policymakers will stop this increase on inflation with contractionary monetary policy, which reduces economic activity and therefore it can rise unemployment.

A distinct factor to have into account is the job growth on the urban areas compared to the rural areas (graph 7). As we have seen, unemployment in the whole country is decreasing,

however if we split this data into urban or rural, we see a much different scene. Even though being an important factor, we must consider that the total rural areas in U.S. cover 97% of the nation but only a 19,3% of population lives in that areas (according to 2016 data of U.S. census).

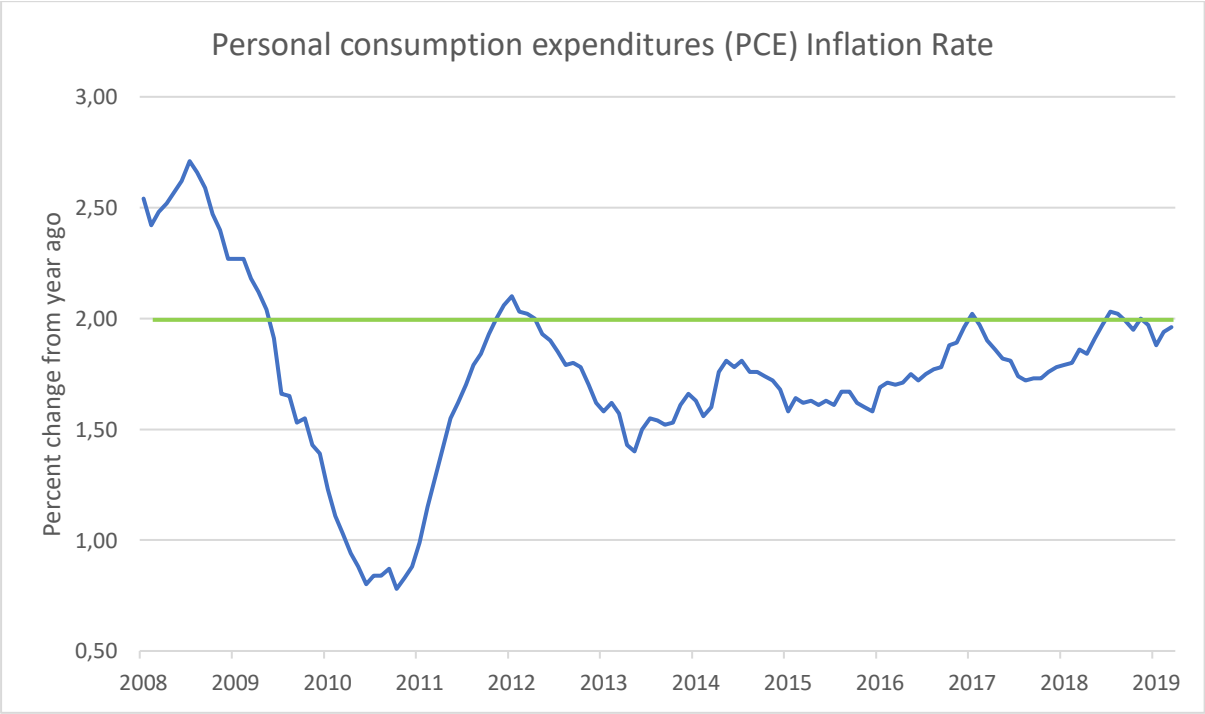


Graph 7. Personal elaboration with data from U.S. News and world report

5.3.5. Prices

As I quoted during the thesis, the objective of the Federal Reserve is to maintain a 2% level of inflation. I would use the personal consumption expenditure (PCE) index to analyse it. This index tracks the variation in prices of goods and services acquired by households. The PCE includes the largest basket of goods and services among other indexes.

If we look at the graph, I have drawn a line on 2% to see how further inflation moved from its objective.



Graph 8. Personal elaboration with data from Federal Reserve Bank of St. Louis, Economic Data

The massive reduction in the upward trend in home prices in 2008, caused a fall in the prices of all other goods. The reason is that consumer aggregate demand decreased and therefore prices felt. Deflation increases the burden of household and business debts, because they hold a larger debt than its real value. Moreover, low inflation influences short-term interest rates to be low which disables the ability of policymakers to decrease interest rates to stimulate the economy.

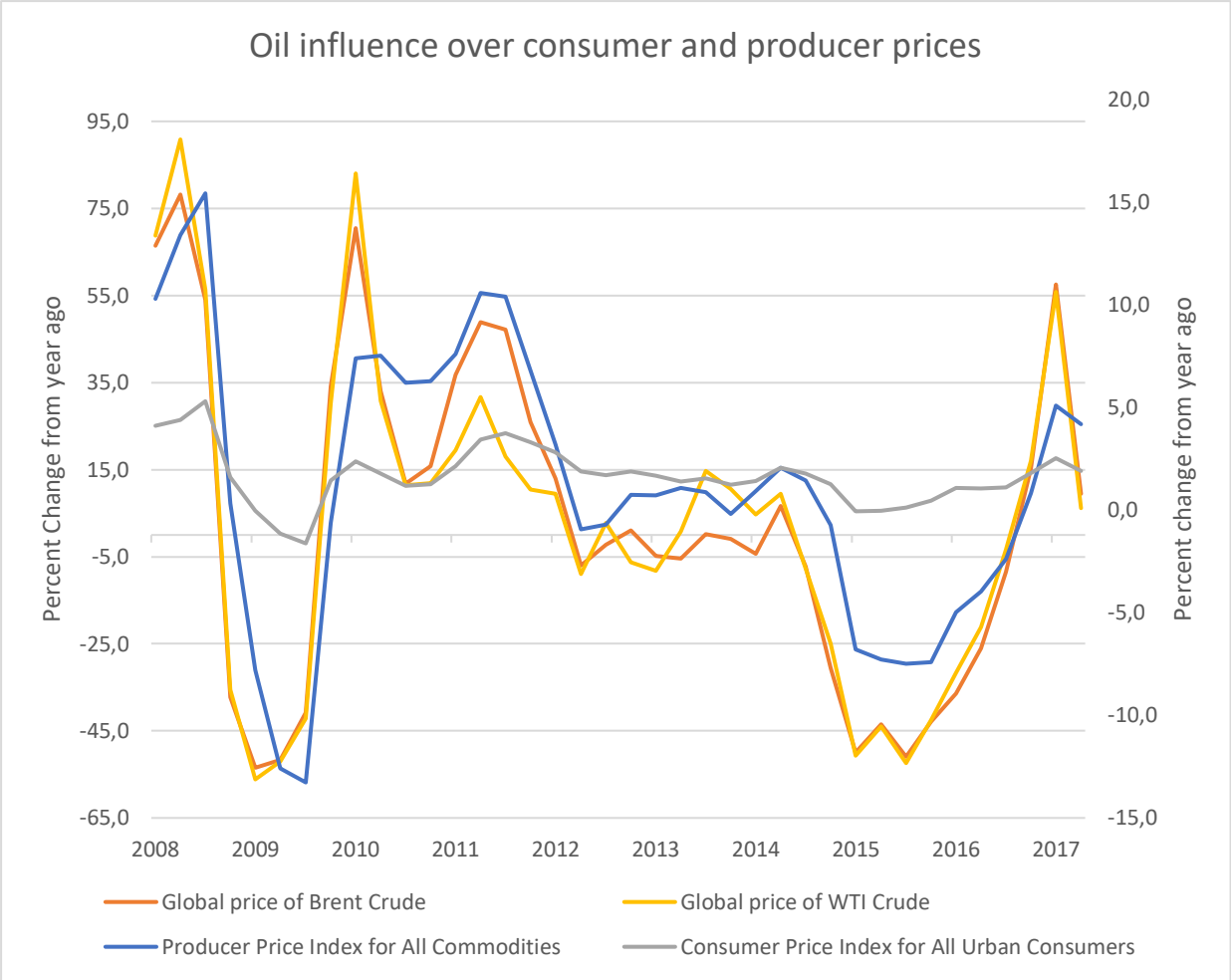
If we look at the graph, we find that in 2011 there was a rebound in prices due to the increase in the cost of raw materials and a high oil price. Moreover, we can see how years later this price fluctuates stable between 1,5% to 2%.

We find that this level of inflation shows up to be below target in advanced economies despite of economic recovery, tightening labour markets and quantitative easing (QE). QE was a Fed programme to recover liquidity in the financial and economic markets. This massive increase in monetary supply had inflationary risks. However, as we see in the graph 8 inflation was rather stable during this period. There are few reasons that explain the stability of inflation.

One explanation for QE not causing high levels of inflation as economists say, is because the banks have not loaned out the money inserted. Since 2008 banks excess reserve was very high as new lending regulations were applied. I would analyse further this effect on the conduct of monetary policy.

One other reason for the low level of inflation is positive supply shocks such as low oil prices, globalization and technology innovations. The main impact of globalization is the increase in global supply of goods especially from the addition of China and India to the world trade, which has lowered the prices of imports.

Another aspect to analyse is the effect of oil prices into consumer and producer prices. On Graph 9 the blue and grey lines reflect the percentage change on price inflation measured with the two major aggregates: producer price index (PPI) and consumer price index (CPI). Also, the orange and red lines show the percentage change on the price of oil measured by the price of Brent Crude and the price of West Texas Intermediate (WTI) crude. As I mentioned later, the movements of oil fares led to diversions in prices. If we properly observe graph 9, we see how the reaction of producer prices are behind the oil fares, following its same path. This leads to a positive relationship between oil prices with PPI. Oil is an important input for production processes, used in important activities like fuelling transportation and heating homes, among others. Therefore, if the fare of the production process increases it will translate into the price of the final product. On the other side, if we look at consumer prices, we find a less linked perspective as prices are less related with the price of oil.



Graph 9. Personal elaboration with data from Federal Reserve Bank of St. Louis, Does oil drive inflation? BLOG

VI. DISCUSSION: THE CONDUCT OF MONETARY POLICY

During the thesis, I have been analysing various variables and their evolution over time. To finish, I will relate the drastic changes of these variables with the establishment of monetary policy. This will serve to observe if the monetary policies of the Fed are behind or ahead of the events influencing the economy.

6.1. Monetary policy after the Great Recession

When the crisis began, central banks applied traditional monetary policies to reactivate the economy. The recession broke the confidence in banks, concerns among them were raising because of the withdrawal of funds from investors during the speculative environment. To avoid bankruptcy, the FOMC reduced interest rates to 0%. In addition, the Fed reduced the discount rate to increase money supply and established other programs instituted in the Federal Reserve Act, to increase liquidity in the short term.

Although these policies helped to recover banks, conventional monetary policies were not useful to get out of the crisis. Thus, the Fed applied additional measures known as **non-traditional monetary policies**, consisting of large-scale asset purchases and forward guidance.

6.1.1. Quantitative easing and artificial interest rates of the Fed

As I explained earlier, as the great recession began in 2007, the economy felt. Unemployment increased, the activity on the external sector decreased, delinquency rates raised, and so on.

The Fed carried out open market operations. It bought a huge quantity of bonds to insert liquidity into the marketplace. However, it was not enough liquidity to revive the economic activity.

Therefore, in 2008 it announced a quantitative easing program. These actions, taken by the Fed chairman Ben Bernanke, were exclusive to solve the problems of the recession. This liquidity program was acting like subsidies for industries that otherwise would not have a buyer. So, the Fed it was not only buying Treasury bills. It was also buying home loans named Mortgage Backed securities (MBS).

What makes agents trust banks is confidence and liquidity. Confidence to know they will get their deposits back. However, banks after the great recession were in a risky situation to pay agents deposits because they did not hold liquidity (liquid assets are the ones that can be converted into cash and with the minimum impact).

The Fed also had the need to reduce the federal funds rate to 0% as it was increasing its balance sheet, to enable the creation of a market for the bad mortgage products. These actions showed positive economic results.

Quantitative easing had two effects both referred as QE: Credit easing and the mentioned QE. On one side, credit easing was the process when the Fed bought private sector assets because of their lower demand. This had a direct effect of increasing liquidity. On the other side, QE actions where to buy treasuries and its immediate effect was the increase in money supply.

On November 2008 the first round of QE1 acted. QE1 concerned the purchase of 600 billion dollars of MBS and 100 billion dollars of purchases on Fannie Mae and Freddie Mac. Fannie

Mae is the Federal National Mortgage Association and Freddie Mac is the Federal Home Loan Mortgage Corporation. FOMC main objective was to inject liquidity and help the economic environment with low interest rates to restore activity, as people would have more access to credit.

Still in 2009 more liquidity was needed in the system. Therefore, the Fed took actions and employed QE1 buying 800 billion dollars, 100 billion more purchases of debt from Fanny Mae and 100 billion more on long term treasury bonds.

One inconvenient of QE is that the Fed after throwing the liquidity could not guarantee that banks created loans. Citizens were still scared by what the recession, and they were reluctant to take loans. Therefore, some of this money was retained by banks.

On November 2010 the second round of QE2 was established. It was made up by purchases of further 600 billion dollars in U.S. treasuries and a reinvestment from prior MBS purchases.

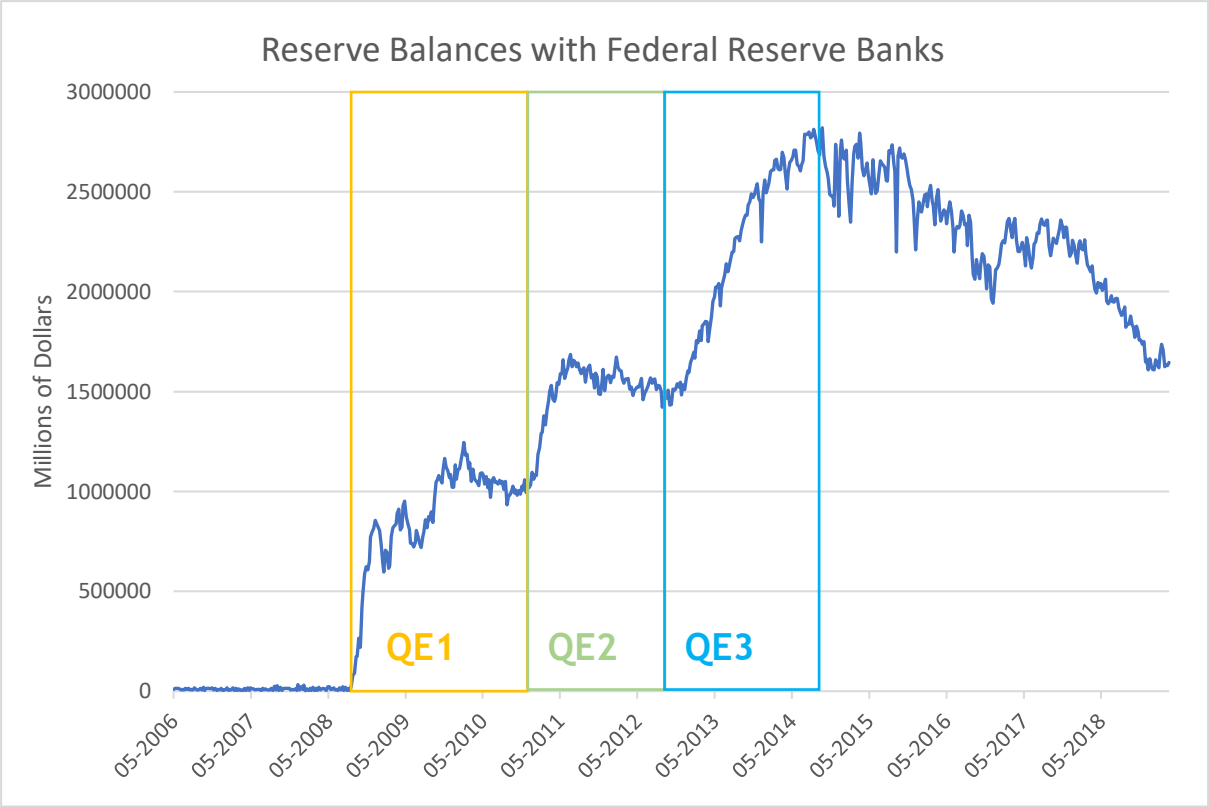
If U.S. treasury income is less than government expenses, U.S. treasury sells new issues and debt increases. Fed reinvestments do not add to the balance sheet, but they do to the national debt. The effects of QE2 would raise the money supply and keep treasury security yields low to stimulate debt purchases. Thus, as the mortgage debt would have a higher return than treasury yield, its demand will increase. This is how the Fed was forcing the liquidity on the market.

Finally, on September of 2012 the third round of QE3 was established. This one involved less injection of money, 40 billion dollars per month and to a smaller range. The Fed was buying the MBS considered as risky. The new strategy of the Fed was the exchange of assets called Maturity extension program, selling Fed reserves short term holdings and using this money to buy longer term debt holdings, which would have the effect of lowering long term interest rates.

Moreover, FOMC announced that the federal funds rate would likely to maintain at 0% until 2015. Low interest rates stimulate the economy. As borrowing is cheaper it prompts aggregate demand. Nevertheless, a low interest rate also decreases savings and investments.

Eventually, the QE program stopped on October of 2014. The economy was recovering, and home prices were stabilised. Whenever home values started to increase in 2012, revaluated the MBS value and created wealth on the economy.

We can see the three quantitative easing programmes reflected in the graph below.



Graph 10. Personal elaboration with data from Federal Reserve Bank of St. Louis, Economic Data

6.1.2. Monetary policy normalization

After the financial recovery, the economy came back to normal and stopped the quantitative easing program and the artificial interest rates. Currently, housing and stock markets were rising, thus, household's wealth through home ownership and stock investments. As long-term interest rates were kept, credit was easy and secure as new regulation was stablished like the Dodd-Frank law mentioned before, which avoided risk taking by banks.

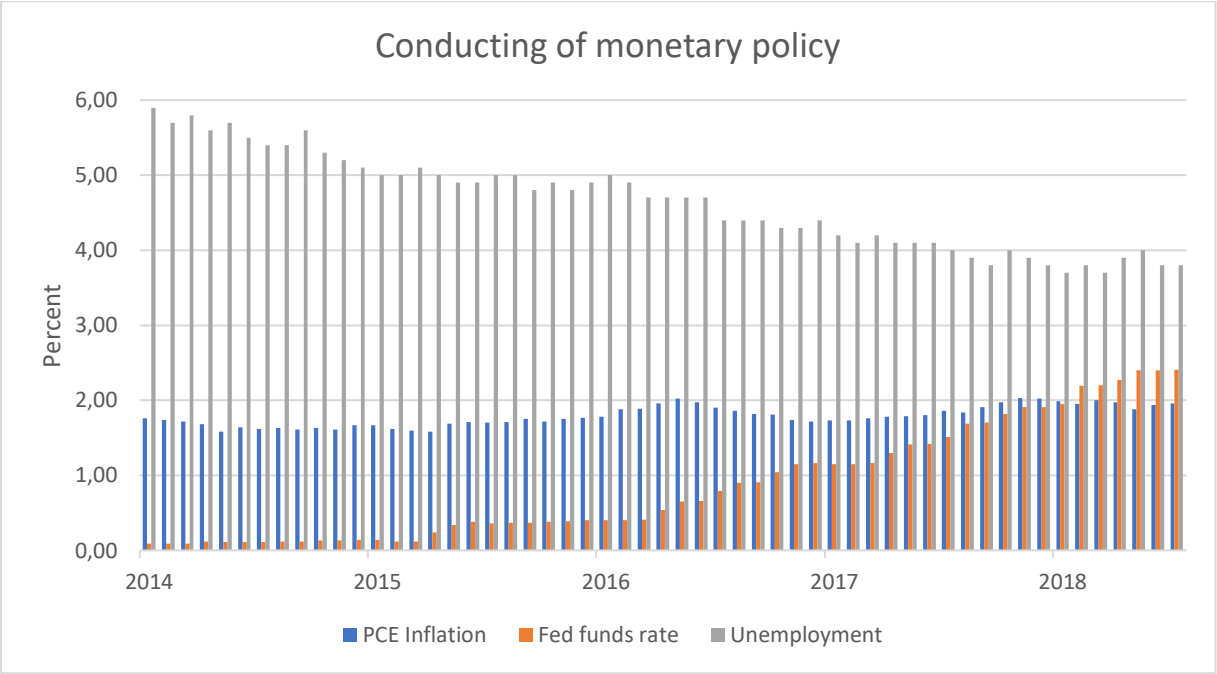
At one point, interest rates had to be returned to normal levels, as these low rates were temporary to stimulate the economy after the crisis. The Fed had to be sure when was the right moment because this increase would bring negative effects on aggregate demand.

As we have seen, the economy was back at good shape in 2015. It was on December of this year when the Fed took the action to increase gradually interest rates. As we can see on the graph 11, in December 2015 the level of unemployment was low and with decreasing perspectives. Moreover, inflation was under its 2% objective but also with good perspectives of reaching it.

Federal funds rates are the interest rates that commercial banks lend to each other overnight. This rate it is the benchmark for Treasury bills and additional short-term interest rates. The perspectives on short term rates have a direct effect to consumer borrowing.

The effect of an increase of interest rates was seen as a recovery and an end to the recession period. It gradually increased 0,25% per year, thus the effect on the economy was partially

unnoticeable. However, in 2018 the interest rates reached the point where they began to influence the economy. They moved from levels of 0,25% in 2015 to 2,5% by the end of 2018.



Graph 11. Personal elaboration with data from Federal Reserve Bank of St. Louis, Economic Data

The liquidity purchases ended in 2014, it was on this year and onwards when the phase of reduction of quantitative easing took place. The Federal Reserve was holding large levels of liquidity purchases and they reflected on the national debt. As the Fed funds rate was normalising, the balance sheet had to reduce as well. These levels, which were allowed during the crisis, are now reaching unsustainable points. Moreover, this phase gets more difficult as interest rates rise even further, because the debt the Fed is holding is getting more expensive.

The Fed has plans to sell the debt in the secondary market. It is subject to the same forces as market agents when interest rates rise. Fed actions to reduce the balance sheet will have to encounter the selling of debt outpacing the purchases they made; thus, the Fed needs to be an absent buyer. Without the Fed as a buyer of MBS and government agencies debt, this seller would have to offer better conditions to acquire buyers. Going back to normal for the Federal Reserve will be a great achievement.

The composition of the balance sheet is mainly treasuries, MBS and government agency debt. When interest rate increase, these assets will decrease in value. If the Fed wants to maintain its profitability it needs these assets to maintain its value. Thus, Federal Reserve finds itself into a dichotomy, they hold debt on their balance sheet, but they are applying rising interest rates measures.

6.2. Validation of the hypothesis

During the thesis, I have been analysing several variables and their evolution over time. To finish, I will relate the changes of these variables with the establishment of monetary policy. This will serve to validate the main hypothesis of the Fed being ahead of the events influencing the economy.

Thanks to today's ease of intercommunications, the Fed uses forward guidance to communicate its policies. This allows companies and families to make decisions based on the future effect of these policies. This argument favours my hypothesis, since the Fed is ahead of the prospects of the economy and generates a change before establishing the real monetary policies.

Thus, the assurance from the Fed that it would keep these interest rates at 0% enhanced its effect. In this way, consumers and companies did not have to worry in the short-medium term for the effects that could lead to its rise.

Policy makers predict the percentage change in gross domestic product adjusted for inflation, unemployment and the change in the price index for personal consumption expenditures (PCE). These projections are made in the short and long term. The long-term growth projections are intended to guide the economy towards growth with the economic policy they predetermine.

To test the hypothesis, the analysis focuses on the increase in interest rates in 2015, clearly establishing that this policy would only be maintained if economic conditions evolved according to their expectations.

The Fed established the raise in 2015 as conditions were favourable. It needed to raise the interest rates now to be able to reduce them later and stimulate the short run economy when needed in the next crisis.

If we decrease the interest rate without previous increase, we might fall into a liquidity trap and monetary policy becomes ineffective. When the interest rates have decreased, many people prefer to hold their assets as cash. Therefore, a liquidity trap reduces the effectiveness of the monetary policy and the only remaining option to expand the economy is fiscal policy. Fiscal policy can be troubling for citizens when recessions. The reason is that they use austerity measures to increase income and decrease expenses with tariffs or cuts in public services.

In March 2015, the FOMC communicated the next increases in interest rates given that economic conditions had improved. The unemployment rate had declined markedly since the crisis. On the other hand, inflation remained below its targets, this was negatively influenced by temporary shocks in oil prices, these being relatively low. The FOMC hoped that the good conditions of the economy would re-establish inflation to its objectives and, therefore, maintained its objectives of rising interest rates in December 2015.

The FOMC also considered that interest rates would gradually rise at low percentages. Thus, the economy would not be sharply cut back because of these increases.

We have seen earlier in graph 11, how this rise in interest rates did not show variation in the variables of unemployment or inflation. Therefore, we can deduce that the U.S. economy has not been negatively affected by the increases.

We see that inflation has remained constant around 2% during these years. Some of the explanations mentioned during the thesis are globalisation and technology innovations. Countries try to hold a similar monetary policy with its main trade partners.

That is why, I validate the hypothesis where the United States decides to anticipate events. That is, raising interest rates when inflation and unemployment are stable, such that in order to safeguard the mobility in interest rates for a possible crisis. Therefore, it raises interest rates according to the effects it may have on the economic outlook and the diversion of inflation and unemployment from its objectives.

> That was how the FOMC announced in its post-meeting statement in 2015: *"The size of future adjustments in the policy objective would depend on the economic conditions realized and expected in relation to its maximum employment objectives and 2 percent inflation. In addition, economic conditions will evolve in a way that is compatible only with gradual increases in interest rates."*

These actions are contrary to those of Europe, where they continue to maintain low interest rates, although some countries in E.U. have already recovered from the crisis, as conditions are more favourable.

If the central bank is acting after the events, the performance would differ. It will rise the interest rates if we observe a rise in inflation, to reduce consumption and mitigate inflation. But unlike the United States, in 2015 inflation not even reached the 2% and unemployment was going down. It was when it decided to increase interest rates progressively, where this increase would only be paused if the effects on the variables become harmful for the economy.

VII. CONCLUSION

During this work we have seen how the monetary policy of the Federal Reserve has evolved after the crisis. I wanted to check how the monetary policy of United States was ahead of events. As we have seen, in the validation of hypothesis, it is especially true based on the increase in interest rates originated in 2015. Since unemployment had declined, therefore, economic conditions were better, but inflation had not reached its objective. It is then, when the Fed decided to increase interest rates, even knowing that the effects of an increase in the interest rate could reduce inflation. But they stipulated that they would be based on the response of inflation and unemployment after the increase in interest rates. Furthermore, according to the Fed's predictions, they trusted that inflation would increase, and it will reach the 2% of neutral inflation.

We have also analysed during this work, the injection of money by the Federal Reserve (quantitative easing) to maintain liquidity in the system after the crisis. This measure, together with the maintenance of interest rates at 0%, were effective for the recovery of the economy. Such monetary policies were carried out in Europe to get out of the crisis. But the final resolution was not the same, as Europe remains with low interest rates and United States recovered much quicker from the recession. This allowed it to return to the normalization of interest rates. From this, we can draw the conclusion that monetary policies in the United States, seem to have a more direct and effective effect than those established in Europe.

Another important point that has been analysed and influences the execution of the Fed's policies is its independence. Despite being independent, it maintains close relations with fiscal policy when it comes to influencing the economy. That is why the FOMC considers the fiscal policies settled when it must establish its monetary policies.

Moreover, we have seen the evolution of house prices. Where their level influences the wealth of households and, therefore, their consumption. As we saw, after the recession these prices fell, and caused the aggregate demand to fall, which was a factor that exacerbated the crisis. This was solved, in a large part, with the mentioned policies of the Federal Reserve. Thus, increasing the liquidity of the system and stimulating the consumption of the citizens.

Based on the main objectives of the Fed, we have seen how unemployment after the crisis exploded, but this was recovered step by step as the outlook of the economy was more favourable. On the other hand, prices fell sharply in 2010 but years after were close to 2%, despite remaining below. It is vital to relate reductions in inflation with shocks in oil prices, which are both closely related.

In 2015, these variables had a favourable environment, and that was when the Fed decided to increase interest rates. One of the reasons that the Fed had to normalize interest rates, was to be able to have a margin for the manipulation of rates for any event that requires it, without falling into a liquidity trap.

When analysing whether this normalization policy was adequate, we have seen how the variables that the Fed targets are not practically affected by this change in interest rates. Unemployment has continued to decline, and inflation has remained at similar levels. This rise in interest rates has been gradually low over the years, with a 0.25% annual increase. Which can explain the small impact on the economy.

One of the factors I have mentioned analysing prices is globalization and its effects on them. As oil prices are estimated in dollars, the effect of the control in prices in the United States expands to other countries. Thus, monetary policies need to consider trade relationships into the establishment of their policies. As monetary policies itself are losing its effect in front of variables such as inflation. This reason demonstrates the growth of international trade, where monetary policies tend to equalize.

On the other hand, when the Federal Reserve performed the quantitative easing, it caused an increase in debt. The appropriate thing would have been that this was reduced before the increase in interest rates. But we have found that the amounts are still high, which can lead to problems to eradicate this debt.

In summary, we can conclude that the Fed is ahead of events when it comes to establishing its monetary policies. The analysis was conducted during the post-crisis period until now, specifically focusing on the 2015 increase, in order to analyse our hypothesis. Thus, in 2015 the economic conditions were good. Therefore, the variation of interest rates was not necessary since the conditions were adequate. But the Fed wanted to normalize monetary policy, thus advancing the events before this normalization could have really been necessary. For example, if there had been a situation where inflation had increased, due to the stimulation of consumption induced by these low interest rates.

This increase in interest rates was dependent on the reaction of inflation and unemployment. Since an increase in rates could lead to a reduction in consumption translated into a decrease in employment or a reduction in the inflation target. Therefore, the Fed established its policy before knowing what would happen with these variables predicting that they would have a stable behaviour with annual increases of 0.25% in interest rates.

"Sometimes you have to make decisions without knowing all that you would like to know, that is part of the job." – Janet Yellen

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