PONTIFÍCIA UNIVERSIDADE CATÓLICA
DO RIO DE JANEIRO

Projeto de Monografia II

Departamento de Economia

The American monetary policy during the pandemic: its impacts and comparison to the Great Recession (2007-2009).

Aluna: Luiza Carestiato Lima da Costa
Matrícula: 1910572
Orientador: Fernando Mendo

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"Declaro que o presente trabalho é de minha autoria e que não recorri para realizá-lo, a nenhuma fonte de ajuda externa, exceto quando autorizado pelo professor tutor."

“As opiniões expressas neste trabalho são de responsabilidade única e exclusiva do autor.”

Acknowledgments

First of all, I would like to thank my parents, Marcus and Lílian, for all the support through these years and for giving me the opportunity to attend this university.

I would like to thank Felipe, my brother, and Felipe Tomé for being my biggest companies in life and helping me daily.

To my grandma, Léa, for always understanding and supporting me.

Also, I would like to thank my tutor, Fernando, for all the help and guidance this last year.

Finally, I would like to thank my friends from PUC, Eduarda Serôa and Luísa Speiski, for making this journey funnier, and a special thanks to Pietro Lucchesi, who has been my friend since high school and continued supporting me for the last four years.

Abstract

This project will be focused on the monetary policy adopted by the Federal Reserve Bank during the Covid-19 pandemic (2020-) and its impacts. The period analyzed will be from the first lockdown (March, 2020) until the data available by the end of 2022. It will use data from the Federal Reserve Bank Economic Data, FOMC reports and from the bibliographic methodology research. Throughout the project, there will be a comparison between the efficiency of monetary policy in the pandemic and in the Great Recession (2007-2009). With the support of already existing literature on the topic, it will be possible to write a detailed analysis of the policies adopted and to write a literature review with critics on the material and conclusions on the effectiveness of the tools.

Summary

Figures

I. Introduction

1.1) The Coronavirus Pandemic

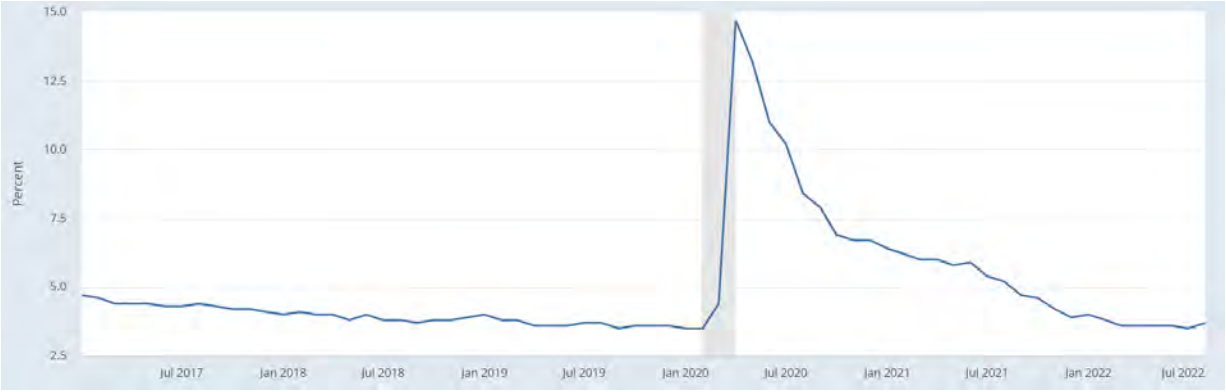
Since the beginning of 2020, the world has been facing one of its most challenging periods. The Covid-19 pandemic started, most likely, in China and it spread very quickly through other countries, making most governments adopt extreme measures, and, in the United States of America, it wouldn't be different. Within months into the pandemic, millions of Americans lost their jobs, their purchasing power etc., and the impacts on the economy would not stop there. The Federal Reserve Bank has been adopting some unconventional monetary policies to help the country recover from one of the sharpest contractions ever seen in the US. These policies mean the Fed will use other policies, rather than manipulating short-term interest rates when the country needs to stimulate the economy. Usually in these periods the interest rates persist at near-zero level.

After mass vaccination, the country began to recover faster than most countries, but the pandemic has not ended yet. Inflation has been one of the biggest enemies in the last few months. The annual inflation rate was 1.5% in March 2020 and, in December 2022, is 6.5%, which is a scenery far different from what people saw from the years that preceded the pandemic or even in the first year of the pandemic[1]. The current opinion from many economists is that the US might enter an economic recession. After a period of growing GDP in 2021, the country is now facing two consecutive quarters of GDP dropping. However, the consumption is high and the unemployment rate is low. For the current situation, it is important to question if the policies were effective and how inflation is behaving.

The motivation behind this project is to understand better how monetary policy tools work under these conditions, and how they can help a country to achieve a degree of economic stabilization. Studying what Central Banks decided to adopt during one of the most challenging periods humanity has faced might help understand more easily what they can choose to adopt at normal times. Also, looking back and analyzing what had good impacts and what could have been done better is a great exercise for everyone interested in this topic.

[1] Data from US Inflation Calculator. https://www.usinflationcalculator.com/inflation/current-inflation-rates/#:~:text=To%20find%20annual%20inflation%20rates,average%20inflation%20rate%20was%208.0%25.

Figure 1: Unemployment Rate in the US



Source: U.S. Bureau of Labor Statistics, FRED St. Louis

Figure 2: United States Fed Funds Rate

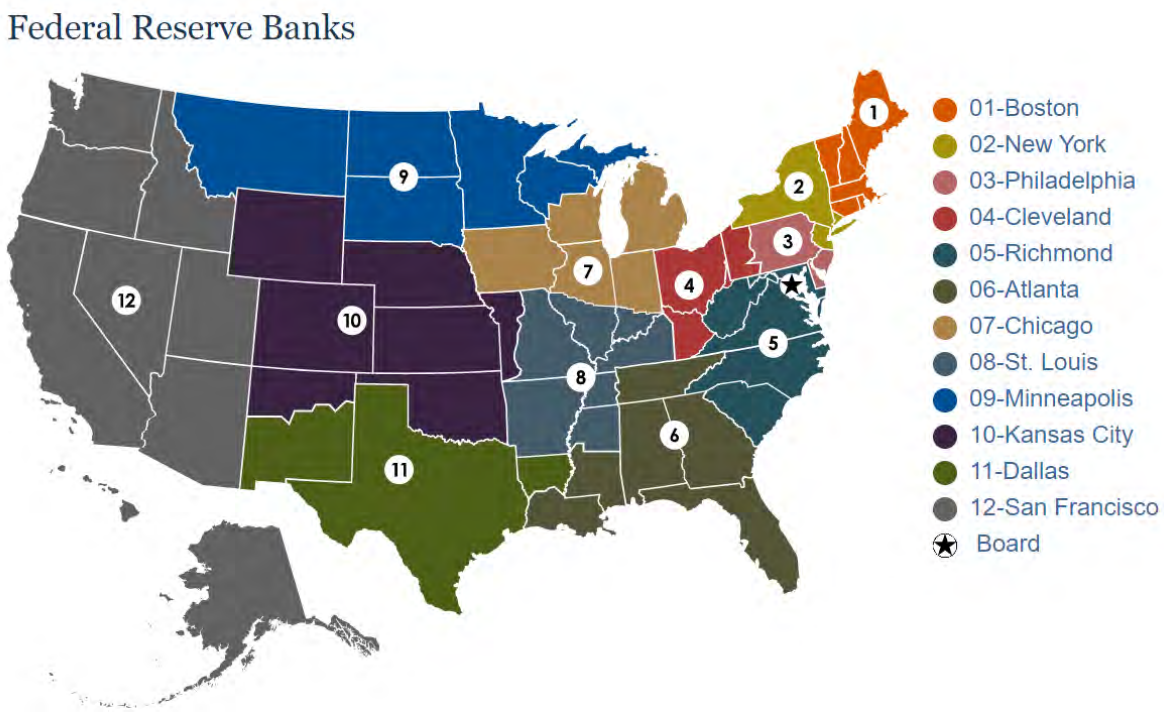
Source: Trading Economics

II. Contextualization

2.1) The Federal Reserve Bank

The Federal Reserve System, mostly called Fed, is the central bank from the United States of America. Its board has 7 members and it was founded to guarantee a stable, flexible and safe monetary and financial system. It is composed of 12 regional Federal Reserve banks with one president each. They are based in Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, Saint Louis, Minneapolis, Kansas City, Dallas and San Francisco. The institution is probably one of the most powerful in the entire world.

Figure 3: Federal Reserve Banks



Source: Federal Reserve

The Federal Reserve has control over the production and distribution of money and credit in America. Currently, it is responsible for the formulation of monetary policy and the regulation of member banks. The Fed was founded in 1913, during President Wilson's mandate, in response to the crisis in 1907 and, also, due to the fact that the US was the only financial power without a central bank. It was established by the Federal Reserve Act by the end of that year. Before its creation, the country struggled with many financial panics that had severe consequences to the economy, such as bank failures and business bankruptcies.

The institution is the primary regulator for banks that are members of its system, and it acts like a lender of last resort. This means the Fed lends money to banks that could not borrow from any other institution. The Fed's dual mandate to ensure maximum employment and stable prices. The Central Bank controls three tools of the monetary policy: open market operations, the discount rate and reserve requirements.

The main source of income is through interest charges on a range of US government securities acquired through open market operations (OMO). Other sources include interest on loans to depository institutions, interest on foreign countries currency investments, fee for services provided to these institutions. After paying expenses, the Fed transfers the rest to the US Treasury. The Federal Reserve has its payment system, Fedwire, that moves trillions of dollars daily, and transactions are for same-day settlement.

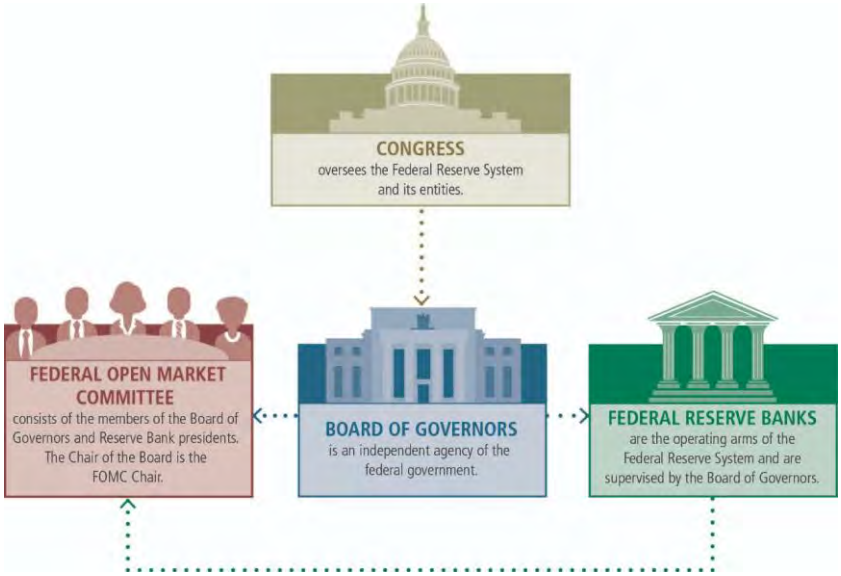
The Fed's duties can be divided into four main categories:

- The first is related to conducting the national monetary policy by interfering with monetary and credit conditions to guarantee maximum employment, stable prices and moderate long-term interest rates.
- Maintaining financial system stability and containing systemic risk.
- Supervision and regulation of banking institutions to ensure its system and financial system safety and guarantee consumer´s credit rights.
- Provide financial services, such as an essential role operating the national payment system.

Fed’s structure:

- Besides the twelve regional banks, the institution has a Board of Governors that is composed of 7 members, who are nominated by the President and approved by the Senate. Their appointment is staggered by two years to limit the President's power.

Figure 4: Fed´s structure



Source: Federal Reserve

It is possible to observe that the America Central Bank is a combination of public and private structures, as at the same time the members of the Board of Governors are chosen by the President and approved by the Senate, Fed's decisions do not need to be ratified by them, which gives the institution an independent status. Many people still debate whether central banks should be independent of the political bias of the government or not. The main argument to be pro-independence is that short-term political pressures should not interfere in the monetary policy. Also, it could better address long-term economic objectives with policies that sometimes might not be popular between politicians but serve a great public interest. Most arguments against its independence are related to the fact that people find it unconstitutional and undemocratic. Also, some might defend that the monetary policy will be poorly coordinated with the fiscal policy which is decided by the Congress.

The Federal Open Market Committee (FOMC) is responsible for open market operation, while the Board of Directors are responsible for the discount rate and reserve requirements. FOMC has 12 members, seven from the Board of Governors, the president of the Federal Reserve Bank from New York and the other seats are taken by four presidents from the eleven remaining regional Federal Reserve Banks that serve one-year terms on a rotating basis. The other regional presidents attend meetings and participate in discussions, they just are not allowed to vote. These meetings review economic and financial conditions, determine the appropriate stance of monetary policy and assess the

risks to its long-run goals of price stability and sustainable economic growth. They occur eight times per year.

2.2) Monetary Policies

Central Banks around the world adopt monetary policies to sustain a healthy economic environment by stimulating or restraining growth of goods and services, so the country can maximize employment and have a low and stable inflation. There are many tools that they can adopt to do so.

Central Banks can decrease or increase bank reserves that are the amount of money banks have to keep overnight. A high Reserve Requirement, which is a contractionary policy, leaves banks with a short amount of money to lend, while a low Reserve Requirement, which is an expansionary policy, allows banks to lend more.

Also, there are Open Market Operations that is when Central Banks sell or buy securities. The Federal Reserve Bank uses this tool to manage federal funds rate. When Central Banks buy securities, they increase banks holdings, increasing the amount they can lend. On the other hand, when Central Banks sell securities, banks have less to lend. In regards to Fed Funds Rate, it is the interest rate a bank, that does not meet the reserve requirement, pays to another bank that has cash in excess**.** Quantitative easing is similar to open market operation, it purchases long-term bonds, which affects long-term interest rates by lowering them.

Discount rate is what Central Banks charge member banks to borrow at their discount window. This rate is higher than fund rates, so banks only resort to it when they can't borrow from other banks. However, banks that appeal to this are usually in trouble and the financial community will assume it, as a bank would only borrow at the discount window when it has been rejected by other banks.

Central Banks can also pay interest on any excess reserves held by banks. If a Central Bank wants a bank to lend more, it can lower this rate and vice-versa. This rate also impacts Fed Funds Rate, as banks will not lend to others for less, they are receiving from the Central Banks for their excesses.

2.3) American Monetary Policy during the pandemic

In the beginning of Covid, a period in which there were many lockdowns and uncertainty about vaccination, the Fed decided to ease its monetary policy. However, in the beginning of 2022, it is possible to see a change, as the country struggled with higher

levels of inflation. Since 1996, the Fed has been aiming for 2% inflation, and, in 2012, its former chair made an explicit policy target. All information from this section was gathered from Eric Milstein, and David Wessel (2021) and FOMC Meeting Notes.

The most conventional policy the Fed adopts during periods of stress is changing fed funds rate. These practices impact other short-term and medium-term interest rates, the foreign exchange price of the US dollar, investment decisions, and some asset prices. Until the beginning of March, the target remained at 1.5 to 1.75 percent. However, to face risks and possible outcomes from the pandemic that would impact the economy, the Fed reduced the target to its effective lower bound of 0 to 0.25 percent. This move was mainly to reduce the costs of borrowing that consequently stimulates consumption in households and businesses. After the second Federal Open Market Committee of 2022, the Fed decided to raise the fed funds rate's target to 0.25 to 0.5 percent, so inflation, which was increasing, could be at its target at 2 percent in the long-run. In the next meeting, they decided to raise the target again to 0.75% to 1%, as the country was still struggling with high inflation. In June, the target increased to 1.5% to 1.75%, the same level found before the pandemic. As established in May 2022, the Fed started to reduce its holdings of Treasury securities, agency debt and mortgage-backed securities in June 2022. In July, another raise to 2.25 to 2.5 percent and reaching 3 to 3.25 percent in September. The most recent meeting, in November 2022, decided for a target from 3.75 to 4 percent.

The Fed provided forward guidance as a way to path interest rates during the pandemic. This would help public expectations about inflation, GDP growth. In the beginning, FED stated they would remain interest rates close to zero, but they expected to raise it in 2022, what in fact happened.

Quantitative easing became a very regularly adopted policy, even though it is considered unconventional. This policy consists of large-scale purchases of financial assets, such as government and corporate bonds or stocks. When the Fed decides to adopt this policy, the amount of money circulating in the economy increases, lowering interest-rates and, consequently, decreases the costs of borrowing. In March 2020, Fed decided to buy $500 billion in Treasury securities and $200 billion in government-guaranteed mortgage-backed securities over the coming months, helping restore the functioning of these two markets. The Fed set its rate to at least $80 billion in Treasuries and $40 billion in residential and commercial mortgage-backed in June 2020. Between March and June

2020, Fed bought about $2 trillion[2] worth of bonds. After December 2020, the Fed stated they would slow down these purchases as the economy made substantial progress.

The Primary Dealer Credit Facility (PDCF) is a program in which the Fed offers low interest rate loans up to 90 days to primary dealers (big financial institutions) that provide Fed with various securities as collateral. Its goal is to keep these institutions in their roles during a crisis.

Money Market Mutual Fund Liquidity Facility (MMLF) is a program which Fed lent to banks against collateral they purchased from prime money market funds that invest on Treasury securities and commercial papers. In the beginning of the outbreak, investors withdrew from these funds, afraid of the risks. With these outflows, the funds started to try to sell their securities, but market disruptions made it difficult. This only made prices decrease (fire sales) and closed off markets that businesses rely on to raise funds. The Fed set up this facility to assist money market funds in meeting demands for redemption by households and other investors, enhancing the overall market functioning and credit provision to the economy. It expired in March 2021.

The pandemic caused disruption on the repo market which is the one where firms borrow or lend cash and securities in the short-term. These shocks can affect federal funds rate, Fed´s repo operations made cash available for primary dealers in exchange for Treasury and other government-backed securities. During the pandemic, the Fed expanded the amounts offered and length of the loans.

The Foreign and International Monetary Authorities (FIMA) Repo Facility was a program in which the Fed offered dollar funding to foreign central banks that do not have established swap lines with it to ensure they have access to it without selling Treasuries. The Fed established this facility in July 2021 making overnight dollar loans to these central banks, taking Treasuries as collateral.

Another relevant point was the international swap lines. The Fed made US dollars available to other foreign central banks to improve liquidity of global dollar funding markets and help other countries which needed to raise dollar funding. The Fed receives foreign currencies and charges interest on the swaps. For some countries, it lowered its interest rate and extended the maturity of the swaps.

[2] Data from Financial Times. https://www.ft.com/content/a964f7ed-a3cd-4bd1-8ecb-7e1689dbc002

The Federal Reserve Bank lowered the rate it charges banks for loans, typically overnight, at its discount window from 2.25% to 0.25%. This is not very risky to the Fed as banks pledge many collaterals in exchange of cash. However, banks might not want to borrow from the discount window because if someone finds out, people will probably think this bank is in trouble. In March 2020, 8 big banks decided to borrow from it.

The Fed encouraged banks (large and community) to dive into their regulatory capital and liquidity buffers, so they could increase lending. After the financial crisis, reforms required banks to detain additional loss-absorbing capital to prevent failures and bailouts, but they include the possibility of provisions that allow banks to use their capital buffers to support lending during difficult times. Fed, to support this lending, had to change its total loss-absorbing capacity (TLAC) requirement, that included capital and long-term debt, to gradually phase in restrictions related to shortfalls in TLAC. In addition, Fed eliminated bank´s reserve requirements which was irrelevant as banks held a lot more than was required. Also, Fed restricted dividends and share buybacks of bank holding companies. This decision was suspended June 30, 2021 for most firms based on stress test results. These results showed banks have a lot of capital to support lending even if the economy does not go as expected.

In March 2020, the Fed established two facilities to support flow of credit to American corporations. The Primary Market Corporate Credit Facility (PMCCF) was a facility created to let Fed lend directly to corporations by buying new bonds and providing loans, so they could pay employees and suppliers as they could defer interest and principal payments for at least six months. Borrowers could not pay dividends or buy back stock during this period of time. The other facility was Secondary Market Corporate Credit Facility (SMCCF) which consisted of Fed buying existing corporate bonds and also exchange-traded funds investing in investment-grade corporate bonds. An organized secondary market helps businesses to access more credit in the primary market. In April 2020, Fed announced they would increase these new facilities to backstop combined $750 billion corporate debt, initially Fed would support $100 billion. After that, the US Treasury provided $75 billion from its Exchange Stabilization Fund to cover potential losses. As the pandemic was getting better by the end of the year, the Treasury Secretary, contradicting Fed´s objections, decided to cut off these facilities by December 31st, 2020. Fed finished selling its corporate bonds portfolio ($13.7 billion) by the end of 2021.

The Commercial Paper Funding Facility (CPFF) was established by the Fed. Commercial paper is a market where firms issue unsecured short-term debt to finance day-to-day operations. Fed bought commercial paper, so it could lend directly to corporations for up to 3 months at a rate 1 or 2% higher than overnight lending rates. This helps investors to engage again in term lending in the commercial paper market, improving it. The US Treasury put $10 billion into CPFF to cover any losses. This facility lapsed in March, 2021.

The Main Street Lending Program was announced in April 2020 by Fed to attend firms that were too large for the Small Business Administration´s Paycheck Protection Program and too small for Fed's two corporate credit facilities; it was later modified to include more potential borrowers. Fed would coil count on 3 facilities (New Loans Facility, Expanded Loans Facility and Priority Loans Facility) to fund up to $600 billion in five-year loans. The US Treasury put $75 billion into these 3 facilities included in the program to cover losses. It was decided, against Fed´s willingness, that they would stop taking loan submissions on December 14, 2020, as its final purchases were set in January 2021. There was also a Paycheck Protection Program Liquidity Facility (PPPLF) established by the Fed that facilitated loans made under PPP. This facility closed July 2021.

Fed expanded the Main Street Lending Program to non-profit institutions, such as hospitals and schools that were in a good financial situation before the pandemic. The loans to support non-profit organizations were for 5 years, but the payment of the principal was just after 2 years. This happened until January 8th, 2021.

The Term Asset-Backed Securities Loan Facility (TALF) aims to support households and consumers. It was reestablished in March 2020. This facility helped the Fed support consumers, households and small firms by lending holders of asset-backed securities collateralized by new loans. Initially, the Fed stated that TALF would support up to $100 billion in new credit, and with the approval of the US Treasury $10 billion from the Exchange Stabilization Program were allocated to finance TALF. This program stopped making new purchases by the end of 2020.

During the pandemic, the Federal Reserve Bank had to lend directly to state and local governments, differently than in the crisis of 2007-2009 that the entity saw as a responsibility of the administration and Congress. This time the state and municipal government were struggling a lot to borrow money as the municipal bond market was

under huge stress. The measure was created in April 2020 and used the Municipal Liquidity Facility (MLF). The program made $500 billion available to governmental entities that had investment-grade credit ratings in exchange for notes tied to future tax revenues with maturities of less than 3 years. The US Treasury supported the facility until December 2020, providing $35 billion to cover potential losses.

Using also two of its credit facilities, the Fed tried to backstop municipal markets. After some changes, the eligible collateral for the MMLF started including municipal variable-rate demand notes and highly rated municipal debt with maturities of up to 12 months. It also expanded the eligible collateral for the CPFF to include high-quality commercial paper backed by tax-exempt state and municipal securities. With that, the Fed helped the municipal debt market that was struggling with lack of liquidity.

III. Analysis of the American Monetary Policy during the Pandemic

Most of the research done in regards to the pandemic is related to expansionary policies that were adopted from the beginning of the crisis until March 2022, when the Fed decided to raise short-term interest rates to control high levels of inflation. The Federal Reserve Bank almost doubled its Balance Sheet to almost $9 trillion[3] in the beginning of 2022. Its assets mainly consisted of MBS and Treasury Securities. The impact of the pandemic on it was considerably higher than in other recessions, such as the Great Recession. As previously described, Quantitative Easing is an unconventional monetary policy that buys long-term assets, but the question many researchers want to answer is if unconventional monetary policies are as efficient as a conventional policy rate cut.

Zero Lower Bound (ZLB) has been a reality in the last decades and it is expected to be a significant part of the future, especially in developed countries. Bernanke, Ben S., Michael T. Kiley, and John M. Roberts (2019), supported by some ideas from their previous papers**,** argue that "lower-for-longer" policies are more effective than Taylor rules at the effective lower bound (ELB), and even imperfect credibility does not eliminate advantages of them, we can only see a reduction compared if there was perfect credibility. However, the policies have to be very calibrated to have its benefits while avoiding large overshoots of inflation and outputs.

According to Bernanke (2020), Forward Guidance was not very effective right after the Global Financial Crisis (2007-2009), but it has gained power over the past few years, as it became more precise and aggressive. This tool assists the public to understand how policymakers will respond to changes in the economic outlook and allows policymakers to commit to "lower-for-longer" rate policies. It can help ease financial conditional and economic stimulus by convincing market participants that policy makers will continue to not increase interest rates for longer, even as the economy gets stronger. During the Financial Crisis, Forward Guidance was qualitative in nature and did not succeed in convincing market participants that rates would stay lower for longer. However, in 2011, more explicit guidance that would tie rate policy first to specific dates, then to the behavior of unemployment and inflation, gave the market participant the confidence that rates would stay at a lower level.

[3] Data from the Federal Reserve. https://www.federalreserve.gov/releases/h41/

Wesley Janson and Chengcheng Jia (2020) studied Forward Guidance during the beginning of the pandemic, specifically if the FOMC meetings held in April and June impacted public's expectations of future policy rates, GDP growth, and inflation. The study shows that in June when the meeting was accompanied with the Federal Reserve´s Summary of Economic Projections (SEP), forward guidance was able to successfully shape expectations about future monetary policy but not in April. However, they could not see the meeting in June leading to much change in expectations of future economic fundamentals. One explanation is that during this meeting there were no big changes in policy expectations, so the changes in economic expectations were also small, and these changes are difficult to detect in economic forecasts, especially with monthly survey data. Another explanation is that the public could have interpreted the forward guidance in one of two ways. The first interpretation is that the forward guidance reflects the Fed's commitment to keeping the policy rate anchored at its effective zero lower bound through at least 2022. With this interpretation, households understand there is a possibility that the future economy will recover faster but the future policy rate is fixed at zero due to the policy commitment, households will revise their expectations to an optimistic way, as they will expect future output growth and inflation to increase. The second interpretation is that the forward guidance is the Fed's projection of the most appropriate future policy rate conditional on its projection of the future economic trajectory. With this interpretation, households´ expectations will be revised in a pessimistic way and decrease their expectations of future output growth and inflation to increase because they think the Fed is considering this projection due to its belief the economy will not recover by then. This mix of interpretation will make Forward Guidance not be able to significantly change the public's expectations of the future economy. Both interpretations seem to be effective but with their own limitations. Eggertsson, Gauti B., and Michael Woodford (2003) show that when a central bank's ability to combat current deflation is constrained by the zero lower bound, it can still affect the economy by communicating its commitment to setting future interest rates at a lower rate than it would have under a more traditional conduction of policy. By an inflation-targeting rule, Fed commits to lower-for-longer rate policies, but this policy commitment is affected by a time consistency problem. In the future, sticking to the previous commitment of extra policy accommodation might contradict the policy action prescribed by the central bank's inflation-targeting rule. The household knowing this problem makes it difficult for the Fed to convince the public that any

forward guidance is a policy commitment. The Fed started to address this issue in August 2020 with the Statement on Longer-Run Goals and Monetary Policy Strategy. Now, the policy is guided by a flexible average inflation targeting, which means they are targeting inflation at an average of 2% through time and not 2% being a ceiling each period. Angeletos and Sastry (2020) study forward guidance as a Fed´s projections, but that has an obstacle. Revealing information can be not welfare-improving if projections are more pessimistic than households´ beliefs and potentially hurting the economy. The authors state that forward guidance should be a target-based policy commitment. Forward guidance communications should focus on the macroeconomic variables targeted by the central bank, such as the unemployment rate and the inflation rate. In September 2020, Fed started making explicit the target Forward Guidance wants to achieve.

Antoine Lepetit, and Cristina Fuentes-Albero (2022) have two main results by analyzing conventional interest rates policy and forward guidance. The first result is that monetary policy was generally less effective during Covid. This happened because people had to balance the advantage, they could take from intertemporal substitution opportunities with the risk of becoming sick. With that, decreasing real interest rates are less effective in holding up economic activity than in other periods. The other result is in regard to optimal conduction of the monetary policy. The authors concluded that monetary policy is poorly equipped to address the main inefficiency arising in the decentralized equilibrium, that consists of the fact that infected individuals do not internalize the effects of their actions on the dynamics of the epidemic. The optimal behavior of monetary policy depends on how other tools used to limit virus spread, such as lockdowns, are deployed. The more suboptimal the lockdown policy is, the more tightening the monetary policy has to be to deal with the trade-off between ensuring price stability and minimizing the distortions arising from the infection externality.

In regards to the papers about Forward Guidance, it is possible to conclude that this policy is effective and very important in a world where low interest rates are very common. However, the way it is being conducted needs to be discussed regularly, as household preferences and beliefs might change over time. It seems that discussions have happened during the pandemic. Policy makers need shift strategies when needed, like they did in August 2020. About the last paper that states lowering interest rates was not effective because of intertemporal substitution opportunities with the risk of becoming

sick, I will later discuss that this does not seem like the case through all of the pandemic, as economic stimulus seem to have helped macroeconomic variables to recover.

Currently, there are a good amount of empirical papers that show the effectiveness of QE, especially from the post Great Recession period. Joseph Gagnon, Matthew Raskin, Julie Remache, and Brian Sack (2011) consider its primary channel mechanism is by affecting the risk premium on the asset that is being purchased. This means that the Fed purchasing an asset bids up its price and hence lowers its yield, this is known as the "portfolio-effect". The event study and time series analysis concluded that large-scale asset purchases adopted between December 2008 and March 2010 reduced the term premium between 30 and 100 basis points. In addition, these programs had a powerful effect on longer term interest rates on agency debt and agency MBS by improving market liquidity and removing assets with high prepayment risk from private portfolios. This by lowering longer term private borrowing rates should stimulate economic activity.

In the same line of this previous paper, Krishnamurthy and Vissing-Jorgensen (2011) concluded also through an event study analysis that QE lowered interest rates on Treasuries, Agencies, corporate bonds, and mortgage-backed securities, but with magnitudes that differed across bonds, across maturities, and even across QE1(2008-2009) and QE2 (2010-2011). Their event-study analysis stated that QE1 would have impacted 5 to 10-year bonds on 20 to 40 bps, via signaling channel. Effects on long-term safe assets as high as 160 bps bps for 10-year agency and Treasury bonds. For riskier bonds, such as, 10-year CDS rates on Baa corporate bonds fell by 40 bps on QE1 dates, through a reduction in default risk/default risk premia and a reduced prepayment risk premium. In regards to QE2 event study analysis, the signaling channel lowered yields on 5-year bonds by 11 to 18 bps and on 10-year bonds by 11 to 12 bps, the safety channel lowered yields on low-default risk 10-year bonds by an additional 5 to 10 bps. Also, there is significant evidence for an increase in inflation expectations (5 to 16 bps over the 10-year horizon), leading to the conclusion that real rates fell for all borrowers. One of the paper´s first findings is that QE1 had a relevant reduction in mortgage rates probably due to large purchases of MBS, while during QE2 which only involved large Treasury purchases, the impact was substantial only on Treasury and Agency bond rates (extremely safe bonds) and the effect on MBS rates and corporate rates (riskier bonds) were smaller. They found evidence that QE1 and QE2 were impacted by: the signaling channel, which drove yields on all bonds, especially immediate compared to long-term bonds; a long term

safety channel which the yields on medium and long maturity safe bonds fell because of a unique clientele for safe nominal assets and these assets were purchased by the Fed, reducing the supply; and inflation channel, as both inflation swap rates and TIPS showed an increase on inflation, that means larger reductions on real than nominal rates. QE1 also had three additional channels: MBS risk premium channel lowering yields on MBS; default risk/default risk premium channel lowering yields on corporate bonds; and liquidity channel, as QE financed by reserves increases yields on the most liquid bonds relative to less liquid bonds of similar duration.

Clarida, Richard H., Burcu Duygan-Bump, and Chiara Scotti (2021) concluded on their paper that the Federal Reserve acted decisively and with dispatch to deploy all the tools in its conventional kit and to design, develop and launch in a short period of time a series of innovative facilities to support the flow of credit to households and business. The first analysis on this paper shows that the increased asset purchase and repo operations that started in March 2020 helped market function improve. Larger volume of repo operations and the announcement and expansion of asset purchase (QE) helped narrowing the US Treasury bid-ask spread, helping the market with liquidity. Secondly, the authors highlight the fact that after the Statement on Longer-Run Goals and Monetary Policy Strategy approved in August 2020, as the Fed´s first public review of the strategy, tools, and communication practices it deploys to achieve its dual mandate, the forward guidance changed to a new "flexible average inflation targeting" framework. The authors also state that announcements of some programs adopted during the pandemic, such as PDCF, CPFF, and MMLF, helped quickly stabilize market mutual funds' outflows and commercial paper spreads declined considerably. The announcement that the two later facilities would also accept short-term securities issued by state and local governments improved, and they improved even further after the announcement of the MLF, that was the facility that purchased short term debt from U.S. states, cities, and other public enterprises. To sum up, the authors stated that the announcement effect of PDCF, CPFF and MMLF led to fast improvements in financing conditions in corporate and municipal bond markets well ahead of the facilities' actual opening, which resulted not just in tighter spreads, but also a higher ability for a variety of issuers. Another relevant analysis that helps the authors corroborate with their conclusion is that the expansion and announcement of swap lines led swap basis spread decline towards pre-pandemic level. Also, right after the announcement of SMCCF and PMCCF, spreads of both investment-

grade and speculative-grade corporate bonds declined, and the issuance of the first one rebounded to robust levels. According to this study, the PPPLF, which extended credit to small businesses that participated in the program, was very effective by supplying liquidity to these lenders.

On the other hand, Andrew T. Levin, Brian L. Lu, and William R. Nelson (2022) conducted an analysis of costs and benefits of large-scale securities purchase that was initiated in March 2020 as the Fed assumed, what they called in the paper, the role of market-maker of last resort. The first thing they question is the fact that the FOMC seemed to not have discussed substantially the cost-benefits of QE4 in its statements, probably because it considered these purchases as only beneficial and with minimal costs. Through the study, they highlight the fact that the FOMC committed to achieve maximum employment and to induce a moderate overshooting of inflation in December 2020, which was considered overly rigid and a bit problematic by many. The paper indicates that the QE4 program increased Fed´s footprint in the markets for Treasuries and agency MBS. This could lead to liquidity impacts in the future. In regard to costs, they expect a total ex post cost to taxpayers of $760 billion over 10 years. Also, they are not sure if there were any macroeconomic benefits, as QE4 did not seem to have any substantial impact on term premiums. To analyze the macroeconomic benefits, the authors decided to plot the Fed Reserve Board and New York Fed estimates of the effect of QE on term premium. The Fed Reserve Board published the estimation using the methodology of Kim and Wright (2005) that consists of a simple three-factor arbitrage-free term structure model. While the New York Fed estimates using the methodology of Adrian, Crump, and Moench (2013) based on a linear regression.

Alessandro Rebucci, Jonathan S. Hartley, and Daniel Jiménez (2022) consists on an event study analysis of QE announcements on 10-year sovereign bond yields and US dollar exchange rates during the beginning of COVID in a few countries and a standard GVAR model to investigate the transmission of innovations to long-term interest rates during pre-Covid. They concluded that QE did not lose its effectiveness over time, but less predictable interventions have a greater impact, as the impact of the first QE announcement during the pandemic was larger than the second. The first Fed's QE announcement on March 15, 2020 had a -0.21% statistically significant one-day impact on the US 10-year Treasury yield on the subsequent trading day, March 16, 2020. The second announcement on March 23, 2020 had a smaller, -0.16%, but statistically

significant single-day impact. Treasury yields rose in the two days after both interventions, resulting in a statistically significant three-day yield increase following the first announcement, and a negligible three-day effect after the second intervention. Also, in developed countries, such as the US, the effects on bond yields and exchange rates are in line with the working of long-run uncovered interest rate parity and the presence of a large dollar shortage shock in the data, to which the Fed responded with enhanced and extended swap lines. The paper evidences that the Fed had a major role in the transmission of innovations to long rates. It helped stabilize world bond markets and address global dollar shortage. The global bond market turnaround and subsequently continuous decline in bond yields caused by QE were very important to deal with recessionary effects triggered by the pandemic.

In regards to this last paper and Krishnamurthy and Vissing-Jorgensen (2011), there are a few thoughts about the similarities described in both papers that might show they are complementary and in agreement with most of the literature on the topic that says QE is effective. They might explain why QE1 (early 2009) had a bigger market impact than QE2 (December 2010) and why the first announcement of QE4 was also bigger than the second, showing it is not a matter of QE losing its effectiveness. The first paper talks about how predictability and anticipation from market players can affect the magnitude of the QE on yields, as already mentioned. In this same line, it is also fair to assume that people predicted more that this tool would be adopted during QE2 than in QE1, as it was already adopted before (the first program was QE1) and the period consisted of a time in which unemployment was still high, banks needed to secure liquidity and US consumer price remained low, as the country was still rebuilding its economy. While the later paper**,** even though it mentions that a change in demand during a crisis (QE1) explains bigger effects on interest rates, which was later shown that with control for market expectations of the level and mix of planned asset purchases find that later rounds of QE remained powerful (BERNANKE, 2020), concludes that: i) it is not desirable for central banks to focus only on Treasury rates as a policy target because Treasury rates are driven by safety effects that do not carry over to mortgage and lower-grade corporate borrowing rates; ii) the beneficial effects of QE for mortgage and lower-grade corporate rates are bigger when these purchases involve non-Treasury assets such as MBS; iii) a Treasuries-only policy such as QE2 has effects primarily through a signaling channel, which means that the market lowers its anticipation of future Federal Funds rate. Meaning that the composition

of the purchases might also impact its outcomes, but one aspect about the policy is almost unquestionable: the signaling channel is very relevant. However, the difference in asset purchases during the first and second announcement of QE4 could not indicate a difference in the outcomes of both announcements, as both consisted of the announcement of Treasury securities and agency MBS (the second also included the purchase of agency CMBS). Another point about the predictability reducing the effects of QE, what if it is just a matter of the effects perhaps being distributed through time instead of a major impact in the announcement day. Right before the first announcement of QE4 which happened March 15th 2020, the Federal Reserve had already decreased Fed Funds Rate to the range of 1 to 1 to ¼ percent[4], and even before the pandemic, interest rates were already low in most developed countries. This already gives the public an idea that the Central Bank will stimulate the economy. Something that was probably already on the radar of many people since the end of January, as the first case of Covid was confirmed in the country. The second announcement March 23rd 2020 was even more predictable, as during the same day of the first announcement, Fed cut Fed Funds Rate to the range of 0 to ¼ percent[5], and introduced forward guidance, committing to lower for longer. This gave the market a feeling of more certainty and predictability. The same could have happened during QE2, the market, already feeling that the Central Bank would adopt large-scale asset purchase, had the policy effects already showing a bit prior to the announcement, instead of a huge drop of term premium or long-term interest rates at the day. Looking at the long-term treasury yields chart during the pandemic, it is possible to see that yields remained low, showing that not only during announcement, but throughout the program, the policy seemed effective (**Figure 5**). It is also a good observation to point out that especially during the second QE4 announcement, there were other policies being announced simultaneously, most QE event studies ignore the fact that there are other policies being announced, including Alessandro Rebucci, Jonathan S. Hartley, and Daniel Jiménez (2022). Because of that, it is dangerous to credit all the decrease in long-term Treasury yields only to QE. Probably the -0.16% on yields are also due to the fact the Fed was adopting these other policies at the same day. Still, it is fair to consider that the policy has been effective, and maybe the significant decrease is due mainly to QE, and its association to forward guidance and lower short-term interest rates.

[4] Data from FOMC, https://www.federalreserve.gov/monetarypolicy/fomccalendars.htm
[5] Data from FOMC. https://www.federalreserve.gov/monetarypolicy/fomccalendars.htm

Figure 5: 10-year Treasury Yield and QE4

Source: Federal Reserve Board of Governors, edited by the author.

The green lines indicate the beginning of QE and the red ones represent the reduction of these purchases, also known as QT.

Another relevant point that should be discussed is that Andrew T. Levin, Brian L. Lu, and William R. Nelson (2022) stated that the Quantitative Easing Policy during the pandemic did not have clear macroeconomic benefits. The authors show two ways the Fed is used to estimate Term Premium, as previously mentioned, and concluded that they could not see any substantial decline as the policy was announced. This conclusion supposes that the policy might have failed at reducing long term-interest rates. Aside from the fact that this conclusion is very debatable, as without QE, term premium could have been higher because of the recession, there is a decline when the policy is announced. Economic and Monetary Policy Uncertainties for the near-term increase term premium that is one of the reasons why forward guidance is extremely important. Michael Abrahams, Tobias Adrian, Richard K. Crump, and Emanuel Moench (2015) concluded that the term premiums on ten-year Treasury securities fell, cumulatively, by about 1.1% on days of QE1 announcements. With data from Bloomberg using the methodology of Adrian, Crump, and Moench (2013), we can see the evolution of term premium on 10-year Treasury bonds, it is possible to see that after an increase in March 2020, there is a decrease right after, which coincides with the announcements of QE4 (**Figure 6**). The policy helped term premium stay at low levels, especially in the beginning of the pandemic. It is important to state that before the crisis, term premium has been lower for quite a long time. Something very relevant to be discussed that is mentioned in Andrew T. Levin, Brian L. Lu, and William R. Nelson (2022) are the ex-post costs of QE, the

authors stated that QE4 helped stabilize markets for Treasuries and MBS. On the other hand, QE4 continued to expand the Federal Reserve's outsized footprint in those markets, which could substantially reduce market liquidity in the future. As for the moment the paper was published, the SOMA held nearly 30% of the outstanding stock of Treasury notes and bonds, and over 40% of the total outstanding stock of agency MBS, and its purchases included almost the entire issuance of agency MBS over the period of QE4.

John Kandrac (2018) argued that continuous purchases might have some impacts on market functioning and liquidity, just as the previous paper. This can be extremely costly, as the global financial market relies a lot on deep and liquid markets for U.S. debt securities. This study has data from MBS purchases mainly from QE3. The cost was explicitly pointed out by the Board of Governors of the Federal Reserve in 2013 when they were fearing that additional LSAPs could lead to a deterioration of market functioning and liquidity, as the Fed would become a too dominant buyer, and trading between private participants would decrease. The paper concludes that the Fed MBS purchases negatively affected average trading volume, trade sizes (often used to measure liquidity), and the number of trades. Bid-ask spreads were almost unaffected. However, there was a spread widening that appeared just after the beginning of the largest MBS purchase program. The marginal liquidity effects can be sizable, but the economic magnitude of the effects is modest compared to the size of the operations. There is no evidence of impaired price discovery in the MBS market during QE purchases.

There were many benefits brought by QE4, it is important to highlight that one of main goals of the policy was "to support the smooth functioning of markets for Treasury securities and agency mortgage backed securities"[6], and according to Clarida, Richard H., Burcu Duygan-Bump, and Chiara Scotti (2021), larger volume of repo operations and the announcement and expansion of asset purchase (QE) helped narrowing the US Treasury bid-ask spread, helping the market with liquidity, which exemplifies once again how the policy was very important, especially in the beginning of the pandemic when inflation was low and unemployment was high. The policy assures liquidity through a reduction of the priced frictions in the targeted security classes. Also, lower long-term interest rates were super important to put economy back on track.

[6] Data from FOMC. https://www.federalreserve.gov/monetarypolicy/fomccalendars.htm

However, there were costs involved, which might have grown in the past few years due to successive QE programs since 2008. In regards to the liquidity and functioning of the Treasury Market, it can be seen an increased friction in 2022. Treasuries are suffering a decline in liquidity, as the current period consists on economic uncertainty and higher volatility due to high inflation in the whole world, with a big amount of government debt increasingly difficult to trade. The decrease of liquidity in 2022 has several reasons, such as the exponential growth in the size of the market; the fact that after the Great Recession, primary dealers had their capacity to intermediate trades constrained due to tighter regulation; Fed adopting QT to shrink its balance sheet and leaving the market with no major buyer; and the scenario of uncertainty in regards to economic outlook and interest rates policy future. QE might impact liquidity of security markets; however, the costs do not seem to be more concerning than the consequences the economy could have suffered without stimulus. Discussing about regulation, Fed´s QT adoption, lower exchange rate etc. can be discussed to address the liquidity issue.

Being said that, this work does not say policy makers should not be discussing the cost-benefits of unconventional policies. Central Bank papers usually have a more positive view on QE impacts on output and inflation than academic researchers (BRIAN FABO, MARTINA JANČOKOVÁ, ELISABETH KEMPF, ĽUBOŠ PÁSTOR, 2021), and it seems necessary a bigger debate on these during committee meetings. It also shows that larger effects of QE on output have better career outcomes for central bankers. This last paper does not imply that Central Bank papers are biased, nor argue that one is better than the other. The authors recognize the importance of Central Bank papers as they have more information and a very high expertise.

Figure 6: Term Premium

Source: Bloomberg

IV. Comparison with the Great Recession

4.1) The Great Recession

The Great Recession, also known as the Global Financial Crisis, started by the end of 2007 and finished in June 2009. The United States of America suffered from a massive decline in the gross domestic product of 4.3% from the fourth quarter of 2007 to the second quarter of 2009. Unemployment was also a big issue, peaking at 10% in October 2009 from 5% in 2007.

The Federal Reserve Bank started controlling the situation with traditional monetary policies, meaning that they lowered the federal funds rate from 5.25% in the beginning of the crisis to a range of 0.0% to 0.25% in December 2008. After that, the Fed started implementing policies known as nontraditional. The first one was Forward Guidance when they stated they would keep interest rates at lower rates for “some time”, guaranteeing monetary stimulus by increasing inflation expectations. This policy started to be used in May 1999, and in August 2011, the Fed announced federal funds rate would stay at a low level until mid-2013, as crisis recovery was slow and tenuous.

In addition to that, they decided to adhere to two other nontraditional policies, such as credit easing programs and large-scale asset purchase programs. The first one was a set of programs to help US funding markets. In December 2007, they installed the Term Auction Facility (TAF) to provide term discount window loans to depository institutions, usually in good conditions. These loans had a standard window discount collateral. At some point, there was $493 billion in outstanding TAF credit.

However, not only the USA was under pressure for raising dollars, short-term dollar funding markets in foreign countries were struggling to fund their investments in dollar-denominated assets. To aid a few central banks, The Federal Reserve established temporary central bank liquidity swap lines, so these countries could lend money to their institutions. The agreement held by the Americans and these other nations consisted on the foreign country being obligated to buy back with dollars their currency in the future at the same exchange rate used in the first transaction, that was made when the foreigners sold their currency Fed to get dollars. The Fed did not assume any risk during these transactions, including credit risk and exchange risk. The use of this tool reached $586 billion in outstanding. The Fed also established foreign-currency liquidity swap lines as

a form of precaution, so they could borrow foreign currencies from foreign central banks but it was never used.

Another program adopted in March 2008 was the Term Security Lending Facility (TSLF) that consisted of the Fed loaning liquid Treasury securities for a month to primary dealers[7] that were struggling with funding in return of eligible collateral of less liquid securities. In July 2008, the American Central Bank needed to offer more liquidity when the pressures in the collateral market was high therefore, they created TSLF Options Program (TOP). They auctioned options to primary dealers that gave them the possibility to resort to a TSLF loan in exchange for eligible collateral in the future. The TSLF lasted from March 2008 to February 2010 with $236 billion in TSLF loans outstanding.

Furthermore, the Fed established the Primary Dealer Credit Facility (PDCF) which was an overnight loan facility that was also established during the pandemic. It worked for primary dealers more or less like discount windows worked for depository institutions, in regards to being an alternative source of funding. This type of credit was fully collateralized, and collateral eligible was, in the beginning, restricted to investment-grade securities and later the Fed expanded to match all instruments that can be promised in the tri-party repurchase agreement systems of the two biggest clearing banks. In September 2008, $130 billion in credit given through PDCF was outstanding.

After the bankruptcy of Lehman Brothers in late 2008, a money market mutual fund (MMMF) that had the bank´s commercial papers struggled and ended up announcing that it would not be able to redeem its shares at the usual price. Then, many MMMFs started seeing many withdrawals from the funds, so they had to sell assets into illiquid markets. With that, the Fed installed the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) to finance purchases of the paper that these funds wanted to sell, meaning that the central bank gave liquidity to these funds. Something similar to that happened during the pandemic, under the program MMLF, as previously described. During the Financial Crisis, this program lent to institutions, such as depository institutions and bank holding companies, that bought these papers from these funds. At the all-time high during the crisis, there was $152 billion in AMLF loans.

In October 2008, the Fed announced the Commercial Paper Funding Facility (CPFF), the same one that was established during the pandemic, and it lasted until April 2010. It had $350 billion in loans outstanding.

In March 2009, the Fed established the Term Asset-Backed Securities Loan Facility (TALF), the same program adopted during Covid. They issued loans with a term up to five years to support consumers, households and small firms (US holders of eligible asset-backed securities). The facility peaked at $48 billion.

Finally, probably one of the most relevant non-conventional monetary policies, Fed established Large Scale Asset Purchase (LSAP) programs during the Great Recession. The Fed purchased US agency mortgage-backed securities (MBS), debt of housing related US government agencies and later long-term Treasury securities. All these efforts costing $1.75 billion were called QE1.

4.2) Comparison

The Great Recession and the Pandemic were very different yet similar times. It is true that during the first one, Central Banks did not have the same set of monetary programs as they do now, making it easier to implement them faster. A proactive Fed helped the economy during the pandemic way more quickly and with an amount of stimulus never seen before. In addition, after the recession in the late 2000's, banks became more equipped and the financial system better regulated, as the Dodd-Frank Act was signed. This certainly also helped the Central Bank act more effectively in regards to time. Another relevant point of difference is the market decline during these two crises. In the Financial Crisis, it took over one year for stock indexes to fall 50%[8] in March 2009, while in the pandemic, it took approximately one month for the S&P index to fall 34%[9] in March 2020, the fastest ever fall into a bear market.

4.2.1) Fed's Balance Sheet

The Fed's balance sheet increased during both crises. During the first one, the balance sheet reached $4.5 trillion at its peak or 25% of the GDP, compared to $850

[8] Data from CNBC. https://www.cnbc.com/2020/05/27/here-are-key-ways-coronavirus-crisis-differs-from-the-great-recession.html

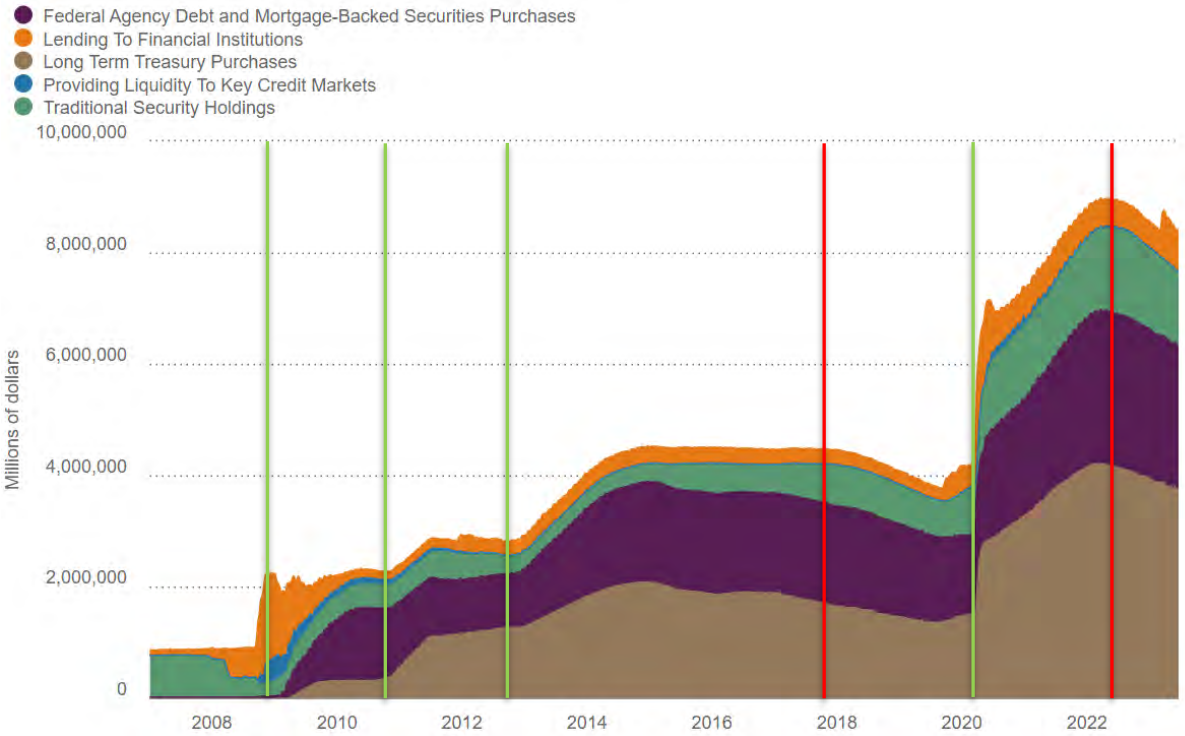
[9] Data from CNBC. https://www.cnbc.com/2020/05/27/here-are-key-ways-coronavirus-crisis-differs-from-the-great-recession.html

billion before the crisis or 6% of the GDP[10]. During the second one, it reached almost $9 trillion or around 35.3% of the GDP at its peak, compared to $4 trillion or around 19% of the GDP before the pandemic[11]. It is observed that before 2020, the Federal Reserve balance sheet was considerably bigger than it was in 2007/ 2008, even with quantitative tightening in late 2017, when the Central Bank started to shrink it by not reinvesting the proceeds of all the bonds in its portfolio when they mature. Another point that can be seen in the figure below is that before the 2008 financial crisis, the balance sheet consisted mainly of short-term Treasury Purchases. Quantitative Tightening also began in June 2022, when QE had already finished (March 2022) and the Fed committed to stop reinvesting up to $30 billion in maturing Treasuries and $17.5 billion in maturing MBS every month[12]. In the figures below, we can state that both QE1 and QE2 increased a lot of Treasury, Federal Agency Debt and MBS holdings if compared to the period right before the measures were adopted.

One interesting point of difference that is directly related to the cause of the two crises is that during the Great Recession the Fed lent proportionally more to financial institutions, assuming its role of lender of last resort. The period of the "boom" is just after the Lehman Brothers bankruptcy, when many banks were in a very difficult situation. Besides the traditional discount window, Term Auction Facility, Primary Dealer Credit Facility and PPP Liquidity Facility are some of the programs adopted. It is undeniable that the Basel III and other regulations improvements made in the US made banks more resilient. This resilience was essential to absorb a sharp spike in bad debts, support borrowers and keep credit-lines open, as banks entered this crisis with way more capital than in the first one (ROY DAVIDSON, 2020).

[10] https://www.brookings.edu/blog/up-front/2019/05/17/the-feds-bigger-balance-sheet-in-an-era-of-ample-reserves/
[11] Data from Richmond Fed and Statista.
https://www.richmondfed.org/publications/research/econ_focus/2022/q3_federal_reserve and
https://www.statista.com/statistics/263591/gross-domestic-product-gdp-of-the-united-states/
[12] Data from Richmond Fed.
https://www.richmondfed.org/publications/research/econ_focus/2022/q3_federal_reserve

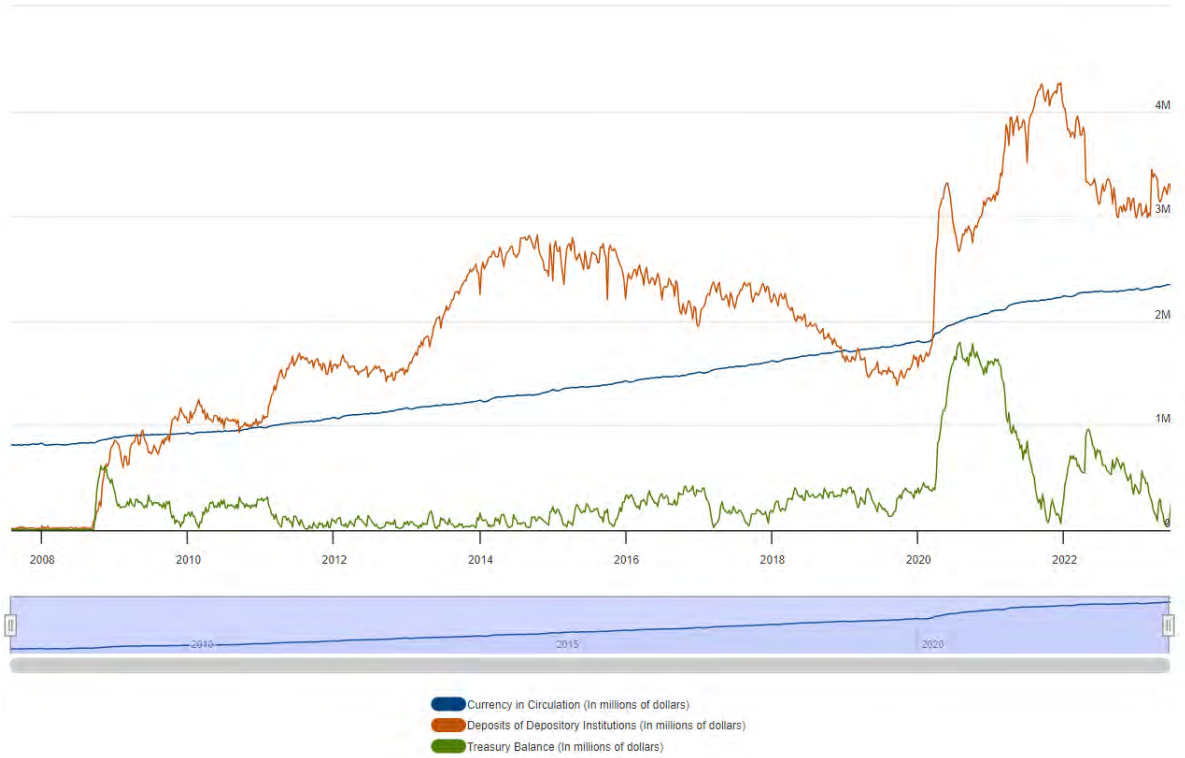
Figure 7: Fed's Balance Sheet - Assets



Source: Federal Reserve Bank of Cleveland and Federal Reserve Bank of Richmond calculations based from data from the Federal Reserve Board and Haver Analytics. Edited by the author.

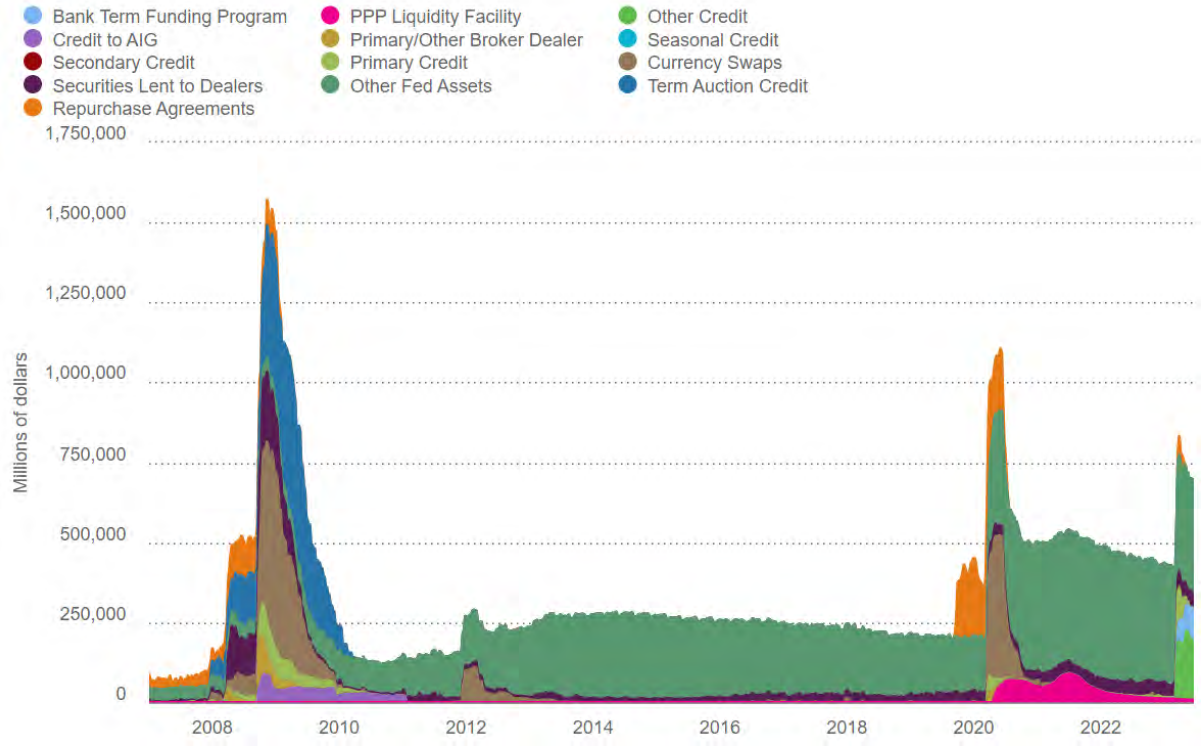
The green lines indicate the beginning of QE and the red ones represent the reduction of these purchases, also known as QT.

Figure 8: Fed´s Balance Sheet - Selected Liabilities



Source: Federal Reserve Bank of St. Louis

Figure 9: Lending to Financial Institutions



Source: Federal Reserve Bank of Cleveland calculations based from data from the Federal Reserve Board and Haver Analytics

4.2.2) Unemployment

In this section, unemployment will be analyzed. This variable is highly affected during recessions. However, here we want to see its behavior during these two periods of time. During the most recent recession, unemployment rose from 3.5% in February 2020 to 14.7% in April 2020[13], but at the same time a reduction in labor market participation, higher than usual, helped decrease unemployment, as can be seen in **Figure 10**. The containment measures, such as the lockdown, made many companies close, some temporarily and others definitively. The Great Recession did not have the rapid increase

[13]Data from European Central Bank.
https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op298~f3f39e0b4f.en.pdf

in unemployment as the Covid. Before the crisis, in December 2007, the unemployment rate was 5% and it peaked at 10% only in October 2009[14].

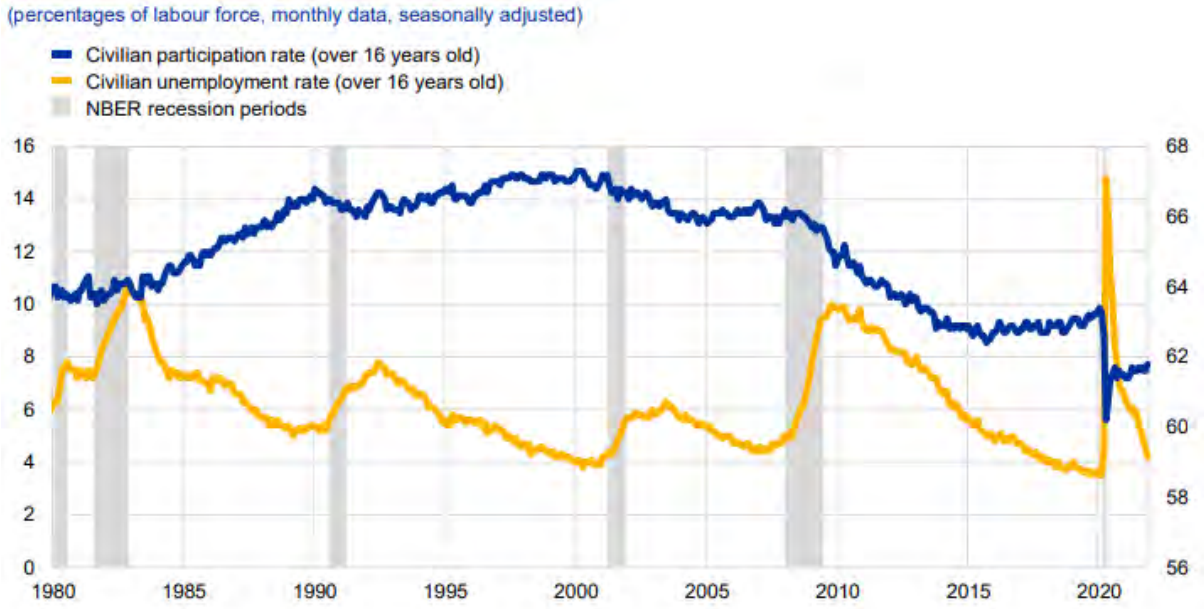
Unemployment rate in the United States reached its highest level since World War II in a very small period of time. More than twice as many jobs were lost between March and April 2020 as were lost during the entire 2007–2009 period, and almost around a third of those jobs recovered quickly until June 2020, largely through recalling laid-off workers[15]. This recall was something that did not happen in previous rises, but after this rapid recovery, unemployment rate started decreasing slower and was only reabsorbed in the beginning of 2022. The unemployment just reached its pre-Great Recession level 5 years later, so it is fair to say that recovery during the pandemic was faster.

The impact through sectors and demographics were different. During Covid, women were more affected than men and part-time jobs suffered a bigger impact than full-time ones, two factors that were the opposite from the previous crisis. Leisure and hospitality were greatly impacted by the pandemic, while construction and manufacturing were much less affected than in the previous recession.

It is important to state that teleworking impacted unemployment during the pandemic. It made possible for many to work from home during lockdown, helping them not lose their jobs. Even though, it is possible to see a decline on the percentage from people who work from home after the end of lockdown, the percentage is still way above pre-pandemic levels.

[14] Data from BLS. https://www.bls.gov/spotlight/2012/recession/pdf/recession_bls_spotlight.pdf
[15] Data from BLS. https://www.bls.gov/opub/mlr/2020/article/employment-recovery.htm

Figure 10: Participation rate and unemployment rate in the US



Source: European central Bank with data from the Bureau of Labor Statistics

4.2.3) Inflation

There is a huge difference between both crises when it comes to inflation. During the Great Recession, after the Fed adopted an expansionary monetary policy to stimulate the economy, inflation was inside the Fed's target, and it continued until the beginning of 2021. The Fed had over a decade of stable inflation and low interest rates. However, it began to change. Here, there is an ongoing question on how these two crises differ on the inflation outcome if the Fed adopted almost the same policies. According to Milton Friedman, “inflation is always and everywhere a monetary phenomenon”. So, one idea that could explain the increase in inflation would be partly the result of the magnitude of long-term asset purchases in the pandemic and the continuous LSAPs that the Fed adopted in the last decade. However, the newspaper *The Economist* raises the hypothesis defended by many that inflation would have risen due to the fiscal stimulus. During the pandemic, the CARES Act provided the needed fiscal transfers to households and businesses very impacted by shutdowns. This strengthens household´s and firm´s balance sheets, making them more likely to spend. Fiscal Stimulus associated with QE would have resulted in a surge in deposits at commercial banks, this translates to big pressure on inflation. Another reason for this inflation could be explained by the demand being higher than the supply that is demand-pull inflation. This could be happening for three main reasons: i) during

the beginning of the pandemic with the lockdowns, people could not go out and spend their money, so the money they would have spent at restaurants, trips etc. is being used now when the lockdown is over with also the money they would be spending today if nothing had happened; ii) change in consumers preferences with the new normal, as Covid made people rethink their preferences; and iii) supply chain disruptions because of borders closed, industries closing during lockdown etc. These reasons were very present from the pandemic, so they could help explain why there is an inflation problem now but there was not one then. There is some criticism in regards to the Fed that should have started increasing interest rates earlier, as unemployment was already comparatively low and GDP was recovering. In fact, the causes of high inflation are going to be an ongoing debate for the next few years and it needs more research on this topic. This paper does not aim to give evidence on the topic, but it does not seem unlikely that high inflation is a combination of points listed above.

Figure 11: Inflation

Source: Trading Economics with data from the U.S. Bureau of Labor Statistics

4.23) GDP

During the Global Financial Crisis, GDP fell by 4.3%[16] from the end of 2007 to the middle of 2009. Just like the unemployment rate already discussed in the paper, GDP

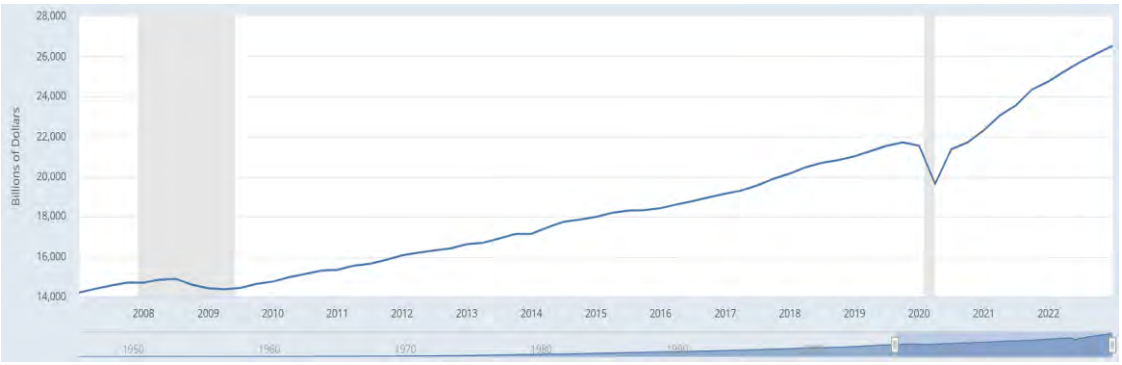
[16] Data from Federal Reserve. https://www.federalreservehistory.org/essays/great-recession-and-its-aftermath

recovery was slow. In fact, this recession was the longest, lasting 18 months. Also, this recovery was on average 9%[17] below previous recoveries. The CBO document released in November 2012 stated that 2/3 of this slower recovery compared to others is due to sluggish grow in potential GDP and the other 1/3 is due to shortfall in the overall demand for goods and services.

The pandemic the American GDP fell by 8.9% in the second quarter of 2020, which was huge decrease in a short period of time. However, it was less than many other developed countries such Canada and the UK with the GDP down by 12.4% and 21.4%, respectively[18]. In the first semester of 2021, the American recovery was faster than its major trading partners and its GDP exceed pre-pandemic levels. Many researchers credit this fast recovery to mass vaccination, and to the magnitude of fiscal and monetary policy that had a major hole supporting and stimulating the economy.

In 2022, the country grew 2.1%[19] but there are some recession fears, as the country is struggling with high inflation and high interest rates.

Figure 12: GDP



Source: U.S. Bureau of Economic Analysis

[17] Data from CBO. https://www.cbo.gov/publication/43707
[18] Data from White House. https://www.whitehouse.gov/wp-content/uploads/2022/04/Chapter-3-new.pdf
[19] Data from The Washington Post. https://www.washingtonpost.com/business/2023/01/26/gdp-2022-q4-economy/

V. Conclusions

Through this paper, it could be seen that adopting monetary policies during periods of stress is very challenging. The Great Recession consisted of an endogenous crisis that emerged from the financial markets, while the pandemic is characterized as an exogenous crisis. At both crises, the Fed needed to aid many businesses, companies etc. while also stimulating the economy and trying to control levels of inflation. The Great Recession and the Pandemic had a few similarities, besides their obvious differences. Cutting fed funds rate, Quantitative Easing, Forward Guidance, International swap lines and credit program such as PDCF, CPFF and TALF were part of both realities. This paper mainly focuses on two of the most famous unconventional monetary policies, Quantitative Easing and Forward Guidance.

Here I analyzed many papers written during and before the pandemic. From the evidence gathered in many papers, both of them are effective to stimulate the economy. In regards to Forward Guidance, there was an evolution from 2011 to now. The strategy needs to be discussed regularly, so households are convinced and adapt their expectations to the ones that will improve the economy´s functioning. This debate seems to be happening, as there were explicit shifts on strategy during the pandemic.

In regards to Quantitative Easing, research is more controversial. Many point out QE has many costs that are surpassing benefits. During both crises, QE was able to decrease long-term interest rates and to support the smooth functioning of markets for Treasury securities and agency mortgage backed securities, as the policy was announced. However, there are some downsides, such as affecting liquidity and functioning of the Treasury Market and increasing inflation. The benefits seemed bigger than the costs for now, but it can change overtime. As previously mentioned, it is something to be regularly debated and incorporated into FOMC meetings. Also, there is a need to have more studies analyzing the costs, as there are not that many.

Comparing the pandemic to the Great Recession, it seems that the quickness that the policies were adopted and their magnitude, as we could see in size of the balance sheet, might have helped a faster recovery. However, inflation is a problem now that was not back then. There are many reasons for that as discussed earlier.

It is possible to affirm that the Fed did what was possible to stimulate the economy in such complicated times and they were effective. Maybe if QE was discontinued earlier as the country reached good metrics very fast, the problem with inflation would not be happening. However, this paper does not bring any quantitative research on that.

VI. Bibliography

ABRAHAMS, M. et al. Decomposing real and nominal yield curves. **Journal of Monetary Economics**, v. 84, p. 182–200, dez. 2016.

AMADEO, K. **Monetary Policy Tools and How They Work**. Disponível em: <https://www.thebalancemoney.com/monetary-policy-tools-how-they-work-3306129>. Acesso em: 30 jun. 2023.

ANGELETOS, G.-M.; SASTRY, K. **Managing Expectations: Instruments vs. Targets**. Disponível em: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3308409>. Acesso em: 30 jun. 2023.

B.;PIACENTINI,JOSEPH;SCHULTZ,MICHAEL;SVEIKAUSKAS,LEO, H. W. **Employment recovery in the wake of the COVID-19 pandemic : Monthly Labor Review: U.S. Bureau of Labor Statistics**. Disponível em: <https://www.bls.gov/opub/mlr/2020/article/employment-recovery.htm>.

BERNANKE, B. **The New Tools of Monetary Policy American Economic Association Presidential Address**. [s.l: s.n.]. Disponível em: <https://www.brookings.edu/wp-content/uploads/2019/12/Bernanke_ASSA_lecture.pdf>.

BERNANKE, B. S. **Why are interest rates so low, part 4: Term premiums**. Disponível em: <https://www.brookings.edu/blog/ben-bernanke/2015/04/13/why-are-interest-rates-so-low-part-4-term-premiums/>.

BERNANKE, B. S.; KILEY, M. T.; ROBERTS, J. M. Monetary Policy Strategies for a Low-Rate Environment. **Finance and Economics Discussion Series**, v. 2019, n. 009, fev. 2019.

BHATTARAI, A. U.S. economy grew 2.1 percent in 2022, but recession fears linger. **Washington Post**, 26 jan. 2023.

BLYSTONE, D. **Why Is The Federal Reserve Independent?** Disponível em: <https://www.investopedia.com/articles/investing/041515/why-federal-reserve-

independent.asp>.

CHEN, Q. et al. **Financial Crisis, US Unconventional Monetary Policy and International Spillovers; by Qianying Chen, Andrew Filardo, Dong He, and Feng Zhu; IMF Working Paper No. 15/85; April 1, 2015**. [s.l: s.n.]. Disponível em: <https://www.imf.org/external/pubs/ft/wp/2015/wp1585.pdf>.

CHRISTENSEN, J. H. E.; KROGSTRUP, S. Transmission of Quantitative Easing: The Role of Central Bank Reserves. **The Economic Journal**, v. 129, n. 617, p. 249–272, 11 dez. 2018.

CLARIDA, R. H.; DUYGAN-BUMP, B.; SCOTTI, C. The COVID-19 Crisis and the Federal Reserve's Policy Response. **Finance and Economics Discussion Series**, v. 2021, n. 034, p. 1–23, 28 maio 2021.

DAVIDSON, R. **How does COVID-19 compare to the GFC?** Disponível em: <https://craigsip.com/insights/overview/2020/06/covid-vs-gfc>.

EGGERTSSON, G. B.; WOODFORD, M. The Zero Bound on Interest Rates and Optimal Monetary Policy. **Brookings Papers on Economic Activity**, v. 2003, n. 1, p. 139–211, 2003.

FABO, B. et al. Fifty Shades of QE: Comparing Findings of Central Bankers and Academics. **SSRN Electronic Journal**, 2021.

FELDKIRCHER, M.; HUBER, F.; PFARRHOFER, M. Measuring the Effectiveness of US Monetary Policy during the COVID-19 Recession. **Scottish Journal of Political Economy**, v. 68, n. 3, 8 fev. 2021.

GERTLER, M.; KARADI, P. A model of unconventional monetary policy. **Journal of Monetary Economics**, v. 58, n. 1, p. 17–34, jan. 2011.

GOMEZ-SALVADOR, R.; SOUDAN, M. **Occasional Paper Series**. [s.l: s.n.]. Disponível em: <https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op298~f3f39e0b4f.en.pdf>.

HAJDUKOVIC, I. Transmission mechanisms of conventional and unconventional

monetary policies in open economies. **International Economics and Economic Policy**, 21 jan. 2022.

HARTLEY, J.; REBUCCI, A. An Event Study of COVID-19 Central Bank Quantitative Easing in Advanced and Emerging Economies. **SSRN Electronic Journal**, 2020.

HAYES, A. **Federal Reserve System**. Disponível em: <https://www.investopedia.com/terms/f/federalreservebank.asp>.

HERNANDEZ,RICHARD. **What caused inflation to spike after 2020? : Monthly Labor Review: U.S. Bureau of Labor Statistics**. Disponível em: <https://www.bls.gov/opub/mlr/2023/beyond-bls/what-caused-inflation-to-spike-after-2020.htm#:~:text=As%20the%20labor%20market%20tightened>.

JANSON, W.; JIA, C. Forward Guidance during the Pandemic: Has It Changed the Public's Expectations? **Economic Commentary (Federal Reserve Bank of Cleveland)**, p. 1–7, 1 dez. 2020.

JOHNSTON, M. **Open Market Operations vs. Quantitative Easing: What's the Difference?** Disponível em: <https://www.investopedia.com/articles/investing/093015/open-market-operations-vs-quantitative-easing.asp#:~:text=Open%20market%20operations%20are%20a>.

K. LOGAN, L. **Federal Reserve Asset Purchases: The Pandemic Response and Considerations Ahead - FEDERAL RESERVE BANK of NEW YORK**. Disponível em: <https://www.newyorkfed.org/newsevents/speeches/2022/log220302>.

KANDRAC, J. The Costs of Quantitative Easing: Liquidity and Market Functioning Effects of Federal Reserve MBS Purchases. **SSRN Electronic Journal**, 2014.

KIM, D. H.; WRIGHT, J. H. An Arbitrage-Free Three-Factor Term Structure Model and the Recent Behavior of Long-Term Yields and Distant-Horizon Forward Rates. **SSRN Electronic Journal**, 2005.

KRISHNAMURTHY, A.; VISSING-JORGENSEN, A. The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy. **Brookings Papers on Economic Activity**, v. 2011, n. 2, p. 215–287, 2011.

LEPETIT, A.; FUENTES-ALBERO, C. The Limited Power of Monetary Policy in a Pandemic. **SSRN Electronic Journal**, 2020.

LEVIN, A.; LU, B.; NELSON, W. Quantifying the Costs and Benefits of Quantitative Easing. dez. 2022.

MILSTEIN, E.; WESSEL , D. **What did the Fed do in response to the COVID-19 crisis?** Disponível em: <https://www.brookings.edu/research/fed-response-to-covid19/#:~:text=Easing%20>. Acesso em: 30 jun. 2023.

OSTERLAND, A. **Here are key ways the coronavirus crisis differs from the Great Recession**. Disponível em: <https://www.cnbc.com/2020/05/27/here-are-key-ways-coronavirus-crisis-differs-from-the-great-recession.html>.

OSTERLAND, A. **Here are key ways the coronavirus crisis differs from the Great Recession**. Disponível em: <https://www.cnbc.com/2020/05/27/here-are-key-ways-coronavirus-crisis-differs-from-the-great-recession.html>.

RICH, R. **The Great Recession | Federal Reserve History**. Disponível em: <https://www.federalreservehistory.org/essays/great-recession-of-200709#:~:text=Initially%2C%20the%20Fed%20employed%20%E2%80%9Ctraditional>.

SCOTT, M. **What's Behind the Drop in Treasury Market Liquidity?** Disponível em: <https://www.alliancebernstein.com/corporate/en/insights/investment-insights/whats-behind-the-drop-in-treasury-market-liquidity.html>. Acesso em: 30 jun. 2023.

SILVA, D. et al. **The Risk Channel of Unconventional Monetary Policy ***. [s.l: s.n.]. Disponível em: <https://www.cepweb.org/wp-content/uploads/2017/11/Silva-paper.pdf>. Acesso em: 30 jun. 2023.

SUBRAMANIAN, S. **The Fed's inflation target comes from a casual remark on New Zealand TV**. Disponível em: <https://qz.com/2022696/where-did-the-feds-2-percent-inflation-target-come-from>.

The Economist. Has the pandemic shown inflation to be a fiscal phenomenon? Disponível em:< https://www.economist.com/finance-and-economics/2021/12/18/has-the-pandemic-shown-inflation-to-be-a-fiscal-phenomenon?utm_medium=cpc.adword.pd&utm_source=google&ppccampaignID=19495686130&ppcadID=&utm_campaign=a.22brand_pmax&utm_content=conversion.direct-response.anonymous&gclid=CjwKCAjw-vmkBhBMEiwAlrMeF5NjAf1fCsW_p5pyABCjO1EV21R7oN84278mfuiGZxlQG2oUFh2PQBoCGVwQAvD_BwE&gclsrc=aw.ds>.

The Fed - Federal Open Market Committee. Disponível em: <https://www.federalreserve.gov/monetarypolicy/fomc.htm>.

The Fed - Meeting calendars and information. Disponível em: <https://www.federalreserve.gov/monetarypolicy/fomccalendars.htm>.

The U.S. Economy and the Global Pandemic. **The White House**. [s.l: s.n.]. Disponível em: <https://www.whitehouse.gov/wp-content/uploads/2022/04/Chapter-3-new.pdf>.

U.S. BUREAU OF LABOR STATISITCS. **The Recession of 2007–2009: BLS Spotlight on Statistics**. [s.l: s.n.]. Disponível em: <https://www.bls.gov/spotlight/2012/recession/pdf/recession_bls_spotlight.pdf>.

WEINBERG, J. **Federal Reserve Credit Programs During the Meltdown | Federal Reserve History**. Disponível em: <https://www.federalreservehistory.org/essays/fed-credit-programs>.