Changes and Impact of Monetary Policy in the United States: Quantitative Easing and Federal rate hikes

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Abstract. In response to the 2008 financial crisis, marked by the collapse of Wall Street giants like Bear Stearns and Lehman Brothers, the U.S. faced significant economic challenges. Traditional monetary policy tools proved ineffective as interest rates neared the Zero Lower Bound. Consequently, the Federal Reserve implemented Quantitative Easing (QE) as an unconventional measure to stimulate financial markets. This policy was executed in four phases, and by the end of the fourth round, U.S. inflation rates surpassed the 2022 target. Elevated inflation impacted living standards, prompting the FED to introduce interest rate hikes in 2022 to control it. Supply chain disruptions were a major contributor to this inflation spike. This paper uses qualitative and statistical methods to explore QE and the subsequent FED rate hikes. It emphasizes that QE essentially expanded the FED's Balance Sheet and uses visual data like graphs to illustrate the FED's actions since 2022. The article provides a comprehensive view of U.S. monetary policy adaptations during and after the financial crisis. The first three QE rounds addressed the 2008 crisis aftermath, while QE4 combated the economic fallout of COVID-19. The 4 rounds of QE and the last 2 years of Fed rate hikes have been generally successful. Both monetary policies have had some proven effect on the US economy. However, by critical thinking, QE has potential downsides, like fostering economic bubbles and inflation. And the Fed's repeated interest rate hikes have led to the problem of bank failure. Therefore, the Fed's monetary policy choices, especially unconventional ones like QE, require weighing benefits against potential risks.

Keywords: Balance sheet, Quantitative Easing, unconventional Monetary Policy, Financial Crisis, Federal Reserve's interest rate hikes.

1. Introduction

In 2008, a financial crisis erupted in the United States. The impact of this financial crisis on the United States was unprecedented. Bear Stearns and Lehman Brothers collapsed in March 2008 and September 2008, respectively [1]. The fall of these two Wall Street giants also signaled the collapse of the entire U.S. financial market. If such problems remain unresolved for a long time, the United States will lose its competitiveness among the world economies. Not only that, the living standard of the residents will also be seriously affected. Both the government and the Fed need to come forward to solve this problem. And this article focuses on the central bank's response to the financial crisis. In the 2008 financial crisis, traditional monetary policy has failed. This raises the interesting question of what instruments the FED needs to use to restore financial markets. Typically, the FED can influence the money supply and liquidity in the market simply by controlling interest rates. But at a time when interest rates were already close to or equal to the Zero Lower Bound, there is no way to get more money supply by continuing to lower interest rates. The FED can only use Quantitative Easing, an unconventional monetary policy, to stimulate a recovery across financial markets. It is clear that the cost of the financial crisis to the U.S. market was enormous. Figure 1 shows the components of the cost of the financial crisis and the total amount of 1488 billion dollars [1]. It is impossible to get the economy to recover or even return to rapid growth levels in a short period of time. That is why the United States Federal Reserve's quantitative easing policy was implemented in four rounds. Until the end of the fourth round of quantitative easing, the inflation rate in the United States was higher than the target level of 2022. Excessive price levels will likewise affect people's standard of living. As a result, the FED needed to slow down economic growth through conventional monetary policy, i.e., interest rate hikes, in order to lower the inflation rate. In 2022, the FED made

several rounds of interest rate hikes. This could also be a long-term result of quantitative easing. But in general, the main reason for excessive inflation rate is problems in the supply chain of some specific products. In this paper, qualitative and statistical analyses are used to study the main two topics which are QE and FED rate hikes as mentioned earlier. The text contains numerous detailed explanations of the concept of QE. A graph of the changes in the FED's Balance Sheet is used to explain that the essence of QE is that the FED is expanding its Balance Sheet. a line graph of the changes in the FED's interest rates visually shows the magnitude of each increase in the interest rates by the FED since 2022. This article also lists some key data on both monetary policies when they were in place.

In this article, the first thing that is explained is what QE is. this is followed by a description of the specific measures of the 4 phases of QE and the implications. Then what gets mentioned is the FED's current progress in raising interest rates. After this introduction, the pros and cons of QE are listed in detail. The consequences of the Fed's rate hikes are also mentioned in the QE cons. After these, the next section examines the relationship between QE and GDP. Finally, the conclusion of the full paper is given.

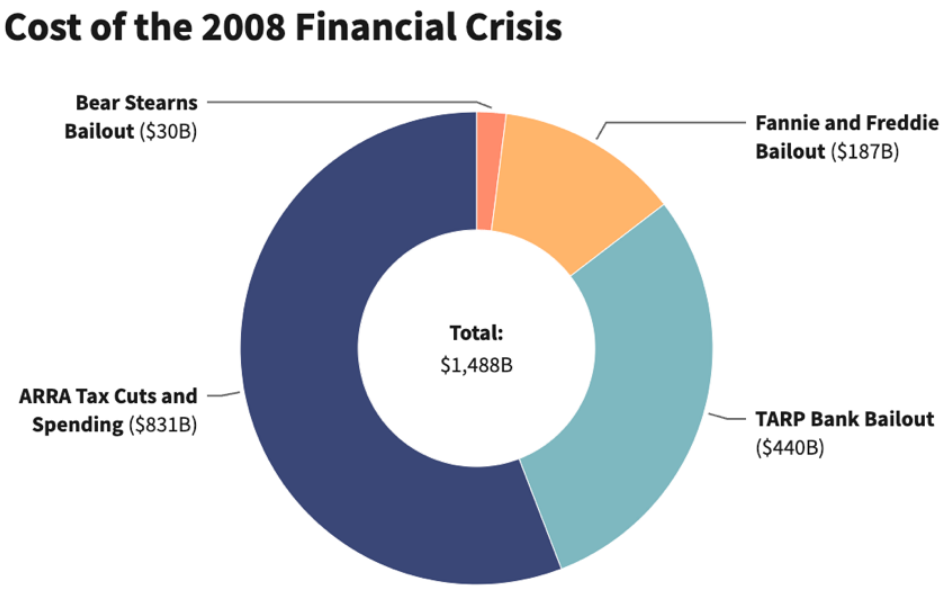


Figure 1. cost of 2008 financial crisis

2. What is Quantitative Easing?

2.1. Basic analysis

In economics, QE is a very important concept. To introduce what QE is, start with the definition. Quantitative easing is a strategy employed by central banks to boost the national money supply and stimulate economic growth [2]. In essence, the implementation of QE is an act of central bank to change the balance sheet. In times of economic crisis, the Fed has the ability to enlarge its balance sheet through the purchase of additional assets under QE [3]. The expansion of balance sheet means there is an increase in both asset and liability. In figure 2, it is clear that the balance sheet of FED from QE1 to QE4 is continuously expanded [3]. And the fundamental purpose of QE by central banks is to improve economic conditions. Inflation is an indicator of the economic situation. Based on it, QE can also be understood as a tool to change the inflation rate [4]. It should be mentioned that QE is a non-traditional monetary policy that is used only under certain conditions. The condition in this case is the financial crisis. Quantitative easing is typically employed when economic expansion is stagnant and interest rates are close to zero [2]. Traditional monetary policies like Open Market Operations (OMO) lose their effectiveness in times of financial crisis. Traditional monetary policy can only cope with normal economic recession. For instance, even if the interest rate is at zero, lending and economic activities might still be lagging [5]. In implementing quantitative easing, central banks

purchase government bonds and other assets to infuse the economy with bank reserves [2]. The end effect is to make banks more liquid and have more lending and investments [2].

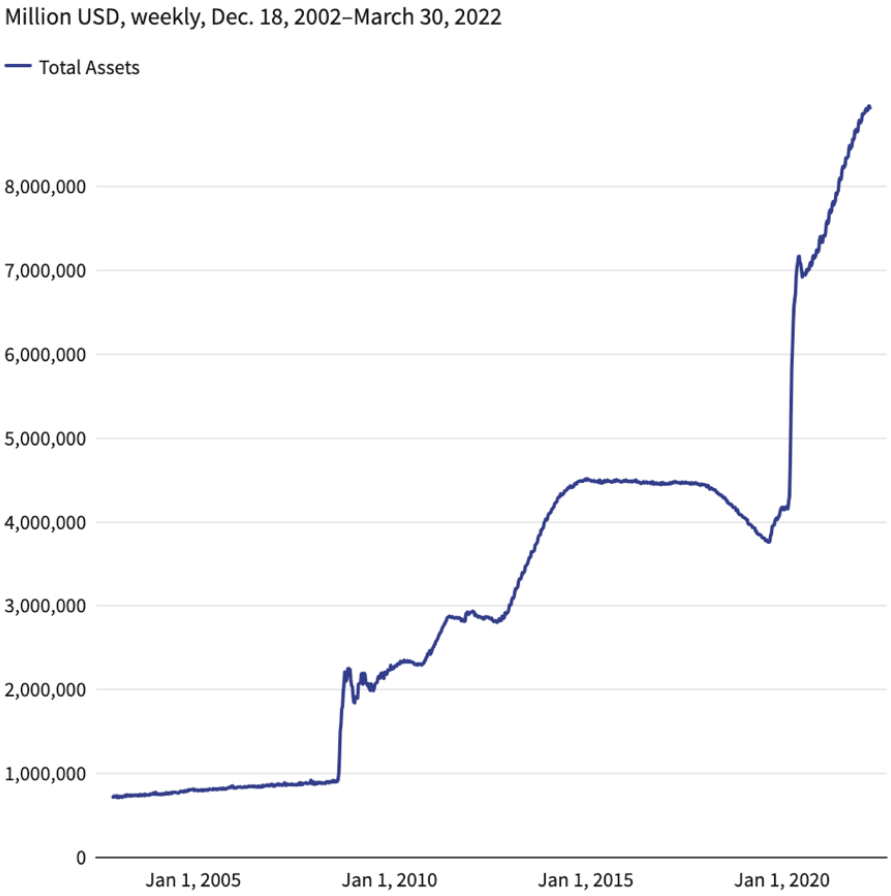


Figure 2. FED balance sheet

2.2. QE1-QE4

From the late 2000s to the early 2020s, in response to significant economic challenges, the U.S. Federal Reserve introduced a series of unconventional monetary policy measures known as QE. In this period, the U.S. has initiated quantitative easing on four occasions. The inaugural instance was in November 2008, reacting to the worldwide financial crisis [6]. While earlier rounds of quantitative easing shared certain commonalities, the specific securities purchased, and the duration of each program differed [6].

QE1-QE2

During the 2008 financial crisis, the entire market was in a panic. A large number of workers lost their jobs and Americans lost confidence in the financial markets. Central bank adjustments became urgent. Based on the root causes of the formation of the financial crisis, the central bank implemented the first QE in the history of the United States. In response to the crisis, the Fed significantly expanded its routine Open Market Operations [7]. By December 2008, the Fed had reduced the Fed funds rate to almost zero, a significant drop from 5.25% in September 2007 [6]. However, this conventional monetary policy was not sufficient to deal with the financial crisis. After that, it acquired debt, consisting of mortgage-backed securities (MBS), consumer loans, or Treasury instruments, from its member banks [7]. These purchases were made via the trading desk at the New York Federal Reserve Bank [7]. From March 2009 to March 2010, the Federal Reserve acquired $200 billion of agency debt (from entities like Fannie Mae, Freddie Mac, and Ginnie Mae), $1.25 trillion in mortgage-backed securities, and $300 billion in extended-term Treasury bonds [6]. Why the FED chose to buy these assets starts with how the financial crisis developed. The financial crisis of 2008 originated from easily accessible credit and lenient borrowing criteria, which propelled a surge in housing prices [1].

However, when this bubble deflated, financial institutions found themselves with vast amounts of devalued subprime mortgage investments [1]. So, the consumption of MBS became a priority in QE1. The FED needs to address the root causes of the financial crisis. Although the implementation of QE1 created problems such as a large amount of dangerous assets on the FED's balance sheet, QE1 was effective for the financial crisis of 2008 on the whole [7].

After the end of QE1, the financial crisis was partially solved. However, the United States economy has not yet recovered to the level it deserves. The level of economic growth remains depressed. For this reason, the FED launched the next phase of QE, which is called QE2. It was employed from November 2010 to June 2011 [8]. The leadership of the Fed revealed a strategy to acquire long-term Treasuries worth $600 billion, intending to buy at a rate of $75 billion monthly until the second quarter of 2011 [6]. After QE2, the 2010 disinflationary trend appears to have been halted, preventing the U.S. economy from experiencing a scenario akin to Japan's [9].

QE3-QE4

In 2012, the consequences of the financial crisis receded, and the U.S. economy began to gradually rebound. But the pace of growth still fell short of expectations. In order to increase the rate of economic growth and reduce unemployment, the third phase of QE was born. On September 13, 2012, it was declared that there would be monthly acquisitions of mortgage-backed securities worth $40 billion. Additionally, a strategy to boost holdings of long-term Treasury securities by $45 billion each month was set into motion [6].

At the end of 2019, the emergence of covid-19 caused a lot of turmoil in the global economy. The United States was no exception. There were even the most cases in the U.S. of any country, so the U.S. government and the FED needed to figure out how to promote economic recovery. The initiation of QE4 at the start of the COVID-19 pandemic was in response to disruptions in the US Treasury markets, where, for a short period, the trading of US Treasury bonds seemed to break down [10]. During the meeting on March 15, the Fed announced that QE4 included encompassing monthly acquisitions of $80 billion in agency debt and $40 billion in mortgage-backed securities [6]. QE4 was similar to QE3, which means the Fed did not provide a definitive purchase sum or a set duration for these acquisitions [6].

2.3. Current progress of the Federal Reserve's interest rate hikes

After the fourth round of QE, the economy is growing at a rapid pace. The cost of living also continues to rise. the CPI is a great indicator of the cost of living. The U.S. set a target level for CPI of 2%, but in June 2022 it reached 9.1% [11]. This is when the problem of an overheated economy arises. The rise in inflation is partly attributed to the pandemic-led change in consumer spending from services to goods during a time of disrupted supply chains and labor markets [12]. A distinctive aspect of the U.S. economy is the tight labor market, with October marking the 22nd straight month of job additions, totaling 261,000 jobs [12]. Excessively high prices will affect the living standards of the population and lead to the creation of some economic bubbles. Therefore, the FED needs to keep the inflation rate at an acceptable level. In order to achieve the target inflation rate, the FED has recently implemented a monetary policy of raising interest rates.

On July 26, 2023, the FED increased the reserve interest rate to a range of 5.25% to 5.50% [13]. From last March to this rate hike, it rose a total of 5.25% and it became the swiftest rate-hike cycle ever recorded [13]. Even with a 12-month decrease in consumer prices, June's inflation rate rose 3% annually, the lowest in over two years, yet still above the Fed's 2% goal [13]. In Figure 3, we can see the trend in the FED rate over a full year. It is clear to see that the change in FED rate from March 2022 to July 2023 is a continuous upward trend [14].

Because of inflation rate in the U.S. is still above the target level and the FED views inflation as a priority for the U.S. economy, there is still a high likelihood that the FED will continue to raise interest rates in the future until inflation reaches the target point it has set (2%). In the June Fed forecast, the final rate could end up at 5.6% to lower inflation [13]. However, it's not absolute. The Fed is

continuing to watch the market performance as well as the labor market that comes with higher interest rates. When necessary, rates may also remain unchanged at the next meeting [14].

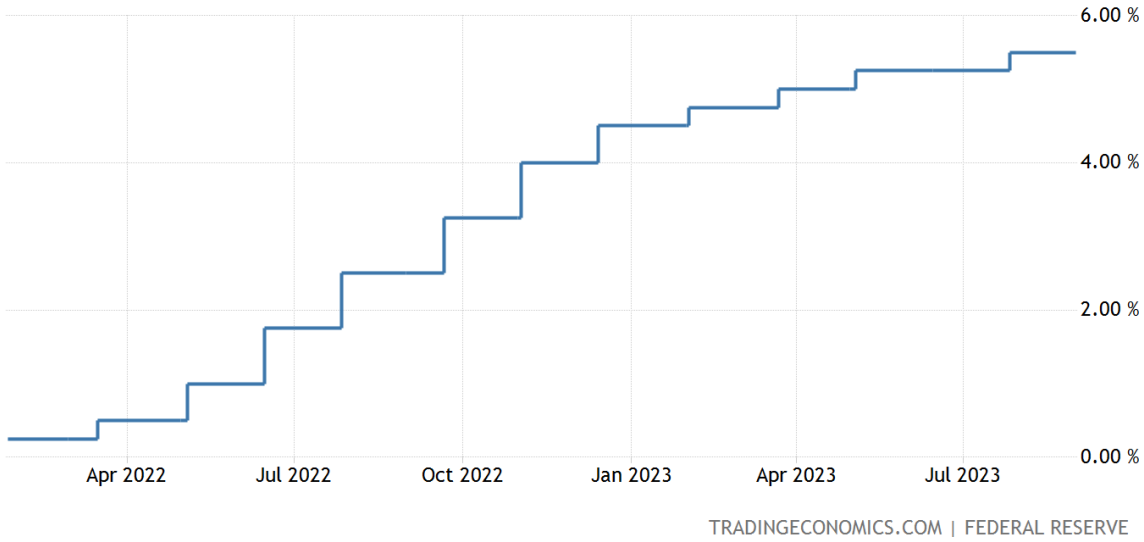


Figure 3. FED rate of recent years

3. Pros and Cons:

Any monetary policy has the potential to bring both advantages and cost to the economy. When the Fed introduces a monetary policy, both positive and negative aspects need to be considered. This involves the issue of opportunity cost. QE is no exception.

3.1. Pros

Since QE is an unconventional monetary policy specifically designed to deal with financial crises, the merits of QE surely revolve around addressing the effects of the financial crisis. The financial crisis of 2007 to 2008 crippled the entire U.S. financial system and sent the economy into reverse. This was mainly reflected in the loss of investment confidence, a sharp rise in unemployment, a fall in house prices and a significant drop in market price. QE can bring a lower interest rate to encourage investment [15]. This is a reflection of stimulating economic activity. Moreover, QE can prevent unemployment during the financial crisis [16]. The main reason for the financial crisis was the creation of a lot of real estate bubbles due to some non-performing assets like MBS. When QE was in place, the FED acquired a lot of these non-performing assets. As a result, a lot of money supply flowed into the market as well. Here QE can achieve that drains toxic assets [16]. In this process, the rapidity with which QE can bring about results is fast. That is why QE is also considered to be the most favored approach in the financial crisis [16]. Following the unveiling of QE1, the yield on the 10-year Treasury fell by 107 basis points within two days [6]. From QE1 to QE3, each implementation has had a huge impact on the U.S. financial markets. The National Bureau of Economic Research states that during QE1, the origination of conforming mortgages surged by 170% [6]. QE2 primarily targeted Treasuries, yet it led to a drop in mortgage rates by approximately 35 basis points, and there was a 65% rise in the initiation of new loans [6]. During QE3, loan rates decreased approximately 18 basis points, with a boost in loan originations ranging from 15% to 30% [6]. Between 2007 and 2017, across the initial three phases of quantitative easing, the Fed's assets expanded from $882 billion to $4.473 trillion [6]. After that, QE4 has significantly boosted the Fed’s balance sheet, with its assets now exceeding $8.5 trillion [6]. Following QE4, inflation in the U.S. was already above the target level and the FED needed to raise interest rates to lower inflation.

3.2. Cons

The introduction of QE is also likely to have some negative effects. The intuitive problem is that QE is a non-conventional monetary policy, so its risks are definitely higher than those of conventional monetary policy. It can lead to significant inflation and create economic bubbles [15]. Economic bubbles are closely related to people's standard of living. It can lead to an inflated GDP with people's purchasing power is low. This is mainly reflected in long-term interest rates, as well as inflation rate. Over time, it results in inflation, which in turn pushes interest rates up, ultimately undermining financial stability [17]. Furthermore, QE could be the cause of business cycle [17]. QE floods the economy with easy money, prompting lenders to aggressively seek borrowers, sometimes lending to those who are not creditworthy [17]. When quantitative easing halts and money tightens, banks start pulling back loans, triggering a recession [17]. By the same token, QE can lead to higher unemployment in the long run [17].

After QE4, the FED began to adjust inflation by raising interest rates significantly as inflation in the US was above its target level. However, this approach also brought significant drawbacks. Some banks were unable to operate normally due to the rise in interest rates, which even led to a banking crisis. Silicon Valley Bank (SVB) is a prime example. Regulatory authorities closed down SVB and took over its deposits after increasing FED rate, marking the biggest U.S. banking collapse since the 2008 financial crisis and the second most significant in history [18]. In response to inflation, the Federal Reserve significantly raised interest rates, leading to SVB's financial challenges [18]. Startups that were impacted by the tough funding climate withdrew their deposits from SVB [18]. This forced the bank to sell its bonds at a $1.8 billion loss [18]. It follows that the introduction of QE has the potential to create some financial problems in the long run.

4. The relationship between QE and macroeconomics

QE is a monetary policy, so by definition QE is a tool used by the central bank to adjust the money supply in the markets. The ultimate goal of QE is to promote economic recovery from the financial crisis, and GDP is an important indicator of a country's economic level. Therefore, QE can also be understood as a method used by the central bank to increase the level of GDP. On a more detailed level, QE can affect some of the components of GDP. In economics, GDP is calculated using the expenditure approach, which sums up the spending of three main groups: households, businesses, and the government [19]. The formula is:

$$GDP = C + I + G + NX$$

Because QE is a monetary policy, it cannot directly affect government spending. And its main impact is on consumption and investment. The main role of QE is to increase market liquidity and lower interest rates, so it is not difficult to find that the use of QE is positively correlated with consumption and investment in the short term. Going back to the formula, when the amount of consumption and investment rises in the short run, GDP is going to rise when all else is assumed to be constant. As a result, QE is going to be positively correlated with GDP in the short term. Why is it the short term that needs to be emphasized? It is because QE is a relatively aggressive monetary policy that has the potential to impose some economic costs in the long run. The focus is on the business cycle mentioned earlier and the long-term unemployment rate [17]. In the long run, especially when QE ends, there is still a possibility that the economy will fall into a depression, resulting in GDP will fall. Since the immediate impact of QE is generally discussed, it is widely recognized that QE will directly make GDP go on the rise.

5. Conclusion

Now that the Fed has stopped its fourth round of QE and shifted to a substantial rate hike, the legacy of the 2008 financial crisis can be said to have been largely resolved. Therefore, the Fed's QE policy can be called a success. In the process, it can be understood that the essence of QE, an

unconventional policy, is that the Fed expands its balance sheet to increase the market's money supply and bring liquidity to the market. The implementation of QE boosts the country's GDP by increasing investment. This is the direct link between QE and macroeconomics. Each round of QE is implemented differently because the FED faces a different situation and buys different assets in each round. The first three rounds of QE were designed to deal with the aftermath of the 2008 financial crisis, while the last round of QE was designed to deal with the economic impact of the COVID-19 pandemic. Because the 2008 financial crisis hit the U.S. economy more severely than the 2020 epidemic, the first three rounds of QE would be considered more impactful than QE4. The use of QE can bring many benefits, such as boosting the economy, reducing unemployment in the short term, and encouraging investment. At the same time, however, such unconventional monetary policies can sometimes be so aggressive as to lead to high risks. In the long run, it can lead to economic bubbles and high inflation rate which has been a problem since the end of QE4. However, objectively speaking, one cannot directly link excessive inflation rate after QE4 to QE. The main cause of excessive inflation rate in the United States was problems in the supply chain of certain products. The Fed's sharp interest rate hikes have improved the problem, but also made it impossible for some banks to operate normally, and they eventually collapsed. Thus, both expansionary and contractionary monetary policies have benefits as well as externalities. The Fed needs to carefully consider the opportunity costs of using each type of monetary policy, especially unconventional ones like QE.

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