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The effects of quantitative easing in the United States: Implications for future central bank policy makers

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The Effects of Quantitative Easing in the United States: Implications for Future Central Bank Policy Makers

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Abstract

The purpose of this thesis is to examine the effects of the Federal Reserve's recent bond buying programs, specifically Quantitative Easing 1, Quantitative Easing 2, Operation Twist (or the Fed's Maturity Extension Program), and Quantitative Easing 3. In this study, I provide a picture of the economic landscape leading up to the deployment of the programs, an overview of quantitative easing including each program's respective objectives, and how and why the Fed decided to implement the programs. Using empirical analysis, I measure each program's effectiveness by applying four models including a yield curve model, an inflation model, a money supply model, and an economic activity model. By and large, each stimulus effort added value in varying proportions, albeit QE1 negatively influenced the economy in some regards.

I. Introduction

In 2008, economies around the world experienced a financial crisis. Sparked by a housing boom and credit terms that allowed many to borrow extensively, as well as a subsequent saturation in home ownership and a rise in interest rates (causing several subprime borrowers to default on their loans) in the U.S., the crisis spread to consumers and business. Many consider the breaking point to have occurred on September 15th, 2008, when Lehman Brothers, the fourth largest investment bank, went bankrupt. Unlike its dealings with Bear Stearns (the fifth largest investment bank) in which it lent support, the United States government decided to let Lehman fail.[1] Lehman's collapse sent ripples through the financial markets, freezing credit markets and decreasing confidence in the financial system. Figure 1, shows the drop in total consumer credit in early 2008.

Throughout the global financial crisis (GFC), market participants questioned the financial strength of their counterparties and the future value of assets. Trust, the backbone of the financial system, faded and, as a result, liquidity shortfalls arose, not only for banks but also for consumers and corporations. Additionally, in 2008, the Federal Reserve was not fulfilling its two primary responsibilities: promoting stable prices and maximum employment. As you can see in Figure 2, prices dropped and the unemployment rate increased in 2008.[3] The preceding economic data and the prevalent instability in the financial markets at the time was a major concern of the Fed, setting the stage for relief efforts.

The Federal Reserve deemed action necessary to restore credit market functioning, uphold its dual mandate, and attempt to mitigate and/or avoid the tailwinds of the GFC. From a

[1] In March 2008, the Fed bailed out Bear Stearns through its loan, which allowed the central bank to purchase $30 billion of Bear Stearns' out-of-favor mortgage-backed securities, which at the time were essentially worthless.

[3] The CPI presented in Figure 2 was sourced from the Bureau of Labor Statistics. It includes all items and is representative of all urban consumers.

conventional standpoint, the Federal Reserve had a few options to achieve its goals; these included controlling the discount rate (the interest rate charged to commercial banks and other depository institutions for loans received from the Federal Bank's discount window) and setting reserve requirements. For example, when the Fed cuts the discount rate, in theory, banks borrow more, causing an increase in the supply of reserves and a decrease in the Federal Funds Rate.[4] Alternatively, by decreasing reserve requirements, the Federal Reserve allows banks to set aside a smaller portion of their funds for reserves which therein increases bank lending, the money supply, and the money multiplier; thus causing short term rates to fall, all else equal.[5] Central banks have used these policies previously to bring about desired effects on economies.

The Federal Reserve chose to reduce its target policy rate-the overnight Federal Funds Rate-effectively to its minimum, zero, to combat the GFC. Having not seen noticeable improvement from the aforementioned prescription, the Federal Reserve decided to take additional measures.[6] Diverging from conventionalism, the Fed considered taking nontraditional monetary policy actions because both the discount rate, pictured in Figure 3, and the target and effective Federal funds rate, presented in Figure 4, were already at their lower bounds in 2008. Accordingly, the bond buying program, known as Quantitative Easing 1 was borne.

II. Theory

Quantitative easing is a form of monetary policy in which the Federal Reserve conducts large-scale asset purchases (LSAP) of mainly long-term securities including Treasuries, Agency bonds, and

[4] The Federal Funds rate is the interest rate at which banks can lend funds maintained at the Federal Reserve to each other overnight

[5] Please refer to Appendix B for a complete history of Federal Reserve's stated reserve requirements and balances maintained by banks.

[6] The economic growth outlook remained sluggish and a threat of significant disinflation were entirely still present at that time.

Agency Mortgage Backed Securities, in an attempt to drive interest rates downward. The declared objective of quantitative easing is to decrease long-term interest rates to stimulate spending and investment.[7] Specifically, when the Fed makes asset purchases, it artificially boosts demand for the respective security and thus drives prices up and yields down. As rates fall, businesses can finance new capital investments more cheaply, which results in more investment, increased economic activity, new jobs, and ultimately a reduced unemployment rate. Likewise, households can lock in lower rates on their mortgage or monthly car payments, thus enticing them to spend more sooner. One proclaimed channel through which the LSAP effects take form is the portfolio balance channel. The idea of the portfolio balance channel suggests that when the Fed influences the net supply of an asset available by conducting LSAP, it alters the portfolio (or quantity and mix) of financial assets held by the public.[8] That is, the LSAP reduces the yield on the securities targeted and pushes investors into holding other assets with similar characteristics. On the downside, there are several inherent risks associated with the strategy including a possible decrease in confidence in the dollar, inflation, the chance that the Fed will lose money on its purchases (and inevitably either pass on this burden to taxpayers or create more money), and the financial market's reaction to the Fed normalizing rates.

III. Literature Review

There is significant literature which finds evidence that quantitative easing can influence long-term rates. One study by Gagnon, Raskin, Remache and Sack in 2010 concluded that QE1 was broadly successful. Their study articulated the program's effects, including reductions in premium on the 10-year rate, the longer-term private borrowing rates, Treasury yields, agency debt yields, and agency

[7] See Dudley, William C. "The Outlook, Policy Choices and Our Mandate."
[8] See Bernanke, Ben S. "The Economic Outlook and Monetary Policy."

MBS yields.[9] In 2011, Krishnamurthy and Vissing-Jorgensen also made use of an event-study method, but they measured both daily and intra-day interest rates and reviewed the Fed's effectiveness in implementing both QE1 and QE2. Importantly, their study documents that MBS purchases in QE1 decreased MBS yields and corporate credit risk (and therefore corporate yields). Their research also showed that QE2's Treasury purchases had a substantial impact on Treasury yields and agency bonds relative to MBSs and corporate bonds.[10] Swanson carried out a high-frequency event-study approach and presents support from the 1961 Operation Twist. His empirical evidence shows a cumulative (from the six announcements he analyzed) decline of 15 basis points (bp) on long-term Treasury yields, a 13 bp decline for agency securities, and a 2-4 bp decline for corporates.[11] There exists much less research analyzing the Fed's most recent bond buying program, QE3, relative to the preceding programs.

IV. Background

A. Quantitative Easing 1 (QE1)

The first round of quantitative easing, QE1, came to the public's eye on November 25th, 2008 when the Federal Reserve, under the guidance of Ben Bernanke, announced it would purchase the direct obligations of government-sponsored enterprises (GSEs)-Fannie Mae, Freddie Mac, and the Federal Home Loan Banks, and mortgage back securities (MBS) backed by Fannie Mae, Freddie Mac, and Ginnie Mae.[13] Buying $100 billion in GSE direct obligations and $500 billion in MBS, the Federal Reserve took action in the wake of turbulence in the financial markets. In this way, the Fed had

[9] See Gagnon, Joseph, Matthew Raskin, Julie Remache, and Brian Sack, "Large-Scale Asset Purchases by the Federal Reserve: Did They Work?"
[10] See Krishnamurthy, Arvind and Vissing-Jorgensen, Annette 2011. "The Effects on Quantitative Easing on Interest Rates: Channels and Implications for Policy."
[11] See Swanson, Eric T. 2011. "Let's Twist Again: A High-Frequency Event-Study Analysis of Operation Twist and Its Implications for QE2."
[13] See FOMC Press Release Nov 25, 2008

hoped to lend some support to the housing market, which at the time was plagued by the effects of the subprime mortgage crisis. Accordingly, QE1 was lengthened, with the goals of lowing costs of borrowing and assisting in easing credit.

On three separate occasions, December 16th, 2008, December 30th, 2008, and January 28th 2009, the Federal Reserve declared that it was willing and able to provide additional stimulus if conditions warranted.[14] Specifically the Fed communicated that it was prepared to purchase large quantities of agency debt, MBS, and long-term Treasuries if the transactions were to be particularly effective. On February 23rd, 2009, the FOMC revealed their plan in further detail, providing transparency on the level of additional purchases and the make-up of securities likely to be involved to all.[15]

On March 18th, 2009 the FOMC expanded the LSAP program and announced that between January 5, 2009 and March 31, 2010 the Fed would increase its purchases to a total of $1.25 trillion, increasing its MBS purchases by up to an additional $750 billion, upping its purchases of agency debt to $200 billion (an increase of $100 billion). The Fed decided to purchase up to $300 billion of Treasury securities over the succeeding six months to provide additional support to private credit markets. Collectively, the preceding purchases became known as "QE1" or the first LSAP.[16]

The FOMC reported on August 12th, 2009 that it believed the economy had showed signs of development such that it decided to gradually slow the pace of Treasury purchases and designated the end of October as the time which the full amount of Treasury purchases would be completed.[17] Similarly, on September 23rd, 2009, the FOMC publicized it would slow the pace of agency debt and

[14] See FOMC Statement Dec 16, 2008, FOMC Press Release Dec 30, 2008, and FOMC Press Release Jan 28, 2009
[15] See FOMC Press Release Feb 23, 2009
[16] See FOMC Statement Mar 18, 2009
[17] See FOMC Statement Aug 12, 2009

MBS. The Committee disclosed that by the end of the first quarter of 2010, it will have brought the agency debt and MBS purchases to a close.[18] Finally, on November 4th, 2009, the FOMC disclosed that only $175 billion of agency debt would be purchased, which is less than their previously announced maximum of $200 billion, and that purchases would be completed by the end of the first quarter of 2010.[19] Acting on their intentions, the Fed drew QE1 to a close by the end of March.

B. Quantitative Easing 2 (QE2)

After having noticed a worrisome disinflationary trend in the U.S. consumer price index, as inflation dipped toward 1%, the Fed announced on August 10th, 2010, that it would keep its holdings constant by reinvesting its principal payments of about $250 to $300 billion from agency debt and agency MBS in long term Treasuries.[22] As a result, the size of the Fed's balance sheet decreased because it no longer made additional purchases or re-invested in MBS and agency debt. Soon thereafter, the Fed began to signal to the markets that it was considering further asset purchases if the economic conditions warranted action. Moreover, the September 21, 2010, FOMC statement revealed that the Fed was still troubled by the inflation data with respect to its dual mandate but that it would maintain their existing plan to reinvest their principal payments.[23]

Following suit, on November 3rd, 2010 the Fed announced that it would purchase an additional $600 billion in U.S. Treasury bonds. Together, the reinvestment of principal payments in long term Treasuries as well as the additional $600 billion purchase of Treasury bonds became known as QE2. At a pace of about $75 billion per month, the Fed signaled that the program was to expire by the end of the second quarter of 2011.[24] The Fed followed through and finished the

[18] See FOMC Statement Sep 23, 2009
[19] See FOMC Statement Nov 4, 2009
[22] See FOMC Statement Aug 10, 2010
[23] See FOMC Statement Sep 21, 2010
[24] See FOMC Statement Nov 3, 2010

program by the end of the second quarter of 2011, as planned. In total, QE2 purchases were comprised of securities with maturities primarily between 2.5 and 10 years.

The rationale behind pursuing QE2 was to aid the United States' fragile economy. Further, the Fed had a fear of replicating Japan's economic environment throughout the 1990's and believed in the theory that injecting money would create inflation. Consistent with QE1, as short-term rates were already near zero, the Fed made an attempt to lower long-term interest rates and increase the money supply to bring about inflation. In theory, the lower long-term rates prompt consumers as well as businesses to borrow, thus increasing overall consumption as well. Critics of QE2 argued that the public's confidence in the Fed's ability to exit efficiently from its programs might decrease, leading to higher inflation expectations, and Fed had a lack of experience and knowledge about the quantitative effects of changes of the its holdings on financial conditions.

C. Operation Twist (The Fed's Maturity Extension Program)

As the VIX, a barometer of both investor sentiment and market volatility, increased to historical highs (levels above 40) in the late summer of 2011 and economic growth remained sluggish, many were concerned of another recession. The Fed unveiled "Operation Twist" on September 21st, 2011, in an attempt to drive down long-term rates. In Operation Twist, the Fed would purchase an additional $400 billion in long-term Treasuries, specifically ones with remaining maturities of 6 to 30 years, with the proceeds of selling the equivalent in short term treasuries, ones with remaining maturities of 3 years or less. The Fed would do this over a nine-month timeframe, with an expiration of the program by June 2012.[25] In other words, the Fed decided to shift the makeup of its balance sheet by trading short-term treasuries for long bonds. Moreover, the nature of the program constrained the Fed by the amount of short-term securities it held. On June 20th, 2012, near the end

[25] See FOMC Statement Sep 21, 2011

date of Operation Twist, the Fed decided to extend the program by an additional $267 billion.[26] In contrast to QE2, throughout this particular open market operation the Fed didn't expand the monetary base but simply influenced the term structure of interest rates by altering the makeup of its holdings. Additionally the Fed commented in its announcement on June 20th, 2012, that it would be rolling over maturing agency debt and MBS, and thus not replacing them with Treasury securities.

D. Quantitative Easing 3 (QE3)

On September 13th, 2012 the Fed expressed its concern that without continued policy accommodation it wouldn't have the capacity to achieve its 2% inflation target and there wouldn't exist sustained improvement in the labor market. For this reason, the Fed announced that it would purchase $40 billion of agency MBS per month, but no longer with financing from the sale of short term treasuries.[27] As time passed and the Fed's Maturity Extension Program (i.e., Operation Twist) expired, the Fed pledged on December 12th, 2012, to increase its involvement by purchasing an additional $45 billion of long term Treasury securities per month, therein bringing the total of monthly purchases to $85 billion per month. This program is generally referred to as QE3.[28] Nevertheless, the Fed didn't announce an end date to this policy (unlike prior operations), but rather stated it would monitor economic data and accommodate accordingly.

The total monthly purchases of $85 billion continued to take place until the Federal Reserve announced on December 18th, 2013 that beginning in January it would reduce (taper) its monthly purchases to a total of $75 billion.[29] It announced that the purchases would consist of $40 billion of Treasuries and $35 billion of agency MBS. Through time, the Fed continued to monitor the relevant economic data concerning their stimulus packages. If the data justified another taper, the Fed would

[26] See FOMC Statement Jun 20, 2012
[27] See FOMC Statement Sep 13, 2012
[28] See FOMC Statement Dec 12, 2012
[29] See FOMC Statement Dec 18, 2013

follow by voting to continue taper. I summarize the Federal Reserve's tapering decisions in Table 1.[31]

Beyond tapering and the end of QE3 the Federal Reserve continued to mention to households and corporations alike that rate hikes wouldn't take place for a "considerable amount of time".[32] At some point in time, however, the Fed will begin to normalize interest rates in order to re-stabilize markets. The question of when, remains to be answered but will largely rely on a host of key economic indicators monitored by the Fed.

E. Summary

I summarize the Federal Reserve's Bond Buying Programs in Table 2.

V. Analysis

A. Data

I present the data used to conduct analysis in Table 3. The time-series data spans the period beginning October 2006 and ending October 2014.[33] I use data that includes a pre-crisis period as a base for comparison. I capture the effects from all of the Fed's bond buying programs and additionally expand on some of the prior research by measuring the effects of each of the programs on Treasury yields, the TED Spread, the slope of the yield curve, the money supply, inflation, lending, stress levels, and consumption.

[31] Each taper reduced the Fed's monthly purchases by $5 billion in Treasuries and $5 billion in Agency MBS, except for the final taper. The final taper reduced the Fed's monthly purchases by $10 billion in Treasuries and $5 billion in Agency MBS, ending QE3. See FOMC Statement Jan 29 2014, FOMC Statement Mar 19, 2014, FOMC Statement Apr 30, 2014, FOMC Statement Jun 18, 2014, FOMC Statement Jul 30, 2014, and FOMC Statement Sep 17, 2014

[32] See FOMC Statement Oct 29, 2014

[33] All of the data was analyzed on a monthly basis.

B. Methodology

The purpose of the analysis is to examine the effect of the Fed's programs on credit availability, the term structure of interest, inflation, the money supply, and economic activity. Accordingly, I designed four separate models including a yield curve model, an inflation model, a money supply model, and an economic activity model. I use regression analysis on each of the four models to capture the implications of the Federal Reserve's monetary policy.

1. Yield Curve Model

I analyzed Treasury yields, the slope of the yield curve, and the TED spread by using the following regression equation that contains four dummy variables (one for each of the Federal Reserve's bond buying programs), QE1, QE2, TWIST, and QE3 and four slope-dummy variables (to account for the size of each of the programs), $SIZE_{QE1}$, $SIZE_{QE2}$, $SIZE_{TWIST}$, and $SIZE_{QE3}$.

$$Y = \beta_0 + \beta_1 QE1 + \beta_2 QE2 + \beta_3 TWIST + \beta_4 QE3 + \beta_5 SIZE_{QE1} + \beta_6 SIZE_{QE2} + \beta_7 SIZE_{TWIST} + \beta_8 SIZE_{QE3} + \varepsilon$$

$$QE1 = \begin{cases} 0 \text{ if the observation didn't occurred within Quantitative Easing 1} \\ 1 \text{ if the observation occurred within Quantitative Easing 1} \end{cases}$$

The dummy variable, QE1, is such that the variable takes on a value of 1 if the observation occurred during the timeframe of Quantitative Easing 1, 0 otherwise. In the same fashion, I built dummy variables for QE2, TWIST, and QE3.

$$SIZE_{QE1} = \begin{cases} 0 \text{ if the observation didn't occurred within Quantitative Easing 1} * X_k \\ 1 \text{ if the observation occurred within Quantitative Easing 1} * X_k \end{cases}$$

Where X_k = the month over month percentage change in the Federal Reserve's cumulative total holdings of Federal Agency Securities, Mortgage Backed Securities, and long term Treasury Purchases for time period (X_k).

The slope dummy variables were designed by starting with the same premises as the dummy variables above such that a 0 was added into the data range if the observation didn't occur during

the timeframe of Quantitative Easing 1; if in fact the observation did occur during the timeframe of Quantitative Easing 1, a 1 was added to the data range. I then multiplied the determined value of each month (0 or 1) in the dataset by its respective month over month percentage change in the Federal Reserve's cumulative total holdings of Federal Agency Securities, Mortgage Backed Securities, and long term Treasury Purchases for the time period (X_k[34]). I continued in the same regard to generate the remaining slope dummies ($SIZE_{QE2}$, $SIZE_{TWIST}$, and $SIZE_{QE3}$). Table 4 defines the respective starting and ending dates for each of the Federal Reserve's successive bond buying programs.

The sample consisted of 97 observations on each run. I ran regressions using SAS software to measure the extent to which the Federal Reserve influenced each of the dependent variables: Treasury yields, the slope of the yield curve, and the TED spread (each are represented by Y in the regression equation).

2. Inflation, Money Supply, and Economic Activity Models

I analyzed inflation proxies, the money supply, and six economic activity indicators by using the following regression equation that contains four dummy variables (one for each of the Federal Reserve's bond buying programs), QE1, QE2, TWIST, and QE3, four slope-dummy variables (to account for the size of each of the programs), $SIZE_{QE1}$, $SIZE_{QE2}$, $SIZE_{TWIST}$, and $SIZE_{QE3}$, and three additional independent variables, UNEMP, IP, and CS, to control for business cycles.

$$Y = \beta_0 + \beta_1 QE1 + \beta_2 QE2 + \beta_3 TWIST + \beta_4 QE3 + \beta_5 SIZE_{QE1} + \beta_6 SIZE_{QE2} + \beta_7 SIZE_{TWIST} + \beta_8 SIZE_{QE3} + \beta_9 UNEMP + \beta_{10} IP + \beta_{11} CS + \varepsilon$$

$$QE1 = \begin{cases} 0 \text{ if the observation didn't occurred within Quantitative Easing 1} \\ 1 \text{ if the observation occurred within Quantitative Easing 1} \end{cases}$$

[34] X_1 refers to time period 1 which I define as the month of October 2006. Each successive month is denoted in the same manner such that November 2006 is X_2 and so forth.

The dummy variable, QE1, is such that the variable takes on a value of 1 if the observation occurred during the timeframe of Quantitative Easing 1, 0 otherwise. In the same fashion, I built dummy variables for QE2, TWIST, and QE3.

$$SIZE_{QE1} = \begin{cases} 0 \text{ if the observation didn't occurred within Quantitative Easing 1} * X_k \\ 1 \text{ if the observation occurred within Quantitative Easing 1} * X_k \end{cases}$$

Where X_k = the month over month percentage change in the Federal Reserve's cumulative total holdings of Federal Agency Securities, Mortgage Backed Securities, and long term Treasury Purchases for time period (X_k).

The slope dummy variables were designed by starting with the same premises as the dummy variables above such that a 0 was added into the data range if the observation didn't occur during the timeframe of Quantitative Easing 1; if in fact the observation did occur during the timeframe of Quantitative Easing 1, a 1 was added to the data range. I then multiplied the determined value of each month (0 or 1) in the dataset by its respective month over month percentage change in the Federal Reserve's cumulative total holdings of Federal Agency Securities, Mortgage Backed Securities, and long term Treasury Purchases for the time period (X_k). I continued in the same regard to generate the remaining slope dummies ($SIZE_{QE2}$, $SIZE_{TWIST}$, and $SIZE_{QE3}$).

I used the unemployment rate as measured by the Bureau of Labor Statistics (UNEMP), the levels of the Industrial Production Index (IP), and the University of Michigan's Consumer Sentiment Index (CS) to capture business cycles. I chose each variable carefully to fully control for business cycles.

The sample consisted of 97 observations on each run for each of the three models. I ran regressions using SAS software to measure the extent to which the Federal Reserve affected each of the dependent variables (each are represented by Y in the regression equation). I tested 3 inflation proxies in my inflation model:

1. the Federal Reserve Bank of Cleveland's Median Consumer Price Index (MCPI),
2. the Producer Price Index (All Commodities), and
3. breakeven inflation (the difference between the yield on a 5 Year Treasury Inflation Protected Security and the yield on the 5 Year Treasury Note).

To understand further implications of the programs effect on inflation, I also analyzed the Trade Weighted U.S. Dollar Index in my inflation model.[35] In my money supply model, I examined the St. Louis Adjusted Monetary Base and the M2 Money Stock. Finally, in my economic activity model I investigated six different economic indicators:

1. the monthly return on the S&P 500 Index,
2. the amount of commercial paper outstanding,
3. the Cleveland Financial Stress Index,
4. the personal savings rate,
5. the level of personal consumption expenditures, and
6. the amount of consumer loans at all commercial banks.

VI. Results

Collectively, the stimulus measures put into place were predominantly successful. The Fed was broadly successful in reducing yields on the front-end of the yield curve with all four programs. Nevertheless, only the latter programs, Operation Twist and QE3, seem to have influenced the long-end of the yield curve. QE1, QE2, and QE3 affected the yield curve such that it became more upward sloping, suggesting strong future growth in the economy. On a similar note, I demonstrated that QE2, Operation Twist, and QE3 significantly reduced the TED spread, bolstering trust in the

[35] The Trade Weighted U.S. Dollar Index includes all major currencies (Euro Area, Canada, Japan, United Kingdom, Switzerland, Australia, and Sweden).

banking system. Moreover, QE1 and QE3 increased the St. Louis Adjusted Monetary Base in a statistically significant manner, lending to amplified spending and investment. Likewise, QE1, Operation Twist, and QE3, significantly increased the M2 Money Stock.

In terms of inflation, QE1 likely had a negative impact on major inflation indexes including the PPI, MCPI, and breakeven inflation. Albeit these results, it's tenable to believe that QE1 actually dampened a disinflationary trend. Contrarily, QE2, Operation Twist, and QE3 increased the overall price level, according to the PPI. Seemingly, QE2 and Operation Twist also significantly reduced the value of the dollar. From the perspective of large corporations seeking capital in the short-term, none of the programs look to have had an effect on the amount of commercial paper outstanding. Further, QE1 had a negative statistically significant impact on the total amount of consumer loans at all commercial banks, though QE3 had the opposite effect.

There is no evidence which suggests that the bond buying programs had any ramification on the monthly returns of the S&P 500 Index. The amount of personal consumption expenditures were favorably affected by QE1 and QE3, proliferating spending and investment. By contrast, Operation Twist appears to have had a positive impact on the personal savings rate. Finally, analogous with intuition, Operation Twist raised the market's stress level, whereas QE3 settled the overall market's nerves. Tables 5, 6, 7, and 8 summarize the results of the multiple regression analysis for each of the models.

A. The Yield Curve Model

My regression analysis indicts some success of the Fed in achieving its stated objective as it relates to their intended impacts on yields and the yield curve. As I depict in Table 5, QE1, QE2, Operation Twist, and QE3 all had a statistically significant impact in reducing the yield on the 2 Year Treasury Note. Similarly, QE2, Operation Twist, and QE3 had a statistically significant effect in decreasing

the yield on the 5 Year Treasury Note. Interestingly, only Operation Twist and QE3 had a statistically significant ramification in compressing the yields on the 10 and 30 Year Treasury Bonds. This conclusion suggests that almost every stimulus effort largely affected the front-end of the yield curve. By contrast, the long-end of the yield curve was only affected by the latter programs, Operation Twist and QE3. I also tested the equality of the slopes across maturities using SAS software. My analysis evidenced that the effect of each program was significant across all maturities:

Variable	F Value	Pr > F
US2	20.85	0.0001
US5	11.52	0.0001
US10	15.98	0.0001
US30	15.45	0.0001

In sum, it is probable that the Federal Reserve was indeed effective in decreasing the interest rates of Treasuries, making lending more affordable to consumers and thereby promoting spending and investment.

The TED Spread (i.e. the difference between the yield on the 3-Month T-bill and the 3-Month LIBOR) is an indicator of interbank credit risk and the perceived health of the banking system. When the spread narrows, interbank default risk is considered to be lower and the health of the banking system is greater. Conversely, the higher the perceived risk of default on interbank loans or counterparty risk, the wider the spread. The regression results in Table 5, indicate that the Fed strengthened the health of the banking system by having a statistically significant impact with three of its programs: QE2, Operation Twist, and QE3. It is unclear why QE1 didn't have a statistically significant impact on the TED spread, given its size relative to other programs. However, it stands within reason that there was a time lag associated with the implication of QE1. Nevertheless, the Fed had mostly success in decreasing the TED spread, stimulating a healthier banking system.

Additionally, I tested each of the bond buying programs' implications on the slope of the yield curve. The yield curve captures the general trend of interest rates as well as the relationships between short-term and long-term rates. Under normal circumstances, short-term securities will have lower yields than long-term securities. The yield curve is highly monitored by economists and investors alike as it has been quite indicative of future economic activity.[36] An inverted yield curve exists when short-term securities carry a higher yield than long-term securities; i.e.-the yield curve is downward sloping. As is depicted in Figure 5, shortly after the GFC, the yield curve sloped relatively flattish, signaling an economic slowdown.

Noticeably, in Figure 6, the Federal Reserve's announcement of QE1 changed the slope of the yield curve. As portrayed in looking at both Figure 5 and Figure 6, the slope of the yield curve became more upward sloping in post-GFC times. The more modern, positive slope of the yield curve is a sign of more positive future economic activity and thereby a more productive Federal Reserve.

This view is further supported by reviewing the results of the variable "SLOPE" from my regression. As is seen in Table 3, I define the SLOPE variable as the spread between the yield on the 10-year Treasury bond and the yield on the 2-year Treasury note. As is displayed in Table 5, QE1, QE2, and QE3 were statistically significant in driving the slope of the yield curve higher, suggesting that the Federal Reserve may have spurred economic growth going forward. Recall that Operation Twist involved the Fed exchanging some of their short term securities for longer-term securities but didn't necessitate the Fed increasing the size of its balance sheet, thus it is justifiable that the program didn't have a significant impact on the SLOPE variable.[37]

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[36] See Haubrich, Joseph G. "Does the Yield Curve Signal Recession?"

[37] To ensure the validity of my results, I also ran my yield curve model using an additional dummy variable, NBER, to control for business cycles. NBER denotes the National Bureau of Economic Research. The

B. The Inflation Model

I use three indicators of inflation in my analysis:

1. the Federal Reserve Bank of Cleveland's Median Consumer Price Index (MCPI),
2. the Producer Price Index (All Commodities), and
3. breakeven inflation.

I chose to use the MCPI, rather than the BLS' Consumer Price Index (CPI) because the index negates the impact volatile items (such as food and energy) have on overall prices. As a result, the index provides a better signal of the inflation trend than the BLS' All-Items CPI or CPI excluding food and energy. The MCPI is measured from the prospective of consumers. To more broadly capture inflation, I also scrutinized the Fed's effect on the PPI as it is an index which is built from the vantage point of businesses and corporations. Finally, I created a market-based quantifier of inflation by using the difference between the yield on a 5 Year Treasury Inflation Protected Security (TIPS) and the yield on the 5 Year Treasury note to calculate breakeven inflation.

At first glance, as exhibited in Table 6, it seems that the bond buying programs had no statistically significant impact on the PPI. However, I wasn't able to discern whether these results were entirely accurate as a problem due to multicollinearity likely existed.[38] To have a better handle on how the additional control variables affected my model, I also ran the model without any

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dummy variable, NBER, was created such that the variable took on a value of 1 if the observation took place during an NBER-characterized recessionary month, 0 otherwise. The NBER concluded that a recession occurred from December 2007 to May 2009. As the NBER's methodology is backward-looking and only characterizes business cycles through June 2009, I assumed that beyond June 2009 no other U.S. business cycle contractions materialized. The regression analysis results pertaining to this model can be found in Appendix D. Note that the results related to this model are distorted due to multicollinearity. Though the results were very similar, adding NBER as an independent variable likely robbed some explanatory power away from other independent variables, especially with regard to each bond buying programs' effect on the TED spread. A correlation matrix, specific to this model, is presented in Appendix C.

[38] Appendix E displays a correlation matrix containing all of the variables used in the model. Noticeably, many of the independent variables are highly correlated with each other in a statistically significant manner, likely bringing about the effects of multicollinearity.

variables controlling for business cycles (UNEMP, IP, and CS). The results, displayed in Appendix F, suggest that every program had an effect on the PPI and affirm that the added independent variables reduced explanatory power from each of the bond buying programs. Even so, only QE2, Operation Twist, and QE3 had an effect in line with the Fed's objectives on the index. That is, only QE2, Operation Twist, and QE3 had a positive, statistically significant impact on the PPI and thus brought rise to an upward trend in the price level. By contrast, QE1 negatively influenced inflation according to my model which didn't control for business cycles. Nevertheless, as is pictured in Figure 7, it is possible that QE1 may have actually dampened a disinflationary trend which was prevalent at the time, contrary to my regression analysis results.

As exhibited in Table 6, the MCPI was only statistically significantly influenced by QE1. However, QE1 had a negative effect on inflation according to the output. Similar to the theory behind the PPI results, it is probable that QE1 lessened a worrisome trend. When I ran the inflation model without controlling for business cycles, QE1 had a negative statistically significant effect on breakeven inflation. As this result aligns with the other inflation proxies, QE1 did indeed have a negative effect on inflation, though it is feasible that the program actually took the edge off of a concerning trend.[39]

Consistent with the PPI output, the value of the dollar decreased as QE2 and Operation Twist began. That is, QE2 and Operation Twist (two programs which had a positive effect on inflation) had a negative impact on the value of the dollar. Despite the statistically significant size of QE1, the program does not appear to have had any effect on the value of the dollar. Plausibly, the Federal Reserve mostly accomplished their goals to combat disinflation and promote stable prices.

[39] As was the case with PPI, the breakeven inflation results were also disturbed by multicollinearity.

C. The Money Supply Model

The money supply can have a powerful effect on economic activity. Theoretically, an increase in the money supply lowers interest rates, which naturally incentivizes individuals to hold more money as the opportunity cost decreases, and promotes spending and investment. In response, businesses order more raw materials and ramp-up production; in turn, the greater production creates a need for more labor. That said, an increase in the money supply may lead to greater spending and investment and a lower unemployment rate, thus stimulating the economy. Finally, if the money supply continues to grow at a faster pace than output, prices may begin to rise.[40]

I measured the effects of each of the Federal Reserve's programs on the St. Louis Adjusted Monetary Base and the M2 Money Stock. The St. Louis Adjusted Monetary Base is the sum of currency (including coin) in circulation outside Federal Reserve Banks and the U.S. Treasury, plus deposits held by depository institutions at Federal Reserve Banks, adjusted for the effects of changes in statutory reserve requirements and the quantity of base money held by depositories. Interestingly, as laid out in Table 7, only QE1 and QE3 had a statistically significant impact on the St. Louis Adjusted Monetary Base.[41] The programs increased the St. Louis Adjusted Monetary Base. Reiterating, an increase in the money supply tends to spur spending and investment while decreasing interest rates, easing credit conditions, a major objective of the Fed's policies.

The M2 Money Stock includes a broader set of financial assets held chiefly by households because it includes assets which are highly liquid but not cash (though they could be easily converted). It consists of the M1 plus: savings deposits (which include money market deposit accounts), small denomination time deposits, and balances in retail money market mutual funds. The

[40] See Schwartz, Anna J. "Money Supply."

[41] QE2 also had a positive, statistically significant impact on the St. Louis Adjusted Monetary Base when I tested the model without controlling for business cycles. Multicollinearity likely persisted and reduced some of QE2's explanatory power. The related regression results and correlation matrix are observable in Appendices H and G, respectively.

M2 is a more inclusive money supply quantifier which many consider more precise. My regression results, pictured in Table 7, indicate that QE1, Operation Twist, and QE3 all had a positive, statistically significant impact on the M2. As Operation Twist didn't necessitate an increase in the Federal Reserve's holdings, it jives with intuition that the program increased the M2 Money Stock, but not necessarily the St. Louis Adjusted Monetary Base. As mentioned, an increase in the money supply lends to increased spending and investment.

In sum, my results indicate that the Fed was successful in pursuing some of its desired objectives. The St. Louis Adjusted Monetary Base and the M2 Money Stock were both affected positively. As planned, the Fed promoted spending and investment and therein a stronger economy.

D. The Economic Activity Model

In this model I examine six different economic indicators including:

1. the monthly return on the S&P 500 Index,
2. the amount of commercial paper outstanding,
3. the Cleveland Financial Stress Index,
4. the personal savings rate,
5. the level of personal consumption expenditures, and
6. the total amount of consumer loans at all commercial banks.

My results, illustrated in Table 8, imply that none of the programs had any effect on the commercial paper market or the monthly return on the S&P 500 Index, despite the statistically significant results related to the yield curve. In theory, it would follow that the bond buying programs would push investors away from safer assets like Treasuries (as the yields significantly decreased) but towards

riskier assets such as stocks, thus increasing equity prices. However, there is no evidence which suggests that this phenomenon took place as a result of the Federal Reserve's stimulus efforts.[42]

From the perspective of consumers, in contrast with the Fed's stated objectives, the results of my analysis indicate that QE1 had a negative, statistically significant impact on the total amount of consumer loans at all commercial banks. Although, QE3 proved beneficial, increasing the total amount of consumer loans at all commercial banks in a statistically significant way. In this case, the results were mixed in terms of the Federal Reserve reaching its over-arching goals-to ease credit conditions and provide more liquidity to credit markets.[43]

I also used the Federal Reserve Bank Cleveland's CFSI to observe if the Federal Reserve's Programs had any impact on the overall market's stress levels. Much to the Federal Reserve's dismay, as shown in Table 8, Operation Twist had a statistically significant impact on the CFSI such that it elevated the overall market's level of stress. Throughout Operation Twist the overall market experienced moderate to significant stress levels according to the CFSI. Table 9 describes the CFSI's stress thresholds. Fortunately, QE3 had a statistically significant impact on the CFSI such that it deflated stress levels. No other programs had a statistically significant impact on the CFSI.

In line with the results of the CFSI, Operation Twist had a positive, statistically significant effect on the personal savings rate. Rationally, the program caused consumers to increase their savings at a time when stress levels were higher than normal. To the Fed's credit, the amount of personal consumption expenditures were positively, statistically significantly affected by QE1 and QE3. This indicates that the Federal Reserve not only promoted spending and investment but also

[42] One possible explanation my model did not discover this result is that the monthly returns I used were not total returns and thus did not factor in dividends.
[43] The economic activity model was also effected by multicollinearity in some cases. Refer to Appendices I and J, respectively, to see the model's correlation matrix and regression results without controlling for business cycles.

that it significantly enticed consumers to spend. Altogether, it appears the Federal Reserve sparked economic growth, fueling the economy going forward.

VII. Conclusion and Implications

As central banking operations have adapted over time such that formerly unconventional monetary policies like QE have become common, it is highly important to consider all of the effects of the programs, especially as most of the central banks have little experience in implementing such strategies. I have examined many effects of the Federal Reserve's bond buying programs by testing the effects of these programs on key financial indicators.

By pursuing LSAP, it appears the Federal Reserve has realized its goal to lower long-term yields, though not necessarily with each bond buying program. Overall, the Fed was broadly successful in reducing yields on the front-end of the yield curve with all four programs. However, only Operation Twist and QE3 seem to have influenced the long-end of the yield curve. Furthermore, there is significant evidence which suggests that QE1, QE2, and QE3 affected the yield curve such that it became more upward sloping, signaling economic growth in the future. On a similar note, I evidenced that QE2, Operation Twist, and QE3 significantly reduced the TED spread, a testament to the Federal Reserve increasing the health of the banking system.

It turns out that QE1 and QE3 increased the St. Louis Adjusted Monetary Base in a statistically significant manner. Building on these results, QE1, Operation Twist, and QE3, significantly increased the M2 Money Stock. From the vantage point of the PPI, all of the programs had a statistically significant effect on inflation, though not all of the effects were positive. Opposite of the Fed's intentions, QE1 likely had a negative impact on major inflation indexes including the PPI, MCPI, and breakeven inflation. Although, it's conceivable that QE1 actually traversed a

disinflationary trend which had prevailed at the time. In line with the PPI output, the value of the dollar decreased as result of QE2 and Operation Twist.

In terms of lending, none of the programs look to have had an effect on the amount of commercial paper outstanding. My output suggests that QE1 had a negative statistically significant repercussion on the total amount of consumer loans at all commercial banks. Nevertheless, QE3 reversed this trend, increasing the total amount of consumer loans at all commercial banks in a statistically significant fashion.

Despite the overall decrease in yields on riskless assets (such as Treasuries), there is no testimony which supports that the bond buying programs provoked a significant change in the monthly returns of the S&P 500 Index. QE1 and QE3 seem to have promoted spending and investment as the programs had a positive statistically significant effect on the amount of personal consumption expenditures. Conversely, to a degree, Operation Twist appears to have had a positive impact on the personal savings rate. Finally, in line with the preceding results, Operation Twist unquestionably raised the overall market's stress level, whereas QE3 settled the overall market's nerves.

It is clear from this study that the bond buying programs had a large impact on the economy. As many of the world's advanced economies are intertwined and connected, the Fed should consider not only the first order but also the second order consequences of their actions. It seems that each individual bond buying program brought about significant effects on various economic indicators but that in essence, the entire line of stimulus was widely successful. Future studies should examine the reasoning behind the differences in value added. Finally, although it seems that the Federal Reserve was largely successful with its LSAPs in realizing their goals, it is difficult to tell whether or not the measures the Fed took were indeed optimal. Regardless, serious

thought and deliberation on the Federal Reserve's actions will only serve to better equip central banks in the future.

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IX. Tables and Figures

A. Tables

Table 1: The Fed's Tapering Decisions

Announcement Date	Taper Amount	Prior Total of Monthly Purchases	New Total of Monthly Purchases	Month in which Policy Action Took Effect
December 18th, 2013	$10 billion	$85 billion	$75 billion	January 2014
January 29th, 2014	$10 billion	$75 billion	$65 billion	February 201
March 19th, 2014	$10 billion	$65 billion	$55 billion	April 2014
April 30th, 2014	$10 billion	$55 billion	$45 billion	May 2014
June 18th, 2014	$10 billion	$45 billion	$35 billion	July 2014
July 30th, 2014	$10 billion	$35 billion	$25 billion	August 2014
September 17th, 2014	$10 billion	$25 billion	$15 billion	October 2014
October 29th, 2014	$15 billion	$15 billion	$0 billion	November 2014

Table 2: Summary of The Federal Reserve's Bond Buying Programs

Program	Beginning Date	Ending Date	Composition
QE1	November 25th, 2008	March 31st, 2010	$1.25 billion of MBS, $175 billion of agency debt, and $300 billion of Treasury securities
QE2	November 30th, 2010	June 30th, 2011	$250 to $300 billion reinvestment of agency debt and agency MBS principal payment; $600 billion in Treasuries
Operation Twist	September 21st, 2011	December 31st, 2012	$667 billion swap of short-term Treasuries for long-term Treasuries
QE3	September 13th, 2012	October 29th 2014[44]	$40 billion of agency MBS per month for September, November, and December 2012; $45 billion of Treasuries and $40 billion of agency MBS per month for January 2013 – December 2013; See Table 1 (tapering timeline)

[44] Though the final taper didn't take effect until November 2014, I defined the end of QE3 as the end of October 2014 because of data limitations.

Table 3: Data Variables

Variable Name	Type	Data	Description	Source
US2	D[45]	The yield on the 2 Year Treasury Note	Treasury yields can be expressed as the interest rate which the U.S. Government pays to borrow money for different lengths of time. Conversely, from the investors' perspective, treasury yields are simply the return on investment on the U.S. government's debt obligations.	USDT[46]
US5	D	The yield on the 5 Year Treasury Note		USDT
US10	D	The yield on the 10 Year Treasury Bond		USDT
US30	D	The yield on the 30 Year Treasury Bond		USDT
TIPS5	D	The yield on the 5 Year Treasury Inflation Protected Security (TIPS)	The yield on a 5 Year Treasury Note plus some inflation premium.	FRED[47]
SLOPE	D	The difference between the yield on the 10 Year Treasury Bond and yield on the 2 Year Treasury Note	Measures the slope of the yield curve by observing the difference in the yield on the 10 Year Treasury Bond and the yield on the 2 Year Treasury Note, which I designed.	USDT
TED	D	The TED Spread (the difference between the yield on the 3-Month Treasury Bill (T-bill) and the 3-Month London Interbank Offered Rate or LIBOR (a benchmark rate that some of the world's leading banks charge each other for short-term loans)	As the U.S. Government's T-bills are essentially risk free, the TED spread can be viewed as a risk premium which banks charge each other, given their slightly higher probability of default. All else equal, the higher the perceived risk of default on interbank loans or counterparty risk, the higher the spread. Conversely, as the spread decreases the interbank default risk is considered to be lower. Thus, the TED Spread is a great indicator of interbank credit risk and the perceived health of the banking system.	FRED
INFL	D	The difference between the yield on a 5 Year Treasury Inflation Protected Security (TIPS) and the yield on the 5 Year Treasury Note	Also known as breakeven inflation, it considered a market-based quantifier of inflation.	USDT, FRED
PPI	D	The Producer Price Index: All Commodities	The Producer Price Index (PPI) measures the average change over time in selling prices received by domestic producers for their output.	FRED

[45] D denotes that the data item is a dependent variable in its respective model.
[46] USDT denotes the U.S. Department of the Treasury.
[47] FRED denotes the Federal Reserve Bank of St. Louis' FRED database

Table 3: Data Variables Continued

Variable Name	Type	Data	Description	Source
MCPI	D	The Federal Reserve Bank of Cleveland's Median Consumer Price Index (CPI)	Median CPI is calculated by using the prices of a basket of goods and services published by the Bureau of Labor Statistics (BLS) and finding the median price change (or the price change that's right in the middle of the long list of all of the price changes). This calculation process negates the impact volatile items (such as food and energy) have on the overall basket of goods and services.	FRED
MB	D	The St. Louis Adjusted Monetary Base	The sum of currency (including coin) in circulation outside Federal Reserve Banks and the U.S. Treasury, plus deposits held by depository institutions at Federal Reserve Banks. These data are adjusted for the effects of changes in statutory reserve requirements on the quantity of base money held by depositories.	FRED
M2	D	The M2 Money Stock	The M2 includes a broader set of financial assets held chiefly by households because it includes assets which are highly liquid but not cash (though they could be easily converted). M2 consists of M1 plus: savings deposits (which include money market deposit accounts), small denomination time deposits, and balances in retail money market mutual funds.	FRED
SP500[48]	D	The return on the S&P 500 Index	The S&P 500 is seen as a gauge of the large cap U.S. equities market. The index includes 500 leading companies in leading industries of the U.S. economy, which are publicly held on either the NYSE or NASDAQ, and covers 75% of U.S. equities. The index is a price index rather than a total return index.	S&P DJI[49]
CP	D	The total amount of commercial paper outstanding	Commercial paper consists of promissory notes issued primarily by corporations. Often, large corporations use Commercial Paper to raise cash needed for current transactions as it is considered a lower-cost alternative to bank loans.	FRED
CFSI	D	The Cleveland Financial Stress Index[50]	The Cleveland Financial Stress Index is designed to track stress in the U.S. financial system on a continuous basis. The index incorporates information from a number of different financial markets to provide a measure of financial system stress.	FRBC[51]

[48] The S&P 500 Index data does not include dividends. Dividend return may make up a significant portion of an index's total return.
[49] S&P DJI denotes S&P Dow Jones Indicies
[50] The Federal Reserve Bank of Cleveland reports the Cleveland Financial Stress Index on a daily basis. I converted the daily data to monthly data by calculating the simple average of the daily index reading for each month.
[51] FRBC denotes the Federal Reserve Bank of Cleveland

Table 3: Data Variables Continued

Variable Name	Type	Data	Description	Source
PS	D	The personal saving rate	The ratio of personal saving to disposable personal income as reported by the U.S. Bureau of Economic Analysis.	PS
PCE	D	The amount of personal consumption expenditures	Personal consumption expenditures consist of the actual and imputed expenditures of households. In other words, it is essentially a measure of goods and services consumed by individuals.	PCE
CL	D	The total amount of consumer loans at all commercial banks	The H.8 release provides an estimated weekly aggregate balance sheet for all commercial banks in the United States. The release is primarily based on data that are reported weekly by a sample of approximately 875 domestically chartered banks and foreign-related institutions.	CL
NBER	I[52]	The dates of U.S. business cycle expansions and contractions	The NBER defines a recession as a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales. Within the time frame of this study, the NBER determined a recession took place from December 2007 through May 2009.	NBER
UNEMP	I	The national unemployment rate (from the current population survey)	A monthly household survey that provides comprehensive information on the employment and unemployment of the population classified by age, sex, race, and other characteristics.	UNEMP
IP	I	The Industrial Production Index	The Industrial Production Index is an economic indicator that measures real output for all facilities located in the United States manufacturing, mining, and electric, and gas utilities (excluding those in U.S. territories). The index highlights structural developments in the economy.	IP

[52] I denotes that the data item serves as an independent variable in its respective model.

Table 4: Starting and Ending Dates of each of the Fed's Bond Buying Programs

Program	Start Date	End Date
Quantitative Easing 1	November 25th, 2008[53]	March 31st, 2010
Quantitative Easing 2	November 30th, 2010	June 30th, 2011
Operation Twist	September 21st, 2011	December 31st, 2012
Quantitative Easing 3	September 13th, 2012	October 29th, 2014[54]

[53] My data includes monthly totals, despite some programs starting in the middle of months.
[54] I define the end of Quantitative Easing 3 as the day in which the Fed announced its final taper.

Table 5: The Yield Curve Model: Multiple Regression Analysis Results

	Model 1 US2	Model 2 US5	Model 3 US10	Model 4 US30	Model 5 SLOPE	Model 6 TED
Intercept	2.288*	2.856*	3.603*	4.271*	1.315*	.745*
	(12.00)	(18.68)	(32.96)	(57.84)	(12.84)	(9.10)
QE1	-1.317*	-0.525	-0.128	-.008	1.189*	-.214
	(-3.20)	(-1.59)	(-.54)	(-.05)	(5.38)	(-1.21)
QE2	-1.683*	-0.945*	-0.337	0.144	1.346*	-.557*
	(-3.43)	(-2.40)	(-1.20)	(.76)	(5.10)	(-2.64)
TWIST	-2.017*	-2.053*	-1.746*	-1.312*	0.271	-.380*
	(-5.46)	(-6.92)	(-8.24)	(-9.17)	(1.37)	(-2.39)
QE3	-1.877*	-1.264*	-0.969*	-0.756*	.907*	-.549*
	(-4.87)	(-4.08)	(-4.38)	(-5.06)	(4.38)	(-3.31)
$SIZE_{QE1}$	-.000	-.003	-.004	-.004*	-.004	.002
	(-.07)	(-.80)	(-1.43)	(-2.14)	(-1.40)	(1.20)
$SIZE_{QE2}$	.000	-.001	-.001	-.000	-.002	-.000
	(.02)	(-.08)	(-.12)	(-.03)	(-.16)	(-.03)
$SIZE_{TWIST}$	-.000	.000	.000	.000	.000	.000
	(-.00)	(.04)	(.07)	(.05)	(.07)	(.02)
$SIZE_{QE3}$	.000	.001	.002	.003	0.002	-.000
	(.01)	(.09)	(.27)	(.51)	(.27)	(-.00)
N	97	97	97	97	97	97
R^2	0.358	0.390	0.476	0.560	0.392	0.181

Note: T-statistics are reported in parentheses. * indicates that the coefficient is different from zero at the 5 percent level of significance.

Table 6: The Inflation Model: Multiple Regression Analysis Results

	Model 1 INFL	Model 2 MCPI	Model 3 PPI	Model 4 USD
Intercept	-5.441	239.437	-136.208*	120.280*
	(-1.78)	(1.86)	(-3.50)	(7.50)
QE1	-.380	-23.259*	-.412	-.812
	(-1.50)	(-2.18)	(-.13)	(-.61)
QE2	.084	15.593	4.680	-3.266*
	(.40)	(1.46)	(1.76)	(-2.98)
TWIST	-.159	9.891	4.026	-.668
	(-1.00)	(1.46)	(1.97)	(-.79)
QE3	-.633*	-3.964	3.045	3.178*
	(-2.94)	(-.44)	(1.11)	(2.80)
$SIZE_{QE1}$	-.000	.116	-.022	.042*
	(-.43)	(1.47)	(-.91)	(4.24)
$SIZE_{QE2}$	-.002	.230	.021	-.013
	(-.30)	(.69)	(.21)	(-.32)
$SIZE_{TWIST}$	-.000	.172	-.011	.006
	(-.05)	(1.00)	(-.20)	(.28)
$SIZE_{QE3}$	.000	-.077	-.008	-.002
	(.04)	(-.29)	(-.10)	(-.08)
UNEMP	.089	-14.299*	7.086*	-1.114*
	(1.63)	(-6.21)	(10.20)	(-3.89)
IP	.0518	-.228	3.264*	-.526*
	(1.78)	(-.19)	(8.83)	(-3.45)
CS	.024*	-.552*	-.535*	.184*
	(3.89)	(-2.11)	(-6.77)	(5.65)
N	97	97	97	97
R^2	0.489	0.662	0.849	0.609

Note: T-statistics are reported in parentheses. * indicates that the coefficient is different from zero at the 5 percent level of significance.

Table 7: The Money Supply Model: Multiple Regression Analysis Results

	Model 1	Model 2
	MB	M2
Intercept	-22004.000*	-27419.000*
	(-10.92)	(-9.15)
QE1	586.295*	850.371*
	(3.51)	(3.42)
QE2	1.483	-255.839
	(.01)	(1.25)
TWIST	153.262	330.670*
	(1.45)	(2.10)
QE3	1143.504*	1102.347*
	(8.02)	(5.20)
$SIZE_{QE1}$	3.24*	5.573*
	(2.63)	(3.04)
$SIZE_{QE2}$	-1.700	.787
	(-.32)	(-.10)
$SIZE_{TWIST}$	-.337	.387
	(-.13)	(.10)
$SIZE_{QE3}$	-2.438	-3.235
	(-.58)	(-.52)
UNEMP	621.680*	845.077*
	(17.26)	(15.77)
IP	193.944*	308.897
	(10.12)	(10.84)
CS	9.082*	2.871
	(2.22)	(.47)
N	97	97
R^2	0.912	0.901

Note: T-statistics are reported in parentheses. * indicates that the coefficient is different from zero at the 5 percent level of significance.

Table 8: The Economic Activity Model: Multiple Regression Analysis Results

	SP500	CP	CFSI	PS	PCE	CL
Intercept	-47.06	-.022	9.521*	.548	-10354.000*	-1858.210*
	(-1.59)	(-.09)	(2.46)	(.09)	(-6.88)	(-5.46)
QE1	1.908	.005	.348	.493	346.009*	-152.058*
	(.78)	(.28)	(1.08)	(1.02)	(2.77)	(-5.38)
QE2	.968	.024	-.328	.507	2.466	-21.352
	(.48)	(1.42)	(-1.24)	(1.27)	(.02)	(-.92)
TWIST	.035	.014	1.025*	1.606*	150.780	4.640
	(.02)	(1.04)	(5.04)	(5.25)	(1.91)	(.26)
QE3	-.404	.009	-.840*	.336	531.087*	114.954*
	(-.19)	(.50)	(-3.07)	(.81)	(4.99)	(4.77)
$SIZE_{QE1}$	.034	-.000	.003	.003	1.925*	.729*
	(1.86)	(-1.67)	(1.25)	(.74)	(2.09)	(3.50)
$SIZE_{QE2}$	-.309	.000	.003	-.001	.753	.081
	(-.40)	(.19)	(.33)	(-.09)	(.19)	(.09)
$SIZE_{TWIST}$	.043	.000	-.002	.010	-.058	.034
	(1.10)	(1.01)	(-.50)	(1.28)	(-.03)	(.08)
$SIZE_{QE3}$	.014	-.000	-.008	-.003	-1.298	-.388
	(.24)	(-.08)	(-.97)	(-.29)	(-.42)	(-.55)
UNEMP	1.106*	-.002	-.222*	.413*	426.083*	105.937*
	(2.09)	(-.43)	(-3.20)	(3.96)	(15.84)	(17.40)
IP	.270	.000	-.009	.036	186.048*	21.696*
	(.96)	(.02)	(-.25)	(.65)	(13.00)	(6.70)
CS	.172*	.000	-.089*	(-.034)*	-3.417	-.190
	(2.87)	(.58)	(-11.26)	(-2.57)	(-1.12)	(-.27)
N	97	97	97	97	97	97
R^2	0.175	0.120	0.779	0.662	0.921	0.910

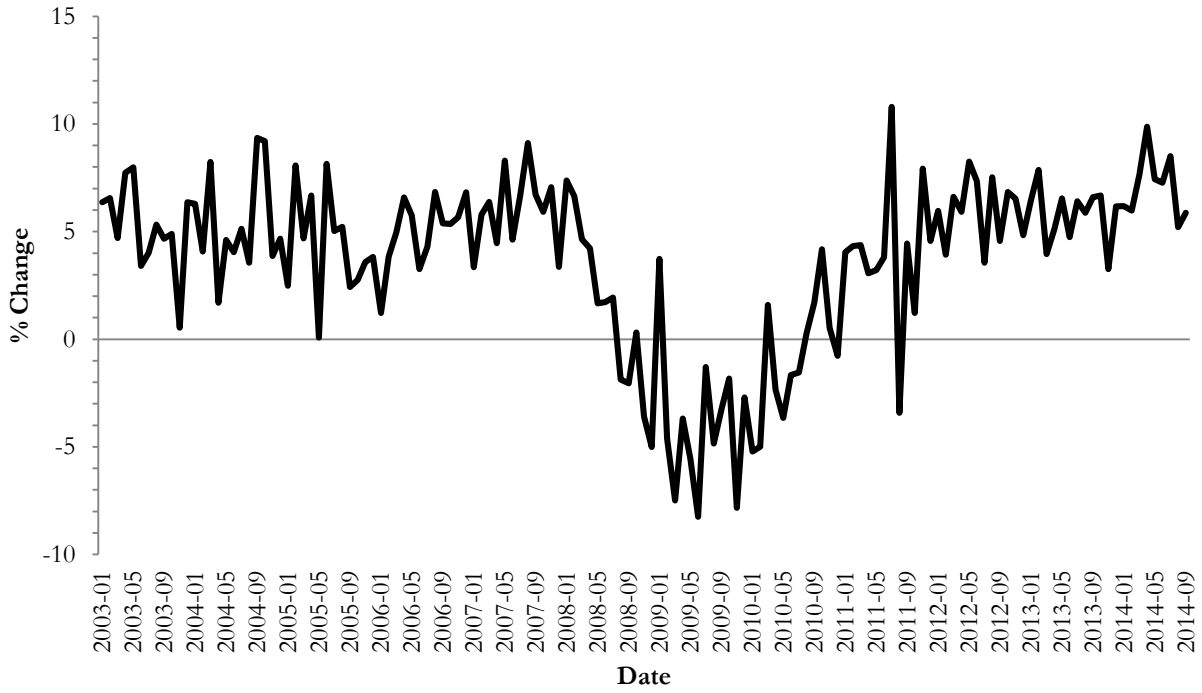
Note: T-statistics are reported in parentheses. * indicates that the coefficient is different from zero at the 5 percent level of significance.

Table 9: CFSI's Defined Stress Thresholds

CFSI Grade at Threshold	CFSI Range	Probability
Grade 1 (below-normal stress)	Less than or equal to -0.50	1.9%
Grade 2 (normal stress)	Between -0.50 and 0.59	8.7%
Grade 3 (moderate stress)	Between 0.59 and 1.68	26.3%
Grade 4 (significant stress)	Greater than 1.68	53.3%

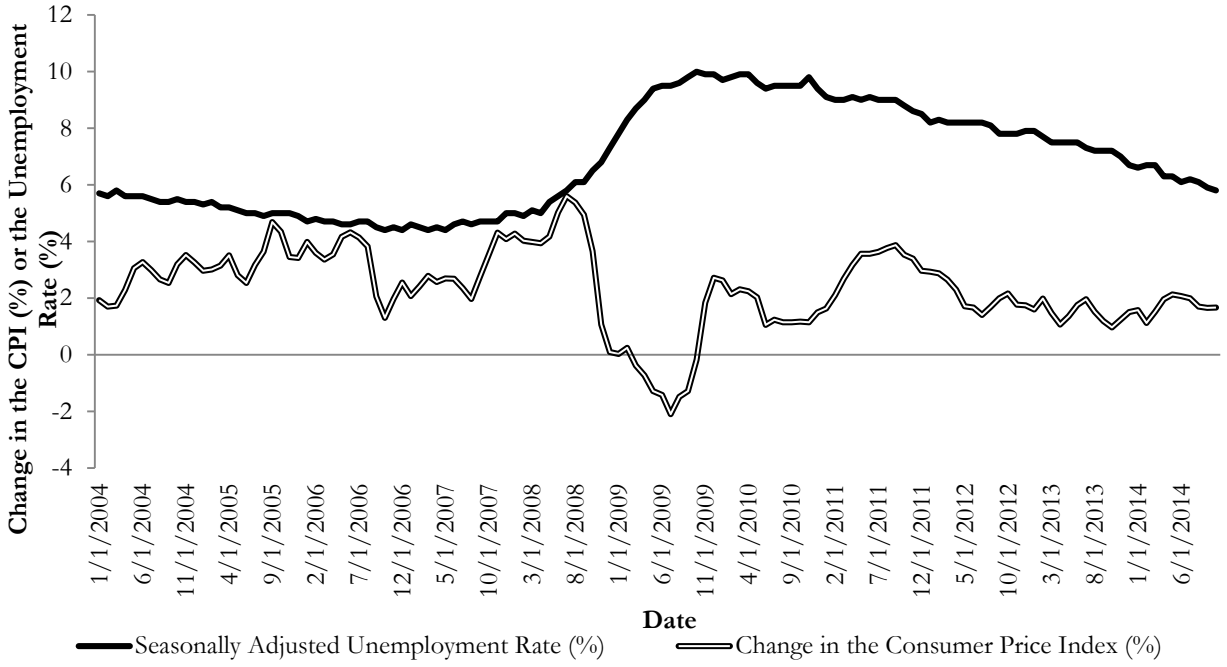
B. Figures

Figure 1: The Percentage Change of Total Consumer Credit



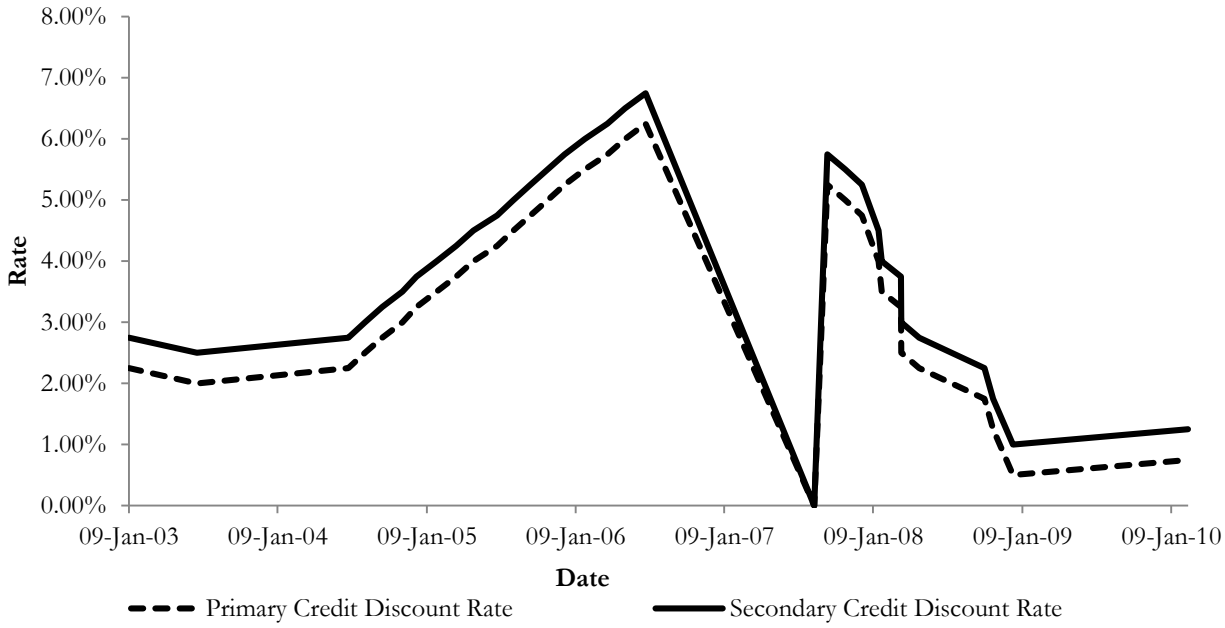
Source: Board of Governors of the Federal Reserve

Figure 2: The Percentage Change in the Unemployment Rate and CPI Since 2004



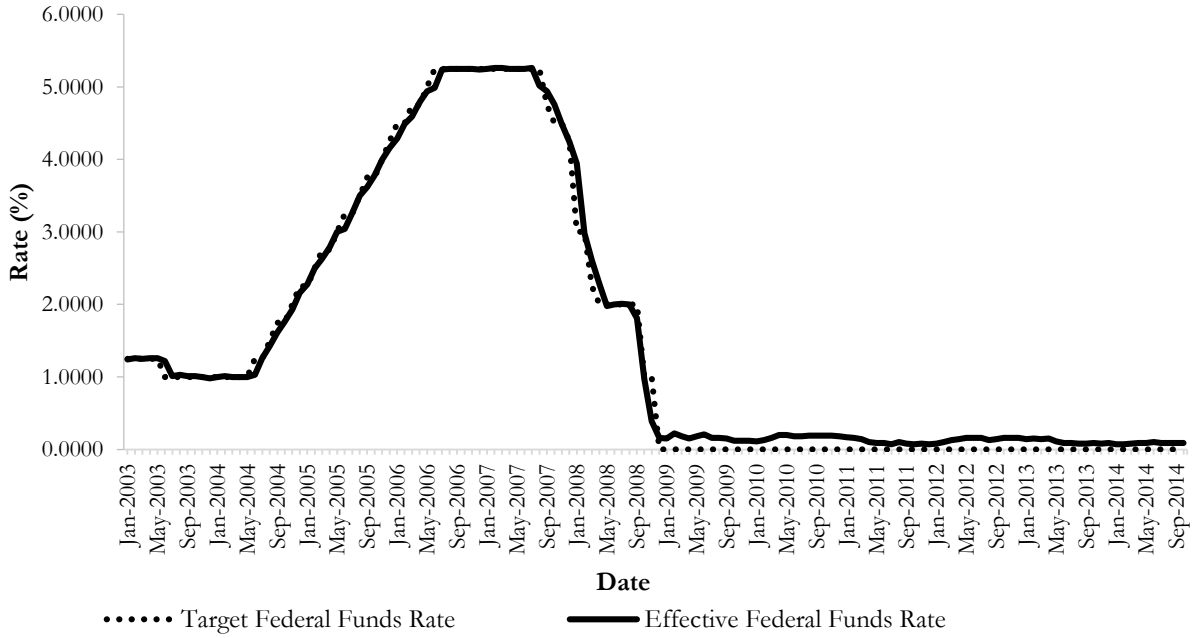
Source: The Bureau of Labor Statistics

Figure 3: Discount Rates Since 2003



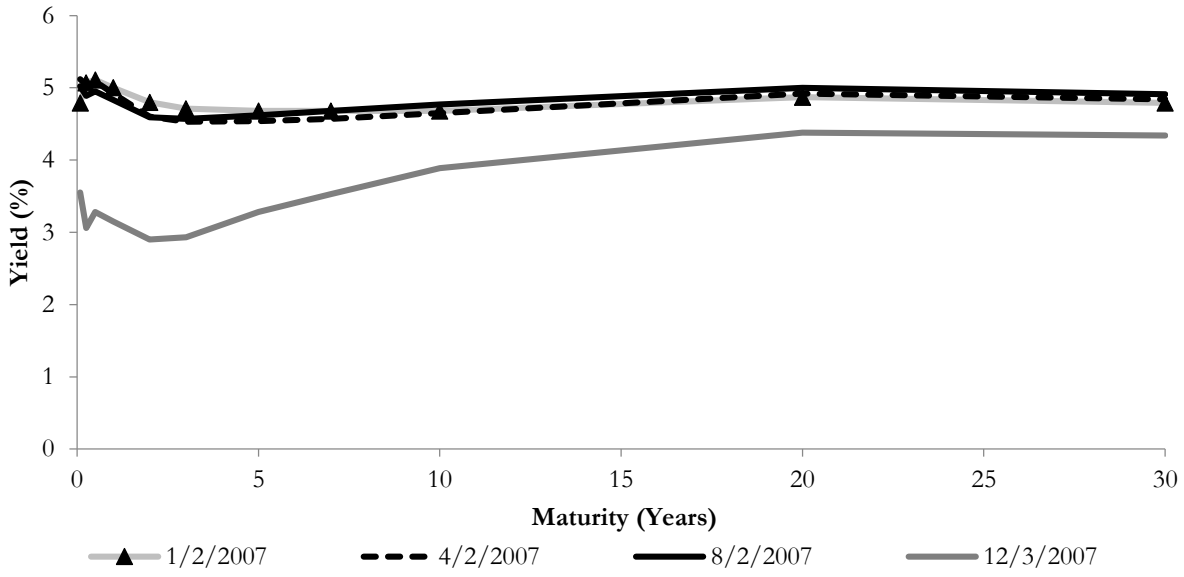
Source: The Federal Reserve Discount Window

Figure 4: Target vs. Effective Federal Funds Rate Since 2003



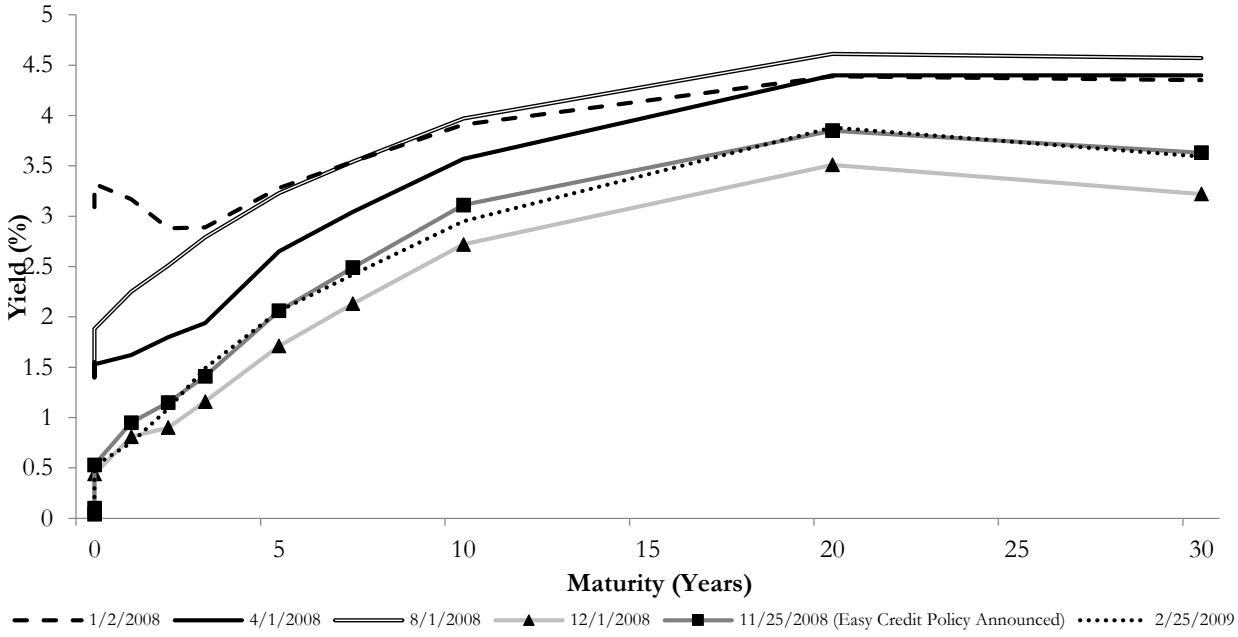
Source: The Federal Reserve Bank of St. Louis' FRED database

Figure 5: The Yield Curve Shortly After the GFC



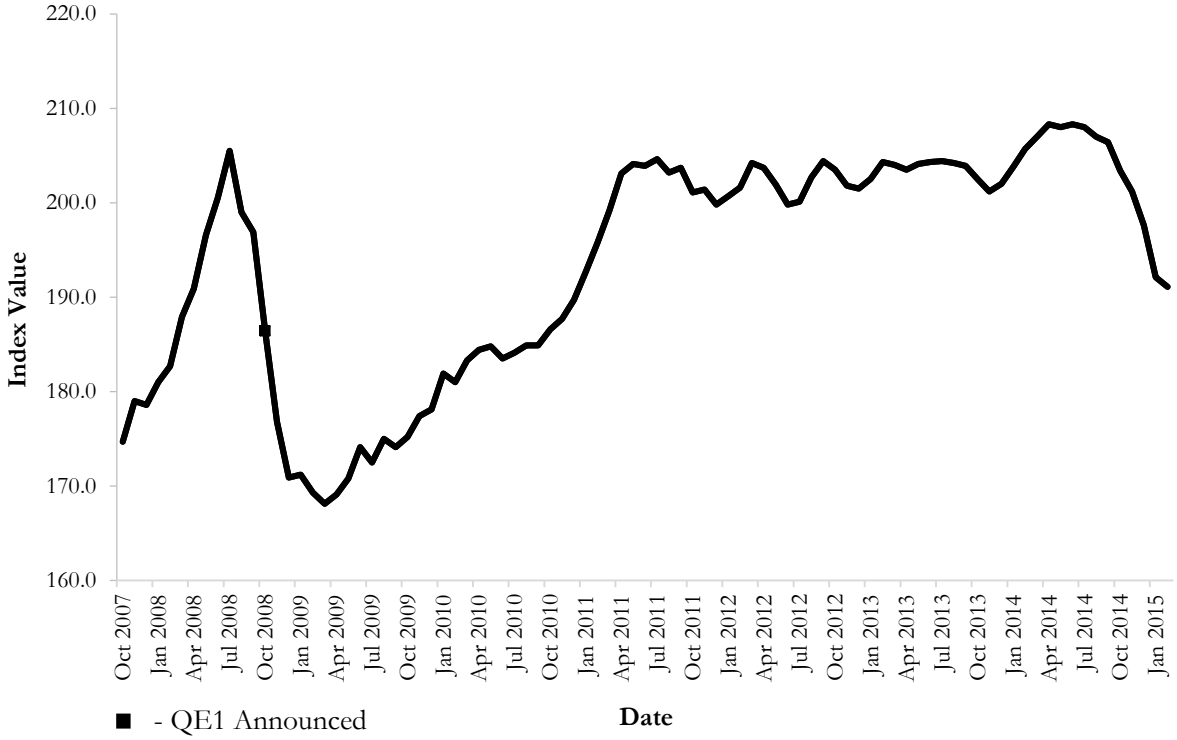
Source: U.S. Department of the Treasury

Figure 6: The Yield Curve Shortly After the Fed's Announcement to Pursue QE1



Source: U.S. Department of the Treasury

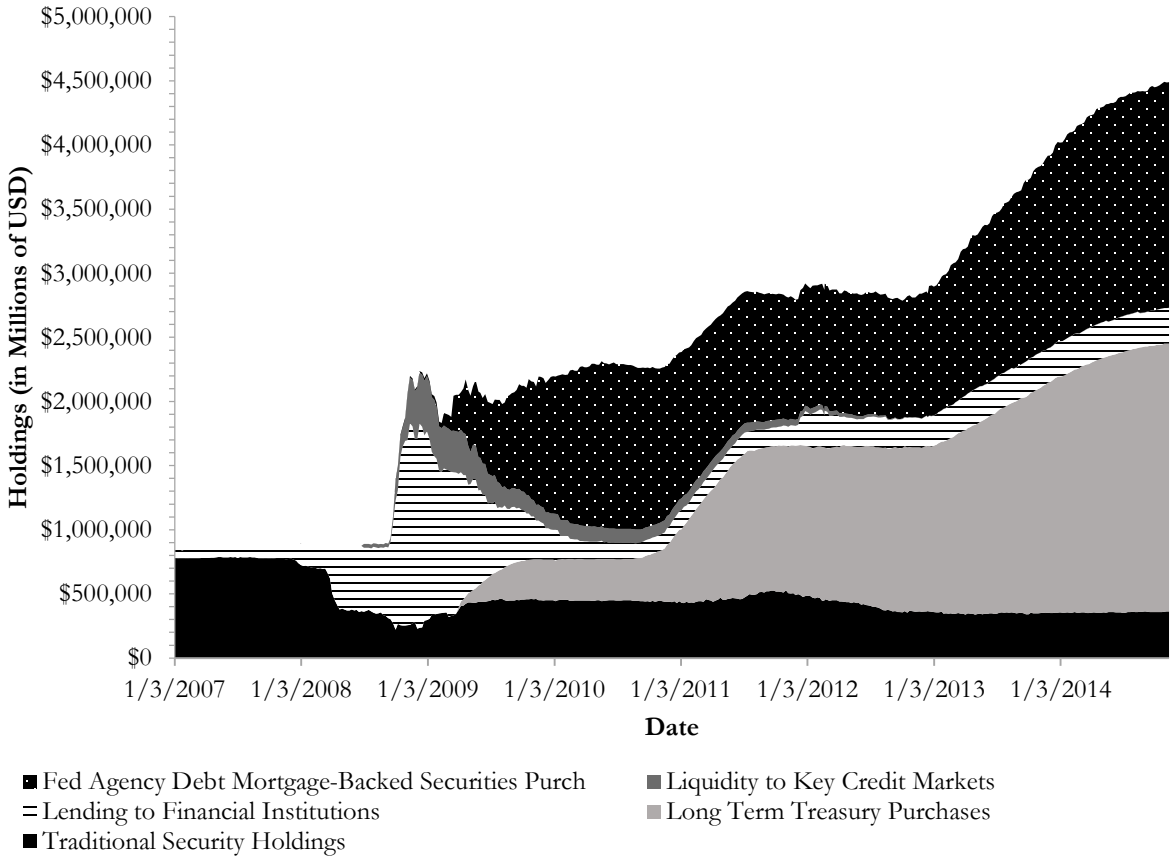
Figure 7: The Producer Price Index (October 2007 – February 2015)



Source: The Federal Reserve Bank of St. Louis' FRED database

X. Appendices

A. Summary of Credit Easing Policy Tools



Source: The Federal Reserve Bank of Cleveland

B. Reserve Requirements vs. Balances Maintained

Source: Federal Reserve Board Statistical Releases

C. Yield Curve Model: Correlation Matrix

	US2	US5	US10	US30	Slope	TEDRATE	QE1	QE2	TWIST	QE3	$SIZE_{QE1}$	$SIZE_{QE2}$	$SIZE_{TWIST}$	$SIZE_{QE3}$	NBER
US2	1	0.95549	0.86472	0.72069	-0.81634	0.37954	-0.11165	-0.14413	-0.31545	-0.25194	-0.06435	-0.03542	-0.06403	-0.04054	0.1469
		<.0001	<.0001	<.0001	<.0001	0.0001	0.2763	0.159	0.0016	0.0128	0.5312	0.7305	0.5332	0.6934	0.1511
US5		1	0.96856	0.86476	-0.61635	0.36659	0.02134	-0.05916	-0.49143	-0.18545	-0.04514	-0.02121	-0.09609	-0.02283	0.17087
			<.0001	<.0001	<.0001	0.0002	0.8356	0.5649	<.0001	0.069	0.6607	0.8366	0.3491	0.8243	0.0942
US10			1	0.95538	-0.41582	0.35394	0.10319	0.05194	-0.58944	-0.19959	-0.03879	0.00443	-0.11431	-0.01202	0.19347
				<.0001	<.0001	0.0004	0.3145	0.6134	<.0001	0.05	0.706	0.9657	0.2649	0.907	0.0576
US30				1	-0.20633	0.22898	0.11005	0.21207	-0.62595	-0.23986	-0.06945	0.05213	-0.12309	-0.0041	0.13627
					0.0426	0.0241	0.2833	0.037	<.0001	0.018	0.4991	0.6121	0.2297	0.9682	0.1832
Slope					1	-0.28024	0.32083	0.32071	-0.10664	0.22667	0.07191	0.06922	-0.0155	0.0596	-0.04352
						0.0054	0.0014	0.0014	0.2985	0.0256	0.4839	0.5005	0.8802	0.562	0.6721
TEDRATE						1	0.08181	-0.18918	-0.13716	-0.25167	0.14126	-0.0514	-0.02552	-0.04157	0.736
							0.4257	0.0635	0.1803	0.0129	0.1675	0.6171	0.804	0.686	<.0001
QE1							1	-0.13821	-0.20488	-0.18932	0.53184	-0.03528	-0.04148	-0.03105	0.26822
								0.177	0.0441	0.0633	<.0001	0.7316	0.6866	0.7627	0.0079
QE2								1	-0.13325	-0.12313	-0.0735	0.25524	-0.02698	-0.0202	-0.14311
									0.1932	0.2295	0.4743	0.0116	0.7931	0.8443	0.162
TWIST									1	-0.18253	-0.10896	-0.03401	0.20247	-0.02994	-0.21215
										0.0735	0.2881	0.7409	0.0467	0.771	0.037
QE3										1	-0.10069	-0.03143	-0.03696	0.16402	-0.19604
											0.3264	0.7599	0.7193	0.1084	0.0543
$SIZE_{QE1}$											1	-0.01876	-0.02206	-0.01652	0.38622
												0.8553	0.8302	0.8724	<.0001
$SIZE_{QE2}$												1	-0.00689	-0.00516	-0.03653
													0.9466	0.96	0.7224
$SIZE_{TWIST}$													1	-0.00606	-0.04295
														0.953	0.6761
$SIZE_{QE3}$														1	-0.03216
															0.7545
NBER															1

D. Yield Curve Model, Controlling for Business Cycles: Multiple Regression Analysis Results

	Model 1 US2	Model 2 US5	Model 3 US10	Model 4 US30	Model 5 SLOPE	Model 6 TED
Intercept	2.288*	2.846*	3.582*	4.278*	1.294*	.464*
	(10.63)	(16.48)	(29.03)	(51.30)	(11.19)	(7.19)
QE1	-1.317*	-0.523	-0.125	-.009	1.192*	-.177
	(-3.18)	(-1.58)	(-.53)	(-.05)	(5.37)	(-1.42)
QE2	-1.684*	-0.935*	-0.316	0.138	1.368*	-.276
	(-3.34)	(-2.31)	(-1.09)	(.70)	(5.05)	(-1.83)
TWIST	-2.018*	-2.043*	-1.725*	-1.312*	0.293	-.099
	(-5.25)	(-6.63)	(-7.83)	(-8.86)	(1.42)	(-.86)
QE3	-1.877*	-1.254*	-0.948*	-0.763*	.929*	-.268*
	(-4.69)	(-3.91)	(-4.13)	(-4.92)	(4.32)	(-2.23)
$SIZE_{QE1}$	-.000	-.003	-.004	-.004	-.004	-.002
	(-.06)	(-.80)	(-1.47)	(-1.96)	(-1.45)	(-1.39)
$SIZE_{QE2}$	.000	-.001	-.001	-.000	-.002	-.000
	(.02)	(-.08)	(-.12)	(-.03)	(-.16)	(-.05)
$SIZE_{TWIST}$	-.000	.000	.000	.000	.000	.000
	(-.00)	(.04)	(.07)	(.05)	(.07)	(.03)
$SIZE_{QE3}$	.000	.001	.002	.003	0.002	-.000
	(.01)	(.09)	(.27)	(.50)	(.27)	(-.00)
NBER	-.001	.038	.080	.024	.082	1.073
	(-.00)	(.13)	(.37)	(-.17)	(.41)	(9.56)
N	97	97	97	97	97	97
R^2	0.358	0.390	0.477	0.56	0.393	0.601

Note: T-statistics are reported in parentheses. * indicates that the coefficient is different from zero at the 5 percent level of significance.

E. Inflation Model: Correlation Matrix

	INFL	PPI	MCPI	USD	QE1	QE2	TWIST	QE3	$SIZE_{QE1}$	$SIZE_{QE2}$	$SIZE_{TWIST}$	$SIZE_{QE3}$	UNEMP	IP	CS
INFL	1	0.2345	0.332	-0.42906	-0.56494	0.09855	0.07599	-0.00248	-0.40092	0.01375	0.0143	0.0016	-0.31094	0.4814	0.51796
		0.0208	0.0009	<.0001	<.0001	0.3369	0.4594	0.9808	<.0001	0.8937	0.8895	0.9876	0.0019	<.0001	<.0001
PPI		1	0.0751	-0.53772	-0.51631	0.13873	0.36176	0.43319	-0.35066	0.0175	0.07216	0.07219	0.15714	0.46072	-0.04943
			0.4648	<.0001	<.0001	0.1754	0.0003	<.0001	0.0004	0.8649	0.4824	0.4823	0.1243	<.0001	0.6307
MCPI			1	0.02183	-0.52061	-0.05645	0.00738	0.0597	-0.14159	0.01501	0.07039	-0.01766	-0.73198	0.59279	0.25862
				0.8319	<.0001	0.5829	0.9428	0.5613	0.1665	0.884	0.4933	0.8637	<.0001	<.0001	0.0105
USD				1	0.27171	-0.34855	-0.29438	0.16013	0.3944	-0.08208	-0.04603	0.01636	-0.32135	-0.00502	0.32267
					0.0071	0.0005	0.0034	0.1172	<.0001	0.4241	0.6543	0.8736	0.0013	0.961	0.0013
QE1					1	-0.13821	-0.20488	-0.18932	0.53184	-0.03528	-0.04148	-0.03105	0.43219	-0.75617	-0.3891
						0.177	0.0441	0.0633	<.0001	0.7316	0.6866	0.7627	<.0001	<.0001	<.0001
QE2						1	-0.13325	-0.12313	-0.0735	0.25524	-0.02698	-0.0202	0.29371	-0.17581	-0.06152
							0.1932	0.2295	0.4743	0.0116	0.7931	0.8443	0.0035	0.085	0.5494
TWIST							1	-0.18253	-0.10896	-0.03401	0.20247	-0.02994	0.20075	0.05855	-0.05994
								0.0735	0.2881	0.7409	0.0467	0.771	0.0486	0.5689	0.5598
QE3								1	-0.10069	-0.03143	-0.03696	0.16402	-0.21433	0.53311	0.28577
									0.3264	0.7599	0.7193	0.1084	0.035	<.0001	0.0045
$SIZE_{QE1}$									1	-0.01876	-0.02206	-0.01652	0.18928	-0.43895	-0.32156
										0.8553	0.8302	0.8724	0.0633	<.0001	0.0013
$SIZE_{QE2}$										1	-0.00689	-0.00516	0.08237	-0.05905	0.02711
											0.9466	0.96	0.4225	0.5656	0.7921
$SIZE_{TWIST}$											1	-0.00606	0.03218	0.02312	-0.01406
												0.953	0.7543	0.8222	0.8913
$SIZE_{QE3}$												1	-0.02255	0.08158	0.04269
													0.8265	0.427	0.678
UNEMP													1	-0.73834	-0.49006
														<.0001	<.0001
IP														1	0.56649
															<.0001
CS															1

F. Inflation Model without Controlling for Business Cycles: Multiple Regression Analysis Results

	Model 1	Model 2	Model 3	Model 4
	INFL	MCPI	PPI	USD
Intercept	2.009*	83.326*	186.286*	75.932*
	(25.55)	(20.30)	(121.7)	(161.63)
QE1	-.843*	-57.327*	-9.551*	-.012
	(-4.97)	(-6.48)	(-2.89)	(-.01)
QE2	-.018	-20.524	10.991*	-4.616*
	(-.09)	(-1.94)	(2.78)	(-3.81)
TWIST	-.120	-14.424	15.717*	-2.808*
	(-.79)	(-1.81)	(5.30)	(-3.08)
QE3	-.227	-8.754	19.107*	1.048
	(-1.43)	(-1.05)	(6.17)	(1.10)
$SIZE_{QE1}$	-.002	.193	-.049	.041*
	(-1.38)	(1.85)	(-1.26)	(3.46)
$SIZE_{QE2}$	-.001	.161	-.044	.004
	(-.14)	(.35)	(-.26)	(.08)
$SIZE_{TWIST}$	-.000	.191	-.001	.004
	(-.01)	(.82)	(-.02)	(.16)
$SIZE_{QE3}$	.000	-.118	.002	-.005
	(.02)	(-.32)	(.02)	(-.12)
N	97	97	97	97
R^2	0.351	0.345	0.554	0.359

Note: T-statistics are reported in parentheses. * indicates that the coefficient is different from zero at the 5 percent level of significance.

G. Money Supply Model: Correlation Matrix

	MB	M2	QE1	QE2	TWIST	QE3	$SIZE_{QE1}$	$SIZE_{QE2}$	$SIZE_{TWIST}$	$SIZE_{QE3}$	UNEMP	IP	CS
MB	1	0.9767	-0.1668	0.03844	0.20767	0.68599	-0.11176	-0.00303	0.04063	0.10226	0.32651	0.29236	0.13286
		<.0001	0.1025	0.7085	0.0412	<.0001	0.2758	0.9765	0.6927	0.3189	0.0011	0.0037	0.1945
M2		1	-0.2325	-0.03268	0.28314	0.65294	-0.12722	-0.01367	0.0652	0.09629	0.2572	0.36919	0.12692
			0.0219	0.7506	0.005	<.0001	0.2143	0.8943	0.5258	0.3481	0.011	0.0002	0.2154
QE1			1	-0.13821	-0.20488	-0.18932	0.53184	-0.03528	-0.04148	-0.03105	0.43219	-0.75617	-0.3891
				0.177	0.0441	0.0633	<.0001	0.7316	0.6866	0.7627	<.0001	<.0001	<.0001
QE2				1	-0.13325	-0.12313	-0.0735	0.25524	-0.02698	-0.0202	0.29371	-0.17581	-0.06152
					0.1932	0.2295	0.4743	0.0116	0.7931	0.8443	0.0035	0.085	0.5494
TWIST					1	-0.18253	-0.10896	-0.03401	0.20247	-0.02994	0.20075	0.05855	-0.05994
						0.0735	0.2881	0.7409	0.0467	0.771	0.0486	0.5689	0.5598
QE3						1	-0.10069	-0.03143	-0.03696	0.16402	-0.21433	0.53311	0.28577
							0.3264	0.7599	0.7193	0.1084	0.035	<.0001	0.0045
$SIZE_{QE1}$							1	-0.01876	-0.02206	-0.01652	0.18928	-0.43895	-0.32156
								0.8553	0.8302	0.8724	0.0633	<.0001	0.0013
$SIZE_{QE2}$								1	-0.00689	-0.00516	0.08237	-0.05905	0.02711
									0.9466	0.96	0.4225	0.5656	0.7921
$SIZE_{TWIST}$									1	-0.00606	0.03218	0.02312	-0.01406
										0.953	0.7543	0.8222	0.8913
$SIZE_{QE3}$										1	-0.02255	0.08158	0.04269
											0.8265	0.427	0.678
UNEMP											1	-0.73834	-0.49006
												<.0001	<.0001
IP												1	0.56649
													<.0001
CS													1

H. Money Supply Model without Controlling for Business Cycles: Multiple Regression Analysis Results

	Model 1	Model 2
	MB	M2
Intercept	1569.618*	8311.010*
	(15.75)	(60.82)
QE1	297.769	67.752
	(1.39)	(.23)
QE2	758.559*	597.763
	(2.95)	(1.70)
TWIST	1087.753*	1589.054*
	(5.63)	(6.00)
QE3	2302.678*	2884.754*
	(11.42)	(10.43)
$SIZE_{QE1}$	-1.055	-.219
	(-.42)	(-.06)
$SIZE_{QE2}$	-2.254	1.252
	(-.20)	(-.08)
$SIZE_{TWIST}$	-.126	.937
	(-.02)	(.12)
$SIZE_{QE3}$	-1.413	-1.991
	(-.16)	(-.16)
N	97	97
R^2	0.627	0.607

Note: T-statistics are reported in parentheses. * indicates that the coefficient is different from zero at the 5 percent level of significance.

I. Economic Activity Model: Correlation Matrix

	SP500	CP	CL	PS	PCE	CFSI	QE1	QE2	TWIST	QE3	$SIZE_{QE1}$	$SIZE_{QE2}$	$SIZE_{TWIST}$	$SIZE_{QE3}$	UNEMP	IP	CS
SP500	1	-0.19171	0.10888	0.01736	0.11138	-0.16277	0.07564	0.0575	0.05168	0.09069	0.13129	-0.01015	0.11592	0.04002	0.15532	-0.03341	0.1766
		0.0599	0.2884	0.866	0.2774	0.1112	0.4615	0.5759	0.6151	0.377	0.1999	0.9214	0.2582	0.6971	0.1287	0.7453	0.0836
CP		1	-0.8751	-0.645	-0.7162	0.09831	-0.00249	-0.16517	-0.36977	-0.29393	0.06092	-0.04548	-0.073	-0.04927	-0.73179	0.13477	0.15873
			<.0001	<.0001	<.0001	0.3381	0.9807	0.1059	0.0002	0.0035	0.5534	0.6582	0.4773	0.6318	<.0001	0.1881	0.1205
CL			1	0.47225	0.84994	-0.23025	-0.37482	0.19001	0.31135	0.44339	-0.17374	0.04916	0.06378	0.06574	0.45198	0.21124	-0.00355
				<.0001	<.0001	0.0233	0.0002	0.0623	0.0019	<.0001	0.0888	0.6325	0.5348	0.5223	<.0001	0.0378	0.9724
PS				1	0.24816	0.32963	0.24371	0.14809	0.50153	-0.13786	0.16713	0.0258	0.17785	-0.03397	0.68573	-0.43413	-0.45916
					0.0142	0.001	0.0161	0.1477	<.0001	0.1781	0.1018	0.802	0.0814	0.7412	<.0001	<.0001	<.0001
PCE					1	-0.35609	-0.4156	-0.00495	0.27014	0.68276	-0.25114	-0.00907	0.06058	0.10447	0.08797	0.55005	0.20058
						0.0003	<.0001	0.9617	0.0075	<.0001	0.0131	0.9297	0.5556	0.3085	0.3915	<.0001	0.0488
CFSI						1	0.31294	-0.15371	0.31838	-0.49528	0.32008	-0.05531	0.04308	-0.13088	0.20376	-0.42516	-0.73137
							0.0018	0.1328	0.0015	<.0001	0.0014	0.5905	0.6752	0.2013	0.0453	<.0001	<.0001
QE1							1	-0.13821	-0.20488	-0.18932	0.53184	-0.03528	-0.04148	-0.03105	0.43219	-0.75617	-0.3891
								0.177	0.0441	0.0633	<.0001	0.7316	0.6866	0.7627	<.0001	<.0001	<.0001
QE2								1	-0.13325	-0.12313	-0.0735	0.25524	-0.02698	-0.0202	0.29371	-0.17581	-0.06152
									0.1932	0.2295	0.4743	0.0116	0.7931	0.8443	0.0035	0.085	0.5494
TWIST									1	-0.18253	-0.10896	-0.03401	0.20247	-0.02994	0.20075	0.05855	-0.05994
										0.0735	0.2881	0.7409	0.0467	0.771	0.0486	0.5689	0.5598
QE3										1	-0.10069	-0.03143	-0.03696	0.16402	-0.21433	0.53311	0.28577
											0.3264	0.7599	0.7193	0.1084	0.035	<.0001	0.0045
$SIZE_{QE1}$											1	-0.01876	-0.02206	-0.01652	0.18928	-0.43895	-0.32156
												0.8553	0.8302	0.8724	0.0633	<.0001	0.0013
$SIZE_{QE2}$												1	-0.00689	-0.00516	0.08237	-0.05905	0.02711
													0.9466	0.96	0.4225	0.5656	0.7921
$SIZE_{TWIST}$													1	-0.00606	0.03218	0.02312	-0.01406
														0.953	0.7543	0.8222	0.8913
$SIZE_{QE3}$														1	-0.02255	0.08158	0.04269
															0.8265	0.427	0.678
UNEMP															1	-0.73834	-0.49006
																<.0001	<.0001
IP																1	0.56649
																	<.0001
CS																	1

J. Economic Activity Model without Controlling for Business Cycles: Multiple Regression Analysis Results

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	SP500	CP	CFSI	PS	PCE	CL
Intercept	-.481	-.007	.424*	4.374*	10242*	920.051*
	(-.67)	(-1.36)	(2.99)	(26.23)	(147.67)	(48.57)
QE1	.953	-.002	.498	1.5348*	-321.414*	-71.498
	(.61)	(-.19)	(1.63)	(4.27)	(-2.15)	(-1.76)
QE2	2.011	.018	-.523	1.606*	309.087	169.038*
	(1.08)	(1.18)	(-1.43)	(3.73)	(1.73)	(3.47)
TWIST	1.274	.009	.905*	2.427*	772.624*	179.809*
	(.91)	(.83)	(3.29)	(7.51)	(5.75)	(4.91)
QE3	1.975	.010	-1.321*	.420	1575.086*	241.354*
	(1.35)	(.89)	(-4.60)	(1.24)	(11.22)	(6.32)
$SIZE_{QE1}$	.019	-.000	.008*	.002	-1.035	.187
	(1.04)	(-1.80)	(2.26)	(.57)	(-.59)	(.39)
$SIZE_{QE2}$	-.020	.000	-.003	-.003	-1.030	.018
	(-.25)	(.22)	(-.21)	(-.16)	(-.13)	(.01)
$SIZE_{TWIST}$	.043	.000	.-.002	.010	.39	.011
	(1.04)	(1.03)	(-.27)	(1.01)	(.10)	(.01)
$SIZE_{QE3}$	.016	-.000	-.008	-.002	-.778	-.154
	(.25)	(-.09)	(-.63)	(-.15)	(-.13)	(-.09)
N	97	97	97	97	97	97
R^2	0.063	0.108	0.434	0.473	0.679	0.475

Note: T-statistics are reported in parentheses. * indicates that the coefficient is different from zero at the 5 percent level of significance.