Quantitative Easing and the Growth in the Federal Reserve's Balance Sheet

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Summary

On November 3, 2010, the Federal Reserve (Fed) announced that it would purchase an additional $600 billion of Treasury securities, an action that has popularly been dubbed quantitative easing or "QE2." This announcement followed purchases since March 2009 of $300 billion of Treasury securities, $175 billion of agency debt, and $1.25 trillion of agency mortgage-backed securities (MBS). (The agency debt and MBS were primarily issued by Fannie Mae and Freddie Mac.) This report defines quantitative easing as actions to further stimulate the economy through growth in the Fed's balance sheet once the federal funds rate has reached the "zero bound."

In its announcement of QE2, the Fed justified its decision by citing the "disappointingly slow" progress to date toward achieving its statutory mandate of maximum employment and stable prices. By contrast, critics believe that unconventional monetary actions such as QE2 could be destabilizing and ultimately result in high inflation.

There are several ways that quantitative easing can affect the economy. It would be expected to reduce yields on the securities being purchased, and this could have a cascading downward effect on private yields that could stimulate investment spending. Like any monetary stimulus, it could put downward pressure on the dollar, which would stimulate exports and U.S. production of import-competing goods. The initial quantitative easing following the 2008 crisis helped restore liquidity to the financial system, although this channel is arguably not as important now that liquidity has generally been restored. Finally, the direct effect of quantitative easing to date has been to increase bank reserves by over $1 trillion. If banks choose to lend these reserves, it would stimulate economic activity and increase the money supply. But lending has fallen in the past year, and there have been only relatively modest increases in the overall money supply.

Nevertheless, the increase in bank reserves could eventually result in large increases in the overall money supply, which could arguably make it difficult for the Fed to meet its statutory mandate to keep inflation low and stable. The Fed has explored different methods of unwinding quantitative easing if inflationary pressures rose, which have been referred to as the "exit strategy." One method would be to directly reverse quantitative easing by selling some or all of the additional securities that the Fed has purchased, which would automatically withdraw reserves from the banking system. A drawback to this approach is that large sales of securities would probably involve selling its mortgage-related securities, and this could be destabilizing to a housing market that is still sluggish. Another method would be to raise the interest rate that the Fed has been paying to banks on reserves since 2008 to a level high enough that it would give banks an incentive to keep the funds parked at the Fed rather than lending them out. This approach is largely untested, however, and the associated expenditure could become large relative to the Fed's overall profits at historically normal levels of interest rates.

Since the Fed remits most of its profits to the Treasury, where these are added to general revenues, both quantitative easing and its unwinding have implications for the federal budget deficit. Since quantitative easing increases the amount of income-earning securities held by the Fed, it would be expected to increase its profits and reduce the federal budget deficit. Indeed, profits increased from $38.8 billion in 2008 to $52.4 billion in 2009. Similarly, unwinding QE would be expected to reduce the Fed's profits. Some critics have argued that the Fed is monetizing the budget deficit through QE2. The Fed is legally prohibited from purchasing federal debt directly from the Treasury, but Fed purchases of Treasury securities on the open market have a similar effect on the budget deficit as if those purchases were made directly.

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On November 3, 2010, the Federal Reserve (Fed) announced that it would purchase an additional $600 billion of Treasury securities, an action that has popularly been dubbed quantitative easing or "QE2."[1] This announcement followed purchases of $300 billion of Treasury securities, $175 billion of agency debt, and $1.25 trillion of agency mortgage-backed securities (MBS) since March 2009.[2] While there may not be a universally accepted definition of quantitative easing, this report defines quantitative easing as actions to further stimulate the economy through growth in the Fed's balance sheet once the federal funds rate has reached the "zero bound." By this definition, quantitative easing has not been tried in the United States before, although it was implemented in Japan from 2001 to 2006.[3]

Congress has given the Fed a statutory mandate to "promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates,"[4] and the Fed has made the case that quantitative easing can help it to fulfill its mandate. In its announcement of QE2, the Fed explained its decision by citing "disappointingly slow" progress toward achieving a reduction in unemployment and stable inflation, which has been falling.[5] By contrast, critics argue that unconventional monetary actions such as QE2 could be destabilizing and ultimately result in high inflation. For example, an open letter from a group of economists to Fed Chairman Ben Bernanke on November 15 stated, "The planned asset purchases risk currency debasement and inflation, and we do not think they will achieve the Fed's objective of promoting employment."[6]

This report discusses the Fed's actions to stimulate the economy through quantitative easing from September 2008 to the announcement of a further round of quantitative easing in November 2010 (popularly referred to as QE2). This report evaluates arguments for and against QE2 in the context of the current economic outlook, the intended and estimated economic effects of quantitative easing, as well as future concerns regarding the "exit strategy" for eventually returning to a more conventional monetary policy. It also addresses concerns about whether the Fed is monetizing the federal debt and what effects QE2 might have on the federal budget deficit.

Overview of Federal Reserve Actions Since 2007

Normally, monetary policy is conducted by setting a target for the federal funds rate, the overnight inter-bank lending rate. To keep the actual federal funds rate (determined by the supply and demand for bank reserves) near the target, the Fed regularly buys and sells Treasury securities. Before 2007, the Fed's balance sheet consisted overwhelmingly of Treasury securities, with a very modest growth in the portfolio over time. While the Fed has always lent to banks at

[1] In this report, actions taken by the Federal Reserve Board, the Federal Open Market Committee, or a Federal Reserve regional bank are all referred to as the Federal Reserve.

[2] For these purposes, agency debt includes the debt securities of Fannie Mae, Freddie Mac, and the Federal Home Loan Banks. Agency MBS includes MBS issued by Fannie Mae, Freddie Mac, and Ginnie Mae.

[3] Since the Civil War, short-term interest rates approached zero only in the Great Depression. For much of the Great Depression, the Fed pursued policies that made the money supply contract. James Clouse et al, "Monetary Policy When the Nominal Short-Term Interest Rate is Zero," *Topics in Macroeconomics*, vol. 3, no. 1, 2003; Allan Meltzer, *A History of the Federal Reserve*, vol. 1 (Chicago: University of Chicago Press, 2003).

[4] Federal Reserve Act, Section 2A, 12 USC 225a.

[5] Federal Open Market Committee, Federal Reserve, "press release," November 3, 2010, http://www.federalreserve.gov/newsevents/press/monetary/20101103a.htm.

[6] The letter can be accessed at http://economics21.org/commentary/e21s-open-letter-ben-bernanke.

its discount window, the amount of loans outstanding has typically been less than $1 billion. It had not lent to non-banks since the 1930s. Beginning in December 2007, the Fed undertook a series of unprecedented policy steps that fundamentally departed from traditional policy.

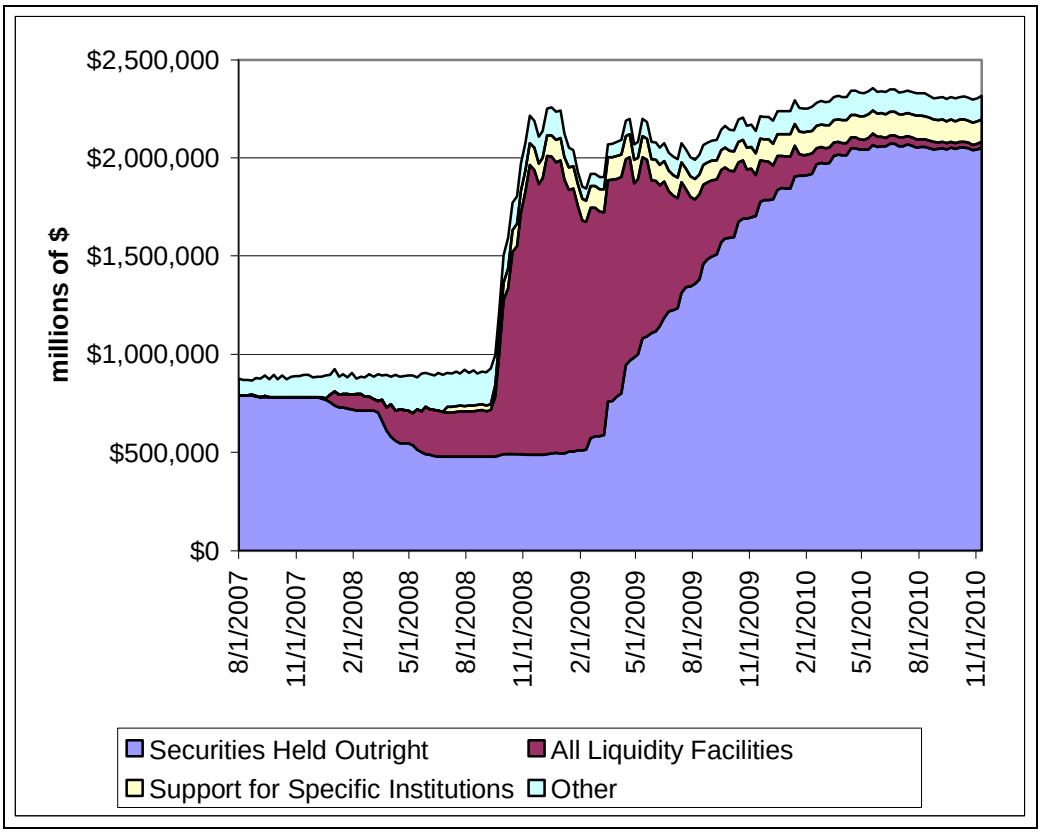
Beginning in 2007, the Fed reduced its target for the federal funds rate in a series of steps to a range of 0% to 0.25% on December 16, 2008. Since the federal funds rate cannot be reduced below zero, the Fed could deliver no additional stimulus through conventional policy. Deeming conventional policy to be insufficient given the state of the economy in September 2008, the Fed turned to quantitative easing even before its federal funds target reached to zero, as will be discussed below.

Phase One: Direct Lending and Initial Balance Sheet Growth

From December 2007 to October 2008, the Fed introduced a series of emergency lending facilities for banks and non-bank financial firms and markets to restore liquidity to the financial system.[7] Lending under these facilities is reported as assets on the Fed's balance sheet. To prevent these facilities from leading to an expansion in the size of the Fed's overall balance sheet and the money supply, the Fed "sterilized" (offset) the effects of the facilities on its balance sheet until September 2008 by selling a cumulative $315 billion of its Treasury securities, as seen in **Figure 1**.

[7] For more information on these facilities, see CRS Report R41073, *Government Interventions in Response to Financial Turmoil*, by (name redacted) and (name redacted).

Figure 1. Assets on the Federal Reserve's Balance Sheet, 2007-2010



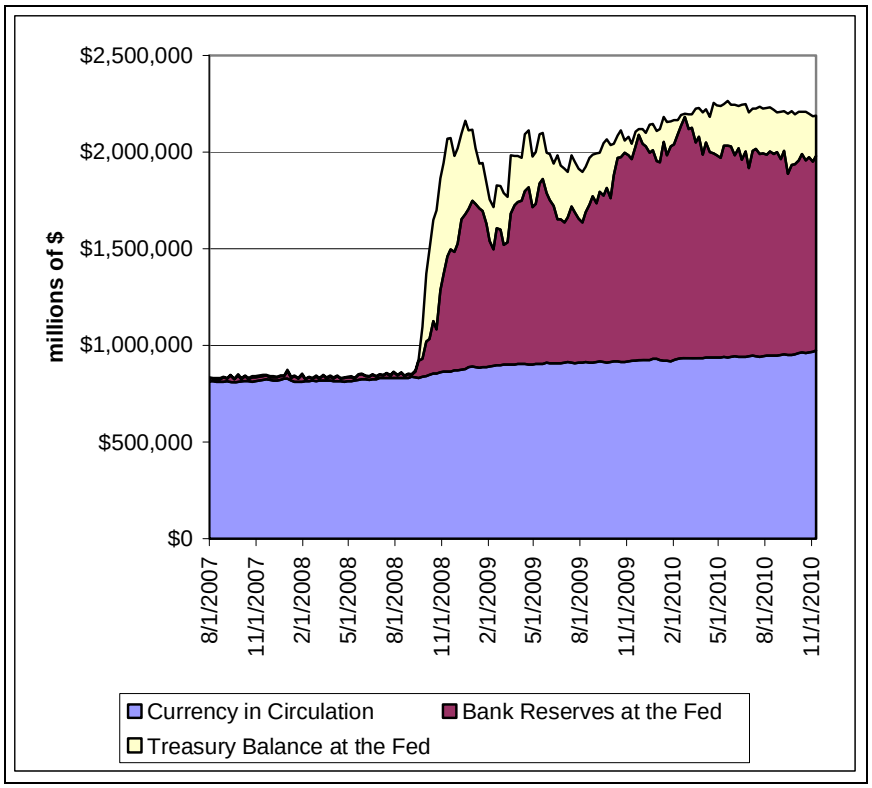
Source: Federal Reserve

When the financial crisis dramatically worsened in September 2008, private liquidity became scarce, causing the Fed's support to the financial system to increase significantly. The increase in support made it impractical for the Fed—if it had desired—to continue sterilizing these loans through asset sales. Instead, the Fed allowed its balance sheet to grow as lending to the financial system increased. Between September and November 2008, the Fed's balance sheet more than doubled in size, increasing from under $1 trillion to over $2 trillion. Over the same period, support offered through liquidity facilities and for specific institutions (including the private security holdings of the Fed's Maiden Lane facilities) increased from about $260 billion to $1.4 trillion.[8]

Since there was no longer any sterilization of its lending, the increase in assets on the Fed's balance sheet was now matched by an increase in its liabilities. The Fed's three main liabilities are Federal Reserve notes, bank reserves held at the Fed, and Treasury deposits held at the Fed—all three items are, in effect, "IOUs" from the Fed to the bearer. As the Fed's assets increased, the primary liability to increase was bank reserves, as seen in **Figure 2**. The sum of outstanding Federal Reserve notes and bank reserves form the "monetary base," or the portion of the money supply controlled by the Fed.

[8] All data on direct lending and support for institutions downloaded from http://www.federalreserve.gov/monetarypolicy/bst_recenttrends.htm. Hereafter, these data will be referred to as "emergency lending."

Figure 2. Selected Liabilities on the Fed's Balance Sheet, 2007-2010



Source: Federal Reserve

The increase in bank reserves can be seen as the inevitable outcome of the increase in assets held by the Fed. These reserves, in effect, finance the Fed's asset purchases and loan programs. In the case of lending facilities, reserves increase because the loan amounts are credited to the recipient's reserve account at the Fed. In the case of asset purchases, the funds to finance the purchase are credited to the seller's reserve account at the Fed, or if the seller is not a member of the Federal Reserve system, the funds eventually lead to an increase in a member bank's reserves as the proceeds get deposited into the banking system.

Phase Two: Large Scale Asset Purchases from Spring 2009 to Spring 2010

By the beginning of 2009, demand for loans from the Fed was falling as financial conditions normalized. Had the Fed done nothing to offset the fall in lending, the balance sheet would have shrunk by a commensurate amount, and the stimulus that it had added to the economy would have been withdrawn. The Fed judged that the economy, which remained in a recession at that point, still needed this stimulus. On March 18, 2009, the Fed announced a commitment to purchase $300 billion of Treasury securities, $200 billion of agency debt (later revised to $175 billion), and $1.25 trillion of agency mortgage-backed securities.[9]

[9] Federal Open Market Committee, Federal Reserve, "press release," March 18, 2009, http://www.federalreserve.gov/newsevents/press/monetary/20090318a.htm. For these purposes, agency debt includes the debt securities of Fannie
(continued...)

Since then, the Fed's direct lending has continued to gradually decline, while the Fed's holdings of Treasury and agency securities have steadily increased, as seen in **Figure 1**. Most emergency lending facilities were allowed to expire in February 2010; by that point emergency lending had fallen to about $200 billion overall, and consisted mostly of the Term Asset-Backed Securities Loan Facility, Maiden Lane holdings, and assistance to the American International Group (AIG). The Fed's planned purchases of Treasury securities were completed by the fall of 2009 and planned agency purchases were completed by the spring of 2010. By this point, the recession had officially ended. The net result of the Fed's actions in phase two was to keep the overall size of the balance sheet relatively constant.

Once the phase two purchases were completed, the Fed faced a decision on what to do about its maturing short-term assets. If the Fed did not replace securities as they matured, its balance sheet would gradually decline at a pace of about $100 billion to $200 billion per year, according to Chairman Bernanke.[10] To prevent that, the Fed announced on August 10, 2010, that it would replace maturing securities (whether they be Treasury, agency, or mortgage-backed securities) with Treasury security purchases.[11]

Phase Three: Quantitative Easing 2 (November 2010)

Dissatisfied with the slow pace of the economic expansion, the Fed announced on November 3, 2010 that it would further increase the size of its balance sheet by purchasing an additional $600 billion of Treasury securities at a pace of about $75 billion per month, and continue the practice of replacing maturing securities with Treasury security purchases. The Fed's announced intention is to purchase securities with maturity lengths primarily between 2 ½ to 10 years.[12]

The Economic Context of QE2

Congress has given the Fed a statutory mandate to pursue stable prices and maximum employment.[13] In the Fed's view, further stimulus is required to meet both goals—unemployment is too high and price inflation is uncomfortably close to zero and falling. In its November 3, 2010, announcement, the Fed gave the following reason for pursuing QE2:

> Currently, the unemployment rate is elevated, and measures of underlying inflation are somewhat low, relative to levels that the Committee judges to be consistent, over the longer run, with its [statutory] dual mandate. Although the Committee anticipates a gradual return to higher levels of resource utilization in a context of price stability, progress toward its objectives has been disappointingly slow.

(...continued)

Mae, Freddie Mac, and the Federal Home Loan Banks. Agency MBS includes MBS issued by Fannie Mae, Freddie Mac, and Ginnie Mae.

[10] Chairman Ben Bernanke, "The Federal Reserve's Balance Sheet: An Update," Speech at the Federal Reserve Board Conference on Key Developments in Monetary Policy, October 8, 2009.

[11] Federal Open Market Committee, Federal Reserve, "press release," August 10, 2010, http://www.federalreserve.gov/newsevents/press/monetary/20100810a.htm.

[12] Federal Reserve Bank of New York, "Statement Regarding Purchases of Treasury Securities," November 3, 2010.

[13] For more information, see CRS Report RL30354, *Monetary Policy and the Federal Reserve: Current Policy and Conditions*, by (name redacted).

> To promote a stronger pace of economic recovery and to help ensure that inflation, over time, is at levels consistent with its mandate, the Committee decided today to expand its holdings of securities.[14]

The National Bureau of Economic Research (NBER) dated the end of the recent recession as June 2009. Beginning in the third quarter of 2009, gross domestic product rose, and it has grown modestly each quarter since then. Unemployment has fallen from a high of 10.1% in October 2009 to 9.8% in November 2010. Since World War II, the only other period when unemployment was above 9.5% was from 1982 to 1983. Most economic forecasters are predicting that the economy will continue to grow at a similar pace through 2011, and that unemployment will continue to top 9% through the end of 2011.[15]

There are two downside risks to the consensus view on the economic outlook that can be considered unlikely but not implausible. There is a fear the economy will experience "double dip" recessions, meaning a return to economic contraction in the near term. By historical standards double dips are rare—in the 20th century, there were two cases where the economy emerged from a recession, only to be quickly followed by another recession (beginning in 1920 and 1981).[16] In 1981, a large tightening of monetary policy is seen as playing a key role in the economy's return to recession, unlike today. The usual pattern is that once the expansion takes root (as the NBER has determined has happened), it continues for some time. For the expansion to be knocked off course and the economy to return to recession, some new "shock" to the economy would likely be needed, such as economic crisis throughout Europe, perhaps following a sovereign default. By their nature, shocks are hard to foresee, but large shocks are relatively infrequent.

Another scenario is that the economy does not re-enter recession, but nor does it experience its usual steady return to full employment and normal growth rates. Instead, it experiences long-term stagnation, sometimes referred to as a deflationary or liquidity trap, where overall spending does not grow quickly enough to reduce significantly the slack in the economy.[17] Evidence in favor of this scenario is the weakness of the expansion to date and the fact that the economy may still be suffering from a debt overhang, where businesses and consumers are "deleveraging" (increasing saving, and in some cases selling assets, to reduce debt).

While the United States has not experienced such stagnation in the post-World War II period, Japan's experience since its equity and real estate bubbles burst in the early 1990s illustrates that this scenario is possible in a modern economy. From 1980 to 1991, GDP growth in Japan averaged 3.8%. Since 1991, GDP growth has never exceeded 2.9% in a year, and from 1992 to 2003, GDP growth was below 2% in all but two years. From a low starting point, Japan's unemployment rate rose each year from 1991 to 2002. From 1995 to 2009, Japan experienced 10 years of deflation (falling prices) and low inflation in the other years, which indicates that Japan's low growth was in part due to inadequate aggregate demand. Although the central bank lowered

[14] Federal Open Market Committee, Federal Reserve, "press release," November 3, 2010.

[15] See, for example, *Blue Chip Economic Indicators*, vol. 35, no. 11, November 11, 2010.

[16] The economy experienced two recessions during the Great Depression. The first ended in 1933 and the second began in 1937. The Great Depression experience is not comparable to current fears of a double dip recession because the two recessions were over four years apart, and output grew very rapidly during the expansion between the two recessions. For more information, see CRS Report R41444, *Double-Dip Recession: Previous Experience and Current Prospect*, by (name redacted).

[17] For more information, see CRS Report R40512, *Deflation: Economic Significance, Current Risk, and Policy Responses*, by (name redacted).

overnight interest rates to low nominal levels and budget deficits were large (5.6% of GDP on average from 1993 to 2009), Japan was not able to break out of its deflationary trap. The Bank of Japan eventually tried quantitative easing in 2001, but on a smaller scale than the Fed (its balance sheet increased by about 70% overall).[18] Further, some economists believe that Japan's deflationary trap was prolonged by sporadic attempts by the government to withdraw fiscal and monetary stimulus prematurely. Balance sheet growth was withdrawn in 2006 when inflation was still below 1% and economic growth was about 2%; prices and output began shrinking again following the 2008 financial crisis. Many economists believe it was prolonged by Japan's failure to address problems in its financial system following its financial crash.

As discussed below, one often-mentioned concern is that QE2 will lead to high inflation. While this is possible, the larger QE1 has not resulted in any increase in inflation in any of the major indices so far. On the contrary, inflation has been below average and falling. For example, in the last 12 months, the consumer price index has risen by 1.2% and the core consumer price index has risen by 0.6%. For most of 2009, the consumer price index fell compared to the previous 12 months, meaning the economy experienced deflation. Inflationary expectations have also remained low so far, despite the attention that QE2 has brought to the issue.

Based on the consensus forecast, QE2 has been justified on the grounds that the pace of the economy's return to full employment is intolerably slow and inflation has persistently been lower than the Fed's "comfort zone."[19] Alternatively, QE2 could be opposed on the grounds that it is not needed because the economic recovery is firmly rooted. In that view, if the only benefit of QE2 is to return to full employment a little quicker, it is better not to risk fueling inflationary pressures or undermining the Fed's credibility, since both would be costly to reverse in the future. Both of the downside risks to the forecast—a double dip recession or a deflationary trap—argue more strongly in favor of pursuing QE2. If these scenarios materialized, there would arguably be little harm in QE2 as announced, and it might be criticized for being insufficient to ward them off. It is unclear whether opponents of QE2 believe that the projected pace of recovery is sufficient, or if they believe that unconventional monetary policy is inappropriate even if economic conditions are still sluggish once the federal funds rate has reached the zero bound.

While both of the downside scenarios are seen as unlikely, there appear to be even fewer forecasters who are predicting that the economy will grow so much more quickly than the consensus forecast that inflationary pressures will become a problem in the short run, or that inflationary expectations will become ungrounded in the short run.[20] Therefore, arguments against QE2 on inflationary grounds are more persuasive in the context of long term rather than imminent problems with inflation. If the stimulus from QE2 could be effectively unwound in time, then these long-run fears need never be realized. Thus, whether or not QE2 poses long-term risks to price stability revolve around whether the Fed has a viable exit strategy. This is discussed below in the section entitled "Exit Strategy."

[18] Murtaza Syed et al., "Lost Decade in Translation: What Japan's Crisis Could Portend About Recovery from the Great Recession," International Monetary Fund, working paper 09/282, December 2009.

[19] Chairman Bernanke defines the informal "comfort zone" as 1% to 2% inflation. See, for example, Ben S. Bernanke, Remarks at a Finance Committee luncheon of the Executives' Club of Chicago, Chicago, Illinois, March 8, 2005.

[20] For example the private firm Blue Chip surveys 50 private sector economic forecasters each month. In its November forecast, the ten most pessimistic forecasters on average projected that GDP would rise by 1.9% and the CPI would rise by 1.1% in 2011. The ten most optimistic forecasters on average projected that GDP would rise by 2.9% and CPI would rise by 2.0%.

Economic Effects of Quantitative Easing

Some forecasters have tried to estimate how much quantitative easing will affect interest rates and economic growth. Former Fed vice chairman Donald Kohn, while acknowledging great uncertainties, estimated that QE1 could increase nominal GDP by as much as $1 trillion over the next several years relative to a baseline forecast.[21] Goldman Sachs estimated that the Fed's previous actions were equivalent to an easing in financial conditions of 1.6 percentage points and predicts that QE2 had an effect equivalent to a 0.8 percentage point easing in financial conditions, which could boost GDP growth by 0.5 percentage points over the next year.[22] Given that this was the estimated effect that occurred between August (when the Fed first began hinting at QE2) and November 4 (when it was officially announced), it remains to be seen whether this estimate will prove accurate and whether the effect will be long lasting. The forecasting firm Macroeconomic Advisors predicts that QE2 – which they believe will be expanded in the future – would raise GDP growth by 0.3 percentage points next year.[23] Given there is no previous experience with quantitative easing in the United States, these estimates are highly speculative. Uncertainty about the effectiveness of quantitative easing makes it difficult to accurately estimate the magnitude of asset purchases needed to achieve the intended stimulus. Furthermore, monetary policy's effect on the economy is gradual, so QE2's full effects will take time and QE1's effects may not yet have completely materialized.

Unless there has been a fundamental change in the economic environment, the effects of QE2 could be expected to be similar to those of QE1, but proportionately smaller. This section discusses four transmission channels through which quantitative easing could affect the economy, and reviews data and research that have attempted to estimate how much QE1 affected the economy.

Liquidity Channel

The initial aim of QE1, the Fed's balance sheet expansion, was to restore liquidity to the financial system, which in late 2008 was highly dysfunctional. Virtually all short-term markets on which financial firms heavily rely on a regular basis were frozen at that time, including interbank lending markets, commercial paper markets, and repurchase agreement ("repo") markets. Most economists believe the Fed's emergency facilities were highly successful in restoring liquidity, although some argue that the system could have healed itself. At this point, financial conditions have normalized enough that further increasing financial market liquidity is arguably not an important goal of QE2.

One view is that emergency lending was necessary to fulfill the Fed's lender of last resort role, but that the Fed's balance sheet should have been allowed to shrink when demand for emergency programs receded, allowing liquidity to be allocated by private markets as soon as it was sufficiently available again. QE1 has left a lasting imprint on the interbank lending market, where

[21] Donald Kohn, "Interactions Between Monetary and Fiscal Policy in the Current Situation," speech at Princeton University, Princeton, NJ, May 23, 2009.

[22] Jan Hatzius and Sven Stehn, "QE2: How Much is Needed?" *U.S. Economics Analyst*, Goldman Sachs, October 22, 2010; Sven Stehn, "QE2 Sets Sail With Favorable Winds," *U.S. Economics Analyst*, Goldman Sachs, November 5, 2010.

[23] Reported in "Down the Slipway," *The Economist*, November 6, 2010, p. 89.

large excess reserve holdings have reduced the demand for private interbank borrowing. If one takes that position, however, there remains the dilemma of what role monetary policy should play if the economy is not returning to full employment when policy interest rates are at the zero bound.

Money Multiplier/Bank Lending Channel

Any increase in the asset side of the Fed's balance sheet is matched by an increase in the liability side of the balance sheet. The initial result of an increase in the Fed's asset holdings, whether they be purchases of securities or direct lending, is an increase in bank reserves. In normal times, banks would be expected to lend out those reserves, and this would stimulate overall spending in the economy. While one cannot directly track what banks have done with these reserves, bank lending has fallen 0.3% over the last year, so overall it appears that banks have been mainly content to hold these reserves at the Fed, short circuiting this channel as an effective stimulus.[24] Banks could choose to maintain these reserves instead of lending them for a number of reasons—to increase their liquidity, to reduce the riskiness of their overall portfolio, because they do not believe the profitable lending opportunities exist, because demand for loans by borrowers has declined, or because they face capital constraints that inhibit their ability to increase lending. For those who believe that quantitative easing is "pushing on a string," the approximately $1 trillion increase in excess bank reserves over the past two years is compelling evidence to make that case.

The bank lending channel, if too successful, would also lead to a rapid increase in the overall money supply through the "money multiplier" effect, which in normal times would lead to a rapid increase in inflationary pressures.[25] The increase in the Fed's balance sheet has been matched virtually one-to-one by an increase in that portion of the money supply which is controlled by the Fed, called the monetary base. Normally, banks would lend out money they received from the Fed, and through a process referred to by economists as the "money multiplier," every $1 increase in the monetary base would lead to a much larger increase in the overall money supply. But if banks hold the money received from the Fed in bank reserves instead of lending it out, the money multiplier process will not occur, so the growth in the overall money supply will be smaller. Data from the Fed show that almost all of the increase in reserves has been through reserves in excess of what regulators require, which is consistent with banks holding most of the increase in reserves instead of lending them out. Thus, the unprecedented doubling of the monetary base in a year beginning in August 2008 has resulted in relatively modest increases in the overall money supply, shown in **Figure 3** as M1 and M2. In fact, the monetary base is now larger than M1, which has never happened in the past 50 years for which data are available, and all measures of inflation are currently extremely low, as was discussed above.[26]

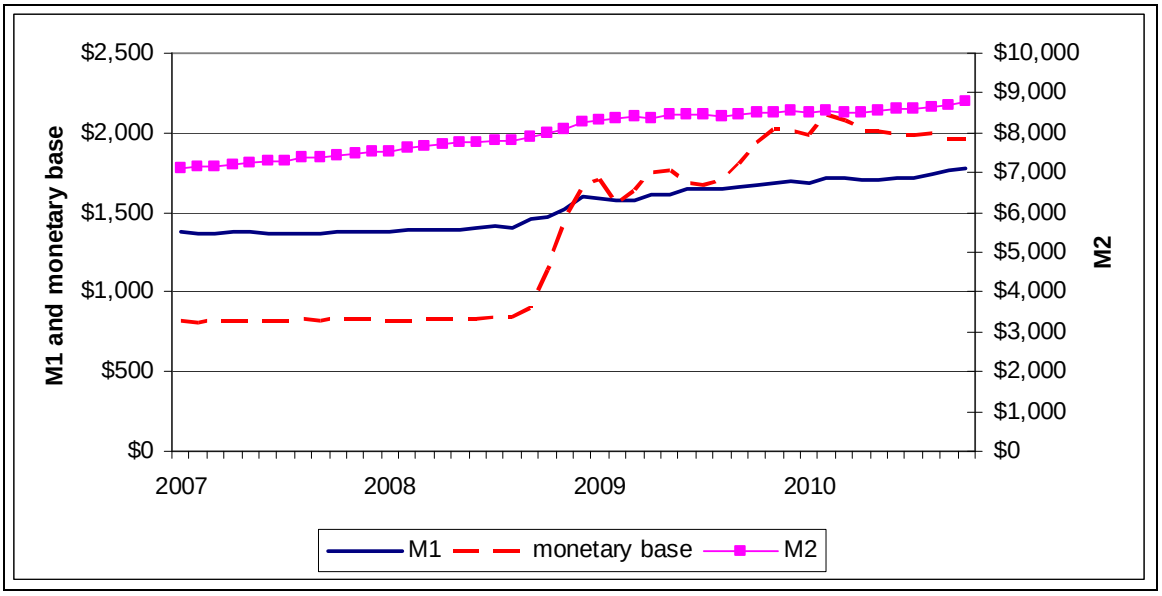
[24] Some commentators have argued that banks will use these reserves to speculate on securities, but banks' securities holdings have risen by less than $200 billion (8%) in the last year. Bank data cover all FDIC-insured institutions and are taken from Federal Deposit Insurance Corporation, *Quarterly Banking Profile*, vol. 4, no. 3, 2010, Table II-A.

[25] Inflation has been low and stable in the last 25 years in part because the Fed has periodically raised interest rates to contain inflationary pressures and has not allowed the money supply to grow rapidly.

[26] Quantitative easing was found to have similar effects on lending and inflation occurred in Japan. See Hiroshi Ugai, "Effects of the Quantitative Easing Policy: A Survey of Empirical Analyses," Bank of Japan, working paper no. 06-E-10, July 2006.

Figure 3. Measures of the Money Supply, 2007-2010

Billions of dollars



Source: Federal Reserve

Based on the experience to date, QE2 can also be expected to lead to an increase in bank reserves similar in size to the amount of assets being purchased. It remains to be seen whether QE2 will have a larger effect on banking lending and broader measures of the money supply than QE1 did.

Asset Yield/Portfolio Rebalancing Channel

Even if the money multiplier channel has become blocked by the growth in excess bank reserves, quantitative easing may still stimulate the economy through other channels. The Fed has stressed the asset yield channel in its explanations of the benefits of quantitative easing.[27] Traditional monetary stimulus is limited to altering short-term rates (the federal funds rate). But long-term investment projects are likely to be financed at longer-term rates. By buying longer-term securities, quantitative easing could lead to a flattening of the yield curve (i.e., pushing down long interest rates relative to short rates). Before the crisis, the Fed held about 50% of its Treasury securities with a remaining maturity date of less than a year and 20% with a maturity date of five years or more. Under QE2, the Fed plans to buy no Treasury securities with a maturity of less than a year and over 50% with a maturity of 5 ½ years or more. A Federal Reserve Bank of San Francisco study estimates that QE1 reduced long-term interest rates by 0.5 to 0.75 percentage points, and cites evidence that long-term rates are more stimulative than equivalent reductions in short-term rates.[28]

The expected direct effect of asset purchases would be to reduce the yields on the assets being purchased. In the case of Treasury securities, lower Treasury yields would have little direct effect on the economy. But if lower Treasury yields cascade through to a broader reduction in interest

[27] See, for example, Chairman Ben Bernanke, "What the Fed Did and Why," *Washington Post*, November 5, 2010.

[28] Glenn Rudebusch, *The Fed's Exit Strategy for Monetary Policy*, Federal Reserve Bank of San Francisco, Economic Letter 2010-18, June 2010.

rates on private securities, this would normally stimulate business investment spending on plant and equipment. How stimulative this "portfolio rebalancing" channel would be depends on how much private yields fall when Treasury yields fall, how sensitive firms are to interest rate changes and, in the present context, how many firms have access to credit markets.[29]

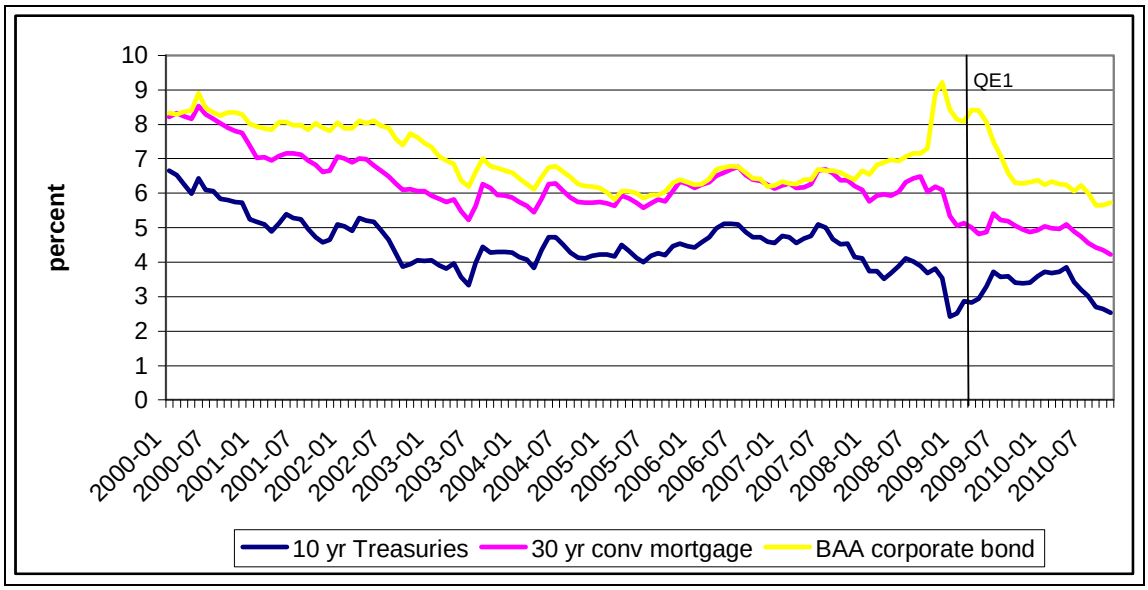
Most research on QE1 found that it had modest but tangible effects on broader interest rates.[30] Its concentration on purchasing mortgage-related assets suggests that it had the largest effects on mortgage rates. As shown in **Figure 4**, a simple comparison of yields before and after QE1 does not show any obvious impact from QE1—yields on Treasury securities and mortgage rates were relatively flat for about a year after QE1 was implemented, with no downward trend for Treasury or mortgage rates beginning until the spring of 2010, after QE1 was completed. Yields on BAA-rated corporate bonds did fall after QE1, but the downward trend predated QE1. Unfortunately, the improvement in economic conditions and normalization of financial conditions was probably pushing Treasury yields up and private yields down at the same time, so more sophisticated methods are needed to attempt to disentangle the effects of QE1. Furthermore, conventional mortgage rates were influenced by the government's decision to take the GSEs into conservatorship in September 2008. Some commentators have attributed the decline in yields since August 2010 to QE2 although it has not started yet, on the grounds that investors began anticipating QE2 by that point (several announcements by Fed officials hinted that the Fed was considering QE2 beginning in August) and have already adjusted expectations to take it into account.[31]

[29] It is also possible that this channel could stimulate the economy through a wealth effect, since lower yields would be expected to raise the value of securities. If this made the holders of these securities feel more wealthy, it could stimulate their consumption spending.

[30] There is little past experience to analyze in the United States, as quantitative easing had never previously been undertaken. In the 1960s, the Fed attempted to flatten the yield curve through sterilized Treasury purchases through a policy referred to as "Operation Twist," that was not financed through quantitative easing. A study by Ben Bernanke (before he was Fed chairman) and other economists concluded that "Operation Twist" is "widely viewed today as having been a failure." Ben Bernanke, Vincent Reinhart, and Brian Sack, "Monetary Policy Alternatives at the Zero Bound," Federal Reserve Board of Governors, *Finance and Economics Discussion Series 2004-48*, 2004, p. 28. A survey of studies on Japan's quantitative easing found the asset yield "effects, if any, were small…" See Hiroshi Ugai, "Effects of the Quantitative Easing Policy: A Survey of Empirical Analyses," Bank of Japan, working paper no. 06-E-10, July 2006, p. 44.

[31] See, for example, Sven Stehn, "QE2: How Much Has Been Priced In?," *U.S. Daily*, newsletter, Goldman Sachs, October 7, 2010.

Figure 4. Selected Yields Before and After QE1, 2000-2010



Source: Federal Reserve

Research by the New York Fed concludes that QE1 was effective in lowering interest rates based on the immediate response of rates to official announcements about the purchases, although this research could be questioned on the grounds that the rate reductions must be long-lasting to be stimulative, and for some of the maturities in question, interest rates over the entire period rose, on balance.[32] Interpreting the overall effect on interest rates during the life of the asset purchase program is complicated by the fact that other changes in economic conditions also influence interest rates. The authors also use time-series evidence to estimate that the purchase program reduced the yield on ten-year securities relative to short-term securities by 0.38 to 0.82 percentage points. A similar study of the Treasury securities purchased in QE1 found that it reduced Treasury yields by about 0.5 percentage points across the yield curve, with larger effects for long-term securities.[33]

Evidence that QE1 pushed down mortgage rates could potentially suffer from omitted variable bias—namely, the change in the risk-premium associated with MBS over the period in question, given the uncertainty prior to the purchase program caused by GSE conservatorship and the financial crisis. Another study found small effects of the Fed's MBS purchases on interest rates

[32] Joseph Gagnon et al., "Large-Scale Asset Purchases by the Federal Reserve: Did They Work?" Federal Reserve Bank of New York, *Staff Reports*, no. 441, March 2010. See also James Hamilton and Jing Wu, "The Effectiveness of Alternative Monetary Policy Tools in a Zero Lower Bound Environment," University of California San Diego, working paper, October 2, 2010. This study estimates that a $400 billion purchase of long-term Treasury securities would reduce Treasury yields by 0.14 percentage points. In their model, whether or not the purchases are financed through quantitative easing does not change the results.

[33] Stefania D'Amico and Thomas King, "Flow and Stock Effects of Large-Scale Treasury Purchases," Federal Reserve Board, *Finance and Economics Discussion Series*, no. 52, September 2010. The authors' results were only statistically significant when they assumed (and controlled for the assumption) that the Fed was purchasing underpriced securities, however.

after adjusting for prepayment and default risk, with the effect mainly occurring at the time the program was announced—before purchases had begun.[34]

Another fear that has been raised is that QE2 will lead to excessive risk taking by driving excess liquidity into riskier pursuits, possibly leading to another asset bubble. Arguably, more risk taking is needed in the economy today, as the financial crisis has left investors extremely risk averse. Given that QE1 seems to have had a relatively modest effects on yields, the risk of QE2 leading to bubbles does not seem acute at this time. Nevertheless, some see the role of monetary policy in last decade's housing bubble as a cautionary tale. Many economists have argued that the Fed left interest rates too low for too long after the last recession because of what turned out to be unfounded fears of deflation and a double dip recession. For example, the recession ended in November 2001, but the federal funds rate was not raised above 2% until the end of 2004. They believe that overly loose monetary policy contributed to the housing bubble by making too much credit available.

The Fed likely favors Treasury securities as the vehicle for quantitative easing because it has a neutral effect on the allocation of capital. (Its purchases of mortgage-related assets in QE1, on the other hand, would be expected to shift the market allocation of capital in favor of housing. One goal of QE1 was to stabilize a fragile housing market.)[35] The drawback of purchasing Treasury securities is that it may have less "bang for the buck" in terms of stimulating overall spending than if the Fed purchased an equivalent amount of private securities or made an equivalent amount of direct loans to private corporations. (Both of these options currently face statutory limitations.) The advantage of purchasing Treasury securities is that it does not put the Fed in the position of "picking winners," which it arguably is not set up to do as well as private financial markets. It could also undermine the Fed's political independence.

Exchange Rate Channel

Another channel through which quantitative easing could affect the economy is through effects on the value of the dollar. While influencing the exchange rate is not a stated goal of QE2, most macroeconomic models would predict, all else equal, that a byproduct of quantitative easing (or any monetary stimulus) would be to reduce the value of the dollar, assuming other countries do not alter their monetary policy in response.[36] Some critics have opposed QE2 on the grounds that it will reduce the value of the dollar, but in conventional models, a weaker dollar would have a stimulative effect on total spending by increasing exports and decreasing imports, all else equal. A decline in the trade deficit could help reduce "global imbalances" that some economists believe are a threat to global economic stability. If QE2 causes political friction that results in trading partners altering exchange rate or trade policies, however, that would also have an effect on the U.S. economy.

In real terms, after a downward trend since 2002, the broad inflation-adjusted dollar index rose from September 2008 until the spring of 2009, despite balance sheet expansion. Most economists attribute this to a "flight to quality" effect, as investors flocked to dollar-denominated assets as a

[34] Johannes Stroebel and John Taylor, "Estimated Impact of the Fed's Mortgage-Backed Securities Purchase Program," National Bureau of Economic Research, working paper 15626, December 2009.

[35] Federal Open Market Committee, Federal Reserve, "press release," March 18, 2009.

[36] Countries that intervene to keep their exchange rate from appreciating against the dollar may be forced to match U.S. monetary expansion in order to maintain their exchange rate goals.

safe haven despite the fact that the crisis was centered in U.S. mortgage markets. The dollar then declined from the announcement of the first large scale asset purchase program to the fall of 2009, and remained relatively stable over the following year. Exchange rate movements are determined by many factors besides monetary policy, including relative growth rates, inflation rates, saving rates, and investment rates. Furthermore, economic models are fairly unsuccessful in predicting exchange rate movements, so the forecasted path of the dollar remains relatively uncertain.

One study estimated that the dollar declined by an average of 3.71% against 5 major currencies following the Fed's March 2009 asset purchase announcement.[37] Including prior statements that foreshadowed the March 2009 announcement, the dollar fell by a cumulative 6.56%. The actual change in the dollar was somewhat smaller than the author's model had predicted. A shortcoming of this type of study is that a big jump in the dollar after the announcement could potentially be dissipated by subsequent market movements, leaving no substantial economic effect over time. Since the dollar continued to depreciate after March 2009, that does not seem to be the case.

Exit Strategy

Once the economic outlook improves, banks may decide to use their reserve holdings to rapidly increase their lending. At that point, if the Fed found itself fighting inflationary pressures, it would have to find a way to prevent banks from lending those reserves to prevent an excessive increase in the money supply.[38] The most straightforward method to achieve this would be for the Fed to withdraw those reserves from the banking system by selling some of its assets or not replacing assets that mature. This would reduce both the assets and liabilities on its balance sheet. Some of the Fed's outstanding assets can be sold relatively quickly in theory, although there could be political resistance in reality. By April 2010, the Fed's balance sheet consisted predominantly of securities that could be sold in secondary markets. But the Fed has pledged to hold these assets long term. Given the Fed's concerns about the fragility of housing markets, it is not clear how its mortgage-related holdings could be reduced quickly if the Fed became concerned about rising inflation. Selling only Treasury securities might not be sufficient, given the size of the balance sheet compared to the amount of Treasury securities the Fed might feel comfortable selling. In 2008, the Fed was only comfortable reducing its holdings of Treasury securities to approximately $480 billion.

Another option would be to give banks incentives not to lend out reserves by raising the interest rate that the Fed pays on reserves, thereby keeping the larger monetary base from increasing the broader money supply.[39] Since there is no domestic and very little international experience with first increasing the monetary base and then tightening policy without reversing the increase in the

[37] Christopher Neely, *The Large-Scale Asset Purchases Had Large International Effects*, Federal Reserve Bank of St. Louis, working paper 2010-018B, October 2010.

[38] The Fed's views on the issues outlined in this section can be read in Ben Bernanke, "The Fed's Exit Strategy," *Wall Street Journal*, July 21, 2009, p. A15. See also Claudio Borio and Piti Disyatat, *Unconventional Monetary Policies: An Appraisal*," Bank for International Settlements, Working Paper 292, November 2009; John Taylor, "An Exit Rule for Monetary Policy," Testimony before the Committee on Financial Services, U.S. House of Representatives, March 25, 2010.

[39] Economist Alan Blinder argues that the interest on reserves can help ensure that an exit strategy of selling assets is not disruptive. Alan Blinder, "Quantitative Easing: Entrance and Exit Strategies," *Federal Reserve Bank of St. Louis Review*, vol. 92, no. 6, November 2010, p. 465.

monetary base, this strategy can be considered untested.[40] To better prevent these reserves from being lent out if necessary, the Fed began offering "term deposits" with a one to six month maturity for bank reserves. The interest rate on these term deposits would be set through auction; banks would presumably be willing to bid for term deposits only if the interest rate exceeded the rate paid by the Fed on normal reserves.

The Fed could also attempt to reduce liquidity by lending its assets out through "reverse repos."[41] This would change the composition of liabilities on the Fed's balance sheet, replacing its other liabilities with reverse repos. It is unlikely that reverse repos operations could be large enough to remove most of the new liquidity, however.[42]

Cash balances held at the Fed through the Treasury Supplemental Financing Program could also be used to tie up excess liquidity if needed. The Treasury announced the Supplementary Financing Program on September 17, 2008, as an alternative method for the Fed to increase its assistance to the financial sector without increasing the amount of money in circulation.[43] Under this program, the Treasury has temporarily auctioned more new securities than it needs to finance government operations and has deposited the proceeds at the Fed. (The operations do not affect inflation because the money received by the Treasury is held at the Fed and not allowed to circulate in the economy.) Since 2009, $200 billion has been kept in this account, except at times when the federal debt has approached the statutory debt limit. Given that the size of this program is constrained by the debt limit, it would be insufficient to significantly reduce liquidity without a large increase in the debt limit.[44]

If the Fed decides to pursue an exit strategy based on raising rates while maintaining a large balance sheet, economic theory casts some doubt on whether it would have any overall effect on the economy. Any stimulative effect of a larger balance sheet on the economy would be offset by the effects of paying interest on reserves, reverse repos, the Treasury Supplemental Program, or issuing Fed bonds. The large balance sheet would have no positive effect on aggregate demand if it is offset by any of these actions that drain liquidity from the economy.

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[40] One paper looks at international experience with paying interest on bank reserves to answer this question. There is very limited experience with raising short-term interest rates while maintaining excess reserve balances, however. Japan in the 1990s is the best-known case of quantitative easing, and it removed excess balances before raising rates. The authors found that Norway had successfully raised rates while maintaining excess reserves from 2005 to 2008, although they did reduce reserves by half during that period. David Bowman, Etienne Gagnon, Mike Leahy, "Interest on Excess Reserves as a Monetary Policy Instrument: The Experience of Foreign Central Banks," Federal Reserve Board, *International Finance Discussion Paper 996*, March 2010. See also Richard Anderson et al., "Doubling Your Monetary Base and Surviving: Some International Experience," *Federal Reserve Bank of St. Louis Review*, vol. 92, no. 6, November 2010, p. 481.

[41] A reverse repo (or reverse repurchase agreement) is a purchase of securities with an agreement to resell them at a higher price at a specific future date. The transaction is equivalent to a loan, with the securities serving as collateral.

[42] The size of reverse repo operations are limited to the amount of securities held by the Fed available to lend and private investors' willingness to borrow them. In recent years, reverse repos outstanding have not exceeded $108 billion. Goldman Sachs reports that Fed officials have indicated that they do not believe private investors could absorb more than $100 billion in reverse repos. Ed McKelvey, "Fed Lays Groundwork to Offset Another Increase in Excess Reserves," *U.S. Daily Newsletter*, September 24, 2009.

[43] The Treasuries issued under the program are indistinguishable to investors from regularly-issued securities.

[44] The Fed and Treasury announced in March 2009 that they would seek "legislative action to provide additional tools the Federal Reserve can use to sterilize the effects of its lending or securities purchases on the supply of bank reserves." Many analysts interpreted this statement to express the desire for the Fed to gain authority to issue its own bonds. To date, legislation to allow the Fed to do so has not been considered, and the idea has not been widely discussed since.

If investors have rational expectations, it is not clear how this strategy could flatten the yield curve either, since the long end of the yield curve is determined primarily by expectations of future interest rates, and sterilized purchases of assets in the present should not change those expectations, all else equal. Previous experience suggests that sterilized attempts to flatten the yield curve have failed to stimulate the economy. For example, a study by Ben Bernanke (before he became Fed Chairman) and other economists concluded that a similar policy in the 1960s called "Operation Twist" is "widely viewed today as having been a failure."[45]

To date, quantitative easing has not had any noticeable effect on the public's inflationary expectations. If inflationary expectations remain low, it would be expected to make an exit strategy, and monetary policy generally, more effective. On the other hand, one criticism of quantitative easing is that it could undermine expectations of low and stable inflation, and the Fed's credibility on inflation. If inflationary expectations rise, larger-scale operations could become necessary for an exit strategy. In a worst case scenario, a rise in inflationary expectations could force the Fed to pursue an exit strategy before the economy has recovered, or risk "stagflation" (stagnant growth with high inflation).

Some Possible Congressional Concerns

Impact on the Federal Budget Deficit

The Fed is a self-financing entity that yields a profit each year. That profit is largely remitted to the Treasury, where it is added to general revenues, thereby reducing the budget deficit.[46] As the Fed has increased the interest-earning assets on its balance sheet, its profits have increased. The Fed had net income of $38.8 billion and remitted $34.9 billion to the Treasury in 2008. Net income increased to $52.4 billion and remittances to the Treasury rose to $47.4 billion in 2009. A further $600 billion increase in Treasury security holdings would be expected to increase the Fed's profits further.

The Fed's profits are generated by the positive spread between its interest-earning assets (securities and loans) and its liabilities. Federal reserve notes are interest-free liabilities, and until 2008, bank reserves were also interest-free liabilities. Congress authorized the Fed to pay interest on bank reserves in the Emergency Economic Stabilization Act of 2008 (P.L. 110-343).[47] Since the Fed began paying interest on reserves in mid-October 2008, it has set the interest rate near the federal funds rate target, and has paid 0.25% on reserves since December 2008. Through the first half of 2010, the Fed has paid $4.4 billion in interest over the life of the program, reducing the Fed's net income by an equal amount. While the cost of paying interest on reserves is relatively low when interest rates are near zero, were the federal funds rate to return to a more normal level and reserves remained large—a scenario outlined in the section on "Exit Strategy"—it could significantly reduce the Fed's remittances to Treasury.[48]

[45] Ben Bernanke, Vincent Reinhart, and Brian Sack, "Monetary Policy Alternatives at the Zero Bound," Federal Reserve Board of Governors, *Finance and Economics Discussion Series 2004-48*, 2004, p. 28.

[46] Other profits are paid out to stockholders and added to the Fed's surplus as a buffer against potential losses.

[47] This authority was originally allowed beginning in 2011 in the Financial Services Regulatory Relief Act of 2006 (P.L. 109-351). The Emergency Economic Stabilization Act of 2008 granted immediate authority.

[48] For example, if reserves held at the Fed equaled $1 trillion and the rate paid on reserves was set at 5%, the Fed would (continued...)

The Treasury Supplemental Financing Program also has implications for the federal budget deficit. The Supplemental Financing Program requires Treasury to issue more interest-bearing securities, thereby increasing the government's debt service costs. Higher debt service costs are ultimately canceled out by higher profits on the Fed's larger holdings of Treasury securities, leaving the deficit no larger than if the Supplemental Financing Program were reduced to zero and the Fed reduced its assets by an equivalent amount. Nevertheless, the Supplemental Financing Program leaves the deficit larger than if the Fed's Treasury purchases were backed by higher bank reserves, as long as the interest paid on reserves is lower than Treasury yields.

Fears that the emergency activities of the Fed would lead to losses have proved to be unfounded. To date, the Fed has not realized any losses and relatively few risky assets (namely, the TALF loans and the Maiden Lane assets) remain on the balance sheet. While the Fed's exposure to Agency debt and Agency MBS remain high, these assets have no credit risk as long as the federal government stands behind the GSEs. Nonetheless, the Fed faces interest rate risk and prepayment risk on the assets. Losses on these assets could be realized in a scenario where interest rates rose and the Fed were forced to sell them. But if the Fed holds them to maturity, no losses should ever be realized.

Is the Fed Monetizing the Federal Deficit?

Some commentators have interpreted the Fed's decision to make large scale purchases of Treasury securities as a signal that the Fed intends to "monetize the federal deficit," which in 2009 reached its highest share of GDP since World War II, and remained at similar levels in 2010. Monetizing the deficit occurs when the budget deficit is financed by money creation rather than by selling bonds to private investors. Hyperinflation in foreign countries has consistently resulted from governments' decisions to monetize large deficits.

According to this definition, the deficit has not been monetized. Section 14 of the Federal Reserve Act legally forbids the Fed from buying newly issued securities directly from the Treasury, and all Treasury securities purchased by the Fed to date have been purchased on the secondary market, from private investors.[49] In modern times, the Fed has always held Treasury securities in order to conduct normal open market operations. Moreover, the size of the Fed's planned purchases of Treasury securities is small relative to the overall deficit. From fiscal years 2009 to 2011, the federal government is projected to run budget deficits equal to a cumulative $3.8 trillion, and the Fed has already purchased or is planning to purchase $600 billion of Treasury securities (plus a small amount to replace maturing MBS and GSE debt.)

Nonetheless, the effect of the Fed's purchase of Treasury securities on the federal budget is similar to monetization whether the Fed buys the securities on the secondary market or directly from Treasury. When the Fed holds Treasury securities, Treasury must pay interest to the Fed, just as it would pay interest to a private investor. These interest payments, after expenses, become profits to the Fed. The Fed, in turn, remits about 95% of its profits to the Treasury, where they are

(...continued)

pay $50 billion of interest on reserves over a year.

[49] Until 1978, the Treasury had limited authority to "draw" from the Fed to finance its deficits, and used that authority sparingly. U.S. Congress, House Committee on Banking, Finance, and Urban Affairs, Domestic Monetary Policy, *Extending the Treasury-Federal Reserve Draw Authority*, committee print, 95th Cong., 2nd sess., April 5, 1978, 26-179 (Washington: GPO, 1978).

added to general revenues.[50] In essence, the Fed has made an interest-free loan to the Treasury, because almost all of the interest paid by Treasury to the Fed is subsequently sent back to Treasury.

The Fed could increase its profits and remittances to Treasury by printing more money to purchase more Treasury bonds (or any other asset). The Fed's profits are the incidental side effect of its open market operations in pursuit of its statutory mandate (to keep prices stable and unemployment low). If the Fed chose instead to buy assets with a goal of increasing its profits and remittances, it would be unlikely to meet its statutory mandate. The key practical difference between experiences that have been characterized as monetizing the deficit and the Fed's actions is that under the former, the goal of monetary policy becomes the financing of the government's budget deficit.

Conclusion

By December 2008, the Fed had reduced the federal funds rate to zero, thereby exhausting its ability to stimulate the economy through conventional policy. The Fed could have stopped there, but instead took a series of creative and aggressive unconventional policy actions to stimulate an economy that, following the financial crisis, experienced the deepest and longest recession since the Great Depression. QE2 took place in a somewhat different context—the recession had ended, and liquidity in key financial markets had been restored, but employment growth was still sluggish and inflation was close to zero.

QE2 can be thought of as QE1 on a smaller scale. Thus, assuming the economic context has not changed fundamentally, arguably the best way to predict the effects of QE2 is to look at the effects of QE1, and adjust them proportionately downward. The direct effect of QE1 was to increase excess bank reserves from almost zero to over $1 trillion, which, in essence, is how the Fed's loans and asset purchases were financed. In normal conditions, banks would be expected to lend out these reserves relatively quickly, which would boost economic growth and result in a rapid increase in the money supply through a money multiplier effect, that would increase inflation. Instead, bank lending fell 0.3% over the past year, and the doubling in the portion of the money supply controlled by the Fed (roughly equivalent to the growth in the Fed's balance sheet), did not translate into large increases in overall measures of the money supply. Some would point to the $1 trillion in bank reserves as evidence that quantitative easing is "pushing on a string."

Even if this bank lending channel does not work, the Fed has stressed that quantitative easing can still stimulate the economy through an interest rate channel. Purchasing Treasury securities of longer maturities should reduce long-term Treasury yields. But to stimulate the broader economy, two additional steps are necessary. First, it is necessary for the decline in interest rates to spread to private assets that were not purchased. Second, businesses and consumers must be willing and able to respond to lower interest rates by increase their interest-sensitive investment and consumption spending, respectively. Although interest rates did not fall after QE1 in absolute terms, most research indicates it resulted in a modest decrease in interest rates, relative to if the Fed had not purchased these assets, that modestly increased economic growth relative to what would have occurred in the absence of QE1.

[50] The net addition to general revenues is reduced by the extra interest the Treasury must pay on debt it issued in order to deposit cash at the Fed.

Some critics have complained that QE2 will lead to a weaker dollar. Most macroeconomic models would predict that QE2 would lead to a weaker dollar, and this would stimulate the overall economy by stimulating net exports, assuming other central banks do not take steps that depreciate their currencies at the same time.

Though there is a consensus that the benefits of QE1 outweighed the risks, the Fed's decision to increase its balance sheet further through QE2 is less clear cut. The recession has officially ended, and the consensus forecast is that the economy will continue to grow in the next year. A case could be made that QE2 is not necessary because the economy is already on the road back to full employment, so the benefits of trying to get there a little faster do not outweigh the risks. On the other hand, although it is growing, the economy is expected to grow relatively slowly, and unemployment is expected to remain above 9% through the end of next year. Inflation is still close to zero, and has been falling. If this forecast is accurate, a case can be made that QE2 would be expected to help the Fed meet its dual mandate.

Furthermore, there are downside risks to the economy, which can be considered improbable, but not implausible. The economy could experience a "double dip" into another recession. Alternatively, it could keep growing, but not quickly enough to return to full employment or keep prices from falling. In other words, it could fall into a "deflationary trap" of the type experienced by Japan after its asset bubble collapsed, where unemployment rose for 11 consecutive years and prices fell in 10 out of 14 years. The lesson from Japan seems to be that conventional fiscal and monetary stimulus that would be considered fairly aggressive in normal conditions are not enough to overcome a deflationary trap, particularly if withdrawn prematurely. Japan even tried quantitative easing on a smaller scale than QE1 from 2001 to 2006, and was unable to generate more than modest economic growth and inflation. QE2 could be seen as insurance against a double dip recession or deflationary trap, and if the economy were to experience either, the worst that might be said about it is that its effects would be too small to make a difference.

While those predicting a double dip and deflationary trap are in the minority, there are arguably even fewer economists who are predicting that the economy will grow so rapidly next year that high inflation will become a problem. Nevertheless, a lesson that could be taken from the last recession is it can be dangerous to leave monetary policy too loose for too long. There is a risk that QE2 will eventually lead to excessive inflation because it leads to an increase in bank reserves. Eventually, banks may decide to use those reserves to rapidly increase lending, in which case the growth in the monetary base would translate into a large increase in the overall money supply.

The Fed has acknowledged this risk and has devoted considerable efforts to developing an "exit strategy" from quantitative easing when appropriate. But will the exit strategy work? The most straightforward exit strategy would be for the Fed to sell its assets, thereby automatically reversing the growth in its balance sheet and the money supply. The Fed seems somewhat reluctant to pursue this strategy as long as the housing market remains fragile because it would likely involve the sale of its mortgage-related assets. Its other main proposal is to give banks an incentive to keep those reserves sitting at the Fed by raising the interest it pays on reserves, a power that Congress granted the Fed in 2008. This approach is largely untested in the United States or abroad, so its potential effectiveness is unproven. At current reserve levels, it would involve considerable expenditure if interest rates returned to levels closer to their long-term averages, and that expense would ultimately be borne by the taxpayer, since it would reduce the Fed's profits, which are mostly remitted to the Treasury.

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