

Quantitative Easing: A Postmortem

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Abstract

From summer 2007 onward, the United States' economy went through a monetary panic, financial crisis, and a severe economic downturn – a 'Great Recession' – followed by a sluggish recovery. The biggest credit for averting another Great Depression is typically given to the unconventional monetary policy of the Federal Reserve (Fed) initiated under Ben Bernanke. The Fed's interventions unfolded over two periods which can be distinguished with regards to the particular tools employed and goals pursued. Lowering risk and liquidity premiums by propping up the prices of private assets was deemed essential for restoring the flow of credit and the orderly function of financial markets during the first period and in the early months of the second period. Reducing interest-rate spreads through the so-called flattening of the yield curve for the purpose of lowering borrowing costs and boosting total spending in the economy became a major goal of monetary policy during the second period. The purpose of monetary policy changed over time but the targeted channels of its effects remained largely unaltered. While conventional monetary policy targets interest rates, unconventional monetary policy targeted asset prices. Starting with an overview of the two periods in the conduct of monetary policy, which correspond to the two phases of the crisis and its aftermath, this paper explores the theoretical justifications and practical implications of unconventional monetary policy. It further interrogates the effects of the Fed's policies on government bond yields and asset prices as well as their macroeconomic and distributional effects. A key argument is that the effects of quantitative easing have been most acutely felt not in a revival of domestic investment and employment but in the staggering distortions in asset prices domestically and globally. The macroeconomic effects of unconventional monetary policy pale in comparison with its distributional effects.

Keywords: Federal Reserve, Unconventional Monetary Policy, Quantitative Easing

1. Introduction

From summer 2007 onward, the United States' (US) economy went through a monetary panic, financial crisis, and a severe economic downturn – a 'Great Recession' – followed by a sluggish recovery. The biggest credit for averting another Great Depression is typically given to the unconventional monetary policy of the Federal Reserve (Fed) initiated under Ben Bernanke. The Fed's interventions unfolded over two periods which can be distinguished with regards to the particular tools employed and goals pursued. During the first period, from summer 2007 to early September 2008, the overarching purpose of monetary policy was to prevent the collapse of financial intermediation and alleviate the credit crunch. Importantly, the restoration of functionality of the impaired credit markets was not pursued through the traditional channels for provision of liquidity via open market operations and discount lending, but through the targeted allocation of credit to particular segments of the financial market via special lending facilities and arrangements. During that first period, monetary policy was conducted predominantly through changes in the composition of the Fed's assets without eliciting any significant changes in the size of its balance sheet. During the second period of unconventional action beginning around mid-September 2008, monetary policy was conducted not only through the continued shift in the composition of the Fed's assets towards riskier and less liquid assets but through a huge expansion of the size of its balance sheet, which increased manifold from \$909 billion at the end of August 2008 to \$4,486.7 billion by 29 October 2014 following three consecutive rounds of quantitative easing, also known as large-scale asset purchases (LSAPs). In the course of that period, the key purpose of monetary policy changed from restoring the functionality of financial markets to stimulating aggregate demand via direct purchases of private and government securities.

While the purpose of monetary policy changed over time, the targeted channels of its effects

remained largely unaltered. In general, unconventional monetary actions aimed at boosting asset prices and suppressing long-term government bond yields, thereby reducing the risk and liquidity premiums (i.e. the premiums paid on private debt instruments for being riskier and/or less liquid than government securities), on the one hand, and the term premium (i.e. the difference between short-term and long-term government bond yields), on the other. The differences with regard to the conduct of unconventional monetary policy over the two periods concerned the immediate policy priorities as well as the variety and variable intensity of the means employed towards the achievement of the ultimate purpose. Lowering risk and liquidity premiums (i.e. reducing credit spreads) by boosting the prices of private assets was deemed essential for restoring the flow of credit and the orderly function of financial markets during the first period and in the early months of the second period. Reducing interest-rate spreads through the so-called flattening of the yield curve for the purpose of lowering borrowing costs and boosting total spending in the economy became a major goal of monetary policy during the second period. That goal was pursued through the combination of forward guidance on the future path of the short-term interest rate and large-scale purchases of longer-term Treasury securities aimed at reducing the term premium.

In terms of design, impact, and implications, unconventional monetary policy represented a radical departure from the conventional tools and targets of monetary policy and the traditional role of the central bank. From the early stages of the crisis, the Fed ventured into the allocation of credit, thereby abandoning a fundamental aspect of its traditional role, which had been confined to the general provision of liquidity while leaving credit allocation to the private market. The attempt at propping up asset prices by swapping some of the Fed's holdings of government securities for riskier and less liquid private assets was another early example of a nontraditional monetary intervention. The direct purchases of private assets represented a further departure from the Fed's traditional role. While both conventional and unconventional monetary policy endeavor to stimulate

aggregate demand, their targets and transmission channels are quite different. Conventional expansionary monetary policy targets interest rates in the hope of stimulating aggregate demand via the interest-rate channel. US-style quantitative easing targeted asset prices, purportedly aiming to achieve the same purpose in a different way. Higher asset prices were meant to lower asset yields and borrowing costs which was, in turn, equated with stimulating economic growth. Undoubtedly, the Fed's quantitative easing has had significant effects on asset prices, yields, and markets, domestically and globally. But the present state of the US economy and the general weakness of aggregate demand provide little support for the workings of direct asset purchases and the interest-rate channel as conventionally contemplated. As this paper argues, the macroeconomic effects of unconventional monetary policy pale in comparison with its distributional effects.

The paper is structured as follows. Part Two examines the two distinct periods in the conduct of monetary policy from summer 2007 onward which correspond to the two phases of the financial crisis and its aftermath. Part Three explores the theoretical justifications and practical implications of unconventional monetary policy. Part Four critically interrogates the effects of quantitative easing on government bond yields and asset prices as well as its macroeconomic and distributional effects.

2. The Two Periods of Unconventional Monetary Policy

Monetary policy affects the quantity and price of funds available in the financial system by changing the quantity and composition of the assets and liabilities on the central bank's balance sheet. On the one hand, the Fed can change the size of its balance sheet. For example, it can acquire additional assets, such as government or private securities, by creating additional liabilities in the form of bank reserves, which lowers the short-term interest rate. Thus, by changing the quantity of reserves in the banking system, the Fed can manipulate the short-term nominal interest rate. On the other hand, the

Fed can change the composition of its assets without altering the quantity of its liabilities. For example, it can substitute loans to financial institutions or privately issued securities for some of its holdings of government securities. Such changes would not affect the short-term nominal interest rate but may alter the relative supply, prices, and yields of different categories of assets in the marketplace.

Conventional (neoclassical) monetary theory and policy have been traditionally focused on the liability side of the central bank's balance sheet and preoccupied with the two forms of liabilities issued by the central bank – currency and reserves, the so-called 'high-powered money' or the monetary base. It is assumed that an increase in the monetary base leads to a proportional expansion of the money supply, the magnitude of which is determined by the so-called money multiplier¹. In this context, prior to the 2007-2009 crisis, the conduct of monetary policy was construed largely in terms of the manipulation of the short-term nominal interest rates including the choice of a policy target for the federal funds rate and the direct setting of the discount rate by the Fed. By contrast, during the recent crisis, monetary policy underwent a dramatic change with regard to its design and conduct as the manipulation of the composition and size of the central bank's assets emerged as the primary instrument of monetary policy in the conditions of an effective zero lower bound of the nominal short-term interest rates, which was reached on 16 December 2008 when the federal funds rate target was lowered to a range between 0 and 0.25 percent.

2.1. The Two Phases of the Crisis: Stage One

The financial crisis of 2007-2009 unfolded in two distinct phases characterized by vastly different monetary policy with regards to the particular tools employed and goals pursued. The first period,

¹ The multiplier equals $(1 + C/D)/(R/D + C/D)$, where C/D is the ratio of currency to demand deposits and R/D is the ratio of bank reserves to deposits. The multiplier is defined as the money supply (M2) divided by the monetary base, which is the sum of bank reserves and currency held by banks and the public.

from August 2007 to early September 2008, was marked by financial and credit market disturbances triggered as a result of losses in one relatively small segment of the US financial system – subprime residential mortgages. As early as February 2007, several large mortgage lenders started to report default-related losses. On 2 April 2007, New Century Financial, one of the leading subprime mortgage lenders, declared bankruptcy. In addition to its dubious accounting practices, New Century was highly leveraged, relying on about \$2 billion in equity to control more than \$25 billion in assets. The troubled tale of New Century was indicative of the industry-wide problems that plagued subprime mortgage lenders at the time. In June 2007, Moody's began to downgrade its ratings on asset-backed securities (ABSs) containing subprime mortgages.

The first significant disruption to the interbank markets is typically dated as of 9 August 2007, when the decision of the large French bank BNP Paribas to temporarily halt redemptions from three of its money market funds, due to problems with the valuation of assets backed by US subprime mortgage securities, triggered a hoarding of cash and cessation of interbank lending, which imposed severe liquidity constraints on many financial institutions. What developed as a result was a series of bank runs affecting the so-called 'shadow banking system' consisting of scarcely regulated financial institutions including investment banks, money market funds, securitization vehicles, asset-backed commercial paper conduits, etc. These institutions were highly dependent on short-term funding, most of which came either from abroad or from large institutional investors. Similarly to commercial banks, which have deposits that are short-term liabilities and assets that are long-term loans, the financial institutions in the shadow banking system borrow short-term and invest long-term. In particular, they finance long-term (illiquid) investments, such as mortgage-backed securities (MBSs), through short-term, typically overnight, borrowing, such as repurchase agreements (repos), which could be collateralized with almost any marketable financial instrument including securitized debt. This type of borrowing is characterized by the use of the so-called 'haircut', which is the

requirement that borrowers post collateral that is valued at more than the loan. Rising haircuts meant that the same amount of collateral could support less and less borrowing, forcing financial institutions to deleverage by selling off assets in order to meet outstanding payment obligations. At the height of credit market distress following the collapse of Lehman Brothers, haircuts rose to levels as high as 45 percent of the value of the collateral.

The heightened perceptions of counterparty risk due to the inability to value complex financial instruments were manifested in rising credit spreads. The so-called ‘TED spread’, which is the difference between the three-month London Interbank Offered Rate (Libor) on unsecured eurodollar deposits and the interest rate on three-month US Treasury bills, spiked from an average of about 40 basis points before 7 August 2007 to 242 basis points by 20 August 2007 (**Figure 1**). Similarly, the so-called ‘agency spread’, which is the difference between US government agency securities issued by the government-sponsored enterprises (such as Fannie Mae and Freddie Mac), and US Treasury securities of equivalent maturity, increased from its typical range of 15 to 25 basis points to more than 40 basis points in August 2007 and to more than 90 basis points in March 2008. Rising credit spreads significantly affected the operation of money and securities markets across the board (Cecchetti, 2009; Gorton & Metrick, 2012).

2.2. The Federal Reserve’s Interventions during Stage One

The Fed responded to the deterioration of credit market conditions with a mixture of conventional and unconventional steps (a selective overview of some of the unconventional measures from August 2007 onward is presented in **Table 1**). In August 2007, the Fed reduced the difference between the federal funds rate and the discount rate from 100 to 50 basis points (a further cut to 25 basis points was undertaken in March 2008) and extended the term of discount window lending by allowing banks to borrow for as long as 30 and later even 90 days. On 18 September 2007, the Fed

lowered its target for the federal funds rate from 5.25 to 4.75 percent. Yet, the overall effect of these measures on interbank lending was disappointing. Between 22 August and 12 December 2007, discount lending to banks roughly doubled from \$2.26 billion to \$4.55 billion, which seemed highly insufficient to ease the strain in the interbank funding markets.

To eliminate the stigma traditionally associated with discount window borrowing, in December 2007, the Fed created the Term Auction Facility (TAF) which enabled commercial banks to bid for funding for periods of up to 28 and 35 days. In August 2008, this term was extended to 84 days. Banks had to state what interest rate they were willing to pay for what quantity of funds. The minimum bid rate was determined by the expected federal funds rate at the time of the auction. The initial auction amounts of \$20 billion (on 17 December 2007) and \$30 billion (on 20 December 2007) were later increased to \$50 and even \$75 billion per auction. The TAF became immediately popular with banks and remained so for quite a while. By 4 March 2009, term auction credit exceeded \$493 billion. Simultaneously with TAF, the Fed announced the establishment of reciprocal currency arrangements (swap lines) with the European Central Bank (ECB) and the Swiss National Bank (SNB). The size of the transatlantic swap lines was increased several times beginning in March 2008. On 13 October 2008, the Fed introduced virtually unlimited swap lines with the ECB, SNB, and the Bank of England (BoE) pledging to provide US dollar funding ‘in quantities sufficient to meet demand’.

The Fed also became actively involved in the effort to prevent the disorderly collapse of systemically important financial institutions epitomized in the bailout of the investment bank Bear Stearns. In the early months of 2008, Bear Stearns, one of the largest and most leveraged investment banks, became seriously affected by the ongoing run on the repo markets. At the end of February 2008, Bear Stearns relied on roughly \$12 billion in capital to support close to \$400 billion in assets. The firm also had \$14.2 trillion of notional value in derivative contracts futures, options, and swaps

outstanding with thousands of counterparties. Bear Stearns was in desperate need of emergency funding but as an investment bank (and a primary dealer), it did not have access to the discount window. Concerns about the likely disastrous consequences of an impending Bear bankruptcy on the already severely strained financial markets led the Fed to invoke – for the first time since the 1930s – Article 13(3) of the Federal Reserve Act, which gives the Board of Governors the power to authorize Federal Reserve banks to make loans to any individual, partnership, or corporation provided that the borrower is unable to obtain credit from a banking institution. On 14 March 2008, the Federal Reserve Bank of New York (FRBNY) made a direct loan of approximately \$12.9 billion to Bear Stearns which was subsequently repaid on 17 March. In the meantime, the Fed brokered a deal in which JPMorgan Chase purchased Bear Stearns on the following terms. The FRBNY made a \$29 billion non-recourse 10-year loan at the discount rate to a newly formed limited liability company, Maiden Lane LLC, created to hold \$30 billion worth of MBSs previously owned by Bear Stearns. JPMorgan Chase put in \$1 billion and assumed the first loss. Any further losses were to be borne by the FRBNY or rather by the US Treasury as they were to be treated as an expense that would reduce the net earnings transferred by the FRBNY to the Treasury general fund. Because of this implicit subsidy, it seems logical to qualify the Bear rescue as a fiscal, rather than a monetary, operation with the Fed effectively acting as the fiscal agent for the US Treasury (Cecchetti, 2009).

Under the shadow of Bear Stearns' collapse, the Fed invoked Article 13(3) for a second time in a matter of days to establish the Primary Dealers Credit Facility (PDCF) on 16 March 2008. The purpose of this facility was to provide discount loans to investment banks under a broad range of collateral including investment-grade corporate securities, municipal bonds, MBSs, and ABSs for which a price was available. A few days earlier, on 11 March 2008, the Fed had created the Term Security Lending Facility (TSLF) which allowed dealers to temporarily swap riskier assets, ranging from federal agency debt and residential MBSs to non-agency AAA/Aaa-rated private-label

residential MBSs, for US government securities thereby providing them with high-quality collateral for borrowing in the repo market.

The above-described four programs introduced between December 2007 and March 2008 – the TAF, the central bank liquidity swaps, the TSLF, and the PDCF – involved the provision of short-term liquidity to financial institutions seemingly in line with the Fed’s traditional role of lender of last resort but with a few crucial modifications: first, the relaxation of the conditions of discount lending for commercial banks including the ability to avoid unwanted publicity by borrowing through the TAF; second, the extension of discount lending privileges to investment firms, and third, the liberalization of the range of the acceptable collateral to include a variety of private-label securities which were largely unmarketable at the time (further broadening of the eligible collateral for the PDCF and TSLF was announced in mid-September 2008 [Table 1]). Most importantly, while the Fed was lending to various parties, it simultaneously reduced its outright securities holdings in equal measure, thereby preventing any significant changes in the size of its balance sheet. A simplified version of the Fed’s balance sheet as of 4 July 2007 is shown in **Table 2**. Between that date and 28 August 2008, there was only an insignificant increase in the quantity of the Fed’s total assets from \$880 billion to \$909 billion (**Table 3**). In early July 2007, the Fed held \$790.6 billion of (government) securities outright. By late August 2008, that amount had fallen to \$479.6 billion. Repurchase agreements had increased from \$30.3 billion to \$111 billion and discount loans from the negligible \$0.19 billion to \$19 billion. Term-action credit outstanding was \$150 billion. In the same period, bank reserves grew by only \$2.6 billion while the total increase in the monetary base was about 2.5 percent and thus well below the historical average. The Fed managed to prevent a rise in the monetary base by sterilizing its lending operations. TAF lending, for example, was offset by draining of reserves mainly by redeeming maturing Treasury bills. Repo operations were another way to offset the lending of the special facilities meaning that the Fed was swapping highly liquid assets –

short-term Treasury bills – for less liquid ones, such as long-term government bonds or private securities. Thus, rather than trying to expand the total money supply, the Fed was redirecting liquidity towards particular segments of the financial market and selected institutions. This approach was radically different from the traditional conduct of monetary policy aimed at the regulation of the supply of credit through the expansion or contraction of bank reserves via open market operations while leaving the allocation of credit to the private market. Why did the Fed take pains to avoid an expansion of the monetary base? There are at least two possible explanations. The first one is related to concerns arising from the acceleration of inflation in 2007 and 2008 – the inflation rate peaked at 5.6 percent in July 2008 before abating later in the year and collapsing to 0.1 percent in December. Another possibility is that the Fed was concerned that massive injections of liquidity in the financial markets could interfere with its ability to control the federal funds rate (Lavoie, 2011; Thornton, 2015).

A string of studies have sung the praises of the Fed's special facilities for having stabilized financial markets during the crisis by reducing credit spreads, interest rates, and interbank risk premiums as well as helping to improve the performance of the US Dollar swap markets (see Mishkin, 2011, 60-1). Thornton (2015, 4) presents a compelling counterargument: "That the Fed's sterilized lending program had little positive effect is evidenced by the fact that the financial crisis intensified."

2.3 The Two Phases of the Crisis: Stage Two

The subprime financial crisis that started in August 2007 became a global financial crisis in September 2008. Several events, in particular, precipitated this development. As the distress in the financial markets intensified due to significant nationwide housing price declines and the weakening economy, Fanny Mae and Freddie Mac had to be put into federal conservatorship on 6 September

2008. The two federal agencies have traditionally been highly leveraged, with book equity consistently less than 4 percent of their total assets. At the time of their federal takeover, Fanny and Freddie held or guaranteed about \$5.2 trillion of residential mortgage debt (Frame *et al.*, 2015). On 15 September 2008, after suffering extensive losses in the subprime market, Lehman Brothers, the fourth-largest investment bank by asset size and among the most leveraged of the major investment banks, filed for bankruptcy after the Fed had tried and failed to find any takers for the ailing firm (Mishkin, 2011). The Lehman bankruptcy precipitated the following-day collapse of the American International Group (AIG) which had written over \$400 billion of credit default swaps effectively acting like a ‘hedge fund... attached to a large and stable insurance company’ in Chairman Bernanke’s words (Stout & Knowlton, 2009). Unable to meet the enormous payments which became due, the one-time insurance giant had to be kept afloat with an emergency credit line provided by the Fed and the US Treasury. The loan was granted on stiff terms including the taking of the firm and its subsidiaries as collateral, the payment of interest on the outstanding balance at a rate of three-month Libor plus 850 basis points, management replacement, and equity participation rights corresponding to 79.9 percent equity interest for the US government along with the right to veto dividend payments. On the very same day of the AIG collapse, there was a run on one of the oldest and, putatively, safest money market funds – the Reserve Primary Fund, which held \$785 million of Lehman paper. Reserve Primary could no longer afford to redeem its shares at the par value of \$1 leading to shareholders pulling out their money and the loss of 90 percent of the fund’s assets. The failure of the Reserve Primary triggered a run on other institutional money market funds whose total assets declined from \$1.36 trillion in September to \$0.97 trillion in October 2008.

Under these dramatic circumstances, on 19 September 2008, the US Treasury Secretary, Hank Paulson, started negotiations that ultimately led to the passing of the Troubled Asset Relief Program (TARP). As per the original proposal, TARP would have given the US Treasury the

authorization to spend \$700 billion purchasing MBSs from troubled financial institutions. After the passing of the bill on 3 October 2008, TARP's purpose changed to directly recapitalizing banking institutions. But TARP was unable to halt the further deterioration in financial markets conditions. The TED spread continued to rise and peaked at 458 basis points on 10 October 2008 abating afterwards (Figure 1). By the end of 2008, the stock market had fallen by over a half from its peak in fall 2007. The economy entered a recession in the third quarter of 2008. Real GDP contracted sharply in the fourth quarter of 2008 and the first quarter of 2009. The unemployment rate rose rapidly and peaked at over 10 percent in October 2008.

2.4. The Federal Reserve's Interventions during Stage Two

After August 2008, the runs on the shadow banking system intensified and worsened. Despite the huge injections of liquidity domestically and globally, banks continued to hoard cash and eschew lending to each other. The Fed attempted to counteract the overall drain of funds from the money and capital markets by establishing further lending facilities aimed at supporting particular segments of the financial sector. These included the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) whose purpose was to extend loans to banking organizations for the purchase of asset-backed commercial paper from money market mutual funds; the Commercial Paper Funding Facility (CPFF) meant to help provide liquidity to term funding markets, and the Money Market Investor Funding Facility (MMIFF) intended to support a private-sector initiative designed to provide liquidity to US money market investors.

The beginning of the first round of quantitative easing (QE1) dates to 25 November 2008 when the Fed announced its intention to purchase \$100 billion of federal agency debt and \$500 billion of private MBSs guaranteed by the GSEs. In March 2009, the Fed announced additional purchases of \$750 billion in MBSs, up to \$100 billion in agency debt and \$300 billion of longer-term

Treasury securities over a period of six months. This policy was designed with the specific purpose of bolstering the prices of housing-relating assets in order to reduce mortgage interest rates and improve credit conditions in the financial markets more generally. QE1 ended in March 2010 to be followed seven months later by QE2 in the course of which the Fed purchased \$600 billion of longer-term Treasuries while continuing to reinvest the payments on securities purchased during the QE1 in longer-term securities. QE3 was announced on 12 September 2012 as an open-ended plan to buy another \$40 billion in MBSs each month until the economy improves. In December 2012, the program was expanded to include \$45 billion in Treasury securities per month. QE3 was phased out between late December 2013 and 29 October 2014 – a period known as ‘taper’. An overview of the composition of the Fed’s balance sheet at the end of each one of the four periods of LSAPs is presented in Table 3. Between late August 2008 and 29 October 2014, the amount of securities held outright increased from \$479.6 billion to \$4.2 trillion. Included in the latter amount are \$2.46 trillion in US Treasury securities, \$39.7 billion in agency debt and \$1.7 trillion in MBSs. These holdings have remained largely unchanged so far.

3. Making Sense of Unconventional Monetary Policy

The ultimate purpose of unconventional monetary policy (understood to include not only the LSAPs but also the numerous lending facilities and special arrangements created from December 2007 onward) was never confined to resolving a liquidity problem in the financial system. That purpose changed over time from restoring the functionality of financial markets to stimulating aggregate demand. However, propping up asset prices, which was essential for reducing risk and liquidity premiums, and thus credit spreads, was always the immediate goal and primary means for the achievement of the ultimate purpose. During the first period of unconventional monetary policy, the Fed attempted to arrest and reverse the collapsing prices of private and agency debt securities by

the targeted allocation of credit and liberalization of collateral (that is, by accepting as collateral ‘toxic’, otherwise unmarketable, assets). During the second period of unconventional monetary policy, in addition to propping up the prices of private assets, the Fed acted to suppress the long-term yields on government bonds. Importantly, these two goals have been pursued not simply through direct asset purchases but through the maintenance of large securities holdings. Because, according to the so-called stock view (also referred to as portfolio balance view) of the effects of securities purchases, ‘what matters primarily for interest rates, stock prices, and so on is not the pace of ongoing purchase, but rather the size of the portfolio that the Federal Reserve holds’ (Bernanke, 2011).

There is a widespread perception that unconventional monetary measures arose as a practical response to unusual and exigent circumstances that could not be tackled with the conventional manipulation of the short-term policy rate via changes in bank reserves through open market operations. It is, however, important to emphasize that the development of the foundational insights underpinning those measures preceded by several years their actual implementation. The key elements of unconventional monetary policy were outlined in the early 2000s in a series of writings, authored or co-authored by Ben Bernanke, on how to cure deflation caused by low aggregate demand. Arguably, deflation under a fiat money system is always reversible through the following three-step approach to monetary accommodation, the key purpose of which is to bring down long-term interest rates by suppressing the yields on government bonds. The first step, known as management of expectations or forward guidance, boils down to providing assurance to the public that the short-term rates will be lower in the future than currently expected. ‘This commitment, if credible, should lower yields throughout the term structure and support other asset prices’ (Bernanke & Reinhart, 2004). If the attempt to ‘talk down’ long-term interest rates proved insufficient, the Fed can shift the composition of its asset holdings from short-term to long-term

government securities, which will change the maturity structure in the marketplace and lower long-term yields by reducing the term premium. The third step would be to increase ‘the size of the central bank's balance sheet beyond the level needed to set the short-term policy rate at zero (“quantitative easing”)’ (Bernanke, Reinhart & Sack, 2004). These three steps far from exhaust the range of possibilities for unconventional monetary policy. If lowering the yields on long-term government bonds proved insufficient to restart spending, the Fed can attempt to influence the prices and yields on privately issued securities either through direct purchases or by

offer[ing] fixed-term loans to banks at low or zero interest, with a wide range of private assets (including, among others, corporate bonds, commercial paper, bank loans, and mortgages) deemed eligible as collateral... Pursued aggressively, such a program could significantly reduce liquidity and term premiums on the assets used as collateral. Reductions in these premiums would lower the cost of capital both to banks and the nonbank private sector, over and above the beneficial effect already conferred by lower interest rates on government securities (Bernanke, 2002).

Most, or arguably all, of the unconventional monetary actions undertaken by the Fed fall under the heading of some of the policy options outlined above. And yet, as the transcripts of the meetings of the Federal Open Market Committee (FOMC) between September 2008 and March 2009 reveal, the precise workings of the unconventional tools and mechanisms were unclear to the extent of causing perplexity and bewilderment even among some of the FOMC members. There was considerable vagueness as to how exactly LSAPs were supposed to stimulate the economy beyond their general presentation as ‘a way to bring down returns on assets and create stimulus even if the policy rate is down to zero’ (Bernanke, Federal Reserve, 2008, 59). In what follows, we look at the commonly contemplated transmission channels of the effects of LSAPs on economic activity.

When the central bank buys an asset, it augments both the asset side of its balance sheet with the value of the asset and the liability side by adding the corresponding amount to commercial banks’ reserves. Therefore, there are two ways to look at the effects of unconventional monetary policy through the respective changes in the central bank’s balance sheet by focusing either on the

asset side (i.e. on the portfolio balance effect, also known as supply effect) or on the liability side (i.e. on the liquidity effect). The theory and practice of unconventional monetary policy initiated under Ben Bernanke have focused on the asset side of the balance sheet and seen the direct purchases of specific categories of assets, such as MBSs or government securities of specific maturity, as the main mechanism through which monetary policy can alter the relative supply of those assets in the marketplace and influence their yields – this is the portfolio balance effect. The resultant surge of liquidity in the form of bank reserves is merely a byproduct of asset purchases on a scale that is impossible to sterilize. The theoretical underpinnings of this type of monetary policy derive from portfolio balance models going back to the work of James Tobin (1965, 1969) and Brunner and Meltzer (1973). In a portfolio balance framework under the assumption of market imperfections, such as segmented markets and preferred habitat, different assets represent imperfect substitutes and changes in their relative supply affect their prices and yields. Thus, the Fed’s large-scale purchases of a particular category of assets must increase the relative price of those assets and lower their yields. As investors attempt to rebalance their portfolios towards higher-yielding assets, the prices of the assets they buy will rise and their yields will decline as well.

The impact of LSAPs on the liability side of the balance sheet, epitomized in the liquidity effect, results from the expansion of bank reserves regardless of what kind of asset purchases have led to that expansion. The logic is as follows. An expansion in the central bank’s liabilities leaves commercial banks with excess reserves, which they seek to trade for higher-yielding assets (in a typical situation banks receive no interest on excess reserves and have, therefore, no incentive to hold them). Consequently, an expansion of excess reserves is likely to increase demand for all sorts of assets including public and private, short-term and long-term assets, thereby putting upward pressure on asset prices more generally. Once the policy rate reaches the zero lower bound, the demand for short-term assets evaporates as they become perfect substitutes for money. In such a

situation, the liquidity effect may result from the demand for long-term assets.

Bernanke has preferred to label his asset-oriented version of unconventional monetary policy ‘credit easing’ in contradistinction to the ‘quantitative easing’ practiced by Japan, which focused on the liability side of the central bank’s balance sheet by specifically targeting bank reserves (i.e. the liquidity effect). While both policies involve an expansion of the central bank's balance sheet,

in a pure QE regime [as practiced in Japan], the focus of policy is the quantity of bank reserves, which are liabilities of the central bank; the composition of loans and securities on the asset side of the central bank's balance sheet is incidental... In contrast, the Federal Reserve's credit easing approach focuses on the mix of loans and securities that it holds and on how this composition of assets affects credit conditions for households and businesses... To stimulate aggregate demand in the current environment, the Federal Reserve must focus its policies on reducing [credit] spreads and improving the functioning of private credit markets more generally.
Bernanke (2009)

In other words, one significant difference between quantitative easing in Japan and quantitative easing in the US, particularly before March 2009, was that the respective policies in the former were focused on reducing the term premium, mainly by buying long-term Japanese government bonds. By contrast, until it started purchasing long-term government securities in March 2009, the Fed’s credit easing policies targeted the risk and liquidity premiums through a variety of unconventional measures aimed at propping up the prices of private assets. Another important difference is that even after March 2009, the purpose of the Fed’s unsterilized LSAPs, similarly to the previous sterilized lending via special facilities, was not to increase liquidity overall or the aggregate supply of credit but to allocate credit to specific segments of the market that were deemed most ‘credit constrained’ (Thornton, 2015). Unlike Japan, where quantitative easing aimed at supplying banks with more reserves for the purpose of encouraging lending, the Fed took pains to ensure that excess reserves were being held rather than lent. The Fed was originally scheduled to begin paying interest on reserves (IOR) in 2011, but in May 2008, Bernanke petitioned Congress for immediate authority. Permission was granted with the TARP act, and the measure was implemented on 1 October 2008. The initial rate was 1.4 percent on required reserves and 1.0 percent on excess reserves. Both rates

were lowered to 0.25 percent along with the federal funds rate in December 2008 and similarly increased to 0.5 percent in December 2015. The ability to pay IOR significantly enhanced the Fed's ability to control short-term interest rates in the presence of abundant reserves. Arguably, paying interest on excess reserves effectively establishes a floor to short-term interest rates without the need to carry out conventional open market operations.² The Fed can even change the quantity of its assets and liabilities in the opposite direction to the actual policy interest rate without having any effect on it. In other words, 'balance sheet policies' can be conducted independently from the conventional 'interest-rate policy' (Borio and Disyatat, 2010; Friedman, 2015; Lavoie, 2011).

In sum, unconventional monetary policy is based on the premise that even when the short-term nominal interest rate reaches zero, monetary policy is far from powerless as long as the central bank can resort to unconventional policy instruments (i.e. by using its balance sheet) to pursue its objectives. In the hope that the reduction in long-term yields would spill over into the wider financial markets, reduce other interest rates, and boost aggregate demand, the Fed targeted the term premium with direct asset purchases via the portfolio balance channel. The Fed also provided forward guidance on the movements of the short-term policy rate meant to lower expectations for the future path of the short-term interest rates, which is referred to as the signaling channel for reducing long-term yields. Some analysts see the workings of the portfolio balance and signaling channels as complementary (e.g. Krishnamurthy and Vissing-Jorgensen, 2011). Others emphasize the effectiveness of one channel over the other. Woodford (2012), for example, dismisses the validity of the portfolio balance view and argues instead that the effectiveness of LSAPs depend on their ability to alter the public's expectations of future central bank policies by offering guidance on the future path of the short-term interest rates (see also Bauer and Rudebusch, 2014).

² It should be noted that the actual overnight interest rates have typically been lower than the IOR rate because some large lenders in the federal funds market, such as the GSEs, along with some smaller ones, such as foreign institutions holding deposits at the Fed, are not eligible to receive IOR.

By contrast, Hamilton and Wu (2012) and Gagnon *et al.* (2011), find that LSAPs work primarily through the portfolio balance channel – a conclusion shared by Chairman Bernanke who describes the operation of the said channel as follows:

... once short-term interest rates have reached zero, the Federal Reserve's purchases of longer-term securities affect financial conditions by changing the quantity and mix of financial assets held by the public. Specifically, the Fed's strategy relies on the presumption that different financial assets are not perfect substitutes in investors' portfolios, so that changes in the net supply of an asset available to investors affect its yield and those of broadly similar assets. Thus, our purchases of Treasury, agency debt, and agency MBS likely both reduced the yields on those securities and also pushed investors into holding other assets with similar characteristics, such as credit risk and duration. For example, some investors who sold MBS to the Fed may have replaced them in their portfolios with longer-term, high-quality corporate bonds, depressing the yields on those assets as well. (Bernanke, 2010)

The basic assumptions of the portfolio balance and signaling channels are not only inconsistent with each other but deeply contradictory. Following the underlying theory, long-term yields are determined according to the so-called expectations hypothesis of the term structure of interest rates and consist of two components: the average expected value of short-term interest rates over the maturity of the bond, also known as the risk-neutral rate, and a constant risk premium, known as the term premium. Neither component can be directly observed or predicted with any degree of certainty. The expected value of the future short-term rates is often estimated through surveys of bond market participants. The term premium is calculated via term structure models, such as the ACM (Adrian, Crump, and Moench) model (see Adrian *et al.*, 2013). In this context, there are two explanations for what can cause a decline in the long-term bond yields. First, a decline can be attributed to the fall in the term premium as the Fed's asset purchases reduce the amount of long-term bonds in private-sector portfolios (i.e. the portfolio balance channel). Second, the Fed's forward guidance on the future path of the policy rate could lead market participants to revise down their expectations for future short-term interest rates. This signaling channel would reduce yields by lowering the average expected short-term interest rate component of the long-term yields. The key contradiction here arises from the following: on the one hand, the existence of a portfolio-balance

channel depends critically on the assumption that bond markets are ‘segmented’; that is, investors conduct transactions along a particular segment of the yield curve which means that long-term and short-term assets are not perfect substitutes. On the other hand, the existence of the signaling channel is premised upon the expectation hypothesis, which presupposes perfect substitutability of assets across the term structure. Clearly, it is not possible that both theories can be right or both channels can be effective at the same time. In this context, Thornton (2014, 2015) has provided the most consistent critique of the Fed’s unconventional monetary policy. Applying the econometric approach of Gagnon *et al.* (2011), Thornton (2014) fails to find empirical proof of the existence of a portfolio balance channel. Similarly, Kool and Thornton (2015) do not find any statistically significant evidence of the effects of the signaling channel via forward guidance as commonly contemplated.

4. The Effects of Quantitative Easing

As per the above exposition, the intended effects of LSAPs can be summarized as follows. The Fed directly targeted certain categories of assets in the hope of inducing a large-scale portfolio rebalancing and reduction of asset yields across the board. On the one hand, large-scale purchases of longer-term Treasury securities were expected to lower the long-term yields and interest rates which, in turn, would reduce borrowing costs for businesses and households. Assuming that spending on investment and consumer durables depends on interest rates, lower interest rates were expected to stimulate investment and consumption, thereby boosting output and employment. On the other hand, based on the assumption that LSAPs affect the real economy via portfolio rebalancing from lower-yield into higher-yield assets, direct purchases of certain categories of assets were expected to induce reallocation towards other assets, such as corporate bonds, equities, etc., thereby raising the prices of those and related assets, which, in addition to lowering those assets’ yields, would produce

a ‘wealth effect’ that would further stimulate investment and consumption. In what follows, we look at whether those goals were actually accomplished.

4.1. Effects on Long-Term Government Bond Yields

Despite differences in estimates across various studies, there is a broad consensus in the literature that the Fed’s LSAPs have had economically significant effects, particularly on government bond yields, thereby lowering various interest rates below levels that would have prevailed otherwise. There is, however, a considerable debate about the magnitude of the reduction in the long-term bond yields, the persistence of that reduction, and, as discussed above, about the particular transmission channels between the Fed’s actions and asset yields (see Bernanke, 2012; Gagnon and Hinterschweiger, 2013; Gagnon, 2016, and Martin and Milas, 2012 for an overview of different studies and estimates). Following Martin and Milas (2012), while LSAPs have reduced longer-term government bond yields, this effect may be temporary and was weaker during subsequent rounds of quantitative easing compared to the initial one. The general consensus on the effectiveness on LSAPs is not unproblematic and can be best understood if put into a perspective. Most of the existing studies use similar methodologies and originate in central banks or, respectively, are conducted by present or former central bank economists. The majority of those studies fall into two categories – event studies and econometric time series. Event studies (e.g. Gagnon *et al.*, 2011; Glick and Leduc, 2012; Krishnamurthy and Vissing-Jorgensen, 2011; Rogers *et al.*, 2014) assume that all changes in the variable of interest that occur within the chosen time period are due to the event under consideration. One basic problem is that the announcement of the event, the effects of which are being estimated, often contains other news that are likely to influence the subsequent changes in the examined variable. Furthermore, event studies typically measure the immediate response to an announcement and are unable to provide information as to the persistence of the result. This, at

least partially, explains why event studies usually find larger effects of LSAPs on Treasury yields than time series.

One type of econometric time series uses high-frequency data from periods when LSAPs were conducted which makes it difficult to control for macroeconomic variables that may influence bond yields, such as output and inflation (e.g. D'Amico and King, 2013; Neely, 2015). Another type of econometric studies uses lower frequency historical data from before 2008 with a broader set of explanatory variables (e.g. Baumeister and Benati, 2013; D'Amico *et al.* 2012; Gagnon *et al.* 2011). This approach assumes that the economic relationships that determine bond rates under normal circumstances remain undisturbed in periods of financial distress. Needless to say, this is a highly unrealistic assumption. The decline in long-term government bond yields is an empirical fact (**Figure 2**). The yields on the 10-year Treasury note measured at constant maturities fell from 5 percent in July 2007 to 2.3 percent at the end of the taper in October 2014 (the nadir of 1.5 percent was reached in July 2012). But the recent decline is a part of a longer historical trend dating back to the 1980s which suggests that other factors have played a part in the process. Those factors include the long-term slowdown of innovation and productivity growth (Gordon, 2016), demographic changes, unsustainable debt levels, and the persistent overaccumulation of profits, domestically and globally, manifested in the combination of upward pressures on asset prices and low investment, on the one hand, and the deepening imbalance between profits and wages, on the other, which chronically weakens aggregate demand (Ivanova, 2016). Because of the complexity of the matter, compounded by the significant difficulty (or, arguably, impossibility) of empirically separating the effects of LSAPs from other economic factors, econometric models, regardless of how sophisticated their identification schemes may be, are incapable of ascertaining with sufficient, let alone absolute, certainty how much of the recent decline of the long-term yields is attributable strictly to the Fed's actions.

One other point merits attention with regard to the effects of the Fed's policies on the government bond market and yields. As shown in **Figure 3**, in 2015, foreign holders, pension and mutual funds, and the Fed held over 80 percent of the outstanding Treasury securities. The Fed's share fluctuated between 16.1 and 17 percent in 2013-15, thereby being about 3 percent higher than its average in 2001-6. The pension funds' share declined from 21.1 percent in 2006 to 14.5 percent in 2015. In the same period, the mutual funds' share has almost doubled from 4.8 to 9.2 percent, while the foreign holdings' share has been on the rise since 2001, peaking at 44.7 percent in 2008 and declining to about 41 percent in 2015. While apparently there has been a lot of portfolio rebalancing going on over the last several years, the 16-percent share of the Fed's holdings in the \$15.14 trillion US Treasury market is simply not large enough to exercise by itself sustained downward pressure on the Treasury yields even considering the changes in the maturity structure of those holdings³. Furthermore, due to the special status of the US dollar as the key international currency, the demand for US government securities is neither primarily nor exclusively determined by the level of their actual yields. Other key factors include the global overaccumulation of idle funds, an increasingly pessimistic outlook for, at least, the near-term trajectory of the US and the global economy, which prompts the search for a safe haven, and the fact that despite falling yields, US Treasuries still offer higher rates of return than alternative government bonds.

4.2. Effects on Other Assets

While most attention in the early years of LSAPs was devoted to their effects on Treasury yields, the corresponding impact on the prices and yields of other assets has also attracted a considerable amount of research of similar methodological character. Krishnamurthy and Vissing-Jorgensen

³ In July 2007, 35 percent of the Fed's Treasury holdings consisted of Treasury bills with maturities of 1 year or less. By August 2008, that share had fallen down to 4.5 percent. Since August 2012, the Fed has eliminated its Treasury bill holdings altogether.

(2011) and Neely (2015), among others, report a strong impact of QE1 on corporate bond rates. Gilchrist *et al.* (2015) estimate that a 10-basis-point surprise reduction in the long end of the yield curve implies a 10-basis-point drop in real corporate borrowing rates, while a 10-basis-point policy-induced decline in the 2-year nominal Treasury yield leads to a 15-basis-point reduction in real investment-grade corporate bond yields across the maturity spectrum, which suggests an effect on real corporate borrowing costs that is twice as large as that of conventional policy action of the same magnitude. Rogers *et al.* (2014) find that the surprise announcements of Fed's monetary actions have significantly lowered corporate yields, raised domestic stock prices, and led to a depreciation of the US dollar. Hancock and Passmore (2011, 2015) demonstrate that the Federal Reserve's purchases of agency MBSs led to a significant reduction in MBS yields and residential mortgage rates (see also Fuster and Willen, 2010 for similar conclusions). One of the very few studies raising doubts about the effectiveness of direct purchases of MBSs is conducted by Stroebel and Taylor (2012) who argue that a sizable portion of the decline in mortgage spreads is actually due to the decline in default and prepayment risk. Finally, a number of studies have found that the Fed's unconventional monetary policy has had significant international effects in terms of reducing long-term foreign bond yields, interest rates, commodity prices, and the value of the US dollar (e.g. Glick and Leduc, 2012; Neely, 2015; Rogers *et al.*, 2014). According to Fratzscher *et al.* (2013), QE1 triggered a substantial rebalancing in global portfolios characterized by investors shifting out of emerging markets and other advanced economies' markets into US equity and bond funds, thereby giving a boost to US stock market, putting upward pressure on the US dollar and further downward pressure on Treasury yields. QE2 induced a portfolio rebalancing in the opposite direction, redirecting capital movements towards emerging market economies and causing a depreciation of the US dollar.

In sum, the overwhelming majority of empirical studies on the effects of unconventional monetary policy on asset prices display a high degree of methodological and theoretical uniformity

and seem to confirm that the Fed's interventions in the markets for private and government securities have managed to alter the relative supply of different categories of assets, thereby inducing portfolio rebalancing domestically and globally along with a general upward movement of asset prices. The Fed's interventions have been replicated in various forms by other central banks, thereby amplifying their effects. The resultant global portfolio rebalancing has not only weakened the link between asset price movements and macroeconomic fundamentals but brought about a considerable disconnect between asset prices and asset valuations. The latter is a key feature of asset price bubbles when the purchase and sale of assets can no longer be justified on the basis of their expected return. A major problem with artificially propping up asset prices is the clear and present danger of a subsequent fall. The generalized economic and psychological damage induced by such a fall is likely to outweigh any putative prior benefits. As once perceptively observed by Bernanke and Gertler (2001, 253), 'there are good reasons [...] to worry about attempts by central banks to influence asset prices, including the fact that (as history has shown) the effects of such attempts on market psychology are dangerously unpredictable'.

4.3. Macroeconomic Effects

Multiple econometric studies have found significant positive effects of the LSAPs on real economic activity. Baumeister and Benati (2013) argue that the Fed's actions have produced, or at least contributed towards, macroeconomic outcomes that were less severe than they would have been otherwise; that is, according to the authors' counterfactual scenario. Following their estimates, without QE1, annualized inflation would have been -1 percent in the second quarter of 2009, annualized real GDP growth would have contracted by 10 percent in the first quarter of 2009, and the unemployment rate would have been consistently higher throughout 2009, reaching 10.6 percent at the end of 2009. In a similar vein, Chung *et al.* (2012, 73) find that the combination of lower long-

term interest rates, higher stock market valuations and a lower foreign exchange value of the dollar, brought about by the unconventional monetary actions, ‘provide a considerable stimulus to real activity over time’. They judge the effects of the Fed’s asset purchases during 2009 and early 2010 roughly equivalent to a 200-basis-point reduction in the short-term interest rate. Using a variety of statistical and structural models including the Federal Reserve Board’s (FRB/US) macroeconomic model, these authors estimate that LSAPs raised inflation by 1 percent and the level of real GDP by 3 percent by the second half of 2012 in addition to lowering the unemployment rate by at least 0.75 percent. Another study by Federal Reserve economists – Engen *et al.* 2015 – assesses the effects of the total economic stimulus provided by the Fed’s unconventional policies since early 2009 using the same FRB/US model and finds a peak unemployment effect of 1.25 percent (that is, the unemployment rate was lower by 1.25 percent than its counterfactual value in the absence of the unconventional policy actions) and a peak inflation effect adding 0.5 percent to the inflation rate. Finally, Weale and Wieladek (2016) find that the announcement of asset purchases equal to 1 percent of nominal GDP has led to a 0.58-percent increase in real GDP and 0.62-percent increase in the Consumer Price Index. These authors further ascertain that the impact of QE2 and QE3 was not very different from QE1 suggesting that the effectiveness of asset purchases has not diminished over time.

While all studies included in our small but, arguably, representative sample confirm the positive effects of quantitative easing on real economic activity, these and other similar exercises raise more questions than they could possibly answer. To begin with, the theoretical and empirical limitations of their methodological framework are difficult to overstate. A comprehensive analysis and critique of the various limitations of this methodology and its unrealistic assumptions (e.g. rational expectations, perfect foresight, etc.) cannot be attempted here (see Lawson, 2009). Suffice it to note that they employ either the same general-equilibrium econometric models (e.g. FRB/US) or,

similar constructs within the same mathematically reductionist modeling framework that several years ago failed to apprehend any signs of an impending crisis. Importantly, the abundance of methodologically similar studies, almost unanimously asserting the effectiveness of unconventional monetary policy, provides little insight into key questions concerning the general trajectory and present state of the US and global economy.

If, indeed, LSAPs and the commonly contemplated channels of their operation have been so effective, how can we explain the subpar character of the recovery that followed the official end of the Great Recession after June 2009? That recovery has been different from all other postwar recoveries in that the previous periodic peak levels of key macroeconomic variables were never achieved, let alone exceeded. Thus, domestic investment has failed to recover to the level of the last two periodic peaks, let alone grow. In 2014, gross private domestic investment as share of GDP was only 16.5 percent compared to 19.3 percent in 2006-7 and 19.8 percent in 2000. The decline in net private domestic investment is much more staggering. After entering negative territory in 2009, it has 'recovered' to 3.6 percent of GDP in 2014, which is a far cry from the previous periodic peaks of 6.8 percent in 2005 and 7.8 percent in 2000. Importantly, the subpar domestic investment has been accompanied by the lowest levels of capacity utilization in postwar history. The average annual capacity utilization for total industry was 76.5 percent in 2010-15 compared to 78.8 percent in 2000-7, 82.4 percent in the 1990s, 79.6 in the 1980s, and 83 percent in the 1970s.

Household consumption, while still the main engine of 'growth' in the US economy, has remained significantly weaker than before the crisis. This weakness reflects, to a significant extent, the long-term decline in household income. The real median household income in 2014 (the last year for which Census data was available at the moment of writing) was \$53,657, which is lower than the level in 2013 (\$54,462), and significantly below the previous periodic peaks of \$57,357 in 2007 and \$57,843 in 1999. Unsurprisingly, GDP growth has also been subpar. The real GDP growth rate

peaked at 2.5 percent in 2010 and was 2.4 percent in 2014-15. This lies significantly below the 1997-2006 average of 3.3 percent. The fact that there has not been any substantial increase in bank lending, despite the surge in the monetary base, poses an insurmountable challenge to the claims that quantitative easing has stimulated real economic activity via the interest-rate channel. Thus, between December 2007 and December 2014, the monetary base almost quintupled (that is, increased 4.75 times), while the money supply (M2) and commercial bank credit increased by respectively 56.4 and 19.8 percent. After 2008, the commercial banks' loan-to-deposits ratio has fallen to levels unseen since the late 1970s (**Figure 4**). In sum, despite the fact that long-term bond yields and interest rates have remained at exceptionally low levels for an exceptionally long period of time, there is a considerable lack of evidence that the interest rate channel has worked to stimulate aggregate demand as contemplated by the architects of unconventional monetary interventions.

In light of the above, how feasible is to credit the unconventional monetary policies with any substantial contribution towards stimulating employment and job creation? The fact that after years of high unemployment, marking the slowest employment recovery in postwar history, the unemployment rate finally returned to levels approaching those before the Great Recession, is often taken as a confirmation of the ultimate effectiveness of the Fed's policies. But in actuality, a direct causal connection between quantitative easing and the decline in unemployment has never been established anywhere outside the realm of econometric imagination. For those who wish to remain in reality, an investigation into the continued transformation of the occupational and wage structure of the US economy along with the nature of the employment relation would provide more intelligence as to why job creation has apparently resumed (Kalleberg, 2011; Weil, 2014). Furthermore, the fall in the unemployment rate needs to be assessed against the background of some fundamental changes in the labor market, an investigation of which cannot be attempted here due to space limitations. Suffice it to note that the decline in labor force participation is among the

key factors that account for the fall in officially reported unemployment. Thus, the labor force participation rate peaked at 67.1 percent in 1997-2000, declined sharply after 2008 and reached 62.7 percent in 2015 which is the lowest level since 1977.

4.4. Distributional Effects

Conventional expansionary monetary policy produces distributional effects through its impact on interest income and expenses of different sectors of the economy. Low interest rates tend to reduce interest payments for borrowers, on the one hand, and diminish the interest income of savers, on the other. When the zero lower bound of the nominal short-term interest rates was about to be reached, the Fed started targeting asset prices and yields with direct asset purchases. Boosting equity and housing prices has been a major goal of quantitative easing. Any policy aimed at propping up asset prices is likely to produce significant distributional effects in that higher asset prices directly benefit asset owners and asset ownership is unevenly distributed.

According to the Survey of Consumer Finances, in 2013 (the last year for which information is available), 97.9 percent of American families owned some kind of assets including financial assets, such as stock, life insurance, or a retirement account, and nonfinancial assets, such as real estate or consumer durables. A notable trend since the early 2000s, which further intensified after 2007, has been the increasing concentration of asset ownership. For example, the share of US families with direct stock ownership (i.e. holding individual stocks) has declined from 21.3 percent in 2001 to 13.8 percent in 2013 and even the percentage of families with life insurance holdings has fallen from 28 to 19.2 percent over the same period (**Table 4**).

For the majority of Americans the primary residence remains the biggest asset, which is not income-generating as long as it is owner-occupied. However, from a neoclassical perspective, rising home prices are bound to benefit homeowners and the wider economy due to the so-called wealth

effect. The already mentioned FRB/US model, favored by the Fed, integrates household consumption behavior as a function of total wealth and its composition and predicts a marginal propensity to consume out of net tangible assets (housing wealth and consumer durables less home mortgages) which ranges between 5 and 10 cents on the dollar. The underlying assumption is that growing 'wealth' induces households to borrow against home equity which enables them to increase their consumption. The existence of a net wealth effect is debatable, even among neoclassical economists (see Buiter, 2008).

While there is compelling evidence that unconventional monetary policies have boosted housing and stock markets, the increase in equity prices has by far surpassed that of housing prices. In general, the Fed's large-scale effort for reviving the housing market has achieved only moderate success. While in early 2016, nominal home prices were back within 6 percent of their previous peak, they were still down nearly 20 percent in real terms. Notably, in 2015, new home construction was still running near historic lows (Joint Center for Housing Studies, 2016). In this context, the net distributional effects of LSAPs depend on their relative impact on the value of housing assets and equities as changes in house prices and equity returns tend to have opposite effects on inequality if housing assets are concentrated in 'poorer' households and equity holdings in 'wealthier' ones. For example, for households in the second income quintile the value of the primary residence represents over 91 percent of total net worth while the share of direct and indirect stock holdings is only 1.2 percent. For households in the top income quintiles the shares of total stock holdings and housing in total net worth are, respectively, 29.7 and 54.5 percent. Taking into account these differences in the composition of household balance sheets between the lower and the upper ends of the wealth distribution, Domanski *et al.* (2016) find that by boosting equity prices more than house prices, unconventional monetary policy has tended to significantly increase wealth inequality. In particular, the net wealth of richer households in the US has grown four times as fast as that of poorer ones.

Policies which aim at increasing profits as a means of increasing output and employment are referred to as trickle-down economics (Watkins, 2014). Quantitative easing, which directly targets asset prices, thereby raising the fortunes of asset owners, represents a version of this type of economics. For the most part, the unemployed and those in the lower income brackets, lack significant asset holdings, which makes them unlikely beneficiaries of asset price appreciation. They, however, are expected to benefit through the trickle-down effect. While the trickle-down effects of those policies are highly debatable, the period of unconventional monetary interventions has undeniably been marked by the quick recovery and extraordinary growth of total corporate profits which were given a double boost by the unprecedented combination of near-zero short-term interest rates and rising asset prices. By 2010, total corporate profits had not only recovered but surpassed the level of the previous periodic peak in 2006-7. Large corporations have been among the biggest beneficiaries of monetary policy at the zero lower bound as they have been able to issue and sell bonds in capital markets while enjoying continued access to low-interest bank loans. McKinsey Global Institute (2013) estimates that the decline in interest rates lowered the 2012 net interest expenses of US nonfinancial corporations by \$94 billion compared with 2007. Taking into account changes in balance sheets, this amounts to a cumulative benefit of \$310 billion for the period from 2007 to 2012 which increased corporate profits by 5 percent in 2012 and accounted for just over 20 percent of the growth in their profits since 2007. While monetary policy at the zero lower bound has squeezed the profit margins of European banks, it has had quite the opposite effect on their US counterparts where the effective net interest margin (that is, the difference between the interest rate paid on bank liabilities and the interest rate received on bank assets) increased by 63 basis points between 2007 and 2012 which translated into an increase of \$85 billion, or 28 percent, in the overall net interest income of US banks.

Rising asset prices have given an additional boost to bank profitability. For example,

Montecino and Epstein (2014) find that the Fed's direct purchases of MBSs have had significant positive impact on the profitability of banks with heavy exposure to such securities. This impact is not uniform in that the effect of MBS purchases is close to zero for small banks with total assets less than the sample median. This effect, however, is much larger and statistically significant for large banks with total assets greater than the median. But even before the initiation of LSAPs, the Fed's unconventional measures had a distinctive positive effect on bank profitability. TAF lending, which allowed banks, to obtain funds at below-market interest rates, represents a good early example.

5. Conclusion

On 16 December 2015, the Fed raised its short-term policy rate by 25 basis points, thereby bringing a symbolic end to the seven-year period of near-zero-interest-rate policy. This act, however, by no means signified the end of unconventional monetary policy which operates through changes to the central bank's balance sheet and can be conducted independently from interest-rate policy. Thus, the roughly \$3.5 trillion stock of assets acquired over the three rounds of LSAPs has remained largely unchanged, while an 'exit strategy' understood as a process in the course of which the Fed's balance sheet will revert to a size and composition resembling that of the years before the crisis is definitely not in sight.

A distinguishing feature of unconventional monetary policy is the use of the central bank's balance sheet to directly influence asset prices and credit conditions in the financial markets. The Fed's interventions, followed by similar actions of other central banks, have led to dramatic distortions of asset prices domestically and globally, while the macroeconomic effects of those policies appear tenuous at best. In particular, the claim that LSAPs have reduced or helped reduce unemployment seems to lack considerable substance in light of the subpar credit growth, weak income growth, and the veritable absence of an investment recovery in the US economy. However,

the Fed's unconventional interventions have triggered forces and processes that dwarf their original size and seem impossible to control with any of the available means, conventional and unconventional alike. At the moment of writing, a global bond rally is sending benchmark 10-year yields to unprecedented lows in multiple countries, while bond market luminaries opine that present bond yields are the lowest in centuries (Barton and McCormick, 2016). In June 2016, the yields on the 10-year Treasury note fell to levels unseen since 2012, while the yields on the 30-year bonds were the lowest on record. The term premium for the 10-year Treasury note has been negative since January 2016, reaching -60 basis points on 28 June 2016. Benchmark term premiums have gone negative in Japan, Germany, and the UK, among others, with benchmark yields in all three markets hitting all-time lows and even entering negative territory in the case of Japan and Germany. The necessity for unconventional monetary actions arose as a result of the zero-lower-bound constraint of conventional interest-rate policy. At present, unconventional monetary policy seems to be approaching its own limit, which is the zero-lower bound of nominal yields.

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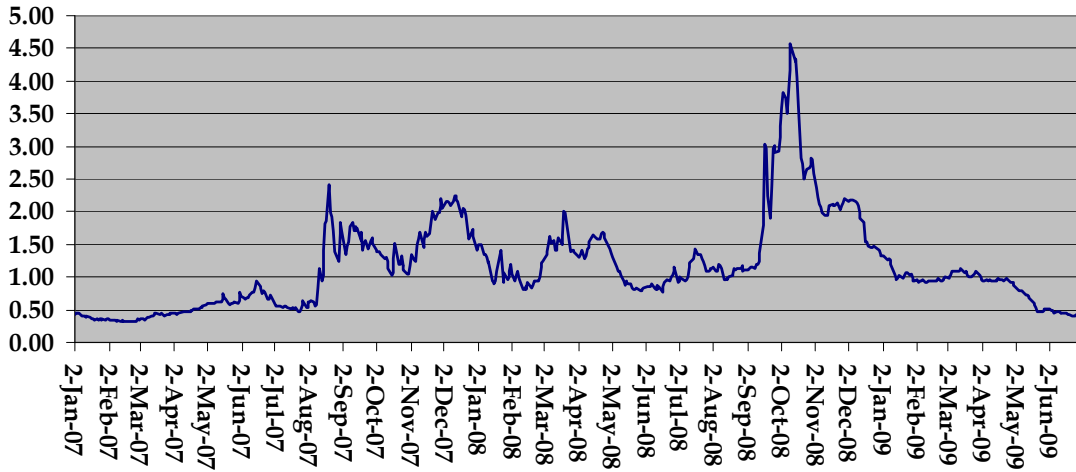
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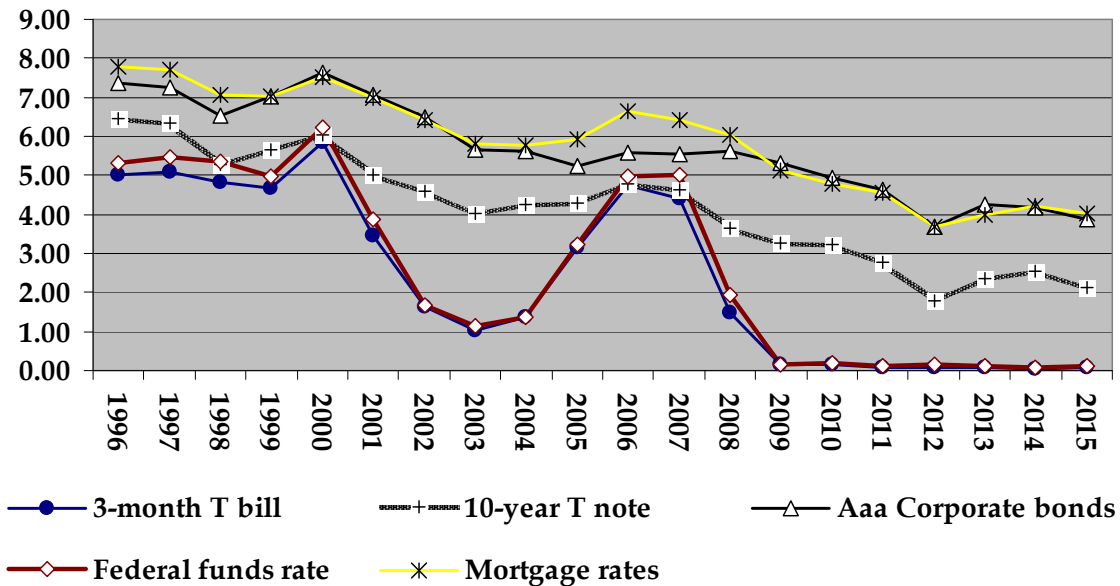
Figures

Figure 1 – The TED Spread



Source: Federal Reserve Bank of St. Louis

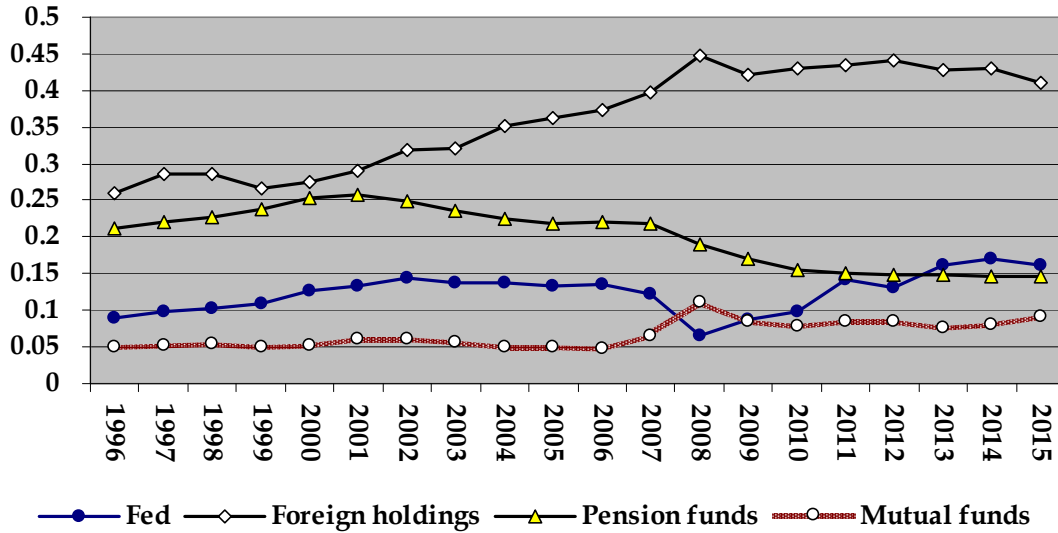
Figure 2 – Bond Yields and Interest Rates, 1996-2015



Source: Economic Report of the President, Table B-25

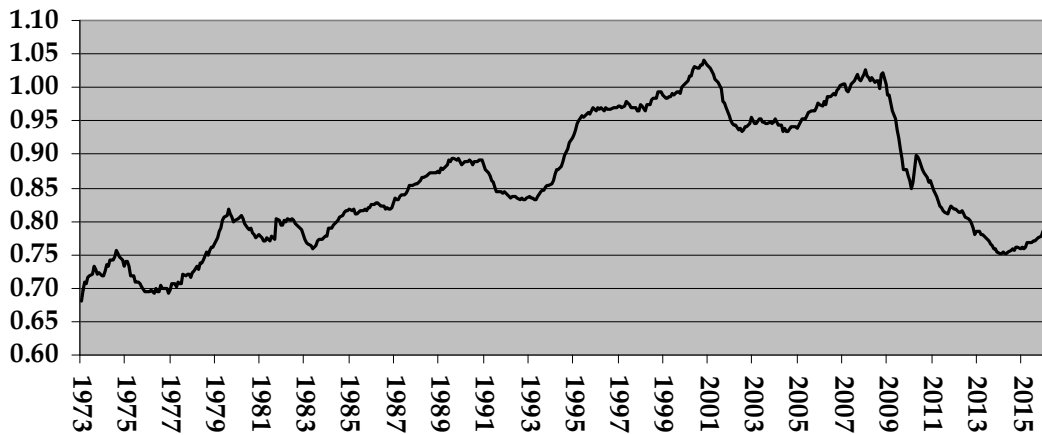
Note: Treasury yields are adjusted to constant maturities; the mortgage rate is the effective rate in the primary market on conventional mortgages, reflecting fees and charges and assuming, on the average, repayment at end of 10 years; data for corporate Aaa series include industrial bonds only.

Figure 3 – Relative Shares of Selected Holders of US Treasury Securities, 1996-2015



Source: Securities Industry and Financial Markets Association.

Figure 4 – Loan-to-Deposits Ratio, All Commercial Banks, 1973-2015



Source: Federal Reserve System, H.8 release.

Tables

Table 1 - Unconventional Monetary Policy, selective chronology of actions

17 Aug 07	The Fed announces the reduction in the premium on primary (discount) lending from 100 to 50 basis points above the federal funds rate target and an increase in the term of the discount lending from overnight to 30 days.
14 Dec 07	The Fed announces that it would offer \$20 billion in 28-day credit through a <u>Term Auction Facility</u> (TAF). The first auction took place on 17 Dec 07. The amount per auction was subsequently increased to \$30, \$50, and \$75 billion. The final auction was held on 8 Mar 10.
14 Dec 07	The Fed announces the establishment of the US Dollar swap line with foreign central banks.
11 Mar 08	The Fed announces the creation of the <u>Term Securities Lending Facility</u> (TSLF) with the intention to lend up to \$200 billion of Treasury securities to primary dealers secured for a term of 28 days by a pledge of a broad range of other securities.
16 Mar 08	The Fed announces the creation of the <u>Primary Dealers Credit Facility</u> (PDCF) to function as an overnight loan facility for primary dealers, similar to the way the discount window provided funding to depository institutions. It was closed on 1 Feb 10.
14 Sep 08	The Fed announces broadening of the collateral eligible to be pledged at the PDCF (previously limited to investment-grade debt securities) to match the types of collateral that can be pledged in the tri-party repo systems of the two major clearing banks. The collateral for the TSLF is also expanded to include all investment-grade debt securities. Previously, only Treasury securities, agency securities, and AAA-rated MBSs and ABSs could be pledged.
19 Sep 08	The Fed announces the creation of the <u>Asset Backed Commercial Paper Money Market Mutual Fund Liquidity Facility</u> (AMLF) – commenced operations on 22 Sep 08, expired on 1 Feb 10 – to extend loans to banking organizations to purchase ABCP from MMMFs.
7 Oct 08	The Fed announces the creation of the <u>Commercial Paper Funding Facility</u> (CPFF) to provide a liquidity backstop to US issuers of commercial paper through a special purpose vehicle that will purchase three-month unsecured and ABCP directly from eligible issuers.
21 Oct 08	The Fed announces the creation of the <u>Money Market Investor Funding Facility</u> (MMIFF) to support a private-sector initiative designed to provide liquidity to US money market investors.
25 Nov 08	The Fed announces the creation of the <u>Term Asset-Backed Securities Loan Facility</u> (TALF) to help market participants meet the credit needs of households and small businesses by supporting the issuance of ABSs collateralized by student loans, auto loans, credit card loans, and loans guaranteed by the Small Business Administration.
25 Nov 08 - 31 Mar 10	<u>Quantitative Easing I</u> : The Fed announces a program to purchase federal agency debt and private MBS guaranteed by the GSEs. Ultimately, the Fed purchased \$1.25 trillion in MBSs, \$300 billion in Treasury securities and \$175 billion in federal agency debt.
3 Nov 10 - 30 June 11	<u>Quantitative Easing II</u> : The Fed announces the purchase of \$600 billion in Treasury bonds
21 Sep 11	<u>Maturity Extension Program</u> : The Fed announces its intention to purchase, by the end of June 2012, \$400bn of Treasury securities with remaining maturities of 6 years to 30 years and to sell an equal amount of Treasury securities with remaining maturities of 3 years or less.
14 Sep 12 - 18 Dec 13	<u>Quantitative Easing III</u> : The Fed announces an open-ended plan to buy another \$40 billion in MBS each month until the economy improves. In Dec 12, the Fed expanded the program to \$85 billion: \$45 billion in Treasury securities and \$40 billion in MBSs.
18 Dec 13 - 29 Oct 14	<u>Taper</u> : The Fed begins to reduce its \$85 billion-per-month asset purchases by \$10 billion per month at each Fed meeting, cutting them to \$35 billion in June and \$15 billion in Sep 14.

Source: Board of Governors of the Federal Reserve System, Press releases, various dates

Table 2 - The Balance Sheet of the Federal Reserve, 4 July 2007, Billions of Dollars

Assets		Liabilities	
Securities held outright	790.6	Federal Reserve notes	781.4
US Treasury (1)	790.6	Reverse repurchase agreements (4)	32.2
Repurchase agreements (2)	30.3	Deposits	
Loans	0.19	Bank reserves	16.8
Gold	11	US Treasury	4.1
SDR	2.2	Foreign official, other (5)	0.37
Other assets (3)	46.1	Other liabilities	11.49
Total assets	880.39	Total liabilities	846.36

Capital (Total assets - Total liabilities) = 34.03

Source: Federal Reserve Statistical Release H.4.1, 5 July 2007

(1) Include securities lent to dealers overnight

(2) Cash value of agreements collateralized by US Treasury and federal agency securities.

(3) Includes assets denominated in foreign currencies, coins, bank premises, and items in process of collection.

(4) Cash value of agreements collateralized by US Treasury securities.

(5) Includes deposits held at the Reserve Banks by foreign governments, international and multilateral organizations, government-sponsored enterprises, and designated financial market utilities.

Table 3 - The Balance Sheet of the Federal Reserve, Billions of Dollars, selected dates.

	27.08.08	31.03.10	6.07.11	25.12.13	29.10.14		27.08.08	31.03.10	6.07.11	25.12.13	29.10.14
Assets						Liabilities					
Securities held outright	479.6	2,014.4	2,648.4	3,762.9	4,219.2	Federal Reserve notes	795.7	894.1	990.8	1,195.2	1,255.1
US Treasury (1)	479.6	776.7	1,624.5	2,208.8	2,461.6	Reverse repos (11)	43.8	57.8	67.5	151.2	236.7
Agency debt (2)	0	169	115	57.2	39.7	Deposits					
MBS (3)	n.a.	1,068.7	908.8	1,496.9	1,717.9	Bank reserves	19.4	1,054	1,663	2,450.7	2,799.0
Securities premiums (4)	n.a.	n.a.	n.a.	209.10	209.10	US Treasury	5	216.5	72.3	93.9	118.7
Securities discounts (4)	n.a.	n.a.	n.a.	-12.3	-18.7	Foreign official, other (12)	0.5	21.1	6	75.7	13.5
Repos (5)	111	0	0	0	0	Other liabilities	3.9	14.9	22.6	10.7	7.2
Loans	19	80.7	12.6	0.19	0.2						
Term auction credit	150	3.4	n.a.	n.a.	n.a.						
NPH of CPMF (6)	n.a.	7.8	0	n.a.	n.a.						
Maiden Lane LLC (7)	29.2	27.4	23.9	1.5	1.7						
Maiden Lane LLC II	n.a.	15.4	11.5	0.06	0						
Maiden Lane LLC III	n.a.	22.2	24.3	0.02	0						
NPH of TALF (8)	n.a.	0.4	0.76	0.1	0.02						
CB liquidity swaps (9)	n.a.	0	0	0.27	0						
Gold	11	11	11	11	11						
SDR	2.2	5.2	5.2	5.2	5.2						
Other assets (10)	106.86	122.7	136.4	54.4	59						
Total assets	908.86	2,310.5	2,874.0	4,032.4	4,486.7	Total liabilities	868.3	2,258.3	2,822.2	3,977.4	4,430.2
Capital	40.56	52.2	51.8	55.0	56.5						
Leverage ratio	22:1	44:1	55:1	73:1	79:1						

Source: Federal Reserve Statistical Release H.4.1, various dates

(1) Include securities lent to dealers under the overnight securities lending facilities.

(2) Federal agency debt securities at face value.

- (3) Guaranteed by Fannie Mae, Freddie Mac, and Ginnie Mae.
- (4) Unamortized premiums or discounts on securities held outright. Reflect the difference between the purchase price and the face value of the securities that has not been amortized.
- (5) Cash value of agreements collateralized by US Treasury and federal agency securities.
- (6) Net portfolio holdings of the Commercial Paper Funding Facility LLC.
- (7) Net portfolio holdings of Maiden Lane LLC.
- (8) Net portfolio holdings of the Term Asset-Backed Securities Loan Facility.
- (9) Liquidity swaps with foreign central banks.
- (10) Includes assets denominated in foreign currencies, coins, bank premises, items in process of collection, accrued interest, and other accounts receivable.
- (11) Cash value of agreements collateralized by US Treasury securities, federal agency debt securities, and MBSs.
- (12) Includes deposits held at the Reserve Banks by foreign governments, international and multilateral organizations, government-sponsored enterprises, and designated financial market utilities.

Table 4 – Ownership of selected categories of assets

Percent of families with	2001	2007	2013
Assets	96.7	97.7	97.9
Financial assets	93.4	93.9	94.5
Directly held stocks	21.3	17.9	13.8
Pooled investment funds	17.7	11.4	8.2
Savings bonds	16.7	14.9	10
Cash value life insurance	28	23	19.2
Retirement accounts	52.8	53	49.2
Stock holdings	53	53.2	48.8
Primary residence	67.7	68.6	65.2

Source: Federal Reserve, Survey of Consumer Finances.