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INSIGHTS FROM THE FEDERAL RESERVE'S WEEKLY BALANCE SHEET, 1976-2017

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Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise

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By Nicholas Fries

About the Series

The Studies in Applied Economics series is under the general direction of Professor Steve H. Hanke, co-director of the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise (hanke@jhu.edu). The authors are mainly students at the Johns Hopkins University in Baltimore. Some performed their work as research assistants at the Institute.

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Abstract

I make available full digitized data of the Federal Reserve's weekly balance sheet from 1976-2017 for the first time. After a short overview of the central bank during the period, I analyze the trends of the Federal Reserve's assets and liabilities, as a result of its monetary policy decisions. I focus on the effects of significant events, such as the Great Inflation, the Great Moderation, and the Great Recession, on the Fed's balance sheet.

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Keywords: Federal Reserve, balance sheet, assets, liabilities, gold, inflation, Great Recession

JEL codes: E58, N12

Introduction

The Federal Reserve's weekly balance sheets have been previously digitized from 1914 through 1975 as a part of working papers by Justin Chen and Andrew Gibson[1], and Cecilia Bao and Emma Paine[2], in the Studies in Applied Economics series. There remains a period where the Federal Reserve's balance sheets have not been converted into spreadsheet form, from 1976 to 1996. From 1996 to 2017, the Federal Reserve already provides balance sheets online, although it does not begin to show them in spreadsheet form until 2002.[3] This paper offers graphs and an associated discussion based on the weekly balance sheets for the whole period 1976-2017. Some commercial services have monthly data for the early years of the period, but this paper is apparently the first to make weekly data available for the whole period.

Purpose

This paper uses weekly Federal Reserve balance sheet data to examine how major economic events such as the Latin American debt crisis, the subprime mortgage crisis, and the Dodd-Frank Act have affected the Federal Reserve's division of assets. The Federal Reserve has historically divided its assets among gold, foreign securities, U.S. private-sector assets, and U.S. Treasury securities, so this paper will discuss the evolution of its monetary strategies from 1976 to 2017.

I divide my analysis into three periods: the end of the Great Inflation, 1976-1982; the Great Moderation, 1982-2007; and the Great Recession and its aftermath, 2007-2017.

The first period begins approximately with the Federal Reserve Reform Act of 1977, and ends with the recession of 1981-1982. I will analyze the impact of Paul Volcker's anti-inflation measures on the Fed's balance sheet, as well as the impact of the oil shock of 1978-1979 on international monetary relations. The period of the Great Moderation offered relative economic stability after years of volatile inflation. The introduction of rate-setting announcements by the Federal Open Market Committee (FOMC) caused fewer surprises, resulting in less volatility. However, there were still economic events that triggered action by the Federal Reserve, such as the Latin American debt crisis, the stock market crash of 1987, the Riegle-Neal Act, and the Gramm-Leach-Bliley Act. A strong expansion over the course of ten years in the U.S. housing market reached its apex in 2006, ending in losses on mortgage-based assets, spiraling the country into the Great Recession. This second period can be subdivided

1 Chen, Justin and Andrew Gibson, "Insights from the Federal Reserve's Weekly Balance Sheet, 1914-1941," Johns Hopkins University, Institute for Applied Economics, Global Health, and the Study of Business Enterprise, Studies in Applied Economics (working paper series), No. 73, January 2017. http://sites.krieger.jhu.edu/iae/files/2017/04/Chen_Gibson_FederalReservePaper.pdf; accompanying spreadsheet via http://sites.krieger.jhu.edu/iae/working-papers/studies-in-applied-economics/.

2 Bao, Cecilia and Emma Paine, "Insights from the Federal Reserve's Weekly Balance Sheet, 1942-1975," Johns Hopkins University, Institute for Applied Economics, Global Health, and the Study of Business Enterprise, Fall 2017.

3 "Factors Affecting Reserve Balances - H.4.1." *Board of Governors of the Federal Reserve System*, www.federalreserve.gov/releases/h41/.

Chronology

Date	Event
January 20, 1977	Democrat Jimmy Carter becomes President after defeating incumbent Gerald Ford in the election of 1976
November 16, 1977	Federal Reserve Reform Act of 1977 is signed into law
January 7, 1978	The Iranian Revolution begins, sending oil prices soaring, marking the beginning of the oil shock of 1978-1979
January 31, 1978	Arthur Burns's term as Federal Reserve chairman ends
March 8, 1978	G. William Miller begins his term as chairman of the Fed
August 6, 1979	Miller's chairmanship ends as he is appointed Treasury Secretary
August 6, 1979	Carter appoints Paul Volcker as Fed chairman
October 6, 1979	Volcker announces the Fed will switch its focus to reserve growth, rather than the Fed funds rate
January-July 1980	Recession as inflation peaks at 14.6 percent and starts to decline
March 31, 1980	Carter signs Monetary Control Act into law
January 20, 1981	Republican Ronald Reagan becomes President after defeating incumbent Carter
July 1981-November 1982	Further recession as inflation declines toward low single digits
August 1982	Mexico defaults, igniting the Latin American debt crisis
August 11, 1987	Alan Greenspan becomes Fed chairman
October 19, 1987	"Black Monday" stock market drop of 22.6 percent
January 20, 1989	Reagan's former vice president George H. W. Bush succeeds Reagan as President
January 20, 1993	Democrat Bill Clinton becomes President after defeating Bush
November 12, 1999	Clinton signs Gramm-Leachy-Bliley Act, repealing parts of Glass-Steagall Act
January 20, 2001	Republican George W. Bush becomes President
March-November 2001	Mild recession
September 11, 2001	Al-Qaeda terrorist attacks leave 3,000 Americans dead
February 6, 2006	Ben Bernanke replaces Alan Greenspan as Fed chairman
December 2007	Mild downturn starts after turbulence in financial markets over the previous summer
September 15, 2008	Large investment bank Lehman Brothers files for bankruptcy, sending economy into worst contraction since Great Depression
November 26, 2008	Fed begins quantitative easing (QE) policies
January 20, 2009	Democrat Barack Obama becomes President
June 2009	"Great Recession" ends; long, slow recovery begins
July 21, 2010	Obama signs Dodd-Frank Act into law
November 3, 2010	Second phase of quantitative easing ("QE2")
January 25, 2012	Fed sets explicit inflation (PCE) target of 2 percent
February 3, 2014	Janet Yellen becomes first female Fed chair
February 5, 2018	Jerome Powell becomes Fed chairman

into the subprime mortgage crisis, the Federal Reserve's credit programs, and then the Dodd-Frank Act. The longest recession since World War II shifted the Federal Reserve back into highly activist policy, after years of calm in the financial system. The next steps in monetary policy by the Federal Reserve were crucial to the recovery of the U.S. economy.

I. History

The End of the Great Inflation (1976-1982)

The Great Inflation can be attributed to Federal Reserve policies that "allowed for an excessive growth in the supply of money."[4] In the period before our analysis begins, there was a change in the leadership of the Federal Reserve. William M. Martin, who had been chairman since 1951, saw his term end in 1970, when Arthur Burns became the chairman in February. Burns, like his predecessor, believed that inflation was a nonmonetary phenomenon, leading him to strongly advocate for income policies.[5] At the time, these policies were thought to curb inflation. Wage and price controls had historically only been implemented during wartime, so the controls that President Richard Nixon imposed were the first U.S. experience with these policies during peacetime. After implementation in 1971, they were eventually found to have no true effect on inflation, and were abandoned.

To make clear the objectives of the Fed, Congress passed the Federal Reserve Reform Act, also known as the Humphrey-Hawkins Act, which was signed into law by President Jimmy Carter in November 1977. The stagflation of the 1970s was the main reason for Congress increasing the role and accountability of the Federal Reserve.[6] The act amended the original Federal Reserve Act by directing the Fed to focus on employment and the price level. This is where the Fed's now familiar "dual mandate" originated. (Previously the law had set no explicit goals for the Fed's monetary policy.) Whether and to what extent the two mandates are compatible has been an enduring source of debate among economists. In addition to the new directives for the Fed, the act also provided a framework for the Fed to have increased oversight from Congress: the Fed Board of Governors would now have to report to the House and Senate semiannually on its outlook and performance goals for the next year. Moreover, the chairman and vice chairman would not only need to be confirmed by the Senate, but also face a term limit – four years – with the terms being renewable based on perceived performance.

Arthur Burns' successor, G. William Miller, began his short tenure as chairman in March 1978, starting his term under the freshly signed Fed Reform Act. Under his leadership, the Fed chose not to raise rates to deal with rising inflation, reflecting a strong fear of recession among economists. During the oil shock of 1978-1979, Miller and the Fed correctly identified a concern

4 Bryan, Michael. "The Great Inflation." *Federal Reserve History*, www.federalreservehistory.org/essays/great_inflation?WT.si_n=Search&%3BWT.si_x=3.

5 Hetzel, Robert L. "The Evolution of U.S. Monetary Policy." *Federal Reserve Bank of Richmond Working Papers*, vol. 18, no. 01, 5 Dec. 2017, pp. 12–13., doi:10.21144/wp18-01.

6 Zhu, Joy. "Federal Reserve Reform Act of 1977." *Federal Reserve History*, www.federalreservehistory.org/essays/fed_reform_act_of_1977?WT.si_n=Search&%3BWT.si_x=3.

that the inflation rate might rise quickly and significantly as the year proceeded.[7] However, at a February 1978 meeting, the Federal Open Market Committee (FOMC) voted against changing the Fed funds rate (its policy interest rate), because members were afraid of inhibiting the already weak growth of the economy. With rising oil prices due to uncertainty about supplies amidst the Iranian Revolution in 1978, the Fed needed to take action to curb inflation for American consumers. In April of the same year, the FOMC voted to raise the Fed funds rate from 6.9 percent to 10 percent by year's end. Unfortunately, the rate hike was seen as coming too late. Monetary policy had been expansionary in a time of already high inflation, about 14 percent in 1980. Miller's short tenure ended in 1979, when he became Secretary of the Treasury at the request of President Jimmy Carter.

Carter then appointed Paul Volcker as chairman of the Federal Reserve. Volcker's chairmanship began in August 1979, amid an inflation rate above 11 percent. He had previously served as the president of the Federal Reserve Bank of New York, so his background was more suited for the chairmanship, compared to Miller, who was seen as an outsider due to his mostly corporate background. Volcker assumed the position with the thought that the Federal Reserve was the only arm of the government that could truly handle the inflation problem plaguing the nation.[8] It was also accepted that the growth rates of the Fed's reserves would need to be controlled more strictly to help reduce inflation. As has been mentioned, prior to Volcker's appointment, the Humphrey-Hawkins Act had become law. It directed the Fed to reduce unemployment while also reducing inflation to 3 percent or less, or to reduce inflation without interfering with the goal of lower unemployment. The FOMC had already begun to implement targets for action in accordance with the new bill, but Volcker made it clear that he planned to take strong measures to control the growth rate of the money supply. As a result, in October 1979 the FOMC announced it was switching its target to the reserve growth rate, rather than the fed funds rate.[9]

To assist the Fed in controlling the money supply more firmly, the Monetary Control Act of 1980 required all depository institutions to adhere to reserve requirements, meaning any institution that accepted deposits was required by law to hold a certain threshold of reserves. The law gave the Federal Reserve a policy tool applicable to all depository institutions. Previously, the Fed could only implement reserve requirements for banks that were members of the Federal Reserve System, and only 40 percent of banks were members, although they included most of the largest banks and had the majority of bank deposits in the United States. Now, all depository institutions would keep a certain amount of their total funds as reserves, stored either as vault cash or accounts at regional Federal Reserve Banks. This legislation would have a huge impact on the Fed's balance sheet and its relation to the banking system. The act increased demand for the monetary base, tending to reduce inflation, other things equal.

7 Graefe, Laurel. "Oil Shock of 1978–79." *Federal Reserve History*, 22 November 2013, www.federalreservehistory.org/essays/oil_shock_of_1978_79?WT.si_n=Search&%3BWT.si_x=3
8 Hetzel, "The Evolution of U.S. Monetary Policy," p. 14.
9 Bryan, "The Great Inflation."

At Volcker's confirmation hearing, he clearly stated his goals as chairman, and said that his first priority was fighting inflation, which would entail restricting money supply growth and promoting long-term economic growth.[10] In the fall of 1979, Volcker and the Fed began to raise the Fed funds rate, a move that resulted in the unemployment rate rising to close to 6 percent. The Carter Administration and Congress alike became concerned about rising unemployment, threatening to force the Fed to cut rates if unemployment grew to 7 percent. Rising unemployment was hurting the re-election prospects of members of Congress, and they sought to combat it. Volcker announced that the FOMC would change its focus to controlling the supply of bank reserves, rather than the fed funds rate — a switch that caused short-term economic turmoil.[11] The fed funds rate reached 20 percent in 1980, a record high. Inflation also rose, peaking at 14.6 percent in March 1980, pushing the economy into a severe recession and causing higher unemployment. Businesses begun to face liquidity problems. This was all expected by Volcker, but it enraged the American people. The U.S. economy had experienced a 58-month expansion that had seen a 23.2 percent increase in real GDP, as well an 18.5 percent increase in nonfarm jobs, albeit during a period of what was considered high inflation in U.S. terms. Volcker started his chairmanship by plunging the American economy into a six-month recession from January to July of 1980, resulting in a 2.2 percent decrease in GDP and an unemployment rate of 7.8 percent.[12] However, Volcker's main goal was to achieve greater price stability, and tightening monetary policy achieved exactly that.

Volcker's disinflation also led to another recession from 1981-1982. Over 16 months, the U.S. saw unemployment rise to 10.8 percent in December 1982, the highest in the post-World War II era. American businesses felt the sting, with nearly 25,000 failed businesses reported in 1982 and 52,000 in 1984, another postwar record. The high interest rates were making it difficult for these businesses to obtain the necessary capital to keep themselves afloat. The sectors of the economy most dependent on credit, in particular housing and cars, suffered immensely,[13] Volcker anticipated the short-term difficulties, and although his policies were unpopular at first, they helped the Fed reach its goal of reducing inflation.

The Great Moderation (1982-2007)

The subsequent Great Moderation was welcomed by the American people, but it still took time to reach economic stability. The significant decline in macroeconomic volatility came to be recognized as not only a U.S. phenomenon, but a global one, as it occurred in many advanced economies and some emerging markets. One cause of the Great Moderation was the ability of

10 Medley, Bill. "Volcker's Announcement of Anti-Inflation Measures." *Federal Reserve History*, www.federalreservehistory.org/essays/anti_inflation_measures?WT.si_n=Search&%3BWT.si_x=3.

11 Barnett, William A. *Getting It Wrong: How Faulty Monetary Statistics Undermine the Fed, the Financial System, and the Economy*. Cambridge, Massachusetts: MIT Press, 2014.

12 Samuelson, Robert J. *The Great Inflation and Its Aftermath: the Transformation of America's Economy, Politics, and Society*. New York: Random House, 2008.

13 Lopez, David A. "The Great Inflation: A Historical Overview and Lessons Learned." *Economic Research - Federal Reserve Bank of St. Louis*, Federal Reserve Bank of St. Louis, Oct. 2012, research.stlouisfed.org/publications/page1-econ/2012/10/01/the-great-inflation-a-historical-overview-and-lessons-learned/.

the Fed's monetary policy to reduce inflation in the short term and to instill confidence that inflation would remain relatively low over the long term. Another reason for this period of stability was a major change in the country's economic structure.[14] The American economy experienced a shift from manufacturing to services as the major sources of growth and employment. This shift reduced volatility because manufacturing tends to be more volatile than services. Additionally, a rise in popularity of information technology and enhanced communication "allowed firms to produce more efficiently and monitor their production processes more effectively,"[13] which was another step toward less overall volatility in the economy.

The Great Moderation is often attributed to good monetary policy during the period by both Paul Volcker and Alan Greenspan. The Federal Reserve followed more of a systematic route to its policy setting methods. Much of Volcker's monetary policy was aligned with the Taylor rule, an economic principle later developed by the Stanford University economist John Taylor as a result of looking at data that included the Volcker era. The Taylor rule states for every 1 percent increase in inflation, a central bank should increase the nominal interest rate by more than 1 percent. In practice, this rule meant tightening monetary policy when output was above its estimated potential, or when inflation is higher than the anticipated inflation rate, and vice versa with the circumstances reversed. The Great Inflation period, in contrast, had seen what in retrospect was termed a "go-stop" policy. The Fed would loosen policy to fight a recession, and tighten policy in to combat rising inflation, but typically too late to stabilize inflation. Volcker was able to curb inflation and lessen "the effects of unforeseen shocks to the economy."[15]

The Great Moderation was not all smooth sailing; a number of crises occurred, the first being the Latin American debt crisis of 1982-1989. U.S. commercial banks were lending money to less-developed countries at such a high clip that the total amount of debt held by Mexico, for example, reached $80 billion. Mexico became the first domino to fall, announcing in August 1982 that it would no longer be able to service its foreign debt. Eventually, 16 Latin American countries rescheduled their debt payments, because they could not or would not meet their payments. Eleven other less-developed countries did the same. Many of the crisis-hit countries were commodity exporters whose export revenues had been crushed by the fall in demand resulting from the U.S. recession. By 1982, the nine largest U.S. banks had Latin American debt equal to 176 percent of their total capital, and total less-developed country debt was equal to almost 290 percent of their total capital.[16] This high exposure to defaulting debtors led banks to abruptly halt all their overseas lending and focus on collecting their debt or restructuring existing loan agreements. The suddenness of the change proved detrimental to the economies

14 Hakkio, Craig S. "The Great Moderation." *Federal Reserve History*, 22 November 2013, www.federalreservehistory.org/essays/great_moderation?WT.si_n=Search&%3BWT.si_x=3.

15 Summers, Peter M. "What Caused The Great Moderation? Some Cross-Country Evidence."*Federal Reserve Bank of Kansas City - Economic Review - Third Quarter 2005*, 2005, p. 9. www.kansascityfed.org/cPfUd/PUBLICAT/ECONREV/PDF/3q05summ.pdf.

16 Sims, Jocelyn, and Jessie Romero. "Latin American Debt Crisis of the 1980s." *Federal Reserve History*, www.federalreservehistory.org/essays/latin_american_debt_crisis?WT.si_n=Search&%3BWT.si_x=3.

of many countries, pushing many Latin American countries into deep recessions. Countries defaulted on their debt as they saw their many previous economic shortcomings exposed. Former Federal Reserve vice chairman Roger Ferguson summarized their problems as "high domestic consumption, heavy borrowing from abroad, unsustainable currency levels, and excessive intervention by government into the economy."[17]

The Federal Reserve took action by organizing a meeting with central banks around the world to provide the framework for a bridge loan to Mexico. As more countries became affected by the crisis, the United States took on the role of emergency lender. Commercial banks were responsible for agreeing to restructure the countries' debts, and the International Monetary Fund, among other agencies, would lend enough funds to less-developed countries to cover just the interest on their loans. This was expected to lead these countries to reform their economic structures to prevent similar future instances and to increase exports and eliminate budget deficits enough to pay down the external debt they owed. [18]

The American financial system had experienced a crisis whose cause foreshadowed the events of the Great Recession. A group of the country's largest banks all lent out money beyond their means to parties that proved incapable of repaying the debt. The problem was not realized until the Latin American debt crisis had commenced, and the banks were supported and were allowed to defer to recognition of their losses, to come to the aid of the insolvent countries.

A somewhat similar though smaller crisis occurred among savings and loan institutions. Losses were especially high from 1985 to 1988.

An important tenet of the Federal Reserve's monetary policy during the Great Moderation was attention to financial stability. The stock market crash of Monday, October 19, 1987, when the Dow Jones Industrial Average dropped 22.6 percent in one day, was caused, in part, by worry about a statement by Treasury Secretary James Baker on the Saturday before "Black Monday."[19] The federal government had previously disclosed a new larger-than-desired trade deficit, and Baker's statement was viewed as favoring a depreciation of the dollar to help narrow the gap. The market plunged in response to the announcements, and its initial decline was aggravated by market practices that impeded liquidity. The Federal Reserve issued a statement the next day, promising to uphold its responsibility as the central bank and "serve as a source of liquidity to support the economic and financial system."[20] It was the first test of the abilities of Alan Greenspan, who had succeeded Volcker as Fed chairman in August 1987. (Greenspan had been chairman of the Council of Economic Advisers about a decade before his appointment, and was a longtime economic consultant, but had no Federal Reserve experience

17 Ferguson, Robert W. "FRB: Speech, Ferguson -- Latin America: Lessons Learned from the Last 20 Years." Federal Reserve Board of Governors, 11 Feb. 1999, www.federalreserve.gov/boarddocs/speeches/1999/19990211.htm.
18 Sims, Jocelyn, and Jessie Romero. "Latin American Debt Crisis of the 1980s." *Federal Reserve History*, federalreservehistory.org/essays/latin_american_debt_crisis?WT.si_n=Search&%3BWT.si_x=3.
19 Bernhardt, Donald, and Marshall Eckblad. "Stock Market Crash of 1987." *Federal Reserve History*, www.federalreservehistory.org/essays/stock_market_crash_of_1987?WT.si_n=Search&%3BWT.si_x=3.
20 Hakkio, "The Great Moderation."

before being appointed chairman.) The stock market crash did not spread to the real economy, which kept growing.

The way the Fed dealt with the aftermath of the crash of 1987 ushered in a new era where investors could remain confident in the Fed's commitment to the financial stability of the economy as a whole. The amount of lending offered by the Federal Reserve to many securities firms was not good for its own sprofitability. However, it proved the Fed was devoted to "the preservation of the system as a whole."[21] The commitment, which became informally termed the "Greenspan put," may have had a downside, making investors too confident that the Fed could and would prevent any financial crisis from hurting the real economy.

New legislation in the late 1990s gave the Fed new powers. The Gramm-Leach-Bliley Act of 1999 repealed parts of the Glass-Steagall Act, which had served to separate commercial and investment banking. Now, language in the bill left an opening for some financial integration. This bill aimed to create a more efficient and fair environment for financial integration, and it granted the Fed with the power to oversee and enforce regulations upon financial holding companies, or "an umbrella organization that could own subsidiaries involved in different financial activities."[22] As a result, the Fed assumed a larger risk management role among the new class of large, consolidated financial institutions.

As Fed chairman, Alan Greenspan adopted similar policies to Volcker, and he was able to maintain moderately low inflation through systematic monetary policy that aimed at stabilizing medium-term expectations, instead of "go-stop," reactive monetary policy.

Ben Bernanke, who had been a Federal Reserve governor from 2002 to 2005 and was then briefly chairman of the Council of Economic Advisers, succeeded Greenspan as chairman in February 2006.

The Great Recession and its Aftermath (2007-2017)

The strong rise in house prices and construction that took place toward the end of the Great Moderation was, in hindsight, unsustainable. Banks had created complex assets backed by mortgages, and they had lent out billions of dollars to poor credit risks. Moreover, oil prices also rose strongly in the last years of the Great Moderation, with the price of a barrel rising from $34 in 2004 to $134 in June 2008, as growing automobile use and other manifestations of wealth in emerging markets increased the demand for oil.[23]

Home prices began to fall in 2006 after a decade of growth. The first signs of stress in financial markets occurred in the summer of 2007 and were related to mortgage-backed and other

21 Bernhardt and Eckblad, "Stock Market Crash of 1987."
22 Mahon, Joe. "Financial Services Modernization Act of 1999, Commonly Called Gramm-Leach-Bliley." *Federal Reserve History*, www.federalreservehistory.org/essays/gramm_leach_bliley_act?WT.si_n=Search&%3BWT.si_x=3.
23 Hetzel, p. 22.

asset-backed securities. Banks had been offering mortgage loans to unqualified prospective homeowners for several years without regulators or the banks themselves realizing their mistake. Lenders expanded their domain of prospective homeowners to high-risk borrowers, or borrowers who previously would have had a difficult time getting a mortgage due to poor credit history. The expansion of lending was taking place while home prices were soaring to record-high levels. New financial instruments backed by high-risk mortgages were seen as an insurance measure, since their junior tranches would be the first to absorb losses on the underlying mortgages, leaving the senior tranches, it was thought, unaffected by any downturn in the housing market short of a repeat of the Great Depression.[24] Rather than efficiently spreading and dampening risk, though, securities backed by high-risk mortgages amplified risk because the models on which they were designed greatly underestimated the probabilities of default. Senior tranches that credit rating agencies had granted their top ratings suffered losses, and junior tranches were in some cases nearly wiped out. The realization spread that calculations of the value of certain other financial instruments rested on similarly shaky foundations. The investment bank Bear Stearns failed in March 2008. The turbulence in financial markets turned into a panic with the failure of a larger investment bank, Lehman Brothers, on September 15, 2008, which sparked a global financial panic. The United States and most other advanced economies suffered their worst financial crisis since the 1930s, which led to a synchronized recession. At this point, the federal government stepped in, and the Federal Reserve had a major role to play. It faced chaos: "deflation combined with the decline in economic activity."[25]

The Bernanke-led Fed proceeded to lend $85 billion to the insurance company AIG the day after the Lehman Brothers failure, to prevent it from being the next domino to fall. AIG was connected to many financial institutions through its role as an originator of credit default swaps. The Fed also lowered the fed funds rate in steps, reaching 0-0.25 percent in December 2008, in the hopes of alleviating the recession.[26] The goal was to lower long-term interest rates and to help generate activity in the economy. The Federal Reserve itself also began buying long-term Treasury bonds and, in an unprecedented step, some mortgage-backed securities that funded prime mortgages.[27] The Fed continued to purchase longer-term securities until it judged that the job market and financial markets had recovered.

In further efforts to encourage economic activity, the Fed instituted a set of credit programs; these programs were implemented to help businesses that were normally credit-worthy to operate on as normal a basis as possible, or at least to help them stay afloat during the recession. The Fed utilized collateral to protect itself from any major losses, and the credit the Fed extended has been paid back in full. The credit programs have experienced no major losses. (The Treasury also extended some credit, which likewise experienced no major losses.)

24 Duca, John V. "Subprime Mortgage Crisis." *Federal Reserve History*, 22 November 2013, www.federalreservehistory.org/essays/subprime_mortgage_crisis?WT.si_n=Search&%3BWT.si_x=3.
25 Hetzel, p. 22.
26 Hetzel, p. 23.
27 Duca, "Subprime Mortgage Crisis".

In an attempt to create bank reserves, the Fed began a series of open market purchases of mortgage-backed securities and U.S. Treasury securities, from autumn 2008 to 2014. The Fed's balance sheet ballooned from about $900 billion in September 2008 to $4.5 trillion in September 2014. In terms of GDP, assets jumped from 6 percent GDP to 23 percent.[28] The Federal Reserve's intervention was an attempt to aid in the economy's recovery, but when it could no longer lower the nominal Fed funds rate, it announced its intention to extend the time of a zero funds rate, hoping its forward guidance ("quantitative easing") would bring down the yield curve.

The most recent pivotal piece of legislation to affect the Federal Reserve and its responsibilities in the wake of the recession was the Dodd-Frank Act of 2010. The main purpose of the legislation was to set a capital requirement for financial institutions, to ensure that institutions would have an emergency recovery net of capital. A main cause of the Great Recession was the extreme leverage of many major financial institutions. They had insufficient capital to fall back on. During the crisis, these financial institutions went bankrupt (Lehman Brothers), were taken over by the federal government (Fannie Mae, Freddie Mac, parts of American International Group), or avoided a takeover only by availing themselves of assistance from the Fed (Goldman Sachs, Citibank, and many others).

Among its many provisions, the Dodd-Frank Act designated oversight of nonbank companies to the Federal Reserve. Also, in an attempt to motivate banks to build proper safety nets, the bill removed some of the Fed's autonomy to provide emergency credit to failing institutions. It required the Fed to offer emergency loans through federal programs that are available to many firms, instead of only one.[29] In the future, the Fed cannot tailor loans to individual recipients, as it did in 2008 with Bear Stearns and AIG.

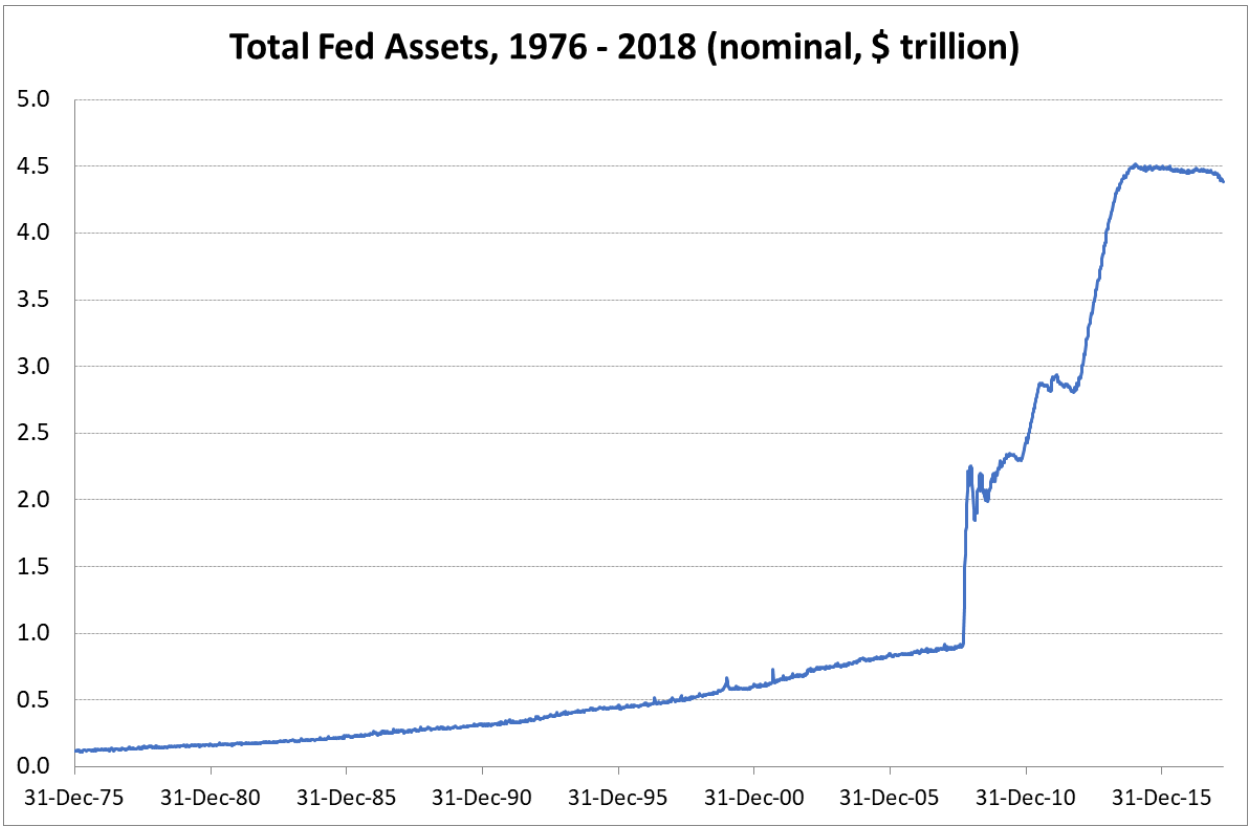
II. Data and Discussion

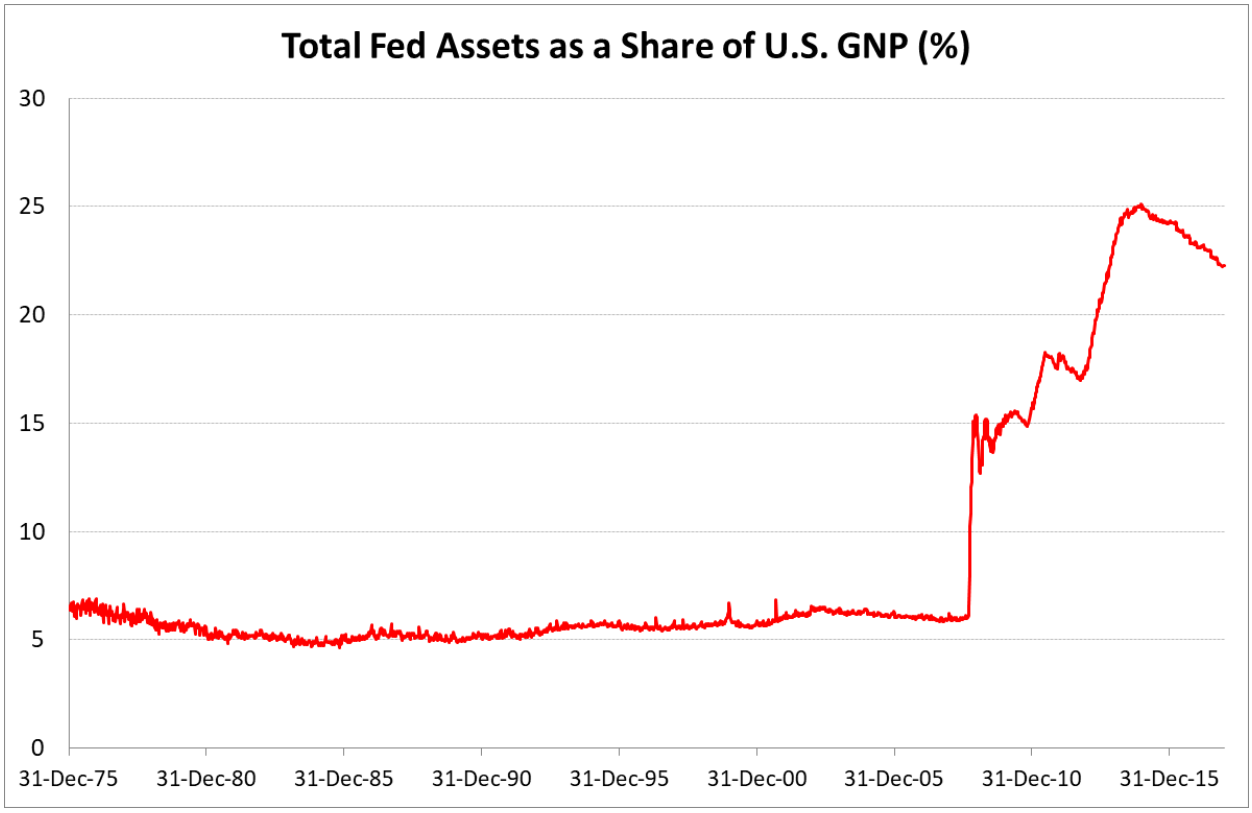
Total Assets (graph on next page)

The end of the Great Inflation saw modest, if not minimal, growth in Fed assets. The record high inflation levels caused the Fed to readjust their focus from growing their asset base to controlling monetary policy first. However, Fed assets experienced sustained growth beginning when Paul Volcker's anti-inflation policies came to fruition during the mid to late 1980s through the first half of the Great Moderation.

28 Hetzel, p. 23

29 Goodwin, Keith. "Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010."*Federal Reserve History*, www.federalreservehistory.org/essays/dodd_frank_act?WT.si_n=Search&%3BWT.si_x=3.


Total Fed Assets, 1976 - 2018 (nominal, $ trillion)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
31-Dec-75
31-Dec-80
31-Dec-85
31-Dec-90
31-Dec-95
31-Dec-00
31-Dec-05
31-Dec-10
31-Dec-15


Total Fed Assets as a Share of U.S. GNP (%)
30
25
20
15
10
5
0
31-Dec-75
31-Dec-80
31-Dec-85
31-Dec-90
31-Dec-95
31-Dec-00
31-Dec-05
31-Dec-10
31-Dec-15

The extreme increase in Federal Reserve assets beginning in early 2008 can be attributed to the Fed's attempt to stimulate activity during the financial crisis. As financial market turbulence turned into a full-blown financial crisis, the Fed sought to become increasingly expansionary. Under its policy of quantitative easing, the Fed purchased many government and private-sector securities to help stabilize the economy. As a result, total Fed assets increased from nearly $1 trillion to nearly $3 trillion in less than five years.[30]

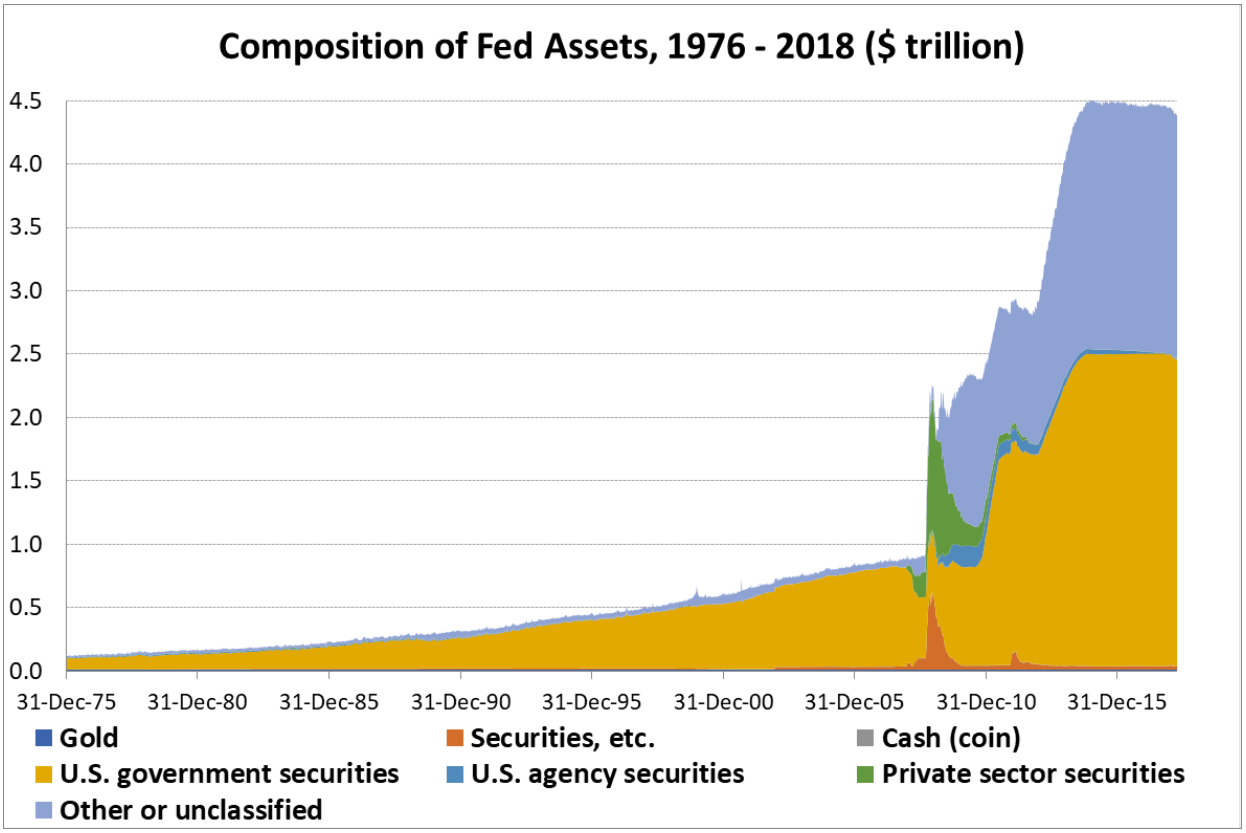
To further emphasize the drastic rise in Federal Reserve assets, the second graph below depicts how the Fed's assets rose as a share of U.S. GNP. Quantitative easing policies caused Fed assets to increase, amounting to nearly 25 percent of the U.S. GNP in 2013, as the Fed purchased more U.S. government securities and mortgage-backed securities to lower interest rates and help stabilize the economy. These purchases were also aimed at increasing the credit available for housing purchases, since this would support the housing market, which was at the center of the Great Recession.

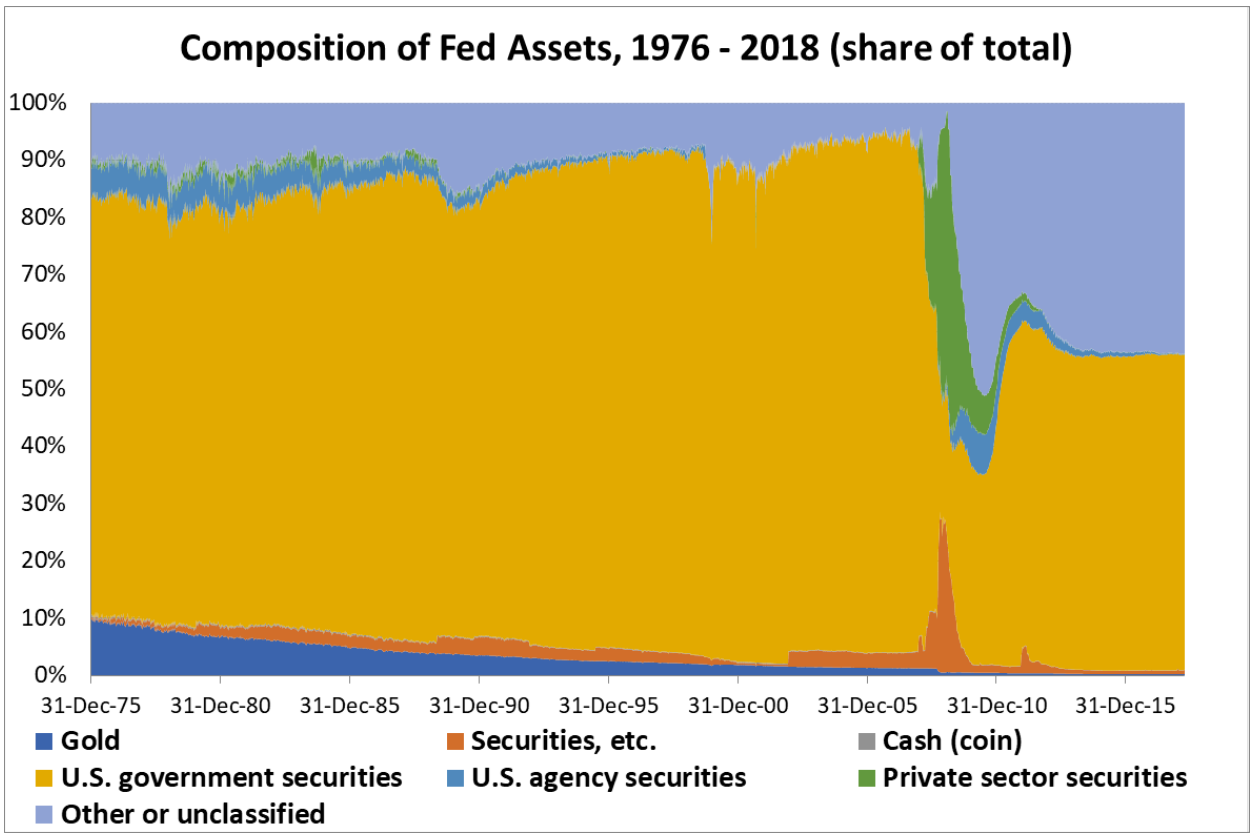
Asset Composition (graphs on next page)

As a result of the end of the Bretton Woods system in the early 1970s, gold reserves declined in importance. The U.S. dollar was not backed by gold anymore; rather, it was now a fiat currency, meaning it was not convertible at a set rate into any commodity. Gold reserves dropped from 9.8 percent of total assets in 1976 to 0.25 percent in 2017. The decline in the usefulness of gold for the Fed is apparent in this severe drop-off. However, this calculation values gold at the official rate of $42.2222 per troy ounce rather than the much higher market price. A graph in the accompanying Excel workbook, not reproduced here, shows that even at the market price for gold, the Fed's gold holdings in the last several years have been in the neighborhood of 7 percent of its total assets, versus around 26 percent in early 1976.

Paul Volcker's anti-inflation measures during 1979-1984 led the Fed to see modest growth in its total assets. Strong economic stability after that point increased the demand for the monetary base and enabled the Fed to increase its liabilities without causing a return to high inflation. The corresponding asset-side change was a sizable rise in the acquisition of U.S. government securities. Before the Great Recession, the Fed's policy was to limit its purchases to Treasury securities with short maturities. During the Great Recession and its aftermath the Fed deviated from decades of tradition to purchase long-term Treasury securities as a way of signaling to markets that it was willing to take unusual measures to expand the monetary base and to ensure that nominal interest rates remained low for as long as necessary to overcome the effects of the recession.

30 A number of economists have however claimed that the Fed severely undermined its efforts at expansion by starting in October 2008 to pay interest on the excess reserves of commercial banks. According them, paying interest encouraged banks to hold reserves at the Fed rather than lend them out to borrowers. Exponents of this view include David Beckworth (Macro Musings Blog), Robert Hetzel (2014), George Selgin (Alt-M blog), and Scott Sumner (The Money Illusion blog). For a little more on the subject, see the discussion below.


Composition of Fed Assets, 1976 - 2018 ($ trillion)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
31-Dec-75
31-Dec-80
31-Dec-85
31-Dec-90
31-Dec-95
31-Dec-00
31-Dec-05
31-Dec-10
31-Dec-15
Gold
Securities, etc.
Cash (coin)
U.S. government securities
U.S. agency securities
Private sector securities
Other or unclassified


Composition of Fed Assets, 1976 - 2018 (share of total)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
31-Dec-75
31-Dec-80
31-Dec-85
31-Dec-90
31-Dec-95
31-Dec-00
31-Dec-05
31-Dec-10
31-Dec-15
Gold
Securities, etc.
Cash (coin)
U.S. government securities
U.S. agency securities
Private sector securities
Other or unclassified

The graphs above depict the Fed's purchase of private-sector securities during the Great Recession, a result of action taken to calm the economic situation. These private-sector security purchases were short-lived, lasting from the onset of the crisis, 2007, until mid 2010. After that point, private-sector securities fell to a menial share of total assets. It is worth remembering that holding private-sector assets has been unusual for the Fed in recent years, but was common in its early years, and envisioned by the Fed's founders. Regardless, the move toward private-sector securities, such as mortgage-backed securities, and the Fed's participation in special-lending programs during the Great Recession exposed it to markets it hadn't been directly involved in before. These lending programs were designed by the Fed to support the ailing financial institutions during the financial crisis, also contributing to increased consumer and business access to credit.[31] The scale of lending distributed by the Federal Reserve during this period was unmatched in its history, and displays the Fed's ability to offer extreme support in times of crisis.

Assets represented in the "Other Assets" category in the graphs include cash and loans. During the Great Recession this category ballooned due to its makeup, which included major items like mortgage-backed securities and even bailout loans to ailing financial institutions. During the apex of the recession, the bailout loans the Fed gave out to many different financial institutions were causing this specific asset category to skyrocket in total value, and as a share of the Fed's total assets. The passage of the Dodd-Frank Act inhibited the Fed's ability to offer emergency loans. The small spike in Other Assets during late 1978 was the culmination of panics that took place in the U.S. and globally during the Iranian Revolution, which led to a jump in oil prices. Many businesses were hit heavily, resulting in the Fed offering aid in during a time of corporate distress to preserve the stability of the financial system. The large spike in Other Assets during the Great Recession was due to the amount of loans and government aid given out by the Federal Reserve to protect select financial institutions from failing. Note how large the Other Assets category became: at one point exceeding Treasury securities, and today still not far behind Treasuries. This was the biggest change in asset policy since the abandonment of the gold standard. At the end of 2016 the Fed held $1.74 trillion of mortgage-backed securities, 27 percent of the total outstanding in the market.[32]

Liability Composition

During the Great Inflation, the Fed's balance sheet shrank slightly as a share of U.S. GNP, as a graph above showed. During the Great Moderation, the balance sheet remained at approximately 5-6 percent of GNP. The composition of liabilities changed, though. The Monetary Control Act brought institutions formerly removed from the Fed's influence into close proximity with the Fed. A countervailing development was the spread of retail "sweep" programs, which reduced transaction account reserve requirements while providing bank

31 Weinberg, John. "Federal Reserve Credit Programs During the Meltdown." *Federal Reserve History*, 22 Nov. 2015, www.federalreservehistory.org/essays/fed_credit_programs.
32 "U.S. SECURITIZATION YEAR IN REVIEW: 2016." *SIFMA Securitization Year in Review*, 2016, pp. 5–6.

customers access to their funds.[33] These programs decreased the amount of reserve deposits in relative terms, although reserve deposits increased in nominal terms.

Until the Great Recession, notes in circulation were growing as a share of the Fed's liabilities. Strong foreign demand was a major force behind the increase in notes. For example, major foreign and domestic crises[34] have usually coincided with large growth in banknotes, because U.S. notes are more widely trusted than the domestic currencies of many countries.[35] Although there is no way to be certain how much U.S. currency is held abroad, a common estimate is about two-thirds.

High inflation tends to drive people out of cash because inflation erodes the purchasing power of cash. Low inflation and low interest rates, in contrast, tend to encourage demand for cash because the loss of purchasing power from not spending or depositing cash is lower. In a matter of two years, the amount of monetary base notes issued by the Fed grew from $25.1 billion in January 1984 to $43.6 billion in December 1986. The Great Moderation created an environment where cash remained widely used even though the volume of electronic payments grew faster than the volume of cash transactions. The Great Recession sparked a "renewed demand for U.S. banknotes that has shown no signs of abating," resulting in a constant rise in supply.[36]

In October 2008, the Federal Reserve received the right to pay interest to banks on their excess reserves.[37] The move incentivized banks to continue to hold onto their reserves, as opposed to lending out the majority of their excess deposits. As a result, during the Great Recession, there was a large jump in deposits, with the introduction of interest payments providing banks another source of revenue during a time of crisis. This can be seen in the graph below, as deposits increased sharply in dollar terms and as a share of total Federal Reserve liabilities. Deposits at the Fed increased 331 percent from October 2008 to October 2013, and as a share of total Fed liabilities they increased from 11.2 percent to 62.5 percent in the same period.

Although long considered an option, the Federal Reserve did not begin paying interest on reserves until 2008, a move that aimed to "broaden the scope of the Fed's lending programs"[38] and help keep the short-term fed funds rate stable. In 2006, before the Great Recession, Congress passed the Financial Services Regulatory Relief Act of 2006, which allowed the Fed to

33 "Legal Interpretation - Sweep Accounts." *Board of Governors of the Federal Reserve System*, May 2007, federalreserve.gov/BoardDocs/LegalInt/FederalReserveAct/2007/20070501/20070501.pdf.

34 The debt crises and accompanying high inflations of less-developed countries in the 1980s, the East Asian currency crisis of 1997-98, the fall of the Berlin Wall, the collapse of the Soviet Union, the events of September 11, 2001

35 Judson, Ruth A. "Crisis and Calm: Demand for U.S. Currency at Home and Abroad from the Fall of the Berlin Wall to 2011." *International Finance Discussion Papers*, Nov. 2012, doi:10.2139/ssrn.2181978.

36 Judson, p. 2.

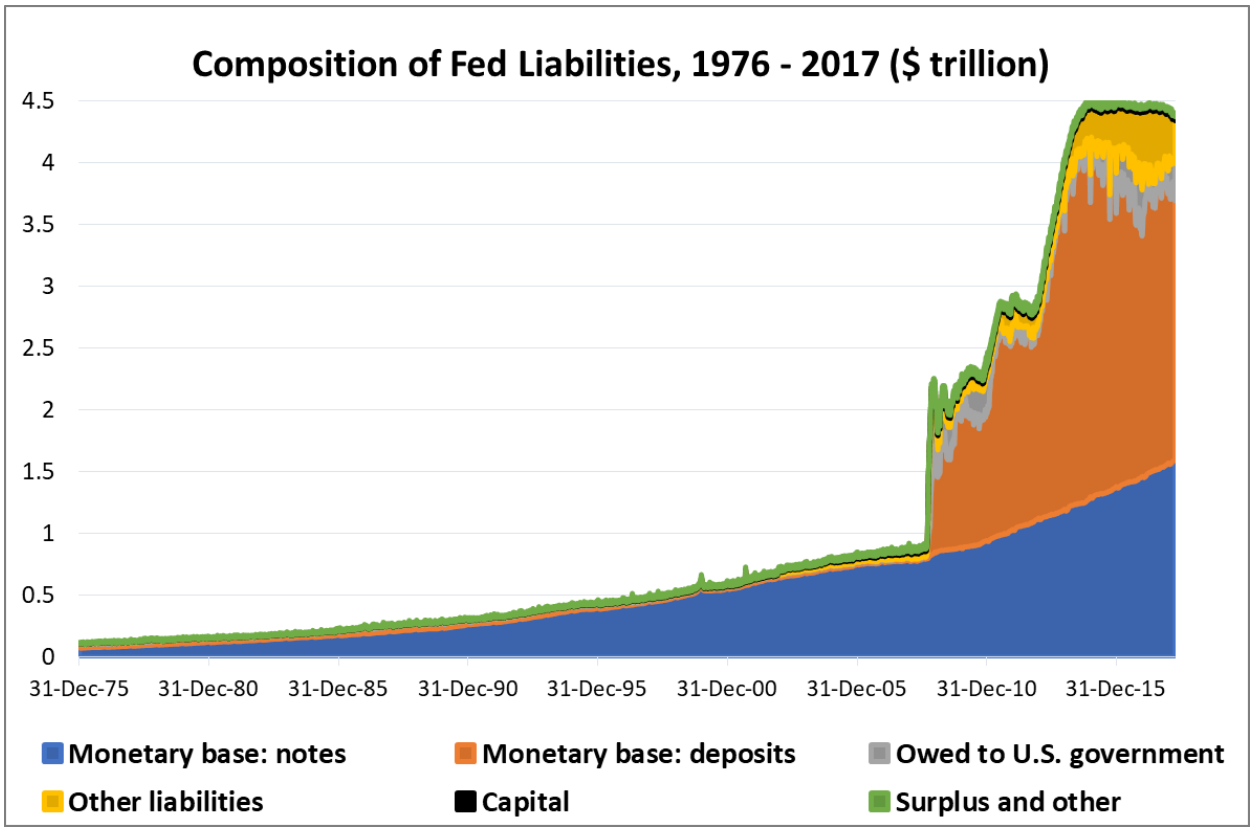
37 Weinberg, "Great Recession and its Aftermath."

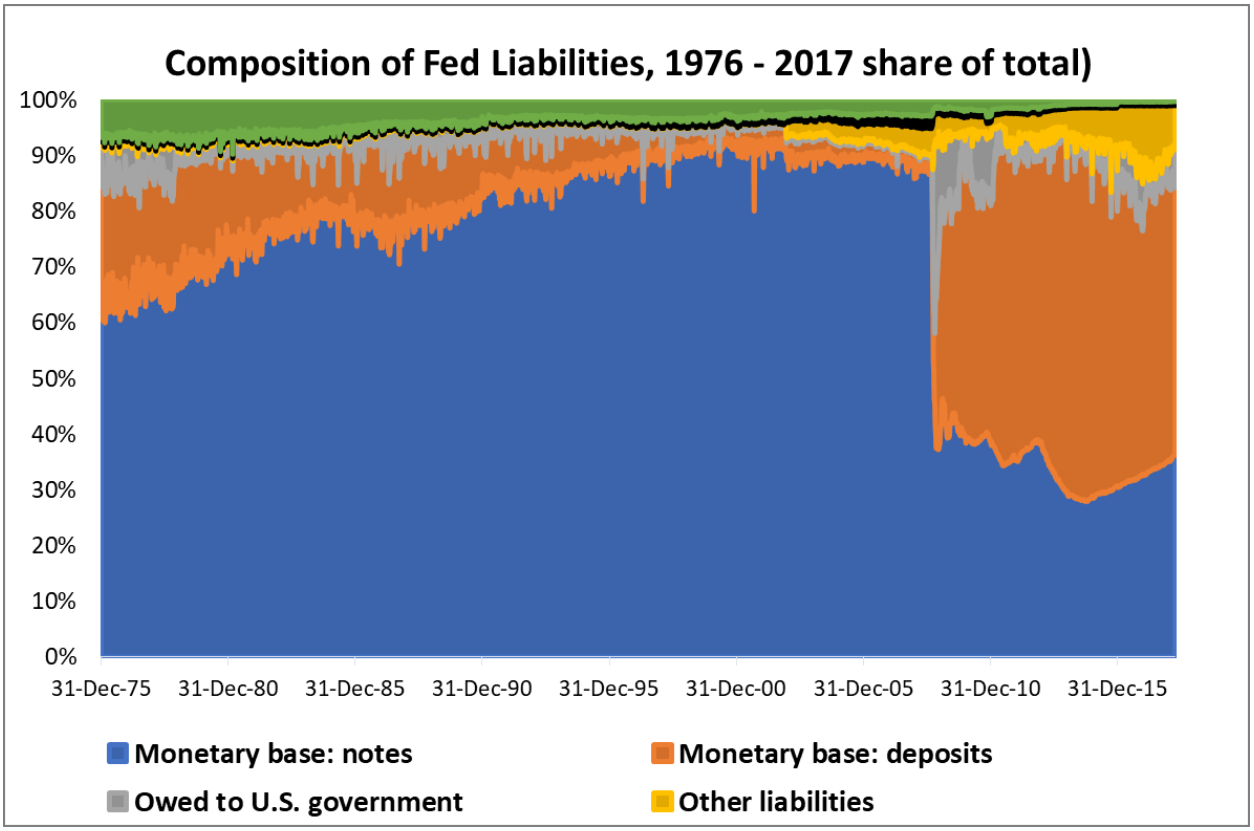
38 Federal Reserve Bank. "Why Did the Federal Reserve Start Paying Interest on Reserve Balances Held on Deposit at the Fed?" *Federal Reserve Bank of San Francisco*, Federal Reserve Bank of San Francisco, 1 Mar. 2013, www.frbsf.org/education/publications/doctor-econ/2013/march/federal-reserve-interest-balances-reserves/.

pay interest on reserves. It was initially scheduled to go into effect in October 2011, but the financial crisis forced legislators to move the start date up by three years, and the policy began October 6, 2008.[39] Since the start of the Great Recession, the Fed's balance sheet has experienced tremendous fluctuation. The Fed has also effectively become an intermediary between banks and the mortgage-backed securities market.

Also, the growth in total Fed liabilities coincides with the rapid economic growth and stabilization of the early to mid 1990s, thanks to the confidence inspired by the monetary policy of Paul Volcker's Federal Reserve. Moreover, the growth continues through the Great Recession and its aftermath, as the Federal Reserve hoped to stabilize the economy after a major crisis through the guidance of Federal Reserve chairs Ben Bernanke and Janet Yellen. Another development during the Great Recession was the spread of retail sweep programs, which reduced transaction account reserve requirements while providing customers access to their funds.[39] These programs increased the amount of deposits as a share of total Fed liabilities, in order to benefit customers.

39 Federal Reserve Bank. "Why Did the Federal Reserve Start Paying Interest on Reserve Balances Held on Deposit at the Fed?" *Federal Reserve Bank of San Francisco*, Federal Reserve Bank of San Francisco, 1 March 2013, www.frbsf.org/education/publications/doctor-econ/2013/march/federal-reserve-interest-balances-reserves/


Composition of Fed Liabilities, 1976 - 2017 ($ trillion)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
31-Dec-75
31-Dec-80
31-Dec-85
31-Dec-90
31-Dec-95
31-Dec-00
31-Dec-05
31-Dec-10
31-Dec-15
Monetary base: notes
Monetary base: deposits
Owed to U.S. government
Other liabilities
Capital
Surplus and other


Composition of Fed Liabilities, 1976 - 2017 share of total)
100%
90%
80%
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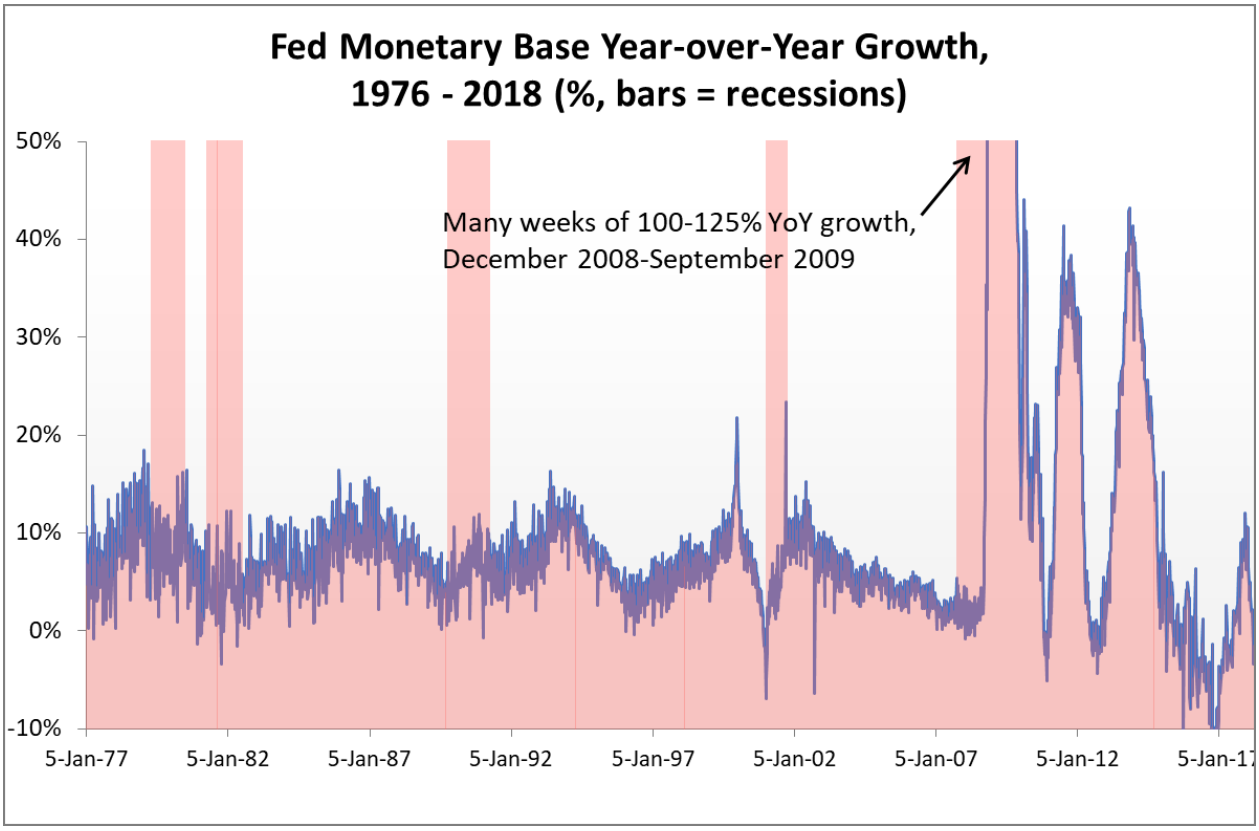
60%
50%
40%
30%
20%
10%
0%
31-Dec-75
31-Dec-80
31-Dec-85
31-Dec-90
31-Dec-95
31-Dec-00
31-Dec-05
31-Dec-10
31-Dec-15
Monetary base: notes
Monetary base: deposits
Owed to U.S. government
Other liabilities

Fed Monetary Base Growth Rate

The blue line in the graph below represents the growth in the Fed monetary base year-over-year, while the vertical pink bars represent recessions.[40] Prior to the Great Recession, the growth of the monetary base generally remained within a band of 0-15 percent. The growth rate tended to decline before or sometimes during a recession. During the Great Recession, growth in the monetary base rose at rates not seen since World War I, as the Federal Reserve purchased many government and private-sector securities to stimulate economic activity and provide credit opportunities that were too absent during this time period.



Conclusion

The period from 1976 – 2017 saw large changes in the responsibilities of the Federal Reserve. The Federal Reserve Reform Act of 1977 (Humphry-Hawkins) instituted the Federal Reserve's dual mandate of maintaining control over both the price level and unemployment. It also created a system of accountability between the Fed and Congress; the Fed had to announce its reports and updates, and report in Senate hearings semiannually. This system helped eliminate

40 The Treasury also issues a small portion of the monetary base, consisting of coins and old Treasury-issued notes that are now destroyed or held by collectors. The Treasury portion of the monetary base is insignificant both for statistical and policy purposes. The *Treasury Bulletin* of March 2018 (page 43) indicates that at the end of 2017, coins in circulation were approximately $49 billion, or equal to somewhat more than 1 percent of total Fed assets.

volatility due to surprise actions by the Fed. The appointment of Paul Volcker as Fed chairman signaled a change in the Fed's approach to policy. Instead of the previously popular "go-stop" method of monetary policy, Volcker utilized a systematic approach to monetary policy, aiming to control the money supply at first chance, rather than react to economic factors. These anti-inflation measures were unwelcome at first, as they caused a few short recessions with high unemployment, but after five years, the economy recovered and the Great Moderation began. The Great Recession led to more regulation for the Federal Reserve and the corporate bodies it oversaw. New legislation such as the Dodd-Frank Act has altered the way banks operate, and how the Federal Reserve can provide emergency aid and serve as an overseeing body to enforce new preventative regulations. However, it has been observed that the Fed's aggressive approach in this period to monetary policy and controlling inflation and unemployment has been successful in helping the U.S. economy recover from multiple recessions.

Data Appendix

An accompanying Excel spreadsheet contains the consolidated weekly balance sheet of the Federal Reserve System from 1976 to early 2018. I digitized data from 1976 to June 20, 1996 by hand from FRASER (Federal Reserve Archival System for Economic Research, a Web site of the Federal Reserve Bank of St. Louis). I filled in several missing statements with data from the following week, which shows the level for that week and the change from the previous week. Data from June 27, 1996 to December 11, 2002 are available on the Web site of the Board of Governors of the Federal Reserve System as individual weekly statements that were not previously available in a combined file. Data from December 18, 2002 onward are available in downloadable form that however is not especially user friendly. Note that from October 25, 1989 onward, balance sheet categories may not exactly equal the sum of their components because of rounding.

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