The Fed’s Monetary Policy and Its Possible Effects on the U.S. Stock Market After the Great Recession

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Corporate Finance
2018

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Introduction

Ten years after the financial crisis all financial media, financial institutions and investment professionals, opinion leaders and influencers came forward with their own assessment of the crisis and the subsequent period including policy decisions and changes. In 2018, with Fed policy normalization on the way, and plans for the European Central Bank to gradually follow suit it becomes crucial in many dimensions to understand what has been happening with regard to monetary policy actions responding to the crisis. This thesis is attempting to cover a lot of ground and go down to the basics while introducing relevant and up-to-date research results with the aim to get a broad understanding of the issues discussed and clear some areas that are often discussed in the media. More precisely, the paper tackles the question of whether and how the Federal Reserve’s monetary policy actions following the crisis affected financial markets focusing on the S&P 500 stock market index in the United States.

The paper starts with a historical overview of the Fed to get an evolutionary perspective of central banking in the U.S. with reasons for its existence, policy responses to crises, and ideological changes along the way. This part is included because history provides us with a dynamic framework where we see how and why central banking became what it is today. Seeing the precedents for triumph and adverse reaction of monetary policy throughout the century and the changes they brought about propels us to think critically about it. We see that the question of what the goal of central banking or the toolkit they use is or should be have been and still is debated. Assessing what is “natural” or “normal” with regard to policy actions and their effects as opposed to “induced” or “excessive” still remains a major challenge. In this first part, I review the Fed’s policy evolution organized around the Great Depression, the Great Inflation and the Great Recession; the three major economic events that defined macro policies since its founding in 1913.

The second part looks at the Fed’s current policy framework including its “dual mandate”, the pre- and post-crisis toolkit and an outlook for the near future with policy normalization and zero lower bound limitation in a possible economic downturn.

The third chapter looks at the stock market and the determinants of stock market prices independently from monetary policy. The determinants are broken down into two groups. One affects corporate earnings which is a more objective measure, and the other group relates to the more subjective valuation level. In the corporate earnings section, I
introduce how forward earnings estimates are generally used in the industry and how these estimations and market prices following them get complicated by business cycles. Business cycles seem to have major impacts on financial markets, and also connect them to central banking. I review some methods used in the financial sector to assess where the economy in a business cycle framework is and where it is headed. I also survey what the most notable economic schools’ focus was when addressing the problem. Private demand, money supply, and debt-creation are the three critical elements in cycle theories; but Edward Yardeni puts the emphasis on corporate profits which approach seems particularly reasonable from a stock market perspective. The second section in this chapter looks at methods used to assess valuation levels in the stock market. The first is the Fed Model which compares the forward earnings yield to the ten-year Treasury note yield. The second is the CAPE ratio which is a cyclically adjusted price-earnings ratio using the inflation-adjusted S&P index and the ten-year average of real earnings to assess valuation levels relative to historical measures. Since the stock market valuation level is first and foremost assessed in relation to Treasury bond yields, the question of what drives long-term yields is also addressed. Lastly, I look at the implied equity risk premium, which is a forward-looking estimated measure of market risk regarding stocks.

The fourth chapter connects monetary policy with the stock market through the monetary transmission mechanism and looks at quantitative measures to assess the impact of the Fed’s actions first on bond yields, then on the stock market. The last section is an international outlook. The thesis focuses narrowly on U.S. monetary policies and stock market and the cumulative effects of all central banks pursuing expansionary policies on global markets are not addressed in depth. This is a logical next step without which the question of how crisis responses affected financial markets cannot be fully answered.

1. A Historical Overview of the Fed and Its Policies

To understand the present system, I believe it is vital to go back in history and review the evolution of the institution and theory in this historical context. One can find the reasons for certain developments as well as the boundaries and limitations caused by both the practical necessity and the ideologic insularity during the progression. To do this, I mostly rely on Mehrling (2011) and follow the structure offered by Blanchard and
Summers (2017) using the major economic events of the 20th century after which macro policies needed rethinking, changing the role of monetary policy and its weight within the macro policy framework as well.

1.1. Origins

Before the Federal Reserve System, there was a regular seasonality in interest rates caused by the seasonality in agriculture. This resulted from the inelastic nature of the bank reserves which at the time consisted of government bonds and made deposits inelastic as well. The Federal Reserve Act of 1913 sought to address the issue by making the supply of reserves elastic by replacing government bonds with commercial loans and thus created the Federal Reserve Banks to discount them when adding reserves to the system.¹ For their daily liquidity, American banks relied on the “shiftability” of their investment portfolios in liquid markets. When in need of funds, the lines of credit with other banks provided them with the necessary liquidity. After that, high-quality bonds served as secondary reserve: they could either sell them or use them in repurchase agreements. This shiftability depended on security dealers and speculators who were willing to take the risk and provide liquidity when needed. The Federal Reserve Act did not replace this private liquidity provision, it only made clear that commercial loans would be shiftable to the Fed if a crisis happens thus it would play the role of the “lender of last resort.”

In practice, the system worked differently than how the framers had imagined. Member banks didn’t use the discount accommodation very often, so Reserve Banks started buying eligible papers in the open market. To replace the National Bank note with the Federal Reserve note, Reserve Banks also started buying the underlying 2 percent bonds which acted as collateral. In these actions, we find the origins of the open market operations commonly used by the Fed today and the understanding of the centrality of shiftability which is “tantamount” to liquidity.² Mehrling goes on from here and suggests the idea that had events go down on a different path, the Fed might have organically developed shiftability mechanisms to provide a liquidity backstop for security markets in order to support the liquidity of the banking system. However, World War I, the Great Depression, and World War II did not allow this evolution to happen and through the blow-up of government debt, Treasury debt became the

¹ Mehrling, 2011.
² Mehrling, 2011. p. 35.
shiftable asset and the source of liquidity for the system. In 1916, the Federal Reserve Act was amended to allow Federal Reserve notes to be issued against Treasury securities as collateral.

To sum up, the Fed’s origins can be understood as an attempt to deal with the seasonal fluctuations in the needs of funding in an agricultural economy, and the solution was to help make the deposits, notes, and reserves elastic. While the original idea was to use self-liquidating and thus elastic-by-nature commercial loans as collateral, history intervened, and government debt took the role forcing the Fed to deal with elasticity artificially by actively trading in existing government debt to expand and contract reserves, and therefore notes and deposits in the system.

1.2. The Great Depression

Before

After solving the seasonality problem, the Fed could go on and deal with the bigger industrial cyclicality issue in the economy. In the case of seasonality, the goal was to remain neutral in the sense that they would not influence the real economy but would only adjust the banking system to it. However, when dealing with cyclicality, neutrality was not necessarily the goal. Benjamin Strong, the governor of the New York Fed followed the Hawtreyan idea that a central bank should restrain credit when it is expanding and loosen conditions when it is contracting. To do so, the Fed would sell and buy assets to influence the “quantity of discounts” thus discouraging or encouraging lending and borrowing. Strong, using this approach, seemed to help mitigate cyclical downturns in 1924 and 1927.\(^3\)

On the international level, the world was about to return to a new gold standard after World War I. In this sense, the Federal Reserve’s actions to deal with the seasonality problem gave elasticity to the system on the domestic level preventing it to spill over to the international markets. Without this added elasticity, gold reserves would fluctuate as foreign capital goes into the dollar and out as a consequence of interest rate changes. During World War I, as countries had to finance war materials, most of the world’s gold went to the United States, which was the only country remaining on the gold standard during that time. As gold reserves increased in the U.S., the Fed

\(^3\) Mehrling, 2011.
monetized it, which led to the doubling of the dollar price level and the halving of the real value of gold.

After the war in 1920-1921, the U.S. went through a recession with serious deflation during which the Fed brought the dollar price level back 60 percent toward the prewar equilibrium and kept it there until 1929.\(^4\) With the world price level above the prewar level and gold reserves depleted during the war, countries going back to the gold standard made gold scarce pushing its value up and prices of goods quoted in gold down.\(^5\) To avoid deflation, countries should have devalued their currency against gold and not go back on the standard at the pre-war parity.\(^6\) The United Kingdom returned to gold in 1925 at the old parity which led to deflation and depression in the country. According to Mehrling (2011), some argue that the reason the Fed kept interest rates low throughout the 1920s, was, to help other countries, notably England, in their return to the standard by not attracting gold.

Whatever the reason might have been, the easy monetary condition led to an annual increase of 4.6 percent or a cumulative 45 percent in the money stock between 1921-1929. With an average 1 percent deflation in the U.S. during 1923-1929, the Fed had no incentive to restrict the money supply, and stock prices kept going up until 1928 when the Fed ultimately started tightening.\(^7\) However, it was too late: contractionary open market operations could not stop the boom, and credit outside the banking system continued to expand due to rising asset valuations until the stock market bubble popped in October 1929. As Mehrling (2011. p. 41.) puts it: “Inadvertently, Strong’s interest rate policy proved to be the original stock market put.”

\textit{After}

The Fed was ready to act as a lender of last resort in the time of crises and lent freely against commercial loans. The real problem was, however, the falling value of private securities and the Fed was not prepared to discount those and lend against them. So, the falling value of these assets undermined the solvency of member banks. The “inherent instability of credit” – as Ralph Hawtrey called it in 1923 – was showing its power and as it helped inflate asset prices on the way up, it also helped deflate them on

\(^4\) Mundell, 2000.
\(^5\) Mehrling, 2012.
\(^6\) Mundell (2000) lists a few economists who saw the deflationary threat including Ludwig von Mises. Another economist from the Austrian school of economics, Friedrich Hayek was also quoting Ricardo who warned about the dangers of returning to the old parity after an inflationary period in 1821.
\(^7\) Peicuti, 2014.
the way down. The point is – as emphasized by Mehrling (2011) – that the money market and the securities markets have always been intertwined which makes it impossible to differentiate between speculative and productive credit. This enlacement originates from the time before the Fed existed: banks relied on the shiftability of their assets for their funding liquidity and the birth of the Fed only put emphasis on commercial loans and later, on government debt, but the intertwining never disappeared from the money and securities markets.

The money supply had been falling since the Fed started tightening in 1928 to stop the stock market speculation and the monetary base fell 6 percent between 1928 and 1930, even though gold reserves were up 10 percent. In 1931, the Fed raised rates to stop the gold outflow. After 1931, the decline in the money supply was supported by banking panics and exchange-rate crises as well. Banking panics (1) caused the currency/deposit ratio to grow due to the diminishing public confidence, and the reserve/deposit ratio also increased due to the caution of the commercial banks, therefore, the money stock/monetary base ratio decreased. Exchange-rate crises (2) and fears of devaluation of currencies made central banks reduce their reserves/gold ratio. These reserves were international reserves and were convertible to gold on a one to one basis under the interwar gold standard. On top of these central banks also increased their gold reserves (3) and the coverage ratios to be safe against currency attacks. These three elements caused the money stock to decline.8

The United States left the gold standard and broke the peg in 1933 and the dollar fell 40 percent in a year relative to gold.9 Reflation, however, did not lead to similar devaluation against commodities as Mehrling (2011) points out, because cautious commercial banks and their expanding bank reserves absorbed the monetary expansion, therefore, it did not have an impact on the money stock. The ideology of the commercial loan theory and the self-liquidating aspect of it prevented the Fed to realize the impact of the falling money supply. As one Fed official articulated it: “We have been putting out credit in a period of depression when it was not wanted and could not be used, and we will have to withdraw credit when it is wanted and can be used.”10 Under the influence of the commercial loan ideology, the Fed failed to monetize bank assets

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8 Bernanke, 1994.
9 Dalio, 2017.
10 Wheelock, 2010.
during the crisis because private securities that made up the bulk of the bank balance sheets were considered speculative.

Ultimately, the Banking Act of 1933 which separated commercial and investment banking activities – also known as the Glass-Steagall Act – and the creation of the Federal Deposit Insurance Corporation which promised the protection of deposits stopped bank runs and currency poured back into banks as they reopened after the bank holiday. The Fed purchased $600 million of government securities during 1933, and gold started flowing back to the country increasing commercial bank reserves during 1934 and 1936.\(^\text{11}\) The Banking Act of 1935 permitted the Fed to lend against any sound asset, and not only commercial loans. This effectively means that liquidity was made a matter of government policy: liquidity is rediscountability. The Fed did not buy the troubled asset though, it only recapitalized banks to give them time to work things out. This meant that the shiftability view has won over the commercial loan theory.\(^\text{12}\)

By 1935, more than half of total bank reserves were excess reserves. So, the amount of reserves kept by banks were twice the size of the regulatory requirement. The Fed, worrying that this could lead to inflation if the banks were to start lending rapidly, increased the reserve requirements from 13 to 26 percent on transactions deposits and 3 to 6 percent on time deposits, making the excess disappear. Another solution could have been to use open market operations and sell securities, but the idea was rejected because the size of the Fed’s securities portfolio was not big enough to absorb the excess.\(^\text{13}\) As a result of this policy change, interest rates rose, the money stock growth declined, and the economy entered a re-cession also giving birth to the expression.\(^\text{14}\)

1.3. The Great Inflation

Before

In 1936, John Maynard Keynes and his *General Theory of Employment, Interest and Money* started a change in macroeconomic policies. He suggested that government spending can produce recovery. Ultimately, World War II caused sufficient spending that would lead to full employment and a planned economy. In these times, solvency and liquidity were a matter of government policy once again, and not a result of

\(^{11}\) Ibid.
\(^{12}\) Mehrling, 2011.
\(^{13}\) Wheelock, 2010.
\(^{14}\) Dalio, 2017.
commercial calculation. Interest rates on Treasuries were fixed, and the Fed was responsible for supporting these prices and as a dealer offered two-way convertibility into cash. Government debt and Fed credit expanded greatly, but after the war, the Fed would support shiftability in the securities market only indirectly. The enlacement of the money and the securities market was established once again through the Fed’s support of the funding liquidity of private dealers.\textsuperscript{15}

The Employment Act of 1946 solidified the change that was started by Keynes ten years before. It defined the promotion of “maximum employment, production and purchasing power” as the primary goal of the federal government and it would use fiscal policy to achieve these goals. Wartime spending and wage and price controls showed the power of fiscal spending and direct controls to achieve economic growth while keeping inflation under control. The wartime experience reduced the perceived importance of monetary policy and the Fed. Unemployment rates remained fairly steady until 1970, and policymakers came to believe that there is “a permanent long-run trade-off between the level of unemployment and the level of inflation”.\textsuperscript{16} The Vietnam War’s stimulation in the 1960s, oil price shocks, commodity and food price increases, the falling value of the dollar and a declining productivity, however, gave way to higher and higher inflation. Due to the ruling paradigm, it took around a decade until policymakers realized the important role that monetary policy and the money stock growth rates played in the Great Inflation of the 1970s.

According to Lubik and Matthes (2014), the narratives of this period can be put into three groups. The first one suggests that it was simply bad luck that there were strong and persistent exogenous shocks with high frequency during the 1970s. The second says it was bad policy from the Fed and that they were not restrictive enough to fight inflation. The third group of narratives highlight that there was a bad understanding of how the economy works: policymakers overestimated the degree of productive potential. The factors highlighted in the three groups together caused high inflation and the inability to deal with it effectively.

In the early years of this period, between 1969-1971, the so-called cost-push views gained ground. This view was not new, but it assumed that inflation in the 1960s was due to excess demand, but inflation in the 1970s was different: they were caused by wage increases and external shocks such as oil price increases. This view was widely

\textsuperscript{15} Mehrling, 2011.
supported by policymakers. Even the former and the incumbent Fed chair, William McChesney Martin and Arthur Burns thought that fiscal and monetary policy together is not enough to fight inflation, and direct measures are needed such as incomes policies. Nixon installed compulsory price and wage controls in 1971 and was determined to bring about full employment by mid-1972. The influence of wartime experience lasted long. At the same time, government deficits grew with the Fed supporting the expansionary policies and even adding fuel to the fire by allowing real interest rates to fall drastically in 1971-1972. By mid-1973, annualized CPI inflation was 9.5 percent. Burns and the cost-push theory blamed fuel price increases and trade unions for the inflation.\(^\text{17}\) In 1975-1976, the money stock growth picked up and led to a rising inflation again in 1977 after a period of decline. Under Burns as Fed chair between 1970-1978, the annual growth rate of M1 was 5.9 percent with an annual growth rate of 9 percent for M2.\(^\text{18}\) After analyzing the FOMC documents, Weise (2012) argues that political pressures on the Federal Reserve were also a major contributor to the rise in inflation and to the insufficient policies to stem it.\(^\text{19}\)

The Carter Administration also had an aggregate demand policy that was directed towards full employment. As he said, his policy “directly addresses the roots of inflation and, at the same time permits expansion in the economy and a simultaneous reduction in unemployment.”\(^\text{20}\) In 1978, in his second incomes policy, Carter announced a restraint on government spending, but he thought it only mattered through a psychological effect and not through an aggregate demand or money growth channel.

**After**

Paul Volcker became the Fed chairman in August 1979 and was convinced that the main concern was price stability for monetary policy. He regarded money stock growth as a fundamental factor behind inflation, but – in contrast to Milton Friedman, who was an advocate of a fixed money growth rate – he also thought that flexibility is needed when it comes to the supply of money. Nevertheless, the Fed put in place a new practice to directly control the quantity of money in October 1979. Originally, the Fed would set the federal funds rate and the FOMC’s trading desk would buy and sell securities in order to reach the targeted rate. This new practice reversed the order and set

\(^{17}\) Ibid.
\(^{18}\) Morgan, 2012.
\(^{19}\) Weise, 2012.
\(^{20}\) Nelson, 2005.
a target for the supply of money which would determine the price of money; the federal funds rate. With this, the Fed targeted the aggregate amount of reserves held by commercial banks and also established a broad tolerance range for the federal funds rate of 11.5 to 15 percent to give room for accommodation.\textsuperscript{21} The new operating procedures were used until late 1982. The episode is often called – inappropriately – a “monetarist experiment”.\textsuperscript{22}

The experiment was successful and the annual growth rates of monetary aggregates continuously fell from November 1980, subsequent to the second tightening cycle started after the presidential election. The federal funds rate remained above 15 percent often reaching the 18 to 20 percent range. Real rates were also high between 4 and 9 percent. The economy entered a recession in July 1981, but Volcker and the Fed stayed on course to make sure they put inflation to rest. By 1982, however, unemployment became the real pain point reaching 9.6 percent, so the Fed began loosening in July. The discount rate fell, the money stock grew rapidly, and the Fed ended the money stock targeting in October 1982. The economic downturn proved to be more severe than the Fed had anticipated. This was in part a result of the declining velocity of money which was caused by moderating inflationary expectations: consumers no longer had a strong incentive to spend their money in order to beat inflation.\textsuperscript{23}

Volcker enjoyed strong public support because inflation was widely considered the primary concern of the American people. The financial community also considered Volcker the best man for the job, so Reagan reappointed him in 1983. By this time, the budget deficit became a major public concern and Volcker was worried that it would fuel inflation. He expanded the supply of credit attracting huge capital inflows from abroad. Unintendedly, he helped funding deficits, but the strong demand for American securities appreciated the dollar. The strong dollar made imports cheap and kept inflation low. The widening trade gap seemed an acceptable sacrifice for the expanding credit and recovering economy.

The Fed’s success in fighting inflation proved to be fundamental to the developing credit driven economy of America. Monetary policy became the primary instrument of macroeconomic management, and the Fed chairman “replaced the president as the chief

\textsuperscript{21} Morgan, 2012.  
\textsuperscript{22} Thoma, 2008.  
\textsuperscript{23} Morgan, 2012.
manager of prosperity.” Low inflation came to be the main index of national economic well-being replacing high employment and rising wages. Stable money made the advance of finance possible, and with the loosening of financial regulations, the only control over inflation was to set interest rates. The Fed used discount window borrowing as a loose steering wheel for influencing the money supply. After 1984, it became less reliable because of the failure of Continental Illinois, a large national bank. The incident made banks reluctant to use discount window borrowing, as it could signal weakness to the market and to the public. The 1987 stock market crash completely ended this practice and the Fed started targeting interest rates directly to show support for the market.

1.4. The Great Recession

Before

Alan Greenspan became the Fed chairman just before the 1987 stock market crash and presided until 2006; during the period which is often called “the Great Moderation”. During this nearly two decades the economy was strong, inflation was modest, and unemployment was low. Greenspan became known as a man who believed in free markets, who does not think that it is part of the Fed’s job to stifle stock market speculation after allowing the stock market to run until the very end in 2001. On the other side, the Fed was propping up the market after a sudden fall in 1987, 1998, and in 2001, which is “part of its job” as lender/dealer of last resort. During the 2001 rate cut – when the stock market was already falling, but recession did not yet hit – the NASDAQ jumped 14 percent in a single day to the news. By 2003, the federal funds rate fell to 1 percent from 6.5 percent in 2000. At this point, real rates were well in the negative territory contributing to the ongoing housing boom.24

The Fed started tightening in June 2004, and the targeted federal funds rate reached 5.25 percent by June 2006. An interesting note is that the FOMC Committee started using “forward guidance” on its policy in 2003 to signal that it will likely remain accommodative for a “considerable period.”25 The reason for the use of this communication tool was that the recovery remained weak and unemployment stayed high, and the FOMC was looking for ways to further stimulate the economy.26

25 Forward guidance will become even more important after the financial crisis in 2009.
26 Yellen, 2013.
reason was that the Fed became concerned about a possible decline in inflation and it feared that the U.S. could get into a deflationary situation like Japan. Being near the zero lower bound (ZLB) meant that the room for traditional monetary policy tools has become narrowed. This was also the reason why the Fed cut rates so aggressively to 1 percent: by being more expansionary preemptively, it hoped to avoid the necessity to get to the real ZLB.\textsuperscript{27}

Gerlach and Moretti (2011) – agreeing with Bernanke (2005 and 2010) – argue that monetary policy was not the main cause of the housing bubble and the global financial crisis. They expand on how non-monetary forces are responsible for driving real interest rates down prior to the crisis, and how central bankers only underestimated the risks posed by low short-term rates and monetary accommodation. Due to savings-investment imbalances, the long-term real interest rate fell in the years before the crisis from about 4 percent in 2000 to 2 percent in 2005 depressing the yield curve all the way to the short end as the Fed lowered the federal funds rate in response.\textsuperscript{28}

\textit{After}

Because of easy monetary conditions and many other factors – a comprehensive collection of which can be found in Shiller (2015) and Bernanke (2010) – asset prices rose until the bubble popped in 2007-2008. It started with the Asset-Backed Commercial Paper (ABCP) market that collapsed in the fall of 2007 when holders started to worry about the value of the collateral. As a result, Eurodollar rates spiked as participants were bidding up the price of alternative short-term funding. Parent companies (large banks) acting as private lender of last resort took the ABCPs on their own balance sheets, therefore, supporting its price while the Fed as the “real” lender of last resort backed the banks up just like in a traditional banking crisis. The real problem started after the collapse of Bear Stearns in March 2008, when the repo market collapsed as well making haircuts – taken from the value of the collateral – soar. The Fed, creating new facilities such as the Primary Dealer Credit Facility and the Term Securities Lending Facility, was able to support the dealer system directly, which proved to be enough to stabilize the Eurodollar market at a high spread over the federal funds rate. In September 2008, Lehman Brothers and AIG collapsed, and all markets froze up including the unsecured money market and the Treasury repo market as no one

\textsuperscript{27} Bernanke, 2010.
\textsuperscript{28} Bernanke, 2005.
trusted anyone else and preferred to hold Treasury securities. “When the music stops you want the government to be your counterparty” – as Mehrling (2011. p. 120.) phrases it jocosely referring to the infamous Charles Prince quote.29

Libor rates spiked to unprecedented spreads over the federal funds rate as a result of the collapsing supply of funding liquidity and diminishing trust. The so-called LIBOR-OIS spread which was normally around 10 to 20 basis points reached about 350 basis points after the Lehman bankruptcy. To stop the panic, the Fed extended its lender of last resort role further and started accepting a wider selection of collateral from a wider selection of counterparties using its own balance sheet for direct lending. To help foreign central banks to roll over their dollar money market funding, the Fed opened liquidity swap lines for them, essentially extending its discount window borrowing to foreign banks through the central banks. At this scale of lending, the Fed had to expand its balance sheet. It did so by borrowing from member banks while paying interest on reserves for the first time, and by borrowing from the Treasury (Figure 2). To sum up, the Fed took the failing money market onto its own balance sheet (Figure 1), thus became the dealer of last resort providing market liquidity in the time of crisis instead of the traditional funding liquidity provision.30

29 He retired from his roles as chairman and CEO of Citigroup in November 2007 as the gramophone was about to fall into pieces.
30 Mehrling, 2011.
Large Scale Asset Purchases (LSAP) or Quantitative Easing (QE) proved to be so successful in stopping the financial crisis that it has won the “beautiful deleveraging
award” given by Ray Dalio (2017 and 2018). In his view, a beautiful deleveraging is one where the debt to income ratio declines while asset prices improve as a result of the right amount of central bank liquidity and credit support. The right amount is (1) enough to neutralize the deflationary effect of the credit market collapse; and (2) gets the nominal growth rate above the nominal interest rate to support the deleveraging process. He adds that it can lead to currency weakness particularly against gold but does not produce inflation since it is only cancelling the deflationary forces of the credit collapse. If too much stimulus is added, it can lead to an “ugly inflationary deleveraging”, if too little, to an “ugly deflationary deleveraging”. I expand on the details of the Fed’s actions and tools after the Great Recession in the next part of this paper.

2. A Detailed Look at the Fed’s Current Goals and Tools

The Federal Reserve’s current monetary policy toolkit can be understood in large part as a result of the Great Recession, but as we have seen, current conditions started to prevail even before the crisis. Namely, the secular decline in nominal interest rates is one major trend that forces the Fed to rethink its monetary policy tools and framework. There are many different factors contributing to the decline: lower inflation rates, aging populations in the developed world, slower productivity growth, global saving and investment patterns, and risk aversion leading to higher demand for safe assets are all forces that result in lower nominal interest rates globally. We have seen in the previous chapter that the Fed had to reinvent itself several times after major changes in economic and financial conditions. Blachard and Summers (2017) argue that the Great Recession is the next major event which should make macroeconomic policymakers realize that there is a need to rethink the current framework.

Lower nominal interest rates on the long end of the yield curve which is priced by the market; and lower long-run neutral real interest rates “consistent with keeping output at its potential on average over time” on the short end of the curve, which is set by the Fed, limits monetary policymakers’ scope to fight a coming recession. During the past nine economic downturns, the Fed on average cut the federal funds rate by about 5.5 percentage points. If the next recession hits while policy rates are still at or below

31 At the time of the writing, I could mostly use the draft version of Dalio’s research. The final version was made freely available in September 2018 at: https://www.principles.com/big-debt-crisis/
32 Bernanke, 2017.
33 Yellen, 2016.
neutral levels, the Fed would have a hard time easing. Since the effective federal funds rate is only at around 220 basis points as of October 2018 and negative rates are not likely to be used by the Fed according to Bernanke (2017) if a recession would hit now, this problem would become very real. Since I started the research for this paper, the effective federal funds rate almost doubled, and it seems that the Fed does not want to wait for a downturn with the short-term rates below neutral levels; however, it is still far from the average 550 basis points and seems unlikely that it will reach that level with long-term rates being where they are today.

This is the environment in which we need to look at the monetary policy framework and the tools used by the Fed to achieve its objectives, and this chapter is going to do just that. First, I start with the statutory goals. Second, I show the simple policy toolkit the Fed used prior to the financial crises. Third, I go through the changes and introduce the new, expanded toolkit; and lastly, the possible future paths the Fed could take in order to make monetary policy as potent as possible in the face of the new challenges. In this last part, I extend my focus a little and take into consideration other macroeconomic policies besides monetary policy.

2.1. The Fed’s Goals

“An Act To provide for the establishment of Federal reserve banks, to furnish an elastic currency, to afford means of rediscounting commercial paper, to establish a more effective supervision of banking in the United States, and for other purposes” is the official, long title of the Federal Reserve Act, where the mandated objectives of the Fed are defined. This definition of the goals was added in 1977 and was amended in 1978:

“The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy’s long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates.”34

Maximum employment and price stability are the two main “guideposts”. Moderate long-term interest rates as an explicit objective in the act can be understood in light of history but is not a concern of present policymakers. Monetary policy is used “to lean

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34 Federal Reserve Act
against damaging fluctuations in the economy.” Normally, it can ease by lowering interest rates when the economy is weak and encourage spending and investing; and it can tighten by increasing interest rates when the economy is overheating and threatening to push inflation too high.\textsuperscript{35}

If we want to understand where we might be in an economic expansionary phase, we need to know what exactly maximum employment and price stability is, and how does the Fed measure it. As for maximum employment, policymakers need to take into account the so-called frictional unemployment. It refers e.g. to those who are temporarily unemployed because they are between jobs, or not yet employed after leaving school. Structural unemployment is when people are ready to work but they don’t have the skills for the available jobs, or fitting jobs are only available in other cities and not where people live. Since monetary policy can do little about frictional and structural unemployment, policymakers must set their targets accordingly. The estimated number for maximum employment can change over time, but in 2017 it was around 4-3/4 percent as judged by the Fed. “In the FOMC’s March 2018 Summary of Economic Projections, Committee participants' estimates of the longer-run normal rate of unemployment ranged from 4.2 to 4.8 percent and had a median value of 4.5 percent”\textsuperscript{36} If the economy is persistently operating below this rate, the economy might overheat pushing inflation high.\textsuperscript{37}

\textsuperscript{35} Yellen, 2017a.
\textsuperscript{36} Board of Governors of the Federal Reserve System, 2018c.
\textsuperscript{37} Yellen, 2017a.
Figure 3: Civilian Unemployment Rate (2001-2018)

Source: fred.stlouisfed.org, 2018.

The U.S. unemployment rate was 3.7 percent in October 2018 and the rate has been within the targeted range for 24 months (Figure 3). It stepped out of the range at the lower end and has been persistently below the target range for 13 months in October 2018. Does it mean that the economy is getting overheated, is inflation becoming a threat? Price stability, as defined by the Fed after decades of experience and research, means 2 percent inflation a year. That is the targeted rate for the average price changes as measured by the price index for personal consumption expenditures, or PCE. During an FOMC press conference in September 2017, Yellen said that “the shortfall of inflation from 2 percent, when none of those factors is operative, is more of a mystery, and I will not say that the Committee clearly understands what the causes are of that.”

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38 Yellen, 2017b.
The personal consumption expenditures price index excluding food and energy in the second quarter of 2018 was only 1.9 percent higher than in the year-ago period (Figure 4). So, inflation still has not picked up significantly. Finding out the reasons for this mystery is not the purpose of this paper, but it is nonetheless of critical importance. If certain areas of the usual mechanisms do not work the way they normally do due to transitory effects, which in this case means that there is no inflation even after two years of reaching maximum employment, then the effects of easy monetary policy might affect other areas which do work as they normally do, such as asset prices, unusually widely. Whether that could be the case, is going to be assessed in Chapter 4.

2.2. The Fed’s Tools

Now that we understand what the Fed’s goals are and what it specifically targets, let’s see how it aims to achieve its goals. First, I review the pre-crisis toolkit, then, add the new tools introduced after the crisis responding to the new challenges.

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39 To learn more about the topic of inflation, I recommend reading Chapter 4 in Yardeni (2018b).
2.2.1. Pre-Crisis Toolkit

Prior to the 2008 financial crisis, the Fed used a simple but effective framework to conduct monetary policy. It used open market operations to influence the amount of reserve balances available to the banking sector consistent with maintaining the overnight federal funds rate at an average around a target rate. Banks needing reserves can borrow at this rate from banks with reserves in excess. The volume of reserves was relatively small before the crises – only around $45 billion. This meant that even small open market operations were effective in managing the federal funds rate which then translated into other short-term interest-rates and affected long-term interest rates as well. These changes influence financial conditions overall affecting economic activity and inflation as well. This simple system required a relatively small balance sheet from the Fed. Less than $1 trillion dollar was enough, and it was mainly determined by the U.S. currency demand that the Fed had to supply.\textsuperscript{40}

The financial crises and monetary policy responses caused severe changes making this simple toolkit no longer effective. The shortcomings are twofold. Firstly, large scale asset purchases not only expanded the Fed’s balance sheet but at the same time also created additional reserves in the banking system. With reserves so abundant, the FOMC loses control over the federal funds rate without using additional tools. With the supply of reserves greatly expanding, the federal funds rate would have gone down dramatically, so the Fed took actions to sterilize some of the effects of its liquidity and credit operations. Since the recession made low rates needed anyway, the Fed lowered its target rate to near zero where the second part of the simple toolkit inadequacy became evident: the zero lower bound limits the ability of monetary policy accommodation.\textsuperscript{41}

2.2.2. New Policy Tools

To address these challenges, the Fed greatly expanded its monetary policy toolkit. The new toolkit consists of four major additional instruments on top of the original open market operations. These four are (1) interest on bank reserve balances (IORR and IOER rates); (2) overnight reserve repurchase agreement (ON RRP); (3) large scale asset purchases (LSAP); and (4) explicit forward guidance. The Fed did not incorporate

\textsuperscript{40} Yellen, 2016.  
\textsuperscript{41} Ibid.
negative interest rates and yield curve control in its policy framework as some other major central banks did.\textsuperscript{42} Interest on bank reserves and overnight reverse repurchase agreements at a specified rate are used to keep the federal funds rate in the target range without having to actively adjust the supply of reserve balances.\textsuperscript{43}

\textbf{Interest on Bank Reserve Balances}

The Federal Reserve Banks pay interest on required reserve balances and on excess reserve balances. The Congress had approved plans to allow paying interest on bank reserve balances starting from 2011, but in the events and the Emergency Economic Stabilization Act of 2008 made the effective date of this authority come forward to October 1, 2008. There are two different interest rates paid on reserve balances. The interest rate on required reserves (IORR rate) and the interest rate on excess reserves (IOER rate) are both determined by the Board. The IORR rate is effectively eliminating the implicit tax that reserve requirements used to impose on depository institutions in the U.S., and the IOER rate is used to help monetary policy to reach its target rate on the federal funds rate.\textsuperscript{44} The IOER rate acts as a floor underneath overnight interest rates: if a bank receives interest on excess reserves it holds at the central bank, it has little incentive to lend those reserves at a lower rate than what is offered by the Fed.

Furthermore, the bank is incentivized to bid up the price of funds in the wholesale money market if it is below the IOER rate since in that case, the bank could earn arbitrage profit on the difference.\textsuperscript{45}

\textquotedblleft In practice, however, some short-term interest rates in U.S. money markets are slightly below the IOER rate. With the large levels of excess reserves in the system, certain institutional features of U.S. money markets create frictions that have made IOER act more like a magnet that pulls up short-term interest rates than a firm floor beneath them. These features include bank-only access to IOER (which makes key cash lenders in U.S. money markets, such as government-sponsored enterprises and money market mutual funds, ineligible to earn IOER), credit limits imposed by cash lenders, and other impediments to

\textsuperscript{42} Ibid.
\textsuperscript{43} Federal Reserve Bank of New York, 2018.
\textsuperscript{44} Board of Governors of the Federal Reserve System, 2018a.
\textsuperscript{45} The Fed intends to set the IOER rate equal to the top of the target range of the federal funds rate. It was 1.75 percent in March 2018.
market competition, as well as the costs incurred by banks through balance sheet expansions related to arbitrage activity.\textsuperscript{46}

One other important role IOER rate plays is that it can be raised if excess reserves would seem to threaten with unwanted inflation. However, the reason it did not cause inflation is because the expansion of excess reserves only replaced government liabilities from Treasury money to Fed money and QE did not increase total debt, only changed the composition of liabilities.\textsuperscript{47} It is the same thing Dalio (2017) said about a beautiful deleveraging in which debt monetization is only cancelling the deflationary forces of the credit collapse.

\textit{Overnight Reverse Repurchase Agreement}

The overnight reverse repo facility effectively has the same goal as the IOER rate, but it can be used by a broader set of money market participants. The ON RRP is, therefore, strengthening the floor under short-term interest rates and helps to keep the federal funds rate in the target range. The instrument is planned to be used only to the extent necessary for that purpose and will not be used when it is no longer needed. During an overnight reverse repurchase transaction, the Fed sells a security to an eligible counterparty and agrees to buy it back the next day. The activity does not expand the size of the Fed’s balance sheet; it only rearranges the structure on the liabilities side: a reduction in reserve balances and a corresponding increase in reverse repo obligations which stands until the trade is completed. The ON RRP maximum rate is set by the Fed, but the actual rate is decided through an auction.\textsuperscript{48}

The use of the IOER rate and the ON RRP rate effectively brakes up the traditional link between the quantity of reserves and the level of the federal funds rate and allows the Fed to control it in times when reserves are abundant. This quality is becoming more and more significant today when policy normalization is in progress at the Fed. A less accommodative monetary policy is required, but interest rate increases and balance sheet reduction are not wanted to happen simultaneously.

\textit{Large Scale Asset Purchases (QE)}

\textsuperscript{46} Federal Reserve Bank of New York, 2018.
\textsuperscript{47} Andolfatto, 2015.
\textsuperscript{48} Board of Governors of the Federal Reserve System, 2018b.
Quantitative Easing is done by central bank purchases of securities in the open market and it is financed by reserve creation in the banking system. The balance sheet of the central bank grows as the securities are added to the assets and the created bank reserves to the liabilities side. The Fed did three rounds of QE between 2008 and 2014 through which its balance sheet grew from less than a trillion to around $4.5 trillion. There has been a lot of controversy about the effects of QE and while it seems to have worked well in stopping of the financial crisis, even Bernanke (2017) admits that the Fed might hesitate to use it in less severe downturns since the effects on financial markets and the economy are not yet very well understood. The Fed was only able to purchase Treasury securities and mortgage-related securities which were issued by government-sponsored enterprises, such as Fannie Mae or Freddie Mac since the law prohibited it to buy other assets. However, other central banks, many of which have done QE long before the crisis, were able and willing to purchase a wider range of private securities such as corporate bonds and equities. The Bank of Japan for example held around 79 percent of all the Japanese ETFs in September 2018.

QE mainly works through two channels: the signaling and the portfolio balance channel. The signaling channel means that the central bank shows its commitment to easing and keeping interest rates low for a longer period. The portfolio balance channel works through the changes in the supply of securities and therefore in their prices and yields. According to Bernanke (2017), there is a “broad consensus that QE has proven a useful tool” and has worked through both channels affecting interest rate expectations and term premiums both driving down longer-term interest rates reducing mortgage rates as well.

“Moreover, private investors responded to lower yields on U.S. Treasury securities and agency-guaranteed mortgage-backed securities by seeking to acquire assets with higher yields--assets such as corporate bonds and other privately issued securities. Investors' purchases raised the prices of those securities and reduced their yields. Thus, the overall effect of the Fed's LSAPs was to put downward pressure on yields of a wide range of longer-term securities, support mortgage markets, and promote a stronger economic recovery.”

50 Hoenig and Whiteaker, 2018.
This statement about LSAP can be found on the Federal Reserve website on the frequently asked questions section, however, Bernanke (2017) argues that any possible asset bubble is more likely to be related to accommodative monetary policy as a whole rather than to QE only and that these effects play an important role in the monetary transmission mechanism. I go into more details on how exactly these channels operate in the last part of this paper.

As the Fed had indicated in its June 2017 Addendum to the Policy Normalization Principles and Plans, it started to reduce its securities holdings and shrink its balance sheet by decreasing its reinvestments of the principal payments received after its holdings in the SOMA portfolio in October 2017. By doing so, it decreases excess reserves in the banking system leading to a decrease in abundant funding liquidity. The Fed is planning to reduce reserve balances meaningfully below current levels but expects to keep it higher than what was seen before the crisis.52

**Explicit Forward Guidance**

Forward guidance had been used by the Fed before the crisis starting in 2003. It has proven a useful nonstandard tool after the Great Recession too, so central bankers are likely to use it in the future as well. Explicit forward guidance is the communication of the expected future changes in the policy rate which impacts the whole yield curve and thus the prices of longer-term financial assets, or of other monetary policy actions such as quantitative easing. Complementary to QE, forward guidance affects longer-term yields without having to set concrete targets as the BOJ does with yield curve control.

Different types of forward guidance can be categorized along many dimensions from which I am only introducing two. The first dimension is the strength of pre-commitment along which one can differentiate between the *Delphic* and the *Odyssean* forward guidance. Delphic guidance makes no promises, only informs the public of how policy is likely to evolve, and it is used as a general tool to make monetary policy more transparent. Odyssean guidance, on the other hand, is used in situations such as the post-crisis period. It was used as a complementary tool when the federal funds rate hit the zero lower bound to promise market participants that interest rates will be kept low for a longer time thus using market participants to bid up asset prices and lower the yield

along the curve. The second dimension is the degree of transparency with regards to the factors based on which policymakers make their decisions. *Qualitative* forward guidance is a more opaque version in which policymakers may use expressions such as “considerable period” in contrast with the *quantitative* where central bankers set specific economic targets and conditions based on which they make their decisions. This latter version enhances transparency more effectively and helps economic actors anticipate monetary policy evolution. The Fed has been moving towards the quantitative type lately.\(^{53}\)

### 2.3. Future Possibilities

In this chapter, I reviewed the changes in the Fed’s monetary policy since the Great Recession and introduced the new policy tools that have been used in the period. Current considerations at the Fed include the anticipation of a future economic downturn which might also result in financial strains. These tools proved to be useful and effective in fighting even a severe recession, so they are likely to remain in the Fed’s policy toolkit. Given that the federal funds rate is still at around 220 basis points, it means that the zero lower bound would limit the scope of monetary policy in a downturn and so the new tools would be needed. To allow for a more aggressive monetary policy action, Bernanke (2017) introduces the possibilities of (1) raising the inflation target and of (2) switching to a price level target framework. As a compromise, he advocates the idea of a temporary price level target which would only become effective in times when the ZLB constrains.

Monetary policy became the primary tool of economic stabilization after the Great Inflation. Countercyclical fiscal policies have lost their weight due to political and ideological reasons which made it less effective. Blanchard and Summers (2017) argue that not only a more aggressive monetary policy action would be needed in the next downturn, but other macro policies should be used as well to strengthen stabilization policies. These include the reintroduction of fiscal policies and the strengthening of financial policies which can be used more effectively to prevent stock market bubbles. They conclude that monetary policy can do little in this regard and that it should not concern itself with financial stability; it should be left to financial policies. These

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\(^{53}\) Bernanke, 2017.
financial policies could, for example, include higher and constant capital ratios as opposed to lower and varying ones.

It looks rather clear by now that monetary policy largely affects financial markets and that these effects were in most part intended. One relevant question today is what is going to happen when most of the tools used by the Fed will reverse. How will money and capital markets react, and what will policymakers do if the reactions will be misadventures. To understand the possibilities of future events it is vital to lay out the forces between monetary policy and asset prices in the capital markets which I continue to do in the following chapters.

3. Determinants of Stock Market Prices

So far, my perspective in this paper was the monetary policymakers’ perspective, and I, for the most part, looked at the relationship between monetary policy and the economy treating asset prices in the capital markets as mainly influenced by monetary policy actions. This, of course, would not be an accurate description of reality. While using a ceteris paribus assumption to analyze the relationship only between asset prices and monetary policy might simplify the situation, it would be such an oversimplification which would probably result in a false conclusion. In this chapter, I review the most important determinants of stock market prices in order to set up a framework in which I can analyze the interactions of the economy and financial markets. The goal is first to get a comprehensive understanding of the basic relationships and the direction of the interactions between the numerous variables that play a role in this complex mechanism. Monetary policy is one of the major factors which affect both the economy and financial markets and at the same time, it is influenced by the state of those too. Economic and financial literature is full of ideas of feedback mechanisms, spirals, and reflective relationships and I believe it is a very useful image to have when trying to figure out these relationships. The cyclical nature of the economy and financial markets is often debated, and I believe the reason for that is that in reality, it is not regular and predictable enough for some economists to call it a cycle because there are just too many factors interacting with each other and that results in infrequent and irregular ups and downs. The latest financial crisis and the following Great Recession created a renewed motivation to dust off old cycle theories or coming up with new ones after the notion of the Great Moderation lost some of its credibility. For now, the point is that
there are several factors influencing one another which makes it difficult to outline them, but I try to do that with the help of Yardeni (2018b) and Damodaran (2018a). By the end of Chapter 3 and 4, we should be able to see what role monetary policy plays in this net of interactions and assess how much effect it might have had on the stock market during the period following the Great Recession.

To predict stock prices, investment strategists need to forecast two numbers: corporate earnings (E) and the valuation of those earnings which is the number of dollars the market is willing to pay for every dollar of earnings (P/E).\(^{54}\)

\[ P = E \times \frac{P}{E} \]

This is going to be the skeleton of my framework. Now, we only need to understand what drives these two numbers if we want to understand what drives stock prices. In the subsequent sections, I review how the market looks at these measures according to Yardeni (2018b) and how do determinants such as GDP growth, inflation, Treasury yields, monetary policy, and recessions affect them. Looking at the relationships between them and going deeper to the possible drivers of these determinants should give us the ability to better understand the role and impact of monetary policy on the stock market after the financial crisis.

### 3.1. Corporate Earnings

The primary determinant of stock prices is corporate earnings. While it is a relatively objective measure, investors can only estimate what earnings will be in the future which makes the task more interesting. In the following two sections, I review how forward corporate earnings can be estimated; and how these estimations are affected by actual earnings that are predominantly driven by business cycles.

#### 3.1.1. Forward Corporate Earnings Estimates

According to Yardeni (2018b), the market is forward-looking and discounts future expected earnings provided by analysts. Since analysts do not provide rolling earnings, he uses the Thomson Reuters’ I/B/E/S data which is a proxy for the 12-month forward consensus expected earnings for the SP 500. He uses it because he believes that the market discounts those estimations. The estimate for the market is the aggregation of the

\(^{54}\) Yardeni, 2018b.
estimates for all the stocks in the index. This bottom-up approach should provide more accurate expectations for the market since industry analysts tend to be well informed about the companies they follow. Wall Street research firms hire them and follow their revisions of their expectations. The best performing analysts are rewarded through a bidding system which allows internal analysts to vote for those sell-side analysts who provide the most accurate forecasts. It is important to note that these industry analysts have been very bad at predicting recessions but – as Yardeni (2018b) points out – it is not their job to do that. It is the job of economists who are just as bad at it.

Analysts estimate quarterly operating earnings for the current and the following year. Operating earnings are less affected by one-time events and discontinued operations, making them easier to predict. The blue “Squiggles” are the rolling 12-month forward estimates updated monthly and weekly which creates the shape (Figure 5). Each squiggle spans over 25 months because it uses estimates for the current and for the next year. Month by month, the two years’ estimates are weighted by the number of months remaining in the period, giving more and more weight to the following year’s estimates as the year progresses. That should be 24 months, the 25th month – which is February – is there to show how the estimate converges to the actual full-year earnings. Monthly data is available since 1978 giving us 37 full year squiggles. As the chart also shows, analysts tend to be overly optimistic at the beginning of the year having to revise their estimates downward by the end of the year 29 times out of the 37. During recessions, they need to slash earnings as they realize the large misses.
3.1.2. Business Cycles

The stock market is driven by corporate earnings and it is forward-looking, so future expectations matter. Analysts tend to be optimistic, which makes them slash their expectations when they see a recession coming and the stock market sells off. Yardeni’s Blue Angel model makes the distinction between a bull market, a bear market, and a correction by looking at how the stock price behaves relative to the earnings. The model shows that a bull market usually occurs when forward earnings (E) and valuation (PE) are both rising (Figure 6). A bear market typically occurs when both of them are falling, and a correction is when valuation is falling but forward earnings are still rising. Given that corporate profits tend to fall during recessions and analysts cut their forward earnings estimates when a recession seems to take shape, recessions are rather important for stock prices. The model is, of course, relatively useless to predict a recession since analysts are revising only ex post facto, but it might be useful to confirm whether we have entered a bear market, or we are just experiencing a correction, as in 1987, when earnings expectations did not confirm a bear market making it unique because the severity of the selloff technically makes it a bear market.
Figure 6: Blue Angels Model: Actual and Implied Price Indexes for the S&P 500

So, the stock market tends to follow business cycles, and it anticipates downturns in the economy which makes it useful to be one component of the Leading Economic Indicators (LEI) created by The Conference Board, an independent research association, although it only gets a relatively small weight in the index. The LEI, especially used together with the Coincident Economic Indicators (CEI), is very accurate in leading the turning points of the business cycles (Figure 7). The business cycle is monitored by the NBER’s Business Cycle Dating Committee as well; according to the Committee:

“During a recession, a significant decline in economic activity spreads across the economy and can last from a few months to more than a year. Similarly, during an expansion, economic activity rises substantially, spreads across the economy, and usually lasts for several years.”

The measures used to assess economic activity are the same ones constituting the CEI which includes the following four components: (1) Employees on nonagricultural payrolls, (2) real personal income less government transfers, (3) real manufacturing and trade sales, and (4) industrial production. If we look at these four components we can

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56 nber.org, 2018.
57 Yardeni, 2018b.
see how the participants of economic activity are interconnected. Companies sell goods and pay their employees who can, in turn, buy goods of other companies and so on. What drives this cycle in Yardeni’s playbook is the *profits cycle* which is basically the result of the asynchronous changes in these factors reflected in the indicators. The simple thesis is that profitable companies tend to increase their capacity and extend their payrolls while unprofitable ones need to cut costs to stay in business.

*Figure 7: Leading and Coinciding Economic Indicators by The Conference Board*

Yardeni (2018b) lists the most important economic schools dealing with the business cycle and their primary focus in making sense of it. Going through these schools can give us a good idea of the interconnections in the economy. The difference in the explanations of the business cycle is a difference in the starting point in the interconnected system of economic activity, monetary policy, and debt creation. The three most influential theories are focusing on private *demand*, money *supply*, and debt-creation as the critical element in the business cycle. (1) Keynesians focus on private demand. In their view, a downturn is caused by the insufficient demand in the private sector and it can be helped through more government spending which is preferred over tax cuts. (2) The monetarists’ focus is on the money supply and central banking. They think central bankers cause the business cycle which would be quite the opposite of what they were created for in the first place. Monetarists were supporting a nearly
constant growth rate in the money supply which would curtail the Fed’s ability to tinker with the economy through changes in its policies and therefore create more stability in the economy. The best-known supporter of the idea was Milton Friedman. Yardeni argues that monetarists lost their influence after Volcker has tried the approach during his fight against inflation but abandoned the practice. Thoma (2008) argues however that the monetary experiment of 1979-1982 is inappropriately called a “monetarist experiment” because the money growth rates were bouncing around a lot during the period and the Fed did not restrain itself from activism. The monetarists’ way of getting out of a recession is through tax cuts and they favor deregulation.

(3) Notable debt-siders, according to Yardeni (2018b), are the economists of the Austrian school of economics, Irving Fisher, and Hyman Minsky. I would like to add Charles Hawtrey to the list who based his “inherent instability of credit” theory on his balance sheet view of the economy in 1923. His idea was that everyone participating in economic activities is connected to everyone else through the connection of balance sheets which simply means that one person’s spending is another’s income, and so on. Introducing credit to this system makes it unstable because it creates additional spending and income when created but it becomes a burden in the future affecting the whole system.58 The Nobel laureate economist of the Austrian school, Friedrich Hayek stated:59

“…the primary cause of cyclical fluctuations must be sought in changes in the volume of money, which are undoubtedly always recurring and which, by their occurrence, always bring about a falsification of the pricing process, and thus a misdirection of production. The new element we are seeking is, therefore, to be found in the “elasticity” of the volume of money at the disposal of the economic system. It is this element whose presence forms the “necessary and sufficient” condition for the emergence of the trade cycle.”

The volume of money, in Hayek’s view, was driven by gold flows, central bank money creation, and deposit creation of commercial banks. The difference between monetarists’ and Hayek’s view is that according to the former central banks could effectively regulate the money growth rate by the regulation of the monetary base while Hayek did not think that it was possible in practice. For that, credit should be controlled too. Irving Fisher’s debt-deflation theory describes the process of the downward spiral

58 Mehrling, 2011.
caused by falling asset prices that put pressure on debtors who are forced to liquidate their assets causing further decline in their prices.\(^6\)

“Then we may deduce the following chain of consequences in nine links: (1) Debt liquidation leads to distress selling and to (2) Contraction of deposit currency, as bank loans are paid off, and to a slowing down of velocity of circulation. This contraction of deposits and of their velocity, precipitated by distress selling, causes (3) A fall in the level of prices, in other words, a swelling of the dollar. Assuming, as above stated, that this fall of prices is not interfered with by reflation or otherwise, there must be (4) A still greater fall in the net worths of business, precipitating bankruptcies and (5) A like fall in profits, which in a "capitalistic," that is, a private-profit society, leads the concerns which are running at a loss to make (6) A reduction in output, in trade and in employment of labor. These losses, bankruptcies, and unemployment, lead to (7) Pessimism and loss of confidence, which in turn lead to (8) Hoarding and slowing down still more the velocity of circulation. The above eight changes cause (9) Complicated disturbances in the rates of interest, in particular, a fall in the nominal, or money, rates and a rise in the real, or commodity, rates of interest.”

Bernanke (1994) concludes that debt-deflation, as described by Fisher, has real effects on the aggregate economy:

“From the agency perspective, a debt-deflation which unexpectedly redistributes wealth away from borrowers is not a macroeconomically neutral event: To the extent that potential borrowers have unique or lower—cost access to particular investment projects or spending opportunities, the loss of borrower net worth effectively cuts off these opportunities from the economy. Thus, for example, a financially distressed firm may not be able to obtain working capital necessary to expand production, or to fund a project that would be viable under better financial conditions. Similarly, a household whose current nominal income has fallen relative to its debts may be barred from purchasing a new home, even though purchase is justified in a permanent-income sense.”

If debt-deflation gets severe enough, it can threaten the health of banks and financial intermediaries which then can lead to bank runs and a reduced lending activity by the safety-seeking institutions which have large effects on manufacturing production and employment. Minsky’s (1992) financial instability hypothesis follows Fisher’s idea and builds on the empirical experience of inflations and debt-deflations. His theory identifies the economic problem as the “capital development of the economy” following Keynes rather than as the “allocation of given resources among alternative employments”. This

capital development of a capitalist economy is characterized by the exchanges of present money for future money where present money flows from depositors through intermediaries to firms to fund the capacity expansions, and future money flows back to the depositor from the firms in the form of profits. Minsky, just as Yardeni, sees profits as “the key determinant of system behavior” and distinguishes economic units based on their income-debt relations. There are hedge, speculative, and Ponzi finance units according to the model. The problem arises when speculative and Ponzi units start to dominate the economy because they either have to roll over their debt or have to sell assets to meet their interest payment obligations.\footnote{Minsky, 1992.}

**Profits Cycle**

So why pick profits as the main driver of the business cycle in an economic system which is full of interconnected factors and two-way relationships? One answer might be suggested by Minsky’s theory, although it mainly applies to extreme cases. A couple of evidence is presented by Yardeni (2018b) to support his opinion. He admits that he might be biased because of his Wall Street career to focus on profits, but even if he is biased it is because the stock market is driven by earnings. Since my focus is on stock market prices as well, I accept his view and will not assess whether profits actually are the “lead actor”, or they are just a part in the business cycle story. His argument is that the behavior of companies is dependent upon the profits they are able to generate even without taking debt service into account. Profitable companies tend to expand their operations by hiring more and investing in new capacities, while unprofitable ones cut back on spending by getting rid of unnecessary employees and shutting down unprofitable divisions.

Yardeni (2018b) uses four sources of data to back up the “profits” argument. The *NFIB survey* is a monthly survey of small businesses conducted by the National Federation of Independent Business. It shows a very high correlation between the percentage of small business owners who say their profits have been higher rather than lower in the past 3 months and both the percentage of them expect capital spending in the next 3 to six 6 and increase employment in the next 3 months.\footnote{The monthly updated report can be found at: http://www.nfib.com/surveys/small-business-economic-trends/} Small businesses – with less than 50 employees – account for more than 40 percent of nonfarm private
employment in the U.S. The second source is the *After-tax corporate profits* as reported to the IRS which is included in the quarterly National Income and Product Accounts (NIPA) with GDP. Its peaks tend to lead business cycles and its troughs coincide with them. Nonfarm payroll employment excluding government employment is also highly correlated with it. The *Profit margin*, calculated as the after-tax profits divided by nominal GDP, has a similar relationship with business cycles as overall profits. It peaks before the end of an expansionary period as businesses expand their production capacities faster than their sales rise. When a recession hits, profit margins plummet as sales fall faster than production costs can be cut (*Figure 8*).

*Figure 8: Profit Margin vs. Employee Compensation Plus Investments*

Yardeni devised a business cycle indicator called the Resource Utilization Rate (RUR) which is the average capacity utilization rate across all industries and the employment rate. Its changes tend to coincide with the cycles in the profit margin. Lastly, year-over-year changes in the S&P 500 *forward earnings* – which is a good leading indicator of actual earnings – is highly correlated with both the growth rates in the aggregate weekly hours of employees and capital spending.
In this chapter, I covered the corporate earnings (E) part of the stock valuation model. The discussion focused on the forward-looking characteristics of it, and its dependency on the state of the economy which impelled me to take stock of business cycle theories and some practical methods used to follow its state in real time and possibly even forecast it. In the coming chapter, I move on to the valuation level (P/E) part of our model.

3.2. Stock Market Valuation Levels

Let’s go back to our simplistic valuation model:

\[ P = E \times \text{P/E} \]

So far, we have reviewed corporate earnings (E) and saw that it has a very strong correlation with the performance of the economy. Earnings are the objective part of the equation. The harder part is valuation (P/E) which shows how much the market is willing to pay for each dollar earned. At this point I must refer to the classic Keynesian beauty contest parallel:

“…professional investment may be likened to those newspaper competitions in which the competitors have to pick out the six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preferences of the competitors as a whole; so that each competitor has to pick, not those faces which he himself finds prettiest, but those which he thinks likeliest to catch the fancy of the other competitors, all of whom are looking at the problem from the same point of view. It is not a case of choosing those which, to the best of one's judgment, are really the prettiest, nor even those which average opinion genuinely thinks the prettiest. We have reached the third degree where we devote our intelligences to anticipating what average opinion expects the average opinion to be. And there are some, I believe, who practise the fourth, fifth and higher degrees.” ⁶³

The quotation perfectly illustrates the difficulty of the valuation problem. It is subjective and therefore harder to predict. Here, I break valuation down to components so at least we can look at them separately and see the behavior of each relative to the movements in prices. First, I give a description of the Fed Model which is a relative valuation method that compares the forward earnings yield on stocks to the ten-year Treasury bond yield. Second, I review the “Shiller PE”, the cyclically adjusted price-

⁶³ Keynes, 1936. p.100.
earnings ratio which may be particularly useful to correct for peaking earnings in periods such as the current when corporate earnings are soaring following the Tax Cuts and Jobs Act of 2017. Before moving on to discuss the implied equity risk premium in the fourth section of this chapter, in the third, I survey the main determinants of the bond market and decompose the long-term yield to create a more solid basis for the discussion.

3.2.1. The Fed Model

The Original Model

At the end of 1996, Alan Greenspan gave his famous “irrational exuberance” speech in which he linked high valuation multiples to sustained low inflation rates. The argument is that lower inflation implies less uncertainty about the future and therefore lower risk premiums are demanded for holding risky assets.64 The Monetary Policy Report which was submitted later in 1997 following Greenspan’s testimony contained the first version of the “Fed Model”.65 This model compared the S&P 500 forward earnings-price ratio to the ten-year Treasury note yield. The earnings yield was based on the consensus estimate of forward earnings for the coming 12 months. Interestingly, this model was extremely accurate between 1981 and 1998, during a period when the two yields closely tracked each other. The 1997 Monetary Policy Report warned that the spread between the two was highest since 1991 – a year in which earnings were depressed due to an economic slowdown – meaning that stock prices might have been too high because the riskless return is higher than the risky one. The spread peaked later in 2000 when the stock market peaked, and the ten-year Treasury yield has never been higher than the earnings yield since 2002 when the model also stopped working.

64 Greenspan, 1996.
Figure 9: The Fed Model

Shiller (2015) also reviewed the model and concludes that the evidence for the Fed’s Model is relatively weak over a longer time horizon. He analyzes the relationship between 1881-2014 and notes that it is true that there was a negative relationship between long-term interest rates and stock prices in the 1960s and the early 1980s when interest rates were rising, price-earnings ratios were declining, and between the early 1980s and the late 1990s when the opposite was true as seen in Figure 9. After the early 2000s and especially after the financial crisis of 2007, the spread grew wide as the ten-year Treasury rates dropped to historic lows while the forward earnings yield remained relatively high.

Considering Growth and Risk

Looking at the Fed’s model might seem strange at first glance. How can it be that the risk-free rate and the uncertain return on stocks are the same? Who in their right mind would accept such a deal? Yardeni noted in 1999 that the simple Fed Model was missing some variables which might give an explanation. Neither the long-term growth prospects for earnings nor the business risk were taken into account. The growth rate in earnings has been around 6 percent in earnings and 7 percent in forward earnings since
1949. This reflects the optimism in analysts’ expectations. Yardeni (2018b) thinks that long-term expectations for growth are often even more optimistic than the 12-month forecasts but as the length of the time-horizon increases so does risk, which can lead to the conclusion that the two variables might offset each other. More formally, assuming a linear relationship:\textsuperscript{66}

\[
\text{FEY} = a + b \times \text{TBY} + c \times \text{DRP} - d \times \text{LTEG}
\]

\textit{FEY} = S&P 500’s year-ahead forward earnings divided by S&P 500 price index

\textit{TBY} = US Treasury 10-year bond yield

\textit{DRP} = Default risk premium. Yield spread between corporate and Treasury 10-year bond\textsuperscript{67}

\textit{LTEG} = Analysts’ consensus long-term expected earnings growth”

If \(a=0\), \(b=1\), and the growth term offsets the risk term we end up with the original Fed Model. Stocks are overvalued according to the model when the yield on the S&P 500 is lower than the yield on bonds. Using the expanded version of the model, we might conclude that the market priced either an unusually high long-term growth rate or low business risk, or a mixture of the two at the end of the millennium. These conclusions are strongly supported by the evidence \textit{ex post}. A simplified version of the expanded model:\textsuperscript{68}

\[
\text{FEY} = \text{CBY} - d \times \text{LTEG}
\]

\textit{CBY} = Corporate bond yield after assuming that \(a = 0\), \(b = 1\), and \(c = 1\) in the expanded model

Looking at the complex model from a discounted cash flow model perspective and assuming a stable growth rate, we can suppose that the two variable is simply in the discount factor in the denominator:

\[
P = \frac{E}{(TBY + ERP - LTEG)}
\]

Note that I replaced Yardeni’s default risk premium (DRP) with an equity risk premium (ERP) variable which is a broader risk measure for equities. I analyze it more fully in Section 3.2.4. For now, let’s look at Figure 10 which shows the relative over- or undervaluation of stocks depending on whether we use the T-bond rate or the corporate

\textsuperscript{66} Yardeni, 2018b. p. 521.
\textsuperscript{67} For the corporate bond yield, Yardeni prefers to use the average of the AA-AAA and BBB-A bond yield composites compiled by Bank of America Merrill Lynch.
\textsuperscript{68} Ibid. p. 522.
bond yield as a reference. It shows that the default spread on corporate bonds has not been a very good measure for equity risk premium (ERP). Since the Great Recession stocks are undervalued relative to both bond categories according to this model suggesting either 1) unusually low interest rates especially in government bonds – an assumption which is not very far-fetched given the historically low interest rates – or 2) an unusually high risk-aversion in equities – an assumption that can be seen using the corporate bond yield as a proxy for ERP. It shows that stocks are undervalued, meaning that other risk components in the ERP have been outweighing the long-term growth prospects in earnings.

3.2.2. The CAPE Ratio

Robert Shiller earned some well-deserved fame since both the first and the second edition of his *Irrational Exuberance* quite accurately warned about the bubbles in equity and housing prices just before they popped. Shiller devised the CAPE with John Campbell following Benjamin Graham and David Dodd’s idea of using average earnings for valuation. The Shiller P/E is “the cyclically adjusted price-earnings ratio
(CAPE), that is, the real (inflation-corrected) S&P Composite Index divided by the ten-year moving average of real earnings on the index. (...) The ten-year average smooths out such events as the temporary burst of earnings during World War I, the temporary decline in earnings during World War II, and the frequent boosts and declines that we see due to the business cycle." Shiller (2015) notes that smoothing is necessary because if earnings were zero in any year, a simple price-earnings ratio would be infinite. Annual earnings for the S&P 500 were always positive since the inception of the index, but they were negative during the fourth quarter of 2008.

Figure 11: U.S. Cyclically Adjusted Price-Earnings Ratio (CAPE) and Long-Term Interest Rates, 1881–2018


“It was tempting for observers in 2000, at the peak of the market, to extrapolate this earnings growth and to believe that some fundamental changes in the economy had produced a new higher growth trend in earnings. Certainly, expansive talk about the new millennium at the time encouraged such a story. But it would have been more reasonable, judging from the cyclical behavior of earnings throughout history, to predict a reversal of such earnings growth.”

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70 Ibid. p. 39.
Given its backward-looking nature, the CAPE ratio is useful to disillusion ourselves from analysts’ forward-looking optimism, however, as Yardeni (2018b) points out, it gets too pessimistic too early because it is backward-looking, and the stock market is not. Another criticism came from Bill Gross, who noted that discussions about the CAPE should include interest rates as an influencing factor as well. During a period of historically low long-term interest rates, it might be rational to assume that the CAPE can remain at a higher-than-average level during this time. Of course similarly to the Fed Model, taking interest rates into account when discussing the Shiller P/E still compares stocks versus bonds. So, one might also conclude that interest rates are unnaturally low and that a bubble might be in the bond market as Shiller suggests in his book as an answer to Gross’ concerns.71

The CAPE is 30.6 at the beginning of November 2018, however, it has already reached 33.3 at the beginning of the year reaching higher than the height of 1929 when the cyclically adjusted price-earnings ratio was 32.6 (Figure 11). The ratio has only been higher than these measures during the last three years of the dot-com mania which also proves Yardeni’s point that it can start signaling too early.

3.2.3. The Bond Market

When trying to assess the level of the stock market, we cannot get a clear picture without taking bond yields into account. Therefore, before we can go further, we need to take a look at the bond market as well to see what drives long-term interest rates in the Treasury bond market.

Damodaran (2018a) argues that market participants treat the Fed as the bogeyman, but in reality, the Fed has significantly less power to influence not just stock prices but even long-term interest rates than what most people think. He wrote his article after the drop in the stock market in the first quarter of 2018 which, many thinks, is caused by the realization the Fed is going to keep tightening this year. As it has been discussed in this essay as well, the Fed only sets the federal funds rate directly. Damodaran (2018a) argues that the Fed has been hiking the fed funds rate since December 2016, but the effects on long-term market interest rates are not evident. Short-term rates as measured by the 3-month Treasury bill rates have gone up and have a strong correlation with the federal funds rate since 1962, but according to Damodaran (2018a), the direction of the

71 Ibid. p. 45.
relationship is not clear. Short-term market rates went up first, and Fed hikes followed with a lag of around one month since the beginning of the current hiking period, but the lag is present for the whole period since 1962. Here, I think, Damodaran (2018a) largely ignores forward guidance by not even mentioning it.\footnote{Although forward guidance has only been used since 2003.} His point is still valid, and the question is an interesting one, which, in my opinion, could be framed as: does the Fed use market forces to become more effective with its policy actions or is it the Fed who needs to and does watch the markets in order not to make mistakes. The truth might be somewhere in between, and the connection is likely to be a two-way relationship. Bernanke (2017) described the Fed’s forward guidance as leaning more towards the quantitative type lately, which means that the communication of the economic targets and conditions that influence the Fed’s monetary policy actions are dominant in the communication and not policy actions by themselves. This could give a pretty good explanation for this lag, at least for the period since forward guidance has been used; but it is also realistic to assume that a similar relationship had been present even before forward guidance in a more informal way.

Long-term rates, as measured by the ten-year Treasury bond rate, have a lot weaker relation with the fed funds rate. Damodaran’s (2018a) measurements show that a 1 percent increase in the fed funds rate is accompanied by a 0.19 percent increase in the ten-year Treasury bond rate. \textit{Figure 12} shows how the ten-year Treasury rate compares to real GDP growth and inflation rate, and therefore to nominal GDP growth since 1954. Damodaran (2018a) calls the difference the Fed effect, which shows how much influence the Fed has on the market-rates. According to this data, the Fed effect brought down rates by 0.77 percent on average between 2009 and 2017.

This model – which compares the bond yield to the nominal GDP growth on a year-over-year basis – is called “the Bond Vigilantes Model” by Yardeni (2018b). He started using this model to replace the more difficult and time-consuming method of tracking the demand and supply of credit with the help of the Fed’s Flow of Funds Accounts. Given that the yield on Treasury bonds is basically the price of government credit, the analysis of the demand and supply conditions should offer the direction of the bond market. With the Bond Vigilantes Model, the question is why the nominal GDP growth rate and the Treasury bond rate diverge when they do. Damodaran’s answer is that it is simply the Fed effect but Yardeni gives a different explanation for each decade.
starting with the 1950s.\textsuperscript{73} His reading is simply based on the premise that investor expectations diverge from time to time from the currently observed nominal GDP growth. That is where the name came from: In 1983, Yardeni wrote an article called “Bond Investors Are the Economy’s Bond Vigilantes” in which he referred to the elevation of bond yield which was caused by high inflation rates. High yields slowed the economy down forcing the fiscal and monetary authorities to deal with the problem.\textsuperscript{74} For the 2010s, he agrees that the ultra-low federal funds rate and LSAP forced the yield consistently below the nominal GDP growth rate.

\textbf{Figure 12: Ten-year Treasury Bond Rates and the Fed Effect (1954-2017)}

\begin{center}
\begin{tabular}{|c|c|c|c|c|}
\hline
 & T. Bond Rate & Inflation Rate & GDP Growth & Intrinsic T. Bond Rate & Fed Effect \\
\hline
1954-2017 & 5.82\% & 3.36\% & 3.01\% & 6.59\% & -0.76\% \\
1974-1980 & 5.86\% & 4.49\% & 3.50\% & 7.97\% & -2.15\% \\
1981-2008 & 6.88\% & 3.26\% & 3.04\% & 6.30\% & 0.58\% \\
2009-2017 & 2.54\% & 1.73\% & 1.58\% & 3.31\% & -0.77\% \\
\hline
\end{tabular}
\end{center}

\textbf{Source:} Damodaran, 2018b.

Bernanke gave a speech in 2013, in which he addressed the issue of low long-term interest rates. At that time, the ten-year Treasury rate was persistently below 2 percent

\textsuperscript{73} Yardeni, 2018b. pp.384-387.

\textsuperscript{74} The San Francisco Fed tested the model empirically and found that inflation-targeting countries that have bond markets have significantly lower inflation rates than those that have not, suggesting that “bond vigilantes” exist.
for several months. He started his speech with decomposing long-term interest rates into three components: (1) *Expected inflation* over the term of the bond, (2) the *expected path of short-term real interest rates*, and (3) the *term premium*, a residual component.

In his view, inflation expectations are low because of the Fed’s credibility of keeping it low. Yardeni (2018b) challenges this view by arguing quite convincingly that low inflation has more to do with global competition, technological innovations, and demographic factors than it was usually thought of in the past decades, especially by monetary policy decision makers. In 2013, the FOMC committed itself to target a longer-run inflation rate of 2 percent.

*Inflation expectations*, calculated by using the Treasury Inflation-Protected Security Prices (TIPS) to compute the difference between real and nominal yields, suggest that the market had an expectation of near 2 percent for the 10-year period. Given an inflation expectation of 2 percent, the other two components must have resulted in a negative contribution because long-term yields were below that rate.

The *expected path of short-term real interest rates* is mainly influenced by monetary policy which is driven by the performance of the economy and the outlook for how it will evolve in the near future. In the aftermath of the crisis, the Fed indicated several times that it will remain accommodative for as long as it is necessary, and at least until the unemployment rate is above 6.5 percent.

“...in the longer term, real interest rates are determined primarily by nonmonetary factors, such as the expected return to capital investments, which in turn is closely related to the underlying strength of the economy. The fact that market yields currently incorporate an expectation of very low short-term real interest rates over the next 10 years suggests that market participants anticipate persistently slow growth and, consequently, low real returns to investment. In other words, the low level of expected real short rates may reflect not only investor expectations for a slow cyclical recovery but also some downgrading of longer-term growth prospects.”

And lastly, the *term premium*, which seems to have been responsible for the largest part of the downward move in long-term yields since 2010. The term premium is the additional return investors expect from investing in longer-term bonds as opposed to rolling over short-term credit holdings over the same period. This expected premium which was deemed to be negative was the result of several factors. Interest rate risk decreased significantly, partly because short-term rates are at the ZLB and are expected...

75 Bernanke, 2013.
to remain there, and partly because bonds have become an instrument of hedge against risks from holding stocks and other assets which pushed up bond prices and reduced downside risks. The safe-haven aspect of long-term bonds became more important since the financial crisis as investors became more risk-averse. Foreign governments and central banks hold substantial international reserves in the form of U.S. Treasury bonds. In 2013, they held half of all marketable Treasury securities outstanding, or $5.5 trillion. That number in July 2018 was $6.2 trillion with the largest holders being China and Japan, each with above one trillion dollars of Treasuries in holdings. Another major contribution came, of course, from the Fed itself and its LSAP programs including Operation Twist which was designed specifically to lower longer-term interest rates after the Fed hit the ZLB with short-term rates. The Fed held $2.3 trillion worth of U.S. Treasury securities in August 2018, which is a little more than the holdings of China and Japan combined.

While long-term interest rates are still low – especially relative to short-term rates – in 2018, U.S. yields have risen relative to the yields of other major developed countries (including the U.K., Canada, Germany, and Japan) since 2014. An article by the St. Louis Fed, goes through the possible sources of higher yields in the U.S. Inflation expectations have been higher for the U.S. than what the non-U.S. average is, but the spread between the two hasn’t changed significantly during the period which makes inflation expectation an unlikely reason for the rise in Treasury yields. Higher expected GDP growth and an additional expected future supply of Treasuries, mostly attributable to Donald Trump and the Tax Cuts and Jobs Act of 2017 and the resulting higher relative deficit forecasts are the two most likely sources of the current higher U.S. yields. With near-zero long-term rates in Japan and Germany however and a continuing risk-off attitude, the higher demand for high-quality U.S. government debt with relatively higher yields can keep interest rates in check.

To conclude, I would like to note how important inflation and inflation expectations are to bond prices and yields. During the low-growth, low-rates period following the financial crisis, inflation expectations were the largest component in the nominal long-term interest rates. Therefore, it could be useful to get a perspective on

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76 treasury.gov, 2018.
The Fed holds another $1.7 trillion worth of Mortgage-backed securities. The two asset classes make up the vast majority of Fed holdings.
78 Neely, 2018.
how accurate the bond market is in predicting inflation. Shiller (2015) analyzes the relationship between inflation and interest rates on the ten-year Treasury bond, and he finds that a relationship exists between preceding long-term inflation and interest rates but there is “practically no relation between long-term interest rates and future long-term inflation.”<sup>79</sup> Since it is future inflation that matters for the investor, this suggests that the market is generally rather bad at forecasting inflation.

3.2.4. Equity Risk Premiums

I have already introduced equity risk premiums (ERP) during the discussion of the modified version of the Fed Model. I used it as a replacement for the default risk premium (DRP) used by Yardeni (2018b). The default risk premium is a risk premium on bonds – in this case, corporate bonds – and does not fully capture the risks of equities. Nonetheless, it is, or a variation of it is sometimes used as a proxy for the ERP, due to its simplicity and easy accessibility. According to Damodaran’s (2018a) calculations, the ratio of Implied ERP/Baa Default Spread has a median value of 1.96 for the period of 1960-2017 which indicates that most of the time, ERP has been twice as large as the default spread.<sup>80</sup> So what explains the difference and what measure should we use for equity risk premiums?

The equity risk premium is the price of risk in equity markets, a market-wide measure that reflects the risks investors see in the given economy and market. There are three paths to estimating an ERP: survey premiums, historical premiums, and implied equity premiums. Selecting the premium has huge effects on the present value of future cash flows and therefore huge implications for investment decisions as well as for business investment decisions as it affects the hurdle rate. Since ERP is a market-wide number, when choosing that number, one makes a judgment about the level of market prices and the future direction of it rather than about an individual firm. Depending on our belief about market efficiency, Damodaran (2018a) suggests the following. If one believes that markets are efficient and does not want to take a stance whether they are over- or underpriced, one should use the implied equity premium because it uses the currently available prices and forecasts about the future. If, on the other hand, we assume that markets can be significantly mispriced in either direction, we would use

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<sup>79</sup> Shiller, 2015. p.46.

<sup>80</sup> Yardeni uses an average value for bond spreads which includes higher rated bonds. That results in even lower default spreads and a higher ERP/Default Spread value.
historical premiums that uses past data as a benchmark. Lastly, if you have no faith in the markets whatsoever, you might want to use survey premiums because they are based on the opinions of investors, managers, or academics. Historical premiums are the most widely used approach. This method uses the actual past returns on stocks less the actual risk-free rates in every given year. This method can result in huge differences depending on the chosen time period, risk-free rate and averaging method. The problem with this method is that it is backward looking and there have been significant changes in factors affecting markets, valuations, and risk-free rates during different periods. Damodaran concludes that the historical ERP works better if used as a contraindicator rather than as a forecasting tool. He uses current implied ERP, because that was the best predictor for actual return premium for the next 5 or 10 years on stocks, plus, as mentioned, it is a forward-looking, “judgement-free” version of ERP.

For our purposes, the implied equity risk premium would also be the best choice since we want to assess what price the market has been assigning to equity risk using current market prices and forward-looking expected future cash flows. The price of risk is, therefore “the geometric average of the annualized equity risk premiums in future years and is analogous to the yield to maturity on a long term bond.” The implied premium can be calculated from an implied rate of return. In the following two-stage valuation model, the only missing variable is the required rate of return ($k_e$). After solving it for the rate of return and subtracting the risk-free rate, we receive the implied ERP:

$$\text{Value of Equity} = \sum_{t=1}^{t=N} \frac{E(FCFE_t)}{(1+k_e)^t} + \frac{E(FCFE_{N+1})}{(k_e-g_N)(1+k_e)^N}$$

*Value of Equity: The price of the stock index as priced by the market*

*FCFE: Free cash flow to equity / Potential dividends*

*N = Years of high growth*

$g_N = \text{Growth rate during the stable growth years}$

$k_e = \text{Required rate of return}$

Now, let’s make it compatible with the previously used modified version of the extended Fed Model, a stable growth model. The price ($P$) is equivalent to the value of equity, and the earnings ($E$) in this model is replaced with free cash flows to equity or

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81 Damodaran, 2018a. p.87.
82 Ibid. p.75.
83 See in Section 3.2.1.
potential dividends (FCFE). Here, the long-term growth rate (LTEG) is split up into two periods: during the high-growth-years (N) the model uses explicit cash-flow estimations for each year, and during the stable-growth-years, there is a fixed growth rate (gN). The required rate of return (kE) is the sum of the U.S. Treasury 10-year bond yield (TBY) and the equity risk premium (ERP) in the modified Fed Model:

\[ P = \frac{E}{(TBY + ERP - LTEG)} \]

This model was developed from Yardeni’s (2018b) simplified model where he used corporate bond yields (CBY = Treasury yield + default spread):

\[ (FEY = CBY - d \cdot LTEG) \]

The important difference is that Yardeni’s model was used to give a “correct” price for stocks, or at least indicate whether they are fairly- or overpriced by using the default spreads in the bond market as a risk premium. Damodaran’s (2018a) version reverses the order. It looks for the risk premium by assuming markets are fairly priced. The results can also be made compatible. If the same assumption were used by the two model regarding growth, then, when Yardeni’s version shows undervaluation (overvaluation) by using the default spreads, Damodaran’s model should show higher (lower) equity risk premiums relative to those spreads. Since the assumptions are not the same, and the two model differs in complexity, it will be more useful to compare the model’s results relative to their own historical measures. I do that with the implied premium in Chapter 4.2.

Determinants of Implied Equity Risk Premiums

We calculate the implied equity premium as the difference between the required rate of return (kE) and the risk-free rate, the ten-year Treasury yield. The ERP is higher when, ceteris paribus, either the rate of return is higher, or the risk-free rate is lower. The determinants of the risk-free rate were discussed in Section 3.2.3. Now, I will focus on the required rate of return (kE) which is the variable Damodaran’s model is solved for. Let’s go through the rest of the variables.

The free cash flow to equity is a measure of potential dividends (FCFE) computed as the sum of actual dividends and stock buybacks in the S&P 500. This is a more conservative measure than earnings. Potential dividends can be thought of as the part of
the earnings that is not invested back in the business to generate future growth and can be sustained in the long run. If potential dividends are higher, all else being equal, the required rate of return \((k_E)\) and therefore the ERP is higher. The other variables, so the number of high-growth years \((N)\), and the level of growth \((g_N)\) during the stable growth years, relate to the future value of cash flows positively. So, at any given market price (Value of Equity), or present value, the discount rate \((k_E)\) and the ERP increases as those variables move up as the investor earns more in the future on the same investment today. If the Value of Equity rises, ceteris paribus, the return on equity decreases and therefore the ERP too.

The level of cash flows is mostly determined by the same factors as earnings discussed in Chapter 3.1. The nominal future level is affected by both inflation and real growth, but the effects are not the same on the implied premium. Damodaran (2018a) analyzes the effects of both for the period of 1961 to 2017. He found that the implied ERP is negatively correlated with GDP growth, and positively with inflation. It suggests that GDP growth is good for stocks because higher GDP growth translates into higher expected cash flows and potential dividends. The accompanying optimism makes investors bid up the prices more than how much the cash flows are growing creating lower equity premiums. Inflation, on the other hand, is bad for stocks because investors demand a higher premium to compensate for higher inflation or higher uncertainty about inflation. The regression used for the analysis shows that every 1 percent increase in the inflation rate results in an approximately 0.70 percent upward move in the ERP, while every 1 percent increase in the real GDP growth rate is accompanied by a 0.30 percent decrease in the ERP.\(^\text{84}\) I review the relationship between the implied premium and interest rates in Chapter 4.2.

In Chapter 3, I reviewed the main determinants for stock market prices putting them into a simple framework with only two variables. Corporate earnings \((E)\) and the valuation of those earnings \((P/E)\) equals the price \((P)\). So, understanding what drives those makes it easier to see why stock market prices move in the direction they do; and assess to what extent monetary policy could influence them. In the last, fourth chapter, I connect the Fed's monetary policy with the stock market and look at quantitative measures to estimate the effect it could have had on market prices after the financial crisis.

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\(^{84}\) Damodaran, 2018a. pp. 97-98.
4. The Fed’s Impact on the U.S. Stock Market and Its Determinants

As discussed in Section 2.2.1., the objectives of the Fed as defined in the Federal Reserve Act are “maximum employment, stable prices, and moderate long-term interest rates”. From these three goals, usually only two: maximum employment and stable prices – in the form of low, stable inflation – are mentioned and are generally referred to as the Fed’s dual mandate. Given these goals, the Fed can have significant impact on the business cycle. Yardeni (2018b) quotes former Fed chairman, William McChesney Martin Jr. who said that the Fed’s job is “to take away the punch bowl just as the party gets going.” The problem is that central bankers need to be somewhat countercyclical because they have to do what they can to boost economic activity when there is a downturn, but they also have to get ready and create room to be able to ease monetary conditions during a boom preparing for the next downturn. Since markets are also greatly influenced by the business cycle and by monetary policy too, it is a difficult position for central bankers to be in.

“The problem is that no one likes party poopers, especially ones who take the punch bowl away as the fun is just starting. In trying not to act too hastily, the Fed often has perpetuated conditions that resulted in higher inflation and/or great speculative excesses in asset markets—which finally forced the Fed to slam on the brakes. In other words, the Fed tended to fuel booms and then to trigger the busts that inevitably followed. So the federal funds rate often has soared at the tail end of economic expansions, only to plunge during the ensuing recessions.”85

In the following two sections I first review how the monetary transmission works including the mechanisms of the new policy tools, then, I look at the valuation levels of the bond and the stock market.

4.1. The Monetary Transmission Mechanism

The Fed targets inflation and unemployment with the aim to promote real economic growth. But the central bank cannot directly affect these goals, it can only control internal targets using its toolkit as we have seen in the previous chapters. Between these tools and the ultimate goal, there is the economy with all of its

85 Yardeni, 2018b. p.199.
complexity. There are three main channels through which monetary policymakers can influence the real economy. These are (1) the interest rate channel, (2) the asset price channel, and (3) the exchange rate channel. Changes in those influence the spending decisions made by households and firms, and lending decisions of financial institutions.

“Many of these mechanisms, but not all, operate in the same way under conventional and unconventional monetary policies. But the arrival of unconventional policies has prompted a reexamination of the linkages between monetary policy and financial markets and led to renewed interest in models characterized by imperfect substitutability between assets.”

Before hitting the zero lower bound, the federal funds rate was the only tool through which everything else was influenced. Moving the federal funds rate had an immediate effect on many other interest rates (1) and therefore asset prices (2) in the financial markets. The exchange rate channel (3) works mostly through the import and export decisions that are impacted by the changes in the currency’s purchasing power. Not only the current federal funds rate matter, but the expectations of future rates as well because it impacts the valuation of long-term assets and all decisions that have longer lasting effects. Conventional monetary policy also affects spending through the banking system: banks have longer term assets financed by short-term liabilities, therefore, expansionary monetary policy and lower federal funds rate will increase the value of assets more than the value of liabilities, the net effect of which is an increased capital position of banks. Increased bank reserves mean a higher supply of lending, but it might be somewhat offset by the reduced margin of banks which results from the disappearing margins on deposits as the zero lower bound limits commercial banks’ ability to earn on the liabilities side of the balance sheet.

**The Transmission of New Policy Tools**

From the new policy tools, the *interest on bank reserve balances* and the *overnight reverse repurchase agreement* can be thought of as an extension of the federal funds rate, since the primary goal of these instruments is to keep the short-term interest rate in the target range. The transmission mechanism of *forward guidance* works mainly through the more explicit and open communication regarding the likely trajectory of future short-term interest rates. Forward guidance makes use of the interest rate and

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87 Ibid.

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asset price channel. As discussed in Section 3.2.3, the expected path of future short-term rates is one of the factors influencing long-term rates and therefore all asset prices too. Forward guidance not only works through affecting expectations of future interest rates, but it may also reduce term premiums because the guidance from monetary authorities reduces interest rate risk. However, “Kiley (2014) finds, using a quantitative macro model, that term premium reductions had substantively smaller expansionary effects than reductions of expected future interest rates.”

Forward guidance also helped to push back the expected date of the first interest rate hike. Large scale asset purchases work through the use of the Fed’s balance sheet. It influences longer-term interest rates and private sector interest rates through three channels: imperfect substitutability (portfolio balance channel), signaling about future policy, and improvements in financial balance sheets. Imperfect substitutability means that “each asset class has its own downward-sloping demand curve, allowing changes in the relative supplies of assets to affect prices and yields.”

Quantitative easing changes the relative supply of assets, affecting each asset class more or less directly. Significant purchases by the Fed signals its intention to stay accommodative for a longer period and works similarly to forward guidance. LSAP raised the capital ratios of banks by increasing the values of existing assets on their balance sheets. Additionally, purchases of mortgage-backed securities (MBS) increased the liquidity of these securities. These effects made banks more willing to lend. Kuttner (2018) refers to Rodnyansky and Darmouni (2017) who find that banks with larger initial MBS holdings were more likely to raise their lending activities after QE1 and QE3 – both of which included purchases of MBSs by the Fed. Luck and Zimmerman (2017) also referenced by Kuttner (2018) find that counties whose banks had larger MBS holdings seemed to experience more rapid employment growth following QE3 compared to those that had smaller holdings.

Monetary Transmission and Stock Prices

Here, I focus on stock prices within the asset price channel. Monetary policy actions affect financial markets most directly, so understanding this channel is crucial for the transmission mechanism. According to Mishkin (2001), there are three categories of transmission mechanisms within the stock market price channel. The first

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88 Ibid. p. 13.
89 Ibid. p. 6.
90 Bernanke and Kuttner, 2005.
type includes the effects on investments that companies make. In the case of easy monetary policy, stock prices are high relative to the replacement cost of capital. It means that investing in new equipment and facilities are relatively cheap compared to the market value of the company. In this situation, the company can issue new shares and get a higher price for the same piece of the company and use that money to invest in the needed equipment. Rising investments also raise the level of overall output in the economy. The second category includes the firm balance-sheet effects. Here, as easy monetary policy raises stock prices, it creates a higher net worth for businesses which makes them more creditworthy with higher values of equity. The third category includes household liquidity effects and household wealth effects. The liquidity effects are related to the consumer’s will to spend on consumer durables and housing. Since these items are more illiquid than financial assets, if the price of stocks goes up, the anticipated likelihood of financial distress decreases and makes people more willing to spend on consumer durables and housing which raises the real economic output as well. The wealth effects are related to consumption. Higher stock prices result in higher financial wealth which has a big effect on overall consumption. In the US, this channel is found to be quite strong with consumption giving two-thirds of the GDP.

4.2. Effects on Valuation and Measuring the Impact

In this final section, I review the data on bond market and stock market prices to get a more precise picture of what the paper has been discussing so far. The first step, in Section 4.2.1, is going to be the assessment of the bond market since long-term interest rates have a more direct relationship with monetary policy decisions and short-term interest rates. In this section, I use the results surveyed by Kuttner (2018), who collects several studies attempting to quantify the impact of unconventional policy tools on the bond market and outlines the reasons for why it is difficult to get a precise measure on it. Once the size of the effects on the bond market is known, Section 4.2.2. is going to assess the stock market to see whether it could have been impacted too. Here, I use the implied equity premium and the implied expected rate of return both of which are based on current market prices and forward-looking estimations and have been introduced in Section 3.2.4. I’m concluding this chapter by looking at international spillover effects.
4.2.1. Impact on the Bond Market

Before reviewing the impact, let’s recall the components the long-term interest rate can be decomposed into: (1) Expected inflation over the term of the bond, (2) the expected path of short-term real interest rates, and (3) the term premium, a residual component. Most studies have focused on the new policies’ effects on the interest rates on Treasury bonds and mortgage-backed securities (MBSs). The two approaches to measuring the interest rate effects used most commonly are high-frequency event studies and time series models of term premiums. Here, I quickly review how these methodologies are used, what assumptions they need to make, what limitations they have; and the results they arrived to.

Event studies use a one- or two-day window after the policy announcement to examine the interest rate changes in the bond market. This method relies on two underlying assumptions. The first is that the market did not anticipate the announcement beforehand. This can be plausible in the case of the first large scale asset purchases, but there is no market-based measure of these expectations, therefore, it cannot be confirmed. The other two quantitative easing program and the maturity extension program have been anticipated to a certain extent. The second assumption is that the announcement of expansionary programs is not interpreted as a negative outlook on the economy, which would also impact bond yields.

Cumulatively, the three rounds of large scale asset purchases and the maturity extension program had at least 150 basis points effect on the ten-year Treasury yield, pushing it downward. QE1 had the largest effect, approximately 100 basis points on Treasuries and mortgage-backed securities and more than 150 basis points for agency debentures (debt issued by Ginnie Mae, Fannie Mae, and/or Freddie Mac). Kuttner (2018) lists several reasons why these results should be treated with caution; three of them are: (1) The first round of quantitative easing was launched during a time when financial markets have been under a lot of pressure, thus, the huge impact of QE1 can be attributed to the restoration of normal market functioning rather than a reduction in expected future rates or term premium. (2) The announcements of large scale asset purchases tended to contain forward guidance as well, stating the intention to keep the federal funds rate at “exceptionally low levels”. For the purpose of this paper, this is not

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91 Section 3.2.3 referenced Bernanke, 2013.
92 Kuttner, 2018.
93 Ibid.
an issue since I am more interested in the cumulative effects of expansionary monetary policies rather than only the effects of quantitative easing. (3) The event study approach cannot fully grasp the impact because it is hard to measure persistence with it. It can take some time until changes in the supply of assets are fully realized by the markets. Wright (2012) and Swanson (2017) both referenced by Kuttner (2018) found that the policy effects died down after two-three months.

The time series analysis method is used to measure the impact of large-scale asset purchases on bond yields and on the term premium. The term premium is the difference between the ten-year Treasury yield and the expected short-term interest rate over the life of the bond. The premium which was already low by historical standards before the crisis fell by about 200 basis points from mid-2009 to mid-2012 even into negative territory as discussed by Bernanke (2013) as well. This suggests that investors were willing to pay a premium for Treasury bonds and the hedge it could provide. The correlation between the monthly changes in the ten-year yield and the term premium is 0.97 as they were decreasing hand in hand suggesting that the falling term premium accounts almost entirely for the reduction in the ten-year yield. The assumption underlying this method “is that changes in supplies of assets of a specific term result from factors such as the Treasury’s debt management or Fed portfolio allocation decisions and are otherwise unrelated to expected interest rates or term premiums.” Kuttner (2018) thinks it is a legitimate assumption that supply variables are exogenous. This assumption would be violated, however “if asset supplies and term premiums were both a function of an omitted variable, such as macroeconomic conditions and/or the state of the financial system.” The four well-known studies using the time series method, surveyed by Kuttner (2018), suggest that the policies cumulatively reduced the term premium by about 150 basis points, a very similar conclusion to what event studies arrived at.

Foley-Fischer, Ramcharan, and Yu (2016) analyzed the impact of the maturity extension program on non-Treasury bonds differentiating between them based on the National Association of Insurance Commissioners’ (NAIC) categorization. Category 1 bonds are rated AAA to A-, and Category 2 bonds are those rated BBB+ through BBB-. After every $100 invested in NAIC Category 1 bonds, insurance companies are required to hold $0.30 of equity capital; and $0.90 after Category 2 bonds. The authors find that

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“search for yield” behavior was observable among insurance companies during the maturity extension program, but in only extended to the higher rated bonds, and A- debt in particular which still requires lower equity capital while offering a higher yield than those with a better rating. The share of A-rated bonds in the insurance industry’s portfolio nearly triples between 2008 and 2011 increasing sharply during the program and pushing the risk premium down by roughly 25 percent. The reach for yield, however, did not extend to lower quality bonds, thus, the reach for yield seems not to be overly reckless according to Kuttner (2018).

4.2.2. Impact on the Stock Market

In the previous chapter, I introduced the notion of equity risk premiums, and the implied version of it, which uses current market prices and forward-looking estimates to compute a price for market risk. I am using this measure to assess how reasonable or unreasonable valuation levels are, and whether we should worry about a stock market bubble a decade after the financial crisis hit. The assessment should also help to decide whether ultra-easy and unconventional monetary policies should be held accountable for excesses in the financial markets as is often suggested by the media and investment professionals. In this section, I rely on the analysis of Damodaran (2018a). First, to connect stocks to the bond market, I look at the relation of implied equity risk premiums and interest rates, then I look at the historical measures of the implied risk premium, and lastly, the implied premium following the crisis year by year between 2007-2017.

Implied Equity Risk Premium and Interest Rates

The expected return on stocks can be expressed as the sum of the risk-free rate and the equity risk premium. Figure 13 shows this breakdown since 1961. Damodaran (2018a) notes that as can be seen, the implied premium was highest during the 1970s when interest rates and inflation were high, but the period following the crisis is contradictory, because while both interest rates are low, the implied equity premium is high. Looking only at the numbers, we might conclude that this evidence is antinomic, however, if we look at the meaning of it, it certainly becomes less puzzling. During the 1970s, the risk was high inflation and the uncertainty about the real return that can be obtained which resulted in high risk premiums. Following the crisis, risk-aversion was likely caused by the evidence of huge losses that can be realized and the uncertainty
about the future. As Yardeni (2018b) points out, the financial crisis made investors nervous and fearful creating demand for pessimistic prognosticators to foresee Black Swan events. In a September 2018 blog post, he counts 5 corrections and 61 “panic attacks”, since the beginning of the current bull market, most of which were followed by relief rallies.\(^9^5\) Yardeni (2018b) implies that investors became so fearful of another meltdown – as it is suggested by the risk premium measures as well – that it actually kept room for the continuation of the bull market; with the help of “anxiety fatigue” led runs.

Damodaran (2018a, p. 96.) concludes after running a regression of the implied premium against both the level of the long-term rates and the slope of the yield curve that neither seems to have much impact on the equity risk premium between 1961-2017. It suggests that when using equity premium numbers for valuation or corporate finance purposes, the chosen premium should not be linked to the level of interest rates which gives support for the current practice.

*Figure 13: Expected Return on Stocks: The Ten-year Treasury Bond Rates and the Implied Equity Risk Premium (1961-2017)*

Source: Damodaran, 2018a.

\(^{95}\) Yardeni, 2018a.
With regard to possible monetary policy effects, “the stickiness of the overall expected return on stocks, which has not gone down with the risk free rate, is a testimonial that central banking policy is not pushing up the prices of financial assets.” This means that even if low long-term interest rates can be explained to some extent by monetary policy actions, it seems that the stock market has been resistant, and through an increased equity risk premium, kept the expected return more or less level.

**Historical Measures of the Implied Equity Risk Premium**

*Figure 14* shows the year-end implied premiums for the U.S. stock market between 1960-2017. The method is the same as was shown in Section 3.2.4. Cash flows are calculated as potential dividends which includes buybacks on top of the actual dividends. As mentioned in the previous section, implied premiums were highest during the 1970s and the period following the recent financial crisis. The average implied premium over the full period is 4.2 percent, while the average over the past 10 years (2008-2017) is 5.5 percent. During the Great Inflation, the highest 10-year average measure of the implied ERP was 5.2 percent (1974-1983). Damodaran (2018a) notes that there is a strong tendency towards mean reversion in the case of implied premiums. The shocks of the 1970s, and of the dot-com bubble burst and the financial crisis, made investors warier pushing the implied risk premium for equities higher. The chart also shows how the period of the Great Moderation and the lack of severe crises kept the premium below the long-term average, and how the dot-com mania pushed it further down to historic lows. The year-end 2017 measure of 5.1 percent is still significantly above the long-term average and does not seem excessive. Of course, we have to remember that the implied premium still compares the expected return to bond yields, and it uses expected future cash flows in the calculation of the risk premium.

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96 Damodaran, 2018a. p. 97.
Figure 14: Implied Equity Risk Premium for the S&P 500 (1960-2017)

Source: Damodaran, 2018a.

The Implied Equity Risk Premium Following the Financial Crisis

Figure 15 shows the monthly changes in the expected return on the S&P 500 as the sum of the implied premium and the long-term interest rate between October 2008 and November 2018. Overlaid, the stock market index is shown as it is advancing since March 2009 when the expected return reached almost 11 percent, with the risk premium approaching 8 percent. By 2010, fears of a prolonged crisis had waned, and with the recovery of the stock market, the expected return came back down to around 8 percent, around which measure it has been oscillating ever since. Damodaran (2018a) musters the determinants of the implied risk premium and the notable changes in their level year by year starting with December 31, 2007. Table 1 shows a summary of the changes. The determinants have been discussed previously in this paper; here, we can see examples of how certain changes affect the premium.
By the end of 2008, the implied premium shot up relative to the previous year-end level. While the stock market plummeted 38 percent during the year, expected return remained near flat as both potential dividends and future expected growth rates came down. The spike in the risk premium is, therefore, can be attributable to the fall of long-term interest rates since the other determinants moved simultaneously as reflected by the barely changed expected return. It is important to note that the ten-year Treasury rate is used both as the risk-free rate in the calculation and as the growth rate for cash flows following the 5 years with explicit growth rate estimations in Damodaran’s two-stage model. At the end of 2011, the stock index is unchanged compared to the previous year level. Even though the implied expected return has dropped mostly as a result of the slower growth rate indicated by the long-term interest rate, the same has pushed the implied premium up to 6 percent.
Table 1: Implied ERP and Determinants Year by Year (2007-2018)

<table>
<thead>
<tr>
<th>Year-end</th>
<th>Potential Dividends (USD)</th>
<th>Change (Potential Dividends)</th>
<th>Growth rate (next 5y) (%)</th>
<th>T-bond Rate (growth rate after 5y) (%)</th>
<th>Implied ERP (%)</th>
<th>Implied Expected Return</th>
<th>SP 500 (USD)</th>
<th>Change (SP 500)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>60.35</td>
<td>-</td>
<td>5.00</td>
<td>4.02</td>
<td>4.46</td>
<td>8.48</td>
<td>1468.36</td>
<td>-</td>
</tr>
<tr>
<td>2008</td>
<td>52.58</td>
<td>-13%</td>
<td>4.00</td>
<td>2.21</td>
<td>6.43</td>
<td>8.64</td>
<td>903.25</td>
<td>-38%</td>
</tr>
<tr>
<td>2009</td>
<td>40.38</td>
<td>-23%</td>
<td>7.20</td>
<td>3.84</td>
<td>4.36</td>
<td>8.20</td>
<td>1115.10</td>
<td>23%</td>
</tr>
<tr>
<td>2010</td>
<td>53.96</td>
<td>34%</td>
<td>6.95</td>
<td>3.29</td>
<td>5.20</td>
<td>8.49</td>
<td>1257.64</td>
<td>13%</td>
</tr>
<tr>
<td>2011</td>
<td>59.01*</td>
<td>9%</td>
<td>7.18</td>
<td>1.87</td>
<td>6.01*</td>
<td>7.88*</td>
<td>1257.60</td>
<td>0%</td>
</tr>
<tr>
<td>2012</td>
<td>69.46</td>
<td>18%</td>
<td>5.27</td>
<td>1.76</td>
<td>5.78</td>
<td>7.54</td>
<td>1426.19</td>
<td>13%</td>
</tr>
<tr>
<td>2013</td>
<td>84.16</td>
<td>21%</td>
<td>4.28</td>
<td>3.04</td>
<td>4.96</td>
<td>8.00</td>
<td>1848.36</td>
<td>30%</td>
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<tr>
<td>2014</td>
<td>100.50</td>
<td>19%</td>
<td>5.58</td>
<td>2.17</td>
<td>5.78</td>
<td>7.95</td>
<td>2058.90</td>
<td>11%</td>
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<tr>
<td>2015</td>
<td>106.09</td>
<td>6%</td>
<td>5.55</td>
<td>2.27</td>
<td>5.16*</td>
<td>7.43*</td>
<td>2043.94</td>
<td>-1%</td>
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<tr>
<td>2016</td>
<td>108.67</td>
<td>2%</td>
<td>5.54</td>
<td>2.45</td>
<td>4.5*</td>
<td>6.95*</td>
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<tr>
<td>2017</td>
<td>108.28</td>
<td>0%</td>
<td>7.05</td>
<td>2.41</td>
<td>5.08</td>
<td>7.49</td>
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<td>19%</td>
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<tr>
<td>Nov-18</td>
<td>126.70</td>
<td>17%</td>
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<td>3.16</td>
<td>5.76</td>
<td>8.92</td>
<td>2712.00</td>
<td>1%</td>
</tr>
</tbody>
</table>

Data Source: Damodaran, 2018a. and http://pages.stern.nyu.edu/~adamodar/

Implied Equity Risk Premium and Implied Expected Return values in 2011, 2015 and 2016 are based on modified cash flow estimations because the sum of dividends and buybacks (Potential Dividends) were higher than earnings, which is unsustainable and inconsistent with the model’s assumption that cash flows will grow over time.

At the beginning of November 2018, the stock market index was at $2712 and has tripled over the past ten years, since the end of 2008. Potential dividends have more than doubled but expected growth rates increased both for the next five years and for the period after that, thus, the implied expected return has barely moved even after the huge advance in the stock market. With the ten-year Treasury yield standing at 3.16 percent, the implied premium was 5.76 percent as of November 2018 which suggests that there are no excesses in the U.S. stock market. Again, we need to be careful and understand that it is only true if expected growth rates will not turn out to have been overly optimistic, and the Fed’s actions or other events will not push long-term rates too high too quickly. If these were to happen, either the equity premium would need to fall suggesting that the market remains confident and optimistic even in the face of those events, or the stock market would need to adjust downward to keep the implied expected return end risk premium at an acceptable level.

In 2018, both the 10-year Treasury yield and the implied risk premium has increased, pushing the implied expected return on stocks higher than any of the year-end measures have been during the past ten years. On the one hand, it suggests that stocks are not expensive according to these estimations. On the other hand, however, it also shows that the markets are growing nervous, which, in my opinion, could be the result...
of the tightening monetary conditions, a lack of trust in a continuing economic expansion.

4.2.3. International Outlook and Future Research Areas

The focus of this paper was on the U.S. monetary policies effects on the U.S. financial markets, and the stock market in particular but we must take a short look at the effects on international markets before concluding it. My focus here is narrowly on emerging markets where huge capital inflows were observable after interest rates fell to zero or into negative territories in developed economies. Several studies have found that the Fed’s expansionary policies affected these markets. Bhattarai, Chatterjee, and Park (2015) concluded that the capital inflows to emerging economies were, to some extent, a result of quantitative easing which caused the appreciation of currencies, reduction in bond yields, and booms in the stock markets. Bowman, Londano, and Sapriza (2015) found that sovereign bond yields in emerging markets were reduced similarly as in the U.S. as a result of large scale asset purchases. Fratzscher, Lo Duca, and Straub (2017) analyzed data on flows into more than 16,000 equity and 8,000 bond funds and found that the effects differ across the quantitative easing programs and asset types. While all three QE programs were associated with some influx of funds into emerging market equity funds, the first round of quantitative easing seems to have resulted in an outflow from emerging market bonds into U.S. equities. The authors conclude that it was more the composition of mutual fund flows into emerging market economies rather than the total volume that was affected.97

Another question that I do not tackle but is reflected on a couple of times in the paper, is the behavior of other central banks in major economies and the cumulative effect of those on global financial markets. It was mentioned for example that U.S. Treasury yields are probably held down somewhat by the even lower yields in other developed economies. The Bank of Japan is allowed to purchase equities and the European Central Bank started its own corporate sector purchase programme (CSPP) in 2016 under which it is allowed to buy corporate sector bonds. The BOJ’s bond holdings have reached 79 percent of Japan’s GDP in value and their equity holdings account for 75 percent of the total ETF market.98 The ECB held €170 billion worth of corporate

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97 Kuttner, 2018.
bonds in September 2018. These issues are worth researching and it will probably take decades before we can judge with more certainty whether these actions and their combined effects were essential or excessive and misadventurous.

**Conclusion**

While the scope of this paper is by no means exhaustive, several important conclusions can be made. First of all, the assumption that excessively easy monetary conditions created by the Fed pushed stock prices to irrational heights seems to be an overstatement. To understand why let’s review the main findings.

(1) Although the current level of the CAPE ratio is a little worrisome, the more complex forward-looking model, used to compute the implied equity risk premium and the implied expected return, suggests, that stock market prices in the past ten years have been supported by the fundamentals and the expectations of them. Even as the long-term interest rate fell to historic lows, with the increase in the risk premium, the implied expected return remained steady near 8 percent. The two foibles of this method are the growth expectations and the ten-year Treasury yield. (2) The lesson that can be subtracted from Chapter 3 is that forward estimates are good until a recession hits when they perform very poorly. To overcome this problem, one can either use the CAPE ratio which is not fooled by optimistic expectations or can try to assess and predict the state of the economy which is the main driver of earnings growth.

(3) The long-term interest rate in the model has two roles. It is the growth rate used to calculate the terminal value; and, it is a component of the expected return which is used to discount future cash flows. This second role effectively means that if long-term yields increase, all else being equal, bonds will become more attractive increasing the opportunity cost for stocks or decreasing the equity risk premium. Given the first role, however, it also implies higher earnings growth. Using “the Bond Vigilantes Model”, we can decompose the long-term interest rate into the nominal GDP’s real growth and inflation factors. History suggests that real growth is good for the stock market because it comes with earnings growth. Inflation tends to be bad because while it may still have a positive effect on nominal earnings, the uncertainty of real returns pushes the risk premium and the expected return higher.

(4) The immediate goal of the Fed’s monetary policy actions including the introduction of new tools, such as large scale asset purchases and forward guidance, was, to reduce long-term interest rates. Studies suggest that the new tools were successful in reducing long-term interest rates by as much as 150 basis points, although, much of this effect is attributable to the restoration of normal financial conditions and the effects abated after a couple of months. The story of low long-term interest rates starts before the crisis and even if it may be affected to some extent by the Fed, monetary policy is not the primary driver and has little power over it.
References


Federal Reserve Act 2A.


Appendices

STATEMENT ON THE ORIGINALITY OF THE THESIS WORK

Name: Gergo Keri

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NEPTUN code: ZV5NLW

Title of the Thesis Work:

The Fed’s Monetary Policy and Its Possible Effects on the U.S. Stock Market After the Great Recession

Thesis Work consultant/supervisor’s name: Aladar Madarasz, Dr.

DECLARATION:

I, Gergo Keri, in full knowledge of my liability, hereby declare that all the texts, diagrams and tables in this Thesis Work are based solely on my own individual work and is not based on work published in another document or by another contributor. Where I have drawn on the work of others, this has been appropriately and fully acknowledged in the form of citation and references as set out in the Guidance for Preparing Thesis Work and/or the Corvinus Business School’s Addendum to the Study and Exam regulations.

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I, Aladar Madarasz, Dr., hereby declare that the above named student has regularly participated in my consultation sessions relating to his/her thesis work. The thesis work meets the formal requirements indicated in the Guidance. Its content corresponds to the title, and is keeping with the general requirements as regards the scientific and professional content.

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