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MONETARY POLICY AFTER THE GLOBAL CRISIS

How Important Are Economic (Divisia) Monetary Aggregates for Economic Policy?

(in honour of William A. Barnett)

15th February to 15th March, 2018

Title of the paper

Monetary policy in crisis

Author

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This paper argues contemporary monetary policy is in crisis because it is based on a model and ideas that have essentially nonexistent theoretical foundations and are virtually void of empirical support. The paper shows that the widespread practice of implementing monetary policy by targeting the overnight federal funds rate is based on the myth that the Fed has controlled and can control the federal funds rate with open market operations. It then shows that interest rate targeting is bad, indeed, dangerous; it has distorted yields across the term structure and consequently the allocation of credit and economic resources. This is patently true of the aggressive policies pursued by the Fed in the wake of the financial crisis. Policymakers claim that these policies have been successful by ignoring research demonstrating the ideas and theories upon which these policies are based are faulty and unsound and by citing faulty empirical analysis or research that is so weak that it provides no compelling evidence of these policy's effectiveness. The paper concludes

that the profession needs to engage in a debate about the strength of the theoretical foundations for various methods for conducting monetary and the strength of the evidence that supports these methods. It also makes a recommendation for making monetary policy that will put a governor on scope and extent of the Fed's policy actions while making policy more transparent and predictable, and protect the Fed's independence.

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Monetary Policy in Crisis

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Abstract

This paper argues contemporary monetary policy is in crisis because it is based on a model and ideas that have essentially nonexistent theoretical foundations and are virtually void of empirical support. The paper shows that the widespread practice of implementing monetary policy by targeting the overnight federal funds rate is based on the myth that the Fed has controlled and can control the federal funds rate with open market operations. It then shows that interest rate targeting is bad, indeed, dangerous; it has distorted yields across the term structure and consequently the allocation of credit and economic resources. This is paretically true of the aggressive policies pursued by the Fed in the wake of the financial crisis. Policymakers claim that these policies have been successful by ignoring research demonstrating the ideas and theories upon which these policies are based are faulty and unsound and by citing faulty empirical analyses or research that is so weak that it provides no compelling evidence of these policy's effectiveness. The paper concludes that the profession needs to engage in a debate about the strength of the theoretical foundations for various methods for conducting monetary and the strength of the evidence that supports these methods. It also makes a recommendation for making monetary policy that will put a governor on scope and extent of the Fed's policy actions while making policy more transparent and predictable, and protect the Fed's independence.

The Fed has paid attention to interest rates, particularly the federal funds rate, in evaluating the stance of monetary in the late 1960s to the late 1970s. The result was Great Inflation in the 1970s and early 1980s because, as Milton Friedman and other monetarists noted, the Fed confused high interest rates with “tight” monetary policy.

As a consequence the Fed’s failed policy, the Federal Open Market Committee (FOMC) was reticent to mention the federal funds rate out of concern that it would be seen as returning to a failed operating procedure (Thornton, 2006). Hence, from the early 1980s to the late 1980s, the FOMC returned to using the funds rate as a guide for conducting monetary policy, as it evaluated the usefulness of a variety of monetary and reserve. The FOMC attempted to disguise the fact that it was once again paying considerable attention to the federal funds rate, saying it was focusing its attention on borrowed reserves (see Thornton, 1988a). The FOMC tried to implement policy using monetary and reserve aggregates. But at the February 10, 1988, meeting Greenspan noted “there has been more data mining with the monetary aggregates in the last 2 years than I’ve seen with any other set of data in my whole life. And whenever you get to that, you know that there’s nothing there. We can expand away or we can contract, but I don’t think it matters p. 44).”

Hence, it’s not surprising that Thornton (2018) found that the FOMC began targeting the funds rate to implement policy as it would if it was interest rate rule, such as the Taylor (1993) rule, in the late 1980s, with the most likely date of the change being May 1988: Greenspan explained the metamorphosis at the July 1997 FOMC meeting.

I think we were well aware of what would happen when we shifted to an explicit federal funds rate target. As you may recall, we fought off that apparently inevitable day as long as we could. We ran into the situation, as you may remember, when the money supply, nonborrowed reserves, and various other non-

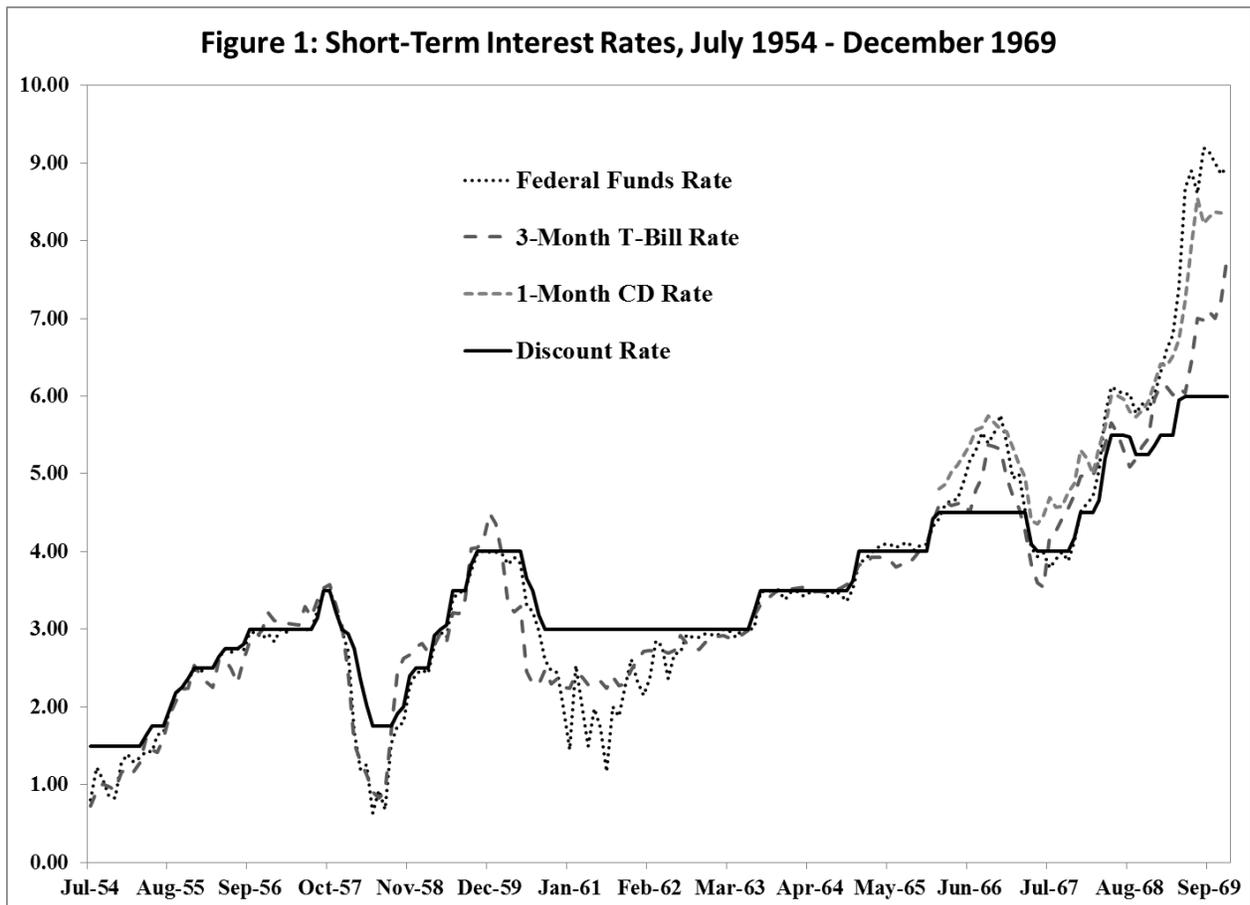
interest-rate measures on which the Committee had focused had in turn fallen by the wayside. We were left with interest rates because we had no alternative. I think it is still in a sense our official policy that if we can find a way back to where we are able to target the money supply or net borrowed reserves or some other non-interest measure instead of the federal funds rate, we would like to do that. I am not sure we will be able to return to such a regime..., but the reason is not that we enthusiastically embrace targeting the federal funds rate. We did it as an unfortunate fallback when we had no other options...(Transcript, July 1997, pp. 80-81).

The FOMC has implemented policy exclusively by targeting the funds rate not only because other options didn't work, but because economists and policymakers believe monetary policy works through the interest rate channel. Indeed, this is the only channel for policy New Keynesian model upon which contemporary monetary is based. Indeed, Woodford (2008) argued that money plays no role in the conduct of monetary policy in that model. McCallum (2008) suggests that money is implicit in the model because the Fed controls the funds rate using open market operations. Because most economists share McCallum's view, my analysis begins by dispelling the myth that is in every textbook and repeated often by policymakers in spite of the overwhelming evidence to the contrary.

2.0 The Myth that the Fed Controls the Funds Rate Using Open Market Operations

Given the facts that; (1) participation in the federal funds market is limited to depository institutions (henceforth, banks), Home Loan Banks, and several government sponsored agencies (GSE) and (2) that the Fed can control the supply or reserves through open market operations, it is hardly surprising that economists assumed that the Fed controlled the funds rate with open market operations. It simple supply and demand. The Fed increases the supply of reserves with an open market purchase of securities and the price of reserves in the market for reserves—the federal funds rate—goes down; the reverse happens when the Fed sells securities. Unfortunately, it's a myth: It has never happened. It can't happen.

Until the mid-1960s the federal market was a simple market where banks traded excess reserves to meeting their Fed imposed reserve requirements. Hence, the funds rate tracked short-term rates closely so long as short-term rates were below the Fed's discount rate. When market rates went above the discount rate, the discount rate provided a ceiling for the funds rate. This is shown in Figure 1, which shows the federal funds rate, the 3-month T-bill rate, the discount rate and the 1-month CD rate (the CD rate is only available from January 1966).



Meulendyke (1998, p. 38) noted “There was considerable surprise when the funds rate first rose above the discount rate, briefly in October 1964 and more persistently in 1965. As large banks became more active managers of the liability side of their balance sheets, they borrowed funds in the [federal funds] market in a sustained way.” This occurred in part because Regulation

Q capped rates on certificate of deposit (CD). The funds rate and the CD rate tracked closely by 1966.

Cook and Hahn (1989) is often cited as evidence that Fed targeted the funds rate in the 1970s and that changes in the funds rate target produced a strong response in Treasury rates. Using daily data from September 13, 1974, to October 5, 1979, Cook and Hahn found that rates on Treasury securities from three months to 20 years responded significantly to funds rate target changes reported in the *Wall Street Journal* (WSJ). Using a federal funds rate target series by Rudebusch (1995a,b), Thornton (2004a) showed that Cook and Hahn's results were based on faulty data. Rudebusch's data indicated that there were 99 target changes during the period—23 more than the 76 changes reported in the WSJ. Moreover, only 39 the target changes reported by Rudebusch (1995a,b) occurred on the day that the WSJ reported the change had occurred. Hence, the market was correct about the timing about 40% of the time. Even when the market got the timing correct, it frequently missed the magnitude.

Furthermore, Cook and Hahn's analysis is based on their explicit assumption that WSJ-identified target changes were exogenous. However, Thornton's (2004a) more careful analysis showed that many of the WSJ-identified "target" changes were due to endogenous movements in the funds rate. This is consistent with the fact that Rudebusch identified 99 target changes—an average of a change every two weeks—much too frequent than rational monetary policy would suggest would be necessary. Indeed, there were only 98 target changes during the more than 20 years from May 1, 1988, and December 15, 2008.

Moreover, at the insistence of a referee for Thornton (2006) created a funds rate "target" series for the period September 27, 1982 through December 31, 1993, using FOMC transcripts, the FOMC Blue Book and other internal FOMC documents (Thornton 2005). Consistent with

target changes being endogenous before 1988, Thornton (2005) found that it was often difficult to identify a change before the late 1980s. In contrast, it was much easier to document target changes by the late 1980s. Also, there were fewer changes of a few basis points; after July 1987 all target changes were 25 basis points or larger. Changes were also much less frequent: There were 55 changes during the 68 months before May 1988 compared with 38 changes during the subsequent 68 months.

That the Fed never controlled the funds rate with open market operations is also supported by the fact that no one has found a statistically significant liquidity effect using monetary or reserve aggregates and low frequency data (for a survey see Pagan and Robertson, 1995). The exception is when nonborrowed reserves are used. For example, Christiano and Eichenbaum (1992) found a statistically significant liquid effect with nonborrowed reserves using data for the period 1959.01 to 1996.12. However, (Thornton, 2001) showed that Christiano and Eichenbaum's liquidity effect is due solely to the fact that the Fed regularly offset the effect of bank borrowing from the discount window on total reserves, thus creating a statistically significant negative relationship between nonborrowed reserves and the funds rate.¹ Consequently, Christiano and Eichenbaum's liquidity effect varies with banks' use of the discount window, and vanished when large banks stopped borrowing from the Fed after Continental Illinois Bank failed despite massive borrowing from the Fed (see Thornton, 2001 and Clouse, 1992 for details).

Hamilton (1997) has suggested that the liquidity effect can be estimated at the daily frequency by estimating the response of the funds rate to a shock to the supply of reserves that are analogous to the shocks the Fed creates by exogenous open market operations. Specifically,

¹ Thornton (1988b) also found a statistically significant liquidity effect with nonborrowed reserves. However, he noted that the effect was small and only when monthly data were used, not when weekly data were used.

he estimates the liquidity effect as the daily response of the federal funds rate to the error the Fed makes forecasting the Treasury's balance with the Fed. Thornton (2001) notes that this does not eliminate the identification problem; it merely replaces one identification problem with another, i.e., identifying the error the Fed makes in forecasting the Treasury's balance. He then showed Hamilton's methodology failed to do this. Indeed, Thornton (2004b) showed that Hamilton's forecast errors were significantly larger than those made by the New York Fed, the Treasury, or the Board of Governors.

Thornton (2001) also pointed out that Hamilton's approach cannot identify the liquidity effect because during his estimation period the Fed's system of reserve requirements were not contemporaneous. He goes on to show that there is no evidence of a statistically significant liquidity effect using Hamilton's methodology for periods before and after his. Furthermore, Hamilton's liquidity effect is only statistically significant on days when banks must meet their reserve requirements, *settlement Wednesdays*. Thornton (2001) shows that Hamilton's settlement-Wednesday liquidity effect is due to just six days when there were unusually large changes in the funds rate and unusually large reserve shocks. When these days are accounted for, there is no evidence of the liquidity effect during Hamilton's sample period.

Finally, Thornton (2007) used daily on open market operations obtained from the Trading Desk of the Federal Reserve Bank of New York to estimate the extent to which daily open market operations affect the federal funds rate. The sample period is March 1, 1984, through December 31, 1996. He found a statistically significant negative relationship between reserve supply shocks and the federal funds rate; however, the effect was tiny: To move the funds rate 25 basis points the Fed would have had to conduct a significantly larger open market operation than it had ever conducted.

2.1 Open Mouth Operations

The funds rate has stayed very close to the FOMC's target since the late 1980s. Indeed, since the FOMC began announcing its new target in June 1999, the federal funds rate has gone to the new target immediately upon the announcement. This is what Guthrie and Wright (2000) called "open mouth operations." A number of economists have noted this. However, some hold to the idea that the federal funds rate could stay at the new target only if the Fed "confirms" the new target by altering the supply of reserves. For example, Taylor (2001) suggests that the initial reactions to Fed announcements are announcement effects and that to maintain the rate the Fed must subsequently adjust the supply of reserves using open market operations. He presents a simple model of how this could be done. However, he presents no empirical evidence to support his contention that the Fed must have done this. To the best of my knowledge, no such evidence has been presented. However, the relationship between the funds rate and the target got tighter when the FOMC began announcing a specific numerical target for the funds rate at its June 1999 FOMC meeting. Prior to this, the FOMC statement implied but did not specifically state a numerical target.

In any event, it is easy to show that the Fed would have considerable difficulty controlling the funds rate without open mouth operations if the market wasn't convince it could do it. To understand why, consider Thornton's (2014a, 2015) simple thought experiment.² Assume that the CD and funds markets are in "equilibrium." The equilibrium rates need not be equal, but for this experiment assume they are and are 4 percent. Now assume that the FOMC wants to reduce the federal funds rate to 3.5 percent. To do so, the Fed would purchase securities

² Thornton (2014a) also explains why the fact that the demand for money depends negatively is neither necessary nor sufficient for the Fed's ability to control interest rates.

which increased the quantity of excess reserves relative to banks' desired holdings. Banks lend more in the federal funds market causing the funds rate to decline.

Assume that these actions caused the federal funds rate to decline to 3.5 percent. So far, so good, but this is not a new equilibrium—the CD rate is still 4 percent. Banks can acquire funds for lending cheaper in the federal funds market, so they increase their demand for federal funds and reduce their demand for CDs. The increased demand for federal funds causes the federal funds rate to rise; the reduced demand for CDs causes the CD rate to fall. How much the CD rate falls and how much the federal funds rate rises depends, importantly, on the relative size of the two markets. If the CD market is large relative to the federal funds market, the decline in the CD rate will be small relative to the rise in the federal funds rate. If the CD market is very large relative to the funds market (which it was), the CD rate would decline a few basis points and the funds rate would rise back to within a few basis points of 4 percent. The implication of this simple arbitrage example is this: To keep the funds rate at 3.5 percent, the Fed has to purchase more securities. How much more depends on the relative sizes of the markets. If the CD market is very large relative to federal funds market, the Fed would have to purchase a lot more. In any event, the Fed would have to keep purchasing securities until the CD and federal funds market achieved a new equilibrium at 3.5 percent.

Unfortunately, this is not a new equilibrium. Arbitrage works across all markets. People that lend to banks in the CD market now have an incentive to reduce their lending in the CD market and purchase other higher yielding securities, Treasury bills, commercial paper, etc. These actions will cause the CD rate to rise relative to the federal funds rate. If the FOMC wants the equilibrium funds rate to be 3.5 percent, the Fed will have to purchase still more securities. Indeed, the Fed will have to purchase the quantity of securities required to achieve a new

equilibrium over the entire structure of interest rates. Given the size of the federal funds market relative to the aggregate size of these other markets, the Fed's purchase would have to be enormous. The Fed never made large purchases before Lehman Bros.' bankruptcy announcement in September 2008. Indeed, the Fed seldom added more than about \$30 billion to its portfolio annually. The Fed didn't do this because doing so would have flooded banks with reserves and produced a massive increase in the money supply.

The myth that the Fed can control the federal funds rate with open market operations is so entrenched in the folk lore of monetary policy that many economists will somehow reject the implication of this simple thought experiment without overturning its logic. Moreover, many of these same economists will have no trouble believing that the exact same arbitrage logic (discussed in Section 3.2) is the reason that the FOMC's large-scale asset purchase program (aka, quantitative easing, QE) could not reduce long-term rates (e.g., Bauer and Rudebusch, 2014).

2.2 Why Open Mouth Operations Works

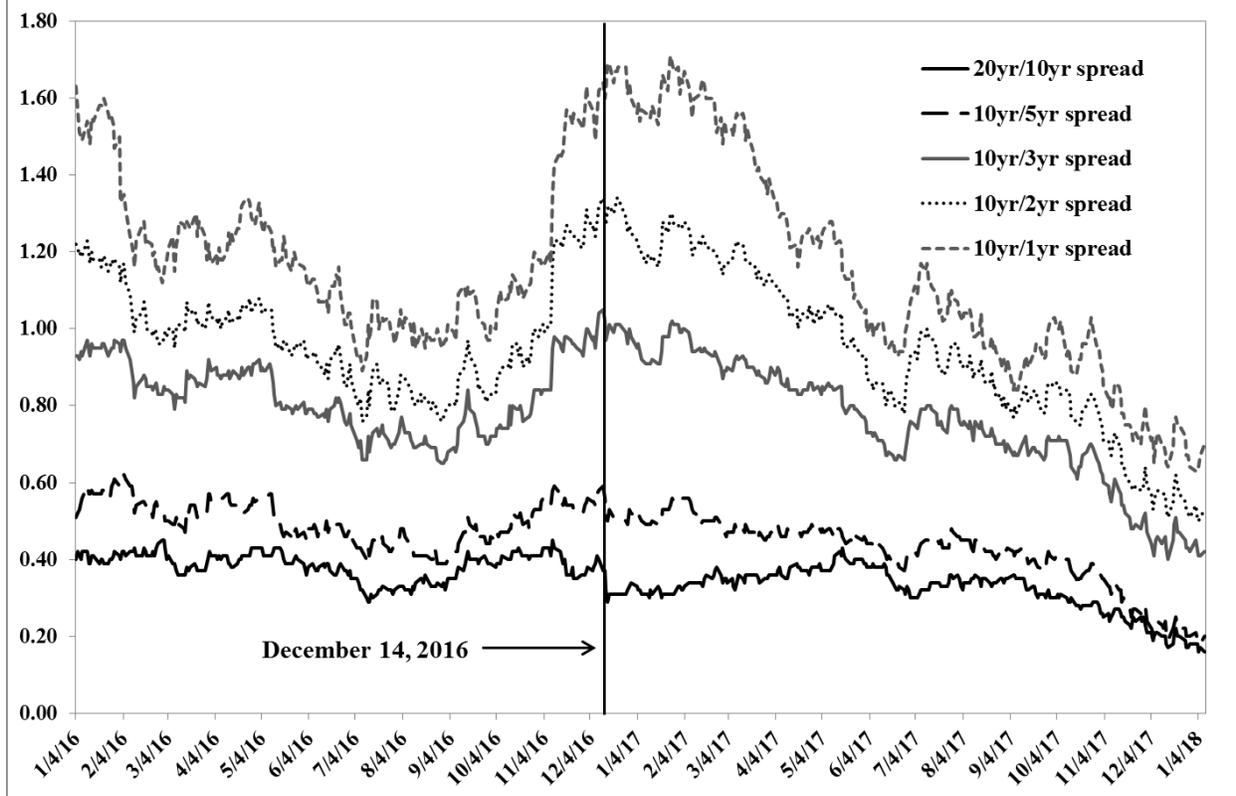
The FOMC can control the federal funds rate with open mouth operations for the same reason a wide variety of interest rates are tied to or priced off of LIBOR rates (see Thornton, 2015). Unlike TVs, furniture and other physical goods whose cost of production are significant and determine a price floor, the "production" costs of credit are trivial. Production costs no guidance for the interest rate to charge on a loan. This is why many lending rates are tied to LIBOR rates, which is odd considering the fact that LIBOR rates are not based on market transactions. They are the simple average of responses by banks to a survey of rate they would charge if they lent to other banks that day. There was a scandal in 2008 when the *Wall Street Journal* reported that several large international banks reported unjustifiably low LIBOR rates. Indeed, lying on the survey got Tom Hayes, aka the "Rain Man," sentenced to 14-years in prison.

The difficulty in pricing credit is the reason the FOMC's setting of the federal funds rate since the late 1980s and, more recently, setting the interest rate the Fed pays banks to hold excess reserves, IOER, has had a strong effect on interest rates across the term structure. The Fed is a government created institution whose actions are believed to have a considerable effect on the economy and on a wide range of asset prices. Indeed, some analysts even believe that the Fed has superior insight into the behavior of the economy and financial markets. Consequently, market participants pay close attention to the FOMC' funds rate target.

Nevertheless, many if not most economists believe that long-term rates are determined by economic fundamentals—expectations of the future growth of output, inflation, and a wide range of other real variables. Given the inherent uncertainty about expectations of economic fundamentals, it is not too surprising to find that the FOMC funds rate target can even affect long-term interest rates. Thornton (2018) has shown that the FOMC interest policy affected Treasury yields out to 5 years.

The FOMC began increasing its target rate aggressively at the December 2016 meeting, increasing the IOER by a percentage point by the December 2017 meeting. The effect of the FOMC's rate increases on longer-term rates is illustrated in Figure 2, which shows the spreads between the 10-year Treasury rate and the 1yr, 2yr, 3yr and 5yr Treasury rates and the spread between the 20-year and 10-year Treasury rates. All four 10-year spreads declined significantly from December 14, 2016 to the present. The 10-year spreads from 1 to 5 years declined by 92, 74, 55, and 32 basis points, respectively. Consistent with Thornton (2016), the FOMC's rate increase even affected Treasury rates with maturities of 10-year—the 20yr/10yr spread declined by 16 basis points.

Figure 2: Treasury Spreads, Daily January 4, 2016, Through January 8, 2018



That the FOMC can affect interest rates along the entire term structure is good, if and only if, the FOMC can allocate credit better than the market. Any economists worthy of the name should be very wary about such a claim. Indeed, when the Fed initiated QE a number of FOMC participants (nearly all of whom were Reserve Bank Presidents) were concerned purchases of securities other than Treasuries would distort the allocation of credit, (see Thornton, 2015b, pp. 7-8 for details). Indeed, prior to the adoption of QE, the Fed had a policy of conducting daily open market operations by purchasing Treasuries using short-term repurchase agreements. The exception was the Fed's failed and short-lived "operation twist" policy in the early 1960s. The Fed tried to unsuccessfully to "twist" the yield curve by selling "short" and buying "long" (see Modigliani and Sutch, 1966).

Interest rates are critical for the allocation of credit and, therefore, important for allocating economic resources. The greater the effect of the FOMC's interest rate policy on rates across the term structure, the greater the effect of its policy on the allocation of credit and economic resources. Consequently, those who were concerned about the effect of the Fed's purchasing of non-Treasury securities because they would distort the allocation of credit and economic resources should be equally concerned about the effect the FOMC's interest rate targeting has had on interest rates across the term structure.

3.0 The Effectiveness of the Interest Rate Channel of Monetary Policy

Economists and policymakers need to ask and answer the question: Why is policy focused on interest rates? To provide a perspective on the answer to this question, it is useful to recall that during much of the 1960s and 1970s the Keynesians and monetarists debated the effectiveness of monetary policy. At that time, Keynesians believed that monetary policy was essentially totally ineffective. They believed monetary policy worked exclusively through its effect on interest rates, which they believed were relatively unimportant for spending decisions. They pointed to the lack of statistical evidence of a strong relationship between interest rates and spending, noting that lack of empirical evidence was supported by surveys of firms that showed interest rate were relative unimportant for making investment decisions.

Ben Bernanke circa 1995 agreed. In his famous "Black Box" article co-authored with Mark Gertler (1995), he said

Most economists would agree that, at least in the short run, monetary policy can significantly influence the course of the real economy. Indeed, a spate of recent research has confirmed the early findings of Friedman and Schwartz (1963) that monetary policy actions are followed by movements in real output that may last for two years or more (Romer and Romer, 1989; Bernanke and Blinder, 1992; Christiano, Eichenbaum, and Evans, 1994a,b). There is far less agreement, however, about exactly how monetary policy exerts its influence: The same research that has established that changes in monetary policy are eventually

followed by changes in output is largely silent about what happens in the interim. To a great extent, empirical analysis of the effects of monetary policy has treated the monetary transmission mechanism itself as a “black box.”

Bernanke and Gertler mention one thing that was not in the black box.

One problem is that, in general, empirical studies of supposedly “interest-sensitive” components of aggregate spending have in fact had great difficulty in identifying a quantitatively important effect of the neoclassical cost-of-capital variable [interest rates].

Unfortunately, the research Bernanke and Gertler (1995) cite doesn’t even provide compelling evidence of monetary policy’s effectiveness. Friedman and Schwartz (1963) and Romer and Romer (1989) use a narrative approach to identify monetary policy actions, but use different sets of actions.

Bernanke and Blinder (1992) find that monetary policy works through the *bank credit channel* of monetary policy, but Thornton (1994) showed that bank lending was not constrained by Fed policy actions banks get little of their funds for lending from reserves. From the mid-1960s to the Fed’s QE program, banks obtained most of their funds for lending in the CD market. Thornton (1994) found a small, albeit statistically significant, relationship between Fed actions and banks’ lending prior to the early 1980s, but no relationship thereafter. He concluded that financial innovations and the elimination of reserve requirements on all but checkable deposits eliminated even the weak relationship that existed before the Monetary Control Act of 1980. Indeed, Bernanke (2007) has acquiesced to the fact that the monetary policy has little to no effect on bank lending.

Christiano, Eichenbaum and Evans use changes in nonborrowed reserves as their measure of monetary policy actions. As discussed in Section 2, changes in nonborrowed reserves are not due to policy actions. It is due to the fact that the Desk offsets the effect of borrowing on total reserves. Consequently, the effect they found vanished in the early 1980s.

Given the lack of compelling evidence of monetary policy's effectiveness generally and the interest rate channel of monetary policy in particular, economists and policymakers should be more humble in asserting monetary policy's effectiveness.

So why do most economists believe that monetary policy works through the interest rate channel: why does the Fed implement monetary by targeting the federal funds rate? Thornton (2010b, 2017a) suggested the answer lies in the experience between late 1979 and the early 1980s when Paul Volcker the Fed chairman. Volcker made ending Great Inflation the sole goal of monetary policy. During a conference call with FOMC participants the day before the October 6, 1979, FOMC meeting, Volcker announced that he wanted to pursue a new approach to implementing monetary policy that “involves leaning more heavily on the [monetary] aggregates in the period immediately ahead.” Much has been written about Volcker's policy. But the bottom line is that actions taken under Volcker appear to have worked. Inflation declined from its April 1980 peak of 14.5% to 2.4% in July 1983. Inflation subsequently rose again to a high of 6.4% in October 1990, but never returned to double-digit rates. The policy change was also followed by back-to-back recessions. The fact that the change in policy was followed by a marked reduction in both inflation and output led economists and policymakers to dramatically change their view about the power of monetary policy to effect output and inflation. Keynesians suddenly became strong proponents of activist monetary policy.³

Reminiscent of the “black box” problem, economists debated whether the success of the Volcker's monetary policy was due to a marked reduction in the supply of money or to higher interest rates. The growth rate of M1 monetary aggregate changed little over the period and the growth rate of M2 actually increased. In contrast, the federal funds rate, which was 11.6% the

³ The change was no doubt enhanced by the fact that the government had been running a persistent deficit since the late 1960s, which sidelined fiscal policy as a stabilization tool.

day the FOMC changed policy, increased to a peak of 17.6% on October 22, 1979. The funds rate then cycled, hitting cyclical peaks above 20% in late 1980 and mid-1981. Given the behavior of the M1 and M2 monetary aggregates relative to the behavior of the federal funds rate during the period, a consensus formed—even among those were monetarists—around the idea that the success of Volcker’s policy was attributable to high interest rates not to slow money growth. Like the Phoenix, the idea that monetary policy worked through the interest rate channel rose from ashes. Keynesians and monetarists both believed that monetary policy was very effective. Both now believe that monetary policy works through the interest rate channel. The monetarists/Keynesian distinction has all but disappeared from the profession of macroeconomics. It has disappeared total among policymakers. As Greenspan noted, the FOMC turned to the funds rate after failed attempts with a variety of money and reserve aggregates.

The problem is that nothing else changed. Bernanke and Gertler’s statement that monetary policy does not work through the interest channel is as true today as it was when they made it. There are no new studies showing that spending is much more sensitive to changes in interest rates than previously thought. Moreover, the survey evidence that helped convince Keynesians to conclude that the interest rate channel was so weak as to be useless, has been confirmed by Sharpe and Suarez (2015). In spite of these facts, most economists and essentially all policymakers believe interest rate changes have a strong effect on output and inflation.

That monetary policy works through its effect on interest rates is no doubt bolstered by the fact that few economists believe that monetary policy could have import effects on output or inflation through the exchange rate channel, the credit channel, wealth effects, or the money supply: If monetary policy works at all, it must work through its effect on interest rates. Because

they believe that monetary policy is somehow effective—as Bernanke and Gertler (1995) asserted on weak and in two cases faulty evidence—economists and policymakers find it convenient to ignore evidence overwhelming evidence that interest rates are unimportant for spending (see Thornton, 2018).

3.1 Unconventional Monetary Policies: The Theory

The FOMC’s total commitment to the interest rate channel is one of the reasons the Bernanke Fed engaged in QE, forward guidance, and maturity extension in 2009.⁴ Bernanke and several other FOMC participants argued that these policies would reduce long-term rates and, thereby, increase spending. Bernanke indicated QE worked through what he called the *portfolio balance effect* (PBE). As Bernanke described it to FOMC participants (Thornton, 2015b, pp. 10-11), the Fed would purchase a large quantity of agency issued mortgaged-back securities (MBS), agency debt, and long-term Treasuries which would cause interest rates on these assets to decline significantly. Bernanke (2012) notes

The key premise underlying this [PBE] channel is that, for a variety of reasons, different classes of financial assets are not perfect substitutes in investors’ portfolios. For example, some institutional investors face regulatory restrictions on the types of securities they can hold, retail investors may be reluctant to hold certain types of assets because of high transactions or information costs, and some assets have risk characteristics that are difficult or costly to hedge.

That is, these markets are *segmented* from the rest of the financial markets—investors who invest in these markets prefer these markets and won’t invest in other markets. More correctly, these investors will only invest in other securities when the spread between Treasuries and other securities is “sufficiently high,” what Thornton (2015b, p. 13) calls the “maximum yield differential.”

⁴ The other, noted by Thornton (2010b, 2015b, 2017d), is the FOMC completely misdiagnosed the condition of financial markets and the severity of the recession.

Bernanke states “as investors rebalance their portfolios by replacing the MBS sold to the Federal Reserve with other assets, the prices of the assets they buy should rise and their yields decline as well.” The “rebalancing” Bernanke refers to is, of course, arbitrage. In this regard it is important to note that the effect of the Fed’s purchases on interest rates generally would depend largely on the size of the Fed’s purchases relative to the size of the market for securities generally. If the size of the Fed’s purchases are large relative to the size of the entire market, the effect would be large. If the purchases are relative small or tiny, the effect would be small or tiny. The Fed’s purchases were large by historical standards but as I and others have noted, tiny relative to the size of the global bond market.⁵ Consequently, the effect should be tiny.

Apparently aware of this problem, Bernanke and others (see Thornton 2015b) argued that QE could reduce long-term yields by reducing bond term premiums. This was hypothesized to happen because the Fed’s purchases of long-term Treasuries removes duration risk from the Treasury market. With less duration risk in the market the term premium on the remaining securities would be reduced. Indeed, Bernanke came to believe that QE had its largest effect on the term premium: “the largest portion of the downward move in long-term rates since 2010 appears to be due to a fall in the term premium” (Bernanke, 2013).

However, Thornton (2015b, p. 14) shows that this is theoretically possible, if and only if, the most risk adverse investors remain in the Treasury market, while the least risk adverse investors exit to purchase securities with some default risk. The reason is simple, the risk (or term) premium depends on two things that cannot be affected by the amount of securities of particular maturities in the market. The risk premium on say a 10-year Treasury relative to a 2-

⁵ For example, Bauer and Rudebusch (2013, p. 242) note, “In particular, the scale of the Fed’s LSAP program—\$1.725 trillion of debt securities—is arguably small relative to the size of bond portfolios. The U.S. fixed income market is on the order of \$30 trillion, and the global bond market—arguably, the relevant one—is several times larger.”

year Treasury is solely determined by: (1) the duration risk of the two securities and (2) by the relative risk aversion of the market participants. A security's duration risk is determined entirely by characteristics of the security. Risk aversion is innate to the investor. Neither depends on the quantity of securities in the market. Consequently, removing all of the Treasuries with maturities say from 3 to 9 years cannot change the risk premium on a 10-year Treasury relative to a 2-year Treasury. Nor can removing a large amount of 10-year Treasuries affect the risk premium on the remaining 10-year Treasuries relative to any other Treasury. Hence, the risk premium can decline, if and only if, the most risk adverse investors leave the security of the default-risk-free Treasury market while the least risk adverse investors remain. This seems incredibly unlikely.

However, Bernanke (2012) suggested that QE could also reduce long-term yields through what is called the *signaling channel*; QE "can signal that the central bank intends to pursue a persistently more accommodative policy stance than previously thought, thereby lowering investors' expectations for the future path of the federal funds rate and putting additional downward pressure on long-term interest rates, particularly in real terms" (Bernanke, 2013).

This is the idea behind the Fed's *forward guidance* (FG) policy. Forward guidance is the brainchild of Michael Woodford (1999, 2001, 2005, 2012), who suggested that monetary policy, i.e., the FOMC's interest rate policy, could be more effective if it was "inertial." Wary of the effectiveness of QE (see Woodford, 2012, and Eggertsson and Woodford, 2003), Woodford argued that the Fed's interest rate policy would have a larger effect on longer-term rates, if the Fed can credibly commit to maintaining its rate longer than it normally would (what is now referred to as the "Woodford period").

The theoretical basis for this policy is the expectations hypothesis of the term structure of interest rates (EH), (Woodford, 2001). The EH asserts that long-term rates are determined by

market participants' expectation for the short-term rate over the holding period of the long-term assets (see Kool and Thornton, 2015 for more details). Woodford's strategy suffers from the empirical fact; specifically, the EH has been rejected consistently over a variety of sample periods, monetary policy regimes, testing methods, etc. (Sarno, et al. 2008, and references therein).

The massive rejections of the EH are not surprising in light of the fact that interest rates are nearly random walk processes. Hence, tomorrow interest rate is largely determined by new information that is unpredictable. Guidolin and Thornton (2018) test a number of interest rate models relative to the random walk model, including models that assume the EH holds. They find that none of the models is statistically superior to the random walk model and none is consistently superior to another model. Hence, it is likely that universal failure of the EH is due to the simple fact that market participants cannot predict short-term rates with any reasonable degree of accuracy.

Of course, this wouldn't prevent FG from being effective if FG makes short-term rates more predictable. However, Kool and Thornton (2015) found that the ability to predict short-term and long-term rates deteriorated over the period 2008 to 2013. They concluded (p. 318) "For the United States, there is essentially no evidence that FG resulted in either convergence or improved forecast accuracy."

Moreover, the effectiveness of FG depends on the credibility of the Fed's commitment. Kool and Thornton (2015) note the FOMC's FG language was initially vague. It became "time-dependent" at the September 2011 meeting when the FOMC announced that it would keep the federal funds rate near zero until at least mid-2013. Some FOMC participants argued that a time-consistent policy was ineffective and the policy needed to be "state-contingent." Consequently,

the FOMC adopted a “state-dependent” FG policy at the December 2012 meeting saying that the target will remain at zero “as long as the unemployment rate remains above 6-1/2 percent.” At its March 2014 meeting, the FOMC essentially abandoned its state-contingent FG policy saying “When the Committee decides to begin to remove policy accommodation, it will take a balanced approach consistent with its longer-run goals of maximum employment and inflation of 2 percent.” In other words, the funds rate will stay low until the Committee decides to raise it. It could be that the FOMC FG policy failed because it was not credible (see Thornton, 2012).

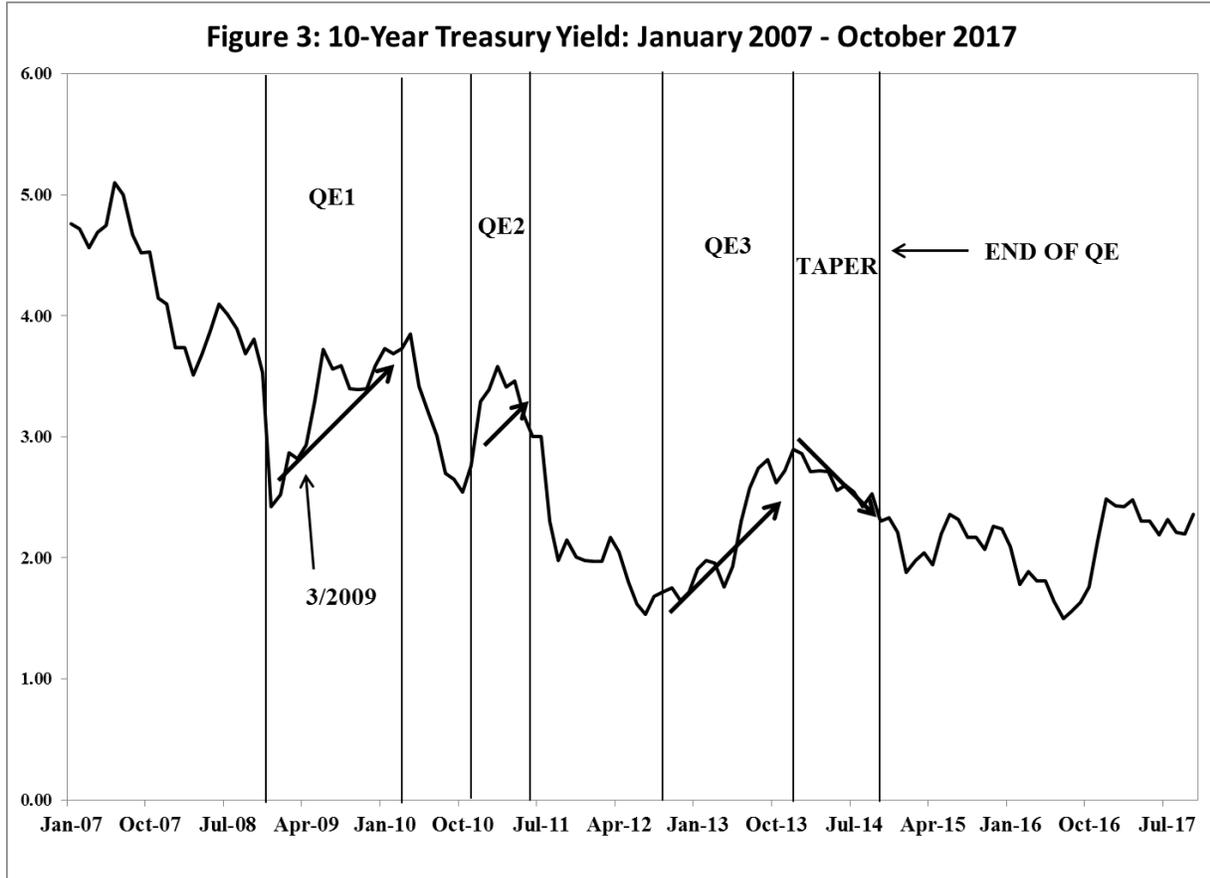
Finally, Thornton (2010c) noted that the simultaneous pursuit of QE and FG is schizophrenic in that the former required markets to be segmented while the latter required markets the complete absence of any market segmentation. Of course, none of the FOMC participants addressed this issue.

3.2 Unconventional Monetary Policies: Were They Effective?

In Section 2.2 demonstrated how and why the FOMC interest rate targeting affected longer-term rates across the term structure. This section investigates whether QE or FG affected long-term yields independent of interest rate targeting. It’s important to note that for these policies to be effective, the effect on long-term rates must be persistent. If the effect is offset in a few days, weeks, or even a month or two, it could not cause a significant increase in spending. Absent an increase in spending, QE cannot be effective.

That QE had no persistent effect on long-term rates is suggested by Figure 3, which shows the 10-year Treasury yield over the period from January 2007 through October 2017. The figure shows that the 10-year Treasury rate increased during each of the three QE episodes.

Indeed, the 50 basis point decline in the 10-year rate on March 18, 2009, when the FOMC



announced the Fed would purchase up to \$1.75 trillion, was completely offset within a month of the announcement. Furthermore, the 10-year rate declined when QE1 and QE2 ended and when the FOMC began tapering its purchases.

In spite of the obvious fact that QE had no permanent effect on long-term rates, Bernanke (2012) and others cited research that purports to provide evidence that QE reduced long-term rates. One study that was frequently cited by Bernanke and widely cited by others is Gagnon, Raskin, Remache, and Sack, (2011), henceforth, GRRS. GRRS provide two analyses they claim provide evidence QE reduced long-term yields. The first used regressed the 10-year Treasury yield and a measure of the 10-year Treasury term premium on several macroeconomic variables and a measure of the public's holding of Treasury debt the over the period January 1985 through

June 2008. Based on their estimate of the supply effect, they concluded that the FOMC's \$1.75 trillion asset purchase (QE1) should have reduced the term premium by about 52 basis points and the 10-year Treasury yield by about 82 basis points.

Thornton (2014b) found that GRRS made a serious analytical error in calculating their series on the public's holding of government debt. Specifically, they subtract foreign official holdings of agency and private debt from the public's holding of government debt; this is the logical equivalent of subtracting apples from oranges. Mathematically it can be done only because these incomparable measures are expressed in dollars. As it happens, the foreign official holdings of agency and private debt became very large toward the end of the authors' sample period, which means their measure of the public's holding of Treasury debt turns negative beginning in November 2007.

He then estimated GRRS model using their data and 10 other public debt supply measures suggested by Krishnamurthy and Vissing-Jorgensen (2011), Hamilton and Wu (2012), and Greenwood and Vayanos (2014). Thornton also noted that GRRS failed to account for the fact that their supply measure and both of their two interest measures trended down over their sample period. This is an important omission. It is well known that two time series will be positively correlated when they trend in the same direction and negatively correlated when they trend in opposite directions, even if there is no fundamental relationship between them.

Thornton (2014b) found that when GRRS's public debt measure is corrected and the trends are accounted for, there is no statistically significant relationship between either the term premium or the 10-year Treasury yields and any of the 10 public debt measures he used.

Thornton found a statistically significant relationship between two of the debt measures and the

yield curve slope measure used by Hamilton and Wu (2012), but the estimated effects were very small.

Bernanke, and others have suggested that QE reduced long-term yields through the so-called “signaling channel,” not as a consequence of the Fed’s security purchases. GRRS rejected Bernanke’s idea that QE works through the signaling channel, but not the effectiveness of the signaling channel, *per se*. Indeed, Thornton (2015b, pp. 9-10) documents that the FOMC went headlong into QE at its March 2009 meeting based on the Board staff’s suggestion that most of the effect of QE would occur on the announcement rather than from the actual purchases.

GRRS also did an event-study analysis of the effectiveness of QE. Specifically, they calculated the change in various long-term yields the day following various QE announcements. They then added these individual “announcement effects” and concluded that the cumulative effect of the QE announcements had reduced various long-term yields from November 2008 to February 2010 by between 67 and 154 basis points.

It is interesting to note that at the April 2009 meeting Janet Yellen said, there is “compelling evidence that purchases of longer-term Treasury securities worked to bring down borrowing rates and improved financial conditions more broadly. She based her statement on the fact that the 10-year Treasury rate declined 51 basis points upon the March 18, 2009, QE announcement. However, by June 2009 meeting she changed her mind saying,

Initially I was an enthusiast for long-term Treasury purchases. I thought the purpose of it was not only to improve liquidity and market functioning, but also to influence yields to push them down... On theoretical grounds, I believe there’s a very strong case that they should have some effect, but it has been awfully hard to identify exactly what that effect is, and I think that we’re beginning to run into costs of pursuing that further... I would say the benefits don’t merit the costs, but I wouldn’t want to see Treasuries taken off the table if conditions were to deteriorate and attitudes were to change.

Yellen didn't explain what caused her to change her mind, but it seems reasonable that it might be the fact that the 10-year Treasury rate was 121 basis points higher on June 24, when she made this statement, than on March 18, 2009, the day before the 51-basis point announcement effect.

In any event, Thornton (2017b) shows that the often estimated and reported announcement effects provide little or no evidence of QE's effectiveness. Thornton analyzed the announcement effects associated with 53 QE announcements used in the literature. All but one of these announcements suffered from a serious identification problem: the announcements also contained other news that could have moved rates. Moreover, the QE announcements varied significantly in the "quantity" of QE news they provide, with most providing little news. Indeed, the November 25, 2008, announcement was the only announcement that only contained QE news. Thornton noted that this announcement occurred at 8:15 am EST, five minutes before the 10-year Treasury market opened. Hence, the announcement effects researchers report that on day are misleading. Thornton estimated the announcement effect on this day using continuous time high-frequency 10-year Treasury futures price data and found no important price response from 15 minutes before the announcement to 45 minutes after the announcement (see Thornton, 2017b, p. 61, and footnote 8): There was no announcement effect associated with the November 25, 2008, announcement.

Importantly, Thornton found only the QE announcements GRRS and Wright's (2012) suggest are most important were statistically significant. But they were only statistically significant for the 10-year Treasury yield. None was statistically significant for either the Aaa or Baa corporate bond yields. In the end, Thornton found that only one announcement, the March 18, 2009, announcement, met the dual requirement of being statistically significant and being

due solely to the QE news in the announcement. But, as Yellen observed, this announcement effect was ephemeral.

4.0 The Monetary Policy Crisis: Two Recommendations

The crisis in monetary policy is this: Apparently, oblivious to the fact that interest rates are not important for spending decisions, FOMC began implementing monetary policy by targeting the federal funds rate. As the ineffectiveness of its interest rate policy became increasingly apparent, the FOMC pursued it more aggressively. It reduced the target to the then historically low level of 3.0 percent in September 1992 and kept it there until February 1994. In 2003 it reduced the target to a new low of 1.0 percent and kept it there for a year. When the financial crisis and economic conditions worsened in spite of the fact that the FOMC reduced the target from 5.25 percent in September 2007 to 2.0 percent on May 7, 2008, the FOMC reduced the target to effectively zero and kept it there for nearly seven years into an economic expansion. To enhance the effectiveness of its interest rate policy, the FOMC engaged in QE, forward guidance, and maturity extension, all of which have been shown to have had little or no effect on longer-term yields. In contrast, the FOMC's interest rate policy has been shown to affect longer-term yields. The effect is relatively small for 10-Treasuries and even smaller for long-term corporate bonds. Given the unimportance of interest rates for spending decisions, it is not surprising that this policy has also been ineffective. Nevertheless, to the extent this policy has reduced longer-term rates it has distorted the allocation of credit and economic resources.

Unfortunately, there is no evidence that economists and policymakers are confronting these facts. There appears to be no end to what economists and policymakers are willing to do in an attempt to market the interest rate channel more effectively. A few central banks have adopted negative nominal interest rate policy and some well-known economists and policymakers have

endorsed the idea. Indeed, John Williams, President of the San Francisco Fed, suggest that policymakers may have to “find ways to make the “lower bound [on nominal interest rates] more negative” (Williams, 2017, p. 8). This could include taxing banks’ deposits with the Fed in order to drive nominal interest rates negative as Mavin Goodfriend (2015) has suggested. Others have suggested the elimination of 100 and 50 dollar bills in order to increase the cost of hoarding cash, which would it easier for nominal interest rates to be negative (see Thornton, 1999). There appears to be no limit to economists’ and policymakers’ infatuation with interest rate policy in spite of overwhelming evidence that it is ineffective and distortionary.

Consequently, I am making two recommendations in an attempt to end the crisis in monetary policy. The first is that economists take the arguments advanced here seriously and undertake an extensive debate about the effectiveness of the interest rate channel of monetary policy and monetary policy generally. The debate should center on a detailed discussion of the strength of the theory that supports various polices and strategies for implementing policies and the veracity of the empirical evidence (facts) that supports claims of their effectiveness.

The debate should also be about the usefulness of several economic concepts that are widely used in economic policy discussions—aggregate supply, aggregate demand, potential output, full employment, and the natural rate of interest. Thornton (2015d, 2017e,f) has argued that these concepts are “mythical” in the sense they are impossible to measure in a way that is meaningful or useful for policy decisions. For example, Thornton (2017e) argues “It is disingenuous to say that we need more stimulative monetary or fiscal policy because output is below potential or because the economy is growing below its potential growth rate.”

It is extremely unlikely that such a debate will occur for a variety of reasons; not the least of which is many very prominent economists have careers based on a model where monetary

policy works solely through the interest rate channel: They will be understandably reluctant to engage in a truly scientific debate that could result in their having to say *mea culpa*. Moreover, “debates” in the profession occur in the pages of high-profile journals and at high-profile conferences. These venues are essentially controlled by economists who are doing similar research and work with variants of the same fundamental model. Economists who advance arguments such as those advanced here are easily ignored for a variety of reasons. Research that is contrary to conventional wisdom is typically published in lower-profile journals where it is easily ignored. Hence, such a debate is likely to happen only if a very high-profile economist, a prominent economic think tank or economic society organizes it and aggressively promotes its findings.

My second recommendation is based on my belief that it is imperative that something be done to constrain the FOMC’s interest rate policy actions. Fundamentally, the Fed can do two things: (1) It can supply credit to the credit market through open market operations and by directly lending to depository institutions (in dire situations, it can also lend to other institutions, at least for now). (2) It can control the overnight federal funds rate very well with open market operations and it can control the funds rate reasonably well with a combination of open market operations about the IOER and open market operation in reverse repurchase agreements.

Thornton (2014c) argues that the Fed erred by not increasing the supply of credit in early 2008 when it became increasingly obvious that the financial crisis was intensifying. Instead, the Fed sterilized the effect of its lending to financial institutions in order to continue implementing policy using the federal funds rate (see Thornton, 2009, 2015b). The FOMC then aggressively used these tools to force the funds rate to zero and kept it there 6 and a half years into the recovery in a failed attempt to stimulate economic growth. Milton Friedman (1962, p.

49) warned, “Any system which gives so much power and so much discretion to a few men, that mistakes excusable or not can have such far reaching effects, is a bad system.” Friedman’s statement was motivated by the Fed’s policy errors during the Great Depression, but they apply equally to the mistakes the Fed made during the Great Inflation and in response to the financial crisis.

A number of economists agree that the FOMC’s actions need to be limited and have signed a letter of support for the Fed Oversight Reform and Modernization Act (H.R. 3189) that would require the FOMC to adopt a policy rule, such as a Taylor rule, as a way of constraining the FOMC’s actions.

Thornton (2018b) has argued that the Fed will never be able to adopt a policy rule that will be suitable to do the job. Instead, Thornton (2017c) suggests that the FOMC’s interest rate policy should be constrained by economics through what he calls economic reality-based monetary policy (ERMP). The idea is that policymakers specify a set of economic realities and commit to conduct monetary policy within the limits implied by these realities. To show how ERMP would work Thornton considers an example where the Fed is conducting monetary policy by setting a target for the federal funds rate and agrees to conduct policy within the limits implied by the following realities:

Reality #1: Credit is most efficiently and effectively allocated by the market and, hence, by economic fundamentals.

Reality #2: Interest rates determine the allocation of credit. Hence, interest rates are best determined by the market. Actions that the FOMC takes to affect interest rates necessarily distort interest rates and the allocation of credit and economic resources.

Thornton notes that the purpose of the Fed’s interest rate policy is to distort interest rates, but a problem occurs when the Fed pursue the policy too aggressively and for far too long as the it did

when it reduced its funds rate target to zero and keep it there for seven years and during a couple of other occasions when it maintained a historically low target for a year or longer.

He notes that “ERMP wouldn’t prevent the FOMC from temporarily engaging in aggressive credit allocation in times of crises. However, the Fed would have to provide a strong case that financial markets are significantly impaired. But it almost certainly would prevent the Fed from engaging in such actions years after markets had stabilized.”

He suggests that ERMP would preserve the Fed’s independence and enhance its accountability:

Because policymakers’ actions are constrained by economics, there is less need for direct governmental oversight. For example, there would be no reason for Congress to enact the Fed Oversight Reform and Modernization Act (H.R. 3189). ERMP would make the Fed more accountable because it has committed to conduct policy in a manner that is consistent with these realities. If the FOMC were to take actions that appear to be inconsistent with the stated economic realities, it would have to explain its actions to congress and to the public.

Thornton notes “ERMP constrains how aggressively the policy can be pursued. It does not constrain how policy is conducted.” Unlike (H.R. 3189), which requires the FOMC to implement policy rule for conducting monetary policy, ERMP neither requires nor restricts how the Fed implements policy. The Fed could adopt a specific policy rules or continue to rely on meeting-to-meeting discretion as it has done historically. It could target the federal funds rate or focus on one or more measures of the money supply. The FOMC can implement policy however it wants to so long as it specifies the economic realities that will serve as a constraint on how aggressively or how long it pursues a particular policy. Thornton concludes saying: “ERMP will make monetary policy more predictable, the Fed more accountable, and protect the Fed’s independence...”

ERMP fixes what Friedman called a bad system: That this system allowed policymakers to undertake extraordinary actions in the wake of Lehman Bros.' 2008 bankruptcy announced based on weak theory, and maintain these policies based on little evidence of their success is undeniable. Time will tell whether the incredible increase in asset price, the increased risk taking by retirees and pension funds, and the massive increase in liquid assets (in the form of a \$1.65 trillion and counting increase in total checkable deposits) and other distortion caused by QE and its excessively low and prolonged interest rate policy will result in more serious problems, such as the next economic crisis.

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