

# **The Role of Contractionary Monetary Policy in the Great Recession**

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Charlie Deist

**Abstract:** Academic work by leading macroeconomists portrays the central bank as highly capable of keeping economic activity stable because of its ability to monitor the appropriate economic indicators, adjust its stance accordingly, and implement aggressive policies when needed. The Federal Reserve's response to economic developments during the recent recession revealed that central bank policymakers were decidedly more cautious than the scholarly literature suggested. Given the central role of the public's expectations of future central bank policy in the monetary transmission mechanism, an easing or tightening of monetary policy can consist of any action or inaction by the central bank that alters the public's expectations of the bank's character, i.e., aggressive versus cautious. After exploring the appropriate indicators of the stance of monetary policy, I identify key periods from late 2007 to 2008 that could have changed the public's expectations of the Federal Reserve's willingness to ease its stance sufficiently. I find that these shifts in market expectations of the Federal Reserve's future policy closely corresponded to significant declines in economy activity. I also examine whether the Federal Reserve's cautious policy approach in the recent recession was justified, or whether its actions constituted an irresponsible tightening.

## **Introduction**

Milton Friedman and Anna Schwartz (1963) laid much of the blame for the length and severity of the Great Depression on the Federal Reserve for failing to prevent a contraction of the money supply caused by a series of bank runs during the early 1930s. While there is some debate over whether it is fair to say that the Federal Reserve *caused* the depression to be so severe, most of the economics profession now accepts that a responsible central bank can and should offset monetary shocks such as financial panics (Bernanke 2002). It is less clear, and less widely accepted, that monetary policy could have mitigated or averted the economic collapse that occurred in late 2008, once fears over the solvency of several major financial institutions surfaced.

Over the fifteen-month period from September 2007 to December 2008, the Federal Reserve lowered the federal funds rate from 5¼ percent to near zero (Federal Reserve Bank of New York), leading many to believe that monetary policy was highly accommodative, and that additional easing would not have prevented the severe decline in economic activity in the wake of the worst financial crisis since the Great Depression. Accordingly, many assume that the bursting of the housing bubble and subsequent financial crisis caused an unavoidable decline in economic activity. However, some economists argue that nominal interest rates are a misleading indicator of the stance of monetary policy, and that more appropriate indicators signaled a significant tightening by the Fed between the initial sub-prime slump and the beginning of the full-blown financial crisis. They also point to the Fed's unwillingness to try unconventional easing policies in the wake of the financial crisis as a further tightening of monetary policy. The narrative

that the Great Recession was made worse by tight money suggests that, once again, the Federal Reserve may have been at least at partially fault.

In order to establish that tight money was partially to blame for the severity of the recession, it must be shown that the Federal Reserve should have been able to anticipate that its stance was too contractionary based on certain indicators of prevailing economic conditions. Its tightening must also have been avoidable, both before and after nominal interest rates fell to zero. Lastly, the estimated benefits of pursuing looser policy must have been worth the estimated costs and risks. There is some ambiguity as to which actions were avoidable and what constituted risk, given the Federal Reserve's justifiable concern for its independence and credibility, as well as the uncertainty inherent in the discipline of macroeconomics. However, I hope to show that implementing looser monetary policy would not have posed a reasonable threat to the Fed's credibility, and that it overestimated the costs and risks of various easing policies.

## **Methodology**

Judging the stance of monetary policy requires an understanding of the capabilities and limitations of a central bank. After all, it would be unreasonable to fault an institution for failing to prevent something that was beyond its control.

Macroeconomists, particularly monetary economists, study the ways that central banks influence the economy. Knowledge of the so-called "transmission mechanisms" of monetary policy informs central bankers of which policies are most likely to achieve their goals. While economists don't always agree on every detail of the transmission mechanisms, there is a general consensus within academia on some core principles of monetary policy, i.e., what a central bank is capable of achieving. Scholarly writings on

monetary economics from journals and textbooks provide a sort of guidebook, or conventional wisdom for central banks to follow.

I use former Federal Reserve Governor Frederic Mishkin's popular introductory textbook on the economics of money, banking, and finance as a proxy for the consensus view of macroeconomists, in addition to the academic work of several prominent macroeconomists who have also served or currently serve as central bankers. To identify the appropriate indicators of the stance of monetary policy during the recent recession, I draw heavily on one of the final chapters of Mishkin's textbook, "Transmission Mechanisms of Monetary: The Evidence," which offers four "Lessons for Monetary Policy" (2007, 583-607). The lessons are a culmination of the entire preceding exploration of banking principles and institutions, and raise a number of often-overlooked points that apply to the recent recession.

I also rely heavily on the academic work of current Federal Reserve Chairman Ben Bernanke, who has written about the proper central bank response to a number of unusual scenarios that became relevant in the recent recession. The conventional wisdom provided by Bernanke, Mishkin, and others, portrays the central bank as highly capable of keeping economic activity stable, even in unusual circumstances, due to its ability to monitor the appropriate indicators, adjust its stance accordingly, and implement aggressive policies when needed. I identify specific responses by the Federal Reserve that might have revealed its unwillingness to sufficiently loosen its stance through aggressive, yet theoretically sound policies. I also find that modern research on monetary policy emphasizes the important role of expected future central bank policy in shaping present aggregate demand. As such, shifts in the public's expectations regarding the character

(i.e., cautious versus aggressive) of central bank policymakers would seem to have a greater easing or tightening impact than actual changes in the overnight interest rate. A failure of the Federal Reserve to ease in accordance with the conventional wisdom would seem to constitute an irresponsible tightening, unless there were compelling reasons to doubt the applicability of the conventional wisdom. I examine the implications of this framing of monetary tightness versus ease both when short-term nominal interest rates are significantly positive as well as when they are near zero. Lastly, I consider possible features of the recent recession that may have invalidated the conventional wisdom about the potency of monetary policy or made aggressive policies riskier, either of which would absolve the Federal Reserve of some guilt.

### **Nominal Interest Rates as a Poor Indicator of the Stance of Monetary Policy**

Successful central banks must carefully monitor the economy for signs that their stance may be inappropriate given the prevailing conditions. A given target for the federal funds rate may be too tight under some circumstances, but too easy under others. Many commentators, and even some economists, point to the fall in the federal funds rate beginning in late 2007 as strong evidence that monetary policy was easy. Contrary to these assertions, Mishkin's first lesson for monetary policy makers states that, "It is dangerous always to associate the easing or the tightening of monetary policy with a fall or a rise in the short-term nominal interest rate." (606)

It is understandable that the public tends to think of nominal interest rates as synonymous with the stance of monetary policy. The simplified explanation of how monetary policy works is that the Federal Reserve lowers interest rates when the economy is slumping to make borrowing for the purpose of consumption or investment

more attractive. When the economy is in danger of overheating, the Fed raises interest rates to achieve the opposite result. The fact that the Federal Reserve targets the federal funds rate as its policy instrument further perpetuates the false impression that the Fed influences the economy mainly (or even solely) through its effects on nominal interest rates. While this impression captures the gist of the Federal Reserve's stabilization goal of "leaning against the wind," or smoothing out the disruptive peaks and troughs of the business cycle, it oversimplifies the economics profession's knowledge of the transmission mechanisms of monetary policy. All else being equal, a decrease in the Federal Reserve's target for the federal funds rate will expand credit and encourage more borrowing and economic activity in the present. However, people base their spending and investment decisions on the real cost of borrowing, which also depends on inflation. The Fisher identity gives a logical relationship that defines the real interest rate as the nominal interest rate minus expected inflation (Fisher 1930, 42).

Extremely low short-term nominal interest rates can correspond to wildly different real rates, as they did during the Great Depression. Initially, in the early 1930s, expectations of falling prices resulting from the massive contraction of the money supply drove real interest rates extremely high. Then, in 1933, estimated real interest rates began to fall due to a change in expected inflation after President Roosevelt took the United States off the gold standard, announced his intention to re-peg the price of gold at a higher level, and bought massive quantities of gold with dollars to show that he was committed to raising prices back to their pre-Depression levels. Christina Romer (1992) estimated that expected (ex ante) real interest rates fell from roughly 15 percent to less than -10 percent after Roosevelt announced his intended dollar devaluation policy, and

that they remained between -5 and -10 percent for several years. She produced her estimates by applying the assumption of rational expectations (that unanticipated inflation equaled zero) to ex post real interest rates, or nominal rates minus observed inflation. She found that the decline in estimated real interest rates was followed by a rapid investment-driven recovery that is hard to attribute to other sources, such as fiscal stimulus, given that government spending as a percent of GDP did not rise substantially until World War II.

Although the dollar devaluation was conducted by the Treasury and was therefore not technically monetary policy, the mechanism (expected inflation lowering real interest rates) was entirely monetary. Romer's study also supports the view that the public's perception of the character of the monetary authority matters more than the mechanical actions, such as changes in the main policy instrument. Bernanke (2000, 165) commented that Roosevelt's visible willingness to "be aggressive and to experiment" was more important than the actual details of his policies. Gauti Eggertsson (2008) modeled the recovery period of 1933-1937 as a shift in the public's perception of certain policy dogmas, such as price stability and a balanced budget, which Roosevelt made clear that he opposed. While Eggertsson grants a larger role to fiscal stimulus in the form of higher budget deficits than Romer, he identifies the impact as coming from the signal of political resolve and intolerance of any potentially deflationary government policies.

An even starker example of nominal interest rates as a misleading indicator of the stance of monetary policy occurred in Weimar Germany, where interest rates were exceptionally high during the post World War I period of hyperinflation. Hyperinflation is a clear sign that credit has been expanded far too much. The logic behind this seeming

paradox is that low interest rates lead to an expansion of the money supply, which eventually leads to inflation. When inflation has been high in the past, lenders expect it to be high in the future as well, and therefore expect to be repaid in devalued dollars. As a result, they demand a higher rate of return, which raises nominal interest rates.

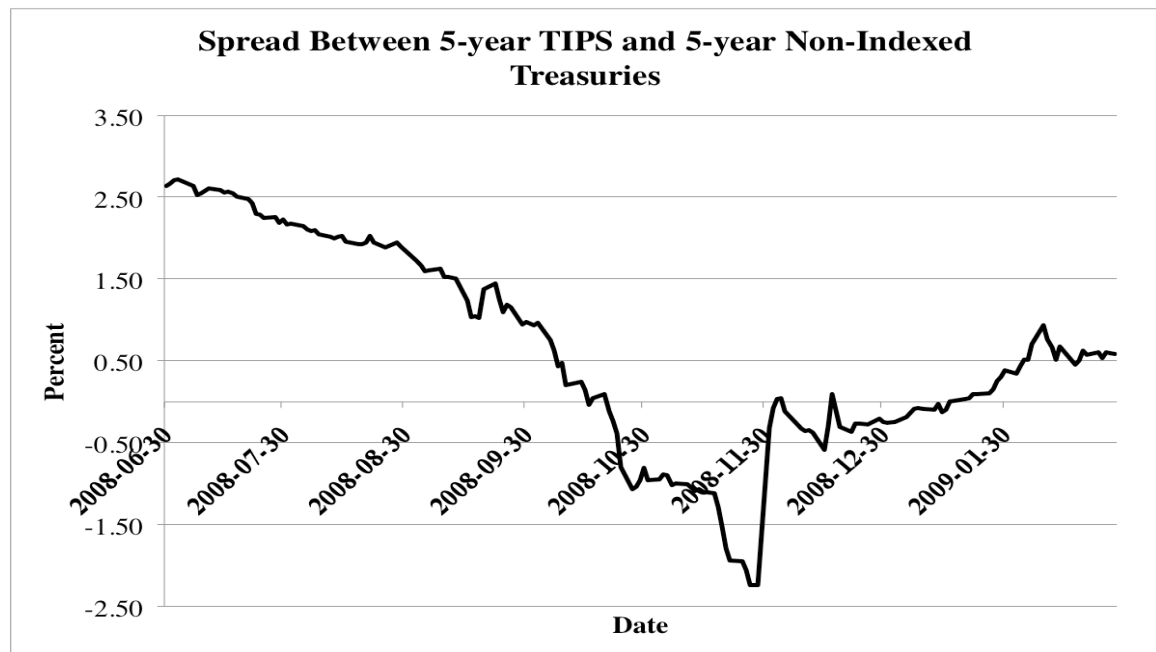
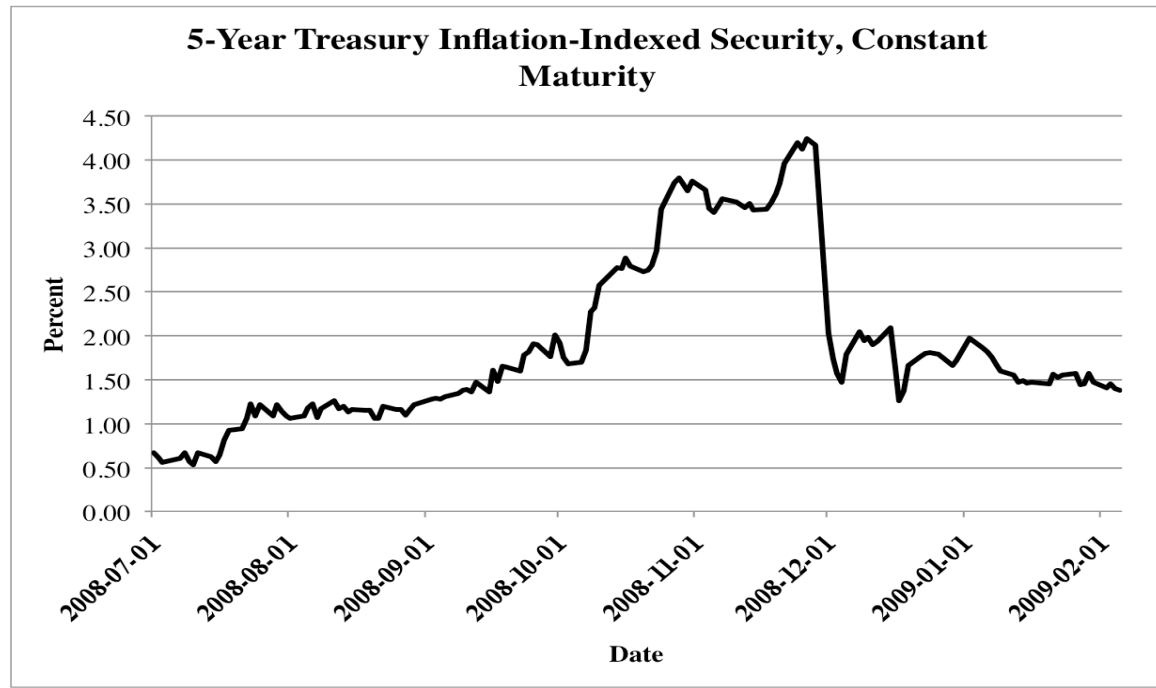
Most macroeconomists believe real interest rates are the primary channel of the monetary transmission mechanism, meaning they will be a much better indicator of the stance of monetary policy than nominal rates. The real interest rate was unobservable until the United States Department of the Treasury introduced a class of inflation-protected securities (TIPS) in 1997. These securities' yields include a fixed component but also pay a variable amount that depends on the level of inflation that occurs over the period of maturity. As a result, the difference between TIPS yields and the yield of a non-indexed Treasury bond of the same maturity, or TIPS spread, can serve as a proxy for the market's expectations of inflation. Although TIPS yields include a liquidity premium due to limited trading volume compared with other Treasuries, the TIPS spread has converged closer to actual inflation expectations as trading of TIPS has expanded.

The behavior of real interest rates leading up to the financial crisis indicates a very different stance than the stance indicated by nominal interest rates. Beginning in the third quarter of 2008, TIPS spreads showed that markets expected rising real interest rates and falling inflation (see figures 1 and 2) (Federal Reserve Bank of St. Louis 2008). The spread between 5-year TIPS and 5-year non-indexed Treasuries fell steadily from their peak of 2.72 percent on July 3, 2008 to 1.50 percent on September 12. In late September, a small but steep drop in the spread was quickly reversed, before it began plummeting in early October until it reached its trough of -2.23 percent on November 26. Later, I will



identify some of the potential causes of the sudden acceleration of deflationary expectations and corresponding rise in real interest rates.

**Figure 1 & 2**



Source: Federal Reserve Bank of St. Louis

Some have questioned the accuracy of TIPS data as a proxy for expected inflation during the highly abnormal period of late 2008 (Federal Reserve Bank of Cleveland 2008). The flight to safe savings vehicles that occurred during the financial crisis may have led to an increase in the liquidity premium, which would lead to higher TIPS yields and thus artificially low inflation expectations. However, if TIPS yields were impacted by a liquidity premium resulting from a financial panic, this in and of itself suggests that monetary policy was too tight and that nominal interest rates should have been lowered further. Additionally, other analyses show that TIPS yields may have actually understated inflation expectations in late 2008, since the bonds guarantee a payment of at least the face value upon maturity, which translates into a bonus if deflation occurs over the period. This means that purchasers of TIPS will accept a lower yield when markets expect deflation.

At the 2010 Annual Meeting of the American Economic Association, Bernanke addressed economists on the subject of what the Federal Reserve had learned from the recent recession. In his speech, he emphasized the need for the Fed to adjust its stance in response to forecast variables, in addition to the current economic conditions. Currently, the most reliable forecast variable that the Fed ought to be monitoring closely is the TIPS spread. A forward looking Federal Reserve should have known that its stance was insufficiently accommodative based on plummeting TIPS spreads in the third quarter of 2008.

### **Other Aspects of the Transmission Mechanism**

Even real interest rates, though, cannot completely indicate the stance of monetary policy. A more complete and accurate understanding of the transmission

mechanism of monetary policy can illuminate what other economic conditions may have indicated tight money leading up to the financial crisis.

The monetarist view, popularized by Milton Friedman (1956), interprets central bank policy as increases and decreases in the supply of and demand for base money. Together these determine the broader measures of the money supply, such as M2, as well as the level of nominal spending, or the product of prices and quantities sold. Friedman recognized, as did his predecessors dating back to John Stuart Mill (1844), that general gluts of goods and services (i.e., recessions) can be caused by increases in the demand for financial assets like money. If the money supply or velocity falls, either prices or real economic activity must fall in response. Since prices do not immediately adjust downward, output and employment usually fall after a monetary contraction. Friedman and Schwartz pointed to the rapid contraction of the money supply during the Great Depression, which left nominal prices well above their market-clearing levels, as the main cause of the decline in output and employment.

While monetarism suggests that central banks can effectively counterbalance monetary shocks to prevent an economy from falling below full employment, this does not imply that increases in the money supply can permanently boost employment above its “natural” rate, which is constrained by the economy’s productive capacity, technology, preferences, labor market frictions, and other non-monetary factors. Additionally, Friedman was skeptical of a central bank’s ability to fine-tune the economy because of the inherent unpredictability of the transmission mechanism.

According to Friedman, the ideal central bank policy would be to apply a rule that would keep some monetary aggregate, such as M2, growing at a stable rate.<sup>1</sup> This would require constant intervention by the central bank in the money market to offset monetary shocks, i.e., changes in the demand for base money. For example, an open market purchase of short-term Treasuries by the Federal Reserve in exchange for cash alters the public's portfolios in a way that makes hoarding cash more costly, ideally by just the right amount to offset the shock. The operation leaves the financial markets in equilibrium both before and after the purchase, but increases the public's holdings of readily spendable cash above the amount it otherwise would have wanted to hold at the current price level (Friedman 1969, 229-234). As a result, people try to rebalance their portfolios by purchasing other assets. However, since all expenditures must equal total income, society as a whole cannot reduce its "excess cash balances," so prices must rise until the public's preferred ratio of cash to other assets is restored. The initial transactions tend to bid up the price of low-risk financial assets, lowering interest rates. The rise in the price of securities then increases the demand for a broader class of non-financial assets. Prices eventually settle at higher levels, but only after an intervening period of increased economic activity.

Friedman's sketch of the transmission mechanism was always tentative. He believed the effects of monetary policy work their way through the economy with long

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<sup>1</sup> Although interest rates alone clearly cannot indicate whether the Fed is easing or tightening, monetary aggregates like M2 have also been abandoned as indicators of the stance of monetary policy because of the atypical behavior of velocity in recent decades. Late in his life, even Friedman (1994) abandoned M2 targeting and voiced support for Robert Hetzel's 1989 proposal to target the TIPS spread, which would accomplish similar goals, but would more effectively accommodate fluctuations in velocity.

and variable lags on different categories of assets, but that an increase in the money supply will always increase prices by a proportional amount in the long run. However, in recent years, adherents to the basic monetarist framework have questioned the nature of these long and variable lags of monetary policy. Although Friedman and Schwartz's detailed study of the money supply roughly tracked the underlying shifts in expectations that occurred throughout United States history, many now believe that it misidentified the precise timing and impact of monetary shocks. Scott Sumner, who calls himself a "quasi-monetarist," cites rational expectations theory and the efficient markets hypothesis as the distinguishing features separating his framework from Friedman's monetarism. Rather than looking at changes in the monetary base and their long and variably-lagged effects on asset prices, Sumner characterizes monetary shocks as changes in the expected path of base money supply and demand, which in turn change the expected path of nominal GDP, or the total cash expenditures in the economy. These changes are instantly reflected in certain asset prices, such as TIPS, and immediately begin the variably distributed adjustment process of stickier prices and wages. Though the effects on sticky prices are lagged, the impetus behind their adjustment is created at the moment that expectations are affected.

In the monetarist and quasi-monetarist views, monetary policy (mostly strategic open market operations) is intended to have the same "leaning against the wind effect," not just through its impact on short-term interest rates, but through its effect on overall spending patterns and multiple asset prices, which adjust at varying rates. Monetarist contributions to the understanding of the transmission mechanism are reflected in Mishkin's second lesson of monetary policy, which states that "[o]ther asset prices

besides those on short-term debt instruments contain important information about the stance of monetary policy, because they are important elements in the transmission mechanism.” (606)

In addition to falling inflation expectations, several other asset prices reflected a tightening of monetary policy leading up to the financial crisis. Between March and September of 2008, the dollar was appreciating, and commodity, housing, and stock prices were falling, all of which reflect tight money according to Mishkin’s second lesson.

David Glasner (2010) explored the mechanism by which tight money might have depressed various asset prices in the recent recession in more detail. Specifically, he points out that the level of deflation cannot exceed the real interest rate without violating the Fisher identity, and hypothesizes what might happen to yields when expectations of deflation put pressure on ex ante real interest rates to fall farther than the zero nominal bound permits, as they did in late 2008.

Normally, one would not expect a strong correlation, either positive or negative, between inflation expectations and various assets like stocks, housing, or foreign currencies. This is because asset prices depend on both expected future cash flows and the discount rate. Although higher expected inflation leads to higher expected future cash flows, it also increases the nominal rate of return that can be earned on other investments by a roughly equal and offsetting amount. These effects are made even smaller by the fact that higher inflation leads markets to expect a future tightening of monetary policy, which would undo the effects on both cash flows and the discount rate.

When the rate of deflation exceeds the real interest rate, however, nominal interest rates cannot fall by enough for the change in the discount rate to offset the decrease in expected future cash flows. When this happens, it becomes more attractive to hold cash with a yield equal to expected deflation than a capital asset that yields the ex ante real interest rate. This implies that expected deflation will exert itself through non-interest rate channels such as foreign exchange markets and equities at the zero nominal bound. Thus one would expect to find a positive correlation between inflation (and thus real interest rates) and asset prices in a low-interest rate environment in which disinflation or deflation is a threat.

To test this hypothesis, Glasner regresses the first differences of the stock prices (S&P 500) on both ex ante real interest rates (10-year constant maturity TIPS) and inflation expectations (10-year TIPS spread) over the period of 2003-2010. He divides this period into sub-periods that correspond to “normal times,” when interest rates are solidly positive and real rates exceed expected deflation by a significant amount, and “abnormal times,” when interest rates are low enough that a rise in deflation expectations could raise expected deflation above real interest rates. As his theory predicts, he finds a very weak correlation prior to 2008, except briefly in 2003, during another period when the economy was weak and when the federal funds rate fell as low as 1 percent. He finds that inflation expectations and stock prices are highly correlated beginning in March 2008, when markets were likely watching the Federal Reserve’s actions for signs of its future stance, its aversion to inflation, etc. The correlation continues throughout the recession, with signs of future inflation corresponding to stock market rallies and vice versa. Additionally, Glasner finds that the dollar/euro exchange rate is strongly correlated

with inflation expectations over the same period, which is consistent with investors seeking to convert foreign currencies into cash due to its implicit rising yield during periods of disinflation/deflation.

### **Identifying Monetary Shocks, i.e., Shifts in Expected Path of Nominal GDP**

The preceding analysis of indicators and the transmission mechanism of monetary policy suggests the Federal Reserve should have been aware that its stance had tightened. In this section, I will examine potential Federal Reserve actions and inactions that may have shifted the public's expectations of the future path of nominal GDP, and whether there was anything the Fed could have done about it.

#### *Excessive Concern Over Headline Inflation*

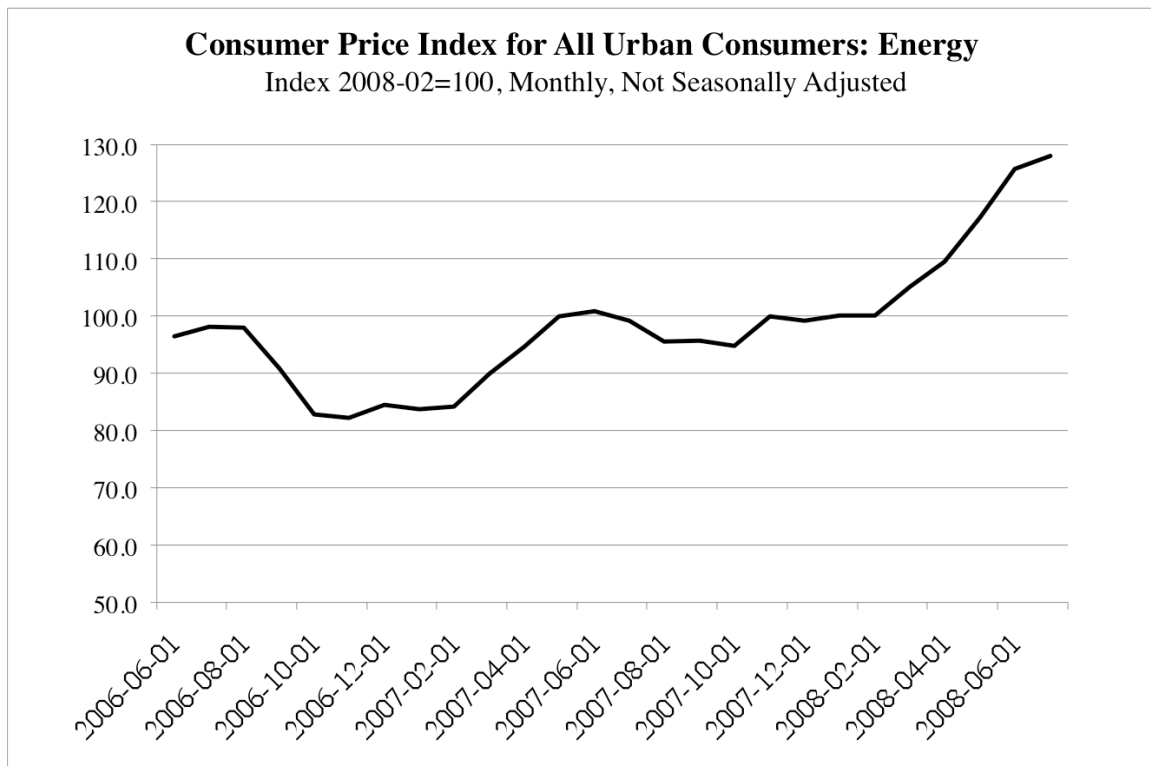
There was no precedent for how the Federal Reserve would react to the unusual circumstances of 2007-2008, meaning that markets had little information off of which to base their expectations. It seems reasonable that markets would infer some information from the past statements and academic work of the central bankers, including Chairman Bernanke and then-Board Governor Mishkin. The public's expectations regarding the Fed's character may have shifted when the Fed responded to a positive shock to inflation in the midst of a financial panic.

The rise in energy prices (and thus headline inflation) had multiple sources that had nothing to do with central bank policy. First, oil production stagnated between 2005 and 2007, largely due to deliberate actions taken by Saudi Arabia to conserve underground reserves for future generations (Hamilton, 2009). Meanwhile, demand from China and other developing nations increased competition for the fixed supply of oil.



Increases in certain countries' oil consumption must come at the expense of other countries' decreased consumption. The only way for the market to clear under increased demand was for the price to rise by an amount that made consumers in countries like the United States cut back their consumption. Since consumers in advanced industrialized nations have a low short-term price-elasticity of demand for oil, it takes a large increase in the price to get them to decrease their consumption. Between February and July of 2008, energy prices rose 28 percent, from an already historically high level (figure 3).

**Figure 3**



Source: Federal Reserve Bank of St. Louis

There is some debate among macroeconomists as to whether it is proper to respond to headline inflation, which includes volatile energy and food components, or core inflation, which excludes them. Proponents of targeting headline inflation argue that

a seemingly temporary increase in food or energy prices might turn out to be permanent, in which case a core-inflation-targeting central bank will ease too aggressively (Bullard 2011). However, despite their volatility, food and energy prices have historically been equally likely to be below trend as above trend. Therefore, proponents of targeting core inflation respond that the central bank can only control the general trend of prices, and should therefore ignore what is out of its control (Mishkin 2007). Since the observed trend of inflation has generally moved back towards core rather than headline inflation, most economists believe central banks should be more concerned with the former.

While some central banks have an explicit goal or goal-range for inflation, the Federal Reserve does not. Many believe, however, that the Federal Reserve has a roughly 2 percent implicit inflation target, based on the observed level of inflation during recent decades, as well as Fed Chairmen Ben Bernanke's seeming endorsement of the policy in his academic work. He has written a number of papers on inflation targeting, including one with Frederic Mishkin (1997) which proposes the policy as a way for central banks to achieve "constrained discretion." Targeting a rate or level of inflation constrains a central bank over the medium to long term to create a stable environment for firms to set prices and negotiate wages, but is also alleged to grant a central bank some discretion to manage short-term economic fluctuations.

Despite the alleged flexibility of a policy of inflation targeting, Bernanke and Mishkin acknowledged in their paper on inflation targeting that such a policy might fare poorly in the face of large supply shocks, which raise inflation temporarily due to no fault of the central bank (107). Under these circumstances, a central bank that strictly targets inflation is forced to tighten its stance on all non-food and energy prices and suffer the

corresponding decline in output. Some central banks that explicitly target inflation have specifically worded escape clauses that dictate how policy should respond to certain special circumstances like a sudden rise in volatile components of the Consumer Price Index. These clauses give the central bank political “cover” to allow higher inflation in the face of potential criticism from the public. Bernanke and Mishkin theorized that a credible discretionary central bank like the Federal Reserve could mimic a central bank with an explicit inflation target plus an escape clause for supply shocks. This theory was put to the test during 2007-2008, and appears to have been partially invalidated when energy prices surged, pressuring the central bank to tighten (or at least ease insufficiently) due to forces that lay beyond its control.

The steady growth of core inflation in late 2007 and the first half of 2008 (figure 4) appears to suggest that Bernanke aptly applied the Fed’s discretionary powers to avoid a tightening. However, due to the inauspicious timing of a financial panic, more than just a minor amount discretionary easing was needed. Illiquid financial institutions could have been greatly relieved by large but temporary increases in the monetary base. This was the approach taken by former Federal Reserve Chairman Alan Greenspan during the 1987 stock market crash, the Y2K scare, and in the wake of the September 11 terrorist attacks (Hummel 2011, 491-496). This is also the approach Friedman said the Fed should have used to combat the banking panics leading up to the Great Depression.<sup>2</sup>

Unlike the bank runs of the 1930s, the panic that began in late 2007 was not a run on demand deposits, which is no longer a possibility due to Federal deposit insurance.

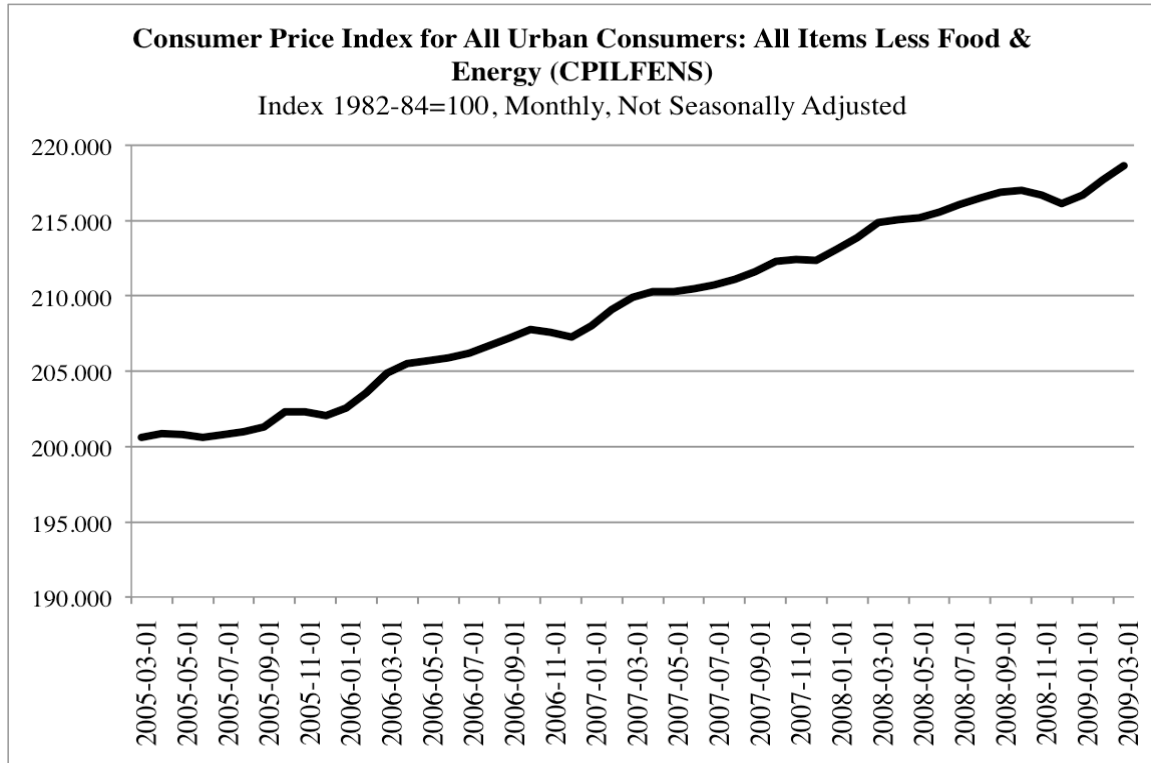
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<sup>2</sup> Hummel 2011 examines the numerous ways Bernanke deviated from the Friedmanite prescription for dealing with financial panics.

Instead, the panic occurred in repurchase markets, where investment banks frequently provided mortgage-backed securities, among other assets, as collateral in order to borrow cash to finance their liabilities in exchange for a promise to buy the security back at a later date (Gorton & Metrick 2009). These transactions (repos), which had become increasingly common since the late 1990s, fulfill a similar function for investment banks that demand deposits do for traditional banks, with the collateral asset playing the role of the deposit. Repo trading volume had exploded, but the assets were not counted in the monetary aggregates. When markets became aware of the extent of unwise sub-prime lending, “depositors” required borrowing banks to pledge more collateral in order to obtain the same cash loans. Beginning in late 2007, the major investment banks were competing to obtain scarce collateral, and the ensuing rush for liquid securities constituted an increase in demand for financial assets similar to the increase in demand for reserves during the banking panics of the Great Depression.

At this point, markets were likely hoping for a Friedmanite injection of liquidity to relieve the panic. Although the Federal Reserve did expand lending to troubled financial institutions, first through expanded discount window lending and later through the Term Auction Facility, it kept the monetary base constant by financing its loans with money from open market sales of treasuries. In other cases, the Fed directly swapped liquid Treasury securities for the investment banks’ questionable assets, leading to no net increase in the Fed’s liabilities, i.e., the monetary base.

**Figure 4**



*Source:* Federal Reserve Bank of St. Louis

As I showed earlier, falling headline inflation expectations beginning in July 2008 should have sent a clear signal that the inflationary shock had subsided and that greater ease was required to keep economic activity stable. Yet as late as September 16, 2008, the day after the failure of the investment bank Lehman Brothers, the Fed decided to keep the federal funds rate steady at 2 percent. The minutes from the September 15 meeting, which were not released until October 7, contained many hints that a number of Federal Open Market Committee participants still had a very cautious outlook with respect to inflation. The minutes contain language such as, “Participants noted that recent readings on core and headline inflation had been elevated, and they expressed concern that high inflation might become embedded in expectations and retain considerable momentum . . . [T]he possibility that core inflation would not moderate as anticipated was still a

significant concern. With substantial downside risks to growth and persisting upside risks to inflation, members judged that leaving the federal funds rate unchanged at this time suitably balanced the risks to the outlook” (Board of Governors of the Federal Reserve 2008). By mid-September, “recent readings” on core inflation had been in line with an implicit 2 percent inflation target. As figure 4 shows, core inflation was growing roughly at the trend rate of the past several decades, and can hardly be called “elevated” at any point in 2008.

The expressed concern over inflation after weeks of falling TIPS yields, in addition to the decision to keep nominal interest rates stable despite the failure of a major investment bank, were likely major sources of a shift towards market expectations that future policy might not be aggressive enough to accommodate the deteriorating conditions in financial markets. These signals likely revealed the FOMC’s decidedly cautious and conservative character, as well as certain influential participants’ single-minded focus on inflation.

In fact, the Federal Reserve should have been much more concerned with the looming possibility of deflation, which can be equally if not more destructive than inflation. Indeed, Mishkin’s fourth lesson for monetary policy makers states, “Avoiding unanticipated fluctuations in the price level is an important objective of monetary policy.” Expanding on this principle, Mishkin writes that “price deflation can be an important factor leading to a prolonged financial crisis,” and that “because of the threat of financial crises, central banks must work very hard to prevent price deflation.” Mishkin also references a discussion from earlier in the book on potential causes of financial crises, which explains how deflation increases the real burden of debts that were

contracted in fixed nominal terms under the expectation that prices would rise at their historical rate (210-211). Higher debt burdens lead to more defaults, which increase the moral hazard and adverse selection problems that lending institutions face. This process of debt-deflation can rapidly accelerate an initially small act of tightening. More aggressive easing could have vastly improved financial institutions' balance sheets by lessening the debt burden of borderline insolvent borrowers, such as homeowners in non-sub-prime markets.

### *Interest on Reserves and Interest on Excess Reserves*

Another shift in the expected future path of monetary policy may have been caused by the October 2008 Federal Reserve Board announcement it had recently begun to pay banks interest on reserves (IOR) and excess reserves (IOER) held in central bank vaults. Changes in the supply of base money are the most common tool used by the Federal Reserve, but changes in money demand also impact broader monetary aggregates and nominal GDP.<sup>3</sup> Payment of interest on reserves increases banks' desire to hold base money and thus makes them less willing to lend, especially when the amount of interest

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<sup>3</sup> For example, Friedman and Schwartz attributed the end of the initial recovery period of the Great Depression to a doubling of banks' required reserves as a fraction of total deposits, another policy that may have increased base money demand and led to an unintentional tightening. Banks were already holding a large number of reserves in excess of the requirement, so the policy wasn't expected to significantly alter lending practices. However, Friedman and Schwartz theorized that banks wanted a certain sized cushion between what they possessed and what was required. This is understandable given that demand for excess reserves is a function of their costs and benefits. Excess reserves provide security that the bank will not have to liquidate loans at a penalty to meet the legal requirement. A doubling of reserve requirements reduces the cushion and increases the marginal security benefit of an additional dollar of excess reserves at the amounts banks were holding.

paid on excess reserves is equal to or greater than the prevailing overnight interest rates, as it has been since November 5, 2008.

In spite of its potentially contractionary effects, policies of paying IOR and IOER can be justified on several grounds. The European Central Bank - as well as the central banks of Canada, Australia and New Zealand - already use IOR/IOER as part of a policy known as the “corridor” system. This system separates the traditional, interest rate-setting function of monetary policy from its other objectives, such as its clearing house functions (Keister, Martin & McAndrews 2008). Under a corridor system, the discount rate serves as an upper bound that a bank with inadequate reserves must pay in order to comply with reserve requirements, while the deposit rate, i.e., interest on reserves, serves as a lower bound on the inter-bank rate. The deposit rate prevents short-term interest rates from falling below the bank’s target, while allowing the central bank to expand the reserves banks hold to settle transactions with one another. In the United States, the amount of reserves required for settlements has risen substantially since 1980, with the advent of real-time gross settlement procedures between banks (Hummel 2008). These procedures can result in banks losing their reserve cushion due to an unlucky chain of deposit outflows. When this happens, the Federal Reserve steps in to provide banks with overdrafts, but in doing so exposes itself to risk that it will not be repaid. The Fed has tried to discourage the use of overdrafts with various policies to make holding more reserves more attractive, the most recent of which was payment of IOR and IOER, which had been scheduled to go into effect in 2011 for several years. However, in May of 2008, Bernanke wrote a letter to Speaker of the House Nancy Pelosi, asking her to expedite the authority.



In an October 6, 2008 press release, the Federal Reserve Board announced that it had begun paying interest on reserves and excess reserves<sup>4</sup> on October 1 to give the Fed “greater scope to use its lending programs to address conditions in credit markets while also maintaining the federal funds rate close to the target established by the Federal Open Market Committee.” Concerns over the efficiency of the central bank’s clearing house functions were probably not the main reason that Bernanke requested immediate authority to implement the IOR policy. The more pressing reason to implement the policy was that the billions of dollars injected through the various TARP lending to bail out the financial system posed a threat as an inflationary overhang if lending and the money multiplier quickly took off during the recovery. The IOR policy granted the Fed the authority to quickly tighten its stance in the face of a rapid recovery by raising the rate until banks choose to reign in lending to the Fed’s desired level (Board of Governors of the Federal Reserve 2008).

The IOR policy can also be defended on the grounds that if it had not been implemented, no further aggressive policies like quantitative easing ever would have been considered. However, valid reasons behind payment of IOER would not have prevented rising expectations of future demand for base money, and thus a lower future path of nominal GDP. At the end of his textbook chapter on the determinants of the money supply, Mishkin supplies a homework problem that asks, “The Fed has been discussing the possibility of paying interest on excess reserves. If this occurred, what would happen to the level of  $e$  [excess reserves]?” (368) Clearly the answer Mishkin is

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<sup>4</sup> The initial rate paid on excess reserves was set at 1.25 percent, based on a formula that pegged the rate 75 basis points below the federal funds rate, which was 2 percent at the time.

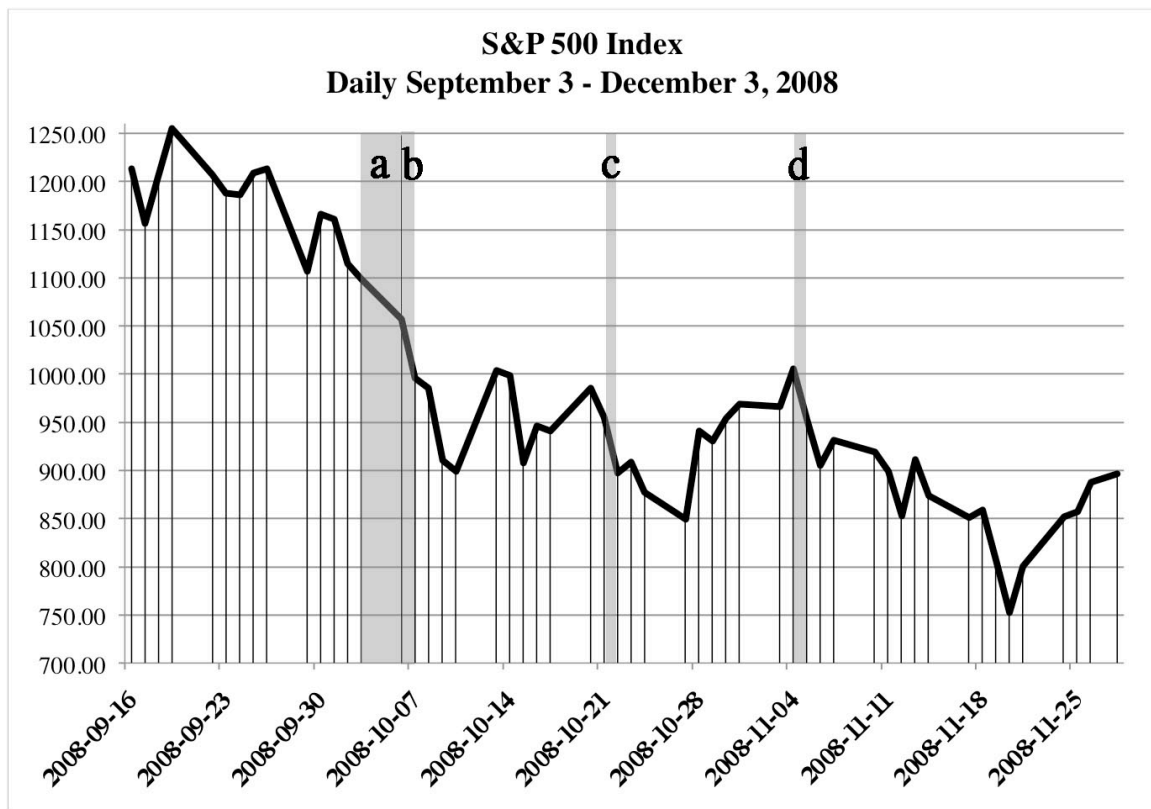
looking for is that they would increase. While this strongly suggests that the Board of Governors was aware that the policy might be contractionary, it probably was not aware of the magnitude of its impact, given that the policy had been used for decades at major central banks.

The large increase in the monetary base has led some to believe that not only has monetary policy been aggressive, but that high inflation is just around the corner. This is not likely to be the case as long as banks are comfortable earning risk-free interest compared with riskier low-yielding investment opportunities. Additionally, if investment demand does suddenly pick up, the Fed now has the power to quickly “step on the brakes” without having to rely on reinvigorating a federal funds market that has been largely stagnant since the nominal interest rate was lowered to near zero in December 2008.

Turning to the specific effects of IOR/IOER, there appears to be a strong correlation between announcements of increases in the rate paid and declines in the stock market. On October 6, 2008, the day the IOR/IOER policy was announced, the S&P 500 stock index fell by 3.85 percent. It fell by another 6.10 percent on October 22, when the Fed announced that it had changed the formula to calculate IOER, raising it to 35 basis points below the federal funds rate. When the Fed announced a second increase in the IOER on November 5, changing the formula to set it only 10 basis points below the federal funds rate, the S&P 500 fell by 5.27 percent. On December 16, the day of the third and final increase announcement (which set IOER equal to the federal funds rate), the S&P 500 rose by 4.88 percent, going against the trend of the previous three announcements. However, the same Federal Reserve press release that announced the

final increase also contained language that signaled that the Fed might pursue more aggressive unconventional policies such as quantitative easing, in the future.<sup>5</sup> This might have raised expectations of future monetary ease, making it hard to assess the net effect of the simultaneous announcements. Perhaps rumors of quantitative easing would have driven the stock market even higher in the absence of the final rate increase.

**Figure 5**



- a) **October 6:** The minutes from the September 15th FOMC meeting, which contain hawkish language, are released
- b) **October 7:** The Federal Reserve Board announces that it has begun paying IOR equal to the interest rate target less 75 basis points.
- c) **October 22:** The Federal Reserve Board announces that IOER will equal the federal funds rate less 35 basis points.
- d) **November 5:** The Federal Reserve Board announces that IOER will equal the federal funds rate less 10 basis points.

Source: Federal Reserve Bank of St. Louis & Federal Open Market Committee

<sup>5</sup> The relevant line of the press release stated: “The Committee is also evaluating the potential benefits of purchasing longer-term Treasury securities.”

Figure 5 shows the S&P 500 stock index, with four vertical shaded bars indicating the behavior of the stock market on the days of some of the potential tightening events from late 2008. This includes the first announcement of the IOR policy on October 6, the October 7 release of the hawkish minutes from the previous meeting, and the first two announced increases in the interest rate paid on reserves. The stock market was very volatile over this period, so it is hard to identify the IOR policies as the cause of the declines. Additionally, there is a potential bias to only seek out the days in which potentially contractionary announcements corresponded to large declines in the stock market. However, it still seems unlikely that three out of four of the decisions relating to the IOR policy would have corresponded with such sharp declines in the stock market by chance alone. At any point in late 2008, the Federal Reserve could have lowered or eliminated the rate and judged whether or not the policy was having a contractionary impact, while still retaining the ability to raise the interest rate on reserves at a later date.

### **Monetary Policy at the Zero Nominal Bound**

By the time the Fed finally lowered the federal funds rate to zero on December 16, 2008, the financial crisis was already well underway. Unemployment was climbing to nearly 8 percent and real output had fallen by roughly 4 percent since its peak in April of 2008. It was clear that the economy would be in a deep recession for some time. The number of unemployed workers and amount of underutilized capacity suggested that the economy could have produced a great deal more with only a small amount of higher inflation. However, many insisted that monetary policy was impotent in a so-called “liquidity trap,” the situation when zero nominal interest rates can no longer be lowered any further. An economy is said to be stuck in a liquidity trap when conventional interest

rate policy with open market operations becomes ineffective because short-term Treasury-bills with near-zero yields become a close substitute for cash. Swapping two nearly identical assets does not alter people's portfolios in a way that makes them spend more.

In a liquidity trap, the question of whether or not the Federal Reserve can be faulted for not easing its policy sufficiently still depends on central banks' abilities and limitations. Here again, however, textbook monetary theory runs contrary to the common claim that the Federal Reserve could not have done more to boost the economy at the zero nominal bound. Mishkin's third lesson for monetary policy states, "Monetary policy can be highly effective in reviving a weak economy even if short-term interest rates are already near zero." He lists several options the central bank has at its disposal, including some mechanical operations like purchases of longer-term government securities and foreign currencies, but he primarily emphasizes the need to commit to future expansionary monetary policy. Mishkin's view on monetary policy at the zero nominal bound is hardly an outlier within the academic community. Bernanke (2000) dismissed the argument that monetary policy could not have been more aggressive in Japan once the overnight interest rate fell to zero in 1999. A number of other papers by prominent macroeconomists have also offered various "foolproof" escapes from the liquidity trap.<sup>6</sup>

All of these proposals call for an explicit commitment to higher inflation, which stimulates aggregate demand primarily by decreasing real interest rates through the Fisher identity, even when nominal rates are at the zero nominal bound. Since the liquidity trap is usually preceded by a period of below-average inflation (as it was in the

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<sup>6</sup> See Svensson 2003, Evans 2010, and McCallum 2001.

U.S. in the recent recession and in Japan in the late 1990s), most proposals suggest that the central bank target the future price *level* at what it would have been if it had grown at a constant rate beginning from the point when inflation first started falling below its trend or targeted rate. A policy of 2 percent price-level targeting, for example, would make up for a year with zero percent inflation by aiming for 4 percent inflation in the following year. However, even a commitment to target the rate of inflation at its previous level of just 2 percent could have had a stimulative effect immediately after the U.S. economy entered the liquidity trap, when inflation expectations were still well below that level. The Federal Reserve's unwillingness to consider these policies would seem to constitute unnecessarily tight monetary policy, unless there were legitimate obstacles to their implementation or serious risks involved.

#### *Challenges Involved in Foolproof Escapes from the Liquidity Trap*

The challenge of implementing expansionary policies at the zero nominal bound arises from a time-inconsistency problem faced by central banks with respect to generating future inflation. That is, the public knows that the Federal Reserve faces a different set of incentives in future periods than it does in the present, and as a result might not think that a promise by the Fed to act sub-optimally in the future is credible. Once the beneficial effects of inflation expectations on aggregate demand have been realized, the Federal Reserve's new optimal policy is to tighten before the expected inflation ever actually comes about. This analysis follows from the Fed's implicit welfare function, which is increasing on output and decreasing on inflation.

Kydland and Prescott (1977) noted a different credibility-related time-inconsistency problem facing central banks. The traditional credibility problem results

from the tension between the long-run benefits of price stability, and the empirically observed short-run trade-off between output and inflation. Kydland and Prescott showed that if the public trusts the central bank to pursue the important long-run goal of price stability, then the Fed has the opportunity at any given time to achieve a better short-run outcome by producing unexpected inflation and higher output. Like Friedman, they conclude that the optimal long-run policy can be achieved by implementing a binding rule that commits the central bank to act a certain way regardless of economic developments. Alternatively, Rogoff (1985) suggested institutional reforms that would staff the central bank with agents who are relatively unconcerned with high unemployment, i.e., have a great degree of inflation aversion. Ironically, the more that this institutional evolution has actually taken place, the less likely it is that the Federal Reserve will respond to the liquidity trap with aggressive actions to temporarily increase inflation.

In one sense, the liquidity trap poses the reverse of the traditional credibility problem, insofar as the central bank has to promise to deviate from its hard-earned reputation for keeping inflation low and stable. In another sense, however, the liquidity expectations trap is the same problem as the traditional one. That is, the Fed wants to commit to a policy that will be suboptimal for a particular period in the future. The fact that people are aware of the Federal Reserve's incentives could make them distrust a promise to implement the optimal long-run policy.

Paul Krugman (1998) examined the challenge posed by a liquidity trap in a paper on the experience of the Bank of Japan during the 1990s. He updated Keynes' classic liquidity trap argument to include the public's expectations, which have played an

important role in many macroeconomic models since the rational expectations revolution. Krugman concluded that it is somewhat unclear whether the liquidity expectations trap poses a true constraint on a central bank that actually wants to stimulate the economy. The static model that he used to show the impotence of monetary policy at the zero nominal bound only applies if the public expects injections of base money to be temporary. This model is consistent with modern research in monetary economics (including that of the quasi-monetarists). In his textbook on monetary economics, Michael Woodford even goes so far as to say, “Not only do expectations about [future] policy matter, but, at least under current conditions, very little *else* matters.” (2003, 15) A simple thought experiment illustrates Woodford’s point. If the Federal Reserve announced that it was going to double the monetary base using open market operations and then cut it in half one week later, short-term nominal interest rates would temporarily fall to zero, but economic activity and most other asset prices would remain unchanged over the interim. Conversely, a credible promise by the central bank to permanently increase the money supply one month in the future would not immediately alter short-term interest rates, but it would generate inflation expectations that would immediately raise a broad class of asset prices. Since the nominal interest rate must always be assessed in relation to where the public expects it to be, a central bank that retains control over the expected future path of interest rates can never truly be stuck in a liquidity trap.

Normally, the Federal Reserve has two ways to signal the expected future path of interest rates: its short-term targeted federal funds rate, and its statements to the public. In a liquidity trap, the Fed loses its first signaling device. Most formulations of a Taylor-rule for interest rate targeting suggest that interest rates would have been set well below zero



if such a policy were possible, given how far both inflation and output fell below their targets during and after the financial crisis. Since negative nominal interest rates are impossible under the present system, Woodford suggests that central banks in the liquidity trap should outwardly commit to keeping the federal funds rate low for long enough to generate higher inflation expectations, unlike the Bank of Japan, which merely issued vague statements about keeping interest rates low “until deflationary concerns subside” (Bernanke 2000, 159). The problem with a commitment like the BOJ’s to keep interest rates low as long as the economy is experiencing deflation is that it implies that the central bank will begin to tighten once any inflation begins to materialize. If the public perceives this, then deflation will continue and interest rates will remain stuck at zero. This is why the central bank must commit to allowing some positive rate of inflation before it tightens. Further injections of liquidity could have the same effect as a promise to keep interest rates low if the central bank could promise that the reserves would not be withdrawn until the specified level of inflation is reached.

It is true that the public may not believe that the Fed would follow through on such a commitment to be, in Krugman’s words, “irresponsible” - no central bank has ever announced an inflation target in a liquidity trap, so there is no way to know for certain what would happen. That is why, in addition to clearly communicating the intention to generate future inflation, most proposals recommend concrete policies to conspicuously signal the seriousness of the central bank’s commitment. One common recommendation is for the central bank to target the exchange rate at a higher level (i.e., depreciate the domestic currency) and stand ready to buy foreign currencies with dollars until it hits the peg. Svensson (2003, 155-160) advocates a crawling exchange rate peg that is initially

targeted above the level that, if kept constant, would lead to above-target inflation. The peg is allowed to crawl down along a specified path that is believed to be consistent with the amount of future inflation the central bank intends to generate. If the bank credibly commits to a policy that will maintain the crawling peg, it will induce expectations of inflation, which would go a long way towards automatically raising the exchange rate even before the exchange rate authority (the Treasury in the U.S.) purchases foreign currencies. The exchange rate provides a visible signal of whether or not the central bank's commitment is on track to achieve inflation when interest rate policy loses its signaling ability.

Nick Rowe (2010) has pointed out that using interest rates as an intermediate target constructs a false perception of interest rates as *being* monetary policy. Alternatively, changes in interest rates can be thought of as an epiphenomenon of changes in supply and demand for base money, alongside a number of other indicators. The liquidity trap wouldn't rob a central bank of its prime signaling device under a monetary policy regime that targeted a dollar-denominated quantity, such as the exchange rate, which has no zero bound. Rowe cites a period in which the Bank of Canada published a Monetary Conditions Index (MCI), which combined the overnight interest rates and exchange rate into a single weighted sum, and notes that the transmission mechanism remained fundamentally unchanged during the period despite the alternative framing.

In addition to exchange rate targeting, Bernanke and Svensson both advocate open market purchases of a variety of assets, including longer-term government bonds and commercial paper. Such policies have come to be known as quantitative easing, and

can potentially serve two purposes in stimulating the economy at the zero nominal bound. One purpose is to alter the average maturity and amount of risk in the public's portfolio. Buying longer-term Treasury bonds lowers the average maturity of the public's asset holdings, and can encourage investing by lowering longer-term interest rates. However, for these portfolio effects to have a major impact on economic activity, the central bank would have to purchase massive quantities of assets. This would subject the central bank to the risk of capital losses upon sale of the assets if inflation and interest rates quickly rose. Furthermore, if the purpose of purchasing longer-term securities is to boost the economy, then the desired effect might actually be to raise long-term interest rates, since a successful expansionary action would lead to expectations of a quicker recovery and a faster return to a positive federal funds rates.<sup>7</sup> The more important effects of quantitative easing come from the signal that the central bank is willing to keep reserves in the banking system until economic recovery and an above-normal rate of inflation results. Unconventional asset purchases send a signal that can instantly boost expectations of future inflation and nominal GDP, which in turn immediately boosts several asset prices, like TIPS and stocks, and also sets the process of sticky price and wage adjustment into motion.

Even absent a visible signal such as an exchange rate target or quantitative easing, the public still has a good reason to trust a commitment by the Fed to follow an optimal

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<sup>7</sup> Scott Sumner cites this as the reason that most asset prices reflected a successful easing after the Fed's March 2009 round of quantitative easing, except for long-term treasuries, whose yields initially fell before eventually rising. While the initial behavior of long-term yields goes against Sumner's core assumption of efficient markets, the seeming discrepancy could have arisen from the ambiguity of the Fed's action. It may have taken some time for markets to figure out the net effect of the yield-decreasing mechanical purchases and the yield-increasing expectations of future monetary ease.

long-run policy, even if it requires a promise to act sub-optimally for a period. The Fed is always in a position to exploit its credibility to achieve short-term gains, but it chooses not to because it believes that its credibility is more valuable in the long run (DeLong). A central bank will want to follow through on its promises as a general rule so that it will be believed in the event of a future liquidity trap, and in general. Sumner (2010) draws a succinct analogy to a parent who promises unhealthy candy in order to get a child to do an unpleasant chore. Even after the child has complied, Sumner says, the parent will still want to follow through on the promised candy reward so that it can be used to incentivize the desired behavior again in the future. In fact, if the central bank did not follow through on its promise to generate inflation, this would likely be very damaging to its credibility. Therefore, once the promise is made, the public has every reason to trust the Fed to follow through.

Unfortunately, Bernanke (Reddy 2009) has said that an explicit inflation target of 3 percent was unfeasible because it could threaten the Fed's hard-earned credibility as an inflation fighter. Bernanke seemed to be hinting that the public would oppose temporarily higher inflation because they would not trust the Fed to ever return to the old level of inflation. However, the public is unlikely to believe this if the Fed clearly communicates the constraining nature of a *level* target, and the large benefits of higher output compared with the relative small costs of higher inflation. Also, if the liquidity expectations trap is a problem because central bankers are perceived to be too conservative, then it is unlikely that expected inflation would go from zero to a sudden upward wage-price spiral. Lastly, Bernanke did not seem to think that a 3-4 percent inflation target would have created a problem for the Bank of Japan when he wrote in 2000, "I do not see how credibility can

be harmed by straightforward, honest dialogue between policymakers and the public” (160).

### **Challenges to the Mishkin/Bernanke View**

I have argued that the collapse of asset prices and subsequent fall in nominal GDP was made worse by an avoidable tightening of the stance of monetary policy, and that a looser stance would have mitigated that fall in asset prices and stabilized economic activity. My analysis suggests that insufficiently expansionary policy was primarily a result of over-cautiousness on the part of the Federal Reserve, and a lack of will to succeed at easing. Some, however, argue that the decline in asset prices and inflation was the inevitable result of excessive borrowing that raised asset prices to unsustainable levels in the first place, not of insufficient monetary stimulus.

#### *Do Financial Crises Inherently Lead to Slow Recoveries?*

Reinhart and Rogoff (2009) argue that recessions preceded by financial crises tend to be inherently deeper and longer. They base this conclusion on an in-depth empirical study of numerous crises throughout history. They claim that the United States in 2007 exhibited all of the major signs of an economy poised for a financial crisis followed by protracted slow-downs in output and employment. By their account, the current disappointing recovery is to be expected. While their narrative fits the actual experience of the U.S. in recent years well, it does not suggest that contractionary aggregate demand policies cannot play a role in worsening a financial crisis nor that accommodative money cannot help reflate asset prices to healthy, sustainable levels and stimulate output.

Reinhart and Rogoff downplay the aggregate demand policies that accompany the episodes of financial crisis they study, and as a result they overstate the causal connection between the banking-centered problems and slow recoveries. Lopez-Salido and Nelson (2010) argue that Reinhart and Rogoff define financial crises to only include events that tend to support their hypothesis about slow recoveries, and ignore those that don't (5-6). Lopez-Salido and Nelson point to several occasions that can be categorized as financial crises that are followed by relatively speedy "V-shaped" recoveries due to sufficiently accommodative aggregate demand policy. Using Anna Schwartz's qualitative definition of a financial crisis as the emergence of bank runs involving *en masse* conversions by households of deposits into currency, Lopez-Salido and Nelson show that a series of bank failures and mergers in 1973-1975, for example, should have been included in Reinhart and Rogoff's study (6-12). If this period had been included, it would have violated their central thesis, since it was followed by a rapid recovery that was due in part to monetary easing. Although the stimulative policies following the 1973-1975 crisis ultimately went too far, and generated too much inflation, this episode still shows that aggregate demand stimulus can boost output in the wake of financial crises. An appropriate dose of aggregate demand stimulus is probably the best cure for ailing banks, too, whose balance sheets are improved when asset prices rise.

### *Balance-Sheet Recession*

Richard Koo, like Reinhart and Rogoff, has argued that recessions following the bursting of an asset bubble and ensuing financial crisis are bound to be longer and more severe than other recessions. Koo, however, identifies the source of slow recovery as an unchangeable desire on the part of debtors to improve their balance sheets following a

collapse in asset prices. He first advanced this argument in 2003, using the term “balance-sheet recession” to describe Japan’s more than decade-long recession that began after the bursting of an asset bubble in the early 1990s. He has since described the recent downturns in the United States and around the world as balance-sheet recessions as well.

Koo argues that Japan’s long-lasting recession during the 1990s and 2000s was characterized by shortage of domestic demand. However, he says that the traditional prescription for demand-side recessions, monetary policy, was impotent because of widespread balance-sheet problems among Japanese firms. At the time, a majority of Japanese corporations were simultaneously paying down debt at the expense of investment. A shortage of demand results from the fallacy of composition, in which it is rational for individual firms to spend and borrow less, even though lower overall expenditures hurt the entire economy by triggering a deflationary spiral (5-6). This is the very problem that monetary stimulus is supposed to overcome, by altering people’s portfolios in a way that makes them more eager to spend. Koo, however, argues that the bursting of the asset bubble made firms insensitive to changes in the cost of credit, and that no action on the part of the Bank of Japan, including an inflation or price-level target, could have significantly altered their spending habits.

Many Japanese firms that had borrowed heavily during the boom period found that they owed more money than their diminished assets were worth after the bubble collapsed. The collapse in asset prices, particularly in land, led to the greatest peacetime loss of wealth in history, roughly 1500 trillion yen. Despite having negative net worth, many firms still enjoyed relatively strong cash flows coming from strong foreign demand for the high-quality goods they were producing. Koo hypothesized that under these

unusual circumstances, firms no longer sought investments to maximize future profits, but instead settled for existing profits, which were used to slowly pay down debt. In effect, firms became debt-minimizers rather than profit-maximizers. The process of firms rebuilding their balance sheets, he says, was particularly slow because of the shortfall in aggregate demand.

In the United States, indebted homeowners who bought during the recent boom are analogous to corporations in Japan's "lost decade." If Koo is correct about the impotence of monetary policy in balance-sheet recessions, then it is wrong to blame the Bank of Japan or the Federal Reserve for the slow recoveries in the wake of their countries' respective asset price collapses. However, there are several problems with Koo's balance-sheet recession theory.

First, Koo has little to say about the potential role of tight money leading up to the bursting of the asset bubble. When he does reference monetary policy during the period, he makes the mistake of associating a fall in the nominal interest rate with an easing of monetary policy, citing the decline in short term nominal interest rates from 8 percent to zero between 1990 and 1999. Milton Friedman, on the other hand, argued in 1998 that the Bank of Japan rapidly and belatedly shifted its stance from too easy to too tight, triggering a much more severe asset price crash and subsequent recession than would have occurred without the unnecessary tightening. Beginning in February 1987, the Bank of Japan agreed to stem dollar depreciation by purchasing dollars with yen as part of the Louvre Accord. As a result, M2 grew at a rate of 10.5 percent per year from 1987 to the beginning of 1990 (Bank of Japan Time-Series Data, Money Supply, M2). The stock market reached its peak at the end of 1989, but the Bank of Japan did not begin tightening



the growth of the money supply until late in 1990, at which point it reduced money growth to less than 3 percent over the course of less than a year. Nominal GDP was falling by a similar magnitude during this same period of money growth tightening. Yet Koo speaks of the bursting of the bubble as if it was completely independent of the Bank of Japan's tightening.

Koo also misunderstands the role of deflationary expectations on real interest rates. He argues that rising real interest rates due to falling inflation could not have contributed to the decline in corporate borrowing, since the annual rate of inflation stood at 1.3 percent as late as 1993, when the balance-sheet recession was already well underway. This ignores the fact that expected *future* inflation determines the real interest rate and is therefore what matters for investment decisions. Japan did not introduce inflation-indexed bonds until 2004, so there is no exact way to measure inflation expectations at the time. However, if the public correctly anticipated in 1993 that inflation was going to fall to zero and then stay there for the next decade, then ex ante real interest rates would have been much higher than the nominal interest rate minus 1.3 percent inflation.

Koo also provides little evidence for the key assumption behind the balance-sheet recession, namely that Japanese firms would have been insensitive to a change in the cost of credit at the relevant margin, that is, from zero nominal interest rates under stable prices to zero nominal interest rates under expected positive inflation. Koo asserts that, "a company suffering from a debt overhang will not ask to borrow more just because loans have grown cheaper." He bases this on the fact that a majority of firms in the late 1990s and early 2000s were paying down debt despite historically low interest rates (9-10). It is

remarkable that in 2003, 2000 out of 3500 firms were still paying down debt, and that another 500 were neither borrowing nor paying down debt, but this is more or less what one would expect to happen to indebted firms in the face of a sharp and persistent monetary tightening and subsequent decline in aggregate demand. Additionally, this means that 1000 firms were still increasing borrowing and investing in new projects to boost future cash flows. Of the 2500 firms that were not increasing borrowing, some surely contemplated new investments, but decided they weren't worth it at the prevailing ex ante real interest, given expectations of zero inflation or even deflation.

Koo offers some anecdotal evidence that firms would not respond to a positive inflation target by noting that the Japanese business executives he spoke to said inflation would not change their priority of paying down debt (49). This kind of answer is consistent with Koo's claim that these same business executives must appear very concerned over their firms' technical insolvency, but it is not strong evidence that firms had ceased to evaluate marginal investment decisions on the basis of the real cost of borrowing. Economics teaches that models do not need to correspond perfectly to reality as long as they yield accurate predictions. Profit-maximization is one such model that is intended to explain how firms respond to certain incentives, including changes in the interest rate. Similarly, few business people are likely to tell a surveyor that they set the price of their product equal to its marginal cost, yet this is a key assumption behind profit-maximization. Neither assumption is intended to mirror a conscious process on the part of business people, or to correspond to a verbal response they would give to a question about their management practices.

In the absence of a counterfactual scenario in which the Bank of Japan credibly committed to a positive inflation target, there is no way to know for certain how Japanese firms would have responded to a decrease in ex ante real interest rates. However, there is evidence of how people might respond to monetary stimulus at the zero bound from another period that Koo characterizes as a balance-sheet recession: the Great Depression. Koo, an advocate of fiscal stimulus to boost aggregate demand in the Japanese recession, repeats the often-heard claim that government spending in the form of military build-up ultimately ended the Great Depression. As I argued earlier, there is strong evidence that monetary stimulus was the major factor in the initial recovery phase between 1933 and 1937. In Eggertsson's framework, President Roosevelt's action represented a shift from a deflationary regime to an inflationary regime. In Woodfordian terms, it altered the expected future path of interest rates. It also corresponded to a sudden increase in investment and consumption that is hard to attribute to any cause other than monetary stimulus.

Koo might defend his argument against this analogy in two ways. First, he claims that policies of devaluation are not feasible in countries like Japan that are already running a trade surplus (61-63). He points to then-Treasury Secretary Lawrence Summers' vocal opposition to an attempted yen depreciation in June of 1999. When markets realized the lack of cooperation between the United States and Japan on exchange rate policy, the yen began to appreciate once again. In the recent recession, the same argument has been made that currency depreciation constitutes a beggar-thy-neighbor policy, and is thus not considered politically feasible. However, if devaluation through an explicit exchange rate policy constitutes a beggar-thy-neighbor policy, then so

does any other policy that aims to stimulate the economy by raising the domestic price level. Krugman made this point when discussing the liquidity trap, but also explained that the policy would not have a net negative effect on foreign economies, because any increase in the devaluing country's exports would be likely to be offset by an increase in imports due to increased domestic demand. In other words, weak Japanese demand is in no one's interest.

Koo's second defense would be that although some degree of monetary stimulus would jump-start borrowing, the amount that would be necessary to get firms to stop worrying about their outstanding debt would harm the economy more than it would help. He essentially says that the Bank of Japan cannot achieve any stance between absolute price stability (zero percent inflation) and hyperinflation (57). This is because, according to Koo, it would be irresponsible for firms to borrow based on a commitment by the Bank of Japan to generate only mild inflation, say 2-4%, before said inflation has materialized. However, even in normal times a central bank that has been consistently hitting an explicit 2 percent inflation target could suddenly tighten and prevent the inflation that borrowers had factored into their investment decisions from materializing. The biggest difference between the normal situation and a liquidity trap with a central bank that commits to positive inflation is the framing, yet no one would say that borrowers who factor trend inflation into their investment decisions are acting irresponsibly.

Elsewhere, Koo argues that an inflation target, as advocated by Bernanke, Krugman, et al., was infeasible because the central bank loses its ability to mechanically control the money supply and inflation when there is no demand for loanable funds (46). His logic is that when there are no willing borrowers, reserves don't leave the banking

system and the money multiplier never takes off. However, this argument assumes there will be no demand for loanable funds even at a higher level of expected inflation, which depends on Koo's largely unsupported claim that firms are insensitive to changes in the cost of credit. Next, he points to increases in the monetary base in the early 2000s that never led to inflation expectations or higher nominal GDP as evidence of central bank impotence at the zero nominal bound (59). However, as Krugman explained, only increases in the monetary base that are expected to be permanent will generate inflation. That is why injections of liquidity, i.e., quantitative easing, must be accompanied by other actions by the Bank of Japan that clearly signal that its general aversion to inflation will not preclude it from allowing temporarily higher inflation.

Koo presents the repeated injections of liquidity as evidence of central bank impotence, but ignores all of the ways the Bank of Japan signaled its unwillingness to ease. Nearly all of the actions of the Bank of Japan during the lost decade indicate no desire to generate inflation whatsoever. Mishkin and Ito (2004) highlighted what in their view were the BOJ's biggest errors during Japan's lost decade. One such error was the decision to raise interest rates by a quarter point in 2000 in the face of zero inflation and ongoing economic weakness. The rate increase was quickly reversed, but only after the BOJ had revealed its staunch aversion to inflation. In 2001, the BOJ announced plans to engage in quantitative easing, but many of its officials claimed that they didn't expect the plan to work. Accompanying quantitative easing with such pessimistic statements virtually guarantees that the most important part of the transmission mechanism, the signal of a willingness to ease in the future, will fail to operate. Unsurprisingly, further injections of base money from 2001-2004 were never translated into increases in the

money supply. Any doubt that the public may have had that the Bank of Japan wasn't serious about generating temporarily positive inflation was erased in 2006, when the Bank raised interest rates again and shrank the monetary base by roughly 20 percent.

At one point, Koo hints that the Bank of Japan's reluctance to endorse monetary stimulus actually stems from a high level of risk-aversion rather than a genuine belief that it wouldn't work. He claims Japanese central bankers responded to foreign monetarists advocating easing by saying, "Try your experiment in the Nevada Desert, where no one lives. We cannot conduct such an experiment in densely populated Japan." To his credit, Koo prophetically writes, "[I]t is doubtful that the Federal Reserve will buy such ideas [about aggressive monetary easing] when it is its turn to decide. This is because the more one thinks about the issues and problems involved, the more cautious people invariably become" (58). Koo seems to be correct, given that Bernanke, one of the most adamant critics of the Bank of Japan, has not admitted error while the Federal Reserve has behaved similarly on his watch.

### **Conclusion**

If central banking is best interpreted, in Michael Woodford's terms, as management of public expectations, then even small signals and policy changes must be factored into an analysis of the stance of monetary policy. Whether a central bank alters people's spending patterns in ways that lean with or against the business cycle depends on the public's assessment of future path of monetary policy, which in turn depends on its perception of the character and preferences of the central bankers themselves. In the decades preceding the recent recession, the Federal Reserve seemed to have figured out how to manage the public's expectations in a way that mitigated the business cycle,

predominantly through strategic changes in the federal funds rate. In 2007-2008, however, the Fed was faced with new challenges that made it difficult to sufficiently ease its stance using the conventional tools.

Nonetheless, a review of the scholarly literature on monetary policy suggests that central bankers at the Federal Reserve had the knowledge to implement the appropriate policies, even under the unusual circumstances that characterized the recent recession. Both former Federal Reserve Board Governor Frederic Mishkin and current Federal Reserve Chairman Ben Bernanke harshly criticized the Bank of Japan for disregarding the evidence and maintaining an insufficiently loose stance throughout its lost decade. Mishkin closes his chapter on the transmission mechanisms of monetary policy by applying the four lessons for policy makers to Japan's experience in the 1990s and 2000s. He concludes, "Heeding the advice from the four lessons in the previous section might have led to a far more successful conduct of monetary policy in Japan in recent years" (608). This statement seems to apply equally well to Federal Reserve policy in recent years.

Going forward, central banks should focus on how to avoid similar mistakes in the future. As a first step, central banks need to stop framing monetary policy solely in terms of interest rates, especially nominal interest rates. More transparent communication about the goals and path of future monetary policy can help stabilize economic activity and prevent certain central bank actions from being interpreted in a way that leads to an unintentional tightening. It is also important for the economics profession to be clear on what central banks should do during rare events such as supply shocks, financial panics, and liquidity traps. If a situation requires a potentially politically unpopular response,

such as allowing temporarily higher inflation, economists must rise to the policy's defense and communicate the intended benefits.

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