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2. Federal Reserve Experiences with Very Low Interest Rates: Lessons Learned

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Executive Summary

This memo reviews three episodes in which the Federal Reserve was operating in an environment of very low interest rates. One common thread is that all three episodes demonstrate the importance of communications about future policies as a means of managing expectations about future interest rates and inflation.

The 1930s were characterized by a long period of short-term nominal interest rates close to zero. Nevertheless, there is evidence that the monetary authority could still influence the real economy. Recent evidence suggests that communication regarding future policy is important for understanding the recovery in 1933, the decline in output in 1937, and the renewed recovery in 1938. This episode also underscores the value of supporting communication through other concrete policies.

Between early 1942 and 1951, the Federal Reserve and the Treasury agreed to cap yields on long-term bond yields and peg the rate on short-term Treasury bills. Maintaining the peg on short-term rates eventually required the Federal Reserve to purchase most of the bills issued by the Treasury, but the firm short-term peg resulted in longer-term Treasury rates remaining below the cap. Even after short-term rates were allowed to rise, the Federal Reserve was able to maintain the cap on the long-term bonds without any apparent decoupling of private long-term rates.

In early 2003, the FOMC cut the funds rate target to 1 percent. The Committee was reluctant to cut the rate even more and instead tried to stimulate spending by adding forward-looking comments about policy intentions. This guidance appears to have been successful in lowering expectations of future short-term interest rates and reducing downward risks to inflation expectations. The FOMC conditioned its guidance on a weak outlook for inflation and the economy. Initially, this conditionality appears to have been understood by market participants. But evidence suggests that markets paid less and less attention to the conditions for continued policy accommodation during the "measured pace" tightening cycle. This development may suggest that, if such a situation were to occur in the future, policymakers may have to communicate the conditionality of their policy intentions with greater emphasis.

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Monetary Policy during the Great Depression

The 1930s were characterized by a long period of short-term nominal interest rates close to zero, as seen in Exhibit 1. Even if the current short-term nominal interest rate cannot be reduced below zero, the Federal Reserve can lower expectations regarding future short rates, which in turn can reduce long-term yields and increase inflation expectations, thus leading to lower short and long-term *real* interest rates and stimulating demand. Evidence suggests that shifts in monetary policy communication, as well as policy actions taken that confirmed the credibility of that communication, contributed importantly to three abrupt changes in the macroeconomic outlook during the 1930s: the onset of recovery in March 1933, the downturn during 1937, and the renewed recovery in 1938.[2] This period also suggests that policies that expand government credit may be helpful in reinforcing policy communication.

The Recovery in 1933-37: Great Expectations

A central element of the New Deal, and of many policies announced in the spring of 1933, was the overarching goal of the Administration to "raise prices," commonly referred to at the time as "reflation." During the contractionary phase of the Great Depression, prices fell at a rate of 8-10 percent per annum. This meant that the real rate of interest was exceedingly high – over 10 percent at times, as can be seen in Exhibit 1.[3]

A large shift in expectations occurred during the spring of 1933 when FDR made several announcements that the overriding goal of the Administration was to increase the price level to pre-depression levels. The reference price level was kept deliberately vague but was commonly understood to refer to the 1926 price level. To add credibility to the Administration's reflation goal, Congress passed into law a set of policies requiring close coordination of fiscal and monetary policy, including effectively eliminating the gold standard and the announcement of relatively broad increases in government spending.[4] Moreover, the National Industrial Recovery Act included several provisions aimed directly at increasing prices.[5]

Although the money stock was unchanged in the spring of 1933, there was a sharp turning point in industrial production and whole sales prices (see the lower panel of Exhibit 1). Furthermore, commodity prices skyrocketed in FDR's first 100 days, the stock market increased by 55 percent, and investment rebounded. More broadly, after a

[2] This section draws heavily on recent papers by Christiano, Motto, and Rostagno (2004), Eggertsson (2006, 2008), and Eggertsson and Pugsley (2006).
[3] Eggertsson (2008) also documents several measures of ex ante real rates that show the same pattern.
[4] Dropping the gold standard removed gold-related restrictions on increasing the money supply.
[5] When FDR took office in 1933, monetary policy was essentially made subservient to his goals. Shortly following FDR's inauguration in March 1933, Congress passed a law authorizing the president to reduce the gold value of the dollar and issue $3 billion in currency—an amount corresponding to 30 percent of the monetary base. While these provisions were only "authorizations" rather than requiring actions, they effectively ended the independence of the Federal Reserve for the time being. FDR used this power to go off the gold standard and state his goal to increase the price level.

30 percent output collapse from 1929-33, output expanded by 39 percent in 1933-37, the highest 4-year growth rate in U.S. economic history outside of war. The 25 percent decline in prices from 1929-33 was followed by an 11 percent increase over 1933-37 (Exhibit 1).[6]

The Second Phase: The Mistake of 1937

Further evidence regarding the importance of communication about future prices is apparent during the sharp recession in 1937-38. In 1937, however, it was the Administration's abandonment of a policy of reflation that was the driving force. This policy reversal appears to have resulted from the Administration's belief that the depression was essentially over. This sense of victory over the depression found its way into the Administration's communications about inflation policy, which the market interpreted as a shift away from the reflationary commitment of the early months of 1933. Eggertsson and Pugsley (2006) document a series of government communications, which they characterize as "the mistake of 1937."

In particular, on April 2, 1937, the Wall Street Journal reported on remarks made by FDR and by the Chairman of the Federal Reserve Board that indicated "a change in the trend of the government's recovery measures away from the emphasis which has been placed upon stimulation of industrial activity and the recovery of prices." These announcements were in opposition to FDR's previous commitment to restore prices to their pre-depression levels. At the time of the mistake, prices as measured by both the WPI and the CPI were still well below their previous levels.[7] With prices below their perceived targets, one interpretation of this period is that the administration's very public alarm over increasing prices sent confusing signals to the public about its reflation policy.

Exhibit 2 shows the response of leading commodity prices in a one year window around this period. In early 1937, these prices were still trending upward. But after the above-mentioned announcements, the trend changed towards deflation.[8] During the mistake of 1937, long-term interest rates rose beyond what would be implied by the rise in short-term rates, consistent with the market's anticipation of future hikes in nominal interest rates (Exhibit 2, lower panel).

[6] One obvious problem with attributing the recovery in 1933-37 to the Administration's commitment to increase the price level is that several other actions were taken. First, there was a resolution of the banking crisis. Second, there were several actions taken with the National Industrial Recovery Act (NIRA). Third, the United States left the gold standard and the foreign exchange value of the dollar declined. While one could argue that each of these policies had their effect through supporting the government commitment to increasing the price level, and thus worked through expectations about future policy, one could also argue that they had their effect independently of the expectation channel. The recession in 1937-38 therefore provides a useful perspective, since the price of gold was unchanged during this period, there was no banking crisis, and the NIRA had already been judged unconstitutional.

[7] The WPI was 13 percent below its 1926 average, and the CPI was 20 percent.

[8] While there is no direct data on inflation expectations during this period, alternative estimates of inflation expectations find evidence of an expectations shift in 1937 from inflationary to deflationary (Hamilton 1992 and Cecchetti 1992).

The Recovery of 1938

The end of the 1937-38 depression is also consistent with the hypothesis outlined above. In early 1938 the Administration restored an inflationary policy. The first announcement of considerable importance was made at a February 15th press conference where FDR said that he once again believed, as he had announced in 1933, that prices should be inflated back to their pre-depression levels.[9] Later that spring the Administration took several steps to support an inflationary program, such as lowering reserve requirements back to their 1936 levels, increasing deficit spending, and desterilizing government gold stocks. The upper right panel of Exhibit 2 shows the rebound in commodity prices after the "reversal of 1938." The period identified with the reversal of 1938 is February-May of that year. The recovery is also evident from the aggregate variables shown in the lower panel of Exhibit 1. The 1938-42 recovery was even stronger than the 1933-37 one, and by most measures the economy had fully recovered by 1942.

Actions and Alternative Interpretations

The evidence above does not establish that communication policy was all that mattered during the 1930s. In 1933, for example, FDR also backed up the objective of raising prices with several actions. For example, he declared that "government credit" would be used "when, as and if it may be necessary" to increase prices. Government credit was used for variety of purposes, such as gold purchases, deficit-financed government spending, and the restructuring of the banking system.[10] One can interpret many of these actions as having had their effect mainly through firming up the commitment of the Administration to raise prices (that is, making the communications "credible"), and in the case of 1937, as having worked in the opposite direction.

Other interpretations are possible, however. Some have suggested, for example, that the fiscal policy tightening in 1937 explains the downturn that year, independently of expectations.[11] Alternatively, Hanes (2005) argues that activities, such as the Treasury's gold purchases, that increased banks' nonborrowed reserves caused the banks to rebalance their portfolios and purchase more bonds, which pushed down longer-term interest rates, independently of expectations. In this case, the Treasury's decision at the end of 1936 to sterilize gold inflows, so that they did not add to nonborrowed reserves,

[9] Three days later FDR called another press conference. On that occasion he read a statement which he had instructed Federal Reserve Chairman Mariner Eccles, Treasury Secretary Henry Morgenthau, and several other senior government officials to prepare. Flanked by senior administration officials FDR announced, "it is clear that in the present situation a moderate rise in the general price level is desirable."

[10] The deficit in the fiscal year of 1934 was one of the largest in US history outside of wartime (Eggertsson (2008)).

[11] This argument goes back to Smithies (1946). Brown (1956) notes that fiscal policy was decidedly less expansive in 1937, but argues that the variations were not large enough to explain the downturn.

resulted in an inadvertent tightening of monetary policy which is also an alternative explanation for the contraction in 1937.[12]

Lessons

The 1930s underline the importance of pairing clearly stated communication regarding policy with concrete policy actions designed to add credibility and reinforce those communications. FDR's promise to increase "government credit," for example, was fully consistent with his announced goal of reflation and likely supported expectations about a rise in the price level.

Wartime and Pre-Treasury-Accord Period (1942-51)

Between early 1942 and 1951, the Federal Reserve and the Treasury agreed that interest rates should be kept low.[13] This episode has sometimes been cited as evidence that the Federal Reserve can not only target short rates, but also long-term interest rates.[14] In this period the Federal Reserve capped yields on long-term Treasury bonds at 2½ percent and, until 1947, pegged the yield on short-term Treasury bills at ⅜ percent (Exhibit 3). After 1947, the peg on short-term rates was allowed to change, but only with the approval of the Treasury.

The period 1942-47 highlights the ability of the Federal Reserve to influence long-term interest rates through a commitment to holding short-term rates low. Because the cap on long-term yields was not binding during most of the period, it played a minor role. During a short period in 1947-48, the cap on long rates became binding and the Federal Reserve managed to maintain it through large purchases of these securities, even with the peg on short-term rates. This was achieved without decoupling long-term Treasury rates from long-term rates faced by private parties.[15]

The Establishment of Interest Rate Caps

The decision to target both short and long-term rates was reportedly the result of a compromise between the Federal Reserve and Treasury. The initial peg of ⅜ on the

[12] Friedman and Schwartz (1963) argue that the increase in reserve requirements constituted a tightening of monetary policy, but more recent scholars have been skeptical of this argument, see e.g. Telser (2001). Eggertsson and Pugsley (2006) argue that the changes in reserve requirements were contractionary mainly because of their effect on expectations about a future tightening.

[13] This low interest rate policy was designed to facilitate the financing of large government outlays needed to pay for the war effort. Between January 1942 and December 1945, outstanding government debt rose from $60 billion to $278 billion, after which it held fairly steady.

[14] See for example Bernanke (2002).

[15] The brief period may have been the motivation for "operation twist' in the 1960s which aimed at holding down long rates while raising short rates. "Operation twist," however, was widely viewed as a failure at the time.

three-month Treasury bill was seen as generally innocuous as the rate at the time of the agreement was around ¼ percent, and at that point, the peg was not perceived as an indefinite commitment.[16] As yields on short-term rates rose, the Federal Reserve acted to enforce the peg by purchasing large quantities of Treasury bills. By the end of 1944, the Federal Reserve held around 75 percent of outstanding Treasury bills. The credible peg on short-term rates allowed the Federal Reserve to maintain the caps on longer-term Treasury yields without substantial purchases of long-term securities. The cap on long-term rates did not bind until the peg on short-term rates was lifted in 1947.

The policy of capping the yield curve at longer maturities was not publicly announced, at least at first, but became apparent over the course of 1942 and 1943. It also became clear that longer-term rates were higher than consistent with expectations and that the government would be successful in holding future short-term rates at relatively low levels. Once market participants gradually became convinced that the Federal Reserve would hold the peg on three-month bills for a substantial period of time, there was a gradual decline in the yield on longer-maturity Treasury securities. The period from 1942-47 thus provides little evidence that the Fed can target long rates independently of the expectations of future short rates.

While the Federal Reserve was able to effectively peg the short-term Treasury bill rate, it was less able to control other short-term rates. Inflation picked up in late 1946 as wage and price controls were lifted. At this time, some short-term rates, such as four to six-month commercial paper rates, rose notably and became decoupled from Treasury rates, likely suggesting that investors placed some odds on resurgent inflation leading the Federal Reserve to abandon the bill-rate peg.

Experience with Pegging Long Rates in 1947-48

As a result of ongoing inflationary pressures, the Federal Reserve pushed for a new agreement with the Treasury and in July 1947 raised the short-term bill peg, which was moved up to a bit over 1 percent by the end of the year. From this point on, the FOMC decided on the level of the bill peg at FOMC meetings, subject to approval from the Treasury.

Once the Federal Reserve allowed short-term rates to rise in 1947, the 2½ percent yield on the long-term bond was less attractive and long-term rates also started to rise. In addition, once the Federal Reserve changed the short-term bill peg, market participants may also have become less certain about the credibility of the cap on long-term rates. Federal Reserve officials had to publicly reaffirm their commitment to the continuation of the 2½ percent cap. At this point the cap on long-term bonds became binding and the Federal Reserve needed to make large purchases of these bonds to enforce the cap. Even

[16] Friedman and Schwarz (1963) argue that under the interest rate peg, the Treasury gained significant control over monetary policy. By issuing more bills, which the Federal Reserve would need to purchase to enforce the cap, the Treasury could drive up excess reserves in the banking system. Woodford (2001) also provides a detailed treatment of this idea.

though purchases amounted to only a modest share of the market, the Federal Reserve was able to successfully defend the cap.[17] During the period from July 1947 to late 1948 the Federal Reserve was able to defend both the cap on long rates and its peg for the short rate without buying up the entire market for government debt. The recession that began in November 1948, however, reduced inflationary pressures. Consequently, bond yields began to fall in the summer of 1948, which allowed the Federal Reserve to cease purchasing bonds to enforce the yield ceiling on long-term rates.

During the period that the Federal Reserve was defending the cap on long rates, the spread between yields on long-term corporate and Treasury securities widened a bit. However, the spread did not narrow appreciably once the caps on long-term Treasuries ceased to bind in 1949, which suggests that the caps were not significantly distorting the relationship between the two rates. Thus, the Federal Reserve appears to have successfully defended the cap on long-term rates for government bonds with purchases of securities, without causing the long rates faced by private parties to decouple from the term structure implied by Treasuries.[18]

The arrangement to cap long-term rates unraveled with the onset of the Korean War in mid-1950 and the resulting pick-up in inflation. In March 1951, the Federal Reserve and the Treasury negotiated the Accord that ended the ceiling on long-term interest rates. Yields on long-term Treasuries promptly rose above the previous 2½ percent cap.

Lessons

The period 1942-47 provides some evidence that the Federal Reserve can lower long-term rates by committing to keeping short-term rates low. The brief period from 1947 to 1948 may also provide additional evidence that long rates can be reduced by direct interventions in the market for long-term Treasuries.

Forward Guidance in FOMC Communications (2003 - 2005)

In June 2003, the FOMC cut the target for the federal funds rate by 25 basis points to 1 percent. This decision was the final reduction in a sequence of rate cuts that began in early 2001 and occurred against a backdrop of decreasing inflation expectations and a sagging economy.[19] At the time, policymakers expressed concern about the possibility of an "unwelcome substantial fall in inflation."[20]

[17] Peak holdings of long bonds reached $11 billion in December 1948, which accounted for just over 10 percent of total outstandings.
[18] Eggertsson and Woodford (2003) predict that such decoupling may take place in the case of these interventions.
[19] Some market participants had even anticipated a larger rate cut, placing a probability of around 70 percent on a funds target below 1 percent. While the low target rate and the configuration of market expectations has some resemblance to the current situation, a key difference is that there were no major

In 2003, the FOMC began adding forward guidance about continued policy accommodation to its statements. This guidance was conditional on a weak outlook for inflation. Overall, this was successful in influencing market expectations and stimulating the economy without further cuts in policy rates. However, there are also concerns as to whether markets paid proper attention to the conditionality of the forward guidance. As a result, if policymakers choose to provide such guidance again, they may wish to increase their emphasis on such conditions in their public statements, and to provide guidance on what factors might lead to a change in policy.

The Conduct of Forward Guidance

After cutting the target rate to 1 percent in June 2003, the FOMC kept the funds rate unchanged for one year. Keeping the funds rate low and unchanged for an entire year could be interpreted as policy having been inactive and constrained by a lower bound in 2003-04.[21] But in fact, the FOMC sought to add further stimulus to the economy by adding forward guidance about continued future policy accommodation to FOMC statements. Statements had been released since 1994, but this was the first time they included guidance about the likely evolution of future short-term nominal interest rates.[22]

In August 2003, the first statement after the rate cut highlighted that "the risk of inflation being undesirably low is likely to be the predominant concern for the future. In these circumstances, the Committee believes that policy accommodation can be maintained for a *considerable period*."[23] The subsequently released minutes of the August meeting said that "While the Committee could not commit itself to a particular policy course over time, many of the members referred to the likelihood that the Committee would want to keep policy accommodative for a longer period than had been the practice in past periods of accelerating economic activity." While the description about the outlook for inflation varied, subsequent FOMC statements maintained the wording of the "considerable period" until the end of 2003.

As the risk of deflation receded, the statement said in January 2004, "With inflation low and resource use slack, the Committee believes that it can be *patient in removing its policy accommodation*." Keeping the funds rate unchanged, that language

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disruptions in financial markets. At the time, money market spreads were low, and Libor was close to the fed funds rate (upper panel of Exhibit 4).

[20] Fed officials had started commenting on this already in late 2002, generally describing the issue as "unwelcome" but also "minor." A comprehensive review of Fed statements during this period is given by Bernanke, Reinhart and Sack (2004, Table 8, p. 61).

[21] Accounting for the side effects on money market funds and the Treasury market, policymakers may not be willing to push the fed funds target all the way to zero. As a result, the lower bound for the policy rate might be a small positive number, like 25 basis points, instead of the theoretical limit at zero.

[22] A recent discussion of the FOMC's forward guidance can also be found in Moessner and Nelson (2008).

[23] In his July 15 testimony to the Congress, Chairman Greenspan already highlighted that the FOMC was prepared to maintain a "highly accommodative policy stance for as long as it takes." In reaction to his testimony, interest rates rose, however, likely because the testimony also referred to "special policy actions [being] unlikely to arise."

was reiterated until May 2004 when the FOMC introduced the wording of "… with inflation low and resource use slack, the Committee believes that policy accommodation can be removed at *a pace that is likely to be measured*. "

Beginning in June 2004, the FOMC raised the funds rate by 25 basis points at each meeting until the rate reached 5.25 percent in June 2006. Until the end of 2005, this was accompanied by the use of the "measured pace" language in FOMC statements.[24] Between June 2004 and November 2005, the Committee emphasized the conditional nature of this language by adding "Nonetheless, the Committee will respond to changes in economic prospects as needed to fulfill its obligation to maintain price stability."

The Effects on Market Expectations

The introduction of forward guidance appears to have been successful in holding down expectations regarding monetary policy some months out. As shown in the middle panel of Exhibit 4, near-dated funds rate expectations became firmly anchored at around 1 percent and far-dated expectations shifted in line with changes in the FOMC's forward guidance. Usage of the different phrases is indicated in Exhibit 4 by the letters "C" (considerable period), "P" (patient) and "M" (measured pace), respectively.

Measures of policy surprises shown in the lower panel of Exhibit 4 confirm this. They are taken from Gurkaynak, Sack, and Swanson (2005), who measured surprises by changes in fed funds futures around FOMC announcements. Further, they computed surprises for a "path factor" summarizing updates in market expectations about future policy targets. The exhibit's lower panel shows that surprises for the current rate were remarkably small in the period when the federal funds rate was at 1 percent, while path surprises remained sizable during this episode. This result suggests that the forward-looking language was successful in lowering the expected future path, even when the short-term interest rate remained unchanged. Also, inflation expectations moved up somewhat in the summer of 2003 (Exhibit 4, upper panel).[25]

The Conditionality of Forward Guidance

Research suggests that a conditional commitment of early policy accommodation can help alleviate deflationary risks when aggregate demand is weak and interest rates are low.[26] Woodford's (2005) Jackson Hole speech prominently referred to the FOMC's

[24] In December 2005, the wording changed from the measured removal of policy accommodation to "measured policy firming" being likely. In January 2006, this was adapted to "further policy firming may be needed."

[25] The exhibit shows movements in one-year ahead inflation expectations from the Michigan Survey. Inflation expectations derived from TIPS for 5 and 10 year horizons showed similar upward movements, whereas expectations from the Survey of Professional Forecasters moved up less pronouncedly.

[26] See for example Reifschneider and Williams (2000), Clouse, Henderson, Orphanides, Small, and Tinsley (2003), Eggertsson and Woodford (2003), Eggertsson (2006), Bernanke and Reinhart (2004), Bernanke, Reinhart and Sack (2004), Wolman (2005) as well as Adam and Billi (2006, 2007).

communication policy in 2003-04 as being a successful example of optimal policy subject to an interest rate bound. The benefit of commitment is that the expectation of persistently low future interest rates should help to depress long-term interest rates and lift aggregate demand.

Conditionality is important because future shocks can cause inflation to rise again, necessitating a tightening in monetary policy.[27] One risk of conditional statements is that they will not be properly interpreted by market participants, jeopardizing policymakers' flexibility in the face of new developments.

In recent years, some observers have suggested that monetary policy was too loose during 2004-05, perhaps because the FOMC was constrained by its previous commitments when it would otherwise have preferred to respond more aggressively to shifts in the outlook for economic activity and inflation.[28]

Clearly, the FOMC's language was geared at shaping *conditional* expectations about future policies. By mid-2005 the balance of risks had shifted away from the earlier deflationary concerns and this change was reflected in FOMC statements. They mentioned clear concerns about elevated inflation pressures, particularly due to energy prices. However, recognition of those risks did not significantly change the Committee's central outlook for well-contained core inflation. In fact, the Committee maintained its policy throughout 2006 while continuing to emphasize its willingness to tighten earlier if doing so were justified by economic conditions.

There is a deeper concern that markets may have viewed the FOMC's forward guidance as stating *unconditional* policy intentions, and that this could have placed undue constraints on policymakers. Evidence suggest that markets paid more attention to the conditionality 2003-04 than during the "measured pace" tightening.

Bernanke, Reinhart, and Sack (2004) analyzed market reactions to releases of payroll employment data, which are important indicators of changes in economic conditions often referred to in FOMC statements. They report an increase in the sensitivity of market expectations to these releases after the introduction of forward-looking statement language. For 2003-04, this finding suggests that market participants likely understood that the language in the FOMC statement was conditional and that the Committee might react if economic conditions shifted suddenly.

Beechey (2006) extended this evidence by looking at a broader set of economic news and by including also the "measured pace" period. While confirming the results of

[27] Such shocks could include a faster than expected recovery in real activity or an unanticipated rise in commodity prices.

[28] For example, Taylor (2007) contrasted the low funds rate and the measured tightening with a much higher path of policy rates, mostly above 2 percent, prescribed by the kind of policy rule he had devised in earlier work. However, such calculations are not without controversy; for example, the recovery in employment was weak, and interest rate rules like the Taylor rule that use labor market measures rather than output gaps suggest, at least in some estimates, that monetary policy was not unusually loose, see e.g., Edge, Kiley, and Laforte (2007) and Kohn (2007).

Bernanke, Reinhart, and Sack for 2003-04, she found a marked decrease in the sensitivity of market reactions to economic news starting with the onset of the "measured pace" tightening cycle (Exhibit 5).[29]

A similar picture emerges when looking at the implied volatility of interest rates. Implied volatilities reflect market perceptions about the likely variation in future interest rates in response to *any shock* hitting the economy – not only those to which the conditions of forward guidance apply. Compared to the previous decade, uncertainty was unusually low during the "measured pace" tightening. [30] Initially, it was also low in 2003 while the rate stayed at 1 percent for a "considerable period," but it spiked in 2004 as conditions for continuing this accommodation clearly changed and the FOMC had changed its guidance to "patient removal" of the low funds rate target (see Exhibit 5).

This suggests two interpretations: Either the market placed a smaller probability on the kind of inflationary shocks that would lead the FOMC to deviate from its "measured pace," than in earlier times, or the market did not appropriately consider the conditionality of forward guidance. It appears hard to argue why the former interpretation should be plausible. In sum, this evidence gives ground for concern that the market's understanding of the conditionality may have been insufficient during the "measured pace" period.

Lessons

Similarly to the previous episodes, the introduction of forward guidance showed that expectations can be used to stimulate the economy even when interest rates are already low.

A distinctive lesson to be drawn from this period seems to be the need for markets to properly understand the conditional nature of policy commitments. If anything, evidence suggests that markets initially understood the importance of a weak outlook for the FOMC to continue with its accommodative policy. But later, markets seem to have paid less and less attention to news of changes in these conditions. One reason for this could have been, that – due to an absence of inflationary shocks – actual policy rates looked as if they were following the forward guidance *unconditionally*. In the light of these dynamics, it appears important for policymakers to keep emphasizing the conditional nature of their intentions.

[29] The exhibit shows an update of Beechey's sensitivity index provided by MA's Monetary and Financial Market's Analysis section. The index is calculated as a latent factor in a regression model with time-varying coefficients relating daily changes in yields to the surprise component of fourteen major data releases. An index value of one indicates that market reactions are close to the sample average.

[30] Hovering at around 100 basis points, the six month volatility was around 50 basis points lower than during the previous five years (1998 – 2003) and about 100 basis points lower than during the bond market upheavals of 1994.

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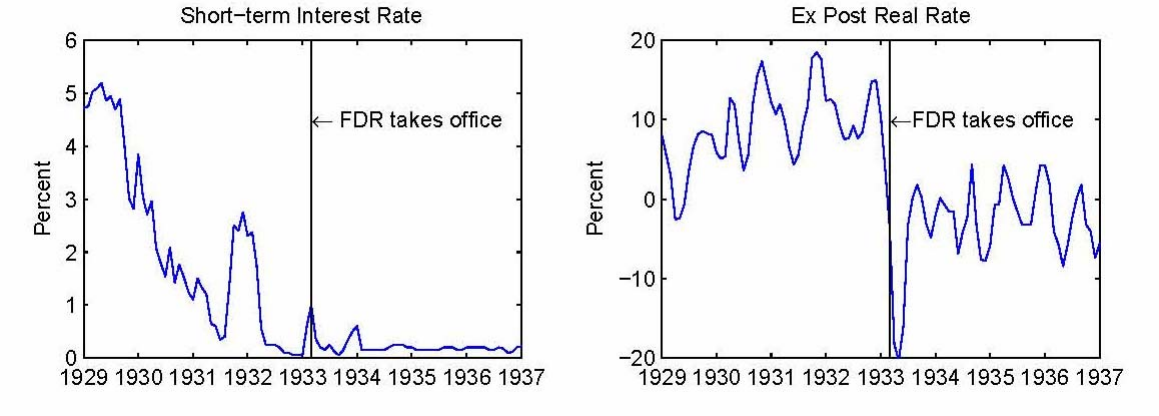
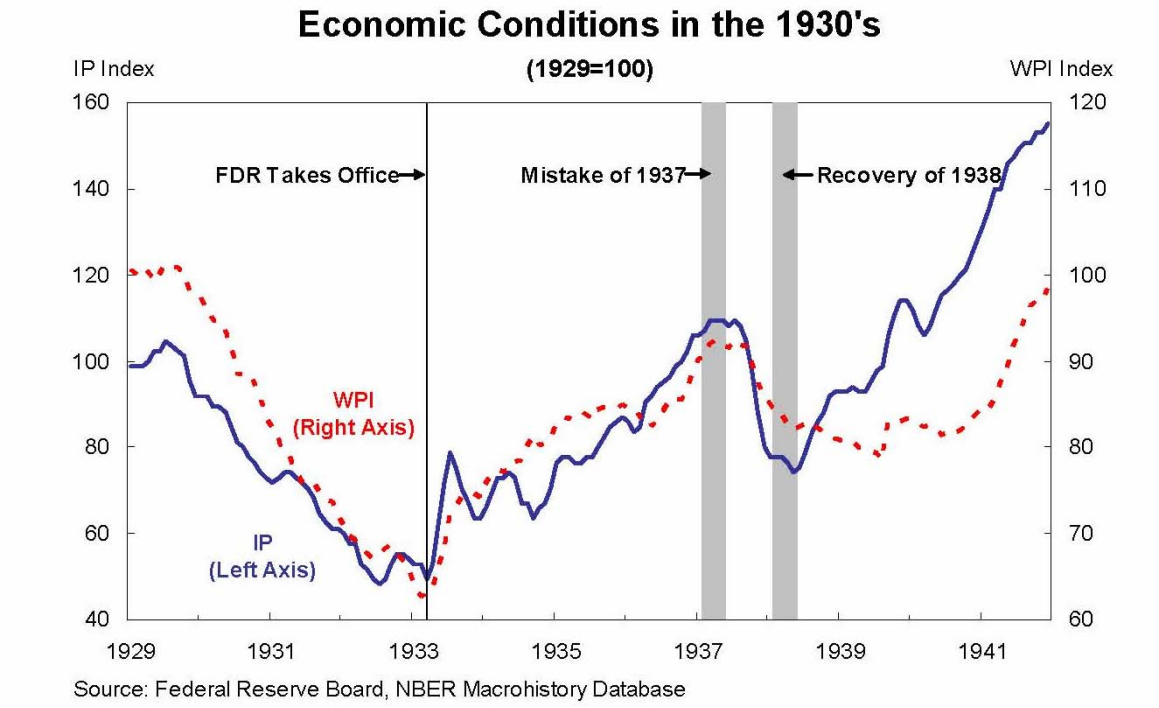
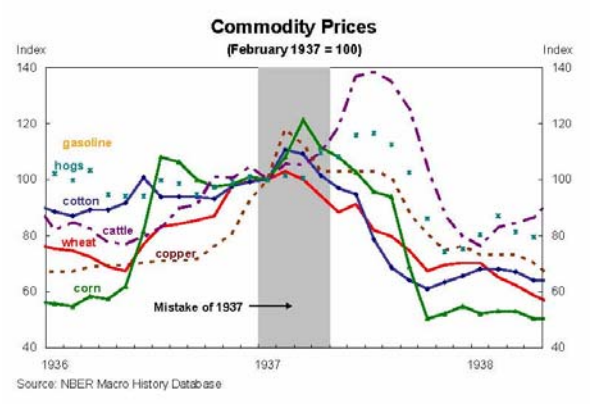
Exhibit 1
Interest rates and economic conditions in the 1930s

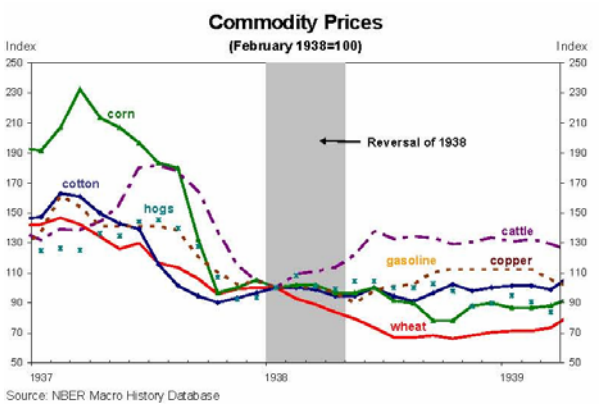


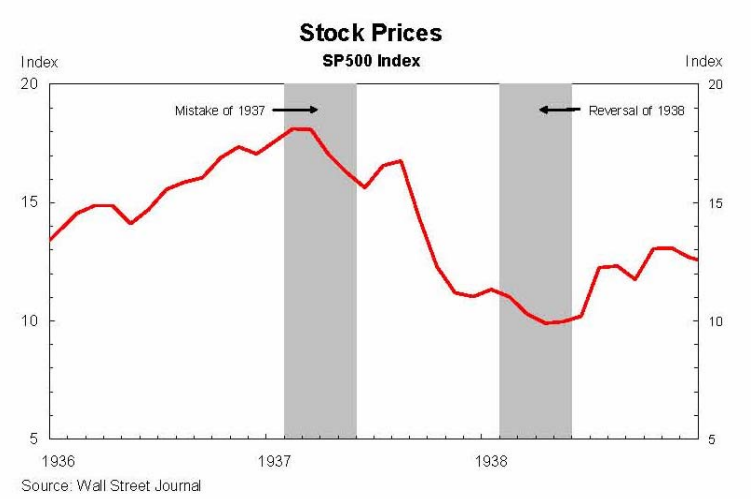


Note. WPI is the whole-sale price index and IP is industrial production

Exhibit 2
Commodity Prices, equity prices, and long-term interest rates
(1936-1938)







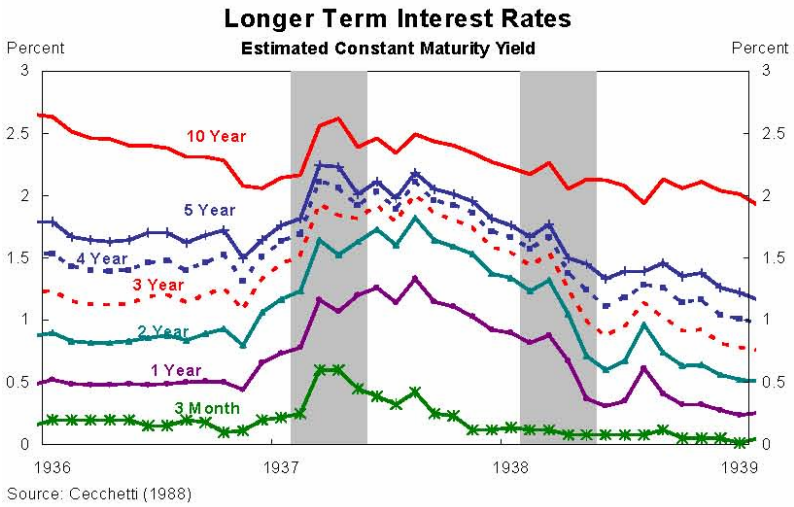
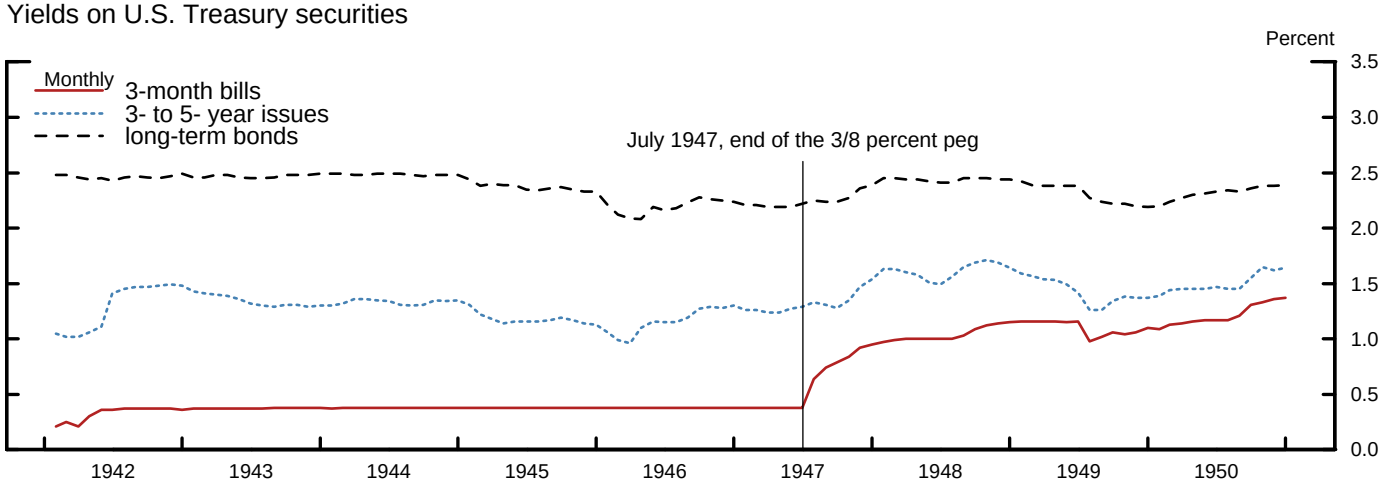
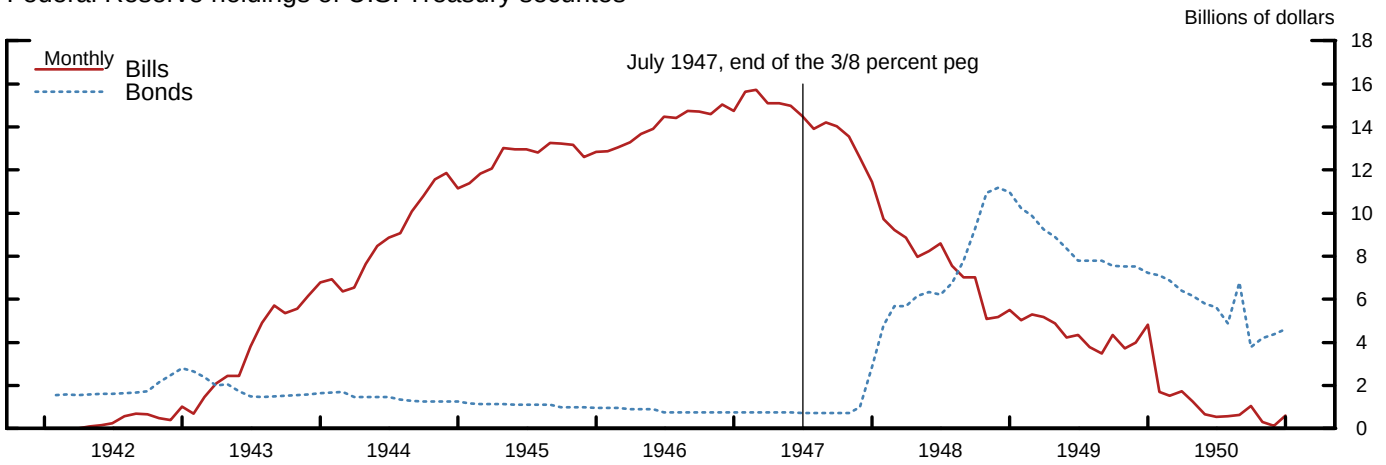


Exhibit 3
Selected Interest Rates and Federal Reserve Treasury Holdings, 1942-1950

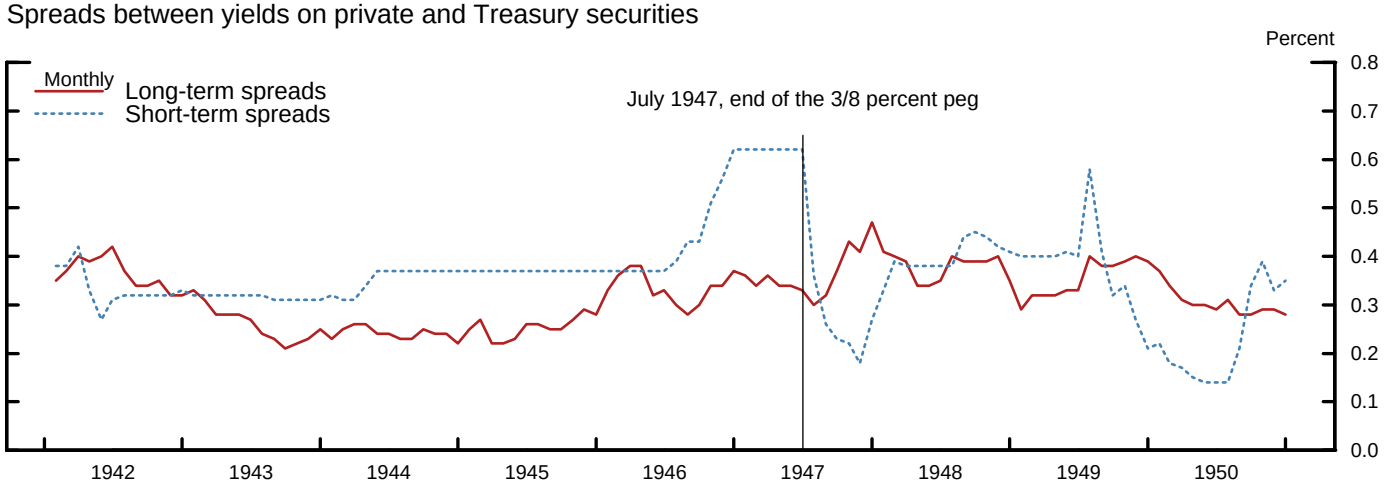
Yields on U.S. Treasury securities



Federal Reserve holdings of U.S. Treasury securites



Spreads between yields on private and Treasury securities

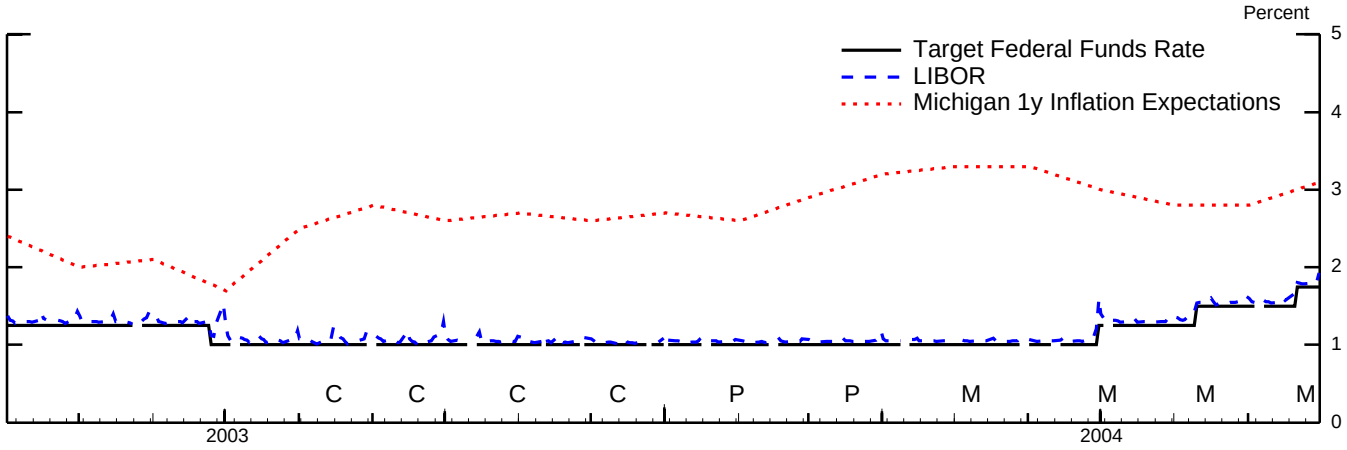


Note. The spread on short-term yields is between yields on four- to six- month prime commercial and the three-month Treasury bill. The spread on long-term yields is between yields on AAA-rated corporate bonds and long-term Treasury bonds

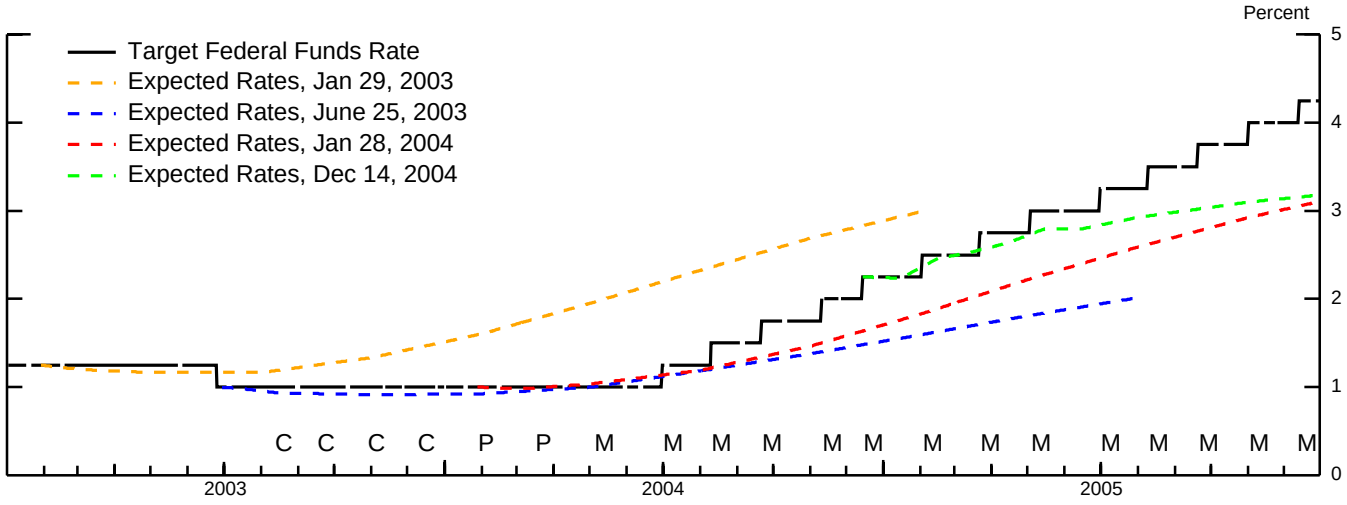
Source. Banking and Monetary Statistics 1941-1970

EXHIBIT 4

Expected Inflation and Policy Rates

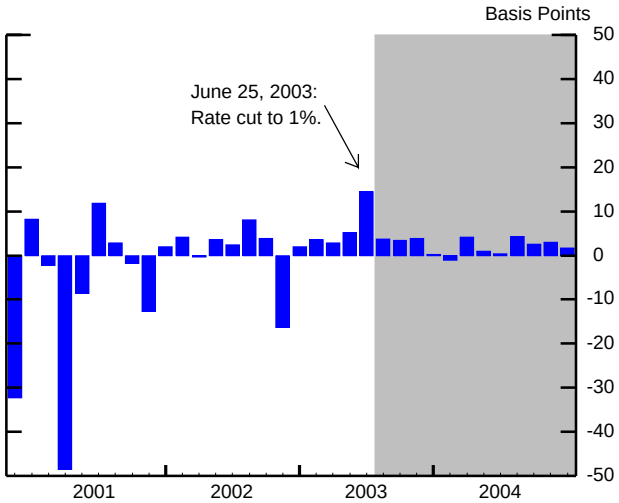


Evolution of Policy Expectations in 2003

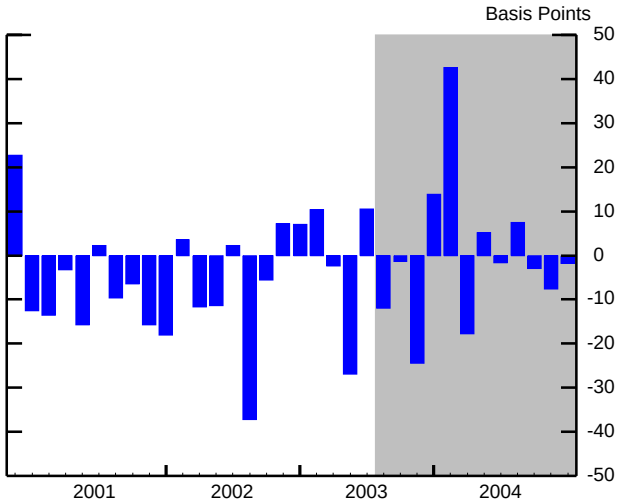


Policy Surprises in...*

Current Month Federal Funds Futures



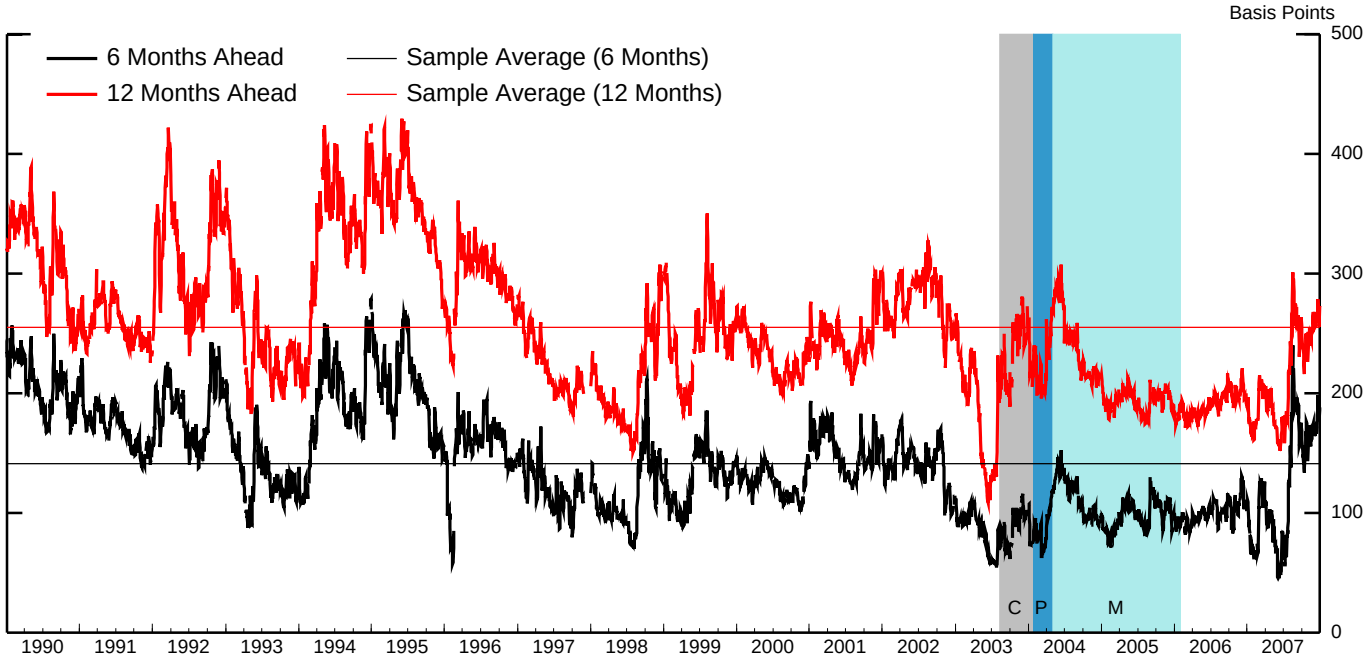
Path of Future Federal Funds Rates



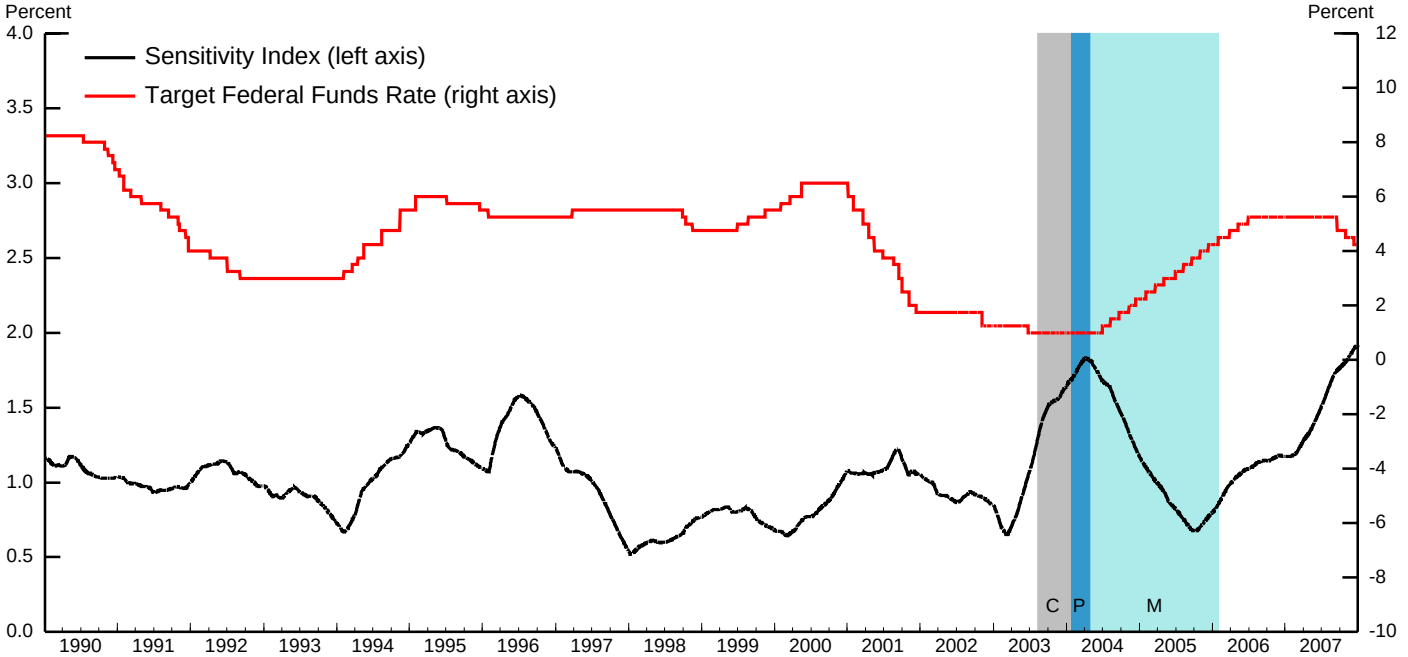
*Source: Gürkaynak, Sack, and Swanson (2005).

EXHIBIT 5

Eurodollar Implied Volatility of Federal Funds Rate



Sensitivity to Major Macroeconomic Data Releases



Note: "C" denotes the period during which "considerable period" appeared in FOMC statements; "P" denotes the period during which "patience" appeared; "M" denotes the period during which "measured pace" appeared.
Note on the second graph: Sensitivity index of Beechey (2006), updated by MA's Monetary and Financial Market's Analysis section. The index is calculated as a latent factor in a regression model with time-varying coefficients relating daily changes in yields to the surprise component of fourteen data releases. An index value of one indicates that market reactions are close to the sample average.