ECONOMIC RESEARCH
FEDERAL RESERVE BANK OF ST. LOUIS

WORKING PAPER SERIES

Lifting the Veil of Secrecy From Monetary Policy: Evidence From the Fed's Early Discount Rate Policy

Federal Reserve Bank of St. Louis, Research Division, P.O. Box 442, St. Louis, MO 63166

Lifting The Veil of Secrecy From Monetary Policy: Evidence From The Fed's Early Discount Rate Policy

February 1998

Abstract

Traditionally, monetary policy has been conducted under a veil of secrecy. In its landmark Freedom of Information Act case, the Federal Reserve argued that it needed to delay the disclosure of its policy decisions, claiming that immediate disclosure would cause the market to react in a way that was inconsistent with the Fed's intentions. Based on this argument and others, the Fed was permitted to delay the release of FOMC policy decisions. Most economist, however, believe that market forces would work to keep equilibrium outcomes more in line with policy maker's intentions if policy makers would announce their intentions and establish a reputation for behaving in a manner consistent with them. This paper tests the hypothesis that the market responds more closely to the Fed's intentions when the Fed makes its intentions known by investigating the market's reaction to a change in discount rate policy in the early 1960s. We find that the market responded in a manner inconsistent with the Fed's intentions when they were unknown, and responded in a manner consistent with them when the Fed made its intentions known.

Daniel L. Thornton
Vice President
Federal Reserve Bank of St. Louis
411 Locust Street
St. Louis, MO 63102
daniel.l.thornton@stls.frb.org

Historically, monetary policy has been conducted under a veil of secrecy. The economic rationale for secrecy is weak, however. Most economists believe that market forces will reinforce the policymakers' objective if they announce their intentions and establish a reputation for behaving in a manner consistent with achieving them. Economic theory's success in altering policymakers' view of how best to conduct monetary policy is evidenced by the number of central banks that have established explicit inflation targets.[1]

While reluctant to go this far, the Fed has lifted the veil of secrecy from monetary policy in a variety of ways, such as, making formal and public the text of the Federal Open Market Committee's (FOMC's) policy directive and becoming more explicit about its short-run operating target, the federal funds rate.[2] At its February 1994 meeting, the FOMC began the practice of announcing its decision immediately upon making them.[3] This procedural change is especially dramatic because it marks a reversal of the Fed's position in its landmark Freedom of Information Act case, Merrill vs. FOMC, [Goodfriend (1986)]. In Merrill, the Fed vigorously defended the need to delay the release of its policy directive.

The Merrill case was ultimately decided when the U.S. Supreme Court established the criterion that the FOMC must immediately disclose information unless immediate disclosure

---

[1]Countries with explicit inflation targets are: Australia, Canada, Finland, Israel, New Zealand, Spain, Sweden and the United Kingdom. In addition, France, Germany, Italy and Switzerland have medium-term inflation objectives.

[2]The latest of such moves occurred at the August 1997 meeting of the FOMC, when the FOMC changed the wording of its policy directive to include a specific federal funds rate target.

[3]The FOMC remains reluctant to release verbatim minutes in a timely fashion or to establish explicit quantitative objects as a number of other central banks have done.

would "significantly harm the Government's monetary functions or commercial interests." The

Supreme Court's ruling forced the FOMC to explain its economic rationale for secrecy. The Fed

defended its practice of delayed disclosure, arguing that immediate disclosure would cause

financial markets to react in a way that is contrary to the Fed's intentions. Goodfriend (1986) has

pointed out that rational expectations implies that were the Fed to announce them, the market's

response would be more closely tied to the Fed's intentions.[4] Although widely accepted,

empirical evidence of this proposition is scant because central banks have been reluctant to make

their intentions known.

The purpose of this paper is to test the hypothesis that *the market's response is more*

closely tied to the Fed's intentions when the Fed makes its intentions known by investigating the

market's reaction to the Federal Reserve's change in discount rate policy in the early 1960s. In

the early 1960s, the Fed began the practice of issuing a *statement of intent* when it announced a

change in the discount rate. Previously, the Fed simply announced a discount rate change

without stating the reason for the action. Because the Fed subsequently indicated what its

intentions were, it is possible to test whether the market's reaction was inconsistent with the

Fed's intentions before the Fed made them known.

The paper begins by briefly reviewing the developments that led to the marked change in

discount rate policy. In the second section, the methodology for testing the hypothesis is

specified. In the third section, the tests are performed and the results are analyzed. The final

---

[4]In advocating greater openness in the conduct of monetary policy, Blinder (1998, p. 70) has even suggested that "greater openness might actually improve the efficiency of monetary policy as a macroeconomic stabilizer."

section presents the conclusions.

I. The Emergence of a New Discount Rate Policy

Starting in 1933, throughout World War II and during most of the immediate post-War

period, discounting was virtually nonexistent. In the sixteen years from 1933 to 1949, discounts

and advances were below their levels of the 1920s. Discount rate policy was likewise dormant.

The discount rate was changed only once between February 1934 and December 1947.

With the Accord between the Federal Reserve and the Treasury on March 3, 1951,

discounting resumed an important role in monetary policy. Indeed, the Fed elevated discounting

to the point of suggesting that open market operations would supplement it.[5] Initially, the Fed

relied on what Roosa (1952, 1959) and others described as banks' *reluctance to borrow* to

regulate the level of borrowing; however, borrowing increased significantly under nonprice

rationing.[6] By December 1952, discount window borrowing had increased to $1.6 billion —

about 7.5 percent of total reserves. Concerned about the level of borrowing and the frequency of

borrowing by some institutions, the Fed undertook a comprehensive re-examination of

discounting in 1953. Discount rate policy reemerged.[7] The discount rate, which was changed

---

[5]In its 1952 Annual Report, the Board of Governors stated that "...the System contemplated that principal reliance for additional Federal Reserve credit, to support increased bank loans and investments, would be placed on member bank borrowings from Federal Reserve Banks and that open market operations would be limited as much as possible to supplying such additional demands as might be necessary to avoid undue restraint." Board of Governors of the Federal Reserve (1952), p. 91.

[6]This experience was consistent with Simmons' (1956) criticism of the Fed's discount rate policy.

[7]See Ahearn (1963) for a discussion of the revived use of the discount rate during this period.

only once between March 1951 and December 1953, was changed ten times between February

1954 and December 1957.

Prior to the early 1960s, the Fed simply announced discount rate changes. No reason for

the action was given. Although the Fed did not state its intent, it believed that the market looked

at changes in the discount rate as a signal of policy. In the 1954 edition of *The Federal Reserve*

System: Purposes and Functions, the Fed notes:

> "To the business community, the discount rate in effect at the Federal Reserve
> Banks, and particularly a change in this rate, serves as an objective index of
> Federal Reserve policy." (p. 36)

Because the Fed's intentions were not announced, the market was left to determine

whether a particular discount rate change signaled a change in policy. Early critics of the Fed's

discount rate policy [Friedman (1960), Smith (1956, 1958), Young (1964)] argued that by failing

to make its intentions known, it was likely as not that the market would misconstrue the Fed's

intentions. By 1961, the Fed acknowledged that discount rate changes were difficult to interpret,

noting in the 1961 edition of *Purposes and Functions*:

> "There are no simple rules for interpreting changes in discount rates, however. In
> some circumstances a change in discount rates may express a shift in direction of
> Federal Reserve policy toward restraint or ease. In other instances it may reflect a
> further step in the same direction. In still other cases,...a change in the level of
> rates may represent merely a technical adjustment of discount rates to market
> rates...." (pp. 46-7)

In acknowledging discount rate changes are difficult interpret, the Fed also acknowledged that

technical discount rate changes had no policy significance. Apparently, the Fed neither wanted

nor expected the market to respond to such discount rate changes.

It is not clear whether the Fed acquiesced to its critics,[8] but beginning with the discount rate change made on July 16, 1963, the Fed began the practice of issuing a statement of intent, stating the reason for the discount rate change.[9] Since then, all Fed Chairmen have followed this practice. Thornton (1982, 1986, 1994, 1998), Smirlock and Yawitz (1985), Cook and Hahn (1988) and Batten and Thornton (1984, 1985) have shown that the Fed's *statement of intent* is crucial for the markets' reaction to discount rate announcements.[10] Specifically, financial and foreign exchange markets do not respond to discount rate changes that the Fed announces are made solely to realign the discount rate with market rates, i.e., *technical* changes. Financial and foreign exchange markets respond only to discount rate changes that the Fed announces are made for other, policy-related reasons, i.e., *nontechnical* changes.

Hence, when informed that particular actions have no policy significance, the market behaves in a manner consistent with the Fed's intentions and does not respond.[11] When informed

---

[8]The 1954 edition of *Purposes and Functions* made no mention of the difficulties associated with interpreting discount rate changes. Therefore, it is possible that both the wording of the 1961 edition of *Purposes and Functions,* to explicitly recognize this difficultly, and the change in discount rate policy itself might be attributable, at least in part, to criticisms by Friedman, Smith, Young and others.

[9] The Board of Governors no longer has a copy of the press release for the discount rate change made on July 16, 1963, but according to the announcement published in the *Federal Reserve Bulletin* (July 1963), page 946, this change was made to "aid the United States' efforts to combat its international balance of payments problem."

[10]For other evidence that the financial, stock and foreign exchange markets respond significantly to announcements of discount rate changes see Waud (1970), Froyen (1975), Mudd (1979), Brown (1981), Roley and Troll (1984), Hakkio and Pearce (1992) Dueker (1992) and Wagster (1993).

[11]An alternative explanation for the difference in reaction to technical and nontechnical discount rate changes is that the former are anticipated, while the latter are not. However,

that particular actions have policy significance, however, the market responds. The important

question that we now turn to is whether the market responds inappropriately when the Fed did

not state its intentions.

II. Testing For The Distorting Effects of Secrecy

Just prior to changing its discount rate policy, the Fed acknowledged that "Most

commonly...changes in discount rates are of a routine nature, designed merely to keep discount

rates in line with market rates."[12] This admission is critical because previous research suggests

that had the Fed announced which of these discount rate changes were technical, the market

would not have responded to them. Hence, the Fed's acknowledgment that most discount rate

changes made prior to July 1963 were technical provides the basis to test whether the market

responded in a manner inconsistent with the Fed's intentions when the Fed did not make its

intentions known.

To see how this hypothesis can be tested, consider the equation:

$$\Delta i_t = \alpha + \delta \Delta DR_{T,t} + \beta \Delta DR_{NT,t} + \mu \Delta DR_{ID,t} + \varepsilon_t . \qquad (1)$$

Following Thornton (1982), discount rate changes made after the Fed's change in discount rate

policy are classified as *technical*, ΔDR_T, if the Fed announced that the change was made solely to

bring the discount rate into alignment with market rates and *nontechnical*, ΔDR_{NT}, if any other

---

Thornton (1998) presents considerable evidence rejecting this explanation for the differential
response to these types of discount rate changes.

[12]Board of Governors (1963b), p. 123. See Rush, Sellon and Zhu (1994) for a discussion
of some reasons why the Fed might make technical adjustments to the discount rate.

reason for the action was given.[13] Discount rate changes prior to the change in discount rate policy are denoted *information-deficient* changes, ΔDR_{ID}, because the Fed did not provide information about its intentions.

If information deficit discount rate changes are partitioned into those which the Fed intended to be technical changes, ΔDR_{IDT} and those which the Fed intended to have policy significance, ΔDR_{IDNT}, Equation 1 can be rewritten as

$$\Delta i_t = \alpha + \delta\Delta DR_{T,t} + \beta\Delta DR_{NT,t} + \mu\Delta DR_{IDT,t} + \gamma\Delta DR_{IDNT,t} + \varepsilon_t . \quad (2)$$

Previous research has established that δ is close to and not significantly different from zero. This result is robust in that the market never responds to discount rate changes that the Fed has indicated are technical.[14] In contrast, the market responds significantly to nontechnical discount rate changes, i.e., estimates of β are positive and statistically significant. If information-deficient discount rate changes are correctly partitioned into technical and nontechnical changes and if the market correctly perceived the Fed's intentions, estimates of μ should be insignificantly different from zero. However, estimates of γ should be statistically significant and the hypothesis that $\gamma = \beta$ should not be rejected, provided the market's reaction to nontechnical discount rate changes has not been affected by the Fed's change in discount rate policy. If the market sometimes mis-

---

[13]Cook and Hahn (1988) and Thornton (1998) have partitioned ΔDR_{NT} into those that were made in part to realign the discount rate and those that were made solely for policy-related reasons and found that the responses were not significantly different.

[14]See Thornton (1986, 1998). The exception is the technical adjustment on October 12, 1982, which occurred about the time the Fed was de-emphasizing M1. See Thornton (1986) for details.

perceived the Fed's intentions, estimates of both γ and μ will be significantly different from zero. Because the market's reaction is determined solely by the market's perception, this will occur whether or not information-deficient discount rate changes have been correctly partitioned into technical and nontechnical changes.

III. The Data and Test Results

The data are daily and cover the period January 4, 1954 to December 31, 1993.[15] The interest rate used is the 3-month T-bill rate, TB. The Treasury rate is taken near market close, about 4:00 p.m. E.S.T. Changes in the discount rate are percentage-point changes on the day the discount rate change was first announced. Changes in the discount rate are aligned so that the change in the market rate reflects announcements of discount rate changes.[16] There were 101 discount rate changes, 20 information-deficient discount rate changes and 81 discount rate changes after the change in discount rate policy — 30 technical and 51 nontechnical. This sample includes 7 technical and 11 nontechnical discount rate changes not considered in previous work. Hence, the robustness of the previous findings is investigated.

Since the Fed has not indicated which of the discount rate changes prior to the change in discount rate policy were technical, the partitioning of information-deficient discount rate changes into technical and nontechnical is accomplished by a review of the discussions of the

---

[15]The sample ends in 1993 because of anomalies in the market's reaction to discount rate changes that appear to arise from the Fed's new policy of immediate disclosure (Thornton 1996), which began with the February 1994 meeting of the FOMC.

[16]This was done by examining the official press release announcing discount rate changes. All but nineteen of the releases had the precise time of the release. In these nineteen cases, it was assumed that the Fed followed the practice of announcing the discount rate action just after the market closed.

Board of Governors on deciding these discount rate changes. Summaries of these discussions are published in the *Annual Report of the Board of Governors of the Federal Reserve System*. These discussions almost invariably contain some reference to recent economic and financial market developments and to the stance of monetary policy. Consequently, unlike the classification from the statements of intent from the Fed's press releases, there is an element of uncertainty associated with this procedure. Because we are interested in knowing whether the markets respond to discount rate changes that the Fed clearly intended to be technical, information-deficient discount rate changes are classified as technical only when it is absolutely clear that this was the Fed's sole motivation. Using this procedure, exactly half of the 20 information-deficient discount rate changes are classified as technical.[17] The proportion of information-deficient changes classified as technical appears to be at odds with the Fed's characterization that *most* of these changes were technical. It is not surprising that a conservative approach may have understated the number of technical information-deficient changes.

To investigate the hypothesis that the market misconstrued the Fed's intentions prior to 1963, the equation

$$\Delta TB_t = \alpha + \theta(L)\Delta TB_{t-1} + \delta\Delta DR_{T,\,t} + \beta\Delta DR_{NT,\,t} + \mu\Delta DR_{IDT,\,t} + \gamma\Delta DR_{IDNT,\,t} + \varepsilon_t, \quad (3)$$

was estimated. The nth-order polynomial in the lag operator, L, $\theta(L) = \theta_0 + \theta_1 L + \theta_2 L^2 + \ldots +$

---

[17]The changes classified as technical were those approved on 2/4/54, 4/13/54, 8/3/55, 8/25/55 8/8/57, 3/6/58, 10/23/58, 9/10/59, 6/2/60 and 8/11/60. Those classified as nontechnical were approved on 4/13/55, 11/17/55, 4/12/56, 8/23/56, 11/14/57, 1/21/58, 4/17/58, 8/14/58, 3/5/59 and 5/28/59.

$\theta_n L^n$, is included in this and all subsequent regressions, but is not reported.[18]

The results, presented in Table 1, confirm previous findings that the market does not respond to discount rate changes that the Fed announced were solely technical realignments of the discount rate.[19] The estimate of δ is small and not significantly different from zero at the 5 percent significance level. The market response to discount rate changes that the Fed announced are nontechnical, however, is highly significant.

The market also responded significantly to information-deficient discount rate changes that the Fed intended to be mere realignments of the discount rate. While the coefficient is much smaller than that of nontechnical discount rate changes, it is significantly different from zero. The market's response to nontechnical information-deficient discount rate changes is somewhat larger than that of nontechnical discount rate changes; however, the difference is not significant at the 5 percent level.

---

[18]The order of this distributed lag was 10. A distributed lag of the federal funds rate was also included. Equation 3 assumes that the T-bill rate responds to changes in the discount rate but the discount rate does not respond to changes in the T-bill rate. There is no way to completely defend this assumption; however, if the results for nontechnical changes are due to the Fed responding to the market rather than the other way around, this should also be true for technical discount rate changes since, presumably, such changes are more likely made inresponse to a change in market rates. In addition, Thornton (1998) has shown that discount rate changes of both types appear to be very difficult to predict on the basis of past movements in market rates and other variables, so it seems unlikely that the results are due to a systematic response of the Fed to changes in market rates.

[19]The estimates reported in this paper are adjusted for heteroskedasticity using a two-step generalized least squares (GLS) procedure. The equations are initially estimated using ordinary least squares (OLS). The OLS estimated residuals are partitioned into different periods and estimates of the standard errors for each period are made. The data are then transformed with the usual square-root transformation and OLS is reapplied to the transformed data. See Fomby, Hill and Johnson (1984) for additional details.

The fact that the response to information-deficient discount rate changes classified as nontechnical is significantly larger than the response to those classified as technical, suggests that the market correctly distinguished some of the technical discount rate changes. This is not surprising since other policy changes or statements of Fed officials around the time of discount rate changes should have provided the market some information about the Fed's intentions.

Because this classification procedure appears to have understated the number of technical discount rate changes and to investigate the sensitivity of the results to the classification procedure, information-deficient discount rate changes are reclassified. This time discount rate changes are classified as nontechnical only if it is clear that the Fed intended the change to have some policy significance. This approach yielded 15 technical information-deficient discount rate changes.[20]

Estimates of Equation 3 with this partitioning of information-deficient discount rate changes are presented in Table 2. Once again, the market responded significantly to information-deficient discount rate changes that we classified as technical. The magnitude of the average response is only slightly larger than the estimate presented in Table 1. Hence, the market may have had some reservations about the policy significance of the five discount rate changes that were reclassified. The response to nontechnical information-deficit discount rate changes is much larger than that of nontechnical discount rate changes; however, the sample is very small.

Given the uncertainty associated with either of the above classifications of information-deficient changes and the fact that there are only 20 information-deficient discount rate changes,

---

[20]The discount rate changes approved on 4/13/55, 4/12/56, 8/23/56, 4/17/58, and 5/28/59 were reclassified from nontechnical to technical.

it is useful to consider the case where the market was unable to decipher the Fed's intentions.

The assumption that the market is unable to distinguish between technical and nontechnical

information-deficient discount rate changes implies that $\Delta DR_{IDT} = \Delta DR_{IDNT}$. With this

restriction, Equation 3 is rewritten as:

$$\Delta TB_t = \alpha + \theta(L)\Delta TB_{t-1} + \delta\Delta DR_{T,t} + \beta\Delta DR_{NT,t} + \pi\Delta DR_{ID,t} + \varepsilon_t . \qquad (4)$$

If the market was unable to determine which of the information-deficient discount rate changes

were technical and which were nontechnical and if there was no change in the market's response

to discount rate changes following the change in discount rate policy, the average response to

information-deficient changes should equal the average response to nontechnical changes, i.e., π

$= \beta$.

Estimates of Equation 4, presented in Table 3, show that on average the market's reaction

to nontechnical and information-deficient discount rate changes are nearly equal and the null

hypothesis of equality is not rejected at any reasonable significance level.

The robustness of this result and its temporal stability is further investigated by

partitioning ΔDR_{ID} into two groups, A and B, with the first N discount rate changes put in group

A; the remainder put in group B. The equation is estimated and the null hypotheses that the

coefficients for groups A and B are significantly different from zero and equal are tested. Three

discount rate changes are then added to group A and removed from group B and the process is

repeated.[21] This procedure is repeated, each time with more discount rate changes in group A

---

[21]Qualitatively identical results are obtained by adding one discount rate change to the
first sample and deleting it from the second.

and fewer in group B. Finally, information-deficient discount rate changes are partitioned into three groups, A, B, and C.

The results, presented in Table 4, indicate that the average response to information-deficient discount rate changes is remarkably robust, changing little over time. The coefficient estimates are similar in magnitude, always significant and the null hypothesis of equality of the response is never rejected. Hence, not only does the market respond inappropriately when uninformed of the Fed's intentions, but the evidence suggests that the mean response to nontechnical discount rate changes was quite stable and not affected by the change in the Fed's discount rate disclosure policy.[22]

The evidence suggests that when the market is informed that discount rate changes are merely technical adjustments, it does not respond. However, when the Fed makes technical adjustments to the discount rate but does not inform the market, the market appears to interpret the discount rate change to have more significance than the Fed intended. Had the Fed been forthcoming about its intentions when it changed the discount rate prior to July 1963, the market would not have responded to most discount rate changes.

Furthermore, the response to discount rate changes prior to July 1963 is nearly identical to the response to nontechnical discount rate changes after July 1963, suggesting that the

---

[22]The result that the mean response is unaffected by the change in discount rate policy is consistent with the results of the market's reaction to the Fed's policy of immediate disclosure. Thornton (1996) finds that the market responds immediately to changes in the Fed's funds rate target under a policy of immediate disclosure and with a lag of about three days under delayed disclosure. However, the magnitude of the total response is the same under immediate and delayed disclosure.

market's response was not affected by this change in discount rate policy.[23]

IV. Conclusions

In its landmark Freedom of Information Act case, Merrill vs. FOMC, the Fed argued that secrecy was important for the efficacy of monetary policy. Most economists, however, believe that the efficacy of monetary policy is greatest when a central bank clearly states its goal, provided that the market believes that the central bank can and will achieve it. This paper undertakes a limited empirical investigation of the Fed's argument for secrecy by investigating the market's reaction to discount rate changes before and after the Fed began announcing the reason for making discount rate changes in the early 1960s.

Historically the Fed has made two basic types of discount rate changes, those made for policy reasons and those made solely to realign the discount rate with market rates. Prior to July 1963 the Fed merely announced discount rate changes, without informing the market which changes were merely technical adjustments and which had policy significance. Previous research has shown that the market does not react to discount rate changes that the Fed announced were solely technical adjustments.

Discount rate changes made prior to the Fed's change in discount rate policy where classified as "technical" or "nontechnical" based on Federal Reserve records. Based on this classification, the evidence indicates that the market responded significantly to discount rate changes that the Fed had intended to be merely technical realignments of the discount rate. Had

---

[23]This is consistent with the recent finding of Thornton (1996) with respect to the market's reaction to changes in the Fed's federal funds rate target following the FOMC's change in disclosure policy. Specifically, Thornton found that the market's reaction was the same before and after the change in disclosure policy.

the market been properly informed of the Fed's intentions, the evidence suggests that it would not have responded to such discount rate changes. Uninformed of the Fed's intentions, however, the market appears to have inferred some significance, greater than was intended, to these discount rate changes.

The empirical analysis is limited in that only the market's reaction to one of the Fed's policy tools is investigated. Nevertheless, the results support the widely-held belief that monetary policy works best when policymakers are explicit about their objective. In so doing, they vindicate the critics of the Fed's early discount rate policy [Friedman (1960), Smith (1956, 1958), Young (1964)] who argued that by not stating them, the Fed's intentions would be misconstrued.

It is important to remember, however, that market forces will not necessarily reinforce the their objective simply because policymakers make it known. The market must believe that the policymakers' objective is obtainable and the policymakers' commitment to the objective must be credible. Stronger evidence on the importance of transparency and credibility likely will come from the many inflation targeting experiments that are currently under way.

REFERENCES:

Ahearn, Daniel S. *Federal Reserve Policy Reappraised, 1951-1959.* New York: Columbia
  University, 1963.

Batten, Dallas S. and Daniel L. Thornton. "Discount Rate Changes and the Foreign Exchange
  Market," *Journal of International Money and Finance* (December 1984), 279-92.

_____. "The Discount Rate, Interest Rates and Foreign Exchange Rates: An Analysis with Daily
  Data," Federal Reserve Bank of St. Louis *Review* (February 1985), 22-30.

Blinder, Alan S. *Central Banking in Theory and Practice.* Cambridge Massachusetts: The MIT
  Press, 1998.

Board of Governors of the Federal Reserve System. *Annual Report,* 1952.

_____. *The Federal Reserve System: Purposes and Functions*, eds. 1939,1947, 1954, 1961,
  1963a, 1974, 1984 and 1994.

_____. *The Federal Reserve and the Treasury: Answers to Questions from the Commission
  On Money and Credit*, Englewood Cliffs, New Jersey: Prentice-Hall, 1963b.

Brown, Kathleen H. "Effects of Changes in the Discount Rate on the Foreign Exchange Value of
  the Dollar: 1973 to 1978," *Quarterly Journal of Economics* (August 1981), 551-58.

Cook, Timothy and Thomas Hahn. "The Information Content of Discount Rate Announcements
  and Their Effect on Market Interest Rates," *Journal of Money, Credit and Banking* (May
  1988), 167-80.

Dueker, Michael J. "The Response of Market Interest Rates to Discount Rate Changes", Federal
  Reserve Bank of St. Louis *Review* (July/August 1992), 78-91.

Fomby, Thomas B., R. Carter Hill and Stanley R. Johnson. *Advanced Econometric Methods*,
  New York: Springer-Verlag, 1984.

Friedman, Milton. *A Program for Monetary Stability.* New York: Fordham University Press,
  1960.

Froyen, Richard T. "The Determinants of the Federal Reserve Discount Rate Policy," *Southern
  Economic Journal* (October 1975), 193-200.

Goodfriend, Marvin. "Monetary Mystique: Secrecy and Central Banking," *Journal of Monetary
  Economics* (January 1986), 63-92.

Hakkio, Craig S. and Douglas K. Pearce. "Discount Rate Policy Under Alternative Operating Procedures: An Empirical Investigation," *International Review of Economics and Finance* (1, (1), 1992), 55-72.

Mudd, Douglas R. "Did Discount Rate Changes Affect the Foreign Exchange Value of the Dollar During 1978?," The Federal Reserve Bank of St. Louis *Review* (April 1979), 20-26.

Roley, V. Vance, and Rick Troll. "The Impact of Discount Rate Changes on Market Interest Rates," Federal Reserve Bank of Kansas City *Economic Review* (January 1984), 27-39.

Roosa, Robert V. "Credit Policy at the Discount Window: Comment," *Quarterly Journal of Economics* (May 1959), 333-37.

_____. "Monetary Policy Again: Comments," *Bulletin of the Oxford University Institute of Statistics* (August 1952), 253-61.

Rush, Mark, Gordon Sellon and Li Zhu. "The Role of the Discount Rate in Monetary Policy,"Federal Reserve Bank of Kansas City working paper , RWP 94-1, April 1994.

Simmons, Edward C. "A Note on the Revival of the Federal Reserve Discount Policy," *Journal of Finance* (December 1956), 413-21.

Smirlock, Michael J. and Jess B. Yawitz. "Asset Returns, Discount Rate Changes, and Market Efficiency." *Journal of Finance* (September 1985), 1141-58.

Smith, Warren L. "The Discount Rate as a Credit-Control Weapon," *Journal of Political Economy* (April 1958), 171-77.

_____. "On the Effectiveness of Monetary Policy," *American Economic Review* (September 1956), 588-606.

Thornton, Daniel L. "The Information Content of Discount Rate Announcements: What is Behind the Announcement Effect?," *Journal of Banking and Finance*, (January 1998), 83-108.

_____."Does the Fed's New Policy of Immediate Disclosure Affect the Market?," Federal Reserve Bank of St. Louis *Review* (November/December 1996), 77-88.

_____. "Why Do T-Bill Rates Respond to Discount Rate Changes?," *Journal of Money, Credit and Banking* (November 1994), 839-50.

_____. "The Discount Rate and Market Interest Rates: Theory and Evidence," Federal Reserve

Bank of St. Louis *Review* (August/September 1986), 5-21.

_____. "Discount Rate and Market Interest Rates: What's the Connection?," Federal Reserve
    Bank of St. Louis *Review* (June/July 1982), 3-14.

Young, Ralph A. "Tools and Processes of Monetary Policy," in *United States Monetary
    Policy*, ed. Neil H. Jacoby. New York: Frederick A. Proeger, 1964, 24-72.

Wagster, John. "The Information Content of Discount Rate Announcements Revisited: A
    Note," *Journal of Money Credit and Banking* (February 1993), 132-37.

Waud, Roger N. "Public Interpretation of Federal Reserve Discount Rate Changes:
    Evidence on the 'Announcement Effect'," *Econometrica* (March 1970), 231-50.

Table 1: Estimated Response to Discount Rate Changes by Type	
Type/[Number]	ΔTB
Const.	0.0074 (0.75)
ΔDR_T [30]	0.0625 (1.54)
ΔDR_{NT} [51]	0.2505* (18.08)
ΔDR_{IDT} [10]	0.1193* (3.05)
ΔDR_{IDNT} [10]	0.3208* (7.87)
Adj R^2	0.0737
Null Hypothesis	F-Statistic
IDT=IDNT	12.7533*
NT=IDNT	2.6697

Table 1, continued: Estimated Variances Used in the Two-Step Estimation	
ΔTB	
Period	**Estimate**
1/4/53-1/24/58	0.0370
1/25/58-9/15/61	0.0672
9/16/61-5/26/66	0.0203
5/27/66-7/25/73	0.0627
7/26/73-7/3/75	0.1721
7/4/75-9/10/79	0.0757
9/11/79-11/29/82	0.2717
11/30/82-8/6/90	0.0768
8/7/90-12/31/93	0.0369

Absolute value of t-statistic in parentheses.
*Indicates statistical significance at the 5% level.
The equations in this paper are estimated using a two-step procedure to correct for heteroscedasticity. Specifically, each equation, written more compactly as, $y = X\beta + \varepsilon$, was estimated using ordinary least squares, OLS. The OLS residuals are partitioned into N groups, i = 1, 2, ..., N. It is assumed that $E(\varepsilon_i \varepsilon_i') = \sigma_i^2 I$ for all i. The equation was then re-estimated using generalized least squares, i.e., $\tilde{\beta} = (X'\tilde{\Omega}^{-1}X)^{-1}X'\tilde{\Omega}^{-1}Y$, where, $\varepsilon = (\varepsilon_1, \varepsilon_2, \varepsilon_3, ... \varepsilon_N)'$ and $E[\varepsilon \varepsilon'] = \Omega$, a diagonal matrix. For more details see Fomby, Hill and Johnson (1984, pp. 174-76). The estimated variances, presented above for N=9, shows how the variance changes over the sample.

Table 2: Estimated Response to Discount Rate Changes by Type	
Type/[Number]	ΔTB
Const.	0.0078 (0.79)
ΔDR_T [30]	0.0625 (1.54)
ΔDR_{NT} [51]	0.2505* (18.08)
ΔDR_{IDT} [15]	0.1290* (3.90)
ΔDR_{IDNT} [5]	0.4409* (8.29)
Adj R^2	0.0749
Null Hypothesis	F-Statistic
IDT=IDNT	24.8093*
NT=IDNT	12.0101*

Table 3: Estimated Response to Discount Rate Changes by Type	
Type/[Number]	ΔTB
Const.	0.0075 (0.76)
ΔDR_T [30]	0.0624 (1.54)
ΔDR_{NT} [51]	0.2505* (18.08)
ΔDR_{ID} [20]	0.2158* (7.62)
Adj R^2	0.0726
Null Hypothesis	F-Statistic
NT=ID	1.2128

Table 4:	Tests For Robustness in Response to Information-Deficient Discount Rate Changes		
Number [A, B]	**ΔTB**		
	A	**B**	**C**
[7, 13]	0.2023* (3.64)	0.2205* (6.71)	--
[10, 10]	0.2443* (6.65)	0.1744* (3.94)	--
[13, 7]	0.2161* (6.47)	0.2150* (4.04)	--
[7, 7, 6]	0.2023* (3.64)	0.2323* (5.64)	0.1999* (3.68)
F-test [7, 13]	0.0791	--	--
F-test [10, 10]	1.4804	--	--
F-test [13, 7]	0.0003	--	--
F-test [7, 7, 6]	0.1519	--	--

Absolute value of t-statistics in parentheses.
*Indicates statistical significance at the 5% level