Why Do Federal Funds Trade at the FOMC's Target Rate?

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The role of inflation expectations on the part of economic agents is being increasingly recognized and incorporated into frameworks for the setting of monetary policy (for example, Piger and Rasche 2008, Hetzel 2008). In this article, I describe how expectations are also critical in the *implementation* of monetary policy. According to the textbook view, the Federal Reserve controls the federal funds rate by varying the supply of reserves available to the banking system. I will argue, however, that fluctuations in the supply of reserves are not the full explanation, thus providing additional support for Taylor (2001), who found that federal funds trade at or around the Federal Open Market Committee's target rate in part because market participants expect that if they don't, the Fed will step in and react.

A Textbook View

Federal funds are account balances of depository institutions, such as commercial banks, at the Federal Reserve. Such account balances are actively traded between these institutions. If an institution projects an account balance that is short of what it wants that balance to be, it may call on an institution that has a surplus to borrow part or all of that surplus, usually on an overnight basis. The lending institution instructs the Federal Reserve to charge its account and to credit the account of the borrowing institution. The following day, the borrowing institution instructs the Federal

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Reserve to charge its account and to credit the account of the lending institution the principal amount plus interest, which is calculated using the interest rate set by the two institutions, known as the federal funds rate.

For many years, the federal funds rate has been the main variable that the Federal Open Market Committee targets when it sets monetary policy. The FOMC instructs the Open Market Trading Desk at the Federal Reserve Bank of New York ("the Desk") to conduct open market operations in order to change the amount of reserves in the banking system and keep the federal funds rate at or near the FOMC's stated target level.

According to the textbook view, the market for federal funds can be described using a classic demand and supply function, with the federal funds rate representing the price at which the demand and supply of federal funds are matched. Assuming a standard, relatively fixed, downward-sloping demand curve and an intended federal funds target rate, the Desk adjusts the supply of reserves so that the equilibrium level of the actual federal funds rate equals the FOMC's target rate. All else remaining equal, a higher target rate implies supplying a lower amount of reserves, and, vice versa, a lower target rate means supplying a higher amount of reserves.[1]

Underlying the downward-sloping demand curve is a model of how depository institutions manage their excess reserves, first proposed by Poole (1968). Depository institutions maintain excess reserves as a safeguard against overdrafts of their account at the Federal Reserve, or against insufficient clearing balances or required reserves. At the same time, depository institutions strive to minimize their excess reserves because of the opportunity cost associated with holding excess reserves, on which the Federal Reserve until recently paid no interest. The resulting interest elasticity of the aggregate demand for excess reserves is what the Desk exploits when it targets a particular federal funds rate (Dow 2001).

According to this view, the principal challenge for the Desk in keeping the actual federal funds rate at or near the FOMC's target rate is estimating the location of the demand curve and the size

[1]An example of the exposition of this view can be found in Walsh (2003: 451–62). Also see *The Economist* (1999).

of other factors that supply reserves to the banking system. So-called misses in the amount of reserves the Desk supplies to the system that cause the actual federal funds rate to deviate from the target rate are ultimately due to the fact that in real life the location of the demand curve and the size of the other supply factors are not known with certainty and need to be estimated.

In Search of a Demand Curve for Excess Reserves

In practice, the challenge for the Desk is somewhat more complicated than indicated by the theoretical model described in the previous section. Arguably, the Desk has two objectives, which more or less reflect two main objectives of the Federal Reserve as a whole: (1) to supply just the right amount of reserves to the banking system to ensure that federal funds trade at or near the FOMC's target rate, and (2) to keep a large enough amount of reserves in the system to ensure that interbank payments flow smoothly and don't grind to a halt.

In theory, assuming a perfectly efficient market for federal funds, these two functions are one and the same. In practice, however, the market for federal funds, like those for many other financial markets, is not perfectly efficient, and variations in the actual federal funds rate from the FOMC's target level do occur. For example, when banking institutions foresee a larger than usual volume of payments flowing through their accounts, they may choose to hold a larger than usual amount of excess reserve balances. To achieve this, they may bid for federal funds at a rate slightly above the FOMC's target rate.

During the period from January 1989 through mid-September 2008, virtually all observations for aggregate excess reserve levels fell within a range of $500 million to $2.25 billion, with a few clearly visible exceptions.[2] In January 1991, for example, the demand for excess reserves was skewed by a change in reserve requirements that meant that depository institutions were not certain how much to hold in reserves and the Desk was not certain how much to supply (Clouse and Elmendorf 1997). Both sides erred on the side of caution. The resulting learning experience meant that fewer excess

[2]Federal Reserve Statistical Release H.3, Table 5: Aggregate Reserves of Depository Institutions (www.federalreserve.gov/releases/h3/hist/h3hist5.pdf).

reserves needed to be supplied during subsequent changes in reserve requirements (Dow 2001: 688). In January 2000, the demand and supply of reserves were affected by a precautionary increase in the demand for currency due to the century date change, or Y2K (Taylor 2001: 38).

In September 2001, the interbank payment system was disrupted by the terrorist attacks of September 11, and the Federal Reserve injected large amounts of liquidity to enable banks to reestablish their normal payment patterns (McAndrews and Potter 2002, Lacker 2004). In August 2003, the spike in excess reserves was due to the blackout in the northeastern United States and Canada stemming from a gridwide power outage on August 14.

In August 2007, increased reserve levels were related to pressures in funding markets at the onset of the current financial crisis, with the Desk injecting an overabundance of reserves into the system in an attempt to counter those pressures. In March 2008, elevated excess reserve levels followed the collapse of Bear Stearns.[3] In late June 2008, somewhat elevated excess reserve balances coincided with an intensification of the financial crisis that drove stock prices down to where they had been at the time of the collapse of Bear Stearns (Ng and Rappaport 2008).

The correlation between the federal funds target rate and excess reserve levels from January 1989 through mid-September 2008 was −0.13. However, if the outlier observations of excess reserve levels over $3 billion are excluded, the correlation improves to −0.42. The average amount of excess reserve balances would appear to be pretty good as a *partial* explanation for the

[3]It should be noted that the data are of actual excess reserves, or the amounts supplied rather than demanded. Supply is only a proxy for demand, with the reliability of this proxy depending on how well the Desk estimates the demand for excess reserves. If the actual federal funds rate is at or near the target level, supply is fairly close to demand, as is the case most of the time. The outlier points may reflect precautionary action by the Desk rather than actual demand, but to some extent this is a case of a chicken-vs.-egg debate. For example, in August 2007, the daily average federal funds rate was well below the target rate for many days because of the deliberate overabundance of reserves supplied by the Desk. But this overabundance came in direct response to an increase in the demand for reserves, as reflected in firm federal funds rates prior to the addition of the reserves. During that time, "the Desk effectively suspended its normal approach to controlling the funds rate" (Markets Group of the Federal Reserve Bank of New York 2008: 4).

level of the federal funds rate, but not as a full explanation. All in all, for targeting a specific federal funds rate, targeting a specific amount of excess reserves is clearly too blunt a method. Whichever way it is that the Desk targets the federal funds rate, targeting excess reserve levels cannot be the full story.

Market Expectations

Published statements by former Desk officials confirm that targeting excess reserve levels is not the full explanation for how federal funds trade at or near the FOMC's target rate. Meulendyke (1998: 142), formerly Advisor to the Domestic Open Market Operations of the Federal Reserve Bank of New York, has noted that when the FOMC makes a change in the target rate, which is usually announced around 2:15 pm in the afternoon of a day on which the Committee meets, the actual federal funds rate usually changes on that same day as well: "The rate has tended to move to the new, preferred level as soon as the banks knew the intended rate." This happens even though the Desk executes its open market operation only once, namely at the beginning of the trading day rather than following the afternoon announcement of the new federal funds target rate, and the Desk does not know the outcome of the FOMC decision prior to the announcement of that decision.

Krieger (2002: 74), formerly head of Domestic Reserves Management and Discount Operations at the Federal Reserve Bank of New York, has noted the following:

> The conventional, textbook view is that the Trading Desk buys and sells securities in response to policy easings and tightenings. From the Desk's perspective, however, the supply-demand balance is primarily a function of the demand for required balances, which is almost completely insensitive to small changes in policy. Consequently, any change in the Committee's target has virtually no effect on excess supply or demand in the funds market.

The Desk's main task is to match the supply and demand of reserve balances. On a daily basis, the Desk estimates the sizes of all factors that make up the demand and the supply of reserves. If the estimated totals do not match, the Desk conducts an open

market operation to inject or drain reserves from the system as needed.[4] If there is an imbalance between the supply and demand for reserves, for example because the actual values of the components of the demand and supply of reserves differ significantly from their estimated values, this is likely to affect the federal funds rate at which reserves are traded between institutions. All else remaining equal, a shortage of reserves in the system will result in upward pressure on the federal funds rate, and a surplus of reserves will result in downward pressure on the federal funds rate. *But even when the total demand and supply of reserves match, it does not automatically follow that the rate at which reserves are traded between depository institutions equals the FOMC's target rate.* A match between the demand and supply of reserve balances is a necessary condition for federal funds to trade at the target rate, but not a sufficient one.

Assuming that the aggregate demand and supply for reserves in the system are balanced, what is it, exactly, that causes federal funds to trade at or near the FOMC's target rate? Recent research suggests that the answer is primarily a matter of market expectations. Federal funds trade at or near the FOMC's target rate in large part because market participants expect that if they don't, the Desk will step in and react.

In recent years, the Federal Reserve has meaningfully increased the transparency of its monetary policy decisions. As a result, market participants have become increasingly accurate in predicting changes in the FOMC's target rate, as evidenced by the pricing of one-month federal funds futures contracts (Poole 2005, Poole and Rasche 2003). On occasions that the market anticipates a change in the target rate, it frequently begins trading federal funds closer to the new, expected rate during the days just *before* the actual change. On such occasions, the Desk often has a difficult time bringing the actual federal funds rate back to the old, existing target level, even though it tries to do so because it does not want to prejudge the outcome of an FOMC decision prior to the official announcement.

[4]For a more detailed description of the supply and demand for federal reserve balances and open market operations, see Board of Governors (2005: chap. 3). Factors affecting the demand and supply of reserve balances are published weekly by the Fed in Federal Reserve Statistical Release H.4.1 (www.federalreserve.gov/releases/h41).

Taylor (2001) proposes a "Trading Desk reaction function" in which the Desk, in determining the supply of reserves, takes into consideration the degree and direction in which the daily average federal funds rate deviates from the FOMC's stated target rate. If the daily average rate is above (below) the target rate, the Desk will tend to be generous (stingy) in supplying reserves the next day, all else remaining equal.[5]

> Expectations are very important . . . because the Trading Desk is assumed to follow the reaction function day after day and because the demand for Fed balances depends in part on expectations of the future federal funds rate. . . . Changes in the target for the federal funds rate can sometimes affect the actual funds rate even without any current open market operations. However, this effect requires credibility that the Trading Desk will follow a reaction function on future days. That way the Trading Desk is expected to do open market operations in the future if necessary. In effect, the expectation of future open market operations moves the federal funds rate today [Taylor 2001: 34].

In setting the rate at which they agree to trade reserve balances among themselves, market participants take their cue from the Federal Reserve as to the rate at which it wants federal funds to trade. The federal funds rate is not merely controlled through the supply of reserves, but rather through the expectation that the Desk will react if market participants decide to trade federal funds at rates that deviate significantly and persistently from the Federal Reserve's target rate.

Conclusion

Under usual circumstances, federal funds trade at or near the FOMC's target rate for two main reasons. First, the Desk affects the federal funds rate by adjusting the marginal supply of reserves to their estimated demand at the target rate. Second, federal funds trade at or near the target rate because of an expectation on the part

[5]The one-day lag is due to the fact that, as noted, the Desk usually operates at the beginning of the trading day and then refrains from conducting any further operations during the rest of the day.

of market participants that the Desk will react if the actual rate deviates significantly and persistently from the target rate.

In the wake of the financial crisis, the Federal Reserve made some significant changes to its conduct of monetary policy, especially during the latter part of 2008. The federal funds target rate was brought down all the way to a range of 0–0.25, as the Fed both expanded and changed the composition of its balance sheet. Since mid-December 2008, what has kept the federal funds rate within the FOMC's 0–0.25 percent target range is an overabundance of excess reserves in the system on the one hand, and the fact that nominal interest rates do not ordinarily fall below zero on the other.

At some point, however, once the financial crisis abates and the credit cycle turns, the Federal Reserve will need to raise the federal funds target rate again to prevent the onset of inflation. If precedence is any guide, the target rate will then become a specific level again rather than a range. When that occurs, federal funds may initially experience some short-term volatility around the target rate, as the Desk will again be seeking to shape market expectations as to its intent and practice of seeing to it that the actual rate remains at or near the FOMC's stated target rate.

References

Board of Governors (2005) *The Federal Reserve System: Purposes and Functions*. 9th ed. Washington: Board of Governors of the Federal Reserve System.

Clouse, J. A., and Elmendorf, D. W. (1997) "Declining Required Reserves and the Volatility of the Federal Funds Rate." Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series No. 1997–30 (June).

Dow, J. P., Jr. (2001) "The Demand for Excess Reserves." *Southern Economic Journal* 67: 685–700.

Hetzel, R. L. (2008) *The Monetary Policy of the Federal Reserve: A History*. Cambridge: Cambridge University Press.

Krieger, S. C. (2002) "Recent Trends in Monetary Policy Implementation: A View from the Desk." Federal Reserve Bank of New York *Economic Policy Review* 8 (May): 73–76.

Lacker, J. M. (2004) "Payment System Disruptions and the Federal Reserve Following September 11, 2001." *Journal of Monetary Economics* 51 (July): 935–65.

Markets Group of the Federal Reserve Bank of New York (2008) *Domestic Open Market Operations during 2007.* New York: Federal Reserve Bank of New York (February).

McAndrews, J. J., and Potter, S. M. (2002) "Liquidity Effects of the Events of September 11, 2001." Federal Reserve Bank of New York *Economic Policy Review* 8 (November): 59–79.

Meulendyke, A. (1998) *U.S. Monetary Policy and Financial Markets*. New York: Federal Reserve Bank of New York.

Ng, S., and Rappaport, L. (2008) "Credit Storm Back with a Vengeance." *Wall Street Journal* (27 June): C1.

Piger, J. M., and Rasche, R. H. (2008) "Inflation: Do Expectations Trump the Gap?" *International Journal of Central Banking* 4 (December): 85–116.

Poole, W. (1968) "Commercial Bank Reserve Management in a Stochastic Model: Implications for Monetary Policy." *Journal of Finance* 23 (December): 769–91.

_____ (2005) "How Predictable Is Fed Policy?" Federal Reserve Bank of St. Louis *Review* 87 (November/December): 659–68.

Poole, W., and Rasche, R. H. (2003) "The Impact of Changes in FOMC Disclosure Practices on the Transparency of Monetary Policy: Are Markets and the FOMC Better 'Synched'?" Federal Reserve Bank of St. Louis Review 85 (January/February): 1–10.

Taylor, J. B. (2001) "Expectations, Open Market Operations, and Changes in the Federal Funds Rate." Federal Reserve Bank of St. Louis *Review* 83 (July/August): 33–47.

The Economist (1999) "Monopoly Power over Money." (20 November): 95–96.

Walsh, C. E. (2003) *Monetary Theory and Policy*. 2nd ed. Cambridge, Mass.: MIT Press.