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# Monetary Policy: Process of interest rates fixation by the central banks

**SHANTA R. KERKETTA**
Assistant Professor
Lady Irwin College, Delhi University, New Delhi (India)

## ABSTRACT

The proofs we get from the theoretical and empirical literature is that central banks pursue their policy objectives by the setting of a short term interest rate. Most of the researches are related to the decision about setting of a short term interest rate and how should the monetary policy to be conducted by them. But very less is known about the actual mechanism used by them to set the rate. The central banks exert their influence in the markets to set the interest rate at the level they desire. Friedman and Kuttner address this issue comprehensively by contrasting the traditional textbook understanding against the actual method central banks use. They review empirical evidence for both cases. Furthermore, they provide powerful insights about future implications on the implementation of monetary policy based on the measures taken in the context of the financial crisis of 2007- 2009. This essay summarizes the main points of the work by Friedman and Kuttner and links the implications to current policy issues.

**Key Words :** Central Bank, Commercial Banks, Gold Standard, Euro Area, Zero Lower Bound, Commercial paper

## INTRODUCTION

The theoretical and empirical literature has made it clear that central banks pursue their policy objectives via the setting of a short term interest rate. Most of the research developed answer the question about how do they decide it and how should they conduct monetary policy. Nevertheless, very little is known about the actual mechanism they use, in practice, to set the rate. How do central banks exert their influence in the markets to set the interest rate at the level they desire?

Friedman and Kuttner address this issue comprehensively by contrasting the traditional textbook understanding against the actual method central banks use. They review empirical evidence for both cases. Furthermore, they provide powerful insights about future implications on the implementation of monetary policy based on the measures taken in the context of the financial crisis of 2007- 2009.

Discussion starts by going back to the times of the gold standard. Important implications are drawn from Wicksell (1907) who showed that the reduction of the interest rate below the one produced naturally by the market (normal interest rate) would raise prices without limit until the rate is adjusted back to its natural level. Nonetheless Wicksell himself pointed out the unlikeliness of that scenario because banks' reserves – in the Gold standard context in which he was living- would eventually deplete as the public would demand them continuously. Nevertheless, in the actual fiat money system, central banks have the ability to infinitely replenish reserves and thus, the capacity to conduct monetary policy by setting their desired level for the interest rate. Therefore, the traditional view suggests that central banks have monopoly control over the supply of reserves and commercial banks have a negative elastic demand for those reserves dependent on the relative price of money compared to other assets. A change in reserves supply leads to a movement along the downward-sloping demand curve, resulting in a new equilibrium rate. Thus, an empirical relationship between the supply of reserves and interest rate should be clearly observable.

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**Monetary Policy Implementation: Traditional understanding:**

The above mentioned demand for reserves is explained in the literature by four rationales. First, in many countries (U.S, Euro Countries and Japan) banks are required to maintain a certain proportion of their reserves at the central bank. Secondly, in terms of payments the banks are indulged into transactions among themselves, but it is more convenient to transfer the reserves which are held in the central bank. Thirdly, banks need to satisfy their customers' routine demands for currency. Fourthly, the central bank cannot default on its liabilities, banks are tempted to hold reserves with the central bank. Thus, the given interest rate demand (as like currency, it could be zero) is elastic as compared to the market interest rate of other assets, that could be held by the banks. However, the optimal ratio is based on the earnings that the bank could have with the interest on reserves and on alternative assets. Therefore, in relation to market interest rate the bank's demand for reserves is feasibly elastic and can be substituted by other assets. The modern central banks can influence the substantial amount of movements of interest rate with small or no change in the supply of reserves which is based on the system where the banks have to maintain reserve requirements and the central bank is able to fix the short term interest rate. The central bank can influence the rate of interest not only by increasing or decreasing the supply of reserves but also affects the bank's demand for reserves by changing the reserve requirements of the banks. But this is not always true. For this the central banks do not actually alter the reserve requirements but they usually change them for various purposes for instance they instruct the banks to maintain a type of deposit in the place of other or to administer the cost of maintaining the reserves by banks. This lack of relationship between reserve requirements and the policy interest rate has been documented empirically.

**The Relation between Reserves and the Policy Interest Rate:**

The estimates from researchers illustrate that the impact of changes in banks' reserve supply on the policy interest rate is significantly small. This implies that banks' demand for reserves is highly interest elastic, but central banks actually change their interest rates over time across a considerable range. The correlation between reserves and the interest rate is just -0.06 in levels and -0.14 in changes in the US between 1994-2007. In the same period, both Europe and Japan have shown irregular relationships between them. It follows that there is almost no evidence of any systematic movement of excess reserve in the policy interest rate.

This absence of clear movement suggests that banks' demand for reserves is highly interest inelastic. In other words, a minor change in supply of reserve brings large changes in the rate of interest. Although estimates about excess reserve demand for Japan illustrate a significant negative interest elasticity of reserve demand in 1992-2007, neither estimates for the US nor the Euro Area show such negative interest elasticity. Thus, these evidence contradicts the perspective of traditional theory that states that bank's demand for reserves is interest elastic.

**Fixation of Interest Rate by Central Bank:**

The interest elasticity of reserve demand not only affects each individual bank but the market as a whole. When the reserve demand is interest inelastic then individual banks and also the whole market act as price takers. If the Central bank supplying reserves is perfectly elastic, no differences are observable in the interest even with an inelastic reserve demand. For the fixation of the interest rate the Central Bank in this case just chooses a point on a vertical demand schedule. But for the interest elastic demand for reserves the central bank is compelled to change the rate of interest. But for this the demand schedule has to be shifted without altering the supply of reserves.

The question arises why do banks demand reserves and what are the reserve requirements? The banks demand reserves to maintain their reserve requirements. The individual bank has to hold compulsorily, certain percentage of it's deposit as per the central bank's guideline. The reserve requirements are calculated on the basis of reserves held by the banks for certain maintenance period. For banks in US the reserve maintenance period is of two weeks but for Euro system and Japan it is of one month.

The borrowing and lending of the reserves by individual bank depends on the anticipation of the interest rates fixed by the central bank. This is called anticipation effect. The anticipation simply depends on the central bank's announcement of raising or lowering the interest rate in future. As a matter of fact, there is change in reserve demand only in the maintenance period and after

that the central bank only changes the reserve supply and maintains the rate of interest.

**Empirical example of reserve demand and supply within the maintenance period:**

To examine the practical validity of the theory about reserve management and the announcement effect discussed above, as the empirical analysis on the within-maintenance-period of reserve demand and supply in the U.S.A. The estimation of demand for reserves within the maintenance period, whose equation can be obtained by

$$R_t^d = L[\alpha^R + \beta^{RF} r_t^F - \gamma(r_t^F - E_t r_{t+1}) + e_t^R] \quad (1)$$

$$r_t^F - r_t^{-F} = \gamma^{-1}\alpha^R - \gamma^{-1}\beta^{RF} r_t^F - E_t(r_{t+1}^{-F} - r_t^{-F}) - \gamma^{-1}R_t + \gamma^{-1}e_t^R \quad (2)$$

$$r_t^F - r_T^{-F} = \rho_1^d (r_{t-1}^F - r_{t-1}^{-F}) + \rho_2^d (r_{t-2}^F - r_{t-2}^{-F}) + \rho_3^d (r_{t-10}^F - r_{t-10}^{-F}) +$$

$$\theta_1^d r_t^{-F} + \theta_2^d R_t + \theta_3^d R_{t-1}^X + \sum_{j=1}^{10} \varphi_j^d d_{jt} \Delta^e r_t^{-F} + \sum_{j=1}^{3} \varphi_j^d c_{jt} + e_t \approx^R \quad (3)$$

Modifying the equation (1) into equation (2) and equation (3) show that the positive relationship between the expected federal funds rate change and the early days of maintenance period provides strong proof for the announcement effect's presence, at the beginning of the maintenance period. The result also shows the less quantitative liquidity effect. In addition, it is confirmed that reserve demand does not depend on the current level of the target federal funds rate *per se*.

$$R_t^s = R^* + \phi L(E_t r^F{}_{t+1} + r_t^{-F}) + Lu_t^R \quad (4)$$

$$R_t^{\approx s} = \rho_1^s R_{t-1}^{\approx s} + \rho_2^s R_{t-2}^{\approx s} + \theta_1^s R_{t-1}^X + \theta_2^s \Delta^{-F} r_t + \theta_3^s \Delta_p r_t^{-F} + \theta_4^s r_t^{-F}$$

$$+ \varphi^s (E_{t-1} r_t^F - r_t^{-F}) + \sum_{j=1}^{3} \psi_j^s c_{jt} + u_t^{\approx R} \quad (5)$$

On the other hand, estimation results of the within-maintenance-period reserve supply, whose equation can be derived from the equation (4), indicates that there is no statistical proof that the interest rate can be altered by Federal Reserve by changing the supply of reserves. More importantly, the Federal Reserve clearly changes its reserve supply in response to the expected deviations of the rate of federal funds from the target, although the magnitude of its changes is likely to be small in practice.

These empirical results imply that the marginal changes in reserves are necessary to effect the movements in the Federal Reserve's policy interest rate. This finding suggests that the announcement effects have a very notable part role in shifting the policy interest rate to the new target of the central bank within the maintenance period. Thus,the regular relationship between the quantity of reserve supply and the target interest rate is very hard to notice.

**Financial crisis :**

The 2007-2009 financial crisis brought drastic real economic costs. In 2009 the volume of world trade fell by 12%. The financial sector was harshly hit resulting in the decrease in value of assets, in the collapse of paper wealth, disturbance of credit flows, loosening of faith in credit market instruments and business firms, lack of credibility of different parties and the collapse of major financial firms. Such unusual events brought forward unusual responses in private economic behavior and public policy. In many countries, governments resorted to voluntary anti-cyclical fiscal policies. Governments and central banks act as lender of the last resort massively. Also, most central banks used existing powers and institutional arrangements in novel ways. For instance, US and Japan changed their institutional structure within which central banks implement monetary policy by allowing central banks to pay interest on banks holdings of reserves. Moreover, Quantitative Easing became the limelight of most discussions. It may be useful to think how the implementation of monetary policy is being affected on an ongoing basis by those new actions undertaken by the central banks during the crisis.

In one situation of crisis the central banks could vary the supply of reserves without thinking about any the interest rate once the policy interest rate hits the Zero Lower Bound (ZLB). This is because the downward-sloping reserve demand curve becomes horizontal as it hits the ZLB. If a corridor system is used, then the reserve demand is effectively horizontal at the interest rate paid by the central bank's deposit facility and the reserve supply is horizontal at the rate charged by its lending facility. In between the effective upper and lower bounds, the central bank has to pick a point on the downward-sloping reserve demand schedule. The supply of reserves can be increased to purchase assets. However, beyond a certain limit, if the central bank continues to raise the reserve supply, the policy interest rate will not equal the target rate but rather the rate paid on excess reserves. Hence there is a trade-off between choosing arbitrarily the reserve quantity and the ability to enforce its interest rate target. Alternatively, if the standing facility for remunerating banks' excess reserves holdings was based on a specific designated rate, the central bank would be

able to choose both the interest rate and the quantity of reserves supplied without that trade-off.

The question remains on whether those massive quantitative easing programs matter for market interest rate relationships, for the functioning of financial markets more broadly, or for nonfinancial economic activity. Those events are too recent and not sufficiently analyzed to provide a firm answer. Nonetheless, there is an example of how the interest rate relationships and the functioning of some markets had been badly affected by massive purchase of assets by the Federal Reserve System in the crisis. The volume of assets purchased grew rapidly with the creation of the new facility, CPFF (to purchase newly issued commercial paper). Furthermore, with the CPFF, the spread between the interest rate on three-month AA-rated commercial paper issued by financial companies and the three-month overnight interest-swap rate widened like never before.

Finally, we can conclude that monetary policy in practice differs from that explained in standard textbooks. With the recent 2007-2009 financial crisis, actions taken by central banks could open a path for new forms of policy in the future. Central Banks' ability to fix both the interest rate and the quantity of reserves represents a crucial departure from decades of thinking about the scope of central bank action.

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