

Homework Assignment 13 solution.

1. Suppose that the currency-to-deposits ratio is 0.3, the required reserve ratio is 0.1, and the excess reserves ratio is 0.03. Suppose that the Fed buys \$1 million worth of securities from the First National Bank. Describe in detail the process of deposit creation (provide the values of the first three deposits created as a result of this purchase of securities by the Fed). Compute the money (M1) multiplier?

The process has the following steps:

- (i) **First National Bank will make a loan with this \$1 m to a client (say, Firm 1).**
- (ii) **Firm 1 pays \$1 m to its supplier Firm 2.**
- (iii) **Firm 2 will cash 30% of this check (currency-to-deposits=0.3) and deposit the remaining 70% (= \$700,000=first deposit created) in the Second National Bank.**
- (iv) **Second National Bank will keep 10% of this amount as required reserves and 3% as excess reserves (excess reserves ratio=0.03). The remaining 87% will be given as a loan to Firm 3. The loan size = \$700,000 * 0.87=\$609,000.**
- (v) **Firm 3 pays its supplier Firm 4.**
- (vi) **Firm 4 will cash 30% of this check and deposit the remaining 70% (= \$609,000 * 0.7=\$426,300=second deposit created) in the Third National Bank.**
- (vii) **Third National Bank will keep 10% of this amount as required reserves and 3% as excess reserves. The remaining 87% will be given as a loan to Firm 5. The loan size = \$426,300 * 0.87=\$370,881.**
- (viii) **Firm 5 pays its supplier Firm 6.**
- (ix) **Firm 6 will cash 30% of this check and deposit the remaining 70% (= \$370,881 * 0.7=\$269,616.7=third deposit created) in the Fourth National Bank.**
- (x) **The process will continue indefinitely.**

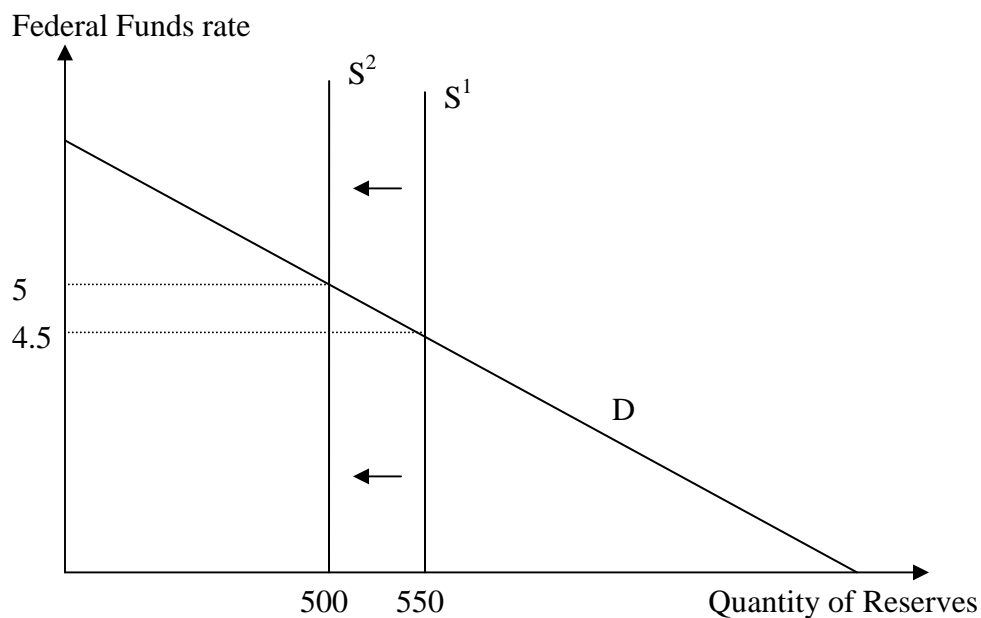
The actual money multiplier can be calculated using the formula:

$m = [1 + C/D] / [C/D + r + ER/D]$, where C/D = currency-to-deposits ratio, r =required reserves ratio, and ER/D =excess reserves ratio. Observe that cash holding affects multiplier in a more complex way than the excess reserves – cash is not part of deposits but it is part of money (M1). So it slows deposit creation but contributes to the money aggregate. $m = 1.3/0.43 = 3.02$.

2. Assume that the Fed predicts that the following demand for reserves on the federal funds market: $R^D = 1000 - 100 \cdot i$, where R^D is the quantity of reserves

demanded (in billions of dollars) and i is the current federal funds rate. Fed's target federal funds rate is 5%. Current supply of reserves is \$550 billion. Explain using a graph what the Fed has to do to achieve its target federal funds rate?

Setting supply equal to demand we get: $R^D = 1000 - 100 * i = 550 \rightarrow i = 4.5\%$, which is 0.5% below target. In order to increase the rate, the Fed must decrease the supply of reserves. This is done by selling securities. The exact amount of reserves needed can be calculated from $R^D = 1000 - 100 * 5 = \$500$. (We just plugged in the target federal funds rate of 5% in order to get to the desired supply of reserves.) Since the current supply is \$550, the Fed needs to sell \$50 worth of securities (and destroy the corresponding amount of reserves).



3. Explain how the Fed could limit the fluctuations in the federal funds interest rate?

Fed could limit the fluctuations in the federal funds rate by involving itself in this market more directly. The higher is the involvement – the more control the Fed can have over this rate. Currently, Fed doesn't participate in the federal funds market at all – it doesn't borrow (it would amount to paying interest on reserves) and it (almost) doesn't lend. "Almost" is because the Fed does lend using discount loans, but the interest rate on discount loans is typically different from the federal funds rate (set 1% above the target federal funds rate). There may be situations where the actual federal funds rate is equal to the discount rate, but this is rare (demand has to be unpredictably high). Using discount loans the Fed limits the upward fluctuations in the federal funds rate. To limit the downward fluctuations the Fed would have to start paying interest on reserves the commercial banks hold at the

Fed. By setting discount rate=target federal funds rate=interest rate paid on reserves the Fed could completely fix the federal funds rate – there would be no fluctuations.