Economics 137 – Midterm Examination Answers

1. (12) What are the major liabilities and assets of the Federal Reserve System? Describe each briefly and explain their relevance to the money supply process.

The two main liabilities of the Federal Reserve System are currency in circulation and reserves. Currency in circulation is that part of the Fed’s outstanding currency held by the non-bank public. Reserves comprise vault cash in banks and deposits by commercial banks and savings institutions with the Fed. Reserves are assets to banks but are a liability to the Fed, which must redeem banks’ requests for repayment of reserves on demand. Both reserves and currency in circulation play an important role in the money supply process. Increases in either currency or reserves will, ceteris paribus, increase the money supply via the money multiplier process.

The two main assets of the Federal Reserve System are government securities and discount loans. Government securities, Treasury bills, notes, and bonds, make up the largest fraction of the Fed’s assets. The purchase and sale of these assets are important for the conduct of monetary policy and thus the money supply process. An increase in the Fed’s holdings of government securities will, ceteris paribus, increase the money supply (via reserves and the money multiplier). Discount loans, issued at the discount window, paying the discount rate, are loans extended by the Fed to depository institutions which are experiencing liquidity problems. When the Fed issues more discount loans, ceteris paribus, it increases reserves and thus the money supply.

2. (20) The current yield on a 3-year bond is 12% and the yield on a 1-year bond is 8%. Two years from now, investors believe that the 1-year yield will be 15%. According to the expectations hypothesis, what must the current 2-year yield be?

The expectations hypothesis suggests that the return on the three year bond must be the same as the expected return from holding the two year bond for two years, and then rolling over into a one year bond. Hence:

\[ i_{3t} = \frac{2i_{2t} + i_{1t+2}^e}{3}\]

so

\[ 12\% = \frac{2i_{2t} + 15\%}{3}\]

so

\[ i_{2t} = 10.5\%\]

3. (20) A common model of expectations formation is that of adaptive expectations. Let \( x_t \) denote a random variable and \( x_{t+1}^e \) denote the forecast of \( x_{t+1} \) made in period \( t \). Then adaptive expectations is defined by the expression: \( x_{t+1}^e = x_t^e + \lambda (x_t - x_t^e) \) where \( 0 < \lambda < 1 \).

a. Give an intuitive explanation for this expression (Hint: What would be the implication if \( \lambda = 0 \) or \( \lambda = 1 \).)

Expectations of \( x_{t+1} \) are formed using information about past expectations and current data. When agents form their expectation about \( x \) next period, they take their previous expected value for \( x_t \) and adjust it according to the error they made. So when \( \lambda = 0.5 \) as in part (b), agents split the difference between their old forecast and the actual realization of \( x \).

When \( \lambda = 0 \), agents place no weight on their forecast errors, and so their forecast is constant, \( x_{t+1}^e = x_t^e \). When \( \lambda = 1 \), agents place full weight on their forecast errors, and just forecast tomorrow what they observed today: \( x_{t+1}^e = x_t \).
b. Suppose in the current and all previous periods, both $x_t$ and its forecast were both equal to 5. Next period, however, $x_{t+1} = 10$ and remains at this level forever. Prove that adaptive expectations are not rational. Assume that $\lambda = 0.5$. (Hint – what is the nature of the forecast errors?)

This year’s expectation of $x$ next year is found by:

$$x_{t+1}^e = x_t^e + \lambda (x_t - x_t^e)$$

so

$$x_{t+1}^e = 5 + 0.5(5 - 5) = 5$$

This forecast will prove to be wrong, since now $x$ jumps to 10 and remains at that value. Next year’s forecast of the following year’s $x$ is given by (updating the formula):

$$x_{t+2}^e = x_{t+1}^e + \lambda (x_{t+1} - x_{t+1}^e)$$

so

$$x_{t+2}^e = 5 + 0.5(10 - 5) = 7.5$$

Repeating this process for the following year we have:

$$x_{t+3}^e = x_{t+2}^e + \lambda (x_{t+2} - x_{t+2}^e)$$

so

$$x_{t+3}^e = 7.5 + 0.5(10 - 7.5) = 8.75$$

Our forecast is getting closer to 10 but it will never quite get there. Our forecasts are consistently low; we have a biased estimator. One of the conditions for a rational forecast is that it be unbiased. Note that the problem with the forecast is not that there was an error, all forecasts have errors, it is the systematic nature of the error which makes the forecast non-rational.

4. (10) True or False: Portfolio decisions by the non-banking public and the banking sector have important implications for the Fed’s ability to control the money supply.

This statement is true, especially in the short run. The Fed can control the monetary base reasonably well, as discussed in question 1. This results in control over the money supply via the money multiplier. The money multiplier is given by:

$$m = \frac{1}{\frac{C_D}{C_D} + \frac{R_D}{R_D} + \frac{ER_D}{ER_D}}$$

Portfolio decisions by individuals can thus have an impact on the money multiplier and the money supply. If individuals choose to hold more of their portfolio as currency rather than checking deposits, the money multiplier will fall. Similarly, banks’ decisions about excess reserve holdings will affect the money multiplier. An increase in the excess reserve ratio will reduce the money multiplier. Fluctuations in $C_D$, and $ER_D$ therefore reduce the Fed’s control over the money supply.

5. (20) Relate Marvin Goodfriend’s description of “Go-Stop” monetary policy with Christina Romer’s characterization of post-War World II business cycles.

Go-Stop policy followed this pattern, according to Goodfriend: 1 the Fed tightened too late to preempt inflation; 2 inflation expectations were raised by #1, so interest rate increases had to be more severe to reduce inflation; 3 the public was only receptive to tight money for a brief period, and the Fed often missed this window; 4 the Fed found it easier to prolong tightening once it was in place than to preempt inflation, so the stop phase was lengthened. All of these contribute to the Fed’s actions exacerbating the cyclical volatility of the economy. Romer’s article suggests that policy in this period actually reduced the severity of recessions in some periods and produced robust expansions in others (pp.36-37 and Fig.2) thus reducing volatility.
6. The following questions are based upon Robert Lucas’s imperfect information model:

a. (10) What three factors influence demand in each market?

Market demand is influenced by the relative price of the product, real income, and shocks to demand. As relative price increases, demand falls. As real income rises, demand rises (goods are normal). Shocks to demand are relative shocks with mean zero across goods.

b. (20) Give an intuitive explanation for the signal extraction problem. What are the implications for the slope of the aggregate supply curve?

Agents observe their own price, but do not observe the current price level. They must therefore infer relative price movements from nominal price movements. Their ability to extract the relative price signal from the general price noise will depend upon the relative volatilities of their price and the price level. A more volatile general price level reduces agents’ ability to extract relative price signals. When they observe their own price change, they attribute much of this to changes in the aggregate price level and so do not change their supply decisions. The Aggregate Supply curve is therefore more steep in a volatile economy, because changes in price are perceived as inflation. In a more stable economy, a change in price is more likely to be perceived as a relative price change, and thus induce output changes. Less volatile economies therefore have flatter AS curves.

7. (15) The Federal Reserve System dramatically changed operating procedures in 1979. What was the nature of this change and what events motivated it?

The acceleration of inflation during the 1970s inspired Paul Volcker to introduce dramatic changes in Fed operating procedures in 1979. Volcker realized that interest rates would have to rise significantly in order to curb inflation and restore public confidence in the Fed. The Fed had been criticized for its use of the Federal Funds Rate as an operational target, as this had caused overshooting of the monetary objectives. The FOMC moved to targeting reserve measures consistent with 3-month growth rates of M1. The Fed chose the quarterly M1 growth rates, then calculated various reserve targets consistent with this. For more details see Muelendyke Ch.2 pp 48-52