Midterm 2 Exam Answers

This exam is 70 minutes long, and is worth 70 points. Part I is multiple choice, Part II is a short answer. The points are allocated in proportion to the time you should spend on each problem.

PART I: Multiple Choice [20 minutes total, 2 points each]. Do NOT explain.

1. For this question, assume that individuals do NOT hold currency (i.e., \( c = 0 \)). If the ratio of reserves to deposits is .10, the money multiplier is:
   a. 0.1
   b. 0.9
   c. 4
   d. 5
   e. 10

2. The natural level of employment (\( N \)) will increase when which of the following occurs?
   a. an increase in the markup of prices over costs.
   b. a reduction in unemployment benefits.
   c. an increase in the actual unemployment rate.
   d. all of the above.
   e. none of the above.

3. Suppose workers and firms expect the overall price level to increase by 5%. Given this information, we would expect that:
   a. the nominal wage will increase by less than 5%
   b. the nominal wage will increase by exactly 5%
   c. the nominal wage will increase by more than 5%
   d. the real wage will increase by 5%
   e. the real wage will increase by less than 5%

4. Which of the following events will cause an increase in the aggregate price level?
   a. an increase in the unemployment benefits
   b. a reduction in the markup
   c. a reduction in \( P_e \)
   d. an increase in the unemployment rate
   e. none of the above
5. As product markets become more competitive and the markup decreases, we would expect which of the following to occur?
   a. no change in the real wage in the medium run
   b. an increase in the aggregate price level and an increase in output in the medium run
   c. an increase in the interest rate in the medium run
   d. no change in output in the medium run
   e. an increase in the real wage in the medium run

6. Assume that expected inflation is based on the following: \( \pi_t^e = \theta \pi_{t-1} \). If \( \theta = 1 \), we know that:
   a. a reduction in the unemployment rate will have no effect on inflation
   b. low rates of unemployment will cause steadily increasing rates of inflation
   c. the actual unemployment rate will not deviate from the natural rate of unemployment
   d. the Phillips curve illustrates the relationship between the level of inflation rate and the level of the unemployment rate

7. Okun's law relation for the United States is represented by which of the following?
   a. \( u_t - u_{t-1} = -\beta (g_y t - 3\%) \)
   b. \( u_t - u_{t-1} = -(1/\beta)(3\% - g_y t) \)
   c. \( \pi_t - \pi_{t-1} = -\alpha (u_t - u_n) \)
   d. \( g_y t = g_m t - \pi_t \)
   e. none of the above

8. Which of the following events will cause a reduction in the size of the sacrifice ratio?
   a. decrease in \( \beta \)
   b. increase in \( \beta \)
   c. decrease in \( \alpha \)
   d. increase in \( \alpha \)
   e. none of the above

9. A consol bond promises to pay $1000 each year, forever, starting next year. If the nominal interest rate is 5%, the present discounted value of this consol is
   a. $900.00
   b. $995.00
   c. $2,500.00
   d. $20,000.00
   e. $25,000.00

10. Assume that the current one-year rate is 5% and the two-year rate is 7%. Given this information, the one-year rate expected one year from now is:
   a. 5%
   b. 6%
   c. 7%
   d. 9%
   e. 12%
PART II: Short Answer [50 minutes total]

1. (18 minutes total) Aggregate demand-aggregate supply. Suppose price adjustment is described by:

\[ P_t = P_t^e (1 + \mu) F \left( 1 - \frac{Y_t}{L} , z \right) \]

Where

\[ P_t^e = P_{t-1} \]

Assume for now the labor force is constant. Aggregate demand is given by:

\[ Y_t = Y \left( \frac{M_t}{P_t} , G_t , T_t \right) \]

1.1. (6 points) Assume that oil prices rise for one period, in period 1. Show what happens in period 1, using both IS-LM/AD-AS graphs. You may assume the initial price level, \( P_0 \), equals 1, the initial income level, \( Y_0 = Y_n \).

Note the long run AS curve shifts in as short run AS shifts up, as price of oil (PE) rises permanently in period 1.
1.2 (6 minutes) Using the AD-AS graph and words, indicate what path the economy takes to medium run equilibrium in the above model, assuming the government does not respond using either fiscal or monetary policy. Briefly explain why the economy takes this path.
1.3. (6 points) Returning to 1.1, show what happens if the government attempts to restore full employment in period 1 using monetary policy, carefully indicating the curve shifts (using IS-LM/AD-AS diagram). Show what happens to output, the price level and the interest rate in the short run. Which curve has shifted (indicate by how much)? Once again, you may assume the initial price level, $P_0$, equals 1, the initial income level, $Y_0 = Y_n$. 
If the authorities (mistakenly) think \( Y_n \) is unchanged, then they will shift out the LM curve, and AD curve, with \( M = M_1 \) (shown below). In this case the price level will rise the next period as the AS curve shifts up. If however, the authorities understand the \( Y_n \) has shifted to \( Y'n \), then the authorities will shift in the LM curve.
2. (22 minutes total) Crowding out with liquidity trap. Suppose the IS curve is:

\[ Y = \frac{\Lambda_0 - b_2 \ell}{1 - c_1 (1 - t_1)} = b_1 \]

where \( \Lambda_0 = 10, b_2 = 2, (1 - c_1 (1 - t_1)) - b_1 = 2 \)

2.1 (6 minutes) Suppose the liquidity-money equation is \( \frac{M^0}{2} = \mu_0 + Y - h \ell \), where

\( M^0 = 20, P = 2, \mu_0 = 2, h = .5 \). Suppose we slightly increase government spending. Plot the IS-LM relationship before and after the government policy. Make sure you fully plot the LM relationship!

IS: \( Y = 5 - I \); LM: \( i = 0 \) if \( Y < 8 \), \( i = 2Y - 16 \) if \( Y \geq 8 \)

![Graph of IS and LM curves](image)

2.2 (6 minutes) Now, suppose that the LM relationship is \( \frac{M^0}{P} = \mu_0 + Y - h \ell + \frac{w_{m, b}}{P} \), where the real stock of bonds outstanding is 10, \( M^0 = 20, P = 2, \mu_0 = 2, h = .5, \ell = 1 \) (note that \( \mu_0 \) is different!). Suppose, again, that engage in government spending. Plot the IS-LM relationship before and after the government policy. Under which LM curve is government spending more effective?

Same equations for IS, LM
2.3 (5 minutes) Graphically construct the AD curve using the IS-LM equilibrium from part a (no need to solve algebraically, though it might help!). In other words, your answer should have both the AD relationship on one graph and the IS-LM relationship on another. Make sure to label your axes.

20/P=2+Y-.5i, so that

2.4 (5 minutes) Now, look at the graph you've made. Indicate in the graph over what range prices can vary without changing output. Why is this?

Only when P is between 0 and 40/14 w/ Y=5

3. (10 minutes total) Consider the pricing formula for a stock price:
$Q_t = \frac{D^e_{t+1}}{(1+i_{1t})} + \frac{Q^e_{t+1}}{(1+i_{1t})}$

3.1 (4 minutes) Write out the formula for the stock price as a function of expected future dividends, assuming no bubbles. Show your work.

Notice by iteration what the expected stock price is, using (15.A1):

$Q^e_{t+1} = \frac{D^e_{t+2}}{(1+i_{1t})} + \frac{Q^e_{t+2}}{(1+i_{1t})}$

Substituting into the given equation yields:

$Q_t = \frac{D^e_{t+1}}{(1+i_{1t})} + \frac{D^e_{t+2}}{(1+i_{1t})(1+i_{1t+1})} + \frac{Q^e_{t+2}}{(1+i_{1t})(1+i_{1t+1})}$

$Q_t = \frac{D^e_{t+1}}{(1+i_{1t})} + \frac{D^e_{t+2}}{(1+i_{1t})(1+i_{1t+1})} + ... + \frac{D^e_{t+n}}{(1+i_{1t})(1+i_{1t+1})} + \frac{Q^e_{t+n}}{(1+i_{1t})(1+i_{1t+1})}$

3.2 (6 minutes) Consider what happens if GDP increases. Discuss what happens to stock prices, including in your answer a discussion of the importance of Fed policy. Use graphs.

$Q_t = \frac{D^e_{t+1}}{(1+i_{1t})} + \frac{Q^e_{t+1}}{(1+i_{1t})}$

$Q_t = \frac{D^e_{t+1}}{(1+i_{1t})} + \frac{D^e_{t+2}}{(1+i_{1t})(1+i_{1t+1})} + \frac{Q^e_{t+2}}{(1+i_{1t})(1+i_{1t+1})}$

Notice that with an increase in GDP, dividends are likely to rise; with an upward sloping LM curve, so too is the short term interest rate. Hence, both numerator and denominator rise, so that the net effect is ambiguous. However, if the Fed accommodates, then the stock price should surely rise, ceteris paribus. If the Fed tightens sufficiently so income is constant and dividends constant, then stock prices will fall.