Please sign the following oath:

The answers on this test are entirely my own work. I neither gave nor received any aid while taking this test. I will not discuss the questions on this test until after 3:30 p.m. on March 22, 2007.

____________________
Signature

Any test turned in without a signature indicating that you have taken this oath will be assigned a grade of zero.

Graph Instructions

When drawing diagrams, the following rules apply:

a. Completely, clearly and accurately label all axis, lines, curves, and equilibrium points.

b. The original diagram and equilibrium points MUST be drawn in black or pencil.

c. The first shift of any curve(s) or line(s) and the new equilibrium points MUST be drawn in red.

d. The second shift of any curve(s) or line(s) and new equilibrium points MUST be drawn in blue.

e. The third shift of any curve(s) or line(s) and new equilibrium points MUST be drawn in green.

Do NOT open this test until instructed to do so.

Good Luck!
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A. **Multiple Choice Questions.** Mark the letter corresponding to the best answer in the assigned space at the bottom of the page. (3 points each; total of 30 points.)

1. Research has shown that small firms are much more responsive to changes in the cost of credit than large firms because they have fewer internal funds. So, if a country as a higher proportion of small firms then:
   
   a. The LM curve would be steeper.  
   b. **The IS curve would be flatter.**  
   c. The IS curve would be steeper.  
   d. The country would have a higher monetary base.  
   e. None of the above.

2. According to Okun’s Law, what variable would tell us the most about the demand for labor in an economy?
   
   a. The level of the money supply.  
   b. **The level of production.**  
   c. The money multiplier.  
   d. The marginal product of labor.  
   e. The level of marginal tax rates.

3. Research has shown that people become more risk adverse during recessions which tends to reduce both investment and lending by banks. So, within the IS-LM framework, an increase in uncertainty would:
   
   a. Shift the IS curve inwards.  
   b. Shift the LM curve inwards.  
   c. Shift the LM curve outwards.  
   d. **a. and b.**  
   e. **a. and c.**

4. Suppose that when the German economy booms Germans like to consume more U.S.-made goods. Thus, if the German economy is at its NAIRU and the German money multiplier suddenly increases, then:
   
   a. The German IS curve shifts outwards.  
   b. **The U.S. IS curve shifts outwards.**  
   c. The U.S. LM curve shifts outwards.  
   d. The U.S. IS curve steepens.  
   e. The fiscal policy multiplier in the U.S. increases.

5. Suppose the Federal Reserve maintains constant interest rates. After which fiscal policy change would the Fed have to increase the money supply the most?
   
   a. **A permanent tax cut to consumers.**  
   b. A temporary tax cut to consumers.  
   c. A permanent tax hike for consumers.  
   d. A temporary tax hike for consumers.  
   e. A tax cut of unknown duration for consumers.

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6. According to the Beveridge Curve, there is a negative relationship between unemployment and advertised job vacancies. Combining this with Okun’s Law would give:
   a. A negative relationship between advertised job vacancies and the NAIRU.
   b. A positive relationship between advertised job vacancies and the NAIRU.
   c. A negative relationship between advertised job vacancies and output.
   d. **A positive relationship between advertised job vacancies and output.**
   e. No relationship between advertised job vacancies and output.

7. According to Tobin’s Q theory of investment a rise in interest rates lowers stock prices and, ultimately, investment by firms. If this is true, we would analyze a rise in the interest rate in the IS-LM model as:
   a. A shift inwards of the LM curve.
   b. A shift outwards of the IS curve.
   c. A shift inwards of the IS curve.
   d. a. and b.
   e. **a. and c.**

8. There is a good deal of evidence suggesting that richer people increase their saving rate when the interest rate rises. This would suggest that:
   a. Monetary policy is more effective in richer countries.
   b. Monetary policy is less effective in richer countries.
   c. The marginal propensity to consumer is higher in richer countries.
   d. Inequality reduces savings rates.
   e. None of the above.

9. Which of the following should be of most concern?
   a. A large actual budget deficit.
   b. A large cyclical budget deficit.
   c. **A large structural budget deficit.**
   d. A small NAIRU.
   e. A large money multiplier.

10. According to the LM curve, a rise in autonomous consumer demand would:
    a. **Raise interest rates.**
    b. Lower interest rates.
    c. Increase the money supply.
    d. Lower the price level.
    e. Reduce the money supply.
B. IS - LM Model Problems. Answer BOTH of the following questions based on the standard models developed in class.

1. Suppose there is no cyclical unemployment but there is a large government budget deficit and a significant international trade deficit. In addition, the central bank always maintains a stabilizing monetary policy at this level of income. The government now increases its spending on infrastructure, education, and research and development. These expenditures immediately make the economy more productive but this effect is smaller than the effect of government spending on equilibrium income. (35 points.)

   a. Based only on this information, use an IS – LM Model diagram with an Okun’s Law diagram to accurately and clearly show the effects of these changes on equilibrium income, the interest rate, the unemployment rate and the natural rate of unemployment.
b. Provide a brief economic explanation of the changes you showed in your diagram above as well as the adjustment process that that the economy undergoes with respect to equilibrium income, the interest rate, the unemployment rate, and the natural rate of unemployment.

Because there is no cyclical unemployment the economy is at potential output, $Y_0 = Y_0^*$. Interest rates are at $R_0$ and the unemployment rate is at the natural rate of unemployment, $U_0 = U_0^*$.

The increase in government spending increases income, shifts the IS curve to the right from $IS_0$ to $IS_1$, and increases income by a multiplied amount. The increase in income raises the demand for money, $L$. The demand for money, $L$, is now greater than the fixed supply of money, $Ms/P$, i.e., $L > Ms/P$. This causes interest rates to rise from $R_0$ to $R_1$. Higher interest rates restrain some interest-sensitive spending and limit the increase in income to $Y_1$.

Higher interest rates reduce the demand for money while higher income increases the demand for money. However, interest rates must rise sufficiently to reduce the overall demand for money until it equals the unchanged supply of money.

In addition, the increase in government spending also increases potential output from $Y_0^*$ to $Y_1^*$ because the spending is on infrastructure, education, and research and development that makes the economy more productive. Because this effect is smaller than the effect of government spending on income, the increase in $Y^*$ from $Y_0^*$ to $Y_1^*$ is less than the increase in $Y$ from $Y_0$ to $Y_1$.

The increase in income from $Y_0$ to $Y_1$ reduces the unemployment rate from $U_0$ to $U_1$ according to Okun’s Law. The increase in potential output from $Y_0^*$ to $Y_1^*$ reduces the natural rate of unemployment from $U_0^*$ to $U_1^*$. The actual unemployment rate, $U_1$, is below the new natural rate of unemployment, $U_1^*$, i.e., $U_1 < U_1^*$.

Because the central bank follows a stabilizing policy at the initial income level, $Y_0$, they engage in a contractionary monetary policy (through an open market sale of government securities). This reduces the money supply, $Ms/P$, and shifts the LM curve to the left from $LM_0$ to $LM_2$.

The supply of money, $Ms/P$, is now less than the demand for money (at $Y_1$, $R_1$). This causes interest rates to rise from $R_1$ to $R_2$. This increase in interest rates restrains interest-sensitive spending and reduces income along the IS curve from $Y_1$ to $Y_3$, which is now equal to $Y_0$. Higher interest rates and lower income reduce the demand for money until it equals the lower supply of money.

The decline in income from $Y_1$ to $Y_3$ will increase the unemployment rate from $U_1$ to $U_3$ according to Okun’s Law. Because $Y_3 = Y_0$, $U_3 = U_0$. The actual unemployment rate, $U_3$, is now above the new, lower natural rate of unemployment, $U_1^*$, i.e., $U_3 > U_1^*$.

Net result: Actual income did not change because the central bank followed a stabilizing monetary policy. Consequently, the actual unemployment rate did not change. Interest rates were higher because of the combination of an expansionary fiscal policy and a contractionary monetary policy. Potential output rose because the economy became more productive as a result of the increased government spending on infrastructure, education, and research and development. As a result, the natural rate of unemployment declined.
c. After the effects of all of these changes have been completed, compared the value of each of the following variables with their value at the initial equilibrium, i.e., indicate whether the variables are higher, lower, the same, or indeterminate. Also provide a brief explanation for why this is the case.

i. Consumer spending:

   Lower. Income has not changed but interest rates are higher. Higher interest rates reduce consumer spending.

ii. Investment:

   Lower. Income has not changed but interest rates are higher. Higher interest rates reduce investment.

iii. Government budget balance:

   Lower. Government spending has increased but tax revenues are unchanged because income is unchanged.

iv. Net exports:

   Lower. Income has not changed but interest rates are higher. Higher interest rates reduce exports and increase imports.

v. The demand for money:

   Lower. Income has not changed but interest rates are higher. Higher interest rates reduce the demand for money (to match the reduced supply of money).
2. Suppose that the actual budget deficit is greater (in absolute value) than the structural budget deficit. The government wants to use fiscal policy to move the economy toward its potential level. However, because they are worried about the size of the budget deficit, they decide to simultaneously reduce tax rates for low income (high marginal propensity to consume) households and raise tax rates for high income (low marginal propensity to consume) households. These changes in tax rates are structured so that they do not change the total tax revenues generated at the initial income level. (35 points.)

a. Based only on this information, use an IS – LM Model diagram with a Budget Balance line to accurately and clearly show the effects of these changes in tax rates on equilibrium income, the interest rate, the actual budget balance, and the structural budget balance.
b. Provide a brief economic explanation of the changes you showed in your diagram above as well as the adjustment process that the economy undergoes with respect to equilibrium income, the interest rate, the actual budget balance, and the structural budget balance.

The actual budget deficit is greater (in absolute value) than the structural budget deficit, so the actual budget balance, ABB, is less than the structural budget balance, SBB, i.e., ABB0 < SBB0. This occurs when actual economic output, Y, is below potential output, Y*, i.e., when Y < Y*. Interest rates are at R0.

The reduction in tax rates for low income/high marginal propensity to consume households combined with the increase in tax rates for high income/low marginal propensity to consume households that keeps tax revenues constant at the initial income level increases the economy’s average marginal propensity to consume but without changing its average tax rate.

The increase in the average marginal propensity to consume causes consumption to rise, shifting the IS curve to the right from IS0 to IS1, and increasing income by a multiplied amount. The increase in income increases the demand for money, L. The demand for money, L, is now greater than the fixed supply of money, Ms/P, i.e., L > Ms/P. This causes interest rates to rise from R0 to R1. Higher interest rates restraints interest sensitive spending and limits the increase in income to Y1, which now equals potential output, Y*.

Higher interest rates will reduce the demand for money while higher income will increase the demand for money. Interest rates must rise by enough to reduce the demand for money by exactly the same as the rise in income increases the demand for money because the supply of money has not changed.

Because the economy’s average tax rate has not changed, there is no shift in the budget balance, BB, line. However, because income has increased, tax revenues rise. This causes the actual budget balance to increase from ABB0 to ABB1. Because the economy is now at potential output, Y*, the actual budget balance equals the structural budget balance which has not changed, i.e., ABB1 = SBB0 = SBB1.

Net Result: Income has increased because this tax reform was an expansionary policy by increasing the economy’s average marginal propensity to consume. Interest rates are higher because of the expansionary fiscal policy. The actual budget balance improved while the structural budget balance was unchanged.
c. After all of the effects of this fiscal policy change have been completed, compare the value of each of the following variables with their value at the initial equilibrium, i.e., indicate whether the variables are higher, lower, the same, or indeterminate. Also provide a brief explanation for why this is the case.

i. Consumer spending:

   Higher. The changes in the tax rates caused an increase in the average marginal propensity to consume. This led to an initial increase in consumption, a multiplied increase in income, and a further induced increase in consumption. Higher interest rates reduced consumption slightly.

ii. Investment:

   Lower. Higher interest rates reduce investment.

iii. Tax revenues:

   Higher. Although the average tax rate did not change, income rose, causing an increase in tax revenues.

iv. Net exports:

   Lower. Higher interest rates reduce exports and increases imports. Higher income increases imports. Lower exports and higher imports reduce net exports.

v. The demand for money:

   No change. Higher income increases the demand for money while higher interest rates reduce the demand for money. Because the supply of money has not changed, these two factors must exactly offset one another so that the overall demand for money does not change.