Midterm 1 Answers

The total time for the exam is 60 minutes, although you are given 70 minutes to complete it. Points are allocated proportionally to the time allocations.

**Part I: Multiple Choice (21 minutes)**

1. If the J-curve is a relevant phenomenon, then a devaluation will lead to
   a. an initial improvement in the trade balance and a worsening in the long-run.
   b. an initial worsening of the trade balance and an improvement in the long-run.
   c. an initial worsening of the trade balance and a greater worsening in the long-run.
   d. an initial improvement in the trade balance and a greater improvement in the long-run.
   e. large short-run demand responses.

2. If the elasticity of export and import demands are 0.7 and 0.3 respectively (and supply elasticities are infinite), and the country initially has balanced trade, a devaluation will lead to
   a. a trade deficit.
   b. a trade surplus.
   c. a decline in export revenue greater that the decline in import revenue.
   d. no change in the trade balance.
   e. none of the above.

3. Under a fixed exchange rate regime, the official exchange rate
   a. must collapse if the central bank no longer has foreign currency reserves.
   b. must equate private supply and demand for a currency.
   c. will lead to a balance of payments deficit.
   d. is maintained by the central bank's willingness to buy and sell currency at the official rate.
   e. none of the above.

4. A country is running a current account deficit. Which of the following might be true?
   a. The central bank is reducing its holdings of foreign assets, but its residents are not reducing their holdings of foreign assets. The private financial account is in balance.
   b. Official reserves transactions are zero and its residents are reducing their holdings of foreign assets.
   c. The central bank is increasing its holdings of foreign assets, but its residents are not reducing their holdings of foreign assets. The private financial account is in balance.
   d. (a) and (b).
   e. none of the above.

5. Suppose today, the exchange rate (from the American perspective) was 1.60 $/£, and a year previously, it was 1.80 $/£. Then,
   a. the pound has appreciated against the dollar over the past year.
   b. compared against a year ago, it now takes more dollars to purchase a single pound.
   c. the dollar has depreciated against the pound over the past year.
   d. (a) and (b)
   e. none of the above.
6. A devaluation
a. raises the price paid by foreigners for domestic exports and lowers the price of imports.
b. does not change the price paid by foreigners for domestic exports and lowers the price of imports.
c. lowers the price paid by foreigners for domestic exports and lowers the price of imports.
d. **lowers the price paid by foreigners for domestic exports and raises the price of imports.**
e. raises the price paid by foreigners for domestic exports and raises the price of imports.

7. A country running a current-account surplus is
a. reducing claims on foreigners.
b. building up a positive net foreign asset position.
c. reducing its net foreign asset position.
d. accumulating claims on foreigners.
e. **(b) and (d).**

**Part II: Short Answer (39 minutes)**

In the following questions 1-4, “box in” your algebraic answers.
Consider the following economy:

<table>
<thead>
<tr>
<th>Eq.No.</th>
<th>Equation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>$Y = AD$</td>
<td>Output equals aggregate demand, an equilibrium condition</td>
</tr>
<tr>
<td>(2)</td>
<td>$AD \equiv C + I + G + X - IM$</td>
<td>Definition of aggregate demand</td>
</tr>
<tr>
<td>(3)</td>
<td>$C = C + c(Y - T + TR)$</td>
<td>Consumption function, $c$ is the MPC</td>
</tr>
<tr>
<td>(4)</td>
<td>$T = tY$</td>
<td>Tax function; $t$ is tax rate.</td>
</tr>
<tr>
<td>(5)</td>
<td>$TR = \bar{TR}$</td>
<td>Fiscal transfers function (e.g., social security payments)</td>
</tr>
<tr>
<td>(6)</td>
<td>$I = \bar{I}$</td>
<td>Investment function</td>
</tr>
<tr>
<td>(7)</td>
<td>$G = \bar{G}$</td>
<td>Government spending on goods and services</td>
</tr>
<tr>
<td>(9)</td>
<td>$X = \bar{X} + nq$</td>
<td>Export spending</td>
</tr>
<tr>
<td>(10)</td>
<td>$IM = \bar{IM} + mY - vq$</td>
<td>Import spending</td>
</tr>
</tbody>
</table>

1. (5 minutes) Solve for $Y$. Show your work.

$$Y = AD = \bar{C} + c(Y - T + TR) + \bar{I} + \bar{G} + \bar{X} - \bar{IM} - mY + (n + v)q$$

Collect up terms:

$$Y = \bar{A} + \bar{X} - \bar{IM} + (cY - ctY - mY) + (n + v)q$$

where $\bar{A} \equiv \bar{C} + c\bar{TR} + \bar{I} + \bar{G}$

Shift “$Y$” terms to the left hand side:

$$Y - (cY - ctY - mY) = \bar{A} + \bar{X} - \bar{IM} + (n + v)q$$

$$Y[1 - c(1-t) + m] = \bar{A} + \bar{X} - \bar{IM} + (n + v)q$$

Divide both sides by the term in the square bracket to obtain equilibrium income, $Y_0$:  2
\[ Y_0 = \left( \frac{1}{1-c(1-t)+m} \right) [\bar{A} + \bar{X} - \bar{IM} + (n+v)q] \]
let \( \alpha = \left( \frac{1}{1-c(1-t)+m} \right) \)

2. (5 minutes) Calculate the change in income for a change in the real exchange rate. Show your work!

Take the total differential of the answer to 1.

\[ \Delta Y = \alpha [\Delta A + \Delta X - \Delta IM + (n+v)\Delta q] \]

Since all autonomous spending is kept constant, then:

\[ \Delta Y = \alpha (n+v)\Delta q \]

\[ \frac{\Delta Y}{\Delta q} = \alpha (n+v) \]

3. (5 minutes) Calculate the change in the trade balance for a given change in the real exchange rate. Hint: \( TB \equiv X - IM \). Show your work!

To figure out what happens to the trade balance in response to changes in government spending, take the definition of the trade balance:

\[ TB \equiv X - IM = (\bar{X} + vq) - (\bar{IM} + mY - nq) \]

Break up the changes in the trade balance in the changes in the constituent parts,

\[ \Delta TB = \Delta X - \Delta IM - mY + (n+v)q \]

To figure out the change in the trade balance, hold constant autonomous exports and imports, and substitute in for the change in income:

\[ \Delta TB = -m\alpha (n+v)\Delta q + (n+v)\Delta q \]

\[ \Delta TB = (1 - m\alpha) (n+v)\Delta q > 0 \]

4. (5 minutes) Calculate the change in the budget balance for a change in the real exchange rate. Hint: \( BuS \equiv T - G - TR \). Show your work!

Substitute in the functional forms for each component:

\[ BuS = tY - \bar{G} - \bar{TR} \]

Take the total differential:

\[ \Delta BuS = t\Delta Y - \Delta G - \Delta TR \]

Hold constant the change in autonomous spending components (government spending
and transfers), and substitute in for the change in income:

\[ \Delta BuS = t\alpha(n + \nu)\Delta q > 0 \]

5. (4 minutes) Explain the economics of why you obtain the results in 4.

When the exchange rate is devalued, then exports increase, imports decrease, thereby spurring aggregate demand. Higher income leads to higher tax revenues, which increases the budget balance.

Now consider an IS-LM model, where

5. (5 minutes) Draw the economy in an initial state of equilibrium (you can assume no imports and exports, the IS curve is downward sloping, the LM is upward sloping).

6. (5 minutes) Show what happens to output and interest rates when the money supply is decreased.

The reduction in the money supply, with fixed price level, results in a reduction in the real money supply; the LM curve shifts up and in. The rise in the interest rates from \( i_0 \) to \( i_1 \), reduces investment, and this reduction in investment is multiplied into a decrease in output, from \( Y_0 \) to \( Y_1 \).
7. (5 minutes) Suppose investment does not depend on the interest rate. Show what happens when the money supply is decreased. What is the impact on output?

The IS curve equation is generally:

\[ Y = \bar{\alpha}[\bar{\delta} + \bar{\pi} - \bar{\eta}M + (n + v)\bar{\eta} - b]\]

The slope of the IS curve when there are no imports or exports: \(-\frac{1-c}{b}\). The interest sensitivity of investment is \(-b\); when \(b\) is zero, the slope is infinite, i.e., the IS curve is vertical. A decrease in the money supply shifts in the LM curve, but the resulting increase in interest rates has no effect on investment, and hence no effect on output.