Midterm Practice Problems

Where a qualitative response (discussion) is requested, be as brief and clear as possible; longer answers are not necessarily better!

1. Terra is a small, open economy, and is running a trade deficit (NX<0).
   a. Draw the savings-investment graph for Terra and show the level of savings, the level of investment, the world interest rate, and the trade deficit on the graph.
   b. If Terra cut off all trade and foreign investment with the rest of the world, it would be like a closed economy. If it implemented this policy, what would happen to Terra's level of savings, investment, and the interest rate (would each rise or fall)?

2. In Terra, the elasticity of output with respect to capital is 0.25, and the elasticity of output with respect to labor is 0.75. The capital stock is growing at 3% per year, and employment is growing at 1.5% per year.
   a. If output growth is 5% per year, what is the rate of productivity growth?
   b. During a recession, Terra's output growth becomes negative, equal to -1.0%. Employment growth slows to 0.5% and the growth in the capital stock slows to 1% per year. What is the rate of productivity growth now?
   c. (4) Would you immediately conclude from part (b) that Terra's workers and capital have become less productive, or might there be another explanation?

3. Terra is a small developing economy. Terra is running a trade deficit (NX<0).
   a. An international investor argues that Terra is a bad risk because of its trade deficit. Using the savings-investment graph with a given world interest rate, show how the trade deficit is related to investment in Terra. Is the trade deficit necessarily a sign of a weak economy?
   b. Suppose that the government of Terra starts running a large budget deficit; this means that government savings falls and becomes negative. Show this effect on the savings-investment graph. How would this affect the trade deficit?
   c. Would the increased budget deficit cause you to be more (or less) concerned about the risk of investing in Terra? Why?

4. When the Federal Reserve **loosens** monetary policy (expansionary monetary policy), operationally they perform an open market operation.
   
   a. (Circle one) True or False In this open market operation, the Fed would buy bonds and give currency in exchange.
b. This expansionary open market operation tends to stimulate output by (circle all that apply):
   i. Lowering short term interest rates
   ii. Putting more money in the hands of the public to increase consumption
   iii. Lowering the cost of capital and encouraging investment
   iv. Increasing the printing of currency, which the government then spends.

c. If the Fed indicated that it was "willing to do whatever it takes" to fight a recession, and would even "accommodate inflation", how effective do you think expansionary monetary policy would be? What would be the effect on inflation?

5. Terra's economy over the last 12 years:

<table>
<thead>
<tr>
<th>Time period</th>
<th>1990-1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor growth</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Capital growth</td>
<td>4%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Output growth</td>
<td>5%</td>
<td>1%</td>
<td>2%</td>
</tr>
</tbody>
</table>

a. Calculate productivity growth for the 3 time periods above to fill in the last row of the table. (Assume that the "elasticity of output with respect to labor" is .65 and that the "elasticity of output with respect to capital" is .35.)

b. Terra is currently in a recession, which began in 2000 and seemed to be ending in 2001. Would you say that the recession was caused by low productivity and that productivity is leading the recovery? What other factors might explain your productivity calculations above?

6. US net exports were -400 billion dollars in 2000 (eg, the net export deficit was $400 billion). This was matched by a $400 billion surplus on the capital/financial account (capital inflows = $400 billion).

a. Draw a savings and investment diagram for the US as an open economy. Show the world interest rate, the level of savings, the level of investment, and the net export deficit (or equivalently, the capital/financial account surplus) on the graph.

b. The value of the dollar has been falling recently, which some commentators have interpreted as a reduction in demand for US (dollar-denominated) assets. This could mean a reduction in capital inflows into
the US. If this happens, the diagram you drew above cannot be the equilibrium anymore. If demand for US assets did fall (putting downward pressure on capital inflows), what would tend to happen to the following (would they rise or fall, and briefly say why)?

i. Net exports

ii. Investment

iii. US interest rates

iv. National Saving

7. Aggregate investment has been consistently higher than national saving in the US for the past decade. This implies that (circle all that apply – no explanation necessary)

a. There are capital inflows from abroad.
b. There is a government budget surplus.
c. There is a current account deficit (essentially, a trade deficit, so NX < 0).
d. The interest rate is too high.

8. You have the following data on a large developing economy:

<table>
<thead>
<tr>
<th>(data in billions)</th>
<th>1998</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption</td>
<td>150</td>
<td>180</td>
</tr>
<tr>
<td>Residential Investment</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Business Investment</td>
<td>10</td>
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<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Government Spending</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>Exports</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>Imports</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>Money Supply</td>
<td>140</td>
<td>300</td>
</tr>
<tr>
<td>Consumer Price Index</td>
<td>115</td>
<td>230</td>
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<td>Government Revenue</td>
<td>75</td>
<td>90</td>
</tr>
</tbody>
</table>

a. Compute GDP in 1998 and in 2002

b. Compute the trade deficit/surplus in 1998 and 2002 (be clear about whether there is a surplus or deficit in each year).


d. If you were a private bank (or the IMF) looking at conditions in this country in 2002, briefly explain if you would be concerned about
i. Monetary policy? Why?
ii. Fiscal policy? Why? (we’ll have more to say on this point using material after the midterm!)
iii. Bonus: If this country was trying to maintain a fixed exchange rate, would the trade surplus/deficit reinforce or soothe your concerns about monetary policy? Why?
Solutions to Midterm Practice Problems

1. Terra is running a trade deficit (NX<0).
   a. Draw the savings-investment graph for Terra and show the level of savings, the level of investment, the world interest rate, and the trade deficit on the graph.

   ![Graph showing savings, investment, and trade deficit]

   b. If Terra cut off all trade and foreign investment with the rest of the world, it would be like a closed economy. If it implemented this policy, what would happen to Terra's level of savings, investment, and the interest rate (would each rise or fall)? If Terra cut off all trade and foreign investment, it could no longer borrow at the world interest rate, r*. Equilibrium would therefore be at the intersection of desired Saving and desired Investment above. The interest rate would therefore rise above the world rate, savings would rise, and investment would fall.

2. In Terra, the elasticity of output with respect to capital is 0.25, and the elasticity of output with respect to labor is 0.75. The capital stock is growing at 3% per year, and employment is growing at 1.5% per year.
   a. If output growth is 5% per year, what is the rate of productivity growth?
      Using growth accounting, productivity growth = 5% - (0.25×3%) - (0.75×1.5%) = 3.125%
   b. During a recession, Terra's output growth becomes negative, -1.0%. Employment growth slows to 0.5% and the growth in the capital stock slows to 1% per year. What is the rate of productivity growth now?
      productivity growth = -1% - (0.25×1%) - (0.75×0.5%) = -1.625%
   c. Would you immediately conclude from part (b) that Terra's workers and capital have become less productive, or might there be another explanation? While productivity growth is negative, it may be that firms are still holding capital and workers that are under-utilized. These
workers and capital may not be intrinsically less productive, it's just that firms may not fire workers or sell off capital that they expect to need in the future. Employment growth and capital growth thus don't fall as much as output growth does, which is measured as lower productivity.

3. a. Terra has a trade deficit because investment exceeds savings. This may be because there are many good investment projects in Terra, which would be a sign of strength, not weakness. The trade deficit is mirrored by a capital account surplus, which means that there is foreign investment in Terra.

b. The trade deficit will rise because domestic savings falls, so more investment must be financed from abroad (via a larger capital account surplus).
c. Would the increased budget deficit cause you to change your answer to the worried investor in part (a)? Possibly: the trade deficit increased due to a reduction in savings, not an increase in investment. The increase in the budget deficit necessitates increased foreign borrowing in order to finance investment. (More detail we’ll cover after the midterm, but to be realistic, if the budget deficit is sufficiently large, it may not be sustainable, and the government may have to finance it with seignorage (causing inflation), or by raising taxes and/or cutting spending, both of which are contractionary.)

4. The Federal Reserve loosens monetary policy
   a. (Circle one) True or False In this open market operation, the Fed would buy bonds and give currency in exchange.
   b. This expansionary open market operation tends to stimulate output by (choose all that apply):
      i. Lowering short term interest rates
      ii. Putting more money in the hands of the public to increase consumption
      iii. Lowering the cost of capital and encouraging investment
      iv. Increasing the printing of currency, which the government then spends.
   c. These statements undermine the Fed's credibility and would likely lead to price increases and inflation. This reduces the "recession-fighting" power of monetary policy, since if prices rise, there is no increase in the real value of money balances and no reduction in real interest rates. The monetary expansion then only promotes inflation.

5. Terra's economy over the last 12 years:

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<tr>
<td>Productivity growth</td>
<td><strong>2.95</strong></td>
<td><strong>-0.35</strong></td>
<td><strong>1.30</strong></td>
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   a. Calculate productivity growth for the 3 time periods above to fill in the last row of the table. (Assume that the "elasticity of output with respect to labor" is .65 and that the "elasticity of output with respect to capital" is .35.)

   90-99 Productivity growth = 5% - (.65×1% + .35×4%) = 2.95%
   2000 Productivity growth = 1% - (.65×1% + .35×2%) = -0.35%
   2001 Productivity growth = 2% - (.65×0% + .35×2%) = 1.30%
b. Terra is currently in a recession, which began in 2000 and seemed to be ending in 2001. Would you say that the recession was caused by low productivity and that productivity is leading the recovery? What other factors might explain your productivity calculations above?

_There is probably a cyclical movement in measured productivity caused by labor hoarding._ Notice that labor growth stayed constant in 2000 (=1%) while output growth fell from 5% to 1%. The lower productivity measure is probably due to underutilization of workers, rather than to technological regress. Similarly, as output recovers in 2001, labor growth has stopped (=0%), so workers look more productive as output recovers, but this may be due to greater worker effort or unmeasured overtime, rather than to technological improvement._

6. US net exports were -400 billion dollars in 2000 (eg, the net export deficit was $400 billion). This was matched by a $400 billion surplus on the capital/financial account (capital inflows = $400 billion).

a. Draw a savings and investment diagram for the US as an open economy. Show the world interest rate, the level of savings, the level of investment, and the net export deficit (or equivalently, the capital/financial account surplus) on the graph.

![Diagram of savings and investment](image-url)
b) The value of the dollar has been falling recently, which some commentators have interpreted as a reduction in demand for US assets. This could mean a reduction in capital inflows into the US. If this happens, the diagram you drew above cannot be the equilibrium anymore. If capital inflows did fall, what would tend to happen to the following (would they rise or fall, and briefly say why):

i. Net exports - must fall since the capital account surplus falls. A falling dollar will stimulate exports and make imports more expensive, so \( NX = X-M \) tends to rise (or the deficit falls)

ii. Investment - tends to fall since investment has been funded from abroad, so a reduction in capital inflows "starves" investment. Equivalently, the interest rate increase depresses investment (see next item)

iii. US interest rates - tend to rise in order to attract capital from abroad.

iv. Saving - higher interest rates promote savings, and higher savings tend to close the gap left by the departure of foreign investment.

To see all of this in a graph...
7. Aggregate investment has been consistently higher than national saving in the US for the past decade. This implies that (circle all that apply – no explanation necessary)
   a. There are capital inflows from abroad.
   b. There is a government budget surplus.
   c. There is a current account deficit (essentially, a trade deficit, so NX < 0).
   d. The interest rate is too high.

8. You have the following data on a large developing economy:

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   a. Compute GDP in 1998 and in 2002

   \[ Y = C + I + G + X - M \]
   \[ 1998: 150+10+10+5+75+50-40 = 260 \]
   \[ 2002: 180+13+11+2+150+60-120 = 296 \]

   b. Compute the trade deficit/surplus in 1998 and 2002 (be clear about whether there is a surplus or deficit in each year).

   \[ 1998: X - M = +10 \text{ trade surplus} \]
   \[ 2002: X - M = -60 \text{ trade deficit} \]


   \[ \text{Money growth} = \frac{300}{140} - 1 = 1.14 = 114\% \]
   \[ \text{Inflation} = \frac{230}{115} - 1 = 1.00 = 100\% \]

   d. If you were a private bank (or the IMF) looking at conditions in this country in 2002, briefly explain if you would be concerned about

   i. Monetary policy? Why?
Yes, money growth and hence inflation are very high. (It looks like money growth is financing a budget deficit, see below – we'll have more to say on this in Topic #4!).

ii. Fiscal policy? Why?

Yes, this is also a concern. The budget is initially balanced, and then there is a budget deficit = 120-60 = 60, or 20% of GDP, in 2002.

iii. Bonus: If this country was trying to maintain a fixed exchange rate, would the trade surplus/deficit reinforce or soothe your concerns about monetary policy? Why?

The country is running a trade deficit (X-M = -60 in 2002). This is consistent with an overvalued currency, since imports are “cheap” and exports are “expensive” when the currency is overvalued. This is consistent with the country’s high inflation and money growth, which should be associated with a devaluing currency. If the country is instead trying to keep its exchange rate fixed, then the currency is likely overvalued.