Econ 100B
Macroeconomic Analysis
Professor Steven Wood
Fall 2008

Exam #1 ANSWERS

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 5:00 p.m. on October 2, 2008.

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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:

1. Completely, clearly and accurately label all axes, lines, curves, and equilibrium points.

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

3. The first change in any variable, curve, or line and any new equilibrium points MUST be drawn in red.

4. The second change in any variable, curve, or line and any new equilibrium points MUST be drawn in blue.

5. The third change in any variable, curve, or line and any new equilibrium points MUST be drawn in green.

Do NOT open this test until instructed to do so.

Good Luck!
A. **Multiple Choice Questions.** Circle the letter corresponding to the best answer. (3 points each; total of 30 points.)

1. Which of the following would lead to a decrease in the marginal product of labor for every quantity of labor?
   a. An increase in the real wage.
   b. A decrease in the real wage.
   c. A beneficial supply shock.
   d. **An adverse supply shock.**

2. A sharp decrease in stock prices makes people much less wealthy. If the main effect of this decreased wealth is felt on labor supply, what happens to current employment and the real wage rate?
   a. Both employment and the real wage rate would increase.
   b. Both employment and the real wage rate would decrease.
   c. **Employment would increase and the real wage rate would decrease.**
   d. Employment would decrease and the real wage rate would increase.

3. If consumers believe that next year a recession will occur, then the real interest rate ______ and investment ______.
   a. Decreases; decreases.
   b. **Decreases; increases.**
   c. Increases; increases.
   d. Increases; decreases.

4. If the United States had a capital and financial account deficit of $50 billion, we could say that the U.S. had:
   a. Net imports of $50 billion.
   b. Net foreign borrowing of $50 billion.
   c. **Net foreign lending of $50 billion.**
   d. A current account deficit of $50 billion

5. When a temporary beneficial supply shock hits a small open economy it causes the current account to ______ and investment to ______.
   a. Decrease; decrease.
   b. **Increase; remain unchanged.**
   c. Decrease; remain unchanged.
   d. Increase; decrease.
6. Suppose that a large open economy is currently running a large capital and financial account deficit. The country then imposes capital controls that prohibit foreign borrowing and lending by domestic residents. This imposition of the capital controls will cause:

   a. Net exports to increase.
   b. The real domestic interest rate to increase.
   c. The real world interest rate to decrease.
   **d. Desired national saving to decrease.**

7. The real domestic interest rate would increase in a large open economy if:

   **a. There was a temporary negative domestic supply shock.**
   b. The government imposed capital controls and the capital and financial account had been in deficit.
   c. Foreigners were more willing to save.
   d. There was a temporary negative supply shock abroad in a small open economy.

8. In microeconomic theory the average real wage rate depends positively on the level of capital per worker. Given this fact, what will happen to the real wage rate in an economy, according to the Solow Growth Model, if technology (or productivity) increases?

   **a. The real wage rate will increase.**
   b. The real wage rate will decrease.
   c. The real wage rate will remain unchanged.
   d. The real wage rate will initially increase but subsequently decrease to its initial level.

9. Suppose that the economy is initially at its steady state. Then an earthquake destroys half of the capital stock but does not affect the labor force. In response to the earthquake, the saving rate increases. Then, comparing the new (post-earthquake) steady state to the initial (pre-earthquake) steady state:

   **a. Output-per-worker will be higher.**
   b. Output-per-worker will be lower.
   c. Output-per-worker stays the same.
   d. Output-per-worker could be either higher or lower.

10. According to supply-side economists, lower income tax rates stimulate higher productivity and more private saving. If this theory was true, then in the long-run within the Solow Growth Model, a decrease in income tax rates WILL ALWAYS:

    a. Increase income-per-worker.
    b. Decrease income-per-worker.
    c. Leave income-per-worker unchanged.
    **d. Could either increase or decrease income-per-worker.**
B. Answer BOTH of the following questions in the space provided. (35 points each, total of 70 points.)

1. **Open Economy S\(^d\) – I\(^d\) Model.** Suppose that the world economy is composed of only two large, open-economy countries—the United States and China—and that the U.S. is running a substantial current account deficit.

   a. Based only on this information, use a 2-country Open Economy S\(^d\) – I\(^d\) diagram to accurately and clearly show:

      i. The initial equilibrium in both countries,
      ii. The effect on the world real interest rates as well on desired national saving, desired investment, and the current account balance in both countries of:

         1. A temporary adverse supply shock in China, and
         2. An increase in wealth and a decrease in the effective corporate tax rate in the United States.
b. Provide a brief economic explanation of the changes you have shown in your diagram above. Be sure to discuss the adjustment process that both countries undergo as they move from their initial equilibriums to their final equilibriums as a result of the temporary adverse supply shock in both countries. Be sure to discuss what happens in to:

i. The world real interest rate,
ii. Desired national saving in both countries,
iii. Desired investment in both countries, and
iv. The current account balance in both countries.

In the 2-country large open economy model, the equilibrium real world interest rate is set at the level where the current account deficit of one country, in this case the U.S., is exactly equal in magnitude to the current account surplus of the other country, in this case China. The initial equilibrium world real interest rate is given by \( r_w^0 \).

At this equilibrium world real interest rate, the U.S. has a current account deficit given by \( CA_0 \), with desired savings of \( S^d_0 \) and desired investment of \( I^d_0 \) in the United States graph above. Also at this equilibrium world real interest rate, China has a current account surplus given by \( CA_0 \) with desired savings of \( S^d_0 \) and desired investment of \( I^d_0 \) in the China graph above.

In CHINA, a temporary adverse supply shock would cause current income to decrease, in turn causing the desired saving function to shift to the left from \( S^d_0 \) to \( S^d_1 \). Because the shock is temporary it has no effect on the desired investment function.

In the UNITED STATES, an increase in wealth could increase desired consumption and reduce desired saving, causing the desired saving function to shift to the left from \( S^d_0 \) to \( S^d_1 \). In addition, a decrease in the effective corporate tax rate would lower the tax-adjusted user cost of capital, increasing desired investment and causing the desired investment function to shift to the right from \( I^d_0 \) to \( I^d_1 \).

The declines in saving in both China and the U.S. reduce the worldwide supply of loanable funds at every real interest rate. The increase in desired investment in the U.S. increases the worldwide demand for loanable funds at every real interest rate. Because the worldwide demand for loanable funds now exceeds the worldwide supply of loanable funds, the world real interest rate must rise until a new equilibrium world real interest rate is reached at \( r_w^1 \) where the current account deficit in the U.S. is equal in magnitude to the current account surplus in China.

As the world real interest rate rises, several things happen.

In the UNITED STATES, a higher real interest rate will increase desired saving along the new desired saving function and reduce desired investment along the new desired investment function.

In CHINA, a higher real interest rate will also increase desired saving along the new desired saving function and reduce desired investment along the original desired investment function.

To be in equilibrium requires that the current account deficit in one country, the U.S., to be identically equal in magnitude to the current account surplus in the other country, China. However, exactly what happens to the current account balances in each country depends on the slopes of the desired saving and desired investment functions in both countries and the relative magnitude of the shifts in the desired saving functions in both countries and the desired investment function in the U.S. I have shown an increase in the current account deficit in the UNITED STATES and an increase in the current account surplus in CHINA.
2. **Solow Growth Model.** In the country of Akinback, an economy that can be described by the Solow Growth Model, income-per-worker is falling. Suddenly, a highly contagious disease kills one half of the younger workers in the labor force. The disease then quickly disappears. Other workers were not affected by the disease. Depreciation rates were not affected. However, in Akinback, younger workers have more job skills and higher saving rates than older workers.

a. Based only on this information, use a Solow Growth Model diagram to accurately and clearly show:

i. The economy’s initial economic situation,

ii. The effect of the disease on the Akinback’s capital-to-labor ratio and income-per-worker, and

iii. Akinback’s final steady state.
b. Provide a brief economic explanation/description of:

i. The capital-to-labor ratio, the level of income-per-worker, and the rate of economic growth at the economy’s initial economic situation,

Akinback’s initial steady state is at “A” with a capital-to-labor ratio of \((K/N)_A\) and income-per-worker of \((Y/N)_A\). If the economy were at this steady state, the economy’s long-run equilibrium growth rate would be the same as its labor force growth rate, i.e. \(\Delta Y/Y = \Delta N/N\).

However, because we are told that Akinback’s income-per-worker level is falling we know that economic growth must be less than labor force growth, i.e., \(\Delta Y/Y < \Delta N/N\). This means that Akinback’s actual position is above its steady state at “A”. The capital-to-labor ratio is \((K/N)_1 > (K/N)_A\) and income-per-worker is \((Y/N)_1 > (Y/N)_A\).

ii. Why you made the changes you have shown in your diagram above,

Three things then happen. First, the disease kills one half of the younger workers. This immediately reduces the size of the labor force, \(N\). As a result, the capital-to-labor ratio rises to \((K/N)_1 > (K/N)_0 > (K/N)_A\). This higher capital-to-labor ratio immediately increases income-per-worker to \((Y/N)_1 > (Y/N)_0 > (Y/N)_A\).

Second, these deaths increase the average age of the work force. Because younger workers have more job skills, average productivity decreases. This is represented by a decrease in the level of technology, \(A\), and shifts both the production function and the saving function down. As a result, while still at a capital-to-labor ratio of \((K/N)_1\), income-per-worker would fall from \((Y/N)_1\) to \((Y/N)_2\). [Depending on the size of the productivity change, \((Y/N)_2\) could be either greater than, equal to, or less than \((Y/N)_A\).]

Third, because these deaths increase the average age of the work force and younger workers have higher saving rates than older workers, the economy’s average saving rate, \(s\), decreases. This shifts the saving function down again.

The result of these last two factors is to create a new, lower steady state at “B”.

iii. The adjustment process that occurs during the transition period from the economy’s initial economic situation to its final steady state, and

However, the capital-to-labor ratio is actually at \((K/N)_1\). At this capital-to-labor ratio, balanced investment is now greater than actual investment, i.e., \(I_b/N > I_a/N\), because of the changes described above. This means that less actual investment is less than is required in order to keep the capital-to-labor ratio constant at \((K/N)_1\). As a result the capital-to-labor ratio will decrease. It will continue to decline until \(I_a/N = I_b/N\) again at \((K/N)_B\) when a new, lower steady state is reached at “B”. When the capital-to-labor ratio falls to \((K/N)_B\), income-per-worker will have fallen to \((Y/N)_B\) along the new, lower production function.

During the transition period from \((K/N)_1\) to \((K/N)_B\), the capital-to-labor ratio is falling. Consequently, the growth rate of the capital stock is less than the labor force growth rate, i.e., \(\Delta K/K < \Delta N/N\). Because the capital-to-labor ratio is falling so is income-per-worker. As a result, economic growth is also less than labor force growth, i.e., \(\Delta Y/Y < \Delta N/N\). This continues until the new, lower steady state at “B” is reached.
iv. The capital-to-labor ratio, the level of income-per-worker, and the rate of economic growth at the economy’s final steady state.

Once the new, lower steady state at “B” is reached, the capital-to-labor ratio will become constant at \((K/N)_B\) because actual investment will equal balanced investment, i.e., \(I_a/N = I_b/N\). As a result, the rate of growth of the capital stock will equal the growth rate of the labor force, i.e., \(\Delta K/K = \Delta N/N\). In addition, because the capital-to-labor ratio is constant at \((K/N)_B\), income-per-worker will also be constant at \((Y/N)_B\). As a result, the economy’s long-run equilibrium growth rate will equal its labor force growth, i.e., \(\Delta Y/Y = \Delta N/N\).