

Name: _____

SID : _____

Discussion Section: _____

**Economic 100B
Macroeconomic Analysis
Professor Steven Wood**

Spring 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 February 21, 2008.

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!

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

1. A winter ice storm has paralyzed the entire East Coast, reducing productivity sharply. This supply shock shifts the marginal product of labor curve:
 - a. To the right, raising the quantity of labor demanded at any given real wage rate.
 - b. To the left, reducing the quantity of labor demanded at any given real wage rate.**
 - c. To the right, reducing the quantity of labor demanded at any given real wage rate.
 - d. To the left, raising the quantity of labor demanded at any given real wage rate.

2. Research on labor supply generally shows that labor supply:
 - a. Rises in response to a permanent increase in the real wage but falls in response to a temporary increase in the real wage.
 - b. Rises in response to a temporary increase in the real wage but falls in response to a permanent increase in the real wage.**
 - c. Rises in response to both a temporary and a permanent increase in the real wage.
 - d. Falls in response to both a temporary and a permanent increase in the real wage.

3. The government announces a tax increase on workers' wages to take effect in the future. 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.

4. If the substitution effect of the real interest rate on saving is larger than the income effect of the real interest rate on saving, then a rise in the real interest rate leads to a _____ in consumption and a _____ in saving for someone who is a lender.
 - a. Fall; fall.
 - b. Fall; rise.**
 - c. Rise; rise.
 - d. Rise; fall.

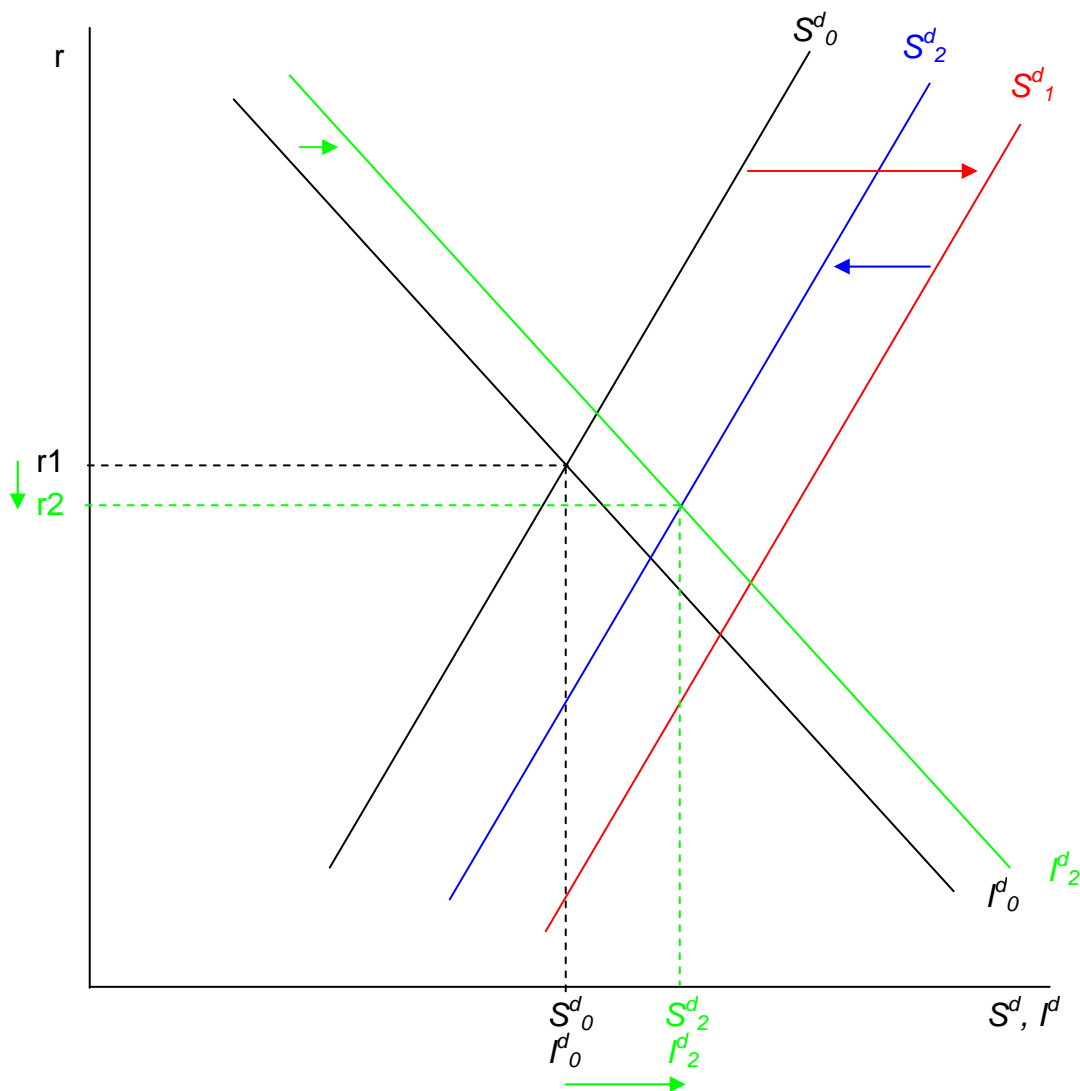
5. Suppose your company is in equilibrium with its capital stock at its desired level. A permanent increase in the depreciation rate now has what effect on your desired capital stock?
 - a. Raises it because the future marginal productivity of capital is higher.
 - b. Lowers it because the future marginal productivity of capital is lower.
 - c. Raises it because the user cost of capital is now lower.
 - d. Lowers it because the user cost of capital is now higher.**

6. If consumers foresee future taxes completely, a reduction in taxes this year that is accompanied by an offsetting increase in future taxes would cause:
- a. A rightward shift in the saving curve and a rightward shift in the investment curve.
 - b. No shift in either the saving or the investment curve.**
 - c. A leftward shift in the saving curve but no shift in the investment curve.
 - d. No shift in the saving curve but a rightward shift in the investment curve.
7. A new pollution law requires businesses to pay for inspections of their plants by independent pollution-monitoring firms. What effect is this likely to have?
- a. Increases productivity.
 - b. Increase the capital stock.
 - c. Reduce productivity.**
 - d. Increase the demand for labor.
8. An increase in pollution has caused a permanent increase in the rate of capital depreciation. This would cause:
- a. An increase in the capital-to-labor ratio.
 - b. Output-per-worker to fall.**
 - c. A decline in consumption-per-worker.
 - d. No change in the capital-to-labor ratio.
9. Endogenous growth theory attempts to:
- a. Replace the Solow Growth model with a model in which money growth plays a key role.
 - b. Explain how societies can more easily reach their steady states.
 - c. Show how population growth reduces capital and output.
 - d. Explain why productivity changes.**
10. A government policy that would reduce the saving rate is:
- a. Eliminating the social security system.
 - b. Giving tax breaks to increase the real return that savers receive.
 - c. Increasing the government budget deficit by increasing government spending.**
 - d. Changing the tax system to tax consumption instead of income.

B. Answer BOTH of the following questions in the space provided. (35 points each, total of 70 points.)

1. **Desired Saving – Desired Investment Model.** Suppose the economy was initially in equilibrium. A fall in home prices then caused household wealth to decline significantly. In response, Congress recently passed and the President just signed an economic stimulus bill. This bill will temporarily reduce income taxes for many households and reduce the effective corporate tax rate for many businesses. Assume that Ricardian equivalence DOES NOT hold and that the wealth effect is twice as large as the income tax effect which in turn is twice as large as the corporate tax effect.

- a. Based only on this information, use a Desired Saving – Desired Investment diagram to accurately and clearly show:
 - i. The economy’s initial equilibrium position,
 - ii. What effects these changes have on the economy’s level of investment, saving, and the real interest rate, and
 - iii. The economy’s final equilibrium position.



- b. Provide a brief economic explanation of the changes you showed in your diagram above as well as any adjustment process that occurs as the economy moves from its initial equilibrium position to its final equilibrium position. Be sure to discuss what happens to:
- i. Current consumption,
 - ii. National saving,
 - iii. Investment, and
 - iv. The real interest rate.

The economy is initially in equilibrium where $I^d_0 = S^d_0$ at a real interest rate of r_0 .

Three things now happen.

1. The decline in household wealth causes an increase in desired saving at every real interest rate level. This can be represented by a rightward shift of the desired savings line from S^d_0 to S^d_1 .
2. The temporary reduction in income taxes for many households will increase current consumption and decrease desired saving at every real interest rate level. This can be represented by a leftward shift of the desired savings line from S^d_1 to S^d_2 .

(Because the wealth effect is larger than the income tax effect, the leftward shift of the desired saving line from the reduction in income taxes is less than the rightward shift of the desired saving line from the decline in household wealth.)

3. The temporary reduction in the effective corporate tax rate reduces the tax-adjusted user cost of capital, increasing the desired capital stock, and increasing desired investment. This can be represented by a rightward shift of the desired investment line from I^d_0 to I^d_2 .

The combination of these three events creates a new equilibrium where $I^d_2 = S^d_2$ at a real interest rate of r_2 .

After these three events occur, desired saving is greater than desired investment at the original real interest rate of r_0 . This causes the real interest rate to decline from r_0 to r_2 . As the real interest rate declines, desired savings will decline along the new desired saving line, S^d_2 , and desired investment will increase along the new desired investment line, I^d_2 , until the new equilibrium is established.

Comparing the new equilibrium to the initial equilibrium, current consumption is lower because the effect of lower wealth is greater than the effect of lower income tax rates, national saving is higher, investment is higher because of both lower corporate tax rates and a lower real interest rate, and the real interest rate is lower because desired saving increased by more than desired investment at every real interest rate level.

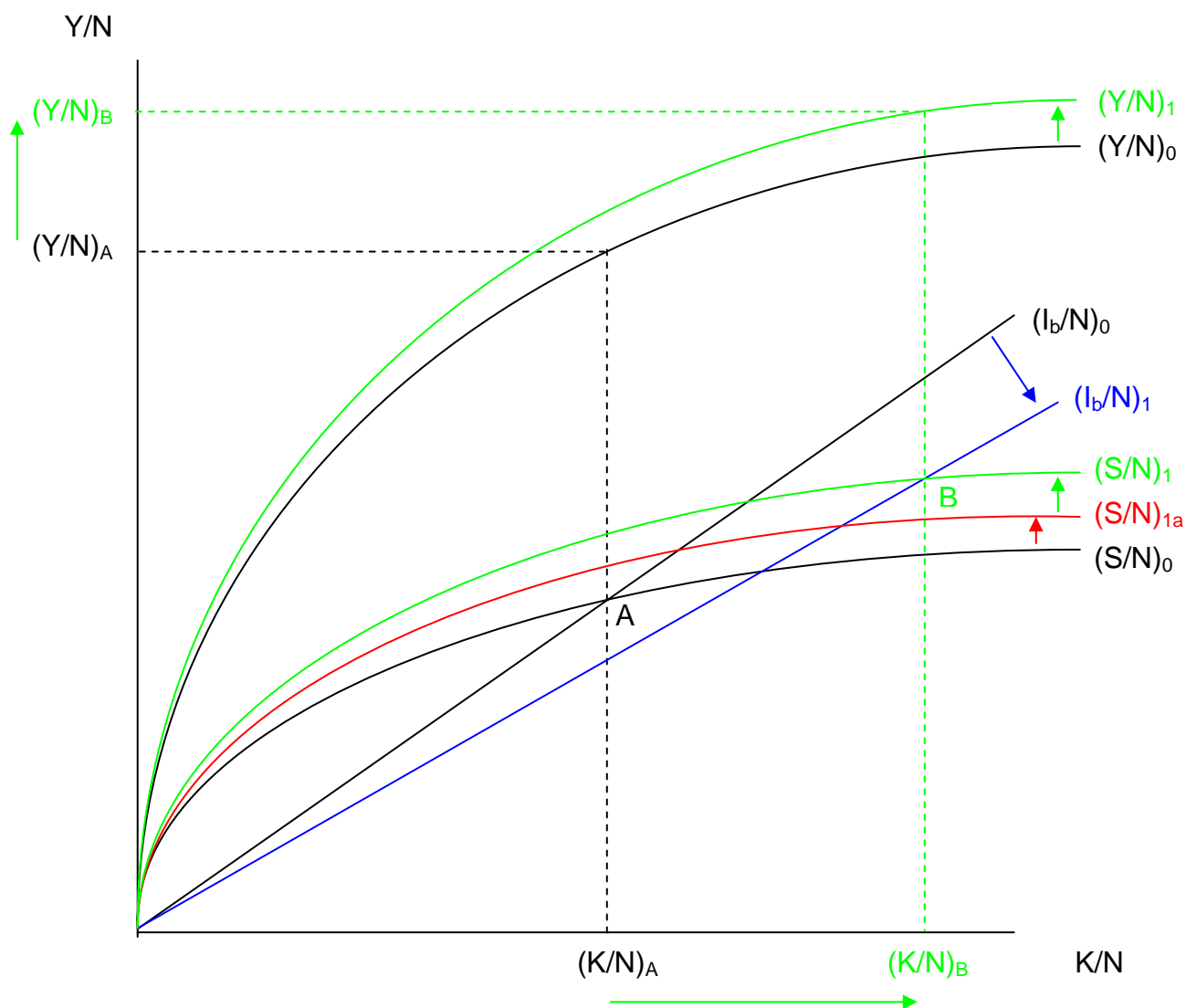
- c. How would your answers above be different if complete Ricardian equivalence DOES hold?

If Ricardian equivalence holds, then current consumption would not be affected by the temporary reduction in tax rates. Desired savings would increase because of the decline in household wealth and desired investment would increase because of the decrease in corporate tax rates. Because the wealth effect is larger than the corporate tax effect, the real interest rate would decline.

If Ricardian equivalence also holds at the corporate level, then desired investment would not change because of the reduction in corporate tax rates. In this case, desired saving line would still shift to the right, causing a decrease in the real interest rate, and leading to an increase in desired investment along the original desired investment line.

2. **Solow Growth Model.** In 2005, President Bush advocated the reform of Social Security because Americans were deemed to be under-saving for their retirement. Suppose that the U.S. economy was at its steady state in 2004 and that job skills and productivity fall with age. In response to the President's warnings about Social Security, the private saving rate in the U.S. increases substantially. At the same time, the large Baby Boom generation starts retiring in substantial numbers, a process that will take place over the next 20 years. This process lowers the average age of the workforce. The effect on the capital-to-labor ratio from the change in the saving rate is larger than the effect on the capital-to-labor ratio of changes in any other variables.

- a. Based only on this information, use a Solow Growth Model diagram to accurately and clearly show:
- The economy's initial steady state,
 - The effect of these changes on the economy's capital-to-labor ratio and income-per-worker, and
 - The economy's final steady state.



- b. Provide a brief economic explanation of the changes you showed in your diagram above as well as any adjustment process that occurs during the transition period from the economy's initial steady state to its final steady state. Be sure to discuss what happens to the capital-to-labor ratio, the level of income-per-worker, and the rate of economic growth:
- i. At the initial steady state,
 - ii. During the transition period, and
 - iii. At the final steady state.

The U.S. was initially at steady state A in 2004 with a capital-to-labor ratio of $(K/N)_A$ and an income-per-worker of $(Y/N)_A$. At this steady state, the rate of economic growth would be equal to the rate of labor force growth, i.e., $(\Delta Y/Y)_A = (\Delta N/N)_A$.

Three separate events happened in 2005.

1. There was a substantial increase in the private saving rate. This can be represented by an upward shift of the saving function from $(S/N)_0$ to $(S/N)_{1a}$.
2. The beginning of the retirement of the large Baby Boom generation that will take place over the next 20 years slows the growth rate of the labor force. This can be represented by a downward rotation of the balanced investment function from $(I_b/N)_0$ to $(I_b/N)_1$.
3. Because job skills and productivity fall with age and the average age of the workforce decreases, the level of productivity will increase. This can be represented by an upward shift of both the production function from $(Y/N)_0$ to $(Y/N)_1$ and the saving function from $(S/N)_{1a}$ to $(S/N)_1$.

As a result of these changes, the economy has a new steady state at B with a capital-to-labor ratio of $(K/N)_B$ and income-per-worker at $(Y/N)_B$. However, until the adjustment process begins, the economy's actual capital-to-labor ratio is still at $(K/N)_A$.

At an actual capital-to-labor ratio of $(K/N)_A$, actual saving and investment per worker is greater than balanced investment per worker, i.e., $S/N = I_a/N > I_b/N$ at $(K/N)_A$. Thus, the economy is actually investing more than is necessary to keep the capital-to-labor ratio constant. As a result, the capital-to-labor ratio will increase. This will continue until the economy reaches steady state B where the capital-to-labor ratio has risen to $(K/N)_B > (K/N)_A$ and $S/N = I_a/N = I_b/n$. At $(K/N)_B$, income-per-worker will be $(Y/N)_B > (Y/N)_A$.

During the transition period from steady state A to steady state B, as the capital-to-labor ratio rises, income-per-worker also increases along the new, higher production function. This means that income growth is greater than (the now slower) labor force growth, i.e., $\Delta Y/Y > (\Delta N/N)_B$.

In the long run, however, when the economy has achieved its new steady state at B, economic growth will once again be equal to labor force growth, i.e., $(\Delta Y/Y)_B = (\Delta N/N)_B$. However, because labor force growth has slowed, i.e., $(\Delta N/N)_B < (\Delta N/N)_A$, the rate of economic growth at steady state B will be slower than the rate of economic growth at steady state A, i.e., $(\Delta Y/Y)_B < (\Delta Y/Y)_A$.

THE END ☺