

MC _____
EXE I _____
EXE II _____
TOTAL _____

Econ 002 – INTRO MACRO – Prof. Luca Bossi – March 24, 2014
MIDTERM #2 SUGGESTED SOLUTIONS

My signature below certifies that I have complied with the University of Pennsylvania's Code of Academic Integrity in completing this examination. In particular, I declare that I have not used a graphing calculator to complete this exam.

Student Name (printed)

PennID

Signature

Date

Your TA Name (printed)

INSTRUCTIONS

The exam is composed of 21 multiple choice questions and two exercises. Unless stated otherwise, all multiple choice questions are worth 3 points (the total is 60 points for the multiple choice part). The exercises are worth 20 points each (the total is 40 points for the exercise part). You can detach the answer sheet for the MC part at the end of the exam if this is more comfortable for you. If that is the case, be sure to put your name on it and to tell your TA to staple it back to the exam when finished. If you do not fill in the MC part on time and request extra time at the end of the exam to write the answers up, a proctor will take your name and you will receive a penalty of 5 points. Please follow the instructions as to how to submit your exam at the end of the 60 minutes. If you do not follow those instructions and/or delay your exam submission, a proctor will take your name and you will receive a penalty that will depend on your (miss)behavior.

TOTAL POINTS = 100. TOTAL TIME = 60 minutes

Provide your answers on the exam sheet directly. Read all questions very carefully. Write legibly.

EXAM TAKING POLICY

If you need to use the restroom, raise your hand and wait for the proctor to come to you. Only one person can be out of the examination room at a time, and the proctor will hold onto your exam papers while you are out at the restroom.

FOR THE DURATION OF THE EXAM, AND WITH THE EXCEPTION OF YOUR ALLOWED SCIENTIFIC CALCULATOR, YOU HAVE TO TURN OFF EVERYTHING ELSE THAT HAS A POWER BUTTON. NO CELL PHONES. NO BOOKS. NO NOTES. NO HELP SHEETS. NO TALKING TO EACH OTHER. NO ASKING THE PROCTORS ANY QUESTION OR HELP TO SOLVE THE EXAM. YOU CANNOT CONNECT TO THE INTERNET.

WRITE IN PENCIL OR IN PEN AS YOU LIKE, BUT IF YOU WRITE IN PENCIL THERE IS NO POSSIBILITY TO ASK FOR RE-GRADING. PLEASE WRITE YOUR NAME ON EVERY SINGLE PAGE OF THE EXAM.

PLEASE DO NOT START THIS EXAM UNTIL INSTRUCTED TO DO SO.

GOOD LUCK!

MULTIPLE CHOICE QUESTIONS.

Identify the letter of the choice that best completes the statement or answers the question. Write your answer in the answer page for the MC provided on the last sheet of the exam.

1) Alice says that the present value of \$700 to be received one year from today if the interest rate is 6 percent is less than the present value of \$700 to be received two years from today if the interest rate is 3 percent. Beth says that \$700 saved for one year at 6 percent interest has a smaller future value than \$700 saved for two years at 3 percent interest.

- a. Both Alice and Beth are correct.
- b. Both Alice and Beth are incorrect.
- c. Only Alice is correct.
- d. **Only Beth is correct.**

2) Consider three imaginary closed economies. In Mainland, saving amounts to \$4,000 and consumption amounts to \$8,000; in Upland, saving amounts to \$2,000 and consumption amounts to \$15,000; and in Lowland, saving amounts to \$6,000 and consumption amounts to \$11,000. In all three economies $T = Tr = 0$. The national saving rate is

- a. higher in Mainland than in Lowland, and it is higher in Lowland than in Upland.
- b. **higher in Lowland than in Mainland, and it is higher in Mainland than in Upland.**
- c. higher in Lowland than in Upland, and it is the same in Upland and Mainland.
- d. higher in Mainland than in Upland, and it is the same in Mainland and Lowland.

3) The country of Bienmundo does not trade with any other country. Its GDP is \$30 billion. Its government purchases \$5 billion worth of goods and services each year, collects \$7 billion in taxes, and provides \$3 billion in transfer payments to households. Private saving in Bienmundo amounts to \$5 billion. What are consumption and investment in Bienmundo?

- a. **\$21 billion and \$4 billion, respectively**
- b. \$18 billion and \$5 billion, respectively
- c. \$13 billion and \$7 billion, respectively
- d. There is not enough information to answer the question.

4) Everything else the same, an increase in capital will increase real GDP per person

- a. more in a poor country than a rich country. The increase in real GDP per person will be larger if the addition to capital is from domestic rather than foreign investment.
- b. **more in a poor country than a rich country. The increase in real GDP per person will be the same whether the addition to capital is from domestic or foreign investment.**
- c. less in a poor country than a rich country. The increase in real GDP per person will be larger if the addition to capital is from domestic rather than foreign investment.
- d. less in a poor country than a rich country. The increase in real GDP per person will be the same whether the addition to capital is from domestic or foreign investment.

5) Given that Tamar is a risk-averse person, she might accept a bet with a 50 percent chance of losing \$100 today if she had a 50 percent

- a. chance of winning \$120 in two years and the interest rate was 11%.
- b. chance of winning \$114 in two years and the interest rate was 7%.
- c. **chance of winning \$110 in two years and the interest rate was 3%.**
- d. None of the above are correct; a risk averse person would not accept any of the above bets.

6) Which of the following is not correct?

- a. The higher average return on stocks than on bonds comes at the price of higher risk.
- b. Risk-averse persons will take the risks involved in holding stocks if the average return is high enough to compensate for the risk.
- c. **Insurance markets reduce risk, but not by diversification.**
- d. Risk can be reduced by placing a large number of small bets, rather than a small number of large bets.

7) Suppose that there are diminishing returns to capital and constant returns to scale. Suppose also that two countries are exactly the same except one has less capital and so less real GDP per person. Suppose that both increase their saving rate from 3 percent to 4 percent. It follows that

- a. both countries will have permanently higher growth rates of real GDP per person, and the growth rate will be higher in the country with more capital.
- b. both countries will have permanently higher growth rates of real GDP per person, and the growth rate will be higher in the country with less capital.
- c. both countries will have higher levels of real GDP per person, and the temporary increase in growth in the level of real GDP per person will have been greater in the country with more capital.
- d. **both countries will have higher levels of real GDP per person, and the temporary increase in growth in the level of real GDP per person will have been greater in the country with less capital.**

8) Suppose that a new government is elected in Eurnesia. The new government takes steps toward improving the court system and reducing government corruption. The citizens of Eurnesia find these efforts credible and outsiders believe these changes will be effective and long lasting. These changes will probably

- a. **raise real GDP per person and productivity in Eurnesia.**
- b. raise real GDP per person but not productivity in Eurnesia.
- c. raise productivity but not real GDP per person in Eurnesia.
- d. raise neither productivity nor real GDP per person in Eurnesia.

9) Investment in

- a. physical capital, unlike investment in human capital, has an opportunity cost.
- b. **physical capital, like investment in human capital, has an opportunity cost.**
- c. human capital is particularly attractive because it involves no externalities.
- d. human capital has been shown to be relatively unimportant, relative to investment in physical capital, for a country's long-run economic success.

10) All else equal, if there are diminishing returns to labor and diminishing returns to capital, then what happens to productivity if both capital and labor increase by the same amount?

- a. Productivity will definitely fall.
- b. Productivity will definitely be unchanged.
- c. Productivity will definitely rise.
- d. **None of the above are necessarily correct.**

11) Which of the following lists contains, in this order, natural resources, human capital, and physical capital?

- a. **For a restaurant: the land the restaurant was built on, the things the Chef learned at Cooking School, the freezers where the chops and steaks are kept.**
- b. For a furniture company: wood, the company cafeteria, saws.
- c. For a railroad: fuel, railroad engines, railroad tracks.
- d. None of the above is correct.

12) Which of the following is a certificate of indebtedness?

- a. both stocks and bonds
- b. stocks but not bonds
- c. **bonds but not stocks**
- d. neither stocks nor bonds

13) Jerry has the choice of two bonds, one that pays 3 percent interest and one that pays 6 percent interest. Which of the following is most likely?

- a. The 6 percent bond is less risky than the 3 percent bond.
- b. The 6 percent bond is a U.S. government bond, and the 3 percent bond is a junk bond.
- c. **The 6 percent bond has a longer term than the 3 percent bond.**
- d. The 6 percent bond is a municipal bond, and the 3 percent bond is a U.S. government bond.

14) If an economy is closed and if it has no government, then

- a. national saving = private saving.
- b. total income = consumption + investment.
- c. saving = total income - consumption.
- d. **All of the above are correct.**

15) Suppose a country has a consumption tax that is similar to a state sales tax. If its government were to eliminate the consumption tax and replace it with an income tax that includes an income tax on interest from savings, what would happen?

- a. There would be no change in the interest rate or saving.
- b. The interest rate would decrease and saving would increase.
- c. **The interest rate would increase and saving would decrease.**
- d. None of the above is correct.

16) Suppose you will receive \$500 at some point in the future. If the annual interest rate is 7.5 percent, then the present value of the \$500 is

- a. \$411.26 if the \$500 is to be received in 5 years and \$338.95 if the \$500 is to be received in 10 years.
- b. **\$348.28 if the \$500 is to be received in 5 years and \$242.60 if the \$500 is to be received in 10 years.**
- c. \$291.11 if the \$500 is to be received in 5 years and \$272.89 if the \$500 is to be received in 10 years.
- d. \$291.11 if the \$500 is to be received in 5 years and \$236.49 if the \$500 is to be received in 10 years.

17) A company that produces computer peripherals is considering buying some new equipment that it expects will increase future profits. If the interest rate rises, the present value of these future earnings

- a. rises. The company is more likely to buy the equipment.
- b. rises. The company is less likely to buy the equipment.
- c. falls. The company is more likely to buy the equipment.
- d. **falls. The company is less likely to buy the equipment.**

18) Nathan owns a coffee kiosk. All of his employees work 8 hours per day. In 2009, he employed 5 people who produced a total of 900 cups of coffee each day. In 2010, he hired a sixth employee and production increased to 1188 cups of coffee each day. In Nathan's kiosk, productivity

- a. **increased by 10 percent.**
- b. increased by 9 percent.
- c. decreased by 2 percent.
- d. increased by 1.11 percent.

19) Suppose you are deciding whether to buy a particular bond. If you buy the bond and hold it for 4 years, then at that time you will receive a payment of \$10,000. If the interest rate is 6 percent, you will buy the bond if its price today is no greater than

- a. **\$7,920.94.**
- b. \$8,225.06.
- c. \$7,672.58.
- d. \$6,998.98.

20) (2 POINTS) According to the assigned reading I gave you: **“Behavioral economics show that women tend to make better investments than men”** in their financial decisions

- a. Women are less loss averse than men, more emotionally unattached and are far quicker to unload losers.
- b. **Women are more loss averse than men, more emotionally unattached and are far quicker to unload losers.**
- c. Women are more loss averse than men, less emotionally unattached and are far quicker to unload losers.
- d. Women are more loss averse than men, more emotionally unattached and are far slower to unload losers.

21) (1 POINT) CAREFUL!! CHOOSE THIS ONE WISELY 😊😊 (New York Stock Exchange style)

In which year was the New York Stock Exchange established?

- a. 1817
- b. 1800 + 17
- c. 1900 - 83
- d. All of the above

EVERYONE GETS ONE POINT HERE. 😊

To get full credits in the exercises below you really need to show your work. If you write just a number as the answer and even if that number is correct you will not get full credits in the exercise unless you show fully the formulas and your work (how you got that number and the reasoning involved in your computation).

EXERCISE I (20 points)

In the closed economy of Geonosis, total income is 140 and consumption is 50. Given that r is measured in percentage points, the demand in the loanable funds market is represented by $I = 76 - 3r$. Private Savings is represented by the equation $S_{PR} = 15r + 13$. The government is currently running a budget deficit of 9. Assume there are no transfer payments in Geonosis.

a) (6 POINTS) Find the equilibrium quantity and interest rate in Geonosis' loanable funds market.

b) (7 POINTS) What is the equilibrium level of taxes, and government expenditures in Geonosis?

c) (4 POINTS) The government wants to stimulate the economy. Assume that private consumption is unchanged at 50, but the prime minister wants to set the government expenditures to 60 while simultaneously setting taxes to 15. What is the effect of this fiscal policy on Investments and subsequently, on current GDP of equilibrium?

d) (3 POINTS) A critic argues that the move of the government described in part c) will actually have a negative effect on the long run growth of the economy. Show graphically the effects of that fiscal policy on the market for loanable funds. Do you agree with this critic? Provide an economic argument as to why you agree or disagree with this critic.

PAPER FOR YOUR USE

Answers:

a. If the government has a budget deficit of 9, public savings $S_{PU} = -9$.

National savings are $S = S_{PU} + S_{PR}$.

Saving Supply = $S = -9 + 15r + 13$. $S = 4 + 15r$.

To find equilibrium quantity of loanable funds and r , set supply equal to demand, or $S = I$.

$4 + 15r = 76 - 3r$. $\rightarrow 18r = 72 \rightarrow r = 4$.

Then put $r = 4$ into the demand or supply equation to find

$S = I = 64$.

b. you know that $Y = C + I + G + NX \Rightarrow 140 = 50 + 64 + G + 0 \Rightarrow G = 26$

Since deficit is 9 $\Rightarrow T - G = -9 \Rightarrow T - 26 = -9 \Rightarrow T = 17$

Alternatively you can get to the same solution by doing this:

Disposable income (Y_D) = Consumption + Private savings.

Private savings = $15(4) + 13 = 73$. $\rightarrow Y_D = 50 + 73 = 123$.

If the total income is 140 and there are no transfer payments, then $Y = Y_D + \text{Taxes} \rightarrow$

Taxes (T) = $Y - Y_D = 140 - 123 = 17$. $T = 17$.

To find G , recall that $S_{PU} = T - G - Tr$. $-9 = 17 - G - 0 \rightarrow G = 26$.

c. If the government increases G to 60 and decreases T to 15, the new budget deficit is -45,

$S_{PU} = T - G = 15 - 60 = -45$.

The new equilibrium in the loanable fund market is found by setting the new national saving supply equal to the Investment demand.

$-45 + 15r + 13 = 76 - 3r \rightarrow 15r - 32 = 76 - 3r \rightarrow 18r = 108 \rightarrow r = 6$.

Hence, $S = I = 76 - 3(6) = 76 - 18 = 58$.

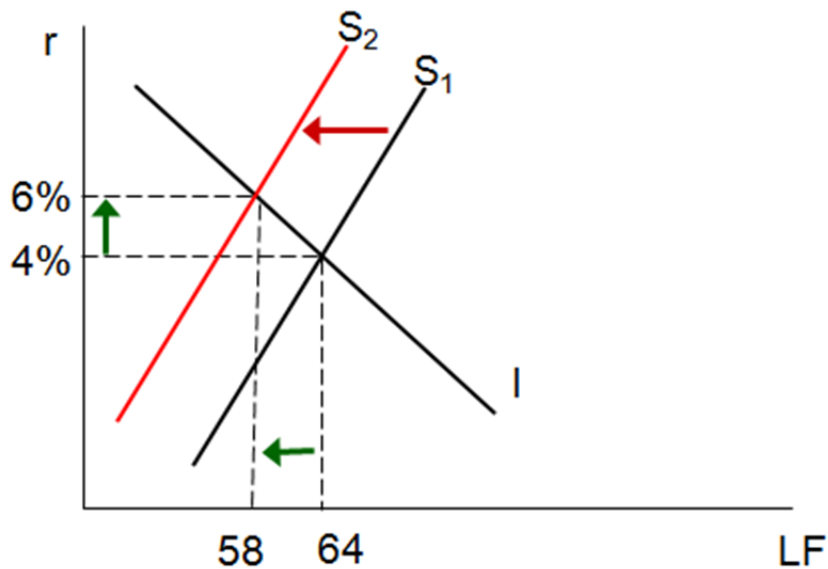
Output is $Y = C + I + G = 50 + 58 + 60 = 168$

In the short run the output increases and the economy is stimulated.

d. This critic is correct.

If this policy is implemented, the government runs a budget deficit of 45 (= 15-60), interest rate increases from 4% to 6% because the negative public saving decreases the total national saving supply. As a result, the quantity of investment of equilibrium decreases from 64 to 58 due to the increase in government spending (crowding out effect). Thus, since investment of equilibrium decreases, future growth will be lower. This is simple to understand by just thinking of the law of accumulation of physical capital in the Solow Model. The fiscal policy induces a temporary increase in output (from 140 to 163), but in the long run growth will be negatively impacted (lower Savings/Investment).

To show this graphically in the market for loanable funds, shift supply in the loanable funds market to the left due to the budget deficit increase and draw the new equilibrium with higher interest rate and lower investment and national savings of equilibrium.



EXERCISE II (20 points)

District 12 in Panem, the country of Katniss Everdeen, is a closed economy whose production function is given by the standard Cobb-Douglas:

$$Y_t = AK_t^\alpha L_t^{1-\alpha}$$

Where the technology parameter A is just a constant and equal to 3 always. The capital share parameter (α) is a constant equal to 0.3 always. You know that in this economy the number of workers in period t is given by L_t and the physical capital is given by K_t .

You are told that the economy of District 12 reaches its natural rate of output, Y_N whenever $L_t = K_t = 10,000$

You also know that in 2014 for the economy of District 12, $K_{2014} = 10,000$, but $L_{2014} = 9,000$

Tax revenues are: $T_{2014} = \tau_{2014} * Y_{2014} = 0.1 * Y_{2014}$

Social Security payments are: $SS_{2014} = 2,000$

Unemployment benefits are: $u_{2014} * (Y_N - Y_{2014}) = 0.01 * (Y_N - Y_{2014})$

Government spending, G, in 2014 is 1,000.

a) (12 POINTS) Compute the actual, structural, and cyclical primary budget deficit for the economy of District 12 in 2014. Show your work. Use 2 decimals for your computations in each step for THIS part of the exercise.

b) (8 POINTS) You are told that at the end of 2014 the debt to GDP ratio is 25% in District 12. The nominal interest rate is constant at 10%, the growth rate of GDP is constant at 1%, and these two figures are projected to stay the same for the next 2 years. Find the actual deficit to GDP ratio for this economy in 2014 and, assuming that District 12 is projected to keep the same actual deficit to GDP ratio of 2014 for the next foreseeable future, predict the debt to GDP ratio of District 12 in 2016? Use 4 decimals for your computations in each step for THIS part of the exercise.

PAPER FOR YOUR USE

Answers:

a) The natural rate of output in this case is:

$$Y_N = 3 * (10,000)^{0.3} (10,000)^{0.7} = 3 * (10,000)^{0.3+0.7} = 30,000$$

Output in 2014 is instead

$$Y_{2014} = 3 * (9,000)^{0.3} (10,000)^{0.7} = 27,867.05$$

So Output gap for 2014 = $Y_N - Y_{2014} = 30,000 - 27,867.05 = 2,132.95$

Let Tr_{2014} denote the total transfers in 2014, the actual primary budget deficit in 2014 is

$$DE_{2014} = G_{2014} + Tr_{2014} - T_{2014} = 1,000 + 2,000 + 0.01 * 2,132.04 - 0.1 * 27,867.05 = 234.62$$

The structural primary budget deficit in 2014 is computed by setting $Y_N = Y_{2014}$ so no output gap:

$$DE_{2014}^* = G_{2014} + SS_{2014} - 0.1 * Y_N = 1,000 + 2,000 - 0.1 * 30,000 = 0$$

The cyclical budget deficit is actual - structural deficit:

$$DE_{2014} - DE_{2014}^* = 234.62$$

b) The actual deficit to GDP ratio for this economy in 2014 is

$$\frac{DE_{2014}}{Y_{2014}} = \frac{234.62}{27867.05} = 0.0084$$

Now you just need to use the formula for budget debt to GDP ratio:

$$\frac{B_t}{Y_t} = \frac{DE_t}{Y_t} + \frac{(1+i) * B_{t-1}}{(1+o) * Y_{t-1}}$$

Recursively:

$$\frac{B_{2015}}{Y_{2015}} = \frac{DE_{2015}}{Y_{2015}} + \frac{(1+i) * B_{2014}}{(1+o) * Y_{2014}}$$

$$\frac{B_{2016}}{Y_{2016}} = \frac{DE_{2016}}{Y_{2016}} + \frac{(1+i) * B_{2015}}{(1+o) * Y_{2015}}$$

You are told that:

$$\frac{B_{2014}}{Y_{2014}} = 0.25$$

$$\frac{DE_{2014}}{Y_{2014}} = \frac{DE_{2015}}{Y_{2015}} = \frac{DE_{2016}}{Y_{2016}} = 0.0084$$

The key information is that the interest rate (i) in the formula is the nominal interest rate which is equal to 10% and that the growth rate of GDP is represented in the formula by o and is equal to 1%.

Solving:

$$\frac{B_{2015}}{Y_{2015}} = 0.0084 + \frac{1.1}{1.01} * 0.25 = 0.2807$$

$$\frac{B_{2016}}{Y_{2016}} = 0.0084 + \frac{1.1}{1.01} * 0.2807 = 0.3141$$

Under this scenario, District 12 will reach a debt to GDP ratio of 31.41% by 2016.

**MARK CLEARLY THE LETTER OF YOUR CHOICE FOR THE MULTIPLE CHOICE QUESTIONS
ONLY THIS PAGE WILL BE GRADED FOR THE MC PART.**

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|-----|---|---|---|---|
| 1. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
| 2. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
| 3. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
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| 5. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
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| 7. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
| 8. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
| 9. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
| 10. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
| 11. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
| 12. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
| 13. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
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| 19. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
| 20. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |
| 21. | Ⓐ | Ⓑ | Ⓒ | Ⓓ |