

name: \_\_\_\_\_

ECON 329  
International Finance  
Professor Ron Cronovich

Exam 2, version 2

Friday April 24, 2009

Instructions:

1. Do not open this exam booklet until told you may begin.
2. Turn off your cell phones and any other electronic devices (except pacemakers).
3. This is a closed book, closed notes exam. You may use a calculator.
4. Answer all questions within the context of material covered in this course.
5. Write legibly and on only one side of each page. If I can't read it, it's wrong.
6. Before you start writing, think about what you want to say. Including irrelevant information may reduce your score.
7. Please avoid using more than the available space for each question.
8. Show your work and/or explain your answer for questions that request it. This helps me determine the appropriate amount of partial credit to award if the answer is not perfect.

*GOOD LUCK!*

Part 1. Definitions

Give a concise, accurate definition of each of the following.

a. national saving

b. capital account

c. efficient level of investment

d. investment (macroeconomics definition)

e. external liabilities

Part 2. Problems and Applications

1. Present value

In a three-period model, South Korea's GDP, in U.S. dollars, equals \$800 billion in the present period, \$750 billion in the second period, and \$850 billion in the third period. Showing your work, compute the present value of South Korea's lifetime income (in dollars) assuming South Korea is completely financially open and can borrow or lend at the world interest rate,  $r^* = 0.04$ .

2. Consumption smoothing in the two-period model

Assumptions:

- i.* Great Britain is a small open economy with perfect capital mobility (i.e., no impediments to international borrowing and lending).
- ii.* There are two periods: the present is period 0 and the future is period 1.
- iii.* Britain begins period 0 with no external wealth or debt.
- iv.* Britain prefers its expenditure to be as smooth as possible.
- v.* The world interest rate,  $r^*$ , equals 8% in both periods.

a. Write down Britain's intertemporal budget constraint.

b. If Britain's GDP equals £500 billion in each of the two periods, what is Britain's trade balance in each period? Briefly explain your answer.

*this problem continues on the next page...*

- c. Now suppose a shock causes Britain's GDP in period 0 to fall by £60 billion (from £500 billion to £440 billion). The shock does not affect any other country. The shock is temporary, so Britain's GDP in period 1 equals £500 billion. Fill in the blanks, showing your work in the space below.

Britain's GNE falls by \_\_\_\_\_ in period 0 and \_\_\_\_\_ in period 1.

Britain's trade balance equals \_\_\_\_\_ in period 0 and \_\_\_\_\_ in period 1.

- d. In the face of this shock, does financial openness make Britain any better off than if Britain were closed? Briefly explain.

3. Balance of Payments and National Income and Product Accounts

Use the following information to answer the questions below. The U.S. is the home country.  
Show your work on all parts.

$C = 900$ ,  $I = 200$ ,  $G = 200$ , imports = 300, trade balance (a.k.a. net exports) =  $-100$   
1100 = income earned by U.S. factors of production located in the U.S.,  
200 = income earned by U.S. factors of production located in other countries,  
100 = income earned by foreign-owned factors of production located in the U.S.  
0 = incoming unilateral income transfers from other countries to the U.S.,  
100 = outgoing unilateral income transfers from the U.S. to other countries

a. Exports =

b. Gross National Expenditure (GNE) =

c. Gross Domestic Product (GDP) =

d. Net Factor Income from Abroad (NFIA) =

e. Gross National Income (GNI) =

f. Gross National Disposable Income (GNDI) =

g. Current Account =

4. The loanable funds model

- a. On the axes to the right, draw the graph of the closed economy loanable funds model. Label the axes and all curves, and label the initial equilibrium point A.



After the economy has been at point A for a while, engineers develop a new type of capital equipment that is more productive and also generates less pollution and carbon emissions than existing capital. Firms would like to purchase and use this new capital, and the government provides tax incentives to make doing so more affordable. Assume the government adjusts other taxes to keep total tax revenue unchanged.

- b. Depict the effects of these events on your diagram. Label the new equilibrium "B." As the economy moves from point A to point B, what happens to the following variables? Circle your answer.

private saving	<i>increases</i>	<i>decreases</i>	<i>does not change</i>
public saving	<i>increases</i>	<i>decreases</i>	<i>does not change</i>
investment	<i>increases</i>	<i>decreases</i>	<i>does not change</i>
real interest rate	<i>increases</i>	<i>decreases</i>	<i>does not change</i>
consumption	<i>increases</i>	<i>decreases</i>	<i>does not change</i>

- c. If this instead were a small open economy and the world interest rate  $r^*$  just happened to equal the interest rate at point A, then tell me how each of these variables would change as the economy moves from its initial equilibrium at point A to its new equilibrium.

national saving	<i>increases</i>	<i>decreases</i>	<i>does not change</i>
investment	<i>increases</i>	<i>decreases</i>	<i>does not change</i>
real interest rate	<i>increases</i>	<i>decreases</i>	<i>does not change</i>
consumption	<i>increases</i>	<i>decreases</i>	<i>does not change</i>
external wealth	<i>increases</i>	<i>decreases</i>	<i>does not change</i>

- d. Continuing the open economy scenario from part c, identify that point in your diagram that determines the new level of investment (if investment changes) and label it "C." Also, identify the trade balance on the diagram.

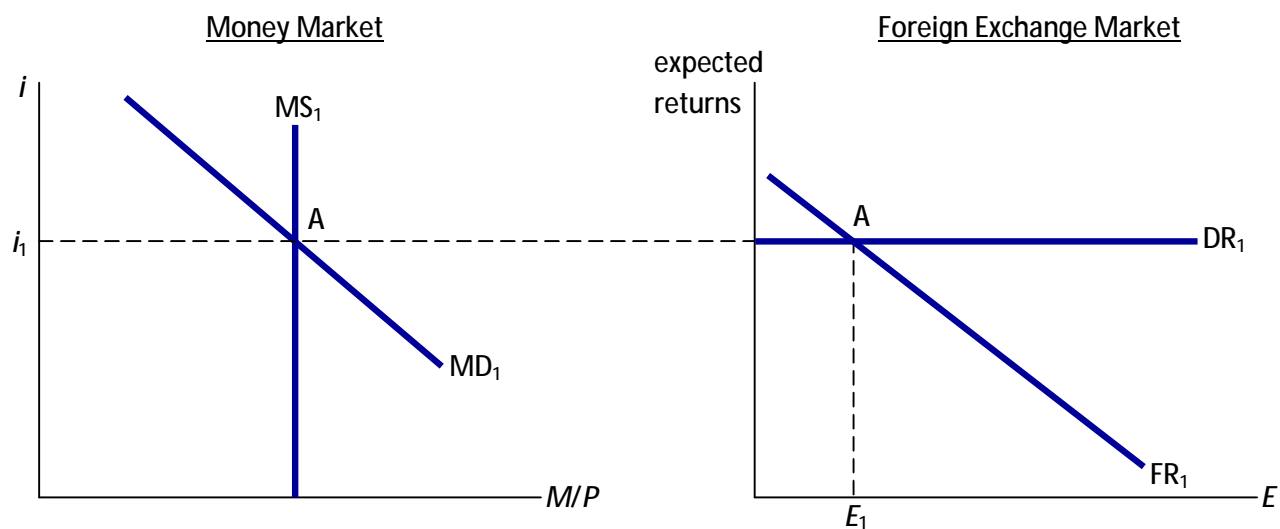
5. An income shock in the combined monetary & asset approach to exchange rates

On 4/24/09, there is a permanent negative shock to U.S. real GDP. Other than this shock, real GDP is constant over time, but it is constant at a lower level starting on 4/24/09. Assume that the nominal money supply,  $M$ , is constant (zero growth rate) before, during, and after 4/24/09. Assume the foreign inflation rate is zero, and assume the world real interest rate  $r^*$  is exogenous.

We have seen using the simple monetary approach that a permanent shock to real GDP will cause the following results in the long run:

- The inflation rate, which was zero before 4/24/09, will be zero after 4/24/09.
- The nominal interest rate will be the same after 4/24 as it was before 4/24.
- Real money demand falls on 4/24/09 because real GDP falls.
- In the new long-run equilibrium, the price level  $P$  and the nominal exchange rate  $E$  will be higher than they were in the initial equilibrium.

Your job in this problem is to use the combined asset/monetary approach to figure out what happens in the short run and in the transition from the new short-run equilibrium to the new long-run equilibrium I described above. I have gotten you started by drawing the initial, pre-shock equilibrium, which is at point A in both graphs.



The questions on the following page ask you to draw directly on the graphs above. You do not need to draw any other diagrams for this problem. Please proceed to the next page.

- a. In the money market diagram, show what happens in the short run. Label the new equilibrium "B."
  
- b. In the foreign exchange market diagram, show what happens in the short run. Label the new equilibrium "B."
  
- c. In the money market diagram, show what happens when the economy has reached its new long-run equilibrium. Label the long-run equilibrium point "C."
  
- d. In the foreign exchange market diagram, show what happens when the economy has reached its new long-run equilibrium. Label the long-run equilibrium point "C."
  
- e. Carefully describe the behavior of the nominal exchange rate  $E$  from before 4/24/09 until it reaches its new long-run equilibrium value.

## Answers to Exam 2 & Point Distribution

73 total points on the exam

### Part 1. Definitions (3 points each, 15 points total)

a. national saving

income minus consumption minus government spending,  $S = Y - C - G$  (p.618)

also, the sum of private and public saving

(Note: while it's true that  $S = I + CA$ , it is not true that  $I + CA$  is the definition of  $S$ . In the equilibrium of any supply and demand model, quantity supplied equals quantity demanded but quantity supplied is not the definition of quantity demanded.)

b. capital account

net incoming transfers of capital, or incoming minus outgoing transfers of capital. Such transfers mainly include debt forgiveness. (p.625)

c. efficient level of investment

The level of investment that equates the marginal product of capital with the world interest rate,  $MPK = r^*$

(handout "the loanable funds model and efficient investment") also section 3 of FT Chap 6/17)

d. investment (macroeconomics definition)

spending on (the factor of production) capital, such as firm spending to acquire plant and equipment, or consumer spending on new houses (p.600)

e. external liabilities

assets (such as bonds) issued by a country's firms or government and held by foreigners (p.626)

### Part 2. Problems and Applications

1. Present value (4 points)

In a three-period model, South Korea's GDP, in U.S. dollars, equals \$800 billion in the present period, \$750 billion in the second period, and \$850 billion in the third period. Showing your work, compute the present value of South Korea's lifetime income (in dollars) assuming South Korea is completely financially open and can borrow or lend at the world interest rate,  $r^* = 0.04$ .

All figures are in billions of dollars.

$$800 + \frac{750}{1+0.04} + \frac{850}{(1+0.04)^2} = 2307$$

2. Consumption smoothing in the two-period model

(14 points: 2 for a, 3 for b, 6 for c, 3 for d)

a. Write down Britain's intertemporal budget constraint.

$$GNE_0 + \frac{GNE_1}{1+0.08} = GDP_0 + \frac{GDP_1}{1+0.08}$$

b. If Britain's GDP equals £500 billion in each of the two periods, what is Britain's trade balance in each period? Briefly explain your answer.

Since income is already perfectly smooth, Britain achieves perfectly smooth consumption simply by consuming its income in each period, with no need for borrowing. Hence,  $TB_0 = TB_1 = 0$ .

c. Now suppose a shock causes Britain's GDP in period 0 to fall by £60 billion (from £500 billion to £440 billion). The shock does not affect any other country. The shock is temporary, so Britain's GDP in period 1 equals £500 billion. Fill in the blanks, showing your work in the space below.

Britain's GNE falls by 31.17 in period 0 and 31.17 in period 1.

Britain's trade balance equals -28.83 in period 0 and 31.17 in period 1.

This problem is similar to Problem 1 on the Consumption Smoothing Worksheet we did in class on April 17.

Since Britain prefers consumption as smooth as possible, Britain will use the world capital markets to make its GNE the same in both periods. Let  $X = GNE_0 = GNE_1$ . We will use Britain's intertemporal budget constraint to solve for X.

The present value of Britain's lifetime expenditure is  $X + X/(1 + .08)$ , which we can simplify to:

$$\{1 + 1/(1 + .08)\}X = 1.926X$$

The present value of Britain's lifetime income, after the shock, is now

$$440 + 500/(1 + .08) = 902.963$$

To satisfy Britain's intertemporal budget constraint, the pv of lifetime spending must equal the pv of lifetime income:

$$1.926X = 902.963$$

$$\text{Solve to get } X = 902.963/1.926 = 468.83$$

Hence, Britain's GNE equals 468.83 in both periods, a fall of 31.17 in each period.

$$TB_0 = GDP_0 - GNE_0 = 440 - 468.83 = -28.83$$

$$TB_1 = GDP_1 - GNE_1 = 500 - 468.83 = 31.17$$

Hence, Britain borrows 28.83 from ROW in period 0, and repays  $28.83(1.08) = 31.14$  in period 1. (The result here, 31.14, is different from  $TB_1$  only because of rounding errors.)

Another way to solve the problem would be to let  $X$  denote the fall in GNE and try to solve for  $X$ . To do so, figure out how much Britain needs to borrow in period 0, how much it must repay in period 1, and how much it gets to spend/consume in period 1. Consumption smoothing requires expenditure be equal in both periods, which gives you an equation to solve for  $X$ .

- d. In the face of this shock, does financial openness make Britain any better off than if Britain were closed? Briefly explain.

Yes. Openness allows Britain to use the global capital market to smooth its expenditures and spread the pain of the shock over both periods. If Britain were closed, then it would have to bear the full brunt of the shock in period 0, i.e.  $GNE_0 = GDP_0 = 440$  and  $GNE_1 = GDP_1 = 500$ , which is not very smooth.

3. Balance of Payments and National Income and Product Accounts (14 points, 2 each part)

- a. Exports = 200

$$TB = EX - IM$$

$$EX = TB + IM = -100 + 300$$

- b. Gross National Expenditure (GNE) = 1300

$$C + I + G = 900 + 200 + 200$$

- c. Gross Domestic Product (GDP) = 1200

$$GNE + TB = 1300 - 100$$

- d. Net Factor Income from Abroad (NFIA) = 100

$$\begin{aligned} \text{NFIA} &= \text{income earned by U.S. factors abroad} - \text{income earned by ROW-owned factors in U.S.} \\ &= 200 - 100 \end{aligned}$$

- e. Gross National Income (GNI) = 1300

$$GDP + \text{NFIA} = 1200 + 100$$

- f. Gross National Disposable Income (GNDI) = 1200

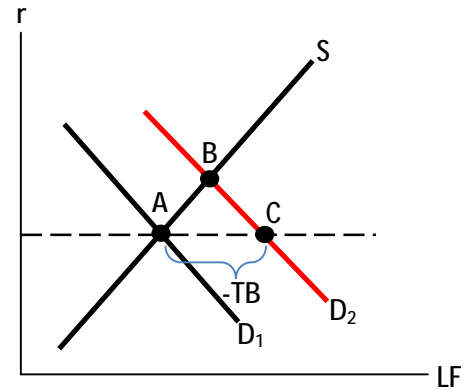
$$\begin{aligned} \text{GNDI} &= \text{GNI} + \text{incoming unilateral transfers} - \text{outgoing unilateral transfers} \\ &= 1300 + 0 - 100 \end{aligned}$$

- g. Current Account = -100

$$CA = TB + \text{NFIA} + \text{NUT} = -100 + 100 - 100$$

4. The loanable funds model  
(14 points: 4 for a, 5 for b, 3 for c, 2 for d)

- a. On the axes to the right, draw the graph of the closed economy loanable funds model. Label the axes and all curves, and label the initial equilibrium point A.



After the economy has been at point A for a while, engineers develop a new type of capital equipment that is more productive and also generates less pollution and carbon emissions than existing capital. Firms would like to purchase and use this new capital, and the government provides tax incentives to make doing so more affordable. Assume the government adjusts other taxes to keep total tax revenue unchanged.

- b. Depict the effects of these events on your diagram. Label the new equilibrium "B." As the economy moves from point A to point B, what happens to the following variables?

The investment demand curve shifts to the right – capital is more productive so firms want to acquire more capital, and the government is altering the tax code to encouraging investment.

In a closed economy, the increase in demand for funds causes a shortage at the initial interest rate, so the interest rate must rise. As it does, households are motivated to save more, so private saving rises and consumption falls. Public saving =  $T - G$ , and  $T$  and  $G$  are exogenous and unchanged, so public saving does not change. Investment rises due to the discovery and the tax incentives (though the rise in the interest rate somewhat but not completely mitigates the increase in investment).

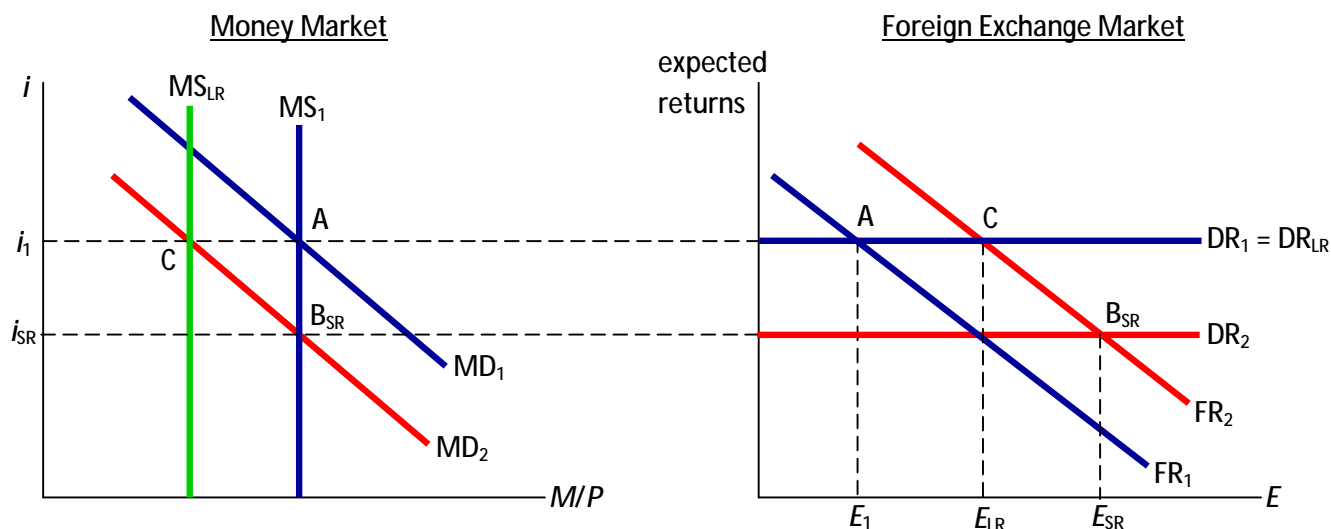
- c. If this instead were a small open economy and the world interest rate  $r^*$  just happened to equal the interest rate at point A, then tell me how each of these variables would change as the economy moves from its initial equilibrium at point A to its new equilibrium.

A small open economy takes the world interest rate  $r^*$  as given, and events occurring in the small open economy will not affect  $r^*$  - so the real interest rate does not change. Since the interest rate doesn't change, private saving and consumption do not change. Public saving is exogenous and unchanging, therefore national saving does not change. Firms are able to increase investment by borrowing the funds they need from abroad, causing external liabilities to grow which reduces external wealth.

- d. Continuing the open economy scenario from part c, identify that point in your diagram that determines the new level of investment (if investment changes) and label it "C." Also, identify the trade balance on the diagram.

The trade balance is negative and equal in size to the distance between investment and saving at the world interest rate, or the distance between points A and C on the diagram.

5. An income shock in the combined monetary & asset approach to exchange rates  
 (12 points: 2 for a, 3 for b, 2 for c, 2 for d, 3 for e)



- a. In the money market diagram, show what happens in the short run. Label the new equilibrium "B."

A fall in income causes people to spend less, and therefore they need less money. The money demand curve shifts left, causing the interest rate to fall.

- b. In the foreign exchange market diagram, show what happens in the short run. Label the new equilibrium "B."

The fall in the interest rate reduces the return on domestic assets, so DR shifts down. Also, because people know that E will eventually be higher, the expected future exchange rate rises, which raises the expected return on foreign assets (because when you cash them in and bring the funds home, you get a better exchange rate and thus more of your own currency back). The FR curve shifts up. The new short run equilibrium is at point B<sub>SR</sub>.

- c. In the money market diagram, show what happens when the economy has reached its new long-run equilibrium. Label the long-run equilibrium point "C."

We know in the long run that P will be higher. In the transition from the short run to the long run, P rises, causing the real money supply (M/P) to fall, which moves the vertical MS curve toward the left. We know that the nominal interest rate will be the same in the new long-run equilibrium as before the shock occurred, so the MS curve must continue moving to the left until the interest rate is back to  $i_1$ .

- d. In the foreign exchange market diagram, show what happens when the economy has reached its new long-run equilibrium. Label the long-run equilibrium point "C."

As the interest rate rises back toward its initial value, the return on domestic assets rises and the DR curve moves upward until it reaches its initial position.

- e. Carefully describe the behavior of the nominal exchange rate  $E$  from before 4/24/09 until it reaches its new long-run equilibrium value.

Before 4/24,  $E$  is constant at its initial, pre-shock value,  $E_1$ . On 4/24,  $E$  jumps up to  $E_{SR}$ . Over time, as the economy transitions to its new long-run equilibrium,  $E$  falls until settling at  $E_{LR}$ , which is higher than its initial level. Thus, the initial impact of the shock causes  $E$  to overshoot its eventual long-run equilibrium value.