Department of Economics
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June 6, 2014

ECO 209Y – L0101
MACROECONOMIC THEORY

Term Test #1

SOLUTIONS

LAST NAME _____

FIRST NAME _____

STUDENT NUMBER _____

INSTRUCTIONS:

1. The total time for this test is 1 hour and 50 minutes.
2. Aids allowed: a simple calculator.
3. Use pen instead of pencil.

DO NOT WRITE IN THIS SPACE

Part I		_____/25
Part II		_____/20
Part III	1.	_____/10
	2.	_____/10
	3.	_____/10
TOTAL		_____/75

PART I (25 marks)

Instructions: Enter your answer to each question in the table below. Only the answers recorded in the table will be marked. Table cells left blank will receive a zero mark for that question. Each question is worth 2.5 marks. No deductions will be made for incorrect answers.

1	2	3	4	5	6	7	8	9	10
D	B	C	A	D	B	C	B	C	A

1. Canadian firm imports $15,000 worth of Frisbees from Mexico and sells them for $20,000 to its customers. What is the effect on Canada's GDP?
   A) GDP increases by $15,000.
   B) GDP decreases by $15,000.
   C) GDP increases by $20,000.
   D) GDP increases by $5,000.
   E) There is no effect on GDP since the Frisbees were produced in Mexico.

2. Suppose that the federal government runs a budget surplus of $20 billion. It collects $100 billion in taxes, and it has the following expenditures: $20 billion in Social Security benefits, $10 billion in interest on the national debt, $10 billion in rent, and $40 billion in wages. The government's contribution to GDP is
   A) $80 billion.
   B) $50 billion.
   C) $70 billion.
   D) $40 billion.
   E) none of the above.

3. In 2013 national saving in a hypothetical country was $90 billion, investment was $110 billion, and private saving was $115 billion. How much was the current account balance?
   A) -$5 billion.
   B) $5 billion.
   C) -$20 billion.
   D) $20 billion.
   E) None of the above.

Use this space for rough work.

4. Consider a closed economy with a fixed price-level and a balanced government budget at the initial equilibrium situation. A drop in government purchases will cause
   A) the level of private saving and the level of consumption to fall, and a government budget surplus.
   B) the level of private saving to rise and a government budget surplus, but no change in the level of consumption.
   C) both the level of private saving and the level of consumption to fall, but no change in the government budget balance.
   D) the level of consumption to fall, the level of private saving to rise, and a government budget surplus.
   E) none of the above.

5. In a fixed-price model of a closed economy, an increase in government expenditure will have the largest impact on the level of output when it is financed by
   A) raising taxes to the rich.
   B) raising taxes to the middle class.
   C) raising user fees.
   D) borrowing from the public.
   E) cutting other expenditure programs.

6. Consider the fixed price-level model of a closed economy. If the government has a balanced budget and income is below its equilibrium value, then
   A) aggregate expenditure will fall.
   B) saving will be smaller than planned investment.
   C) unintended inventory accumulation will occur.
   D) income will exceed aggregate expenditure.
   E) saving will equal planned investment.

7. Consider the fixed price-level model of a closed economy with only autonomous taxes. If the government has a budget deficit of $100, the function for desired consumption is C = 200 + 0.8Y, and desired investment is $1000, what is the equilibrium level of income?
   A) $5000.
   B) $5500.
   C) $6500.
   D) $6000.
   E) none of the above.

Use this space for rough work.

Use the following information of a hypothetical economy to answer questions 10 to 12: National income = Net domestic income = 5200; Government budget surplus = –150; Disposable income = 4400; Net exports = –110; and Consumption = 4100.

8. In this economy, government revenues are
   A) $200.
   B) $800.
   C) $400.
   D) $600.
   E) none of the above

9. In this economy, the value of government purchases is
   A) $500.
   B) $800.
   C) $950.
   D) $650.
   E) none of the above.

10. In this economy, the value of investment is
   A) $260.
   B) $270.
   C) $250.
   D) $280.
   E) none of the above.

Use this space for rough work.

PART II (20 marks)

Consider the following model of the economy:

$C = 340 + 0.8YD - 15i$
$I = 150 - 10i + 0.03Y$
$G = 220$
$TR = 75$
$TA = 25 + 0.1Y$
$Y_{fe} = 2800$

a) As a function of the rate of interest, what is the equation for the AE curve in this model? **(3 marks)** What is the equation for the IS curve in this model? **(2 marks)**

To find the equation for the AE curve, let's first express C as a function of Y:

$YD = Y - TA + TR = Y - (25 + 0.1Y) + 75 = 50 + 0.9Y$

$C = 340 + 0.8YD - 15i = 340 + 0.8\,(50 + 0.9Y) - 15i = 380 + 0.72Y - 15i$

Therefore,

$AE = C + I + G$
$= (380 + 0.72Y - 15i) + (150 - 10i + 0.03Y) + 220$
$= 750 - 25i + 0.75Y$

To get the equation for the IS curve we must equate Y and AE (i.e., to find the expression for equilibrium in the goods market):

$Y = 750 - 25i + 0.75Y \rightarrow 25i = 750 - 0.25Y \rightarrow i = 30 - 0.01Y$

b) If the rate of interest is 6 percent (i.e., i = 6), what is the equation for the corresponding AE curve? What is the level of equilibrium income when i = 6? What is the size of the aggregate expenditure multiplier? **(3 marks)**

We have found above the equation for the AE curve as a function of i and making the replacement we find:

$AE = 750 - 25i + 0.75Y = 750 - 150 + 0.75Y = 600 + 0.75Y$

To find equilibrium income we must plug i = 6 into the equation for the IS curve:

$i = 30 - 0.01Y \rightarrow 6 = 30 - 0.01Y \rightarrow 0.01Y = 24 \rightarrow Y^* = 2400$

Or alternatively, we could equate Y and AE:

$Y = AE \rightarrow Y = 600 + 0.75Y \rightarrow 0.25Y = 600 \rightarrow Y^* = 2400$

Finally, the expression for the expenditure multiplier is:

α_{AE} = 1 / (1 – slope of AE curve) = 1 / (1 – 0.75) = 1 / 0.25 = 4

c) What is the level of private saving (S) when the economy is in equilibrium at i = 6? What is the level of government saving (or budget surplus, BS) at this equilibrium? What is the level of national saving (S_N) at this equilibrium? What is the level of private investment at this equilibrium? **(4 marks)**

Since S = YD – C, let's find the values of YD and C:

$YD = 50 + 0.9Y = 50 + 0.9\ (2400) = 50 + 2160 = 2210$

$C = 340 + 0.8YD - 15i = 340 + 0.8\ (2210) - 15\ (6) = 340 + 1768 - 90 = 2018$

Therefore, $S = YD - C = 2210 - 2018 = 192$

$BS = TA - (G + TR) = 25 + 0.1\ (2400) - (220 + 75) = -30$

$S_N = S + BS = 192 - 30 = 162$

$I = 150 - 10i + 0.03Y = 150 - 10\ (6) + 0.03\ (2400) = 150 - 60 + 72 = 162$.

d) Given the situation of the economy and the budgetary situation of the government you have described above, what do you think the government should do to improve that situation? **(3 marks)**

The economy is in a deep recession since Y = 2400 and Y_{fe} = 2800. In addition, the government is running a relatively small deficit since BS = – 30, which represents about 1.25 percent of GDP. Moreover, this deficit is not only small but cyclical in nature since at the level of full employment income ($2800) the government would be running a surplus. Indeed,

$$BS_{fe} = TA - G - TR = 25 + 0.1\,(2800) - 220 - 75 = 305 - 295 = 10.$$

Therefore, it seems that expansionary fiscal policy should be implemented in order to get Y closer to full employment even at the cost of increasing the government deficit in the short run.

e) All else equal, what change in government purchases (G) would be necessary for the economy to reach the level of full-employment income? **(1 mark)** Given this increase in G, what would be the level of government saving (or budget surplus) at the level of full-employment income? **(1 mark)** In your view, should the government implement such an increase in G? Explain your answer. **(3 marks)**

Since Y_{fe} = $2800, equilibrium income must increase by $400. Given that α_{AE} = 4, ΔG must be $100.

Given ΔG = $100 and Y_{fe} = $2800,

$$BS_{fe} = TA - G - TR = 25 + 0.1\,(2800) - 320 - 75 = 305 - 395 = -90.$$

Should the government increase G by $100? It could be argued that the government should increase G enough to stop the decline in Y and, at the same time, trigger a sufficient increase in Y to restore some degree of confidence on the part of the private sector. The crucial point here is to regain the confidence of households in order for them to start spending once again. In turn, once consumers start spending, at some point the business sector will also start investing once again. Will a $100 increase in G be enough? Or will it be too much? A $100 increase in G will cause the government to increase its deficit in the short run to about 5 percent of the current level of GDP. This is a relatively large deficit but the economy is in a deep recession and this increase in G might not be even enough to jump start the economy and restore the confidence of the private sector (consider, for instance, that the U.S. government run deficits of about 10 percent of GDP during the first few years of the Great Recession). In any case, in these circumstances it's better to err on the plus side rather than on the minus side. If the increase in G is excessive there is always time to reduce it at a faster pace as the level of economic activity starts moving closer to full employment and inflationary pressure builds up. That's why most of the increase in G should be on infrastructure investment since, in addition to increasing economic efficiency, once the projects are completed G can go back to its initial level.

PART III (30 marks)

Instructions: Comment on the following statements in the space provided. Each question is worth 10 marks.

1. If consumption declines as the interest rate increases, then the IS curve will be flatter the less sensitive consumption is to changes in the interest rate. (Use algebraic analysis to aid your answer and explain the economics. Consider the model of a closed economy.)

The *IS* curve indicates the combinations of the rate of interest (i) and the level of income (Y) at which the goods market (i.e., the real sector of the economy) is in equilibrium (i.e., $Y = AE$).

If we consider a model where only investment is a (decreasing) function of the rate of interest, then as the rate of interest decreases and investment rises, an excess demand appears in the goods market and Y increases. That is, the economy moves from one equilibrium combination of i and Y to another, i.e., from one point on the *IS* curve to another. In this case, since i is assumed to decrease, it represents a movement down along the IS curve.

Therefore, the greater the interest sensitivity of investment (b), the greater the initial excess demand in the goods market (i.e., $AE > Y$) and, given the expenditure multiplier, the greater the new equilibrium Y. In other words, the greater b the flatter the *IS* curve. Indeed, in this case the slope of the IS curve is: $-1 / b\alpha_{AE}$, and the larger b is the flatter the *IS* curve.

If we instead consider a model where both consumption and investment are decreasing functions of the rate of interest, then as the rate of interest decreases and both consumption and investment rise, an excess demand appears in the goods market and Y increases. Again, the economy moves from one equilibrium combination of i and Y to another, i.e., from one point on the *IS* curve to another.

In this model, then, the greater the interest sensitivity of investment (b) and the greater the interest sensitivity of consumption (d), the greater the initial excess demand (i.e., $AE > Y$) and, given the expenditure multiplier, the greater the new equilibrium Y. In other words, the greater b and d the flatter the *IS* curve. Indeed, in this case the slope of the IS curve is: $-1 / (b + d)\ \alpha_{AE}$, and the larger b and d the flatter the *IS* curve.

The statement is thus false. The less sensitive consumption is to changes in the rate of interest, the smaller the impact that a change in i will have on C. Therefore, the smaller the excess demand arising in the goods market (i.e., $AE > Y$) as a result of a change in i. And, given α_{AE}, then the smaller the corresponding change in Y (i.e., the steeper will the *IS* curve be).

2. Tax cuts have an expansionary effect on the economy. Therefore, tax cuts are self-financed and do not increase government deficits. (Use algebraic analysis to aid your answer and explain the economics. Consider a decrease in autonomous taxes in a closed economy.)

Assuming a constant marginal propensity to consume out of disposable income ($MPC_{YD} = c$), a reduction in autonomous taxes ($\overline{T}$) increases disposable income (YD) by the same absolute amount (i.e., $\Delta YD = -\Delta\overline{T}$) at all levels of Y and, as a result, consumption (C) also increases at all levels of Y by ΔYD times the MPC_{YD}. Therefore, the decrease in $\overline{T}$ has an expansionary effect on the economy — it creates a situation of excess demand (i.e., $AE > Y$) and Y increases. In turn, the increase in Y increases government revenue by $t\,\Delta Y$. Since government revenues first fall due to the decrease in $\overline{T}$ and then rise due to ΔY, what's the overall impact of the decrease in $\overline{T}$ on the government budget surplus (BS)? Does the BS decrease, remain unchanged, or increase as a result of the decrease in $\overline{T}$? Let's examine these changes in more detail.

The initial change in YD as a result of the decrease in $\overline{T}$ is: $\Delta YD = -\Delta\overline{T}$. Therefore, at each level of Y the corresponding change in C is: $\Delta C = -c\Delta\overline{T}$ (i.e., the AE curve shifts up by $-c\Delta\overline{T}$ and a situation of excess demand arises). As a result, Y increases by $\Delta Y = -c\Delta\overline{T}\ \alpha_{AE}$ and government revenues increase by $\Delta TA = t\Delta Y = t\,(-c\Delta\overline{T}\ \alpha_{AE})$.

The total change in BS is thus:

$\Delta BS = \Delta\overline{T} - tc\Delta\overline{T}\ \alpha_{AE} = (1 - tc\ \alpha_{AE})\ \Delta\overline{T}$.

And since $\alpha_{AE} = 1 / [1 - c(1 - t)]$,

$$\Delta BS = \left[1 - \frac{tc}{1 - c(1 - t)}\right] \Delta\overline{T}$$

$$= \frac{1 - c(1 - t) - tc}{1 - c(1 - t)}\ \Delta\overline{T}$$

$$= \frac{1 - c + tc - tc}{1 - c(1 - t)}\ \Delta\overline{T}$$

$$= \frac{1 - c}{1 - c(1 - t)}\ \Delta\overline{T}$$

Jiaqui,

I realize now that the wording of this question is not very precise. It doesn't indicate whether it refers to a reduction in autonomous taxes or in the tax rate. My suggested answer implies the former, but use your discretion if students assume the latter.

I also realize now that the economics explanation cannot go too much beyond simple intuition and logic. So, again, use your discretion.

And, thus $\Delta BS < 0$ since $(1 - c) > 0$, $[1 - c(1 - t)] > 0$, and $\Delta\overline{T} < 0$. Therefore, a decrease in taxes is not self-financed — it will reduce the government budget surplus. And this result will hold for all values of c and t.

The economics explanation is based on intuition and logic. A decrease in taxes may have an expansionary effect on the economy and thus it will not reduce the budget surplus by the same amount as the decrease in taxes, but it cannot result into an increase of the budget surplus.

3. The leader of a provincial political party claims that, if elected, his government will create one million jobs by laying off 100,000 public sector workers and eliminating the government deficit in two years. (Evaluate the rationale and economic wisdom of such proposition.)

If a million jobs need be created, then we must conclude that the economy is in a recession (i.e., it's producing below capacity). So, how can laying off 100,000 public sector workers and eliminating the government budget deficit contribute to the creation of these one million jobs? What is the rationale for such a proposition?

This proposition appears to be based more on ideology than on serious economic analysis. Those who consider the government to be always inefficient view the government as part of the problem and not of the solution. In their view, therefore, the size of the government should be reduced. But how is this reduction in the size of the government (e.g., laying off 100 thousand workers) contribute to the expansion of the economy? In their view, the reduction of the government and the elimination of the deficit will increase the confidence of the private sector and both consumption and investment will increase. This rationale, therefore, appears to imply that the deficit might be responsible for the recession, although the causation seems to go in the opposite direction: the government is running a fiscal deficit because of the recession.

Greater consumer and business confidence is indeed needed to restore economic activity to pre-crisis levels — but how will this confidence be restored by eliminating the deficit? What will be the impact of a decrease in government spending? The general consensus among economists is that, during a recession, a decrease in G will cause the economy to contract further, thus further reducing the confidence of both consumers and the business sector.

Undoubtedly, consumers and business sector confidence must be restored to move the economy to full-employment equilibrium, but this confidence will start to be restored when there are some clear signs of employment and income improvement — and for this to happen autonomous AE must increase and not decrease! Indeed, the lack of confidence is not due to the deficit but to the lack of sufficient employment and economic activity. Therefore, AE must increase to reactivate the economy. During a recession, therefore, it appears that the government should increase G rather than decreasing it. An increase in G will contribute, first, to prevent a further contraction of the economy and, second, to start restoring confidence in the economy and creating the conditions for further expansion. *But the increase in G will not move the economy to full employment.* The economy will get to full employment as a result of both C and I (and X) recovering their previous levels and beyond. But the latter requires consumer and business confidence to be restored, and this will not happen by itself, i.e., it will not be the result of the "confidence fairy" as Krugman calls it. Something is needed to trigger this change, and that something is the initial increase in Y resulting from expansionary fiscal policy. A deficit reduction during a recession will further contract the economy, and further reduce the confidence of the private sector.