HE1002 Macroeconomics 1

Problem Set 6

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Question 1

Using Okun's law, fill in the four pieces of missing data in the table below. Explain how you get your answers.

Year	Real GDP ($ bil)	Potential GDP ($ bil)	Natural unemployment rate (%)	Actual unemployment rate (%)
2015	13,536	14,400	5	(a)
2016	14,500	(b)	5	5
2017	(c)	14,800	5	4.5
2018	15,444	14,850	(d)	4

According to Okun's law,

$$\frac{Y - Y^*}{Y^*} \times 100 = -2 \times (u - u^*)$$

Where

- Y - Y*= Output Gap, or Actual output - Potential output
- u - u*= Cyclical Unemployment or Actual unemployment rate - Natural rate of unemployment

In short, each 1% increase in cyclical unemployment is associated with about a 2% percent widening of a negative output gap, measured in relation to potential output.

(a) In 2015,
Real GDP ($ bill) = 13,536
Potential GDP ($ bill) = 14,400
Natural unemployment rate (%) = 5

Hence using Okun's law,

$$\frac{13,536 - 14,400}{14,400} \times 100 = -2 \times (u - 5)$$

$$-6 = -2u + 10$$

$$u\,(a) = 8\%$$

(b) In 2016,
Real GDP ($ bill) = 14,500
Natural unemployment rate (%) = 5
Actual unemployment rate (%) = 5

Hence using Okun's law,

$$\frac{14{,}500 - Y^*}{Y^*} \times 100 = -2 \times (5 - 5)$$
$$100\,(14{,}500 - Y^*) = 0$$
$$-100Y^* = -1450000$$
$$Y^*(b) = 14{,}500$$

- Additionally, since actual unemployment rate equals natural unemployment rate, it can also directly be implied that there is no output gap and potential gdp = real gdp

(c) In 2017,
Potential GDP ($ bill) = 14,800
Natural unemployment rate (%) = 5
Actual unemployment rate (%) = 4.5

Hence using Okun's law,

$$\frac{Y - 14{,}800}{14{,}800} \times 100 = -2 \times (4.5 - 5)$$

$$100\,(Y - 14{,}800) = 14{,}800$$

$$Y - 14{,}800 = 148$$

$$Y(c) = 14{,}948$$

(d) In 2018,
Potential GDP ($ bill) = 14,850
Real GDP ($ bill) = 15,444
Actual unemployment rate (%) = 4

Hence using Okun's law,

$$\frac{15{,}444 - 14{,}800}{15{,}444} \times 100 = -2 \times (4 - u^*)$$

$$4 = -2 \times (4 - u^*)$$

$$-2 = 4 - u^*$$

$$u^*(d) = 6\%$$

Question 2

Of the following, identify the incorrect statement

(a) Output gaps are caused by inflationary pressures generated by the unintended side effects of government policy.

(b) Low aggregate spending can make output fall below potential output.

(c) When spending is high, output may rise above potential output.

(d) Government policies can help eliminate output gaps.

The incorrect answer is (a) because output gaps are not caused by inflationary pressures from unintended side effects of government policies. Output gaps are caused in the short run due to changes in demand. Firms tend to adjust to changes in demand in the short run by varying the quantity of output they produce and sell. Instead of changing prices with every variation in demand, firms tend to "meet the demand" for their output at a preset price. This is also the fundamental assumption of the **Keynesian model.** Since firms meet demand, changes in the amount that consumers decide to spend will affect output. Government policies instead help eliminate output gaps.

(b) is correct because as mentioned before, firms tend to adjust to changes in demand in the short run by varying the quantity of output they produce and sell. Consumption spending is the largest part of aggregate spending, hence aggregate spending affects output too. If aggregate spending is low, autonomous expenditure falls, implying that there will be less demand and output produced by firms will be less than potential output, creating an output gap.

(c) is correct and works on the same ideas as part (b). Spending affects demand, which impacts output as firms tend to meet demand. If spending is high, there is more demand from the consumers. Firms will produce more output that can rise over potential output.

(d) is correct since as discussed before, changes in economy wide spending are the primary cause of output gaps. Thus government policies that influence total spending will help eliminate output gaps such as government purchases of goods and services, which is a component of planned aggregate expenditure. Such stabilization policies include fiscal policies where the government can change its spending or change the level of taxes that are imposed.

Question 3

What is the key assumption of the basic Keynesian model? Explain why this assumption is needed if one is to accept the view that aggregate spending is a driving force behind short-term economic fluctuations.

1. Key assumption: **firms meet the demand for their products at preset prices**

2. **in aggregate spending & short-term economic fluctuations**

   -firms produce just enough to satisfy their consumers at the prices that have been set

   - meeting demand at set prices: firms adjust their output to changes in demand
   - Y = PAE
   - indicating that demand is a determinant factor in the output

   -to find out SR economic fluctuations, we look for output gap

   - $Y^* > Y$: recessionary gap, $Y^* < Y$: expansionary gap
   - PAE↓, Y↓; PAE↑, Y↑

Question 4

Acme Manufacturing is producing $4,000,000 worth of goods this year and expects to sell its entire production. It also is planning to purchase $1,500,000 in new equipment during the year. At the beginning of the year, the company has $500,000 in inventory in its warehouse. Find actual investment and planned investment if Acme actually sells

(a) $3,850,000 worth of goods
(b) $4,000,000 worth of goods
(c) $4,200,000 worth of goods

(a) actual investment = $4,000,000 - $3,850,000 + $1,500,000 = **$1,650,000**
planned investment = $0+ $1,500,000 = **$1,500,000**

(b) actual investment = $4,000,000 - $4,000,000 + $1,500,000 = **$1,500,000**
planned investment = $0+ $1,500,000 = **$1,500,000**

(c) actual investment = $4,000,000 - $4,200,000 +$1,500,000 = **$1,300,000**
planned investment =$1500,000 = **$1,500,000**

Question 4

Assuming that Acme's situation is similar to that of other firms, in which of these three cases is output equal to short-run equilibrium output?

In case (b), output equals to short-run equilibrium output

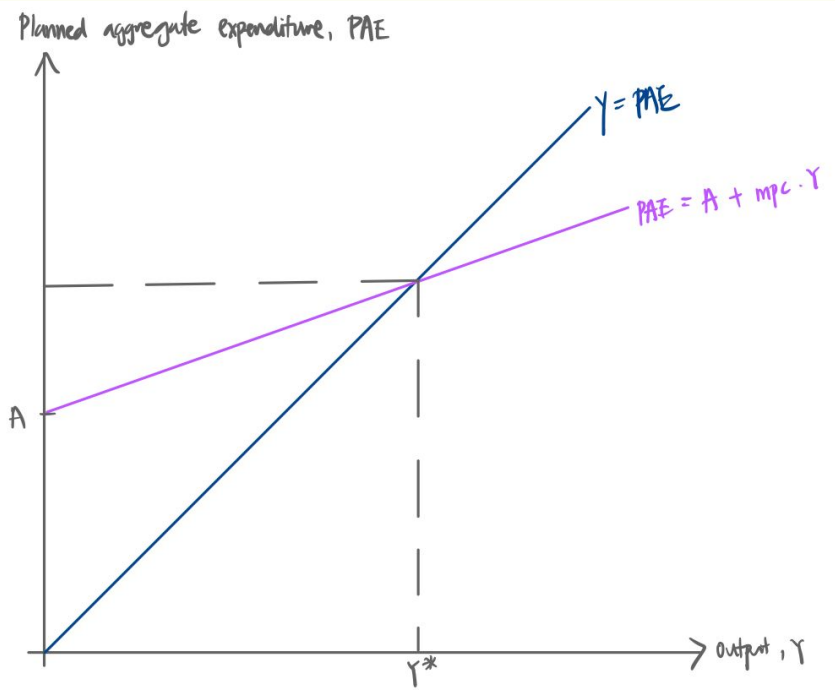
-production all sold out as what the firm expected

-actual investment = planned investment ($I = I^p$)

-assuming other factors constant, Y = PAE

Question 5

Sketch the Keynesian-cross diagram. Explain in words the economic significance of the two lines graphed in the diagram.



PAE = A + mpc . Y (Expenditure line)

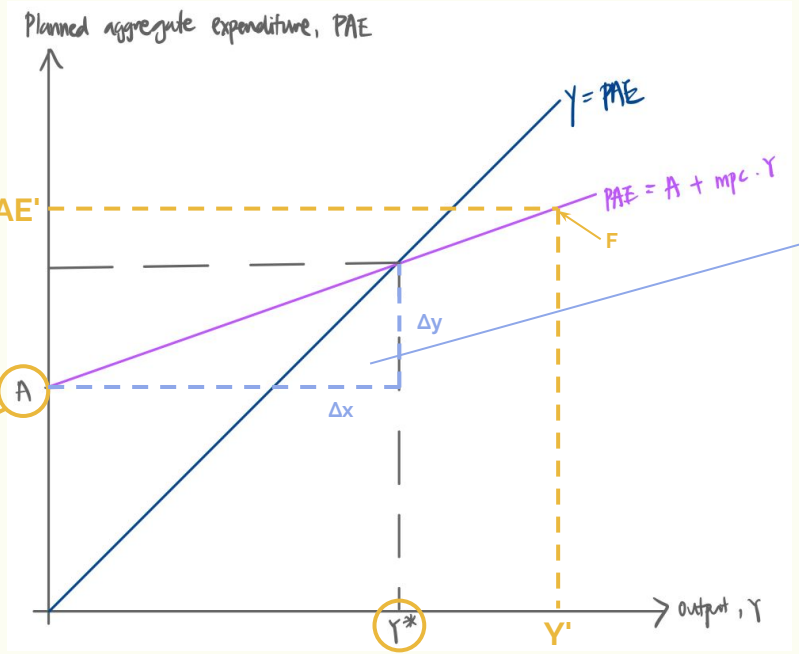
- Shows the relationship of planned aggregate expenditure to output

Y = PAE (Short-run equilibrium)

- This is the level of output at which planned spending is equal to output

Question 5

Given only this diagram, how could you determine autonomous expenditure, induced expenditure, the marginal propensity to consume, and short-run equilibrium output?



Induced expenditure (for point F):
PAE' - A OR mpc x Y'

Autonomous expenditure (A):
y - intercept of PAE graph

Marginal propensity to consume (mpc):
Gradient of the PAE graph
$=\Delta y / \Delta x$

Short-run equilibrium output:
Intersection point of the 2 graphs

Question 6

An economy is initially at full employment, but a decrease in planned investment spending (a component of autonomous expenditure) pushes the economy into recession. Assume that the mpc of this economy is 0.75 and that the multiplier is 4.

$PAE = \bar{C} + I^p + G + NX - mpc \cdot T + mpc \cdot Y$
$PAE = A_1 - mpc \cdot T + mpc \cdot Y$

In SR equilibrium:
$Y = PAE$
$Y = A_1 - mpc \cdot T + mpc \cdot Y$
$Y = [1 / (1 - mpc)] \cdot A_1 - [mpc / (1 - mpc)] \cdot T$

$- mpc / (1 - mpc)$
$= 0.75 / (1 - 0.75)$
$= -3$

$Y = 4A_1 - 3T$, where $A_1 = \bar{C} + I^p + G + NX$

Question 6

(a) How large is the recessionary gap after the fall in planned investment?

$Y = 4A_1 - 3T$, where $A_1 = \bar{C} + I^p + G + NX$

Planned investment is a component of A_1.

Fall in potential output = $4 \times \Delta I^p$

For every unit decrease in planned investment, potential output falls by 4 units, and hence recessionary gap widens by 4 units.

Question 6

(b) By how much would the government have to change its purchases to restore the economy to full employment?

$Y = 4A_1 - 3T$, where $A_1 = \bar{C} + I^p + G + NX$

Government spending is a component of A_1.

To restore full employment, you need to eliminate the output gap.

$\Delta Y = 0$
$\Delta A_1 = 0$
$\Delta G = \Delta I^p$

Hence for every unit decrease in planned investment, to eliminate the output gap and restore full employment, government spending need to be increased by 1 unit.

Question 6

(c) Alternatively, by how much would the government have to change taxes?

$Y = 4A_1 - 3T$, where $A_1 = \bar{C} + I^p + G + NX$

To eliminate output gap:
$\Delta Y = 0$
$0 = 4 \times \Delta I^p + (-3) \times \Delta T$
$3 \times \Delta T = 4 \times \Delta I^p$
$\Delta T = 4/3 \cdot \Delta I^p$

Hence for every unit decrease in planned investment, to eliminate the output gap and restore full employment, tax need to be cut by 4/3 unit .

Question 6

(d) Suppose that the government's budget is initially in balance, with government spending equal to taxes collected. A balanced-budget law forbids the government from running a deficit. Is there anything that fiscal policymakers could do to restore full employment in this economy, assuming they do not want to violate the balanced- budget law?

$Y = 4A_1 - 3T$, where $A_1 = \bar{C} + I^p + G + NX$

Balance budget implies G = T
If we want to keep government budget balanced, it means for every unit increase in G, T need to be increased by 1 unit.

Government spending multiplier = 4 → 1 unit increase in G will result in 4 units increase in Y
Tax multiplier = - 3→ 1 unit increase in T will result in 3 units decrease in Y
Hence, net effect of 1 unit increase in G & T = 1 unit increase Y

We know every unit decrease in I^p will result in 4 units decrease in Y.

Thus, for every unit decrease in I^p, to eliminate the output gap and restore full employment, G & T need to be increased by 4 units.

Question 7a

For this economy, find the following:
- autonomous expenditure
- the multiplier
- short run equilibrium output
- output gap

Given that,
C = 2,500 + 0.8(Y – T)

IP = 2,500

G = 3,500

NX = 300

T = 3,000

Y^* = 31,400

Solution:
To find Short Run Equilibrium output, Y = PAE
Y = C + IP + G + NX
Y = 2500+0.8(y-3000)+2500+3500+300
Y = 0.8Y +6400
Y = 32000

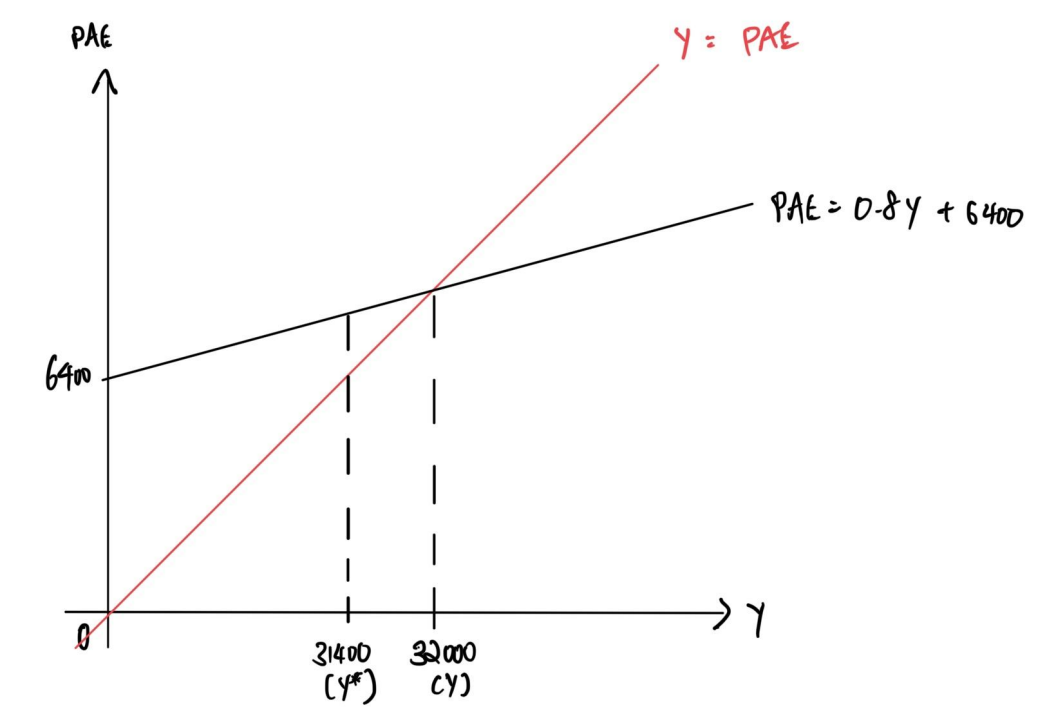
Autonomous Expenditure: 6400
MPC = 0.8
Multiplier = 1/(1-MPC) = 5
Short Run Equilibrium Output = 32000

Output Gap = (32000-31400)/31400 x 100% = 1.91%
or
Output Gap = (32000-31400) = 600 units

Since output is positive it is an expansionary gap.

Question 7b

Illustrate this economy's short-run equilibrium on a Keynesian-cross diagram.



Question 7c

Calculate the amount by which autonomous expenditure would have to change to eliminate the output gap.

To derive the change in autonomous expenditure required to eliminate output gap, we must first find the Expenditure Multiplier.

Expenditure Multiplier = 1/1-mpc = 1/(1-0.8) = 5

For every 1 unit of increase in autonomous expenditure, output is increased by 5 units.

To close an output gap of 600 units (32000-31400),

Change in autonomous expenditure = change in Y/expenditure multiplier = -600/5 = -120 units

Thus, autonomous expenditure has to be reduced by 120 units.

Question 7d

Suppose that the government decided to close the output gap by changing taxes. By how much must taxes be changed in order to do this?

To derive how much tax to be changed, we must first find the tax multiplier.

Tax Multiplier = -mpc/(1-mpc) = -0.8/(1-0.8) = -4

A decrease of Tax by 1 unit, leads to increased output by 4 units

Hence, to close a output gap of 600 units (32000-31400),

Change in taxes = change in Y/tax multiplier = -600/-4 = 150 units

Thus, tax must be increased by 150 units.

New T = 3000 + 150 = 3150

Question 8

$C = 40 + 0.8(Y-T)$
$I = 70$
$G = 120$
$NX = 0$
$T = 150$

a) Find short-run equilibrium output.

Short run equilibrium output is found when AD = AS. (PAE = C + I + G + NX)

$C = 40 + 0.8(Y-150)$

$C = 0.8\,Y - 80$

$PAE = 0.8Y - 80 + 70 + 120 + 0$

$PAE = 0.8Y + 110$

In short run equilibrium, PAE = Y.

$Y = 0.8Y + 110$

$Y - 0.8Y = 110$

$0.2Y = 110$

$Y = 550$

Short run equilibrium output is $Y = 550$

Question 8

b) Economic recovery abroad increases the demand for the country's exports; as a result, NX rises to 100. What happens to short-run equilibrium output?

New equation for PAE:

$PAE = 0.8Y + 110 + 100$

$PAE = 0.8Y + 210$

$PAE = Y$

$Y = 0.8Y + 210$

$0.2Y = 210$

$Y = 1050$

The new short run equilibrium output is $Y = 1050$.

Due to the increase in NX, the short run equilibrium output increased from 550 to 1050.

Question 8

c) Repeat part (b), but this time assume that foreign economies are slowing, reducing the demand for the country's exports, so that NX = -100. (A negative value of net exports means that exports are less than imports.)

New equation for PAE:

PAE = 0.8Y + 110 - 100

PAE = 0.8Y + 10

PAE = Y

Y = 0.8Y + 10

0.2Y = 10

Y = 50

The new short run equilibrium output is Y = 50.

Due to the decrease in NX, the short run equilibrium output decreased from 550 to 50.

Question 8

d) How do your results help explain the tendency of recessions and expansions to spread across countries?

From my results, we can see that recessions and expansions in foreign countries can have positive and negative effects on an economy. For example, in part B, we see that economic recovery abroad leads to a rise in net exports leads and an increase in the short run equilibrium output. Similarly, in part C, the is a drop in net exports when foreign economies are slowing and therefore short run equilibrium output decreases. This shows that there is interdependence within economies and foreign countries can cause global recessions or expansions.

Thank You!