1. Use the Keynesian Model to answer this set of questions. Suppose that in the economy we are analyzing that the consumption function is given as $C = 100 + .5(Y - T)$ and that taxes are autonomous and equal to $40$ million. For this problem assume that the aggregate price level is constant and does not change with the implementation of activist policy.

a. Draw a graph of the consumption function measuring consumption spending on the vertical axis and GDP, or $Y$, on the horizontal axis. In your graph make sure you identify the values of any intercepts and indicate on the graph the level of consumption for $Y$ levels of $100$ million, $200$ million, $300$ million, and $400$ million.

Suppose you know that in this economy government spending is constant (autonomous) and equal to $40$ million, investment spending is constant (autonomous) and equal to $10$ million, and net exports are constant (autonomous) and equal to $5$ million. In this economy assume that there is no inflation and therefore the aggregate price level is constant.

b. Given this information, is this country operating with a trade deficit or a trade surplus? What is the value of capital inflows for this country? Explain your answer.

c. Given this information, describe the government budget balance for this economy.

d. Given this information determine the economy’s equilibrium level of output. Show how you found this equilibrium level of output.

e. At this equilibrium level of output what is the value of private savings? Show how you computed this value.

f. At this equilibrium level of output what is the value of national savings? Show how you computed this value.

g. Does the sum of private savings, government savings, and capital inflows equal the value of investment when this economy is in equilibrium? Show your work and explain your answer. (Hint: if this is not true, then you have made an error and you need to go back and correct your work!)

h. Suppose that you know that the full employment level of output for this economy is $Y_{fe} = \text{ }$ $300$ million. The leader of this country asks you to come up with three fiscal policy proposals
(a spending policy, a taxing policy, and a balanced budget policy) for restoring this economy to full employment. Prepare the report outlining the three fiscal policies that could be pursued. Show the mathematical analytics behind each of these policies.

Answer:

a.

b. This country is operating with a trade surplus since net exports are positive: this tells us that the country is exporting a high dollar value of goods and services than it is importing. When a country operates with a trade surplus, then it has negative capital inflows: this country is lending funds to other countries. We do not know the value of this country’s exports or its imports, but we do know that the difference is that exports exceed imports by $5 million.

c. This country currently has a balanced budget since its government expenditures of $40 million are equal to its tax revenue of $40 million.

d. In equilibrium we know that production, , equals aggregate expenditure, . We can write as . Thus, in equilibrium

\[
Y = AE
\]

\[
Ye = 80 + .5(Ye) + I + G + (X – M)
\]

\[
.5Ye = 80 + 55
\]

\[
Ye = 270 = $270 million
\]

e. We can write a general formula for private savings as:

\[
Sp = -a + (1 - b)(Y - T)
\]

Referring to the consumption function written with respect to disposable income we have:

\[
C = 100 + .5(Y - T)
\]

From this equation we can find the value of "a" as 100 and the value of "b" as .5. So,

\[
Sp = (-100) + (1 - .5)(Y - T)
\]

We know that . So,

\[
Sp = (-100) + .5Y - 20
\]

\[
Sp = .5Y - 120
\]

Since , we can compute when this economy is in equilibrium as:

\[
Sp = .5(270) – 120 = 135 – 120 = 15
\]
f. National Savings = NS = Sp + Sg = 15 + Sg  
Sg = T – G = 40 – 40 = 0  
NS = 15 + 0 = 15  
Since the government is operating with a balanced budget Sg is equal to 0.

g. Sources of Savings = Sp + Sg + KI = 15 + 0 + -5 = 10 = $10 million  
Uses of Savings = Investment Spending = $10 million  
Yes, when this economy is in equilibrium the sources of savings (Gp, Sg, and KI) do equal the uses of savings (I).

h. For all three policies we basically need to have Y increase from $270 million to $300 million or an increase of $30 million (Change in Y = $30 million). The three fiscal policies we can consider are: 1) get to full employment by changing the level of government spending; 2) get to full employment by changing the level of autonomous taxes; and 3) get to full employment by changing the level of government spending and the level of autonomous taxes by equivalent amounts so that the fiscal policy does not alter the zero budget balance.

Policy 1) Reaching full employment by changing the level of government spending:  
(Change in output) = (1/(1 – MPC))(Change in government spending)  
30 = (1/.5)(Change in government spending)  
Change in government spending = $15 million  
So, increase government spending from $40 million to $55 million and you can get this economy back to full employment.

Policy 2) Reaching full employment by changing the level of autonomous taxes:  
(Change in output) = (-MPC/(1 – MPC))(Change in autonomous taxes)  
30 = (-.5/.5)(30) = -30 = -$30 million  
So, decrease autonomous taxes from $40 million to $10 million and you can get this economy back to full employment.

Policy 3) Reaching full employment by using a balanced budget amendment policy: this is a policy that requires that any change in government spending be offset by an equivalent change in taxes. So, for example, if government spending decreases by $5 million, then autonomous taxes would also need to decrease by $5 million. So, in this example:  
(Change in output) = (1/(1 – MPC))(Change in government spending) + (-MPC/(1 – MPC))(Change in autonomous taxes)  
30 = 2(Change in government spending) + (-1)(Change in autonomous taxes)  
But, (change in government spending = (change in autonomous taxes) given the balanced budget approach we are proposing. Thus,  
30 = (Change in government spending)  
So, to reach full employment with this approach we would need to have government spending increase by $30 million from $40 million to $70 million and we would also need to have autonomous taxes increase by $30 million from $40 million to $70 million. Same balanced budget as before, but with a lot more government provided services and a lot higher taxes. Notice we could have gotten the same impact with a much smaller increase in government spending.

2. Suppose you are using a Keynesian Model to analyze an economy and you are given the following information:  
Autonomous Taxes = T= $80 million
Government spending = G = $100 million
Net Exports = (X – M) = $40 million
Autonomous Investment = I = $60 million
Aggregate Price Level is fixed and constant: there is no inflation in this economy

You are also given the following table:

<table>
<thead>
<tr>
<th>Y or Real GDP</th>
<th>C or Consumption Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 million</td>
<td>$-44 million</td>
</tr>
<tr>
<td>$100 million</td>
<td></td>
</tr>
<tr>
<td>$200 million</td>
<td></td>
</tr>
<tr>
<td>$400 million</td>
<td>$276 million</td>
</tr>
</tbody>
</table>

da. Given the above information, find the consumption function expressed as a function of disposable income for this economy. Show your work.

b. Given the above information calculate the equilibrium level of real GDP for this economy. Show your work.

Suppose consumer confidence in this economy increases so that the level of autonomous consumption spending is now $40 million higher than it was initially.

c. Given this change in consumer confidence, what is the change in real GDP in this economy? Show your work.

d. What is the size of the multiplier for changes in autonomous consumption spending given your work in (c)? Explain your answer.

e. Suppose that Yfe for this economy is equal to $900 million but that the economy is still experiencing the increase in consumer confidence. Suppose the government wants to restore this economy’s production to Yfe using government spending. How much government spending will there need to be for this economy to be at Yfe? Assume everything else stays constant except for the increase in autonomous consumption due to the change in consumer confidence. Show your work and then provide a proof that your answer will get this economy back to Yfe.

Answer:
da. In general we can write the consumption function expressed as a function of disposable income as \( C = a + b(Y - T) \) where "a" is autonomous consumption and "b" is the marginal propensity to consume. From the table we have two values of \((Y, C)\): \((0, -44)\) and \((400, 276)\). We can use these two coordinate points to calculate the change in Y as 400 and the change in consumption as 320 and then use these values to find the value of the MPC: \( b = \text{MPC} = \frac{\text{change in consumption spending}}{\text{change in real GDP}} = \frac{320}{400} = .8 \). This allows us to write out consumption function as with respect to real GDP as \( C = a + .8(Y - T) \). But, we need to find the value for "a". So, substitute one of our known points into this equation:
-44 = a + .8(0 - T)
We also know that \( T = 80 \), so:
-44 = a + .8(0 - 80)
a = 20
The consumption function with respect to real GDP is \( C = 20 + .8(Y - T) \).
To write the consumption function with respect to disposable income we need to replace $T$ in the above equation with 80. Thus,
\[ C = 20 + .8(Y – 80) \]
\[ C = 20 + .8Y – 64 \]
\[ C = .8Y – 44 \]

b. In equilibrium, aggregate expenditure is equal to production. Thus,
\[ AE = C + I + G + (X – M) \] and in equilibrium,
\[ Ye = AE \]
\[ Ye = C + I + G + (X – M) \]
From our answer in (a) we have the consumption function and the provided information gives us values for $T$, $I$, $G$, and $(X – M)$: thus,
\[ Ye = .8Ye - 44 + 60 + 100 + 40 \]
\[ .2Ye = 156 \]
\[ Ye = 780 \]
\[ Ye = $780 million \]

c. The increase in consumer confidence will change the consumption function to $C' = 60 + .8(Y – T)$ or $C' = .8Y - 4$. So, we go back to compute the new level of real GDP and then the change in real GDP. We should anticipate that real GDP is going to be larger since consumers have more confidence in the economy and are therefore spending more. So, here’s the calculation:
\[ Ye' = C' + I + G + (X – M) \]
\[ Ye' = 60 + .8(Ye' – T) + 60 + 100 + 40 \]
\[ .2Ye' = 60 – 64 + 200 \]
\[ .2Ye' = 196 \]
\[ Ye' = $980 million \]
Change in real GDP = Ye’ – Ye = 980 – 780 = $200 million

d. The multiplier = (Change in real GDP)/(Change in autonomous spending) = 200/40 = 5. When autonomous consumption increases by $40 million we see that real GDP increases by $200 million, or there is a multiplier effect of 5 times the change in autonomous consumption spending.

e. In equilibrium $AE = Ye$. So,
\[ Ye'' = C' + I + G' + (X – M) \] where $C'$ is the consumption function that includes the decrease in consumer confidence and $G'$ is the new level of government spending implemented to get this economy back to full employment. $Yfe'' = $900 million (this number was given to us). Thus,
\[ Yfe'' = 60 + .8(Yfe'' – T) + 1 + G' + (X – M) \]
900 = 60 + .8(900 – 80) + 60 + G' + 40
900 = 60 + 656 + G' + 100
\[ G' = 84 \] and the change in government spending = $G' – G = 84 – 100 = -$16 million
Government spending needs to decrease by $16 million so that it is at $84 million.

Let’s check to see if this actually works: so replace $G$ with $84 million and solve for $Ye$. If this works, $Ye$ should be equal to $Ye = Yfe =$900 million. So,
\[ Ye = C' + I + G' + (X – M) \]
\[ Ye = 60 + .8(Ye – T) + 60 + 84 + 40 \]
\[ .2Ye = 60 – 64 + 184 \]
\[ .2Ye = 180 \]
\[ Ye = 900 = $900 million! = Yfe \]
3. Use the Keynesian cross diagram depicted below to answer this question.

![Keynesian cross diagram](image)

a. You are told that in this economy inventories are decreasing. What level of real GDP in the provided graph is consistent with this information?

b. You are told that in this economy unplanned inventories are not changing from their planned levels. What level of real GDP in the provided graph is consistent with this information?

c. You are told that the level of planned expenditure in this economy is greater than the level of production in this economy. What level of real GDP in the provided graph is consistent with this information?

d. You are told that the level of production in this economy is lower than the level of planned expenditure in this economy. What level of real GDP in the provided graph is consistent with this information?

e. Suppose that this economy is initially in equilibrium in the above graph. You are told that the government has passed a bill to decrease its level of spending in the economy. Holding everything else constant and given the planned AE line in the above graph, what level of real GDP in the provided graph is the best illustration of the outcome of this new government spending policy?

f. Suppose that this economy is initially in equilibrium in the above graph. You are told that the government has passed a bill to increase its level of taxation in the economy. Holding everything else constant and given the planned AE line in the above graph, what level of real GDP in the provided graph is the best illustration of the outcome of this new government spending policy?

Answer:

a. Y3 since at Y3, AE > Production and this means that there will be decreases in unplanned inventories.

b. Y2 since at Y2, AE = Production and this means that there will no change in unplanned inventories.

c. Y3 since at Y3, AE > Production.

d. Y3 since at Y3, AE > Production.

e. If government spending decreases this will cause the Planned AE line to shift down and this will lead to a lower level of equilibrium real GDP: a level like Y3.

f. If taxes increase this will cause the Planned AE line to shift down and this will lead
4. Use the AD/AS Model for this question. Assume that the AD/AS Model for the economy is initially in long-run equilibrium and then analyze the short-run and long-run adjustments for each of the given scenarios. Illustrate each answer with a graph.

a. Suppose the petroleum exporting countries form a cartel that initially leads to a major increase in the price of petroleum. But, over time this cartel breaks down due to the members producing more petroleum than the cartel agreement amount. What is the short-run impact on real GDP and the aggregate price level given this breakdown in the cartel agreement? What is the long-run impact on real GDP and the aggregate price level? Provide a graph to illustrate your answer.

b. The country decides to invest in a major upgrade of transportation and communication infrastructure and this decision results in a significant increase in government spending to finance the extra expenditures on this transportation and communication systems upgrade. What is the short-run impact on real GDP and the aggregate price level? What is the long-run impact on real GDP and the aggregate price level? Provide a graph to illustrate your answer.

c. The petroleum exporting countries form a cartel that leads to a major increase in the price of petroleum. What is the short-run impact on real GDP and the aggregate price level? What is the long-run impact on real GDP and the aggregate price level? Provide a graph to illustrate your answer.

d. The petroleum exporting countries form a cartel that leads to a major increase in the price of petroleum. At the same time, government officials worried about the recessionary impact of these higher petroleum prices have adopted a policy of increasing government demand in an amount to always offset any reduction in production due to higher petroleum prices. What is the short-run impact on real GDP and the aggregate price level? What is the long-run impact on real GDP and the aggregate price level? Provide a graph to illustrate your answer.
e. Suppose consumer confidence decreases. What is the short-run impact on real GDP and the aggregate price level? What is the long-run impact on real GDP and the aggregate price level? Provide a graph to illustrate your answer.

5. This is a complicated problem using your knowledge of the AD/AS Model as well as your knowledge of the Keynesian Model. Suppose you are given the following information about an economy:

\[ C = 200 + 0.75(Y - T) - 10P \]
\[ T = \$60 \text{ million} \]
\[ G = \$70 \text{ million} \]
\[ I = \$20 \text{ million} \]
\[ (X - M) = -\$20 \text{ million} \]

The full employment unemployment rate is 5% and you are told that for every $100 million that real GDP is less than full employment real GDP that the unemployment rate increases by 1%.

\[ Y_{fe} = \text{real GDP at full employment} = 1000 \]

**AD equation:** \[ AD = Y = C + I + G + (X - M) \]

**SRAS equation:** \[ SRAS = Y = 50P \]

**LRAS equation:** \[ LRAS = Y_{fe} = 1000 \]

\[ P \] is the aggregate price level.

Let’s start by analyzing the data you have been given. Answer the following questions based on this initially data that you have.

a. What is the level of government saving, \( S_g \), for this economy? Is this economy currently operating with a balanced budget, a budget deficit, or a budget surplus? Explain your answer.

b. What is the level of capital inflow, \( K_I \), into this economy? Is this economy currently operating with a trade balance, a trade deficit, or a trade surplus? Explain your answer.

c. Make a prediction of what the value of private savings, \( S_p \), is for this economy if it is operating at its short-run equilibrium. Show your work. [Warning: this is going to take some thinking and some pulling together of material you learnt about the loanable funds market as well as the Keynesian Model: but, you can do this!] DO NOT CALCULATE \( Y_e \) IN ORDER TO THEN CALCULATE \( S_p \)...FIND AN ALTERNATIVE WAY TO FIND \( S_p \)!

d. Given the above information, find the equation for the AD curve for this economy. Write this equation in x-intercept form (where \( Y \) or real GDP is measured on the horizontal axis and \( P \), the aggregate price level, is measured on the vertical axis). Show your work in its entirety here.

e. Given your equation for AD (see (d)), and the short-run AS equation you were given, find the short-run equilibrium level of real GDP, \( Y_e \) for this economy. Then, find the aggregate price level for this economy. Finally, draw a graph depicting this economy's short-run equilibrium as well as the AD curve, the SRAS curve, the LRAS curve, and \( Y_{fe} \). Measure the aggregate price level, \( P \), on the vertical axis and real GDP, \( Y \), on the horizontal axis. Make sure your graph is completely and carefully labeled.

f. Given your answer in (e), what is the actual unemployment rate in this economy in the short-run? Is this unemployment rate greater than or less than the full employment rate of unemployment? What kind of unemployment does this economy exhibit in the short-run?
g. Given your answer in (e), calculate the value of C in the short-run. Then calculate the value of Sp in the short-run and verify that your answer is the same as the one you gave in (c).

h. Suppose that the political leader in this economy wishes to return this economy to Yfe through government spending policy. First, will government spending need to be increased or decreased given the current economic situation? Then, calculate what the value of government spending will need to be in order to get this economy back to full employment. WARNING: THE MULTIPLIER WILL NOT WORK HERE BECAUSE THE AGGREGATE PRICE LEVEL IS NOT CONSTANT! Show your work and then prove that your answer will do the trick! [Hint: this is a multi-step calculation: so provide the step-by-step analysis you are using.] Assume that the SRAS and LRAS curves are not changing and that the slope of the AD curve after the implementation of the fiscal policy is the same as the initial AD curve’s slope.

i. Given your answer in (h), what happen to the level of government saving, $S_g$? What was the rate of inflation? Explain your answers.

6. Suppose that the required reserve ratio is 20% of demand deposits and that the financial system we are analyzing here has no currency drains (that is, all monies are held as demand deposits and no one holds currency) and that banks do not have excess reserves. Answer this set of questions based on this information. Assume that net worth for the banks in the financial system is equal to $0$ (this simplifies our calculations a lot!).

a. If the banking system has $300$ million in demand deposits, what level of reserves did the central bank put into the monetary system in order to support this level of demand deposits? Explain your answer.

b. If the banking system has $300$ million in demand deposits, what is the level of loans in the banking system? Explain your answer and in your answer provide a T-account.

c. Suppose that the central bank decides to buy $20$ million in T-bills from the banks in the financial system. How will this transaction affect the banking system’s overall T-account (we are just using one T-account here), what happens to the money supply in this economy, and what happens to the interest rate (predict whether the interest rate increases or decreases given the central bank’s policy action). Show all calculations and provide the modified T-account depicting the overall impact of this policy.

d. Suppose that the central bank instead decides to sell $20$ million in T-bills to the banks in the financial system. How will this transaction affect the banking system’s overall T-account (we are just using one T-account here), what happens to the money supply in this economy, and what happens to the interest rate (predict whether the interest rate increases or decreases given the central bank’s policy action). Show all calculations and provide the modified T-account depicting the overall impact of this policy.
7. A final big problem using all sorts of things we have studied this semester! Suppose you are given the following information about an economy.

\[ r_r = \text{required reserve ratio} = 10\% \text{ of demand deposits} \]
\[ Ms = \text{Money supply} = 10,000 \]
\[ Md = \text{Money demand}: Md = 12,000 - 500r \text{ where } r \text{ is the interest rate expressed as a percentage} \]
\[ C = 20 + 0.8(Y - T) - 2P \text{ where } P \text{ is the aggregate price level} \]
\[ T = 50 \]
\[ G = 70 \]
\[ I = \left(\frac{10,000}{3}\right) - \left(\frac{1000}{3}\right)r \text{ (X - M) = 50} \]
\[ AD = \text{Aggregate Demand} = Y = C + I + G + (X - M) \]
\[ SRAS = \text{short-run aggregate supply} = Y = 20P \]
\[ LRAS = \text{long-run aggregate supply} = Yfe = 7500 \]

Let’s start by analyzing the data you have been given. Answer the following questions based on this data you initially have.

a. What is the level of government saving, \( S_g \), for this economy? Is this economy currently operating with a balanced budget, a budget deficit, or a budget surplus? Explain your answer.

b. What is the level of capital inflow, \( KI \), into this economy? Is this economy currently operating with a trade balance, a trade deficit, or a trade surplus? Explain your answer.

c. Given the above information, find the equilibrium interest rate in the money market. Show your work. Then, compute the equilibrium level of investment spending for this economy.

d. Make a prediction of what the value of private savings, \( Sp \), is for this economy if it is operating at its short-run equilibrium. Show your work. [Warning: this is going to take some thinking and some pulling together of material you learnt about the loanable funds market as well as the Keynesian Model: but, you can do this!] DO NOT CALCULATE \( Ye \) IN ORDER TO THEN CALCULATE \( Sp \)....FIND AN ALTERNATIVE WAY TO FIND \( Sp \)!

e. Given the above information, find the equation for the AD curve for this economy. Write this equation in x-intercept form (where \( Y \) or real GDP is measured on the horizontal axis and \( P \), the aggregate price level, is measured on the vertical axis). Show your work in its entirety here.

f. Given your equation for AD (see (e)), and the short-run AS equation you were given, find the short-run equilibrium level of real GDP, \( Ye \), for this economy. Then, find the aggregate price level for this economy. Finally, draw a graph depicting this economy's short-run equilibrium as well as the AD curve, the SRAS curve, the LRAS curve, and \( Yfe \). Measure the aggregate price level, \( P \), on the vertical axis and real GDP, \( Y \), on the horizontal axis. Make sure your graph is completely and carefully labeled.

g. Given your answer in (f): what do you know about the actual level of unemployment relative to the full employment level of unemployment or the natural rate of unemployment. Explain your answer.
h. Given your answer in (f), calculate the value of C in the short-run. Then calculate the value of Sp in the short-run and verify that your answer is the same as the one you gave in (c).

i. Suppose that the political leader in this economy wishes to return this economy to Yfe through monetary policy. First, will money supply need to be increased or decreased given the current economic situation? Then, calculate what the value of the change in reserves and thus, the change in the money supply that will be needed in order to get this economy back to full employment. WARNING: THE MULTIPLIER WILL NOT WORK HERE BECAUSE THE AGGREGATE PRICE LEVEL IS NOT CONSTANT! Show your work and then prove that your answer will do the trick! [Hint: this is a multi-step calculation: so provide the step-by-step analysis you are using.] Assume that the SRAS and LRAS curves are not changing and that the new AD curve after the implementation of the new monetary policy is parallel to the initial AD curve.