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## ECO 209Y <br> MACROECONOMIC THEORY <br> Problem Set 5-6

1. Consider the following model of a closed economy:

$$
\begin{array}{ll}
\mathrm{C}=\bar{C}+\mathrm{c} Y \mathrm{D} & \mathrm{~L}=\mathrm{k} \mathrm{Y}-\mathrm{h} \mathrm{i} \\
\mathrm{I}=\bar{I}-\mathrm{b} \mathrm{i}+\mathrm{fY} & \mathrm{M} / \mathrm{P}=(\bar{M} / \bar{P}) \\
\mathrm{G}=\bar{G} & \\
\mathrm{TA}=\mathrm{t} \mathrm{Y} & \\
\mathrm{TR}=\overline{\mathrm{TR}} &
\end{array}
$$

a) What is the equation for the IS curve in this model?
b) What is the equation for the LM curve in this model?
c) What are the equilibrium level of income and the equilibrium interest rate in this model such that both the goods market and the money market are in equilibrium?
d) What are the fiscal policy multiplier $\left(\Delta Y^{*} / \Delta G\right)$ and the monetary policy multiplier $\left[\Delta Y^{*} / \Delta(M / P)\right]$ ?
e) Find the $(\Delta \mathrm{i} / \Delta \mathrm{G})$ and the $[\Delta \mathrm{i} / \Delta(\mathrm{M} / \mathrm{P})]$ multipliers.
2. Consider the following model of a closed economy:

$$
\begin{array}{ll}
C=60+0.8 Y D & L=0.2 Y-10 i \\
I=200-20 i+0.2 Y & M / P=300 \\
G=300 & \\
T A=0.25 Y & \\
T R=50 &
\end{array}
$$

a) What is the equation for the IS curve in this model?
b) What is the equation for the LM curve in this model?
c) What are the equilibrium level of income and the equilibrium interest rate in this model such that both the goods market and the money market are in equilibrium?
d) Show exactly the vertical and the horizontal shift in the IS curve when government expenditure increases by 100.
e) Show exactly the vertical and the horizontal shift in the LM curve when the real money supply falls by 100.
3. Consider the following information of an open economy model as derived in class:

Autonomous expenditure $(\overline{A E})=200$
Simple expenditure multiplier $\left(\alpha_{\mathrm{AE}}\right)=2$
Interest sensitivity of investment $(b)=5$
Real supply of money $(M / P)=400$
Income sensitivity of the demand for real balances $(k)=4$
Slope of the $L M$ curve $=0.2$
a) Derive the expression for the IS curve in this economy.
b) Derive the expression for the LM curve in this economy.
c) Derive the equilibrium values of income ( Y ) and the rate of interest (i).
d) Suppose that initially the income sensitivity of imports (m) was equal to 0.1. Further suppose that as a result of a change in consumers' preferences the income sensitivity of imports increases to 0.2. What is the value of the new simple expenditure multiplier?
4. Assume you have the following information about a macro model:

$$
\begin{array}{ll}
S=-200+0.2 Y D & L=100+0.25 Y-5 i \\
T A=0.125 Y-40 & M=800 \\
T R=60 & P=2 \\
I=300-10 i & \\
G=70 & \\
N X=150-0.2 Y &
\end{array}
$$

Calculate the equilibrium values of investment (I), real balances (L), and net exports (NX).
5. Consider the following model of the economy:

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\(\mathrm{C}=325+0.8 \mathrm{YD}-10 \mathrm{i}\)
I = \(100-15 i+0.08 Y\)
\(G=260\)
\(T R=100\)
\(\mathrm{TA}=50+0.1 \mathrm{Y}\)
\(Y_{\text {fe }}=3500\)
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a) What is the equation for the IS curve in this model?
b) If the rate of interest is 5 percent (i.e., $i=5$ ), what is the equation for the corresponding AE curve? What is the level of equilibrium income when $\mathrm{i}=5$ ? What is the size of the aggregate expenditure multiplier?
c) What is the level of private saving (S) when the economy is in equilibrium at $\mathrm{i}=5$ ? What is the level of government saving (or budget surplus, BS) when the economy is in this equilibrium? What is the level of national saving $\left(\mathrm{S}_{N}\right)$ when the economy is in this equilibrium? What is the level of private investment in this equilibrium
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?
e) By how much could government purchases (G) increase without moving the government into a situation of a structural deficit? What would be the level of equilibrium income if the government were to increase $G$ by this amount?
f) All else equal, what change in government purchases (G) would be necessary for the economy to reach the level of full-employment income? Given this increase in G, what would be the level of government saving (or budget surplus) at the level of full-employment income? In your view, should the government implement such an increase in G? Explain your answer.
6. Consider the following model of a closed economy:

$$
\begin{array}{ll}
A E=C+I+G & L=0.5 Y-25 i \\
C=200+0.8 Y D & M=1000 \\
I=200-5 i & P=2 \\
G=260 & \\
T A=100+0.25 Y & \\
T R=150 & \\
Y D=Y-T A+T R &
\end{array}
$$

a) What are the equilibrium levels of income and rate of interest in this economy?
b) What is the level of private saving when the economy is in equilibrium? What is the size of the government budget surplus when the economy is in equilibrium?
c) Suppose now that, as a result of an increase in government purchases (G), both equilibrium income and equilibrium rate of interest increased. All else equal, by how much did equilibrium income increase if the rate of interest rose to $16 \%$ ? What would be the change in investment resulting from this increase in the rate of interest?
d) Explain why an increase in government expenditure would cause the rate of interest to increase.
e) Suppose now that the Bank of Canada increases the nominal supply of money by $\$ 200$. What would be the level of the rate of interest if output were to remain unchanged at $Y=1600$ ? Would this rate of interest be a new equilibrium? Explain.

