# Intermediate Macroeconomics Assignment #3

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1. Let's represent the tax system by writing tax revenue as

$$T = \bar{T} + tY$$

where $T$ and $t$ are parameters of the tax code. The parameter $t$ is the marginal tax rate: if income rises by \$1, taxes rise by $t \times \$1$.

   (a) How does this tax system change the way consumption responds to changes in GDP?

   (b) In the Keynesian cross, how does this tax system alter the government-purchases multiplier?

   (c) In the IS-LM model, how does this tax system alter the slope of the IS curve?

2. Consider the impact of an increase in thriftiness in the Keynesian cross model. Suppose the consumption function is

$$C = \bar{C} + c(Y - T)$$

where $C$ is a parameter called autonomous consumption that represents exogenous influences on consumption and $c$ is the marginal propensity to consume.

   (a) What happens to equilibrium income when the society becomes more thrifty, as represented by a decline in $\bar{C}$?

   (b) What happens to equilibrium saving?

   (c) Why do you suppose this result is called *the paradox of thrift*?

3. The following equations describe an economy.

$$Y = C + I + G$$

$$C = 50 + 0.75(Y - T)$$

$$I = 150 - 10r$$

$$(M/P)^d = Y - 50r$$

$$G = 250$$

$$T = 200$$

$$M = 3,000$$

$$P = 4$$

   (a) From the above list, use the relevant set of equations to derive the IS curve. Graph the IS curve on an appropriately labeled graph.

   (b) From the above list, use the relevant set of equations to derive the LM curve. Graph the LM curve on the same graph you used in part (a).

   (c) What are the equilibrium level of income and the equilibrium interest rate?

4. Use the IS-LM model to predict the short-run effects of each of the following shocks on income, the interest rate, consumption, and investment. In each case, explain what the central bank should do to keep income at its initial level. Be sure to use a graph in each of your answer.

   (a) After the invention of a new high-speed computer chip, many firms decide to upgrade their computer systems.

   (b) A wave of credit card fraud increases the frequency with which people make transactions in cash.

   (c) A best-seller titled Retire Rich convinces the public to increase the percentage of their income devoted to saving.

   (d) The appointment of a new ”dovish” central bank chair increases expected inflation.

5. This problem asks you to analyze the IS-LM model algebraically. Suppose consumption is a linear function of disposable income:

$$C(Y - T) = a + b(Y - T)$$

where $a > 0$ and $0 < b < 1$. The parameter $b$ is the marginal propensity to consume, and the parameter $a$ is a constant called autonomous consumption. Suppose also that investment is a linear function of the interest rate:

$$I(r) = c - dr$$

(a) Solve for $Y$ as a function of $r$, the exogenous variable $G$ and $T$, and the model's parameters $a, b, c$, and $d$.

(b) How does the slope of the IS curve depend on the parameter $d$, the interest sensitivity of investment? Refer to your answer to part (a), and explain the intuition.

(c) Which will cause a bigger horizontal shift in the IS curve, a \$100 tax cut or a \$100 increase in government spending? Refer to your answer to part (a), and explain the intuition.

Now suppose demand for real money balance is a linear function of income and the interest rate:

$$L(r, Y) = eY - fr,$$

where $e > 0$ and $f > 0$. The parameter $e$ measures the sensitivity of money demand to income, while the parameter $f$ measures the sensitivity of money demand to the interest rate.

(d) Solve for $r$ as a function of $Y, M$, and $P$ and the parameters $e$ and $f$.

(e) Use your answers to parts (a) and (d) to derive an expression for the aggregate demand curve. Your expression should show $Y$ as a function of $P$; of exogenous policy variables $M, G$, and $T$; and of the model's parameters. This expression should not contain $r$.

(f) Use your answer to part (e) to prove that increases in $G$ and $M$, and decreases in $T$, shift the aggregate demand curve to the right. How does this result change if the parameter $f$ equals zero? Explain the intuition for your result.