

This *IS* equation is analogous to the one derived in the text except that each term is divided by  $1 - b(1 - t)$  rather than by  $(1 - b)$ . We know that  $t$  is a tax rate, which is less than 1. Therefore, we conclude that this *IS* curve is steeper than the one in which taxes are a fixed amount.

4. a.

If society becomes more thrifty—meaning that for any given level of income people save more and consume less—then the planned-expenditure function shifts downward, as in Figure 10-9 (note that  $\bar{C}_2 < \bar{C}_1$ ). Equilibrium income falls from  $Y_1$  to  $Y_2$ .

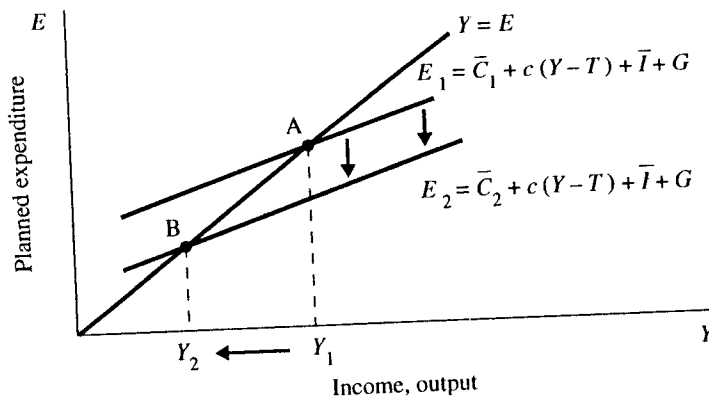


Figure 10-9

- b. Equilibrium saving remains unchanged. The national accounts identity tells us that saving equals investment, or  $S = I$ . In the Keynesian-cross model, we assumed that desired investment is fixed. This assumption implies that investment is the same in the new equilibrium as it was in the old. We can conclude that saving is exactly the same in both equilibria.
- c. The paradox of thrift is that even though thriftiness increases, saving is unaffected. Increased thriftiness leads only to a fall in income. For an individual, we usually consider thriftiness a virtue. From the perspective of the Keynesian cross, however, thriftiness is a vice.
- d. In the classical model of Chapter 3, the paradox of thrift does not arise. In that model, output is fixed by the factors of production and the production technology, and the interest rate adjusts to equilibrate saving and investment, where investment depends on the interest rate. An increase in thriftiness decreases consumption and increases saving for any level of output; since output is fixed, the saving schedule shifts to the right, as in Figure 10-10. At the new equilibrium, the interest rate is lower, and investment and saving are higher.

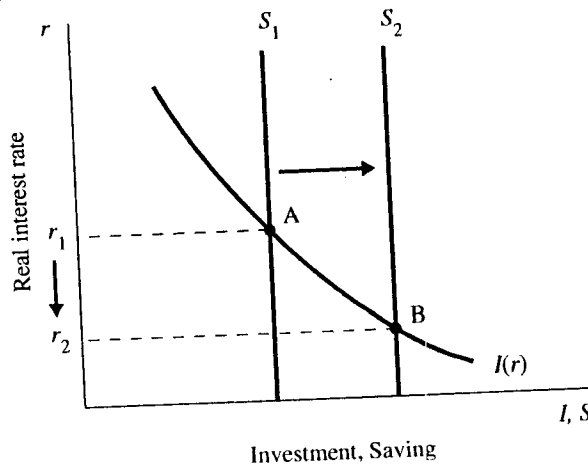


Figure 10-10

Thus, in the classical model, the paradox of thrift does not exist.

4. Falling prices can either increase or decrease equilibrium income. There are two ways in which falling prices can increase income. First, an increase in real money balances shifts the  $LM$  curve downward, thereby increasing income. Second, the  $IS$  curve shifts to the right because of the Pigou effect: real money balances are part of household wealth, so an increase in real money balances makes consumers feel wealthier and buy more. This shifts the  $IS$  curve to the right, also increasing income.

There are two ways in which falling prices can reduce income. The first is the debt-deflation theory. An unexpected decrease in the price level redistributes wealth from debtors to creditors. If debtors have a higher propensity to consume than creditors, then this redistribution causes debtors to decrease their spending by more than creditors increase theirs. As a result, aggregate consumption falls, shifting the  $IS$  curve to the left and reducing income. The second way in which falling prices can reduce income is through the effects of expected deflation. Recall that the real interest rate  $r$  equals the nominal interest rate  $i$  minus the expected inflation rate  $\pi$ :  $r = i - \pi$ . If everyone expects the price level to fall in the future (i.e.,  $\pi$  is negative), then for any given nominal interest rate, the real interest rate is higher. A higher real interest rate depresses investment and shifts the  $IS$  curve to the left, reducing income.

### Problems and Applications

1. a.

If the central bank increases the money supply, then the  $LM$  curve shifts downward, as shown in Figure 11-4. Income increases and the interest rate falls. The increase in disposable income causes consumption to rise; the fall in the interest rate causes investment to rise as well.

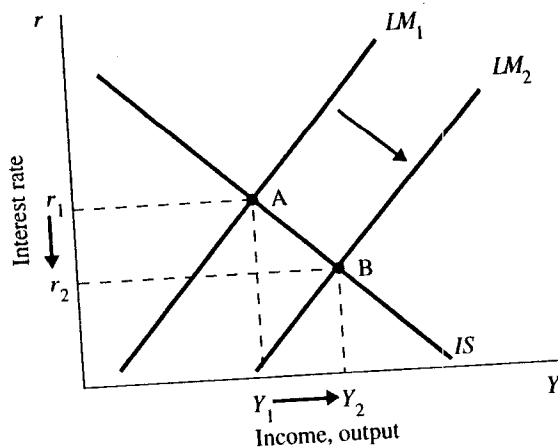
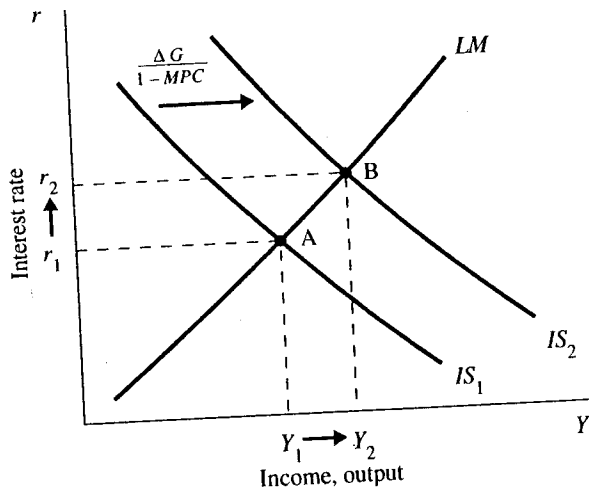


Figure 11-4

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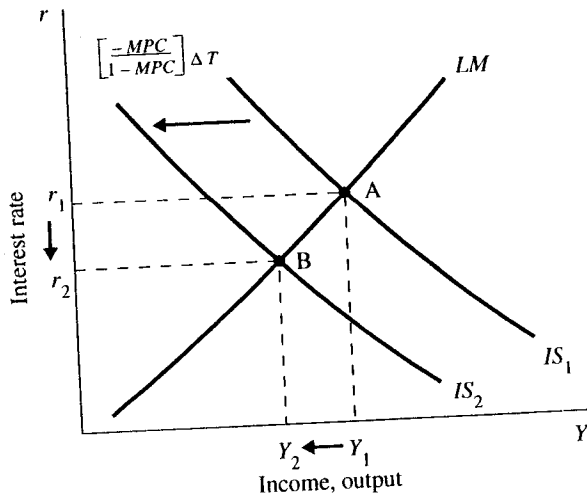
- b. If government purchases increase, then the government-purchases multiplier tells us that the  $IS$  curve shifts to the right by an amount equal to  $[1/(1 - MPC)]\Delta G$ . This is shown in Figure 11-5. Income and the interest rate both increase. The increase in disposable income causes consumption to rise, while the increase in the interest rate causes investment to fall.

Figure 11-5



- c. If the government increases taxes, then the tax multiplier tells us that the  $IS$  curve shifts to the left by an amount equal to  $[-MPC/(1 - MPC)]\Delta T$ . This is shown in Figure 11-6. Income and the interest rate both fall. Disposable income falls because income is lower and taxes are higher; this causes consumption to fall. The fall in the interest rate causes investment to rise.

Figure 11-6



- d. We can figure out how much the *IS* curve shifts in response to an equal increase in government purchases and taxes by adding together the two multiplier effects that we used in parts (b) and (c):

$$\Delta Y = [(1/(1 - MPC))\Delta G] - [(MPC/(1 - MPC))\Delta T]$$

Because government purchases and taxes increase by the same amount, we know that  $\Delta G = \Delta T$ . Therefore, we can rewrite the above equation as:

$$\Delta Y = [(1/(1 - MPC)) - (MPC/(1 - MPC))]\Delta G$$

$$\Delta Y = \Delta G.$$

This expression tells us how output changes, holding the interest rate constant. It says that an equal increase in government purchases and taxes shifts the *IS* curve to the right by the amount that *G* increases.

This shift is shown in Figure 11-7. Output increases, but by less than the amount that *G* and *T* increase; this means that disposable income  $Y - T$  falls. As a result, consumption also falls. The interest rate rises, causing investment to fall.

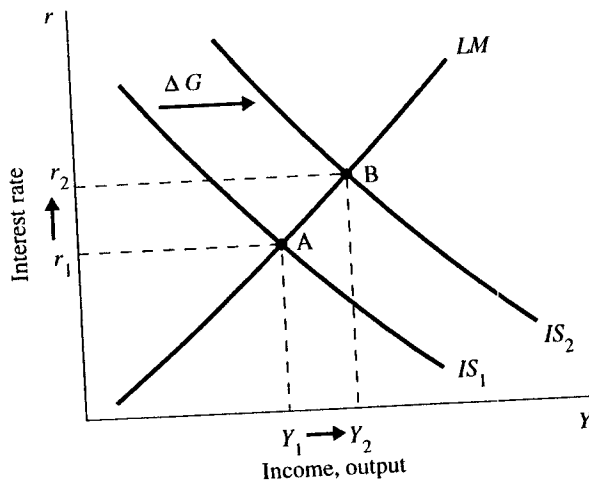


Figure 11-7