

Suggested answer of PS#3

1. question7 of page 177. The effect of a government tax increase of \$100 billion on (a) public saving, (b) private saving, and (c) national saving can be analyzed by using the following relationships:

$$\text{National Saving} = [\text{Private Saving}] + [\text{Public Saving}] = [Y - T - C(Y - T)] + [T - G] = Y - C(Y - T) - G.$$

- a. Public Saving—The tax increase causes a 1-for-1 increase in public saving. T increases by \$100 billion and, therefore, public saving increases by \$100 billion.
b. Private Saving—The increase in taxes decreases disposable income, $Y - T$, by \$100 billion. Since the marginal propensity to consume (MPC) is 0.6, consumption falls by $0.6 \times \$100$ billion, or \$60 billion. Hence,

$$\Delta \text{Private Saving} = -\$100b - 0.6(-\$100b) = -\$40b. \text{ Private saving falls } \$40 \text{ billion.}$$

- c. National Saving—Because national saving is the sum of private and public saving, we can conclude that the \$100 billion tax increase leads to a \$60 billion increase in national saving.

Another way to see this is by using the third equation for national saving expressed above, that national saving equals $Y - C(Y - T) - G$. The \$100 billion tax increase reduces disposable income and causes consumption to fall by \$60 billion. Since neither G nor Y changes, national saving thus rises by \$60 billion.

- d. Investment—To determine the effect of the tax increase on investment, recall the national accounts identity:

$Y = C(Y - T) + I(r) + G$. Rearranging, we find $Y - C(Y - T) - G = I(r)$. The left-hand side of this equation is national saving, so the equation just says that national saving equals investment. Since national saving increases by \$60 billion, investment must also increase by \$60 billion. How does this increase in investment take place? We know that investment depends on the real interest rate. For investment to rise, the real interest rate must fall. Remember the graph that investment as a function of the real interest rate. The tax increase causes national saving to rise, so the supply curve for loanable funds shifts to the right. The equilibrium real interest rate falls, and investment rises.

2. question 8 of page 177. If consumers increase the amount that they consume today, then private saving and, therefore, national saving will fall. We know this from the definition of national saving:

$$\begin{aligned}\text{National Saving} &= [\text{Private Saving}] + [\text{Public Saving}] \\ &= [Y - T - C(Y - T)] + [T - G].\end{aligned}$$

An increase in consumption decreases private saving, so national saving falls. Remember the figure of investment curve and supply of saving curve. It illustrates investment as a function of the real interest rate. If national saving decreases, the supply curve for loanable funds shifts to the left, thereby raising the real interest rate and reducing investment.

3. question 9 of page 177. 9.

a. Private saving is the amount of disposable income, $Y - T$, that is not consumed:

$$\begin{aligned} \text{Thus, private saving} &= Y - T - C \\ &= 5,000 - 1,000 - (250 + 0.75(5,000 - 1,000)) \\ &= 750. \end{aligned}$$

Public saving is the amount of taxes the government has left over after it makes its purchases: thus, public saving = $T - G$

$$\begin{aligned} &= 1,000 - 1,000 \\ &= 0. \end{aligned}$$

Total saving is the sum of private saving and public saving:

$$\begin{aligned} &= 750 + 0 \\ &= 750. \end{aligned}$$

b. The equilibrium interest rate is the value of r that clears the market for loanable funds. We already know that national saving is 750, so we just need to set it equal to investment:

$$\begin{aligned} S &= I \\ 750 &= 1,000 - 50r \end{aligned}$$

Solving this equation for r , we find:

$$r = 5\%.$$

c. When the government increases its spending, private saving remains the same as

before while government saving decreases. Putting the new G into the equations above:

$$\begin{aligned} \text{Private saving} &= 750 \\ \text{Public saving} &= T - G \\ &= 1,000 - 1,250 \\ &= -250. \end{aligned}$$

Thus,

$$\begin{aligned} \text{National saving} & \\ &= 750 + (-250) \\ &= 500. \end{aligned}$$

d. Once again the equilibrium interest rate clears the market for loanable funds:

$$\begin{aligned} S &= I \\ 500 &= 1,000 - 50r \end{aligned}$$

Solving this equation for r , we find:

$$r = 10\%.$$

4 question 10 of page 177.

To determine the effect on investment of an equal increase in both taxes and government spending, consider the national income accounts identity for national saving:

$$\begin{aligned} \text{National Saving} &= [\text{Private Saving}] + [\text{Public Saving}] \\ &= [Y - T - C(Y - T)] + [T - G]. \end{aligned}$$

We know that Y is fixed by the factors of production. We also know that the change in consumption equals the marginal propensity to consume (MPC) times the change in disposable income. This tells us that

$$\begin{aligned}\Delta \text{National Saving} &= [-\Delta T - (\text{MPC} \times (-\Delta T))] + [\Delta T - \Delta G] \\ &= [-\Delta T + (\text{MPC} \times \Delta T)] + 0 \\ &= (\text{MPC} - 1) \times \Delta T.\end{aligned}$$

The above expression tells us that the impact on saving of an equal increase in T and G depends on the size of the marginal propensity to consume. The closer the MPC is to 1, the smaller is the fall in saving. For example, if the MPC equals 1, then the fall in consumption equals the rise in government purchases, so national saving $[Y - C(Y - T) - G]$ is unchanged. The closer the MPC is to 0 (and therefore the larger is the amount saved rather than spent for a one-dollar change in disposable income), the greater is the impact on saving. Because we assume that the MPC is less than 1, we expect that national saving falls in response to an equal increase in taxes and government spending. The reduction in saving means that the supply of loanable funds curve shifts to the left. The real interest rate rises, and investment falls.

5. question 11 of page 177.

- a. The demand curve for business investment shifts out to the right because the subsidy increases the number of profitable investment opportunities for any given interest rate. The demand curve for residential investment remains unchanged.
- b. The total demand curve for investment in the economy shifts out to the right since it represents the sum of business investment, which shifts out to the right, and residential investment, which is unchanged. As a result the equilibrium real interest rate rises because the investment curve shift to the right.
- c. The total quantity of investment does not change because it is constrained by the inelastic supply of savings. The investment tax credit leads to a rise in business investment, but an offsetting fall in residential investment. That is, the higher interest rate means that residential investment falls (a movement along the curve), whereas the rightward shift of the business investment curve leads business investment to rise by an equal amount.

6. question 13 of page 178

Note that first we consider the case where supply curve is upward sloping instead of vertical line. This implies that saving is a positive function of interest rate.

- a) Consider the case where the demand for loanable funds is stable but the supply of funds (the saving schedule) fluctuates perhaps reflecting temporary shocks to income, tax, changes in government spending, or changes in consumer confidence. In this case, when the supply curve shifts to the right, interest rates fall, investment rises; when the supply curve shifts to left, the interest rates

rise, investment falls. Thus, we would expect a negative correlation between investment and interest rates.

b) Consider the case where the supply of loanable funds curve is stable, whereas the demand for loanable funds varies, perhaps reflecting fluctuations in firms' expectations about the marginal product of capital. In this case, when the demand curve shift to the right, the equilibrium interest rate rises and the investment increases. When the demand curve shifts to the left, the equilibrium interest rate fall and investment falls. We would now find a positive correlation

c) we see both positive and negative relationship. As a result, there is no consistent pattern between interest rate and investment.

d) In the data, saving does not seem to depend on interest rate. Also saving curve seems to be quite stable. On the other hand, investment curve seems to fluctuate a lot. As a result, we tend to observe case b.

7. When $K=16$, $Y=4L^{0.5}$. By taking a derivative with respect to L , we can calculate MPL.

$$MPL = 4 \times 0.5 \times L^{-0.5} = \frac{2}{\sqrt{L}}$$

Thus, MPL is downward sloping. At the equilibrium MPL should be equal to wage rate. When $L=36$, $MPL=1/3$. Thus, the equilibrium wage rate is $1/3$

8.

(a) Monetary base: the amount of money that the central bank can control directly. This is equal to currency and reserve

(b) money supply: the amount of money that is available in the market which is equal to the currency plus deposit.

(c) The quantity theory of the money is the theory that argue that the velocity of the money is constant. This implies that

$$V = \frac{PY}{M}$$

where V is constant

This implies that

$$MV = PY$$

where V is constant

(d) Double coincidence of wants is a situation where person A has what person B wants and simultaneously person B has what person A want. In this situation, two person can be engaged in exchange without using money. However, such a situation is very rare. Thus, in the presence of money, without double coincidents of wants, people can be engaged in economic transaction.

(e) Money multiplier is the ration between money supply and monetary base. It shows that how much money supply increases when the central bank increases

the monetary base by one unit. Money multiplier can be calculated as follows:

$$\text{money multiplier} = \frac{cr + 1}{rr + cr}$$

where cr is the cash deposit ratio and rr is the reserve rate

(f) Fisher effect shows the relationship between the nominal interest rate and inflation rate. It says that when the inflation rate increases by one percentage point, then the nominal interest rate also increases one percentage point.