Problem Set 3
Solutions
Due on Wednesday, October 19

3.6.

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

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

Public saving is the amount of taxes the government has left over after it makes its purchases:

$$\begin{aligned} S^{\text{public}} &= T - G \\ &= 1{,}000 - 1{,}000 \\ &= 0. \end{aligned}$$

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

$$\begin{aligned} S &= S^{\text{private}} + S^{\text{public}} \\ &= 750 + 0 \\ &= 750. \end{aligned}$$

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 (notice that G does not appear in the S^{private} above) while government saving decreases. Putting the new G into the equations above:

$$S^{\text{private}} = 750$$

$$\begin{aligned} S^{\text{public}} &= T - G \\ &= 1{,}000 - 1{,}250 \\ &= -250. \end{aligned}$$

Thus,

$$\begin{aligned} S &= S^{\text{private}} + S^{\text{public}} \\ &= 750 + (-250) \\ &= 500. \end{aligned}$$

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:

$$r = 10\%.$$

Additional to 3.6 (1).

G remains at 1,000 and *T* falls ***to*** 750. Using these new values, we can complete all of the necessary steps in order to obtain public savings, private savings, national savings, and finally, the new equilibrium interest rate.

$$
\begin{aligned}
S^{public} &= T - G \\
&= 750 - 1{,}000 \\
&= \mathbf{-250}
\end{aligned}
$$

$$
\begin{aligned}
S^{private} &= Y - T - C \\
&= 5{,}000 - 750 - [250 + 0.75(5{,}000 - 750)] \\
&= 4{,}250 - [250 + 3187.5] \\
&= 4{,}250 - 3437.5 \\
&= \mathbf{812.5}
\end{aligned}
$$

$$
\begin{aligned}
S^{national} &= S^{public} + S^{private} \\
&= (-250) + 812.5 \\
&= \mathbf{562.5}
\end{aligned}
$$

$$
\begin{aligned}
\text{Since } S^{national} &= I\ ; \\
562.5 &= 1{,}000 - 50\boldsymbol{r} \\
\boldsymbol{r} &= \mathbf{8.75}
\end{aligned}
$$

Additional to 3.6 (2).

Government spending is set at 1,250 and *T* rises ***to*** 1250. Using these new values, we can complete all of the necessary steps in order to obtain public savings, private savings, national savings, and finally, the new equilibrium interest rate.

$$
\begin{aligned}
S^{public} &= T - G \\
&= 1250 - 1{,}250 \\
&= \mathbf{0}
\end{aligned}
$$

$$
\begin{aligned}
S^{private} &= Y - T - C \\
&= 5{,}000 - 1250 - [250 + 0.75(5{,}000 - 1250)] \\
&= 3{,}750 - [250 + 2812.5] \\
&= 3.750 - 3062.5 \\
&= \mathbf{687.5}
\end{aligned}
$$

$$
\begin{aligned}
S^{national} &= S^{public} + S^{private} \\
&= 0 + 687.5 \\
&= \mathbf{687.5}
\end{aligned}
$$

$$
\begin{aligned}
\text{Since } S^{national} &= I\ ; \\
687.5 &= 1{,}000 - 50\boldsymbol{r} \\
\boldsymbol{r} &= \mathbf{6.25}
\end{aligned}
$$

3.7.

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

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

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 in Figure 3–3. The real interest rate rises, and investment falls.

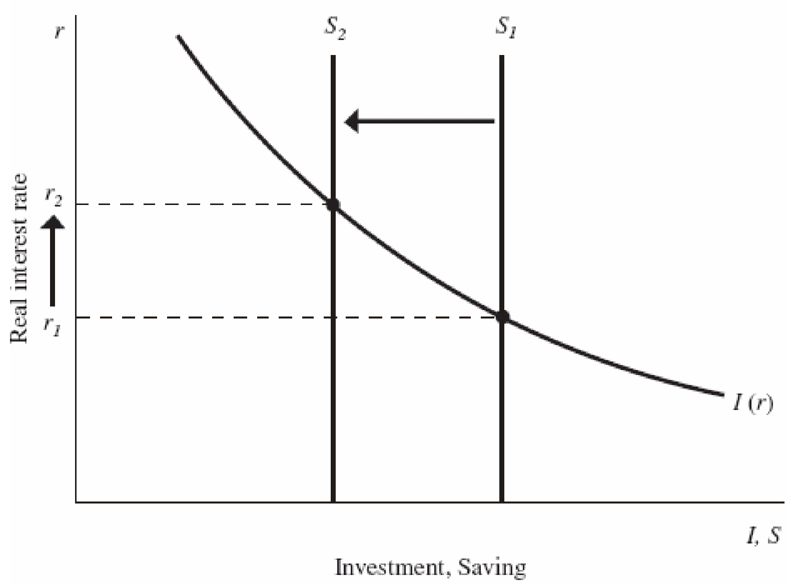

Figure 3–3

4.2.

The real interest rate is the difference between the nominal interest rate and the inflation rate. The nominal interest rate is 11 percent, but we need to solve for the inflation rate. We do this with the quantity identity expressed in percentage-change form:

$$\% \text{ Change in } M + \% \text{ Change in } V = \% \text{ Change in } P + \% \text{ Change in } Y.$$

Rearranging this equation tells us that the inflation rate is given by:

$$\% \text{ Change in } P + \% \text{ Change in } M + \% \text{ Change in } V - \% \text{ Change in } Y.$$

Substituting the numbers given in the problem, we thus find:

$$\% \text{ Change in } P = 14\% + 0\% - 5\%$$

$$= 9\%.$$

Thus, the real interest rate is 2 percent: the nominal interest rate of 11 percent minus the inflation rate of 9 percent.

4.7.

A deflation means a fall in the general price level, which is the same as a rise in the value of money. Under a gold standard, a rise in the value of money is a rise in the value of gold because money and gold are in a fixed ratio. Therefore, after a deflation, an ounce of gold buys more goods and services. This creates an incentive to look for new gold deposits and, thus, more gold is found after a deflation.

4.8.

An increase in the rate of money growth leads to an increase in the rate of inflation. Inflation, in turn, causes the nominal interest rate to rise, which means that the opportunity cost of holding money increases. As a result, real money balances fall. Since money is part of wealth, real wealth also falls. A fall in wealth reduces consumption, and, therefore, increases saving. The increase in saving leads to an outward shift of the saving schedule, as in Figure 4–1. This leads to a lower real interest rate.

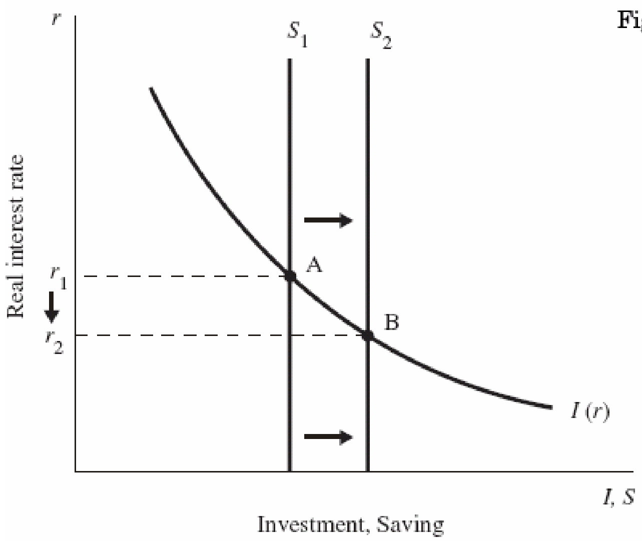

Figure 4–1

The classical dichotomy states that a change in a nominal variable such as inflation does not affect real variables. In this case, the classical dichotomy does not hold; the increase in the rate of inflation leads to a decrease in the real interest rate. The Fisher effect states that $i = r + \pi$. In this case, since the real interest rate r falls, a 1-percent increase in inflation increases the nominal interest rate i by less than 1 percent.

Most economists believe that this Mundell–Tobin effect is not important because real money balances are a small fraction of wealth. Hence, the impact on saving as illustrated in Figure 4–1 is small.