1 Government-Purchases Multiplier (Mankiw 10-1)

- We now know that an increase in government purchases \((G)\) can cause the equilibrium \(Y^*\) to increase. We now ask a more specific question. Suppose we increase \(G\) by one unit. \(Y^*\) will increase by how many units?

- To prepare for the analysis. Suppose variable \(y\) depends on variable \(x\) in the following way: \(y = 2 + 3x\). Now here if we increase \(x\) by 1 unit, then \(y\) will increase by 3 units.

- Suppose instead \(y = 2 + Mx\) where \(M\) is some unknown constant. Then an increase in \(x\) by 1 unit will cause \(y\) to increase by \(M\) units. More generally, an increase in \(x\) by \(\Delta x\) units will increase \(y\) by \(M \times \Delta x\) units.

- We now go back to our model. Suppose the consumption function is \(C(Y - T) = 25 + M(Y - T)\), where again \(M\) is the constant \(MPC\). \(0 < M < 1\). Suppose the investment function \(I(r)\) and \(G\) and \(T\) are left unspecified.
• Substitute the above information into the equilibrium condition

\[ Y = C(Y - T) + I(r) + G \]

to obtain

\[ Y = 25 + M(Y - T) + I(r) + G \]

which implies

\[ Y = 25 + MY - MT + I(r) + G \]

or

\[ (1 - M)Y = 25 - MT + I(r) + G \]

or

\[ Y^* = \frac{25 - MT + I(r) + G}{1 - M} \]

or

\[ Y^* = \frac{25 - MT + I(r)}{1 - M} + \frac{G}{1 - M} \]

• The above equation shows that an increase in \( G \) by one unit will cause \( Y^* \) to increase by \( \frac{1}{1-M} \) units. We call \( \frac{1}{1-M} \) the government-purchases multiplier.

• Note that since \( M < 1 \), the government-purchases multiplier is greater than one. For example, suppose \( M = 0.8 \), then the government-purchases multiplier is equal to 5. Thus for example if the government increases its \( G \) by 10 billion, then GDP will increase by \( 5 \times 10 \) billion.