Components of AD. (Y^{ad})

Consumption expenditure; $C = \bar{C} + MPC \cdot Y_D$

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

$\bar{C}$: autonomous consumption; $(Y - \bar{T})$: disposable income

Investment expenditure; $I = \bar{I} - d(r + \bar{f})$

$\bar{I}$: autonomous investment; $(r + \bar{f})$: real interest cost of borrowing
- real interest on debt free instrument (r)
- financial friction ($\bar{f}$)

Net export; $NX = \bar{NX} - \varepsilon r$

$\bar{NX}$: autonomous net x; r: real interest rates

Goverment purchase & tax; $G = \bar{G}$, $T = \bar{T}$

Goods market equilibrium; Total output = Total AD (planned expenditure)

$$Y = Y^{ad}$$

$$Y = C + I + G + NX$$

$$Y = \bar{C} + MPC \cdot (Y - \bar{T}) + \bar{I} - d(r + \bar{f}) + \bar{NX} - \varepsilon r + \bar{G}$$

$$Y = \bar{C} + \bar{I} - d\bar{f} + \bar{G} + \bar{NX} + MPC \cdot Y - MPC \cdot \bar{T} - (d + \varepsilon) r$$

$$Y - MPC \cdot Y = Y(1 - MPC) = \bar{C} + \bar{I} - d\bar{f} + \bar{G} + \bar{NX} - MPC \cdot \bar{T} - (d + \varepsilon) r$$

$\frac{1}{1-MPC} > 0$ since $0 < MPC < 1$; $(+)$; $(-)$

$$Y = \left[\frac{1}{1-MPC}\right][\bar{C} + \bar{I} - d\bar{f} + \bar{G} + \bar{NX} - MPC \cdot \bar{T}] - \left[\frac{d + \varepsilon}{1 - MPC}\right] r \quad \text{—(*)}$$

$[\bar{C} + \bar{I} - d\bar{f} + \bar{G} + \bar{NX} - MPC \cdot \bar{T}]$: shift IS curve; r: movement along curve

Equation above explains how to determine aggregate output when goods market is in equilibrium. → "IS curve"

Downward slope IS curve; real interest rate ↑ → planned investment spending ↓

NX ↓ → aggregate demand (Y^{ad}) ↓ → aggregate output (Y) ↓

so that $Y^{ad} = Y$ to satisfy goods market equilibrium

Numerical Example :

$\bar{C}$ = \$1.4 trillion, $\bar{f}$ = 1

$\bar{I}$ = \$1.2 trillion, mpc = 0.6

$\bar{G}$ = \$3.0 trillion, d = 0.3

$\bar{T}$ = \$3.0 trillion, e = 0.1

$\bar{NX}$ = \$1.3 trillion

IS curve; $Y = \left[\frac{1}{1-mpc}\right][\bar{C} + \bar{I} - d\bar{f} + \bar{G} + \bar{NX} - mpc \cdot \bar{T}] - \left[\frac{d+e}{1-mpc}\right] r$

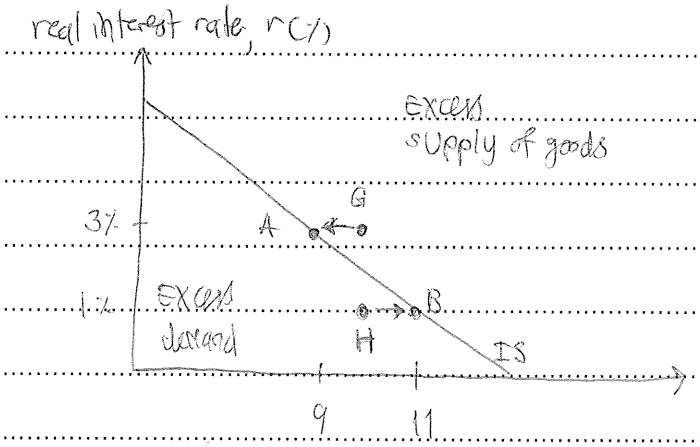
$= \left[\frac{1}{1-0.6}\right][1.4 + 1.2 - 0.3(1) + 3 + 1.3 - 0.6(3)] - \left[\frac{0.3+0.1}{1-0.6}\right] r$

$= \frac{4.8}{0.4} - \left(\frac{0.4}{0.4}\right) r$

IS curve; $Y = 12 - r$

At a real interest rate $r = 3\%$ ⇒ equilibrium output (Y) = 12 − 3 = 9 \$ trillion

$r = 1\%$ ⇒ = 12 − 1 = 11 \$ trillion.



At G, excess supply of goods → firm will cut production → ↓ aggregate output to A

At H, excess demand for goods → firm will ↑ production → ↑ aggregate output to B

IS; $Y = [\bar{C}+\bar{I}-d\bar{T}+\bar{G}+\bar{NX}-mpc\cdot\bar{T}]\left[\frac{1}{1-MPC}\right] - \left[\frac{d+x}{1-MPC}\right]\cdot r$

MP; $r = \bar{r} + \lambda\pi$

AD; $Y = [\bar{C}+\bar{I}-d\bar{T}+\bar{G}+\bar{NX}-mpc\cdot\bar{T}]\left[\frac{1}{1-mpc}\right] - \left[\frac{d+x}{1-mpc}\right](\bar{r}+\lambda\pi)$

MP curve ; is relationship between real interest rate the central bank set and the inflation rate

$\bar{r}$ is autonomous component of real interest rate set by central bank, which is unrelated to current level of inflation

λ is response of real interest rate to inflation rate.

AD curve ; relationship between output and inflation when goods market is in equilibrium