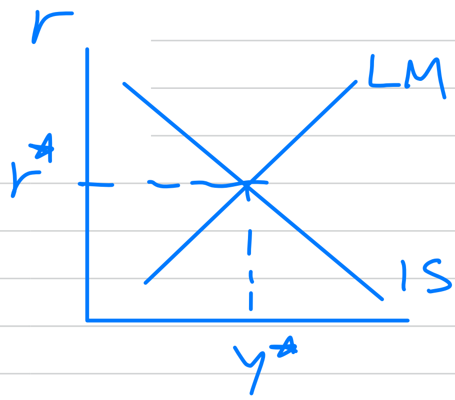
IS–LM Policy Effectiveness

$Y = AE$ ⟶ IS equation: $Y = \underbrace{\frac{1}{1-b(1-t)}}_{k}[a - bT_0 + I_0 - I_1 r + G_0]$

$M_d = M_s$ ⟶ LM equation: $r = \frac{1}{L_2}\left(L_0 + L_1 Y - \frac{M_0^S}{P}\right)$



Find the general eqbm Y^*

1) substitute r of LM into IS
2) solve for Y^*

Let $k = \frac{1}{1-b(1-t)}$ (note that k is multiplier in the $Y = AE$ model)

Thus,

$$Y = k\left[a - bT_0 + I_0 - \frac{I_1}{L_2}\left(L_0 + L_1 Y - \frac{M_s}{P}\right) + G_0\right]$$

We need to move Y to the left to solve for Y^*.

$$Y + kI_1\frac{L_1}{L_2}Y = k\left[a - bT_0 + I_0 - \frac{I_1}{L_2}\left(L_0 - \frac{M_s}{P}\right) + G_0\right]$$

$$Y^* = \frac{k}{1 + kI_1\frac{L_1}{L_2}}\left[a - bT_0 + I_0 - \frac{I_1}{L_2}\left(L_0 - \frac{M_s}{P}\right) + G_0\right]$$

This is the general eqbm Y in the IS-LM.

We can find the multipliers to determine the policy effectiveness. $\frac{dY^*}{dG_0}$ is the fiscal policy mult. and $\frac{dY^*}{dM_s}$ is the monetary policy mult.

$$Y^* = \frac{K}{1+kI_1 \frac{L_1}{L_2}} \left[a - bT_0 + I_0 - \frac{I_1}{L_2}\left(L_0 - \frac{M_s}{P}\right) + G_0 \right]$$

We use the "Partial" Derivative, so $\frac{\partial Y^*}{\partial \text{ exo. var.}}$ is just the coefficient before that variable.

$$\frac{\partial Y^*}{\partial G_0} = \frac{K}{1+kI_1 \frac{L_1}{L_2}} \equiv k_G$$

The multiplier means that if

$G_0 \uparrow$ by 1 unit $\rightarrow$ $Y^* \uparrow$ by k_G units.

$$\frac{\partial Y^*}{\partial M_s} = \frac{K}{1+kI_1 \frac{L_1}{L_2}} \left(\frac{I_1}{L_2}\right)\left(\frac{1}{P}\right) \equiv k_M$$

$P \rightarrow$ assumed to be 1 in the base year

The multiplier means that if

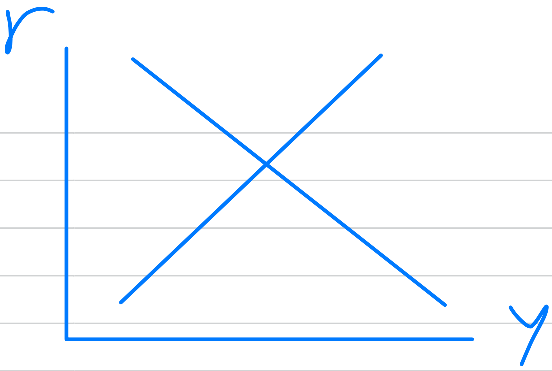
$M_s \uparrow$ by 1 unit $\rightarrow$ $Y^* \uparrow$ by k_M units.

Note that fiscal policy will be more effective than monetary policy only if $k_G > k_M$ or

$$\frac{\partial Y^*}{\partial G_0} > \frac{\partial Y^*}{\partial M_s}$$

$$\cancel{\frac{K}{1+kI_1 \frac{L_1}{L_2}}} > \cancel{\frac{K}{1+kI_1 \frac{L_1}{L_2}}} \left(\frac{I_1}{L_2}\right)$$

$$L_2 > I_1$$



IS equation: $Y = \underbrace{\frac{1}{1-b(1-t)}}_{k}[a - bT_0 + I_0 - I_1 r + G_0]$

LM equation: $r = \frac{1}{L_2}\left(L_0 + L_1 Y - \frac{M_0^S}{P}\right)$

$$r = \frac{a - bT_0 + I_0 + G_0}{I_1} - \frac{1}{kI_1}Y$$

When I_1 or k is high, IS is flat

When L_2 is high or L_1 is low, LM is flat.

Note that fiscal policy will be more effective than monetary policy only if $k_G > k_M$ or

$L_2 > I_1$

Hence, $L_2 > I_1$ means LM is flatter than IS, so we should use fiscal policy to shift IS curve.

IS equation: $Y = \frac{1}{1-b(1-t)}[a - bT_0 + I_0 - I_1 r + G_0]$

LM equation: $r = \frac{1}{\cancel{L_2}}\left(\frac{L_0}{L_2} + \frac{L_1}{L_2}Y - \frac{M_0^S/P}{L_2}\right)$

Consider the case where L_2 is large. (flat LM)

Let's see why fiscal is effective.

When we use fiscal policy, $G\uparrow$

IS : $G_0 \uparrow \rightarrow Y \uparrow$

LM : $Y \uparrow \rightarrow r \uparrow$ a little b/c of large L_2

IS : $r \uparrow$ a little $\rightarrow Y \downarrow$ a little

i.e. there is a small crowding-out effect.

IS equation: $Y = \frac{1}{1-b(1-t)}[a - bT_0 + I_0 - I_1 r + G_0]$

LM equation: $r = \frac{1}{L_2}\left(L_0 + L_1 Y - \frac{M_0^S}{P}\right)$

Consider the case where I_1 is large. (flat IS)

Let's see why monetary is effective.

When we use monetary policy, $M_s \uparrow$

LM : $M_s \uparrow \rightarrow r \downarrow$

IS : $r \downarrow \rightarrow Y \uparrow$ a lot b/c of large I_1

i.e. large I_1 means investment is sensitive to r.