Economics 302
Intermediate Macroeconomic Theory and Policy
(Fall 2010)

Lecture 7

Wednesday, Sep. 29, 2010

(minor edits to graphs 10/3/10)

Outline

- Recap: IS-LM equations
- Recap: Solution
- Graphical derivation of IS, LM curves
- What determines policy efficacy?
- Current events: Liquidity Trap

Recap: Real Side

Eq.No.	Equation	Description
(1)	$Y = AD$	Output equals aggregate demand, an equilibrium condition
(2)	$AD = C + I + G + X$	Definition of aggregate demand
(3)	$C = a_o + bY_d$	Consumption function, b is the mpc
(4)	$Y_d \equiv Y - T$	Definition of disposable income
(5)	$T = TA_0 + tY$	Tax function; TA_0 is lump sum taxes, t is marginal tax rate.
(6)	$I = e_0 - dR$	Investment function ***(revised)***
(7)	$G = GO_0$	Government spending on goods and services, exogenous
(8)	$X = g_0 - mY - \tilde{n}R$	Net Exports ***(revised)***

Recap: Financial Side

Eq.No.	Equation	Description
(14)	$\frac{M^d}{P} - \frac{M^s}{P}$	Equilibrium condition
(15)	$\frac{M^s}{P} = \frac{M_0}{P}$	Money supply
(16)	$\frac{M^d}{P} = \mu_0 + kY - hR$	Money demand

Recap: IS-LM equations

(12) $$Y = \left(\frac{1}{1 - b(1-t) + m} \right) [A_0 - (d + \tilde{n})R]$$ <IS curve>

(17) $$R = \left(\frac{\mu_0}{h} \right) - \left(\frac{1}{h} \right) \left(\frac{M_0}{P} \right) + \left(\frac{k}{h} \right) Y$$ <LM curve>

Graphical Depiction

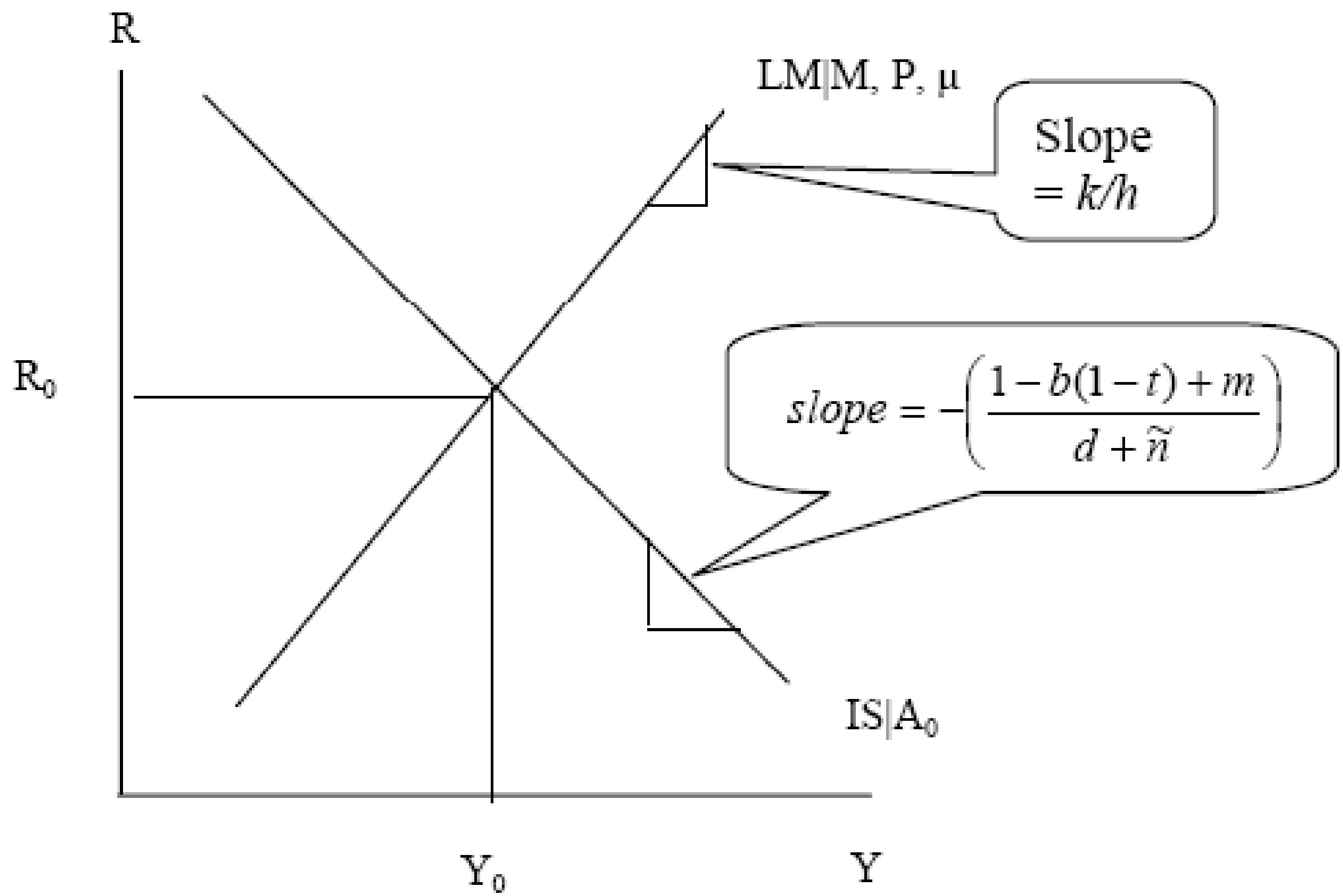


Figure 2: Equilibrium in IS-LM

Solving for Equilibrium (I)

One way to solve this system is to substitute is to (17) in for R in (12).

(18) $$Y = \left(\frac{1}{1-b(1-t)+m}\right)[A_0 - (d+\tilde{n})\left\langle \frac{\mu_0}{h} - \frac{1}{h}\frac{M_0}{P} + \frac{k}{h}Y \right\rangle]$$

Notice that this can be solved for Y, by bringing the term in the (.) to the left hand side.

(19) $$Y(1-b(1-t)+m) = A_0 - (d+\tilde{n})\left\langle \frac{\mu_0}{h} - \frac{1}{h}\frac{M_0}{P} \right\rangle - (d+\tilde{n})\frac{k}{h}Y$$

Collect up the last term on the right hand side involving "Y" to the left hand side:

(20) $$Y[1-b(1-t)+m+\frac{(d+\tilde{n})k}{h}] = A_0 + (d+\tilde{n})\left\langle \frac{1}{h}\frac{M_0}{P} - \frac{\mu_0}{h} \right\rangle$$

Dividing both sides by the term in [.] to obtain:

(21) $$Y = \hat{\alpha}\left[A_0 + \frac{(d+\tilde{n})}{h}\left(\frac{M_0}{P}\right) - \frac{(d+\tilde{n})\mu_0}{h}\right]$$ <equilibrium income>

Where

$$\hat{\alpha} \equiv \frac{1}{1-b(1-t)+m+\frac{(d+\tilde{n})k}{h}}$$

Graphical Derivation: IS Curve

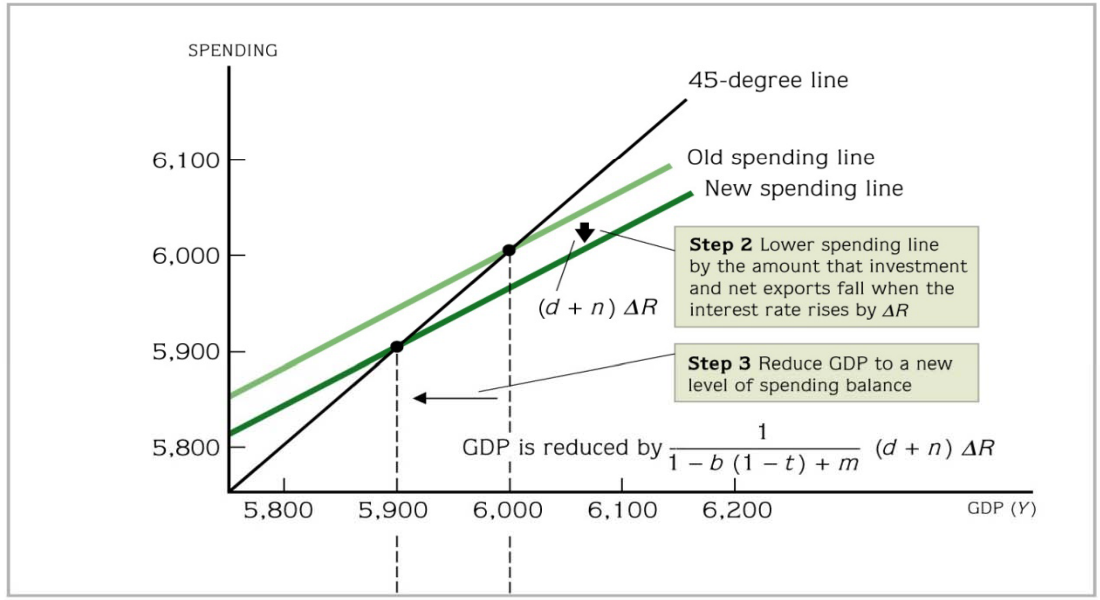


FIGURE 8.3 Graphic Derivation of the IS Curve (top)

Macroeconomics, 6th Edition

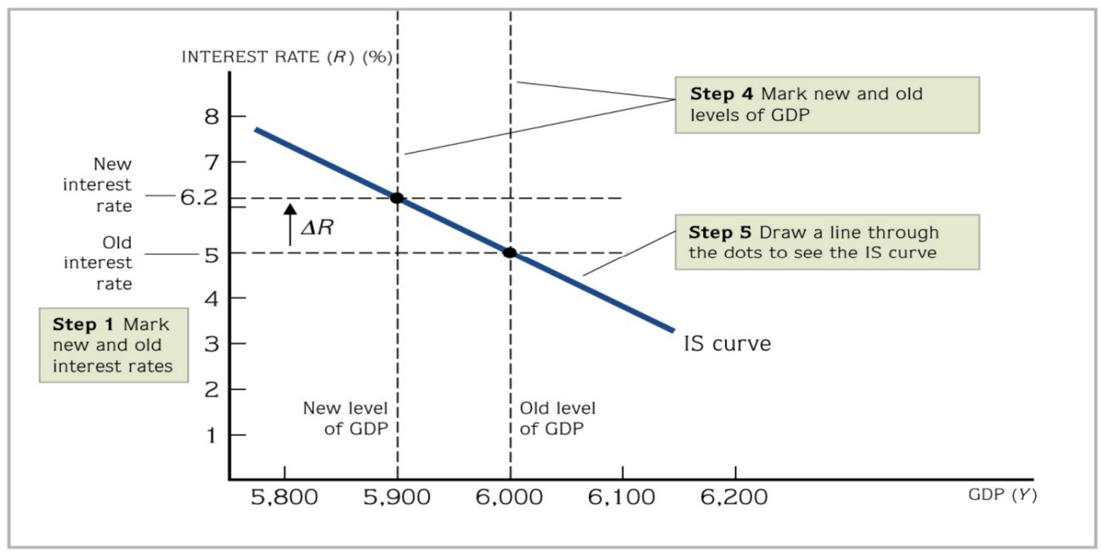


FIGURE 8.3 Graphic Derivation of the IS Curve (bottom)

Macroeconomics, 6th Edition

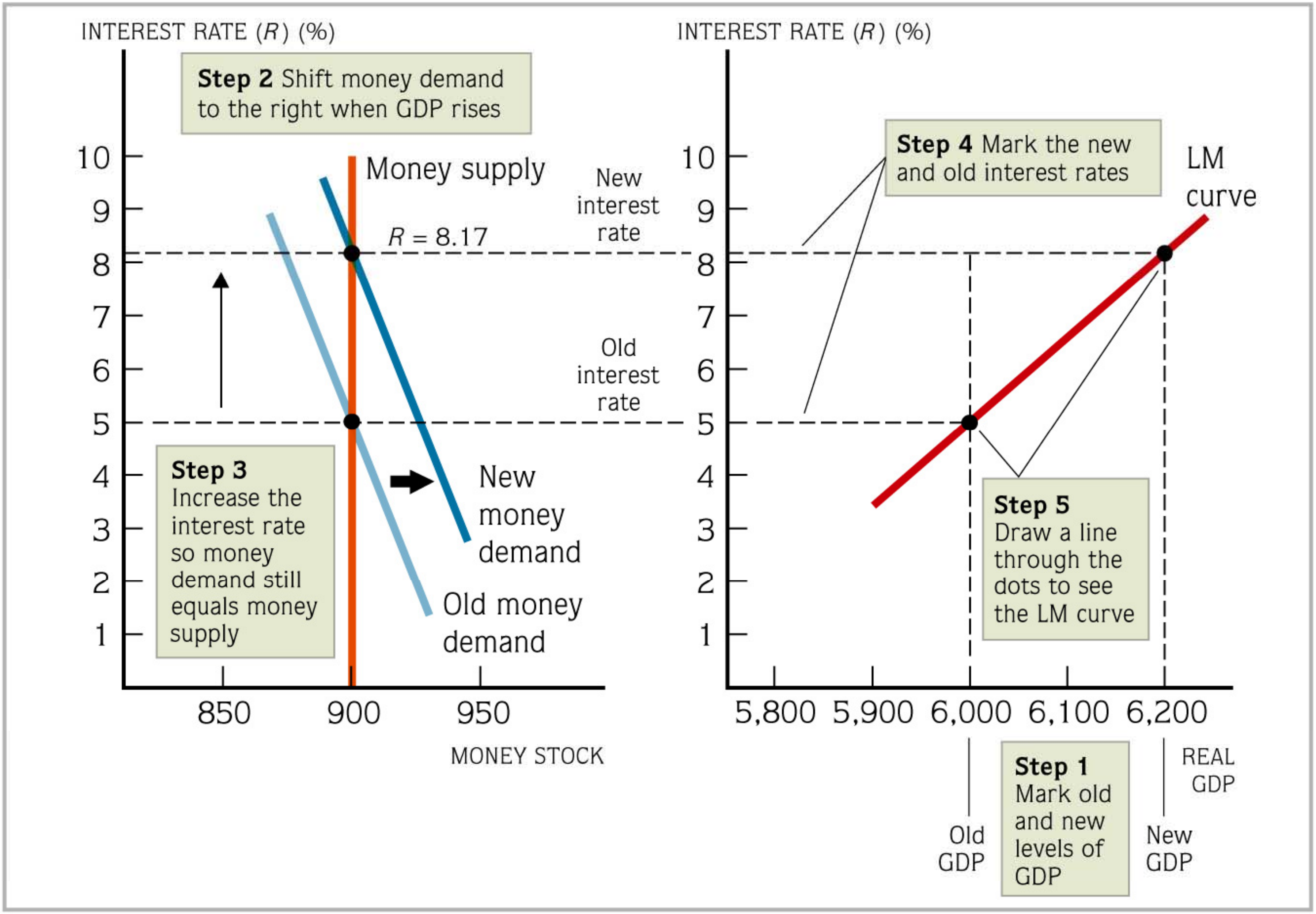


FIGURE 8.5 Graphical Derivation of the LM Curve

Macroeconomics, 6th Edition

The "Multiplier"

- A "multiplier" is a parameter which summarizes the change in one variable for a one unit change in another (typically exogenous) variable. Hence, as the model changes, the "multiplier" for fiscal policy changes.

$$\frac{1}{1-b(1-t)+m+\frac{(d+\tilde{n})k}{h}} \equiv \hat{\alpha} \leq \overline{\alpha} \equiv \frac{1}{1-b(1-t)+m}$$

Solving for Multipliers, in general

(21) $$Y_0 = \hat{\alpha}\left[A_0 + \frac{(d+\tilde{n})}{h}\left(\frac{\overline{M}}{P}\right) - \frac{(d+\tilde{n})\mu}{h}\right]$$ <equilibrium income>

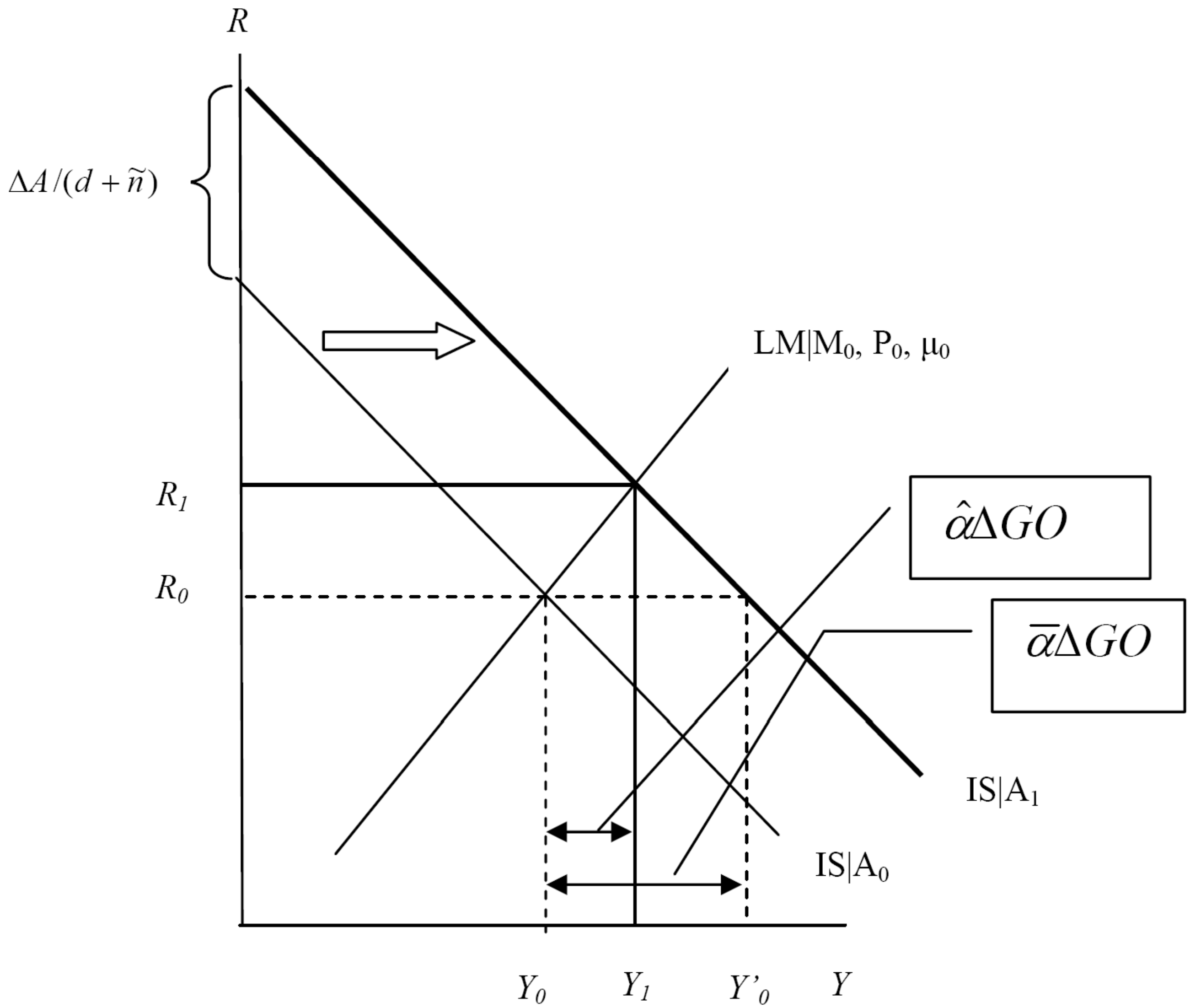
(22) $$\Delta Y = \hat{\alpha}\left[\Delta A + \frac{(d+\tilde{n})}{h}\Delta\left(\frac{\overline{M}}{P}\right) - \frac{(d+\tilde{n})}{h}\Delta\mu\right]$$

$$\Delta Y = \hat{\alpha}\Delta GO \Rightarrow \frac{\Delta Y}{\Delta GO} = \hat{\alpha}$$

If it is lump sum taxes:

$$\Delta Y = -\hat{\alpha}b\Delta TA \Rightarrow \frac{\Delta Y}{\Delta TA} = -\hat{\alpha}b$$

Graphical Depiction of Fiscal Policy



Monetary Policy

If monetary policy is being used, the $\Delta A = 0$, so:

$$\Delta Y = \hat{\alpha}\left(\frac{d + \tilde{n}}{h}\right)\Delta\left(\frac{M}{P}\right) \Rightarrow \frac{\Delta Y}{\Delta(M / P)} = \hat{\alpha}\left(\frac{d + \tilde{n}}{h}\right)$$

- Notice this is a new “multiplier”: the change in real GDP for a one unit change in the price-deflated money stock (or “real money stock” for short).
- Critical to understand how monetary policy works.

Graphical Depiction of Monetary Policy

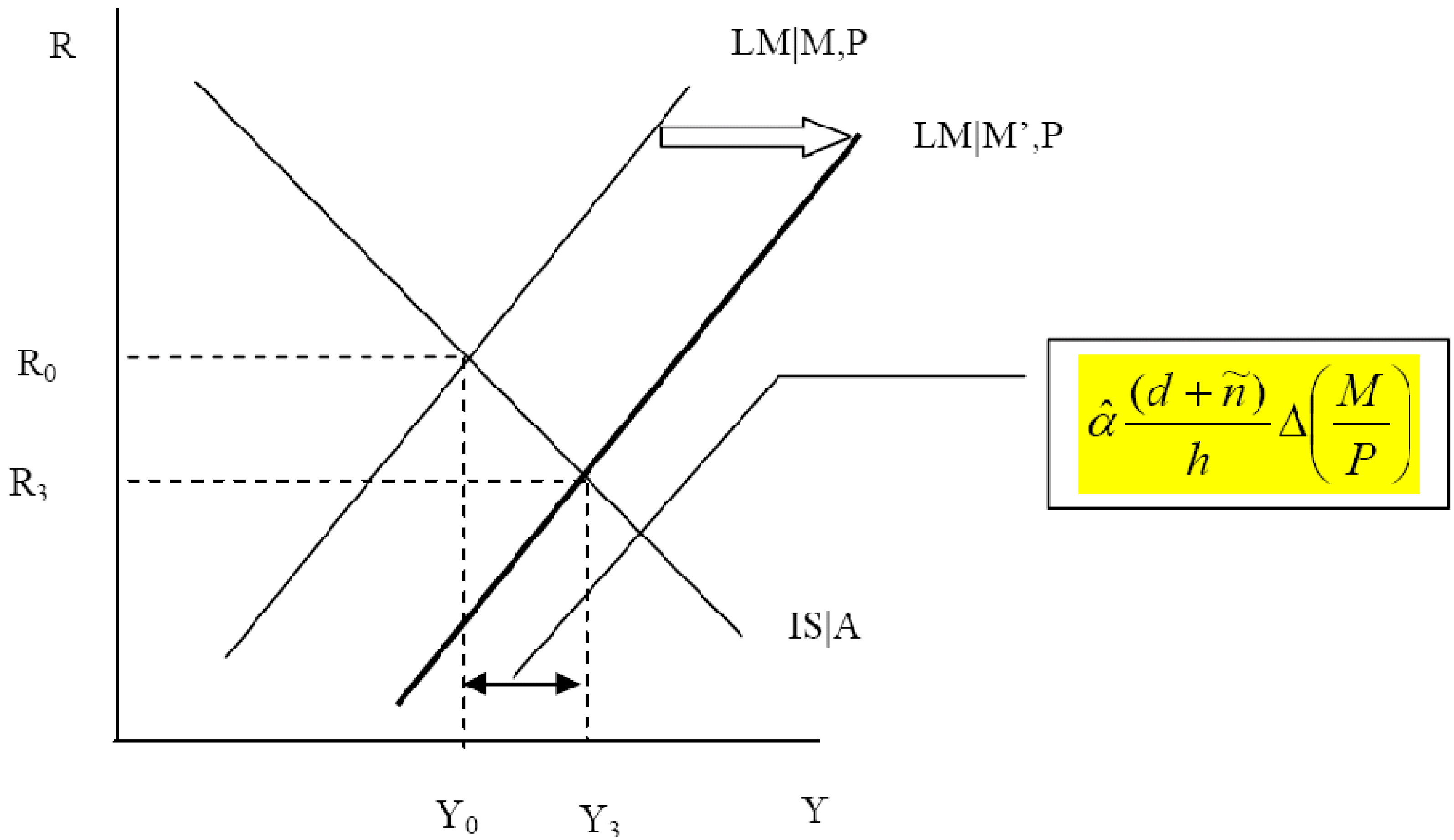
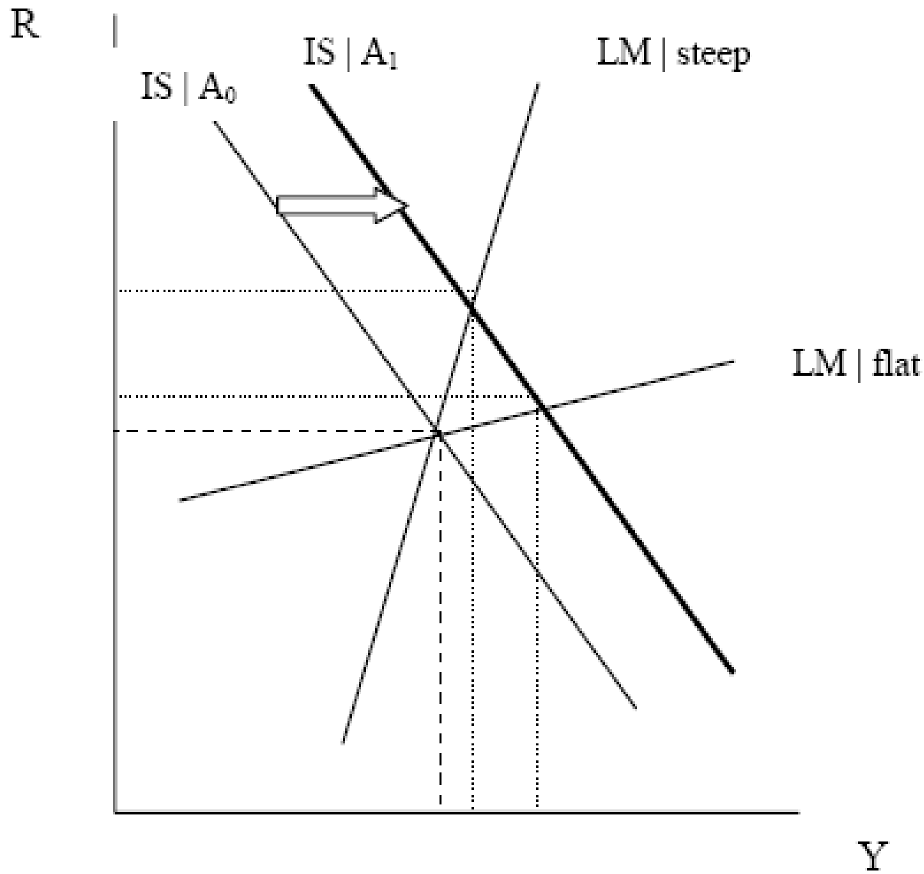


Figure 4: Monetary Policy

What Determines Policy Efficacy?

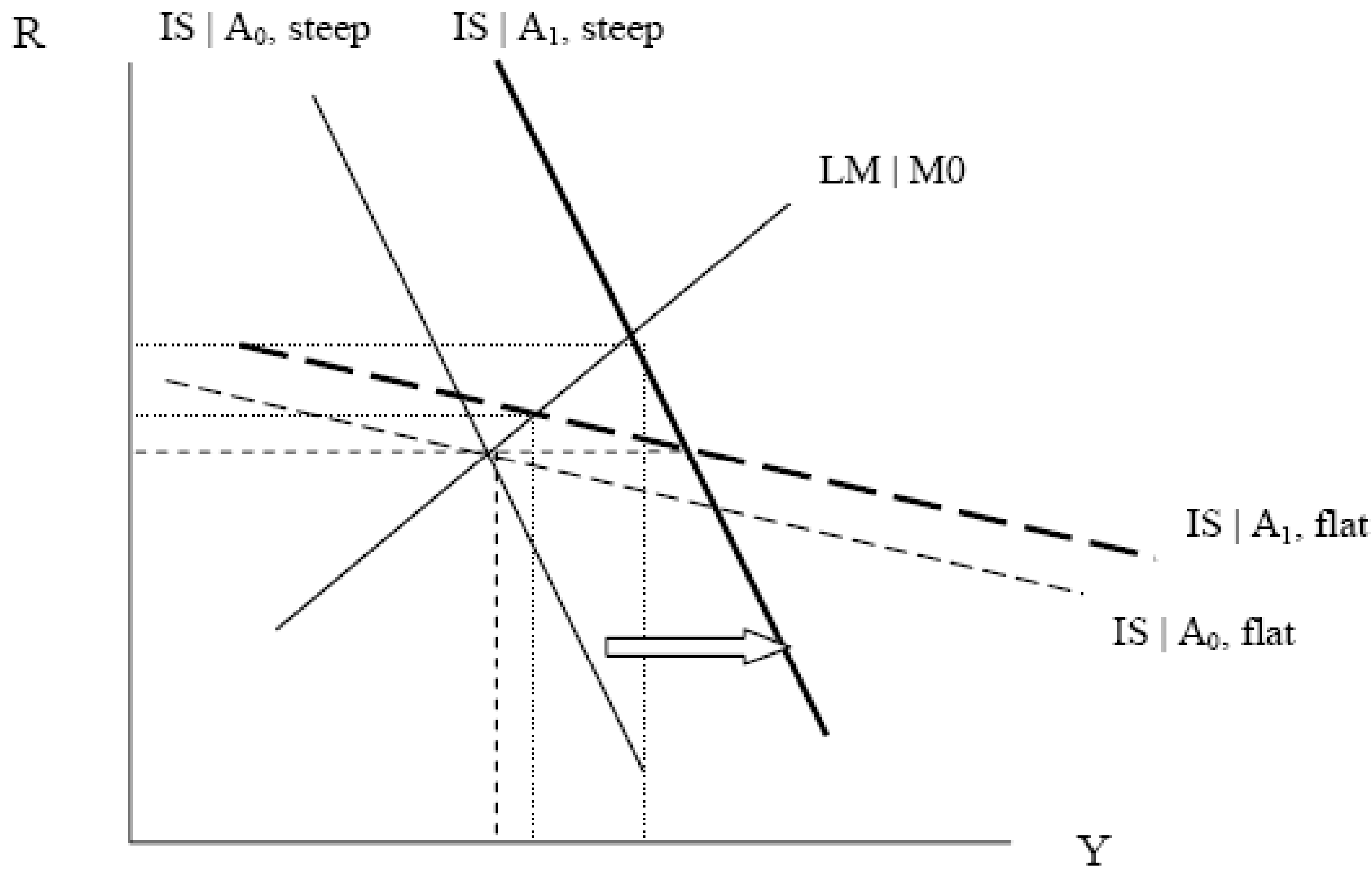
- Sometimes fiscal policy is relatively effective, sometimes monetary policy is relatively effective.
- There are (at least) two ways of thinking about this problem; both are aids to thinking about the economics.
- The first is algebraic.
- The second is graphical.

Fiscal (LM steep vs. flat)

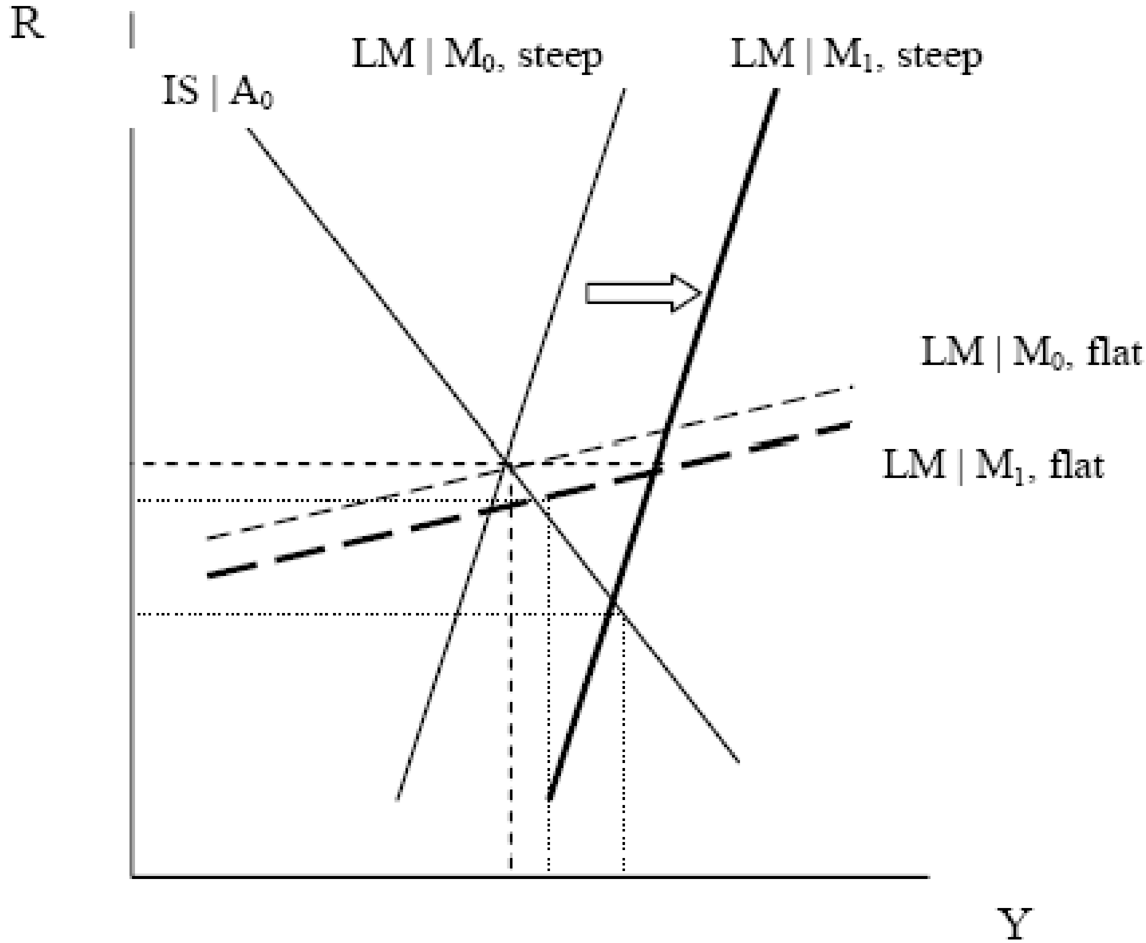


$$\hat{\alpha} \equiv \frac{1}{1 - b(1-t) + m + \frac{(d + \tilde{n})k}{h}}$$

Fiscal (IS steep vs. flat)

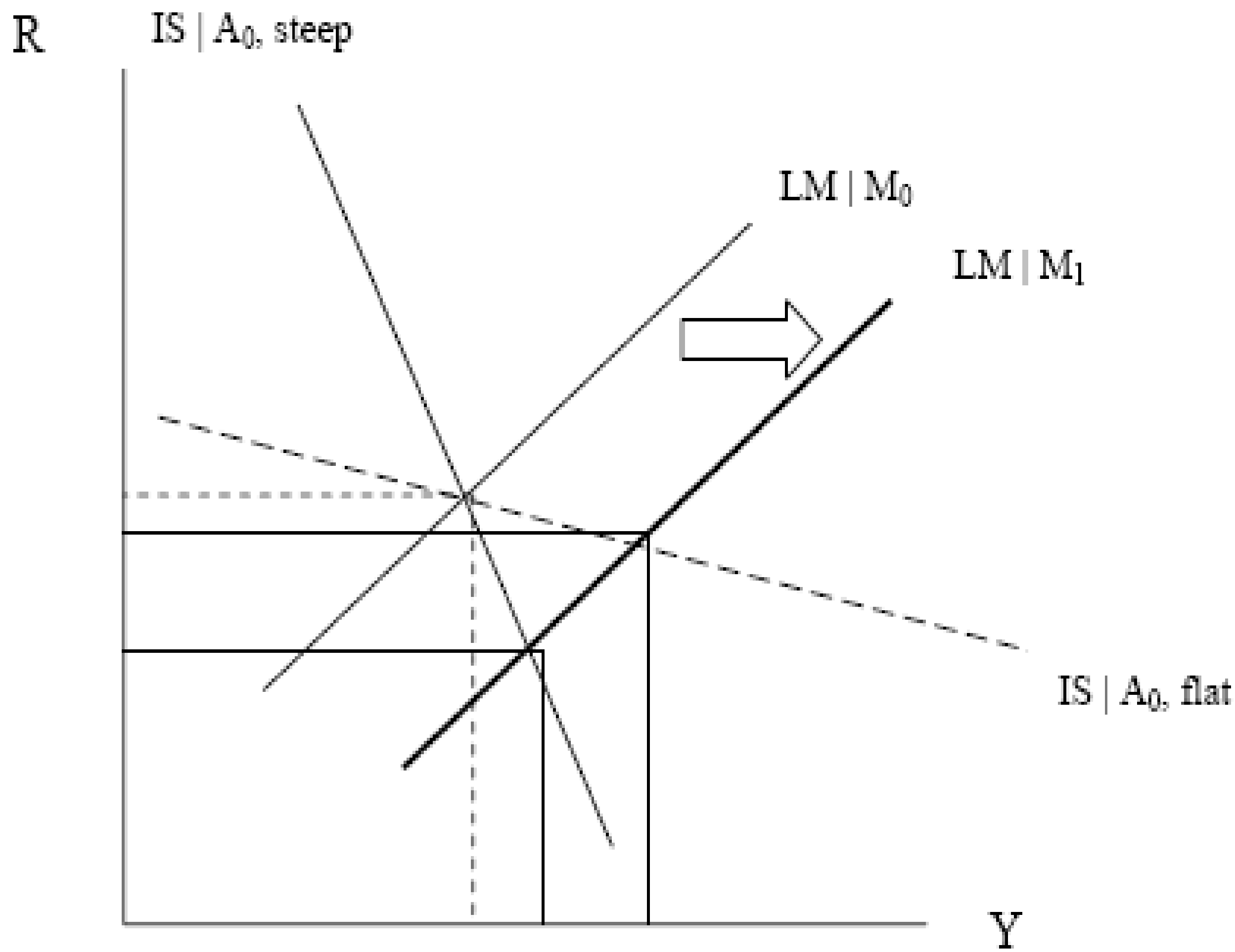


Monetary (LM flat vs. steep)

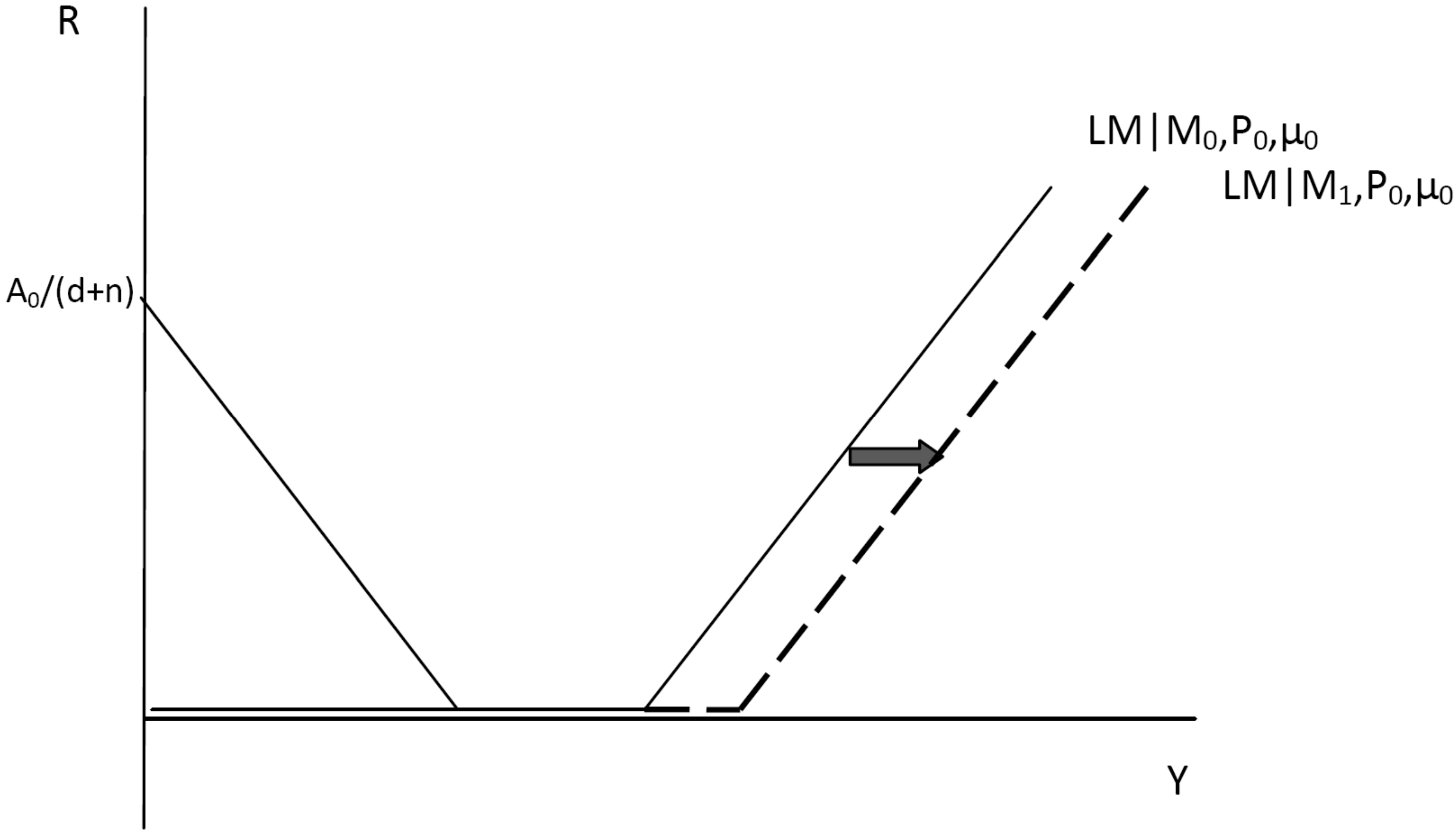


$$\frac{\Delta Y}{\Delta(M/P)} = \hat{\alpha}\left(\frac{d+\tilde{n}}{h}\right)$$

Monetary (IS steep vs. flat)



Monetary Policy in a Liquidity Trap



Monetary Policy in a Liquidity Trap