Chapter 2

AGGREGATE DEMAND I: BUILDING THE *IS-LM* MODEL ADAPTED

S. Aguey, PhD
Macroeconomics II
African School Of Economics

In this chapter, you will learn…

- the *IS* curve, and its relation to
  - the Keynesian cross
  - the loanable funds model
- the *LM* curve, and its relation to
  - the theory of liquidity preference
- how the *IS*-*LM* model determines income and the interest rate in the short run when $\boldsymbol{P}$ is fixed

Context

- Chapter 1 introduced the model of aggregate demand and aggregate supply.
- Long run
  - prices flexible
  - output determined by factors of production & technology
  - unemployment equals its natural rate
- Short run
  - prices fixed
  - output determined by aggregate demand
  - unemployment negatively related to output

CONTEXT

- This chapter develops the *IS-LM* model,
  the basis of the aggregate demand curve.

- We focus on the short run and assume the price level is fixed (so, *SRAS* curve is horizontal).

- This chapter (and chapter 3) focus on the closed-economy case.
  Chapter 4 presents the open-economy case.

The Keynesian Cross

- A simple closed economy model in which income is determined by expenditure.
  (due to J.M. Keynes)

- Notation:
  I = planned investment
  E = ***C*** + ***I*** + ***G*** = planned expenditure
  Y = real GDP = actual expenditure

- Difference between actual & planned expenditure = unplanned inventory investment

Elements of the Keynesian Cross

consumption function: $C = C(Y - T)$

govt policy variables: $G = \bar{G}, \quad T = \bar{T}$

for now, planned investment is exogenous: $I = \bar{I}$

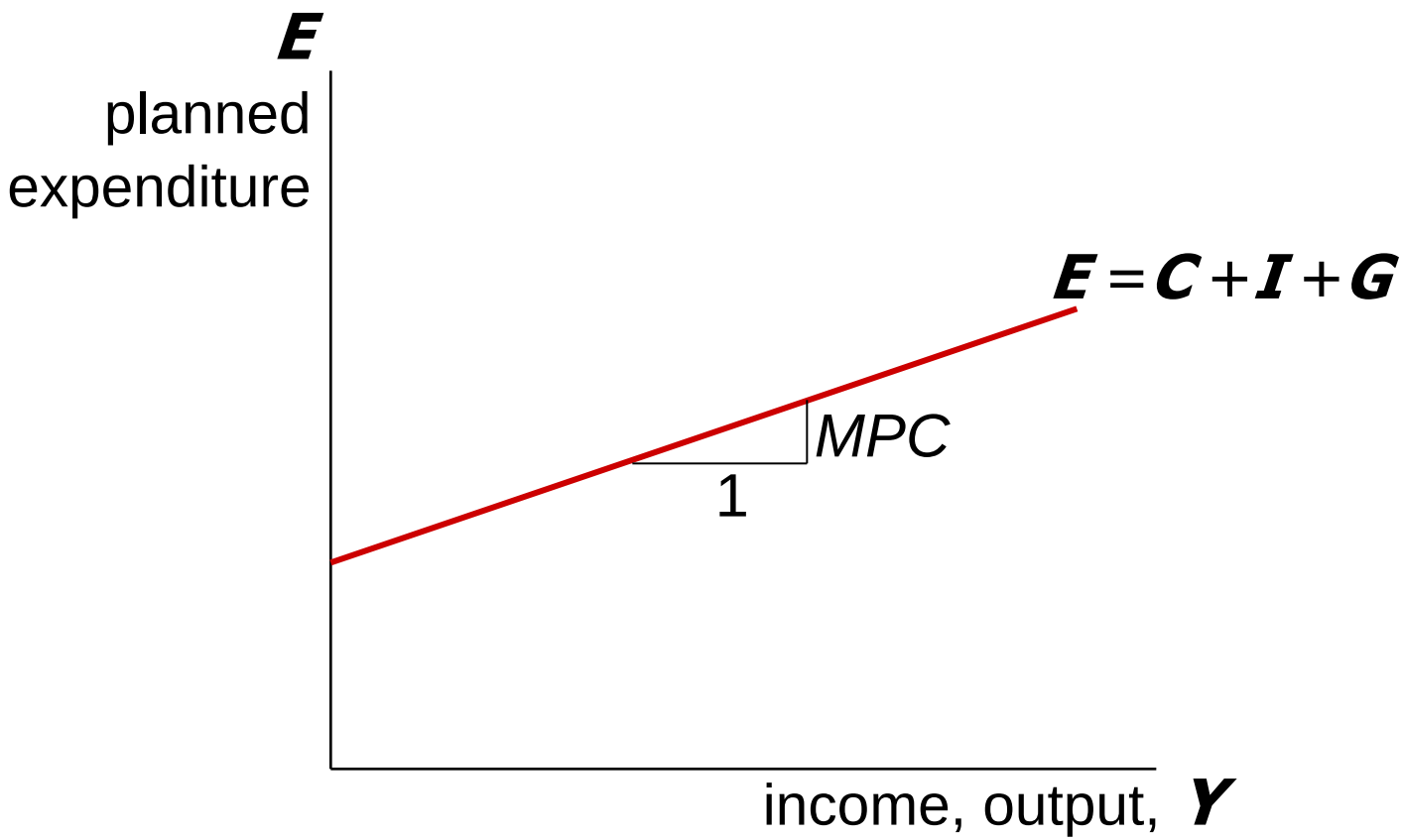
planned expenditure: $E = C(Y - \bar{T}) + \bar{I} + \bar{G}$

equilibrium condition:

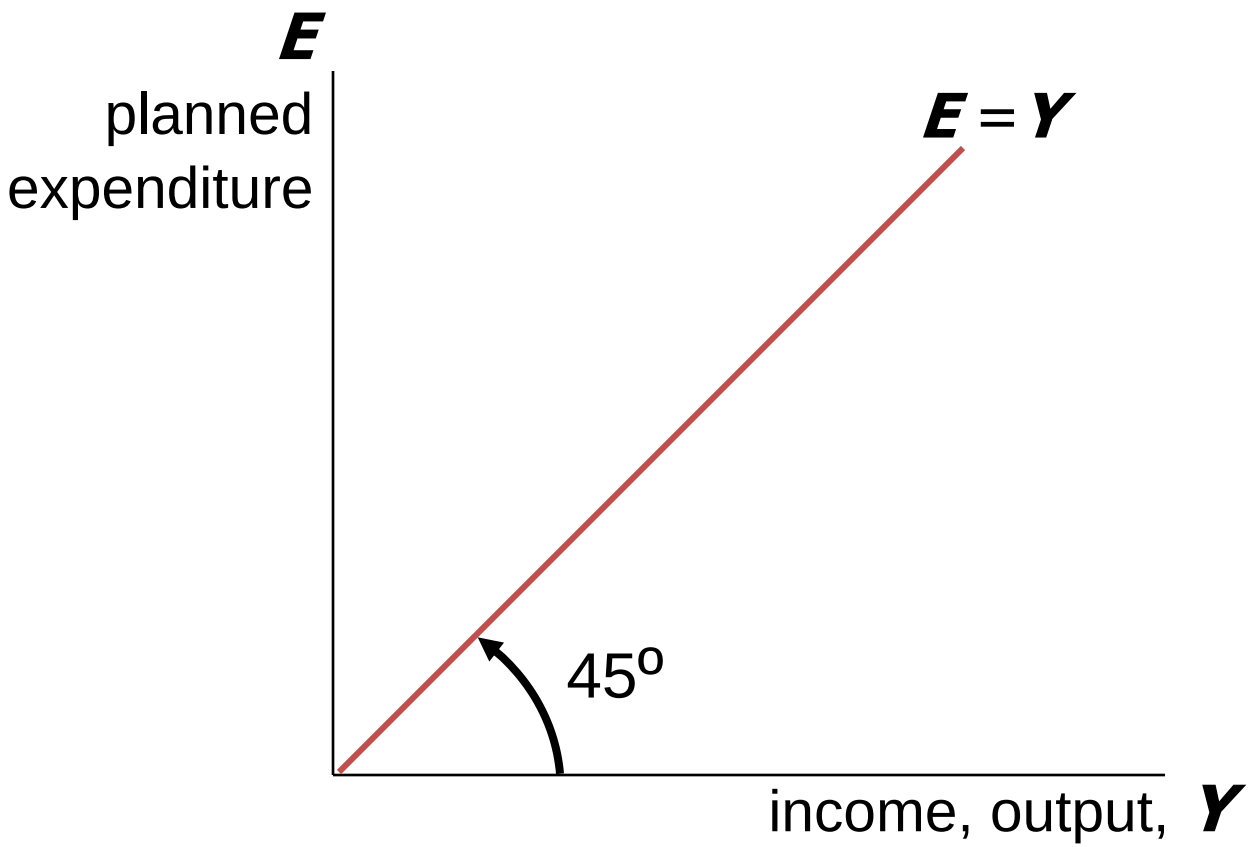
actual expenditure = planned expenditure

$$Y = E$$

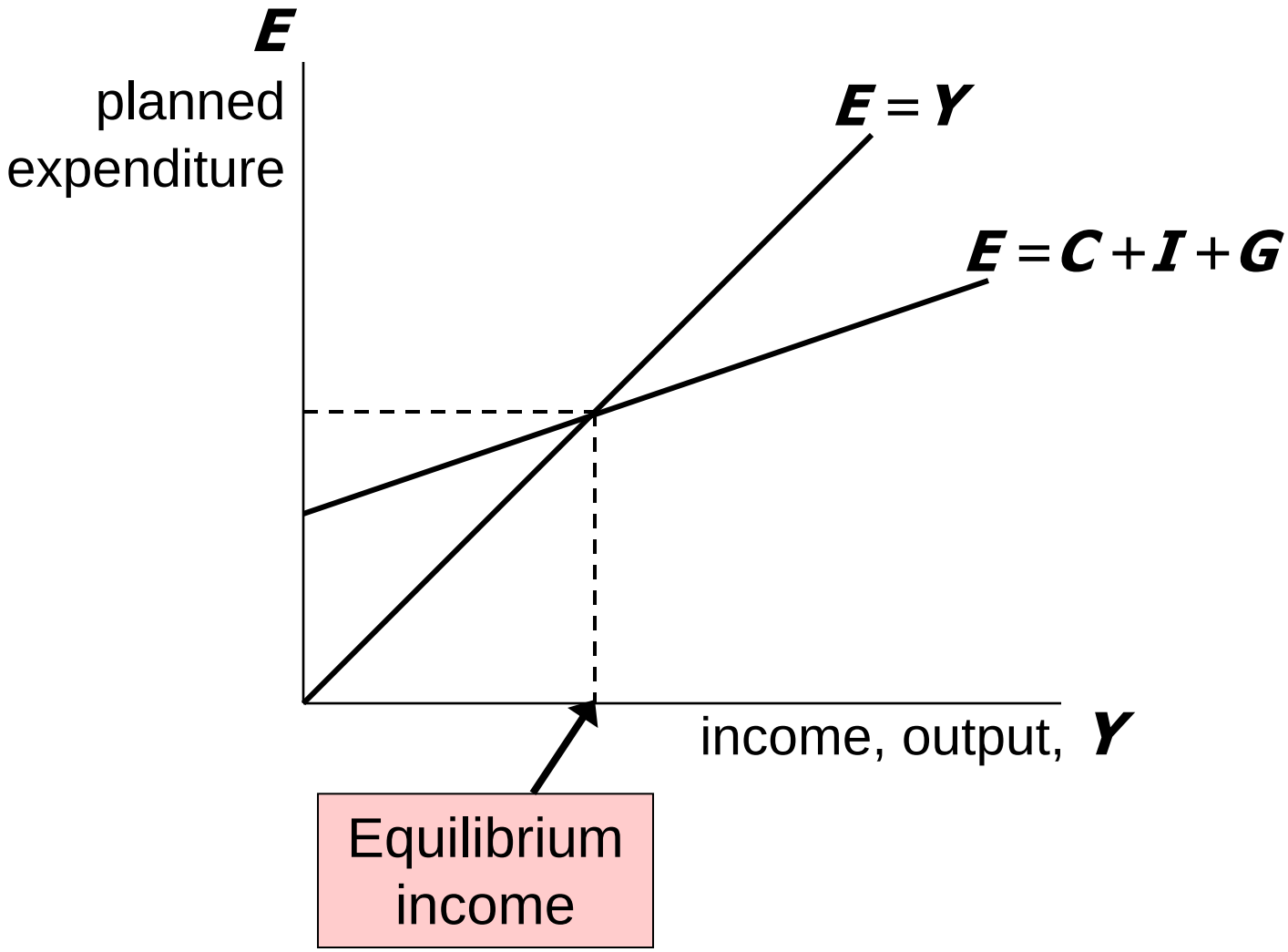
GRAPHING PLANNED EXPENDITURE



GRAPHING THE EQUILIBRIUM CONDITION



THE EQUILIBRIUM VALUE OF INCOME



THE *IS* CURVE

def: a graph of all combinations of r and Y that result in goods market equilibrium

i.e. actual expenditure (output)
= planned expenditure

The equation for the *IS* curve is:

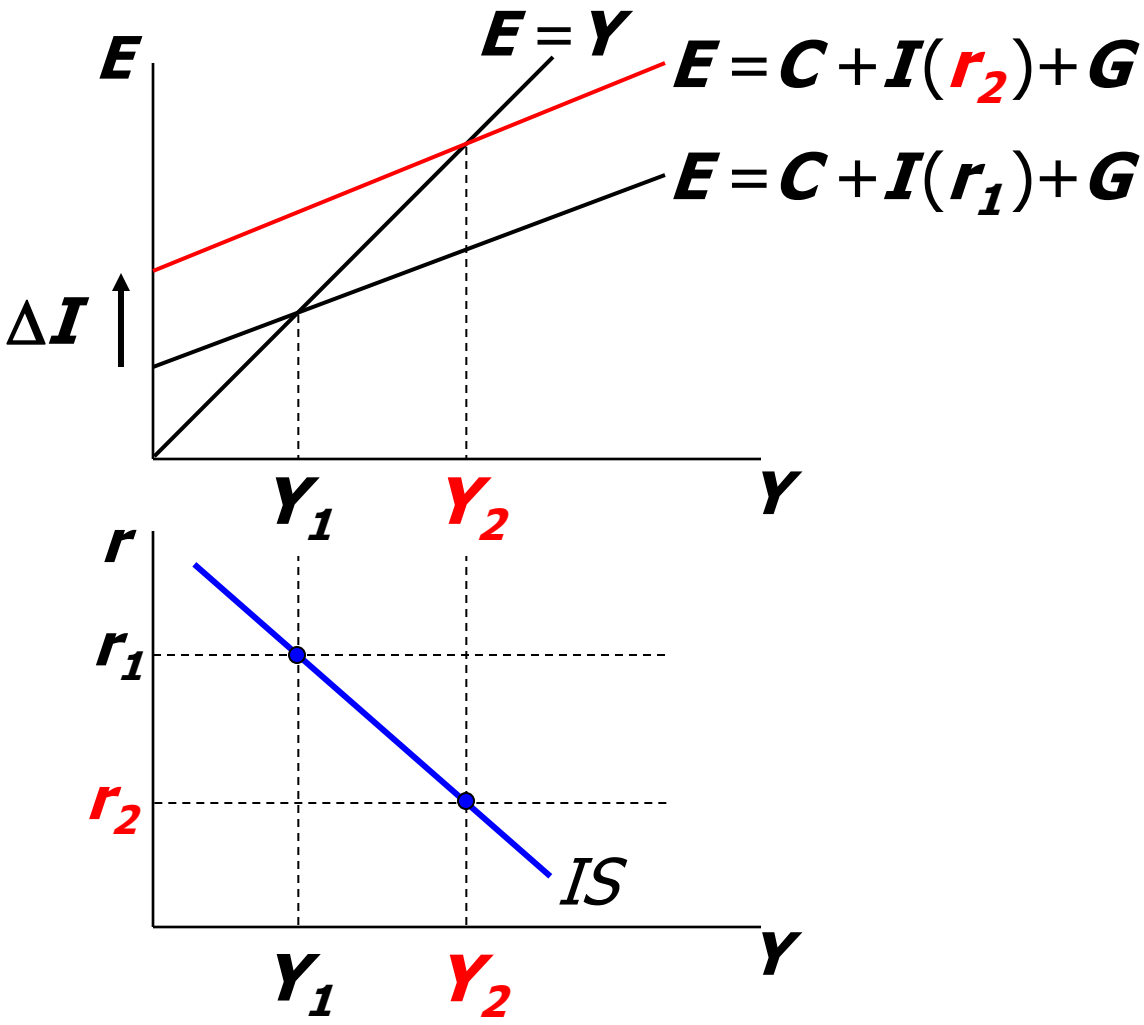
$$Y = C(Y - \bar{T}) + I(r) + \bar{G}$$

Deriving the *IS* curve

$\downarrow r \Rightarrow \uparrow I$

$\Rightarrow \uparrow E$

$\Rightarrow \uparrow Y$

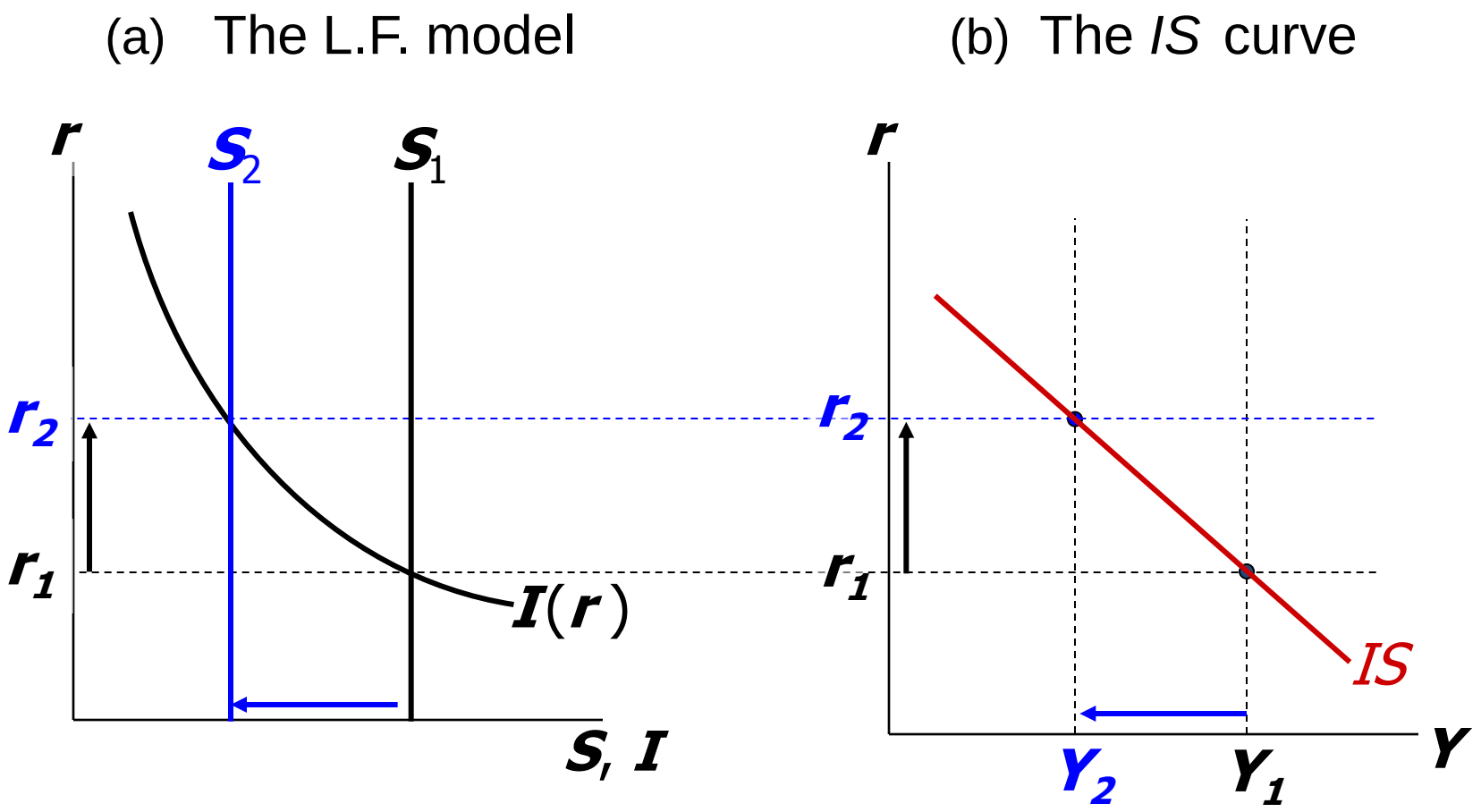


Why the *IS* curve is negatively sloped

- A fall in the interest rate motivates firms to increase investment spending, which drives up total planned spending (***E***).

- To restore equilibrium in the goods market, output (*a.k.a.* actual expenditure, ***Y***) must increase.

THE *IS* CURVE AND THE LOANABLE FUNDS MODEL



Fiscal Policy and the *IS* curve

- We can use the *IS*-*LM* model to see how fiscal policy (***G*** and ***T***) affects aggregate demand and output.

- Let's start by using the Keynesian cross to see how fiscal policy shifts the *IS* curve…

SHIFTING THE *IS* CURVE: ΔG

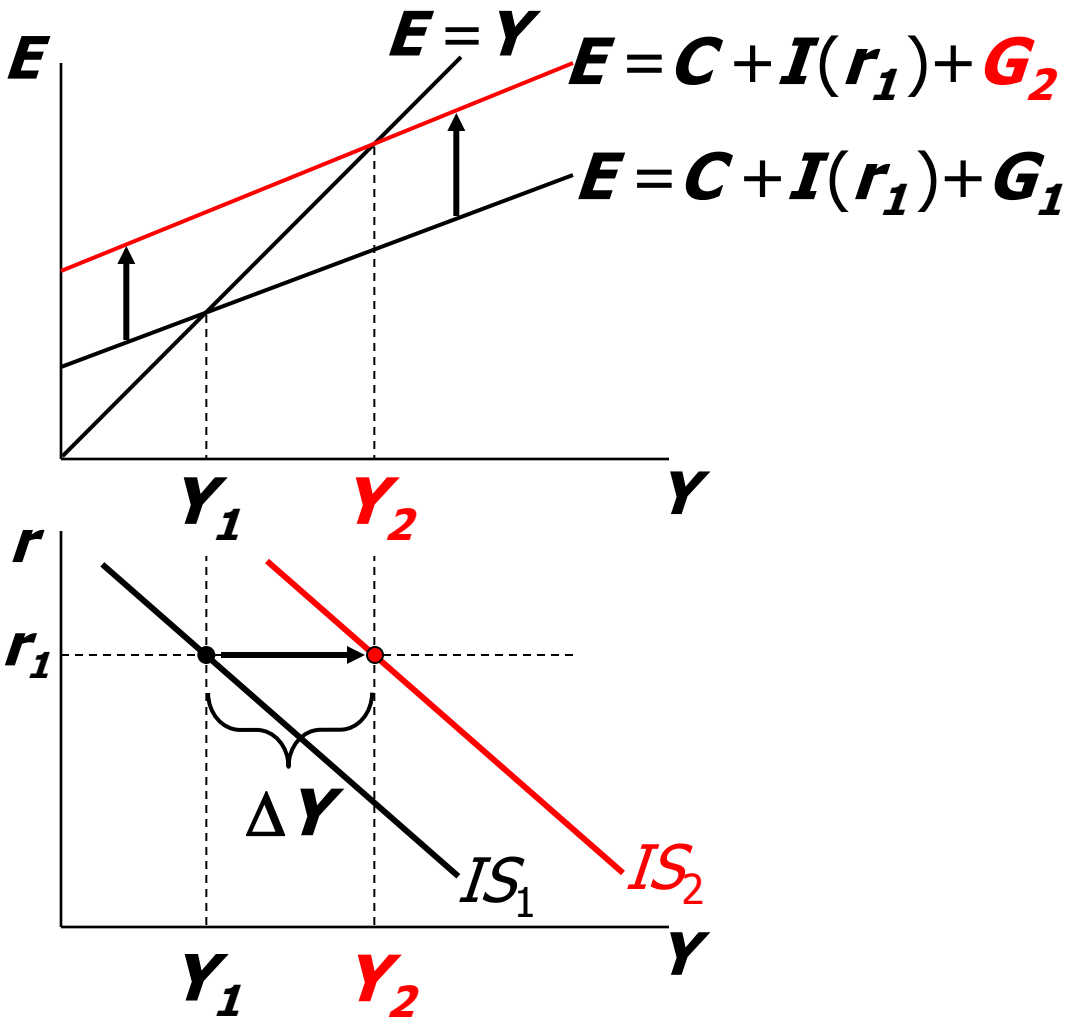
At any value of r,

$\uparrow G \Rightarrow \uparrow E \Rightarrow \uparrow Y$

…so the *IS* curve shifts to the right.

The horizontal distance of the *IS* shift equals

$$\Delta Y = \frac{1}{1-\text{MPC}} \Delta G$$



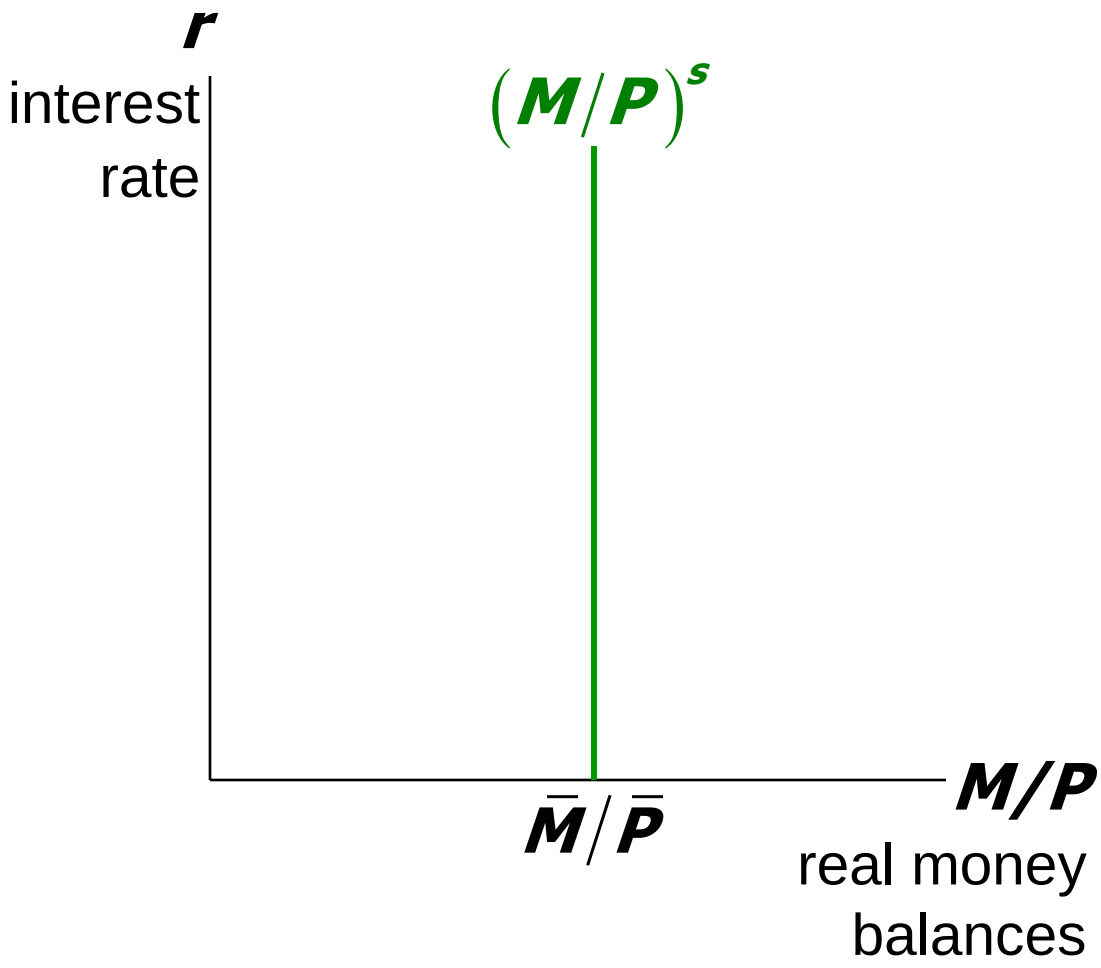
The Theory of Liquidity Preference

- Due to John Maynard Keynes.
- A simple theory in which the interest rate is determined by money supply and money demand.

MONEY SUPPLY

The supply of real money balances is fixed:

$$\left(M/P\right)^s = \bar{M}/\bar{P}$$

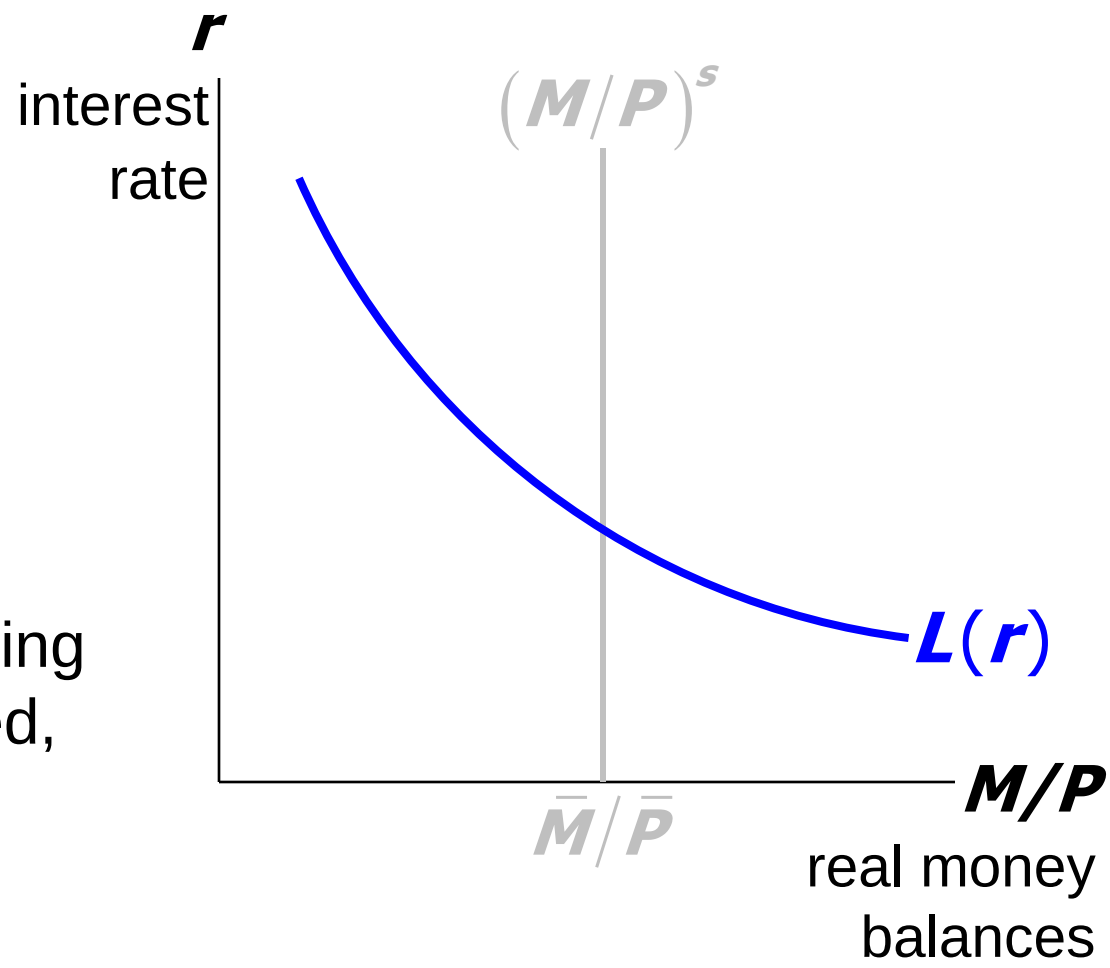


MONEY DEMAND

Demand for real money balances:

$$\left(M/P\right)^{d} = L(r)$$

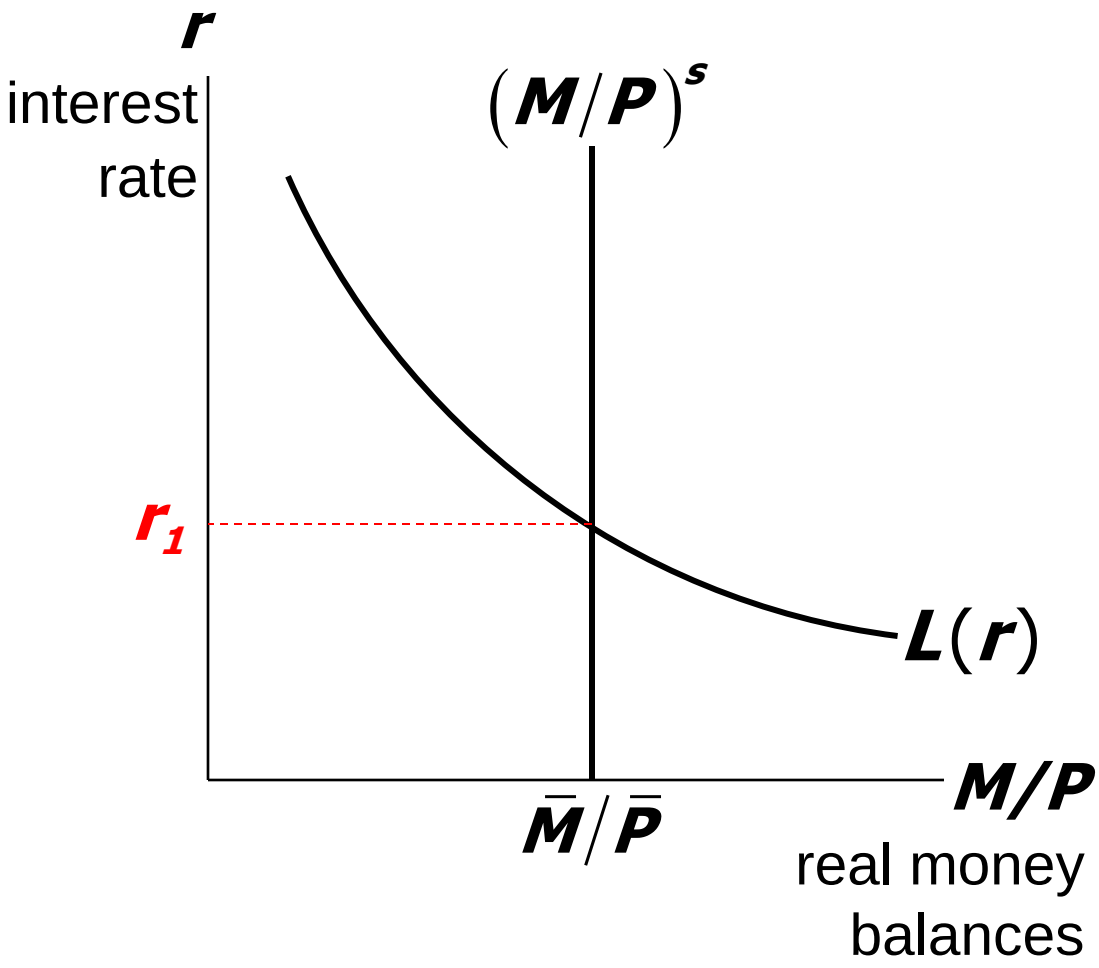
Here, we are assuming the price level is fixed, so $\pi = 0$ and $r = i$.



EQUILIBRIUM

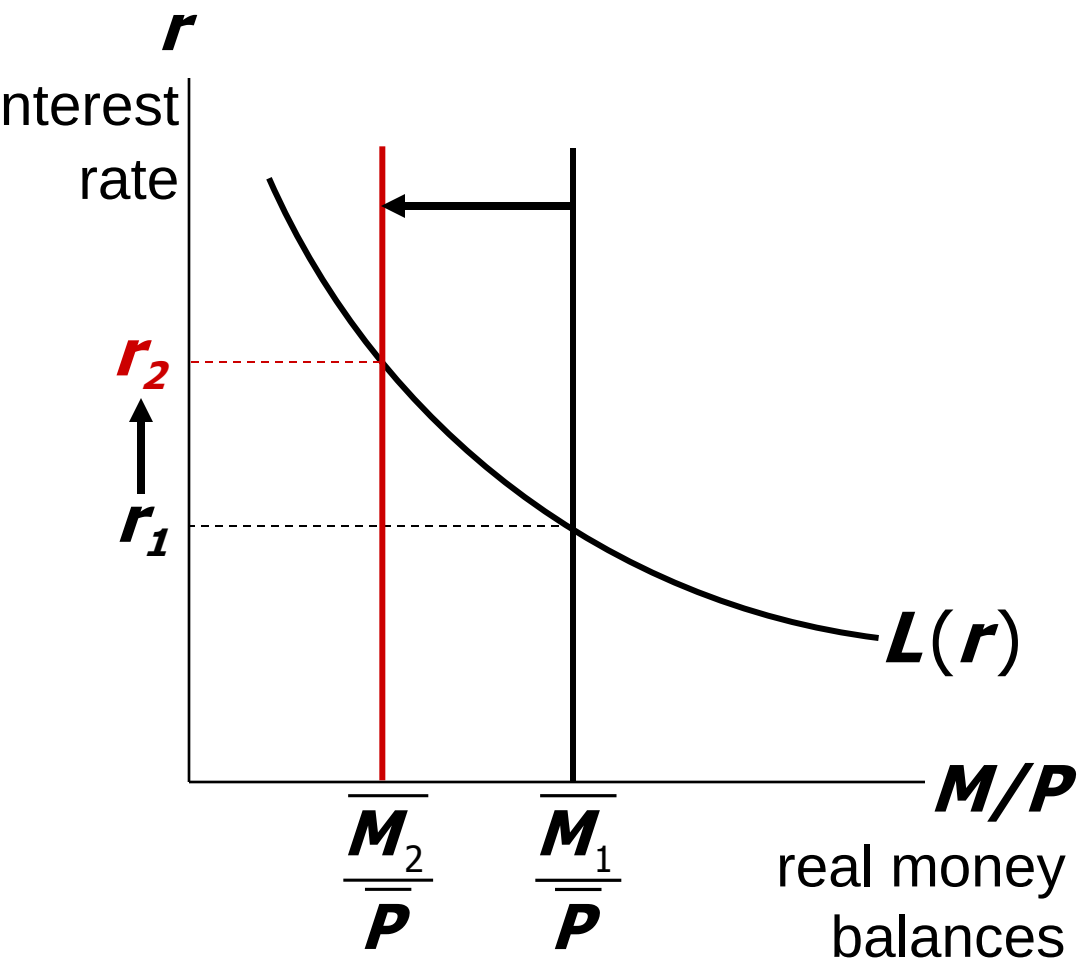
The interest rate adjusts to equate the supply and demand for money:

$$\overline{M}/\overline{P} = L(r)$$



How the Fed raises the interest rate

To increase r,
Fed reduces M



CASE STUDY:
MONETARY TIGHTENING & INTEREST RATES

- Late 1970s: $\pi > 10\%$
- Oct 1979: Fed Chairman Paul Volcker announces that monetary policy would aim to reduce inflation
- Aug 1979-April 1980:
  Fed reduces M/P 8.0%
- Jan 1983: $\pi = 3.7\%$

How do you think this policy change would affect nominal interest rates?

MONETARY TIGHTENING & RATES, *CONT.*

The effects of a monetary tightening on nominal interest rates		
	short run	long run
model	Liquidity preference *(Keynesian)*	Quantity theory, Fisher effect *(Classical)*
prices	sticky	flexible
prediction	$\Delta i > 0$	$\Delta i < 0$
actual outcome	8/1979: i = 10.4% 4/1980: i = 15.8%	8/1979: i = 10.4% 1/1983: i = 8.2%

THE *LM* CURVE

Now let's put Y back into the money demand function:

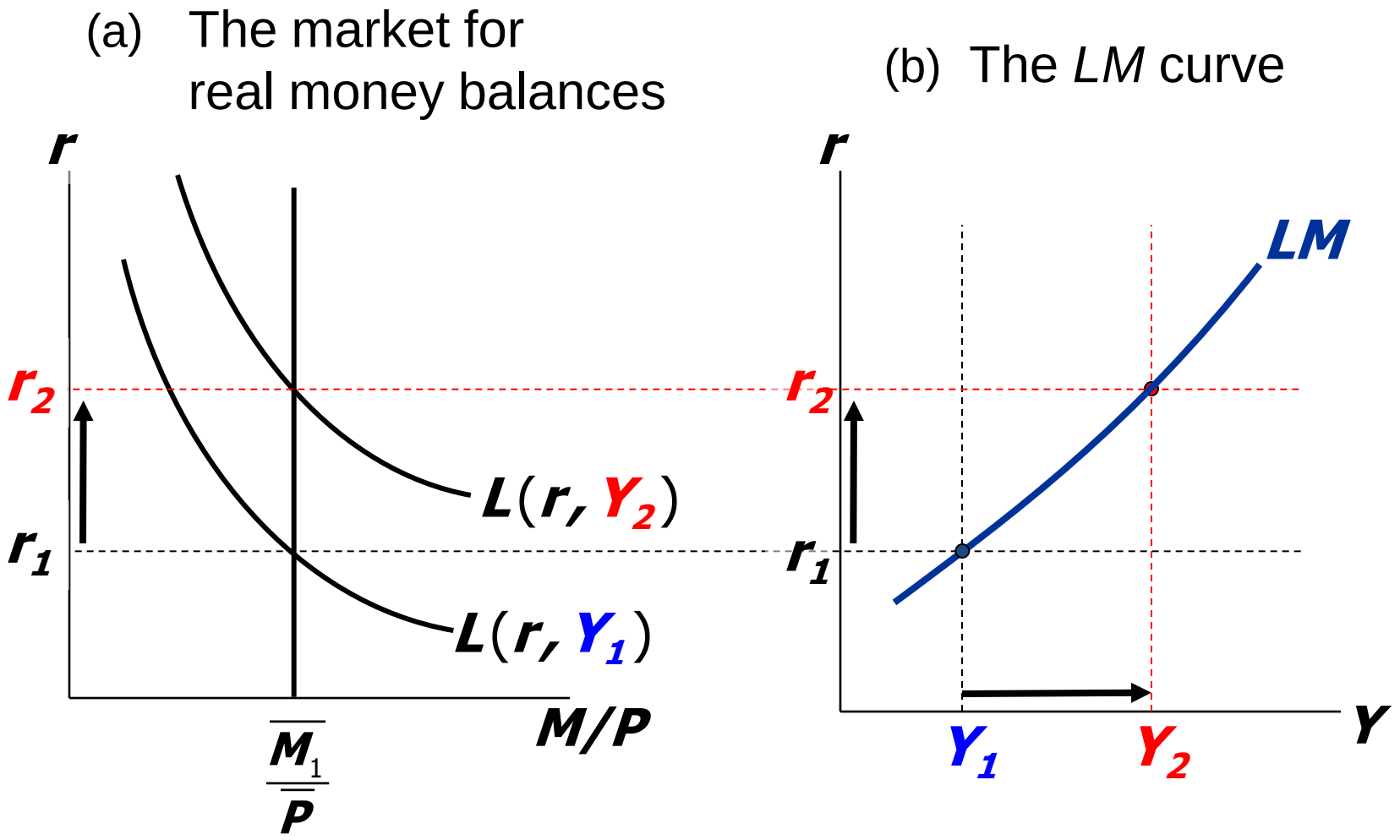
$$\left(M/P\right)^{d} = L(r, Y)$$

The ***LM* curve** is a graph of all combinations of r and Y that equate the supply and demand for real money balances.

The equation for the *LM* curve is:

$$\bar{M}/\bar{P} = L(r, Y)$$

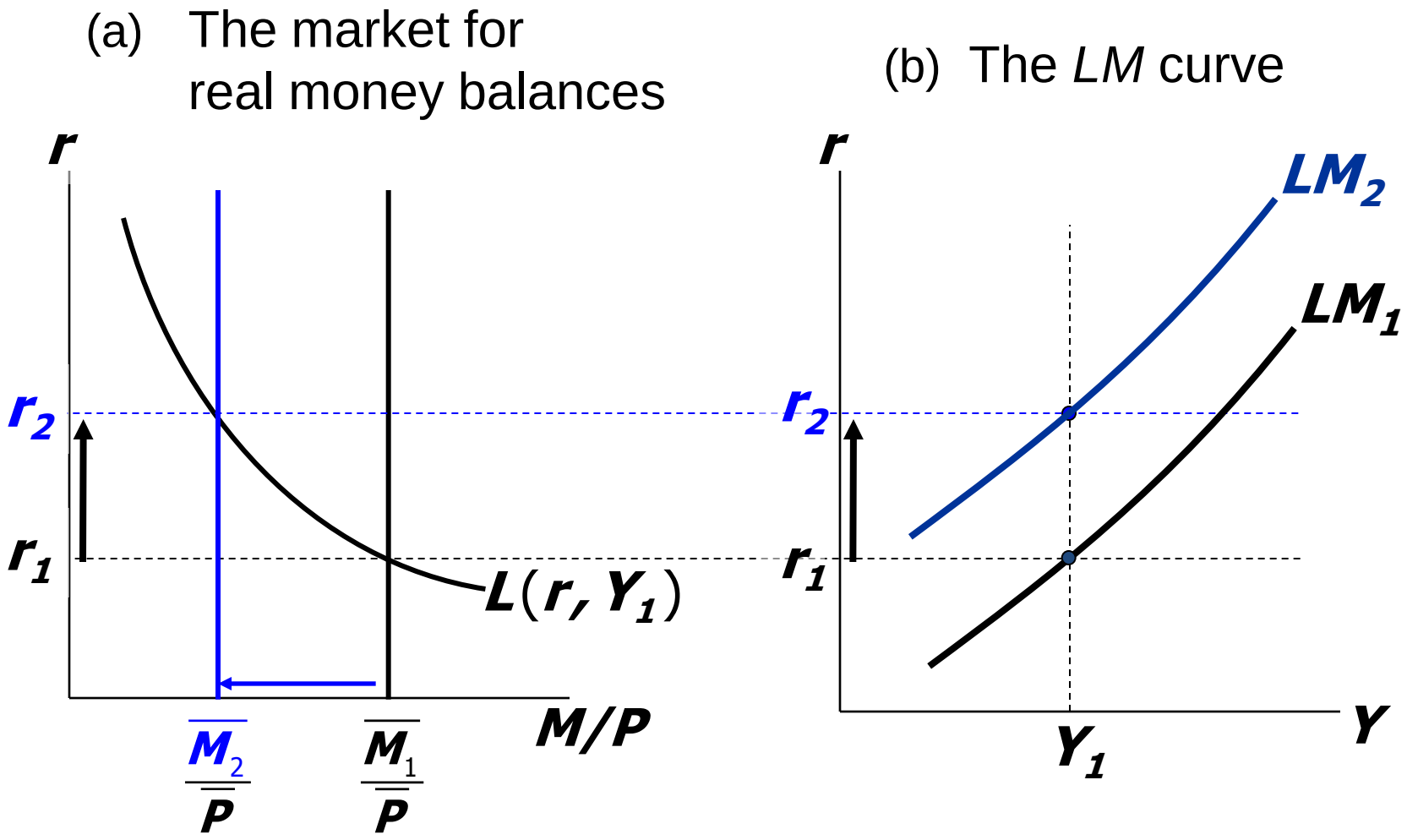
DERIVING THE *LM* CURVE



WHY THE *LM* CURVE IS UPWARD SLOPING

- An increase in income raises money demand.
- Since the supply of real balances is fixed, there is now excess demand in the money market at the initial interest rate.
- The interest rate must rise to restore equilibrium in the money market.

How ΔM shifts the LM curve

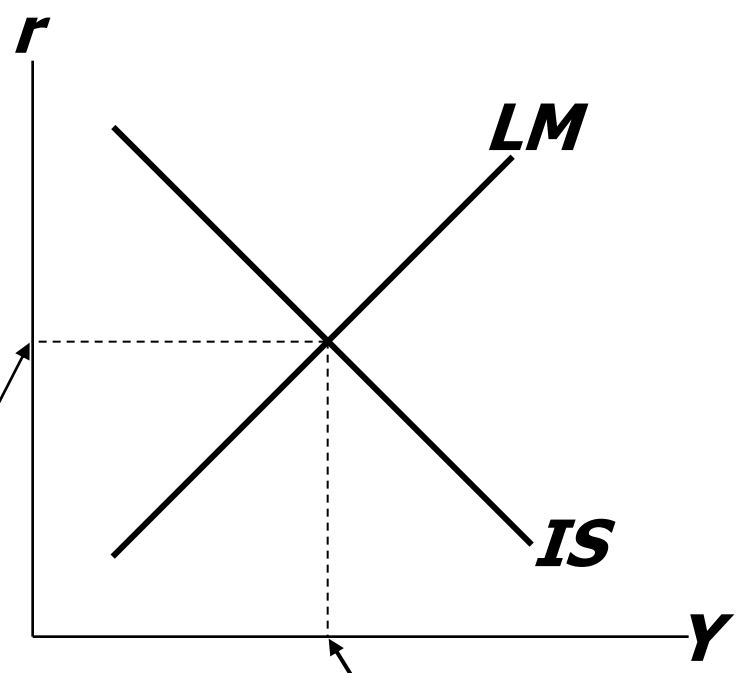


THE SHORT-RUN EQUILIBRIUM

The short-run equilibrium is the combination of r and Y that simultaneously satisfies the equilibrium conditions in the goods & money markets:

$$Y = C(Y - T) + I(r) + \bar{G}$$

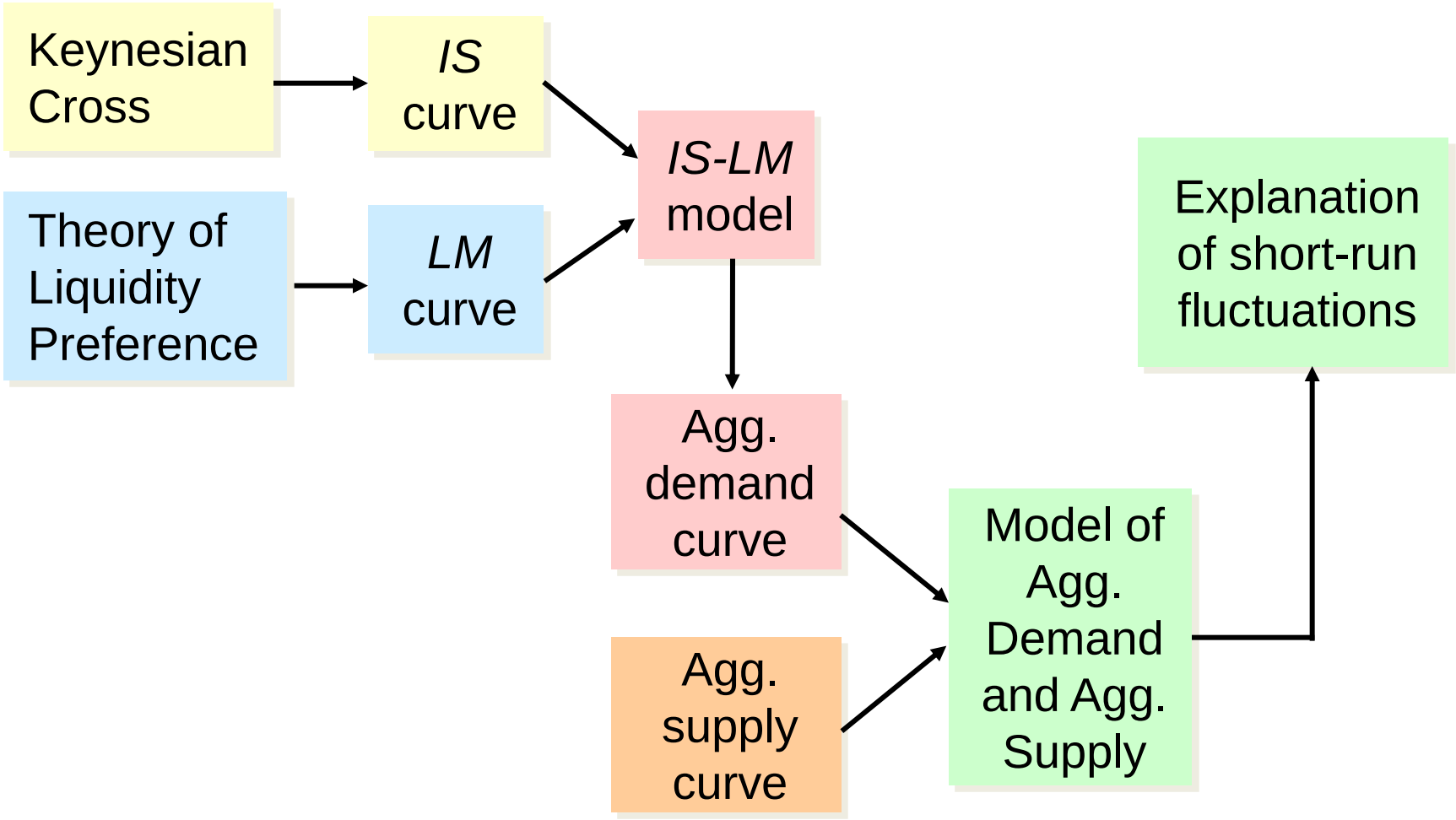
$$\bar{M}/\bar{P} = L(r, Y)$$



Equilibrium interest rate

Equilibrium level of income

THE BIG PICTURE



PREVIEW OF CHAPTER 3

In Chapter 3, we will

- use the *IS-LM* model to analyze the impact of policies and shocks.
- learn how the aggregate demand curve comes from *IS-LM*.
- use the *IS-LM* and *AD-AS* models together to analyze the short-run and long-run effects of shocks.
- use our models to learn about the Great Depression.

CHAPTER SUMMARY

1. Keynesian cross
   - basic model of income determination
   - takes fiscal policy & investment as exogenous
   - fiscal policy has a multiplier effect on income.
2. *IS* curve
   - comes from Keynesian cross when planned investment depends negatively on interest rate
   - shows all combinations of r and Y that equate planned expenditure with actual expenditure on goods & services

CHAPTER SUMMARY

3. Theory of Liquidity Preference
   - basic model of interest rate determination
   - takes money supply & price level as exogenous
   - an increase in the money supply lowers the interest rate
4. *LM* curve
   - comes from liquidity preference theory when money demand depends positively on income
   - shows all combinations of r and Y that equate demand for real money balances with supply

CHAPTER SUMMARY

5. *IS-LM* model
   - Intersection of *IS* and *LM* curves shows the unique point ($\boldsymbol{Y}$, $\boldsymbol{r}$) that satisfies equilibrium in both the goods and money markets.