

# Macroeconomic Theory I

## Aggregate Demand I

## Building IS-LM Model

The *IS* curve and its relationship to:

- the Keynesian cross
- the loanable funds model

The *LM* curve and its relationship to:

- the theory of liquidity preference

How the *IS–LM* model determines income and the interest rate in the short run when ***P*** is fixed.

## Theoretical Background

- ***Long run:***
  - prices flexible
  - output determined by factors of production and technology
  - unemployment equals its natural rate
- ***Short run:***
  - prices fixed
  - output determined by aggregate demand
  - unemployment negatively related to output

## The Plan

- We develop the *IS–LM* model, the basis of the aggregate demand curve.
- We focus on the short run and assume the price level is fixed (the *SRAS* curve is horizontal).
- Firstly, we focus on the closed-economy case.
- Then, we present the open-economy case.

## In the Short Run

- Aggregate expenditures (aggregate demand) determines output.
- Keynes proposes a simple closed-economy model in which income is determined by expenditure.

- Notation:

$I$  = planned investment

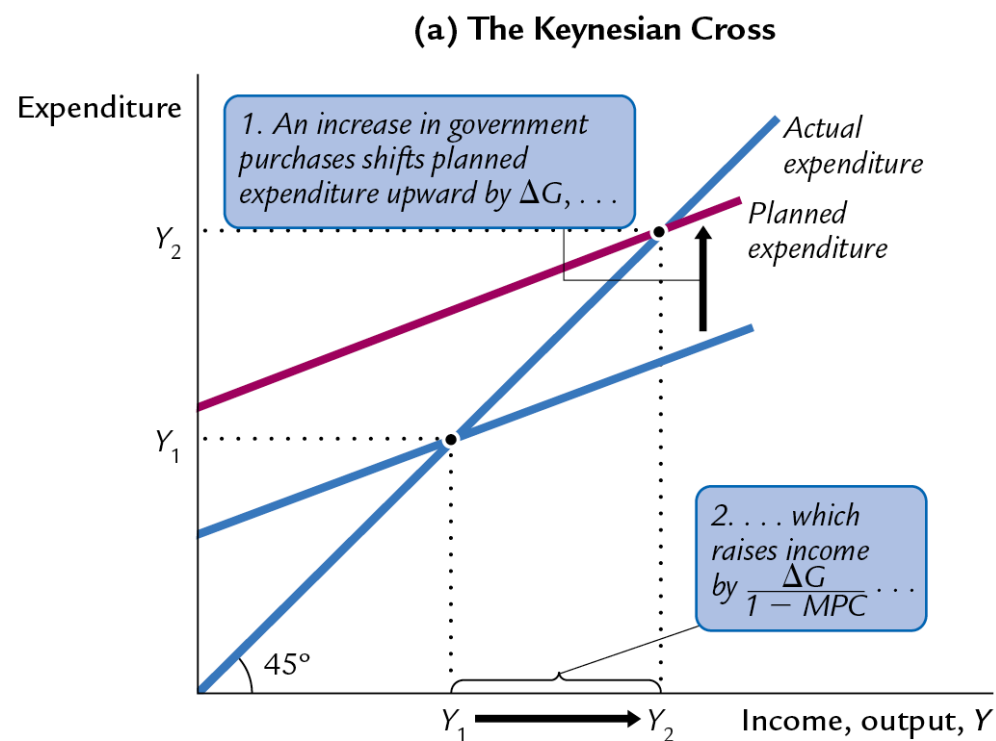
$PE = C + I + G$  = planned expenditure

$Y$  = real GDP = actual expenditure

- Actual - planned expenditure => unplanned inventory investment

## Equilibrium in the Short Run

Actual expenditure = planned expenditure  $\Rightarrow$  **Y = PE**



An increase in planned investment ( $\Delta I$ ) increases planned expenditure ( $PE$ )  
Equilibrium moves from  $A$  to  $B$ .

## The IS Curve

- Definition: a graph of all combinations of  $r$  and  $Y$  that result in goods market equilibrium.
- actual expenditure (output) = planned expenditure
- The equation for the *IS* curve is:

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

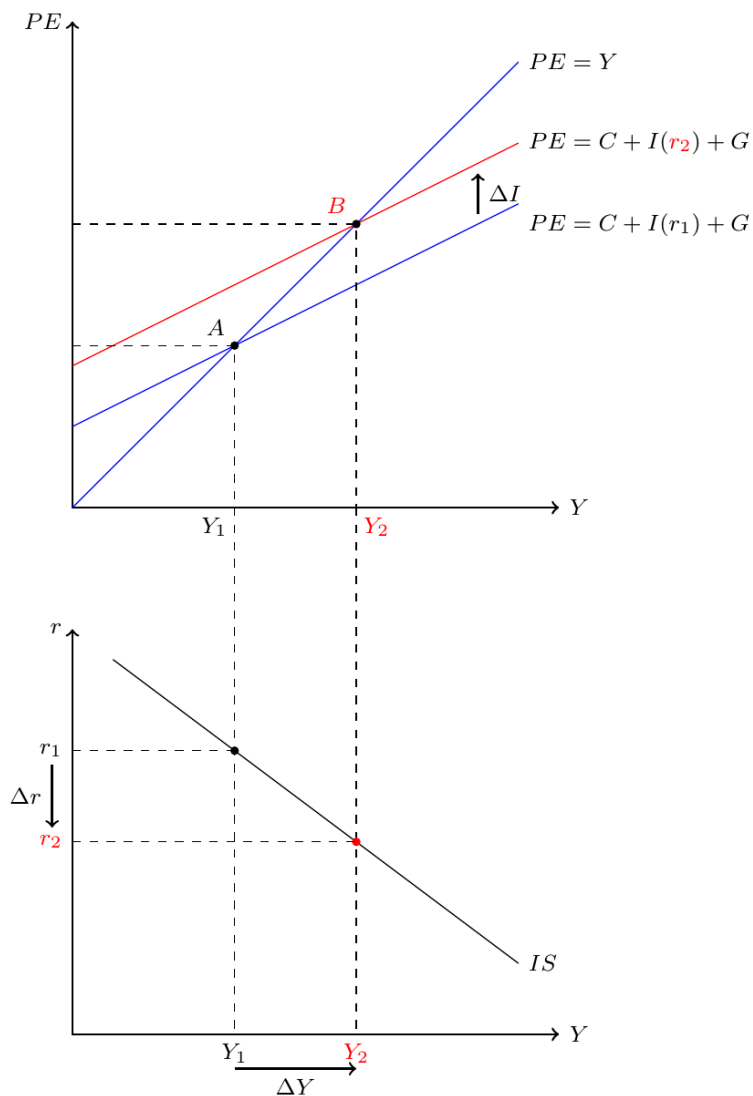
- Investment is negatively related to real interest rate.

## Deriving IS Curve

The real interest rate decreases from  $r_1$  to  $r_2$ , causing planned invest to increase from  $I(r_1)$  to  $I(r_2)$ .

The increase in planned investment increases income from  $Y_1$  to  $Y_2$ .

The *IS* curve summarizes the relationship between the interest rate and income: the lower the interest rate, the higher the level of income.





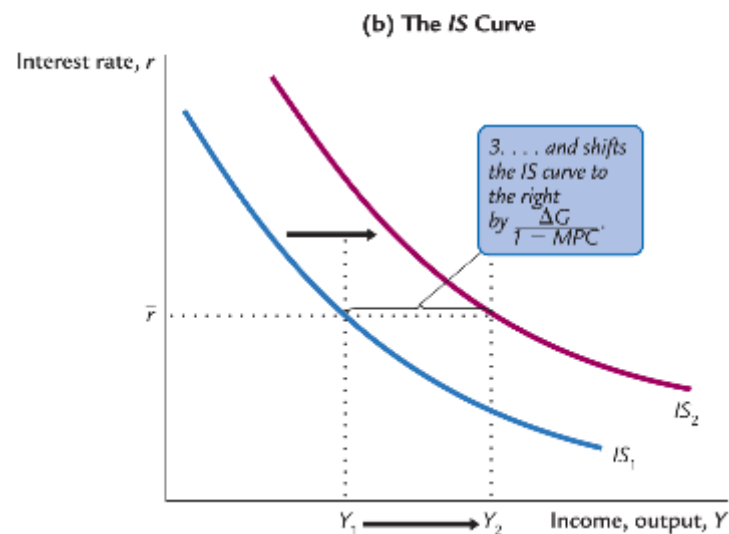
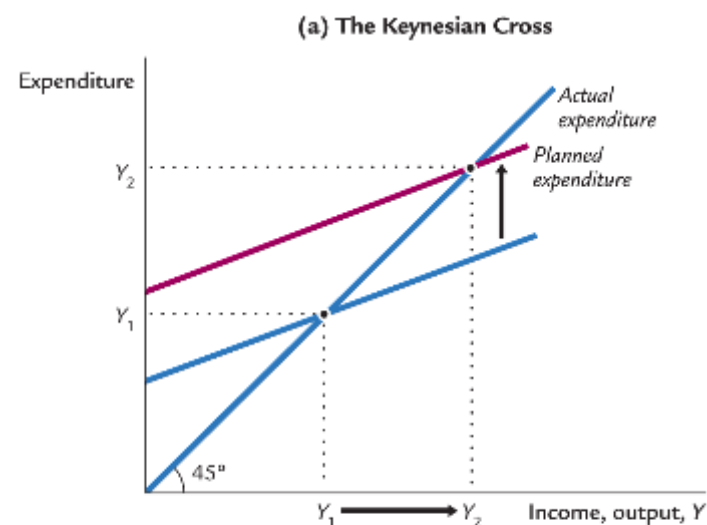
# Shifting IS Curve

At any value of  $r$ ,  $\uparrow G \rightarrow \uparrow PE \rightarrow \uparrow Y$

... so the  $IS$  curve shifts to the right.

The horizontal distance of the  $IS$  shift equals

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



## The Theory of Liquidity Preferences

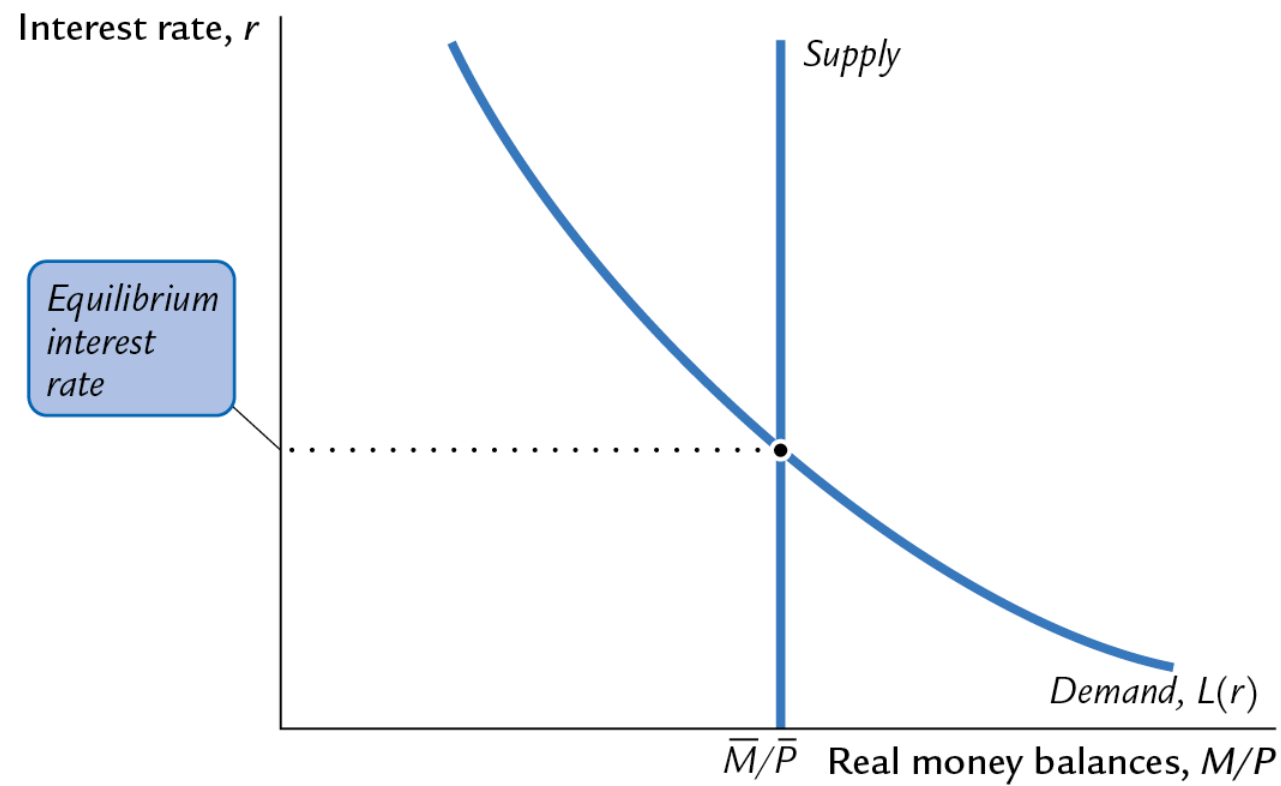
- A simple theory in which the interest rate is determined by money supply and money demand.
- Money supply is controlled by the central bank (CB). – exogenous

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

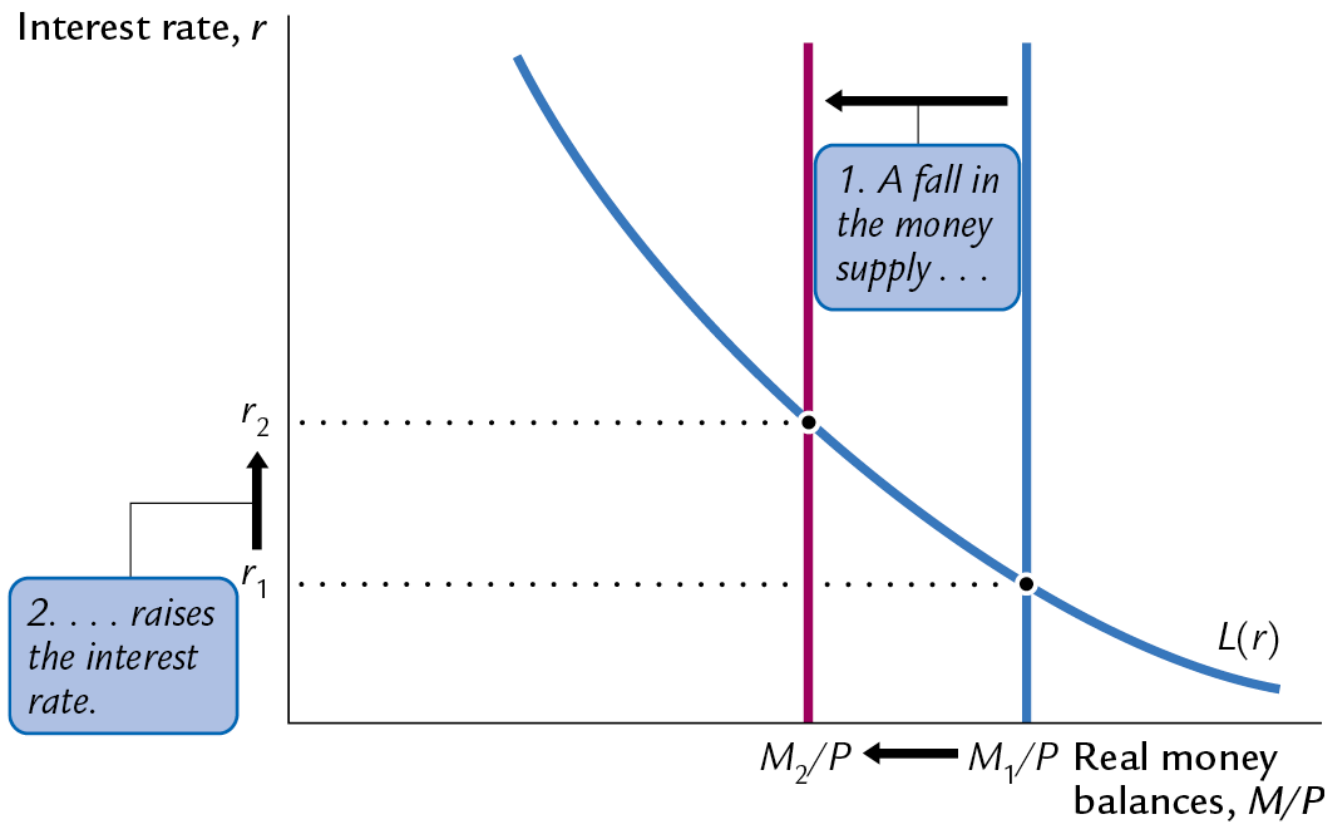
- Money demand is driven by income and interest rate.

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

# The Equilibrium in Money Market

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# How CB raises interest rate



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## Case Study 1: Monetary Tightening and Interest Rate

- Late 1970s:  $\pi > 10$  percent
- October 1979: Fed Chair Paul Volcker announces that monetary policy would aim to reduce inflation
- August 1979–April 1980: Fed reduces  $M/P$  8.0 percent
- January 1983:  $\pi = 3.7$  percent
- *How do you think this policy change would affect nominal interest rates?*

## Case Study 2: Monetary Tightening and Interest Rate

The effects of a monetary tightening on nominal interest rates

	<b>Short run</b>	<b>Long run</b>
<b><i>Model</i></b>	Liquidity preference ( <i>Keynesian</i> )	Quantity theory, Fisher effect ( <i>classical</i> )
<b><i>Prices</i></b>	Sticky	Flexible
<b><i>Prediction</i></b>	$\Delta i > 0$	$\Delta i < 0$
<b><i>Actual outcome</i></b>	8/1979: $i = 10.4\%$ 4/1980: $i = 15.8\%$	8/1979: $i = 10.4\%$ 1/1983: $i = 8.2\%$

## The LM Curve

- Money demand:

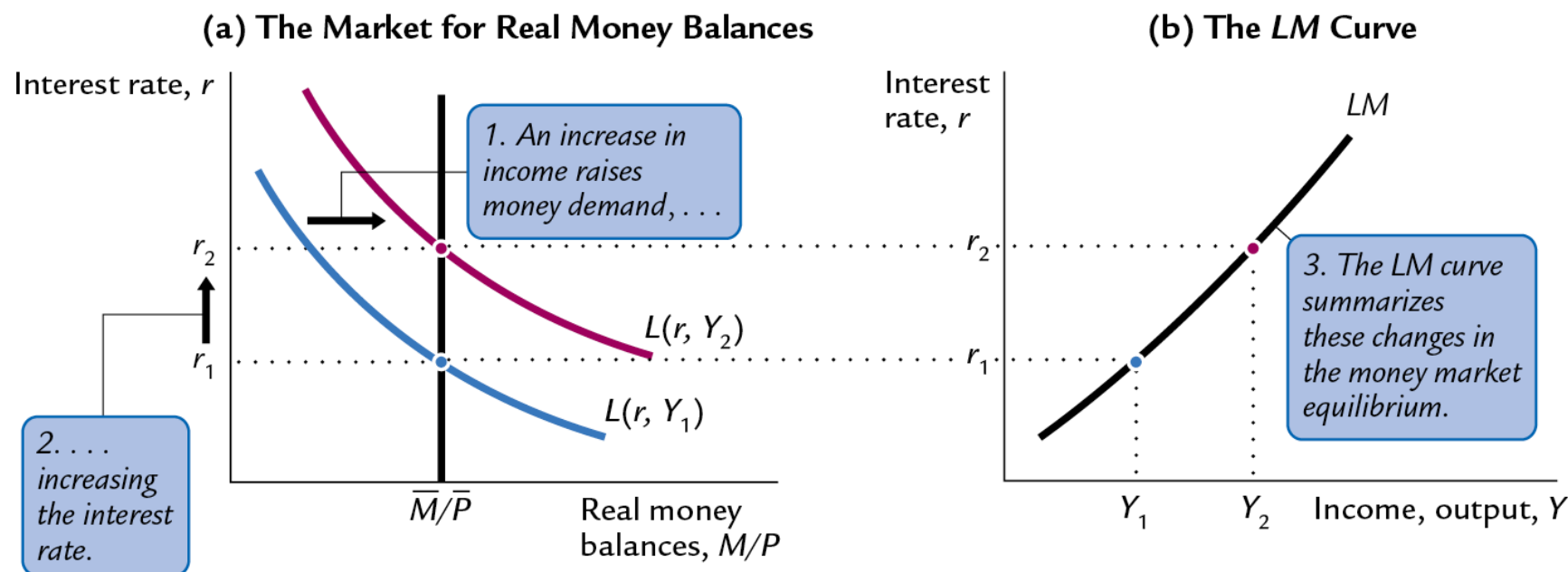
$$\left(\frac{M}{P}\right)^d = L(Y, r)$$

- 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:

$$\left(\frac{M}{P}\right)^s = \frac{\bar{M}}{\bar{P}} = L(Y, r)$$

## Deriving LM Curve

As income increases from  $Y_1$  to  $Y_2$ , money demand shifts out, increasing the interest rate. The *LM* curve summarizes these changes in the money market equilibrium.

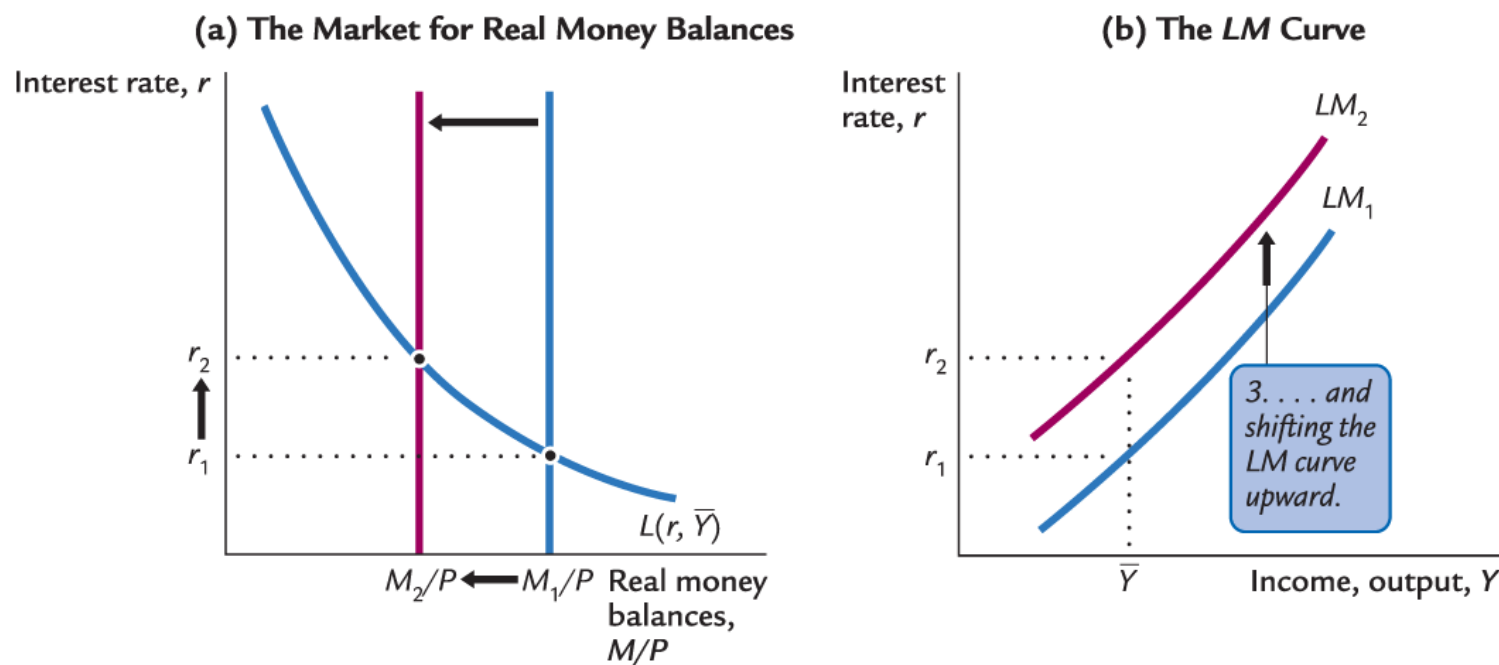


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## Shifting LM Curve

The Fed reduces the money from  $M_1$  to  $M_2$ , causing interest rates to rise. This then results in the  $LM$  curve shifting up to  $LM_2$ .



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## The Short-run Equilibrium

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

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

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

