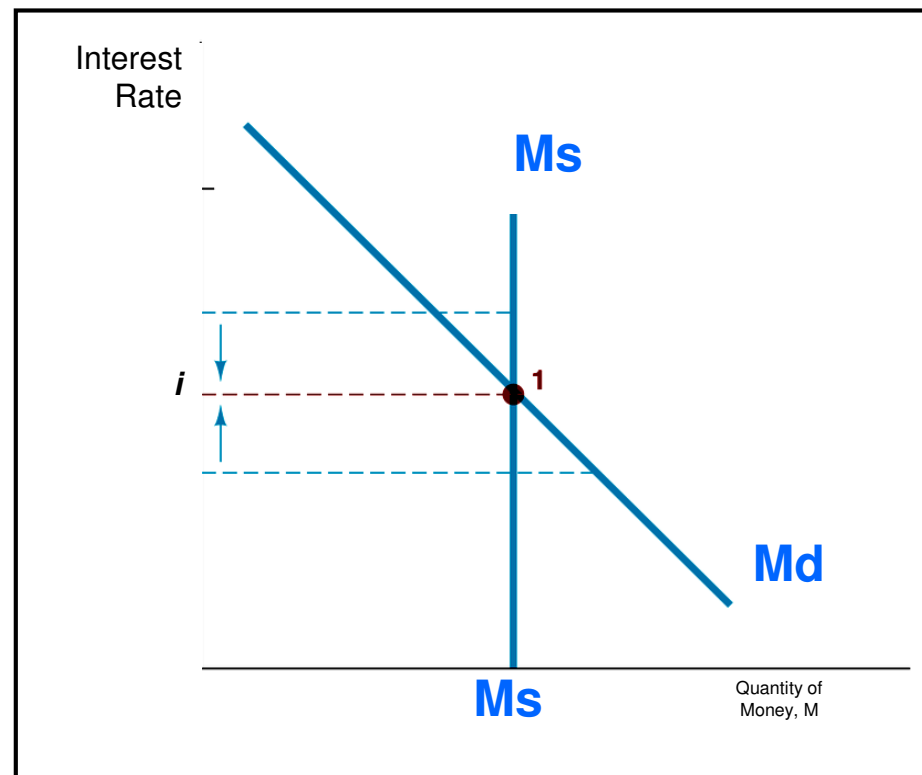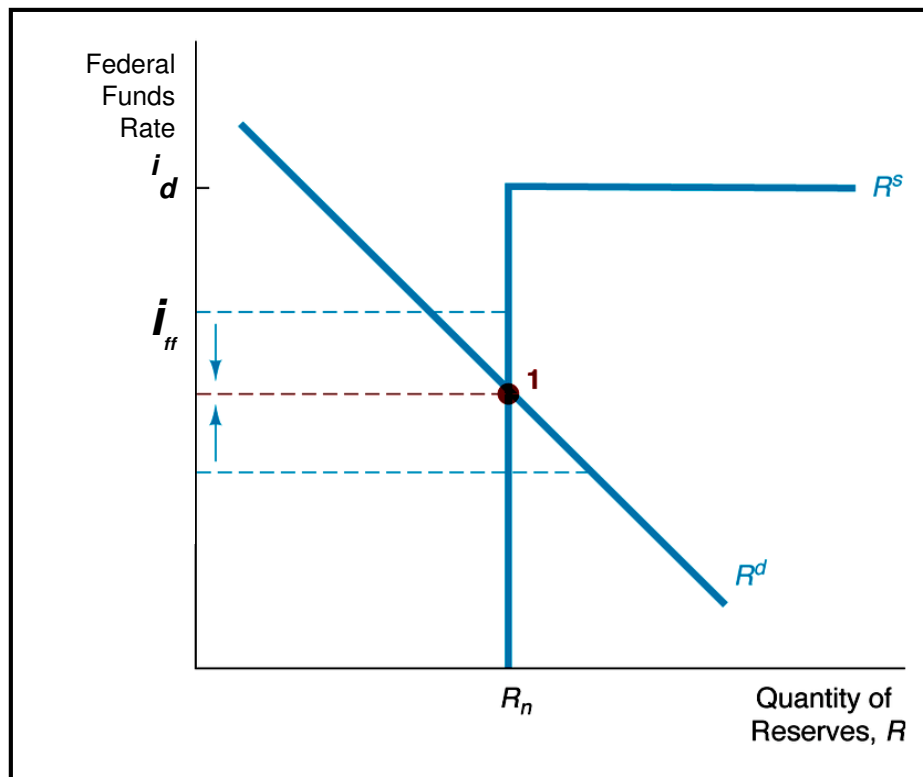# Equilibrium Interest Rate

We will use two ways to illustrate it: (1) Money   &   (2) Reserves

(1) Market for Money: $M_d = M_s$ where $M_s = H *$ Money Multiplier

Equilibrium Interest Rate

We will use two ways to illustrate it: (1) Money   &   (2) Reserves

(1) Market for Money: $Md = Ms$ where $Ms = H *$ Money Multiplier

(2) Market for Reserves: $Rd = Rs$ where $Rs = H - Cu$

$$Rd = \theta (Md - Cu)$$

Supply of reserves is either borrowed or non-borrowed:

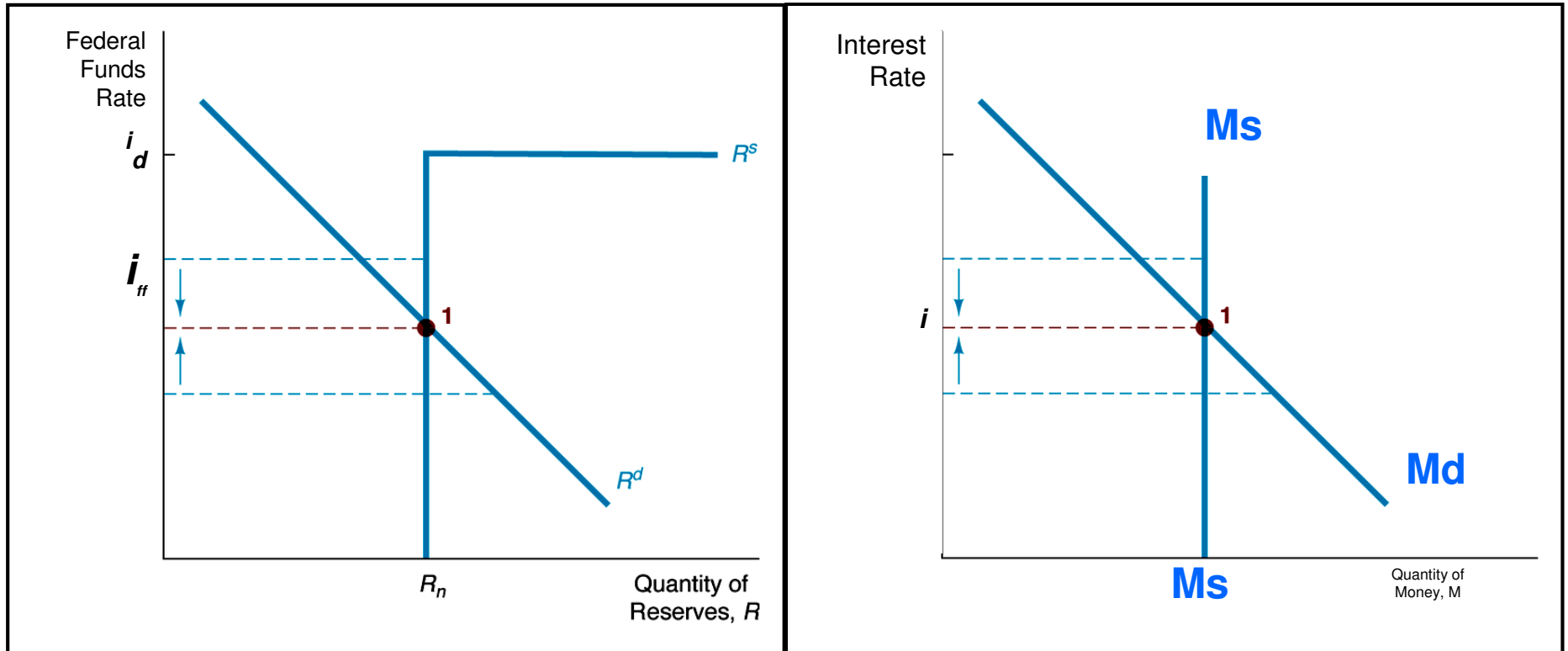$Rs =$ Discount Loans $+ Rn$

$Rn=$Non-borrowed reserves

Interest rate on overnight loans (used as reserves) is called
Federal Funds Rate
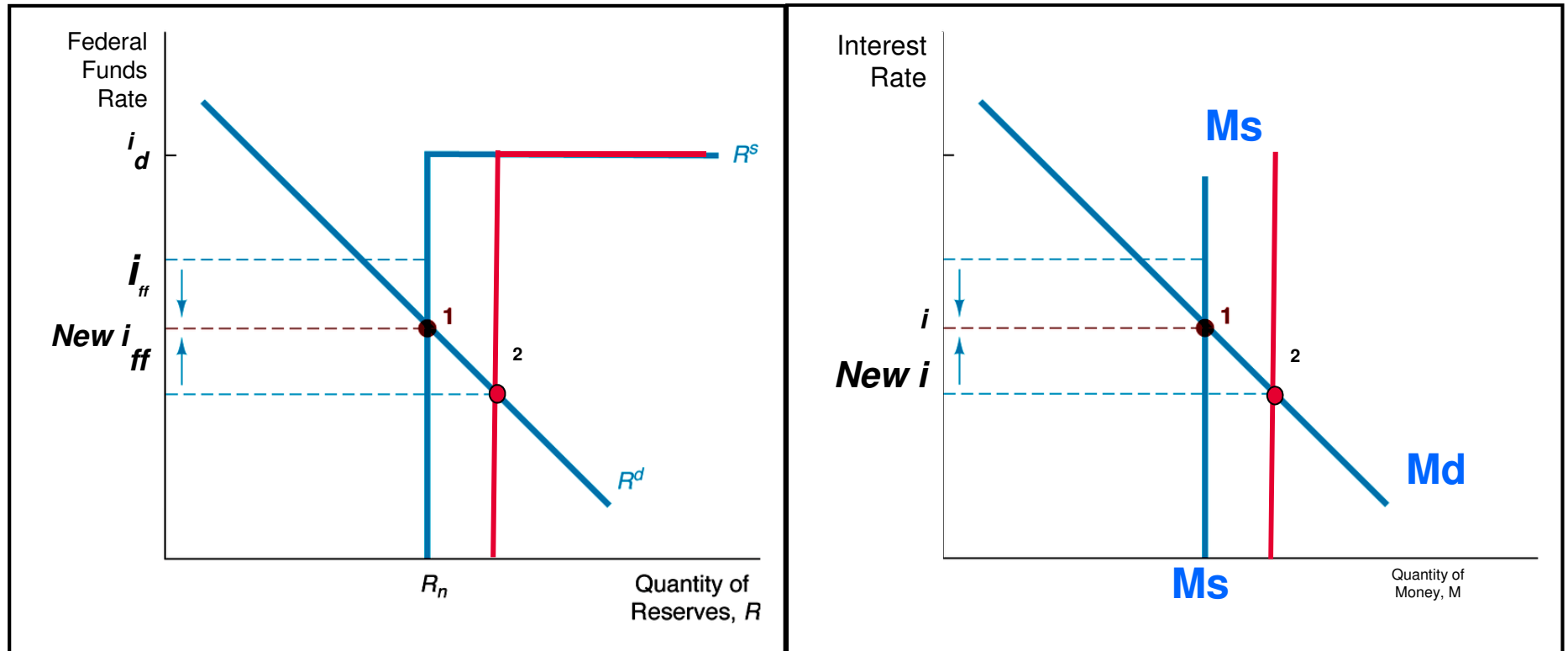
Equilibrium Interest Rate

(2) Reserves $(Rs = Rd)$ (1) Money $(Ms = Md)$

Equilibrium Interest Rate

(2) Reserves   (Rs = Rd)

(1) Money   (Ms = Md)

Federal
Funds
Rate

i_d

i_{ff}

New i_{ff}

1

2

R^s

R^d

R_n

Quantity of
Reserves, R

Interest
Rate

Ms

i
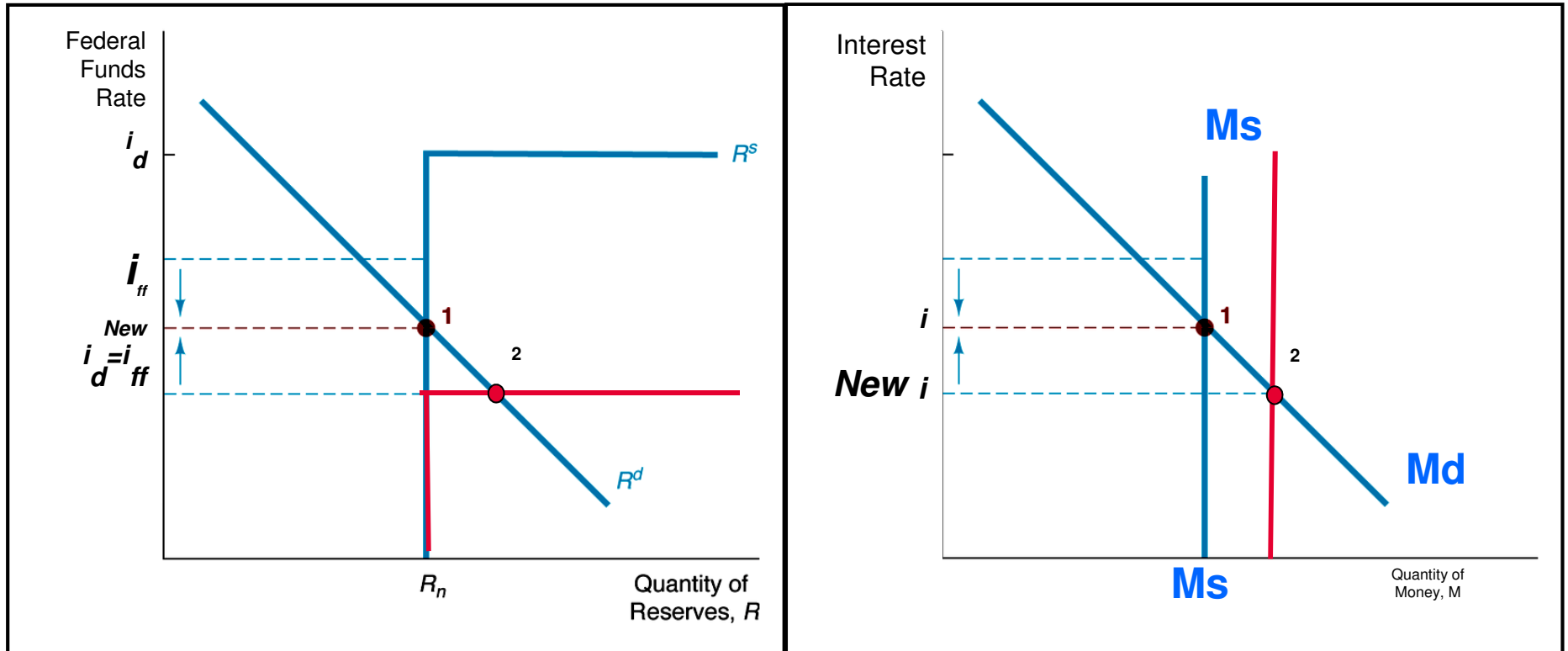
New i

1

2

Md

Ms

Quantity of
Money, M

Response to Open Market Purchase

("Buy Bonds, pay by Reserves")

Equilibrium Interest Rate

(2) Reserves   (Rs = Rd)

(1) Money   (Ms = Md)

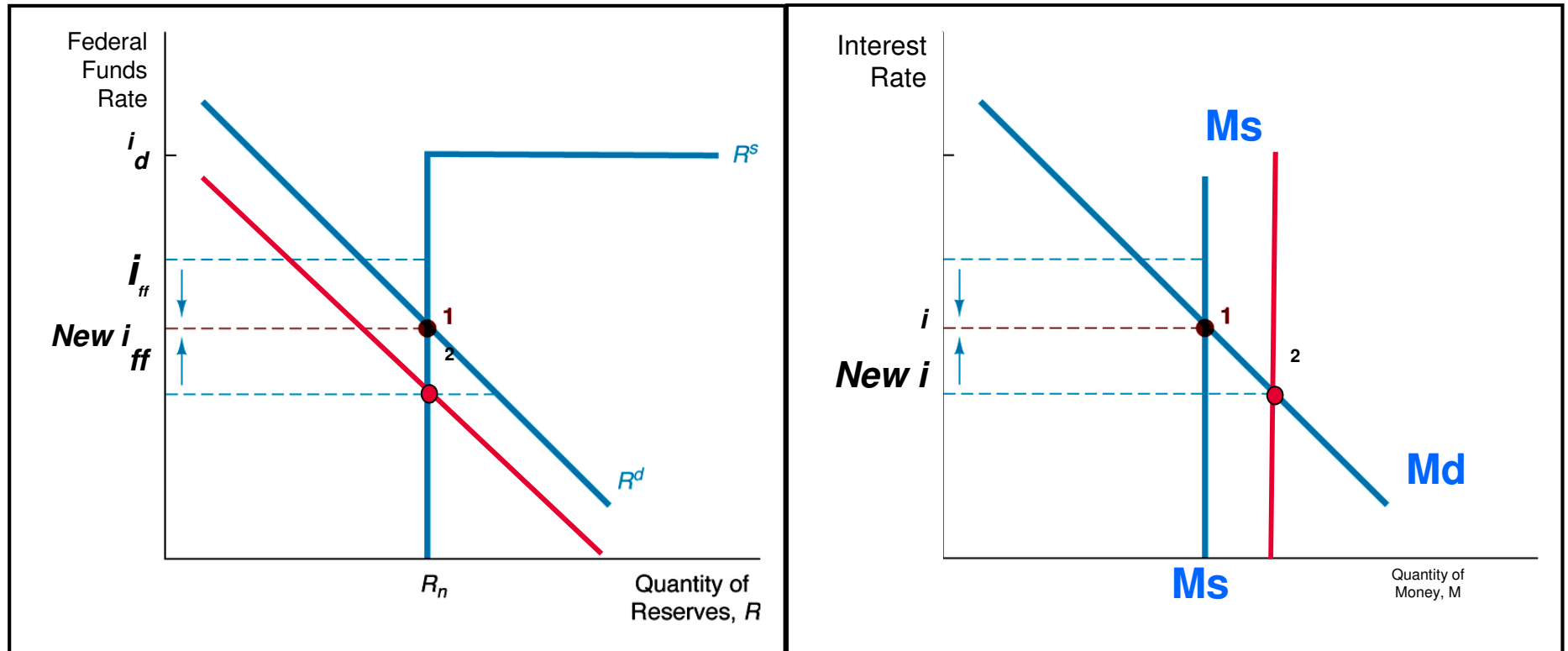# Response to a Decrease in the Discount Rate

("Lend more reserves")

Equilibrium Interest Rate

(2) Reserves   (Rs = Rd)

(1) Money   (Ms = Md)

Response to Decrease in Required Reserves Ratio

("Make reserves more useful"=> Increase Money Multiplier)

- LM Curve
- IS-LM Examples
- Fiscal and Monetary policies
- Keynesians vs. Monetarists

IS-LM model

- General Equilibrium model

    all makets are in equilibrium at the same time

- Two markets only
    1. goods (savings)   2. money (non-money assets)

- Two steps
    1. Investigate demand for output and construct IS curve
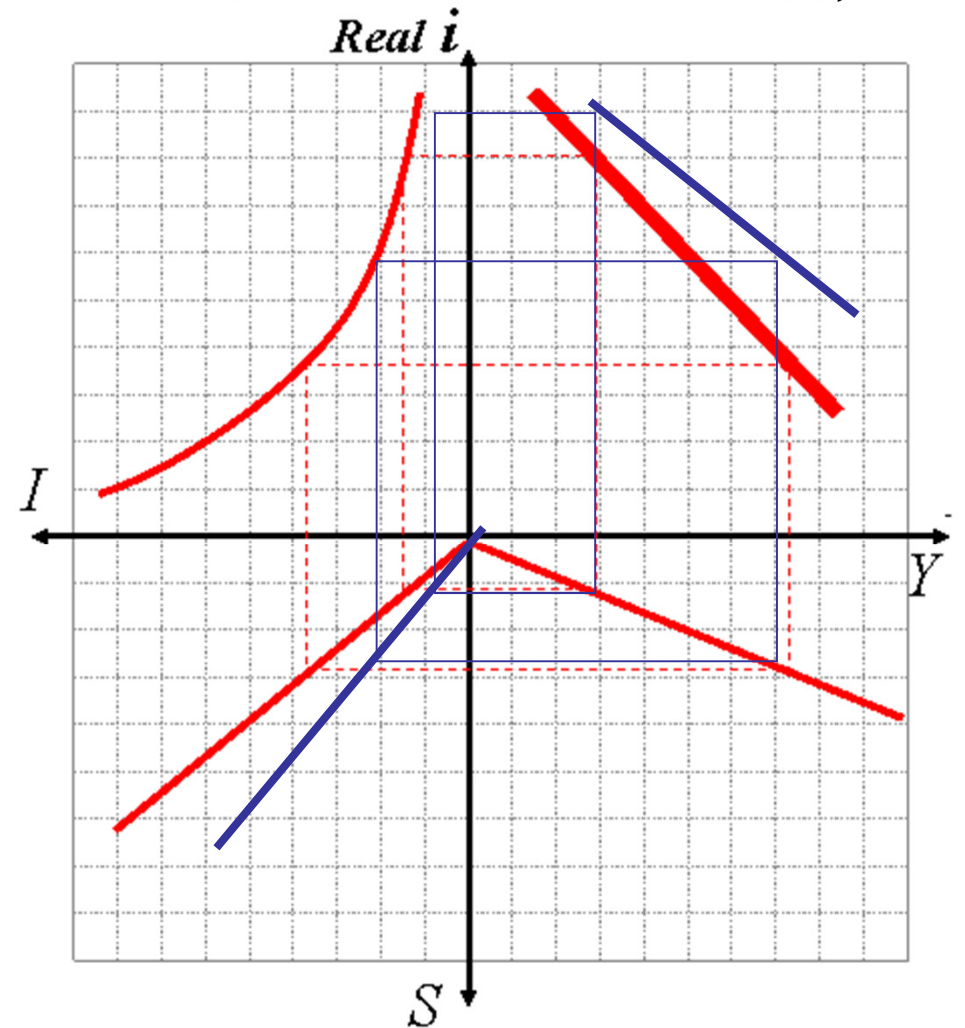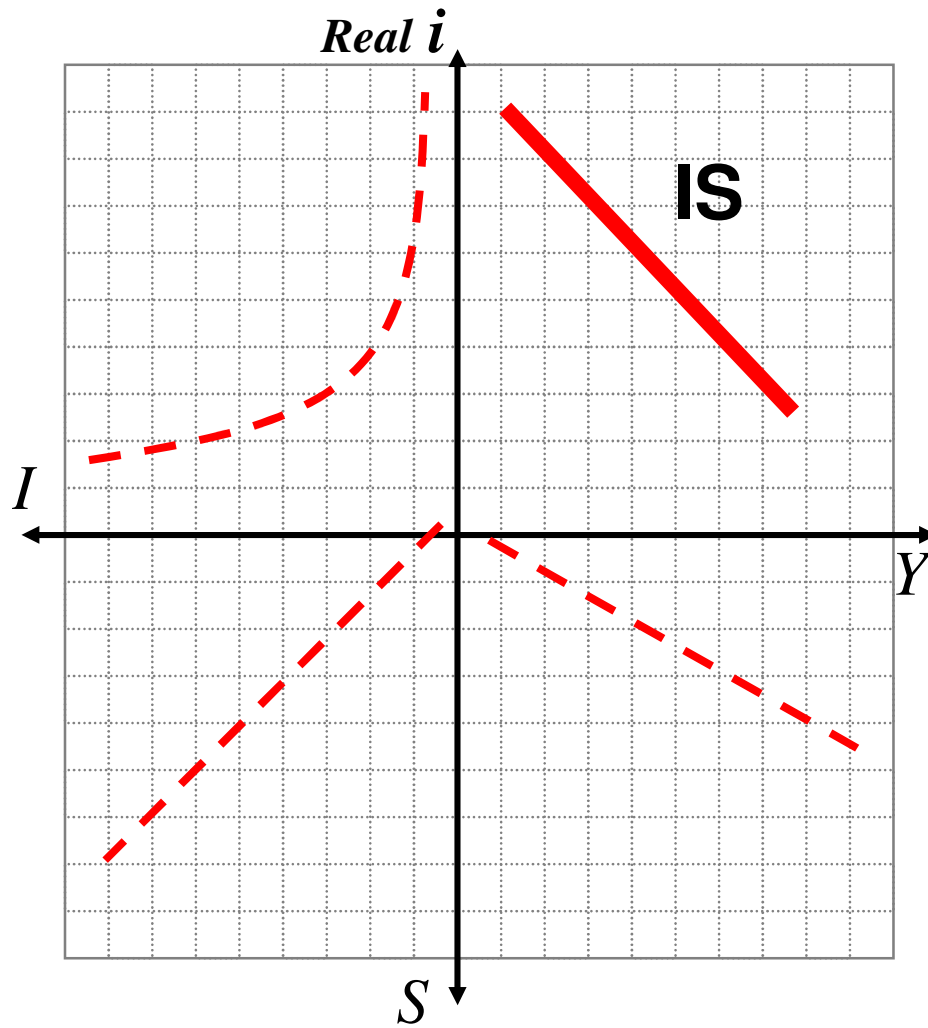   2. Determine willingness to hold money and construct LM curve

IS curve

- Aggregate Demand $= C + I + G + NX$

- Equilbrium on the goods market: $Y =$ Aggregate Demand

- Income/GDP identity : $Y =$ Income $= C + S + NT$

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IS curve

IS

Government Purchases $G\uparrow$ => $S\uparrow$, $I\downarrow$
Export $\uparrow$ => NX $\uparrow$ => $S\uparrow$, $I\downarrow$
Import $\downarrow$ => NX $\uparrow$ => $S\uparrow$, $I\downarrow$
Currency Depreciation
    => NX $\uparrow$ => $S\uparrow$, $I\downarrow$

Real i

I

Y

S

Real i

I

Y

S

$$S = I \ + G - NT + NX$$

LM curve

- Asset Market Equilibrium (stocks, bonds, …)
  Wealth is divided between money (M) and nonmoney (N) assets
  Md + Nd = W =Ms + Ns
  Md - Ms   =   Ns - Nd   = 0 in equilibrium

- Ms given by central bank (and price level) :
  Ms = nominal money balances / level of prices

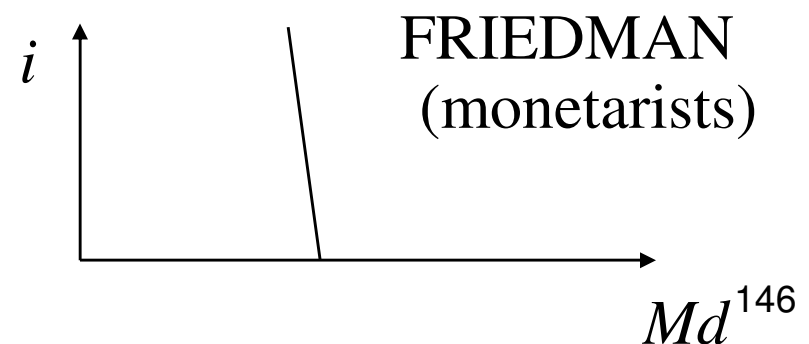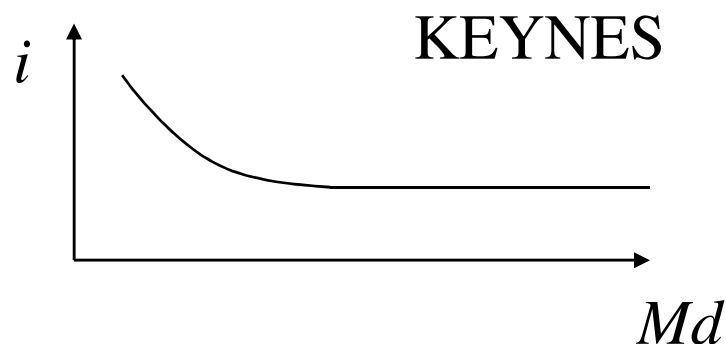- Md determined by

  Transactions motive   — positively related to *Y*
 **Precautionary motive**   — positively related to Y
  Speculative motive   — negatively related to *i*

KEYNES

i

Md

FRIEDMAN
(monetarists)

i

Md [146]
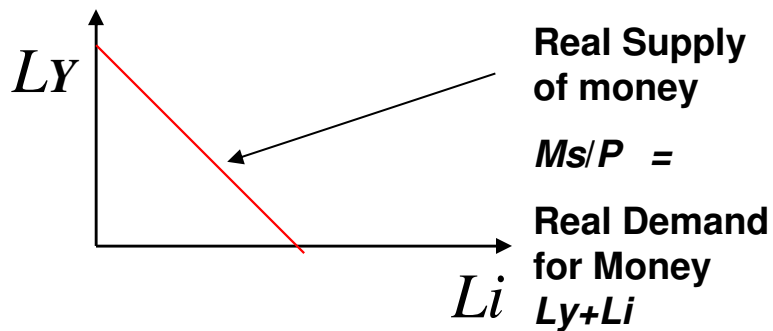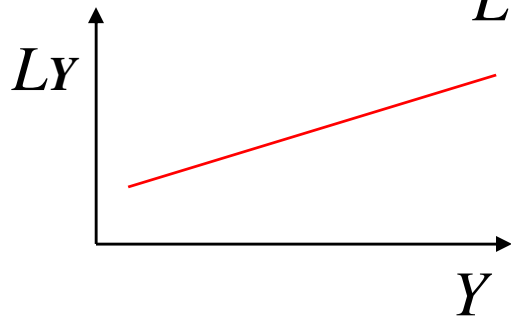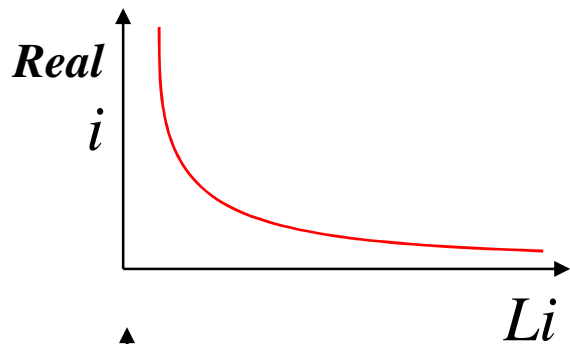
Equilibrium : $Ms = Md$ where Md depends on Y, i and P

e.g. $Md = P (L_Y + L_i)$

L_i … real demand for money due to the speculative motive

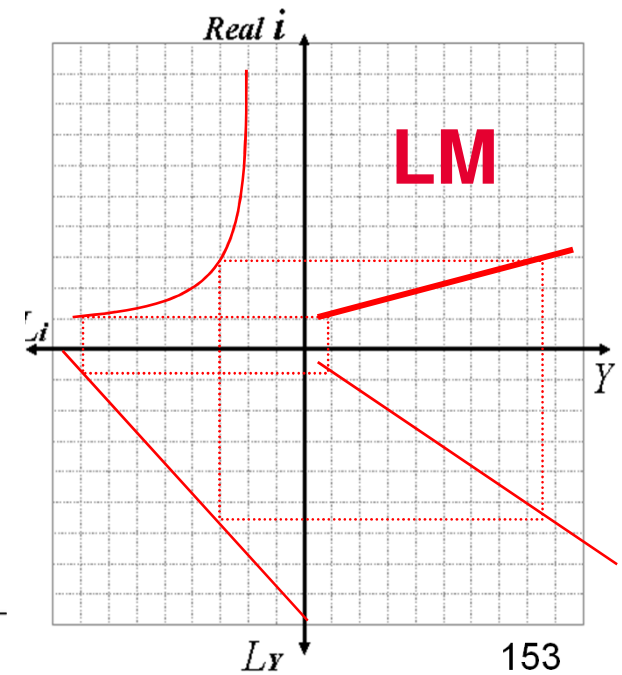L_Y … real demand for money due to the transaction and the precautionary motives

LM

Real Supply
of money

Ms/P =

Real Demand
for Money
$L_Y + L_i$

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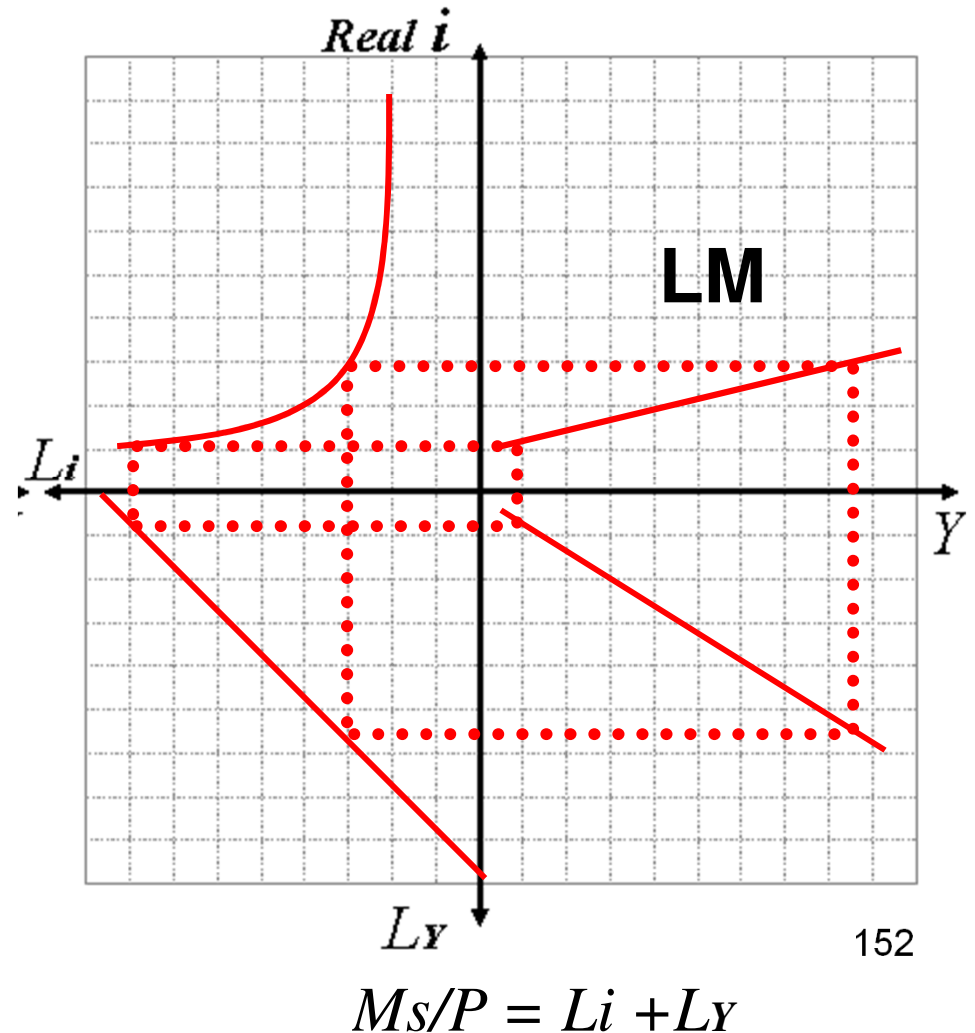
$Ms/P = L_i + L_Y$
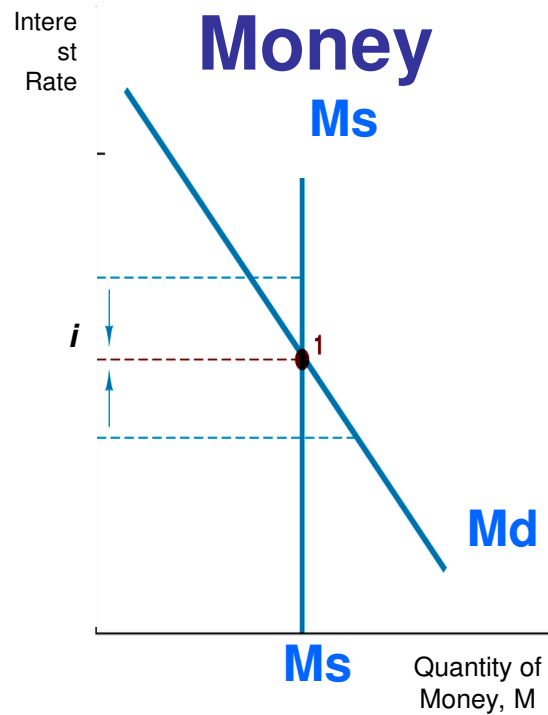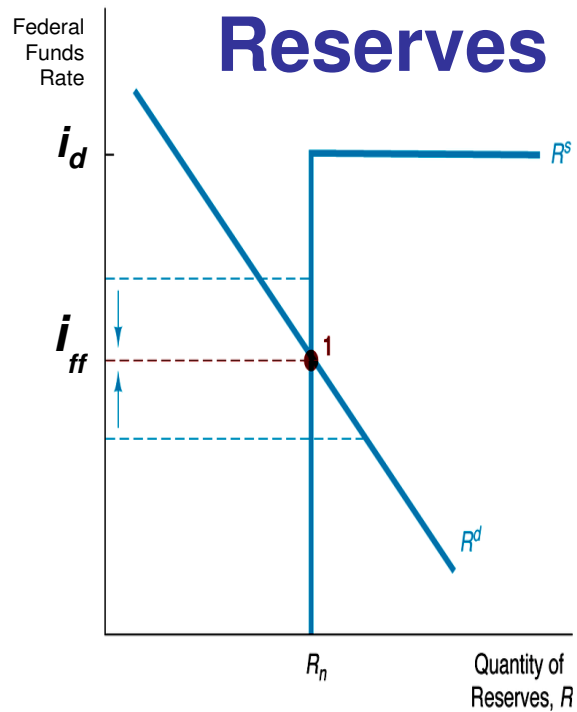
Monetary Policy

i. 3 tools   => Change in Money Supply

    Market for Reserves

    Market for Money

ii. Change in Money Supply => Shift of LM (new Y, new i)
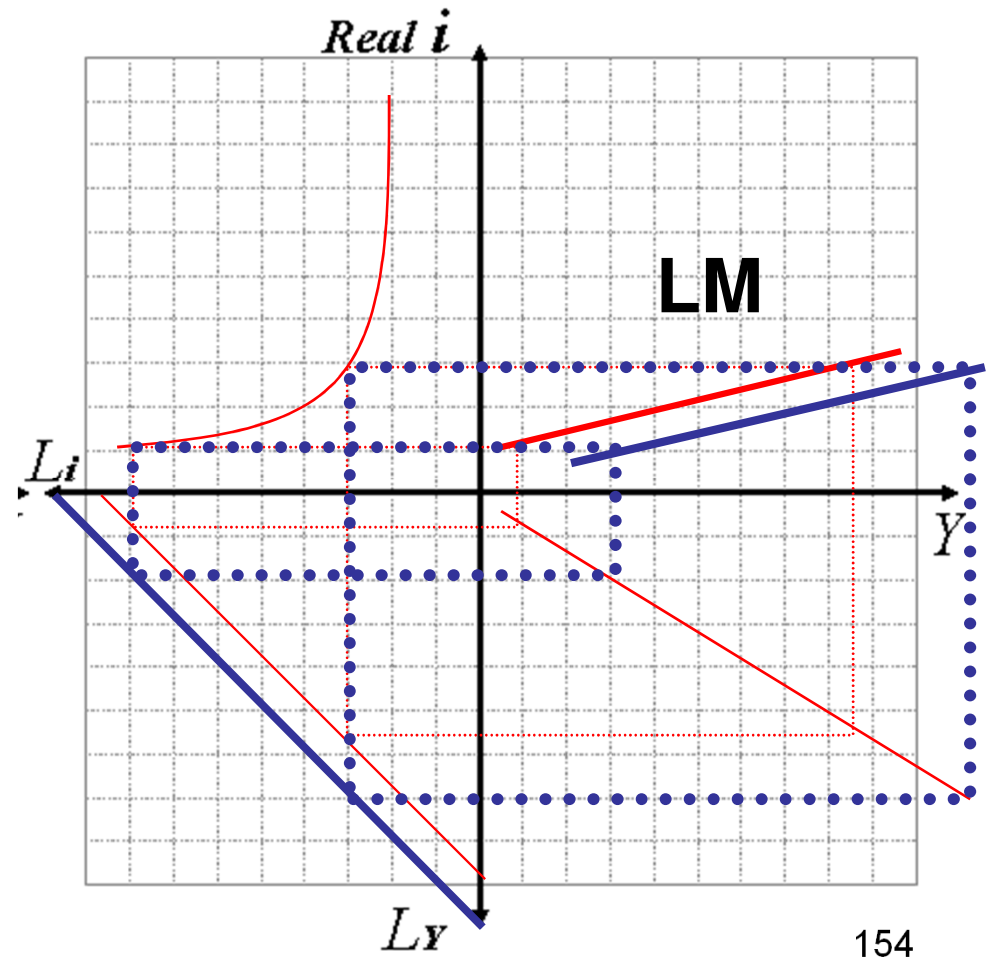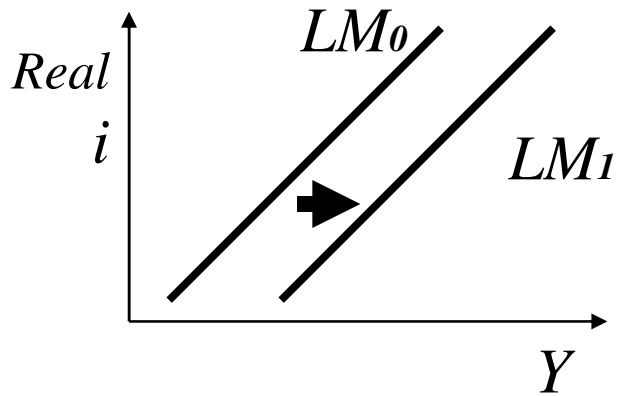

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LM CURVE

(1) Monetary Expansion
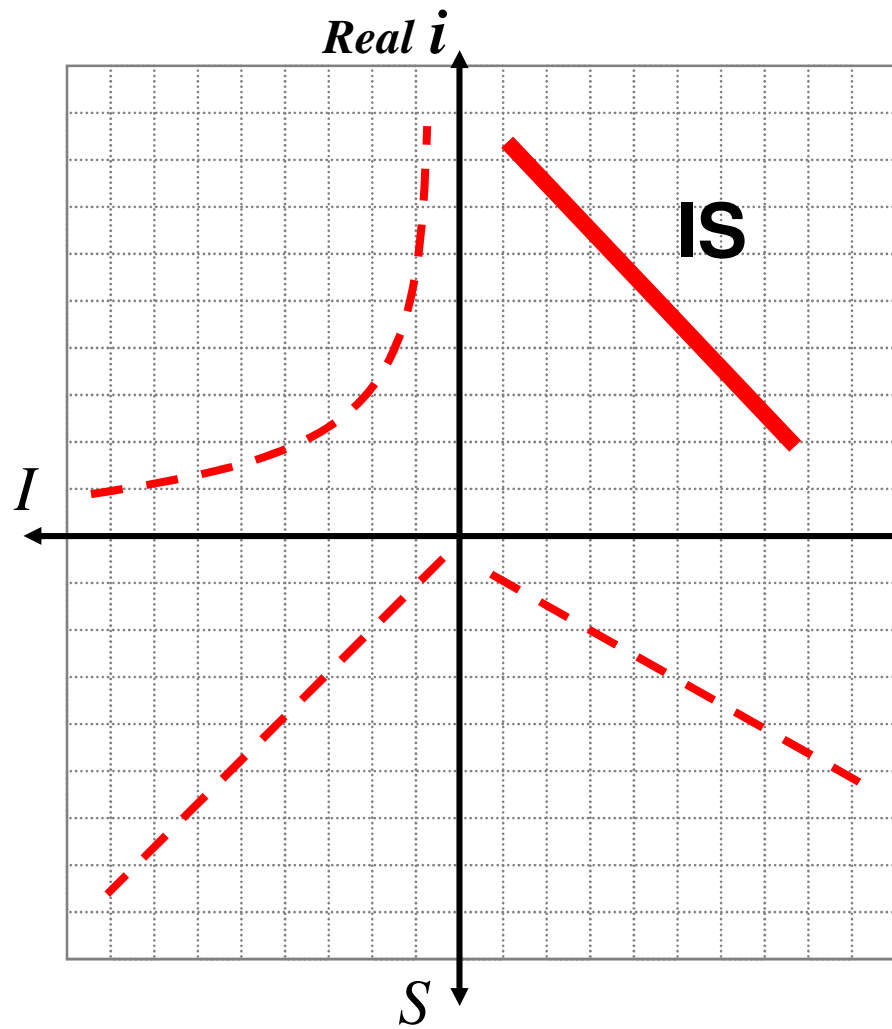
$$\Rightarrow Ms\uparrow \Rightarrow Ms/P\uparrow$$

(2) Deflation
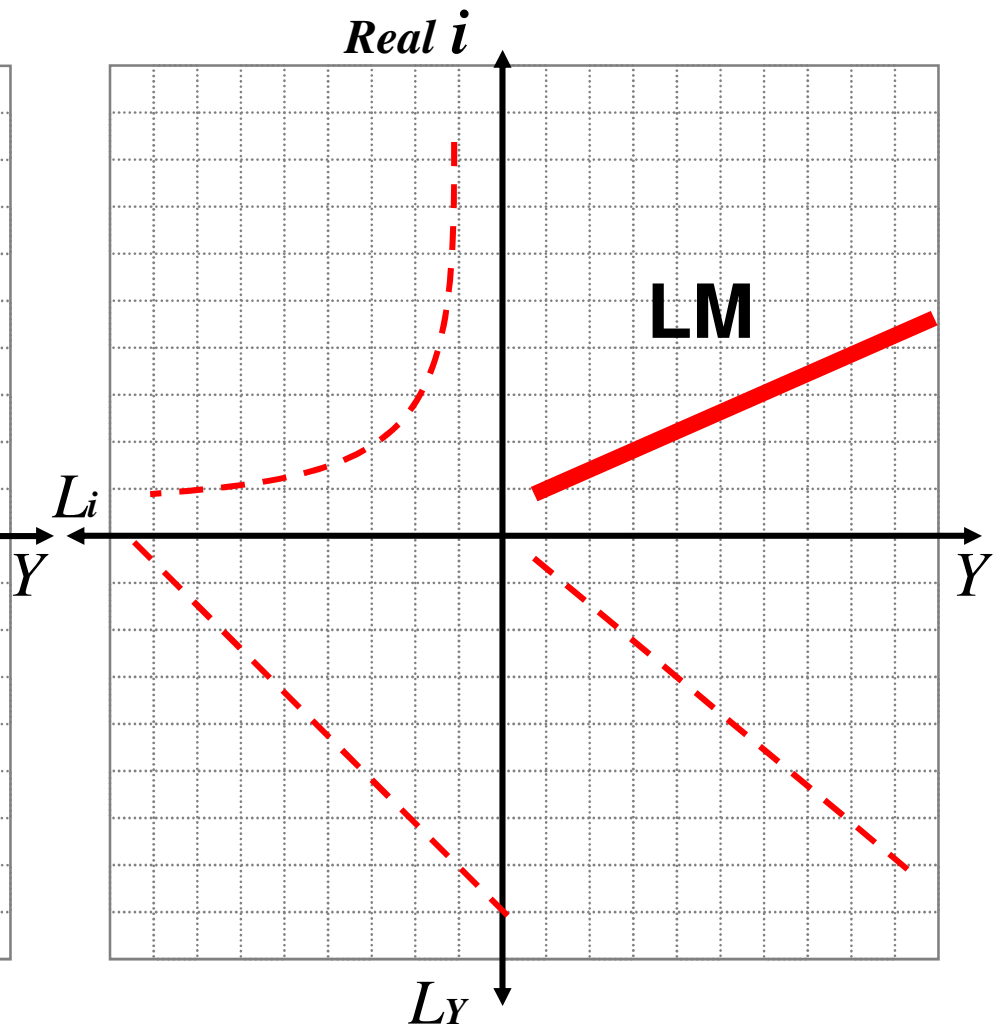
$$\Rightarrow P\downarrow \Rightarrow Ms/P\uparrow$$

LM

$Ms/P = Li + Ly$

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IS curve

Real *i*

IS

I

S

Y

$S = I \ + G - NT + NX$

LM curve

Real *i*

LM

L_i

L_Y

Y

$Ms/P = Li + Ly$