



# GOODS AND FINANCIAL MARKETS: IS-LM MODEL

SHORT RUN IN A CLOSED ECONOMIC SYSTEM



## THE GOOD MARKETS AND IS CURVE

- The Good markets assumption:
  - The production  $Y$  is equal to the demand for goods  $Z$ ;
  - The demand is the sum of consumption, investments and government spending.  $Z=C(Y-T)+I+G$ ;
  - The equilibrium condition is given by  $Y=Z$  such that  $Y=C(Y-T)+I+G$ .

# INVESTMENTS

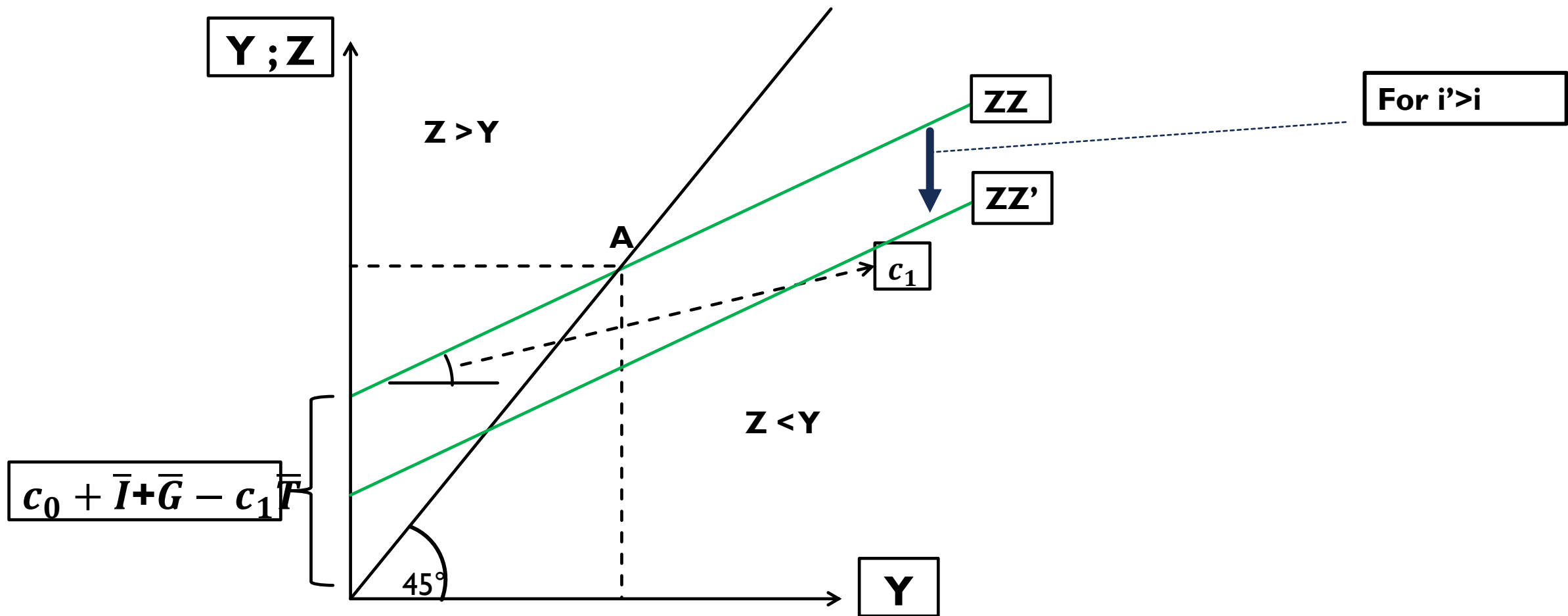
- Before we assumed investment to be constant.
- Investment depends on two factors:
  - Production: here we assume that the production to be equal to the level of sales. An increase in the level of sales needs to increase the firm's production. To do so, it need to improve its endowment buying, i.e., additional machines. The firm need to invest.
  - The interest rate: to buy new machines the firm should borrow. If the higher the interest rate, the less attractive it is to borrow and buy other machineries. In fact the return of payments won't cover the interest payments and so the investment won't be worth.

$$I = I(Y, i)$$

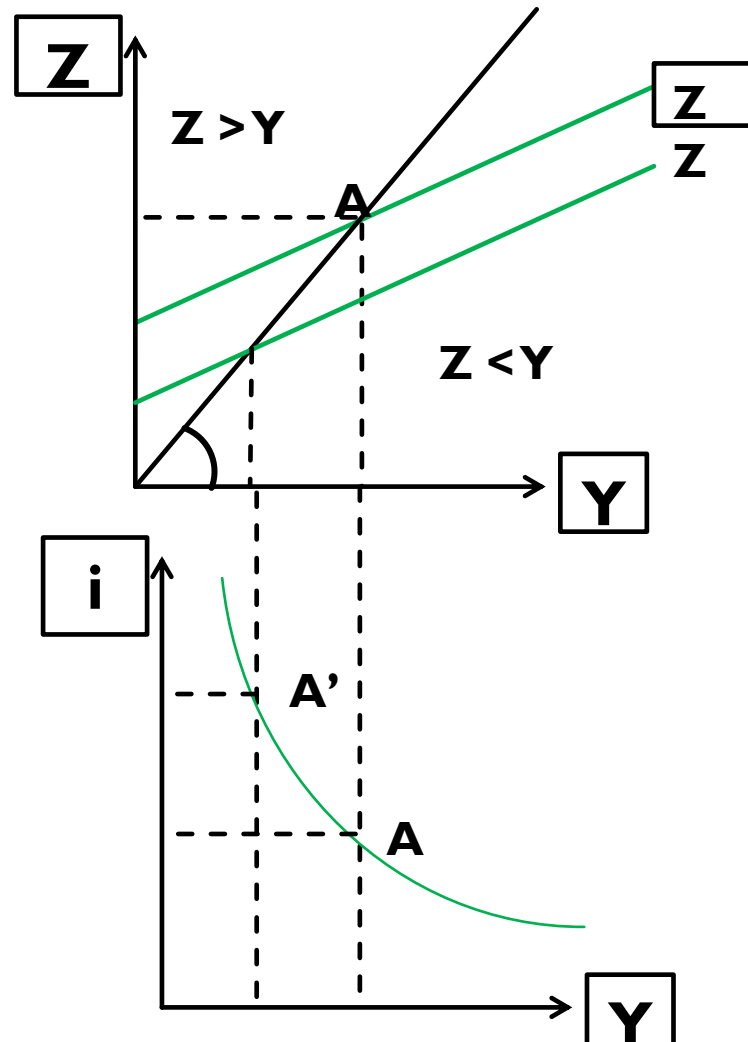
## NEW OUTPUT FORMULA

$$IS: Y = C(Y - T) + I(Y, i) + G$$

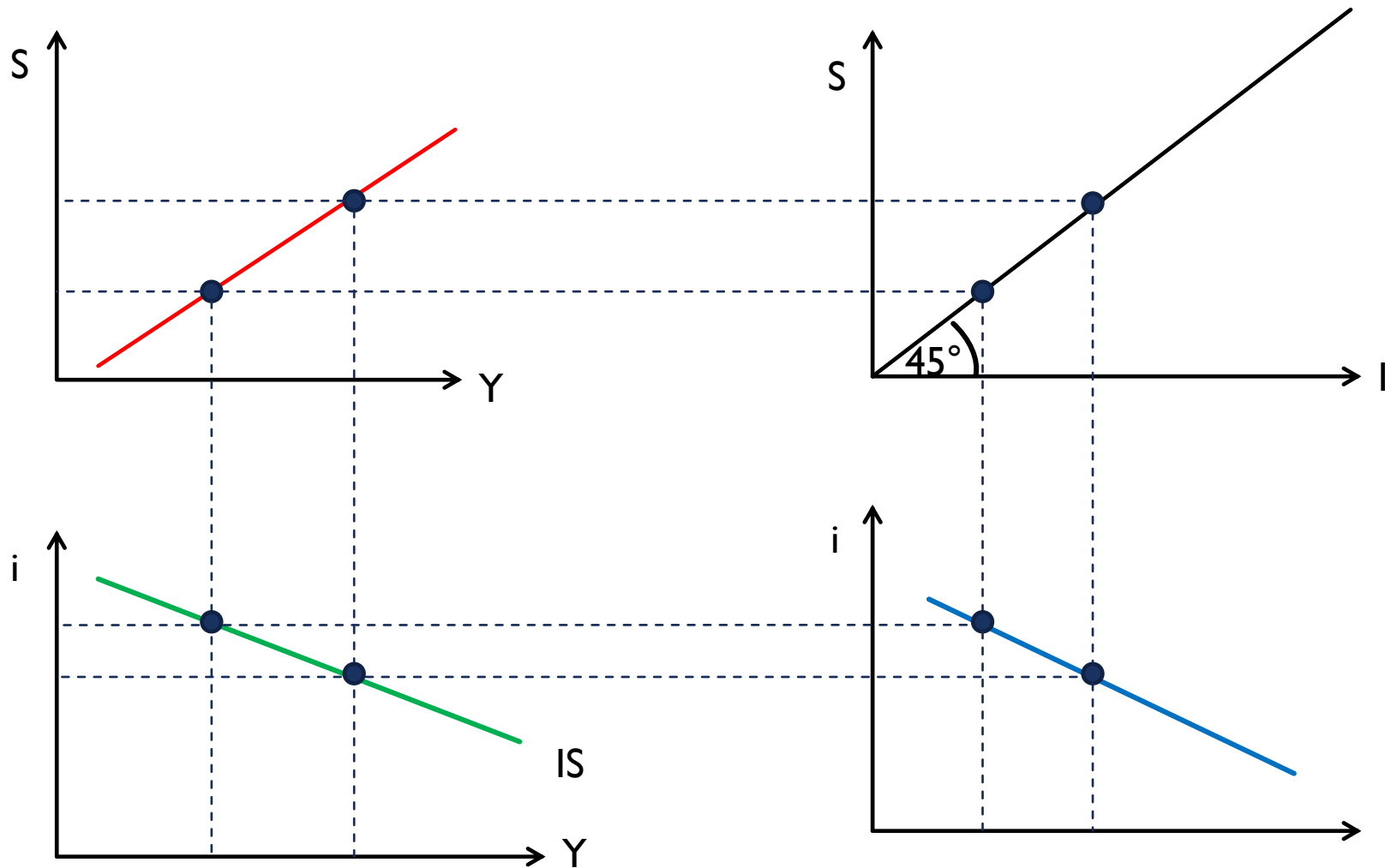
# DERIVING THE IS CURVE



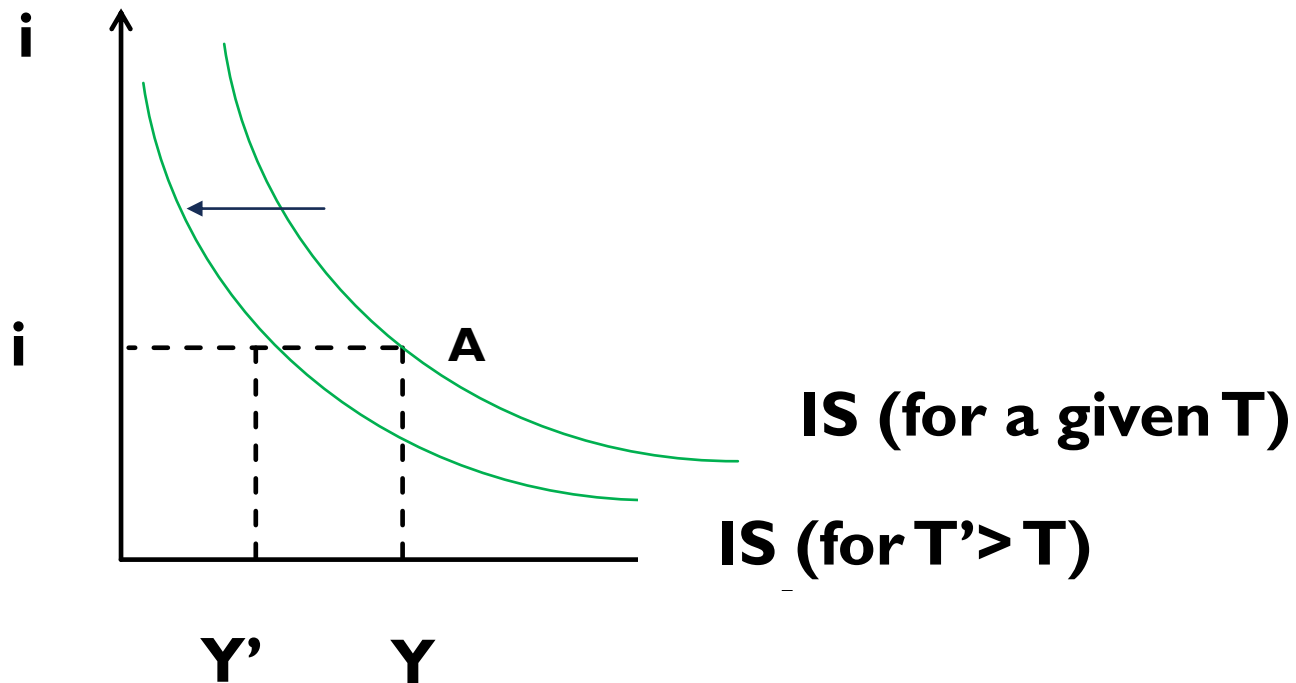
# DERIVING GRAPH OF IS CURVE



# DERIVING THE IS CURVE 2



# SHIFTS OF THE IS CURVE



Government intervention on Taxation and Government spending shifts the IS curve for each interest rate and output level

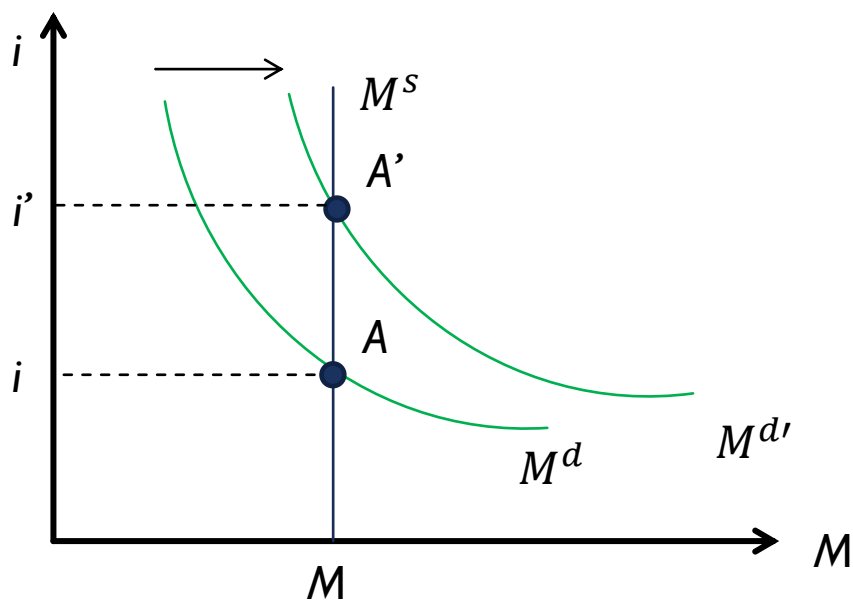


# FINANCIAL MARKETS EQUILIBRIUM AND LM CURVE

- Before starting to analyze the financial market equilibrium, it's important to recall in mind the main assumption of the short run.
  - 1<sup>st</sup> fixed price level;
  - 2<sup>nd</sup> fixed wage

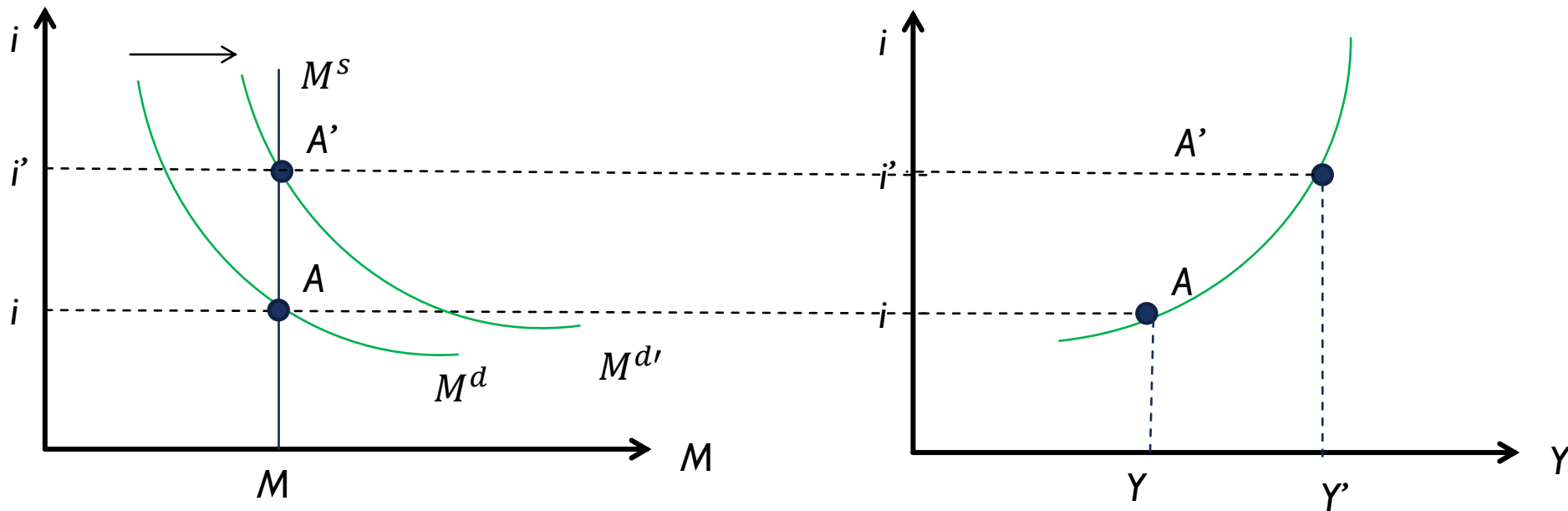
$$\frac{M}{P} = YL(i)$$

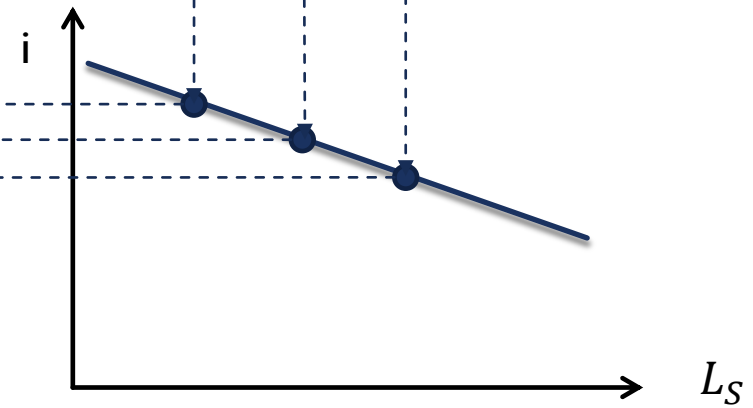
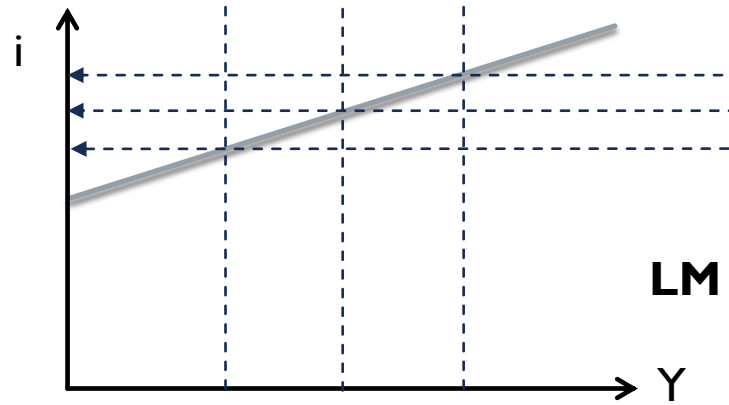
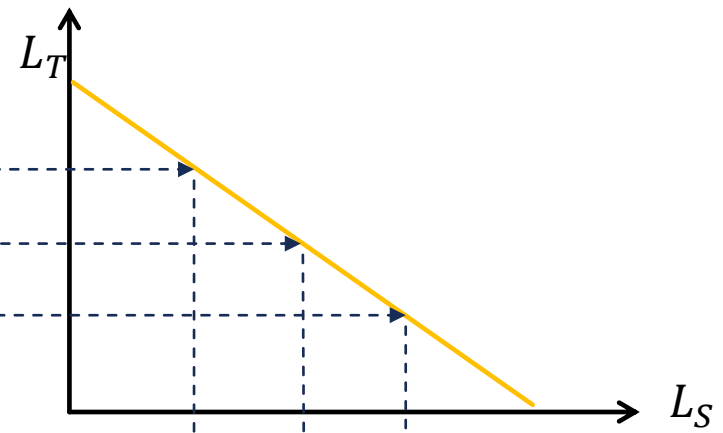
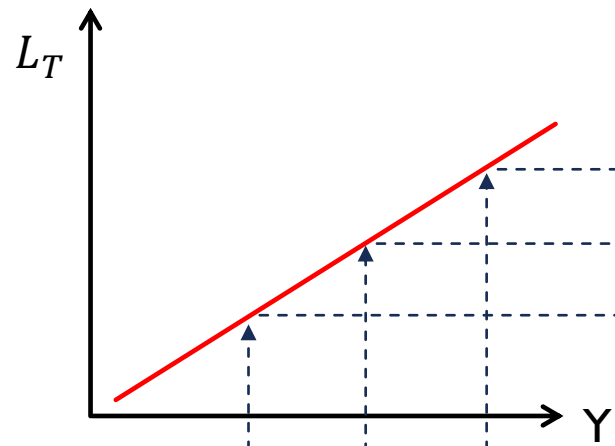
## DERIVING THE LM CURVE



An increase in output level leads an increase in the demand for transaction money, it implies a shift of the liquidity demand on the right hand side. So people want to hold money and the increase of the interest rate that leads to want to hold less money.

# DERIVING LM CURVE I



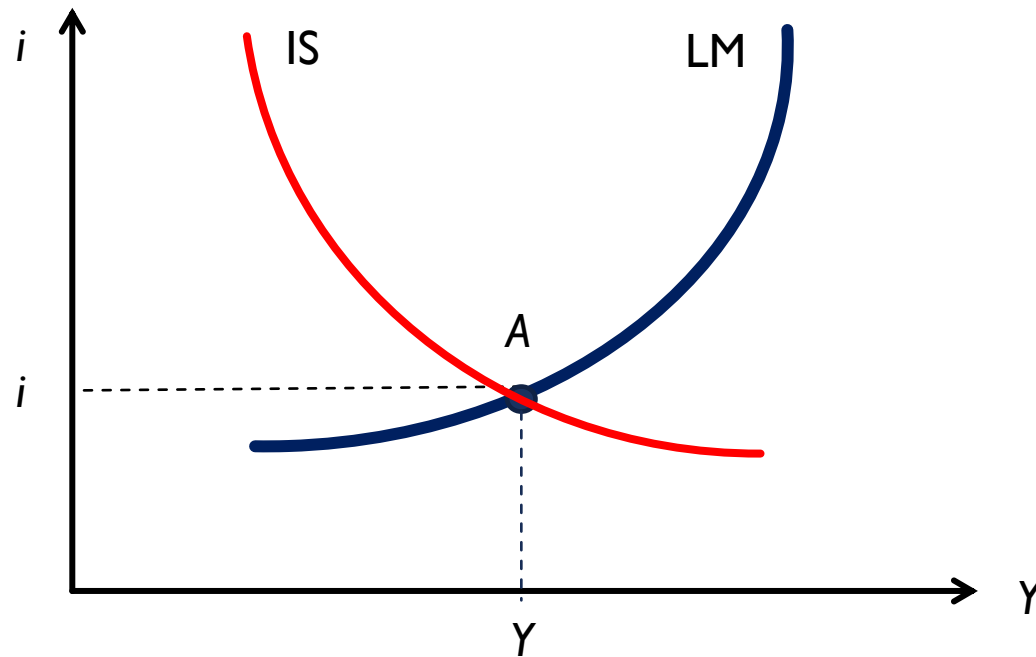


# IS-LM EQUILIBRIUM

- IS equilibrium: the supply of goods is equal to the demand for goods.
- LM equilibrium: the supply of real money is equal to the demand for money

$$IS: Y = C(Y - T) + I(Y, i) + G$$
$$LM: \frac{M}{P} = YL(i)$$

# IS-LM MODEL

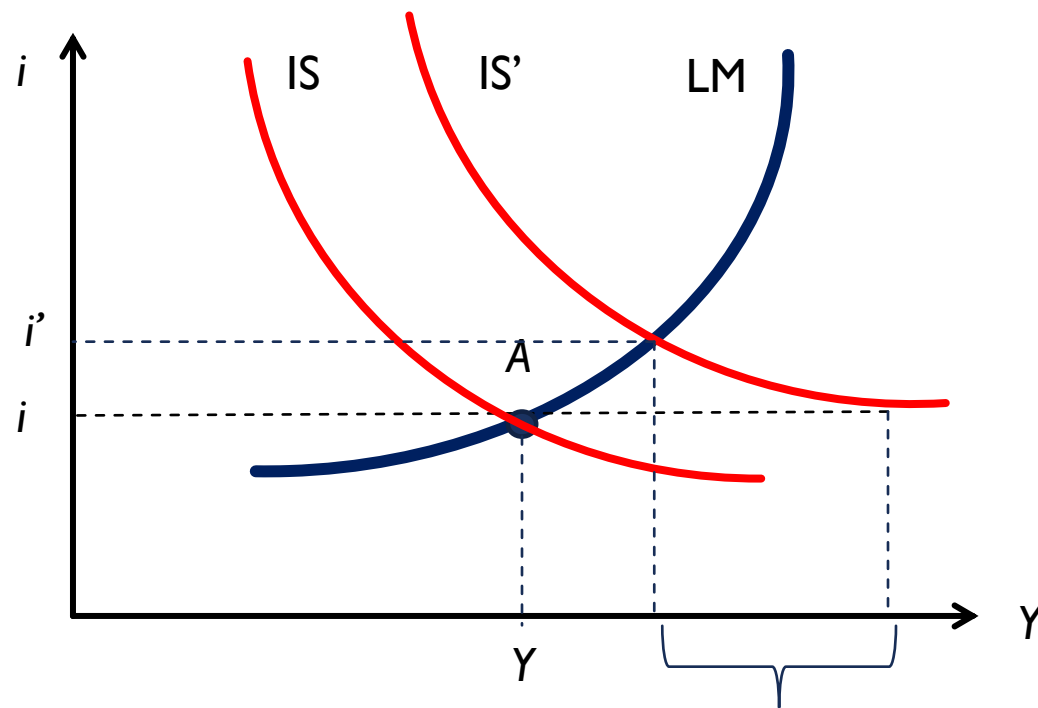


IS curve: any point on the downward-sloping curve corresponds to equilibrium in goods markets;  
LM curve: any point on the upward-sloping curve corresponds to equilibrium in financial markets;  
Point A.: this point corresponds to equilibrium conditions satisfied

# FISCAL POLICY AND INTEREST RATE

- Consider the Public Saving:  $G-T$  this is the budget equilibrium :
  - If  $(G-T)$  decreases: fiscal contraction or consolidation;
  - If  $(G-T)$  increases: fiscal expansion.
- Suppose the Government wants to increase the budget deficit: it reduces the taxes.
- What happens to the IS-LM equilibrium?
- How does the fiscal expansion affect the financial equilibrium?
- Describe the effects.

# THE FISCAL EXPANSION

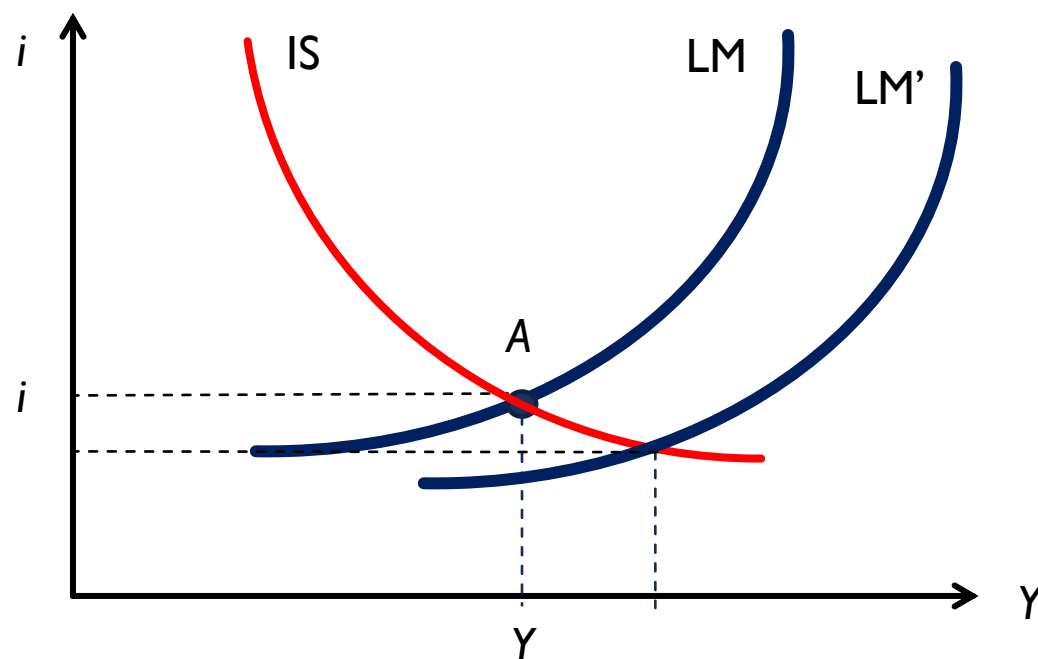


Crowding out  
of investments

- 1° the taxes 'reduction leads an increase in disposable income and, as consequence, an increase in consumption;
- 2° we assist to an increase both the aggregate demand and, for the IS assumption, general output.
- 3° Consequently the IS curve shifts to the right, from  $IS$  to  $IS'$ .
- 4° the fiscal expansion doesn't affect the LM equilibrium so the curve doesn't shift.
- 5° the economy moves along the LM curve, in fact the interest rates runs up to maintain the same level of the real supply of money



# EXPANSIONARY MONETARY POLICY



1<sup>st</sup> CB decides to implement the supply of money in the economy. What happens? (remind to expansionary open markets operations). Why do the interest rate decrease?

2<sup>nd</sup> The interest rate's decrease leads to an increase of the demand for transactions, an increase in investments and, in turn, an increase in demand and output.

3<sup>rd</sup> the economy moves along the IS curve;

# THE FISCAL POLICY MULTIPLIER

- Before deriving the fiscal policy multiplier, focus our attention on the IS equation
- $Y = C(Y-T) + I(Y,i) + G$
- The linear consumption equation is equal to :  $C = c_0 + c_1(Y - T)$   $c_0 > 0$  and  $c_1 < 1$ ;
- The linear investment demand is :  $I = \bar{I} + d_1Y - d_2i$   $d_1, d_2 > 0$
- The IS linear equation is  $Y = [c_0 + c_1(Y - T)] + [\bar{I} + d_1Y - d_2i] + G$ ; solving the equation by Y

$$Y = \frac{1}{1 - c_1 - d_1} A - \frac{d_2}{1 - c_1 - d_1} i$$
$$i = \frac{1}{d_2} A - \frac{1 - c_1 - d_1}{d_2} Y$$

# THE MONETARY POLICY MULTIPLIER

- Consider the LM curve equation:  $\frac{M}{P} = YL(i)$ ;
- The linear equation is:  $\frac{M}{P} = f_1 Y - f_2 i$   $f_1, f_2 > 0$
- The LM equilibrium equation

$$Y = \frac{1}{f_1} \frac{M}{P} + \frac{f_2}{f_1} i$$

# THE IS-LM EQUILIBRIUM IN FORMULA

$$\text{IS: } Y = \frac{1}{1-c_1-d_1} A - \frac{d_2}{1-c_1-d_1} i$$

$$\text{LM: } Y = \frac{1}{f_1} \frac{M}{P} + \frac{f_2}{f_1} i$$



$$Y = \frac{1}{(1-c_1-d_1) \frac{f_2}{d_2} + f_1} \frac{M}{P} + \frac{1}{(1-c_1-d_1) + \frac{f_1}{f_2} d_2} A$$

$$i = \frac{1}{f_2 + \frac{d_2 f_1}{1-c_1-d_1}} \frac{M}{P} + \frac{1}{(1-c_1-d_1) \frac{f_2}{f_1} + d_2} A$$

The equations show us that both variables Y and i are in function of exogenous variables: the money supply and the Autonomous spending. An increase of A leads an increase in Output and in interest rate. An increase of M/P leads an increase in Y but a decrease of interest rate

The  
Monetary  
Policy  
Multiplier

The Fiscal  
Policy  
Multiplier

# HOW DOES THE *IS-LM* MODEL FIT THE FACTS?

Introducing dynamics formally would be difficult, but we can describe the basic mechanisms in words.

- Consumers are likely to take some time to adjust their consumption following a change in disposable income.
- Firms are likely to take some time to adjust investment spending following a change in their sales.
- Firms are likely to take some time to adjust investment spending following a change in the interest rate.
- Firms are likely to take some time to adjust production following a change in their sales.

# HOW DOES THE *IS-LM* MODEL FIT THE FACTS?

## *The Empirical Effects of an Increase in the Federal Funds Rate*

In the short run, an increase in the federal funds rate leads to a decrease in output and to an increase in unemployment, but it has little effect on the price level.

