

# MACROECONOMICS





NEW

SZÉCHENYI PLAN

# MACROECONOMICS

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Course Material Developed by Department of Economics,

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# MACROECONOMICS

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# MACROECONOMICS

Week 10

## Money and monetary policy

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# So far we did not have money

- In the real world we have money and we do exchanges at nominal prices
- If prices adjusted instantaneously, then existence of nominal prices would not affect relative (real) prices. All conclusions we had so far would hold
- Even in a world like this we wanted to know how prices adjust

# Are nominal prices flexible?

- Bad question. Price rigidities exist. The question is, are they important enough to worth the while to include them into the macro model
- It is difficult, and sometimes it makes it worse
- The RBC school thinks it is not worth it
- Of course it depends on the problem we investigate

# Money

- Why do we use it, why do we hold it?
- Functions of money: means of transactions, unit of account, an asset to hold wealth in
- Commodity money, fiat money, debt
- Different measures of money supply: M0, M1, M2...



# Money

- Why does demand for money exist?
- It reduces transaction costs
- Without money searching cost would be prohibitively high
- Reduces costs of acquiring information
- Reduces costs due to risk and uncertainty
- Giving out something as a loan is risky, money is accepted by everyone

# How to build money into the model

- Intuitively it is clear why we use money. However, its role is very complicated, it is very difficult to introduce it into a logical model construct
- Take production technology. It is easy to think about how one unit of more labor produces more output. But how much uncertainty is reduced by an extra unit of money held?
- We have to resort to shortcuts

# Main solutions in the literature

- MIU, money in the utility,
- We know it is useful, but we do not give the details why, just simply introduce it into the utility function
- Many ways to do that. For example, trading consumes time, money reduces the time required to conduct trading actions, allows for more leissure

# Main solutions in the literature

- Cash in advance, finance constraint
- We know, people use money for conducting their transactions. We do not discuss the details why, we just set an extra constraint. To conduct any exchange actions, we have to have the money necessary to do it. What it means is, that we prohibit barter trade

# The Fisher equation

- So far in our models loans were granted in real goods. Now they are given in money for the nominal interest rate,  $R$ .
- Real value of a 1 ft. Loan is  $1/P$ . It pays  $1 + R$  forint at maturity, its real value is  $(1+R)/P'$ . Therefore real return is:

$$\frac{\frac{(1 + R)}{P'}}{\frac{1}{P}} = \frac{(1 + R)}{\frac{P'}{P}} = \frac{(1 + R)}{(1 + i)} = 1 + r$$

# The Fisher equation

- rearranging:

$$(1 + R) = (1 + r) (1 + i) = 1 + r + i + ri$$

If  $r$  and  $i$  are small, it can be approached as:

$$R = r + i$$

$r$  cannot be observed directly, this is the way as we can calculate it out of  $R$  and  $i$ . For the calculation it is the future, not the current rate of inflation that counts.

# Demand for money

- $M^d = PL(Y, R), :$
- $M^d = PL(Y, r + i)$ , where  $i = P_{t+1}/P_t - 1$
- If people do not expect inflation in the future then  $i = 0$  and
- $M^d = PL(Y, r)$
- Nominal and real demand for money
- $L$  is the real demand, if it exists, then there is no money illusion

# Supply of money

- It is created by the central bank, or – at least – it has a strong ability to manipulate its quantity
- M0, M1, M2 etc.
- Monetary policy
- Internal money and external money
- Money market equilibrium. The amount of existing money is willingly held by economic actors.  $M^s = M^d$



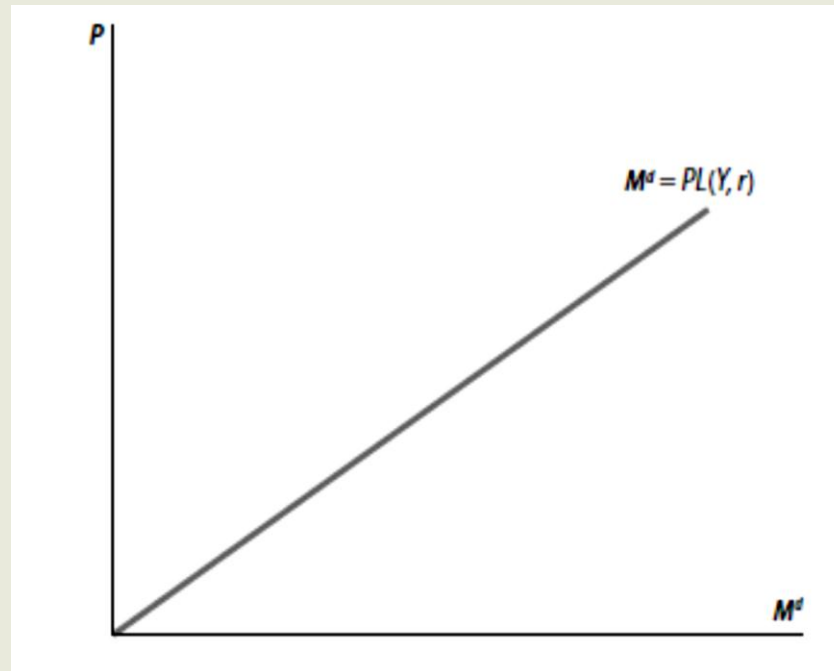
# Government (consolidated)

- The existence of money and its issuance by the government changes the government's budget constraint
- Until now it could finance expenditures via collecting taxes or borrowing in kind, now it can also finance it by printing money

$$G_t = T_t + \frac{B_t^s}{P_t} - \frac{(1 + R_{t-1})B_{t-1}^s}{P_t} + \frac{M_t^s}{P_t} - \frac{M_{t-1}^s}{P_t}$$

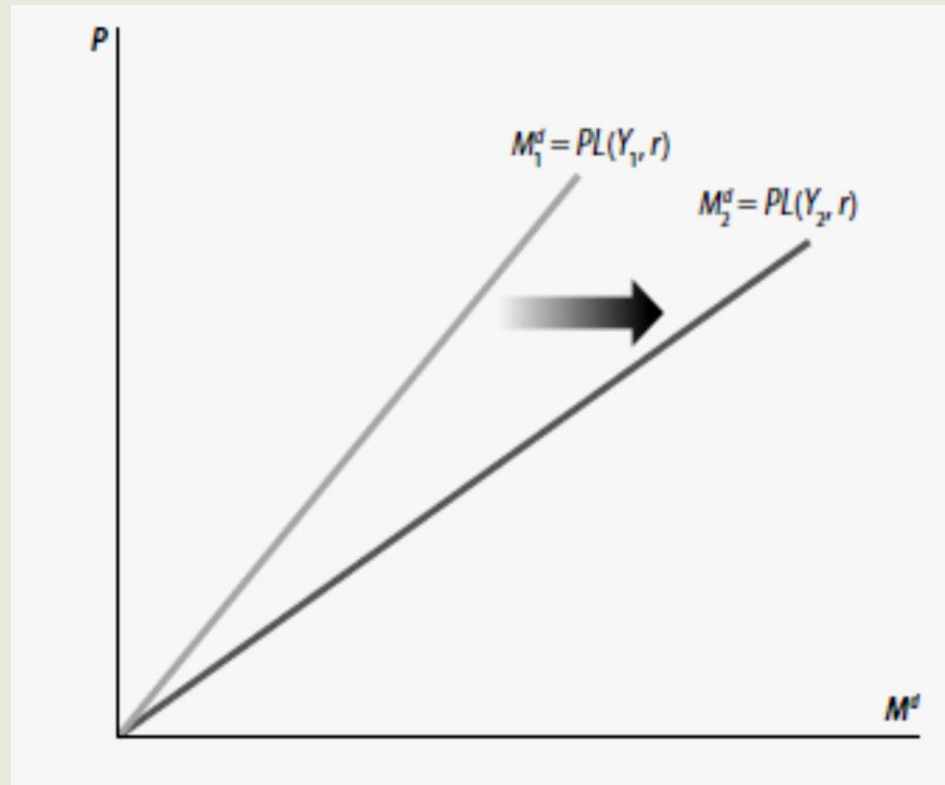
# Money market

- Given  $Y$  and  $r$ ,  $L(Y, r)$  is determined. Nominal money demand is a linear function of the price level.



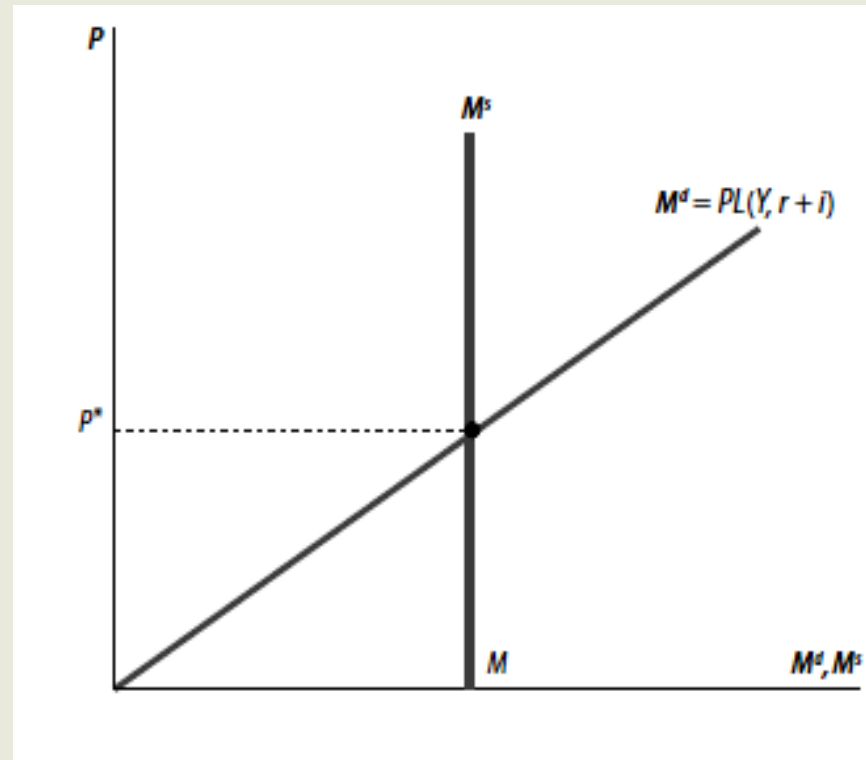
# Money market

- An increase in real income or a decrease in the rate of interest rotates the money demand curve rightward

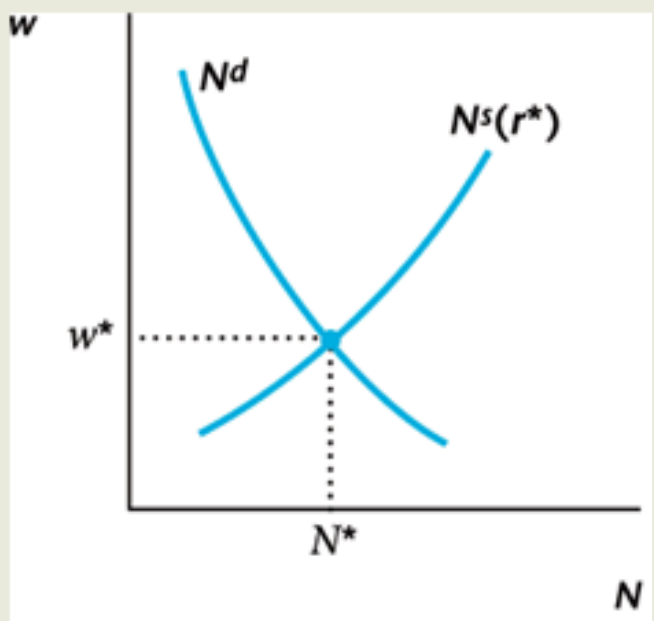


# Equilibrium in the money market

- If  $Y$  and  $r$  are given, the money market determines the price level only

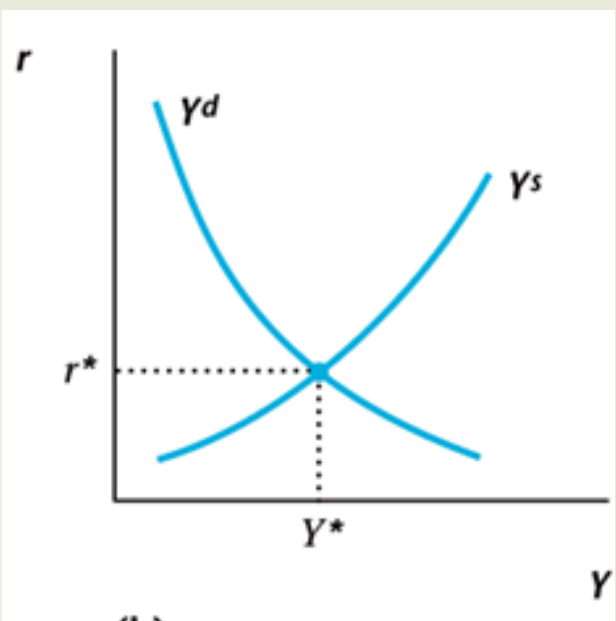


# The full model



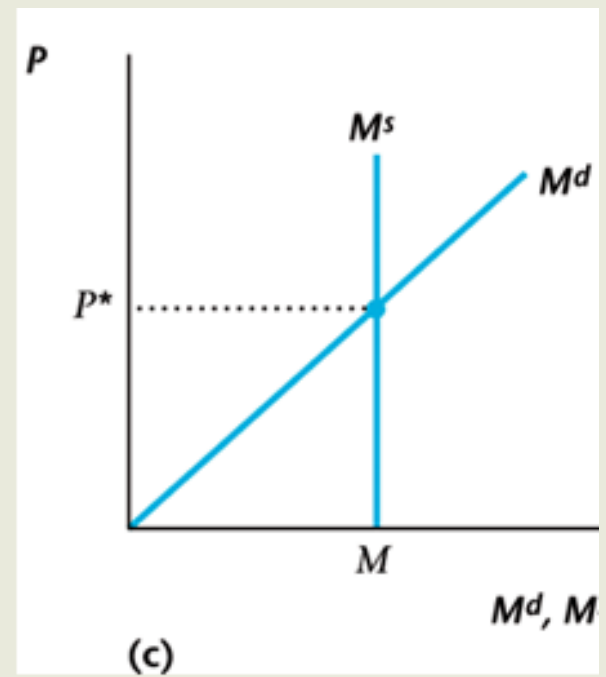
(a)

market for current labor



(b)

market for current output



(c)

money market

# Classical dichotomy

- Real markets determine values of real variables in the economy. Money market events, money supply , nominal variables etc. do not have any effect on the real variables
- nominal adjustments and real variables are fully separable from each other

# One time increase in the money supply

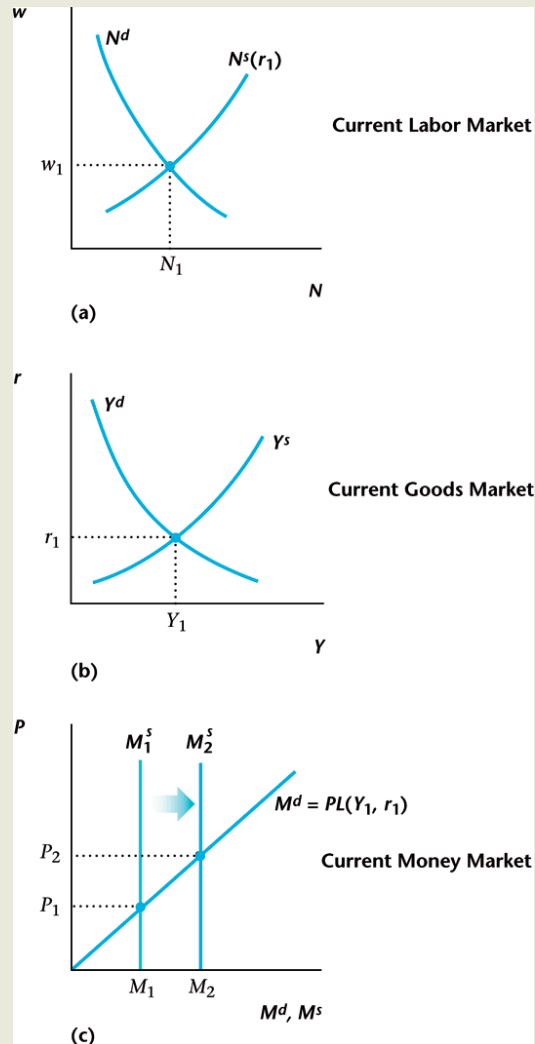
- What is the difference between a one time increase and the continuous increase (growth)?
- If  $M$  increases continuously, then people expect continuous increase in the price level (inflation). Inflation raises  $R$  and decreases the real demand for money. One time increase does not have effects in future periods, there is no reason to expect inflation in the future

# Methods for increasing $M$

- $M$  increases,  $G$  increases. Seigniorage
- $M$  increases  $B$  decreases. The government switches between interest bearing and non-interest bearing debt
- $M$  increases,  $T$  decreases. One time transfer. We consider this case, because it is simpler



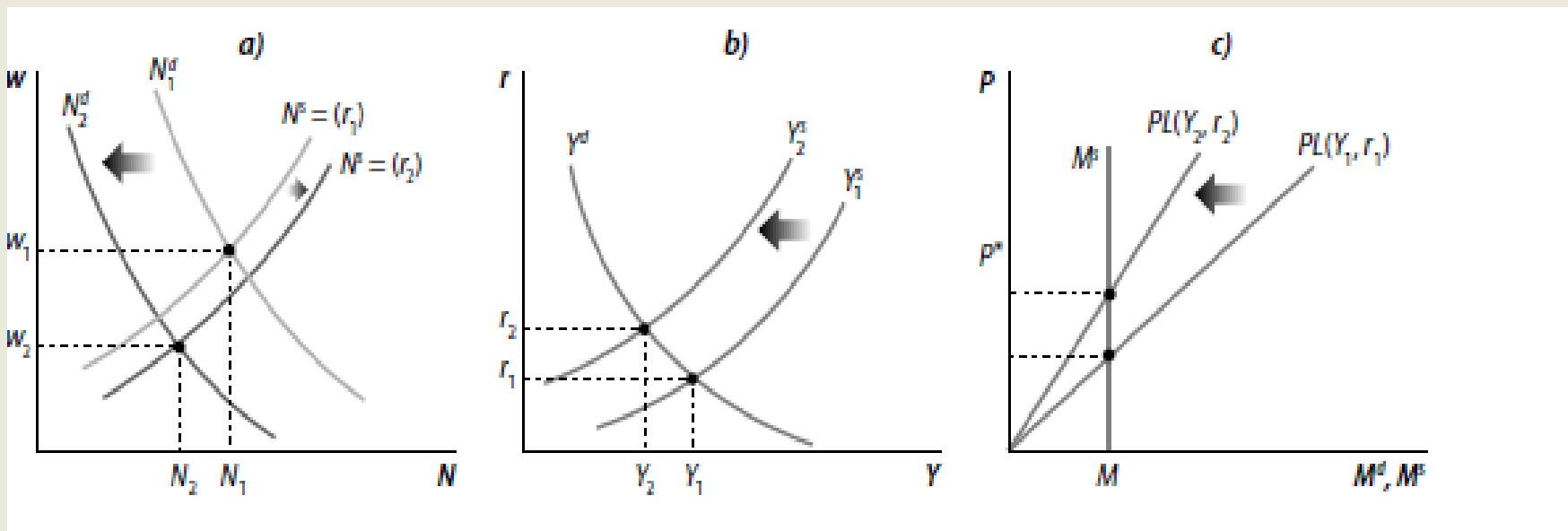
# One time increase in $M$



The classical dichotomy holds, a one time increase in  $M$  does not cause any change in  $Y$  or  $r$ , it changes the price level only

# Effect of a short run decrease in TFP

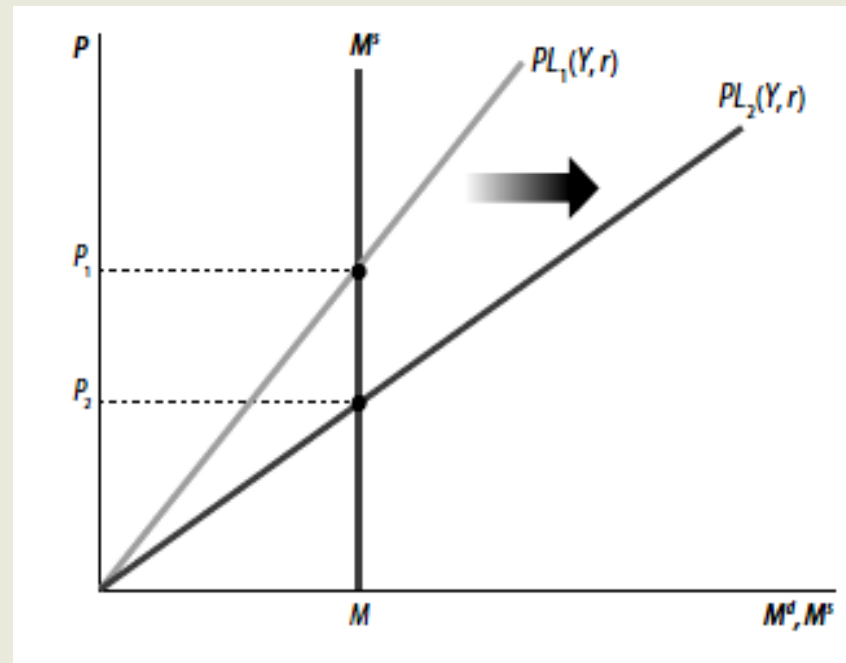
- Recession caused by an oil price shock



Real variables behave as they do in the real model. The price level increases, as it did during the oil price shock

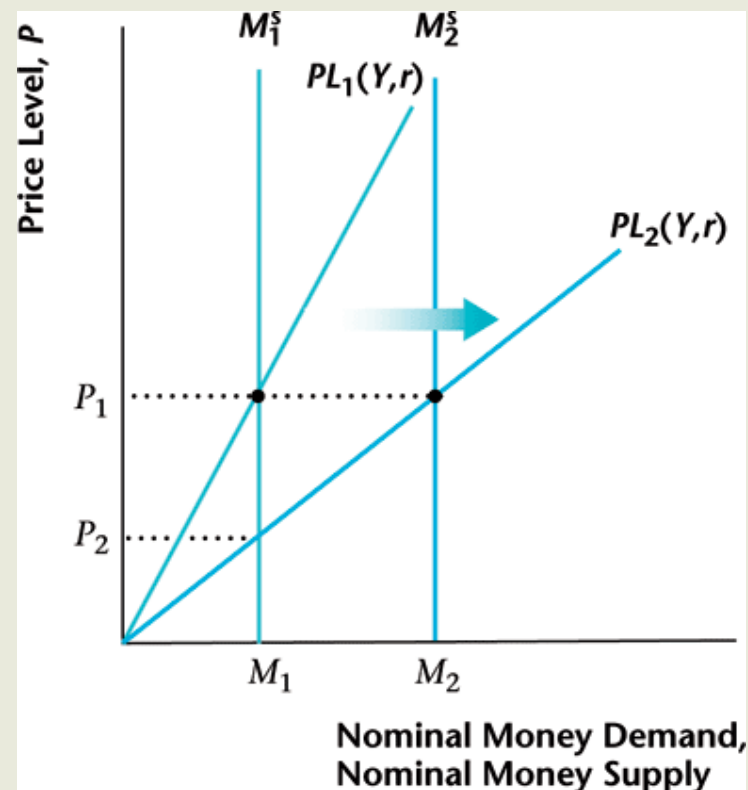
# An exogenous change for the demand for money

- A change in the money demand as a result of a change in the L function



# Monetary policy to stabilize the price level

An increase in the demand for money – with money supply not changing – would result in decreasing price level. Expansive monetary policy can be used to stabilize the price level.



# Monetary policy to stabilize the price level

- An expected increase in the future income increases income now. Demand for money increases and  $P$  is depressed. Expansive monetary policy can act against that.

