

Money and Inflation

He realised well that the abundance of money makes everything dear, but he did not analyse how that takes place. The great difficulty of this analysis consists in discovering by what path and in what proportion the increase of money raises the price of things.

RICHARD CANTILLON (died 1734),
Essai sur la nature du commerce en général, II, 6.



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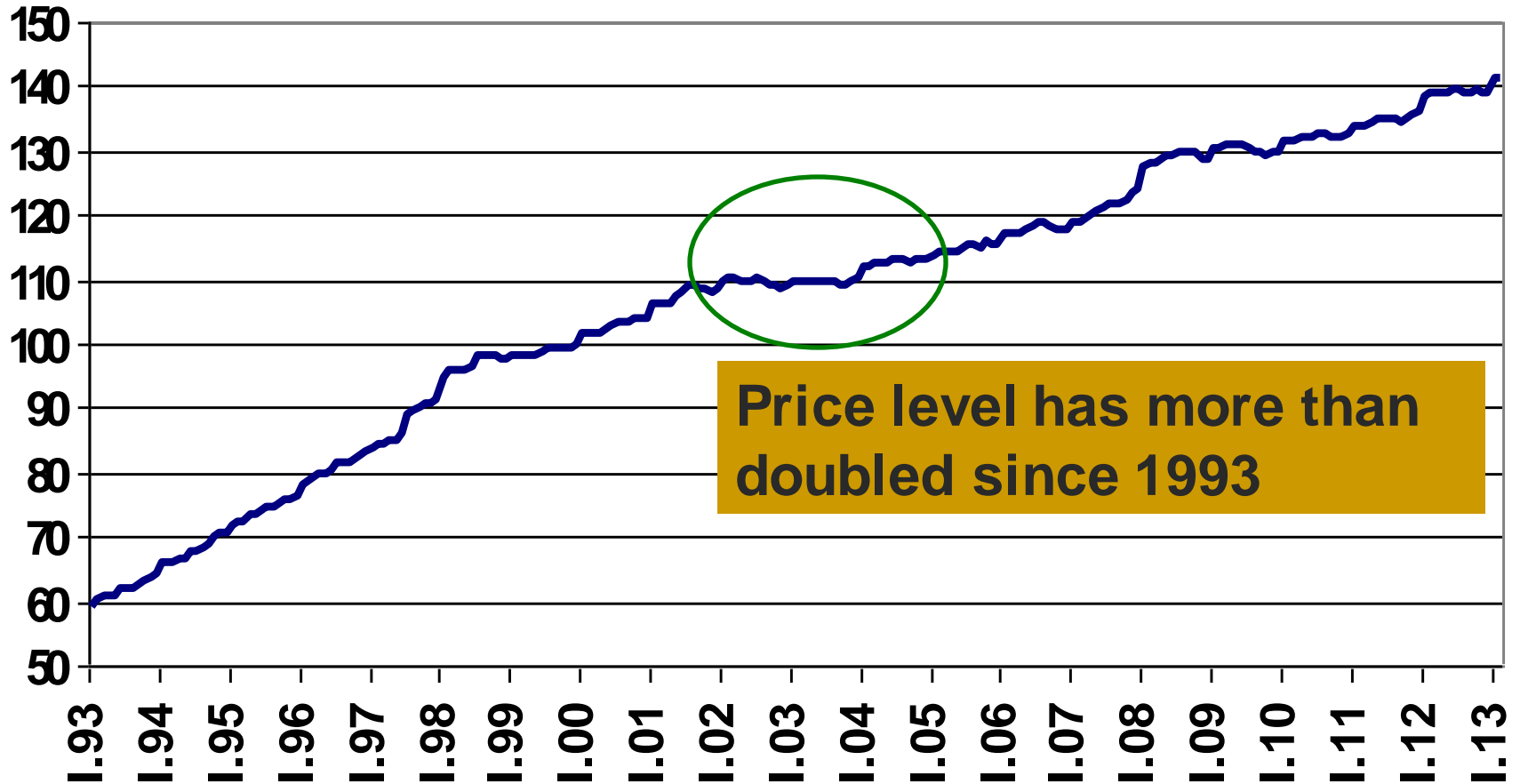
Money and Inflation

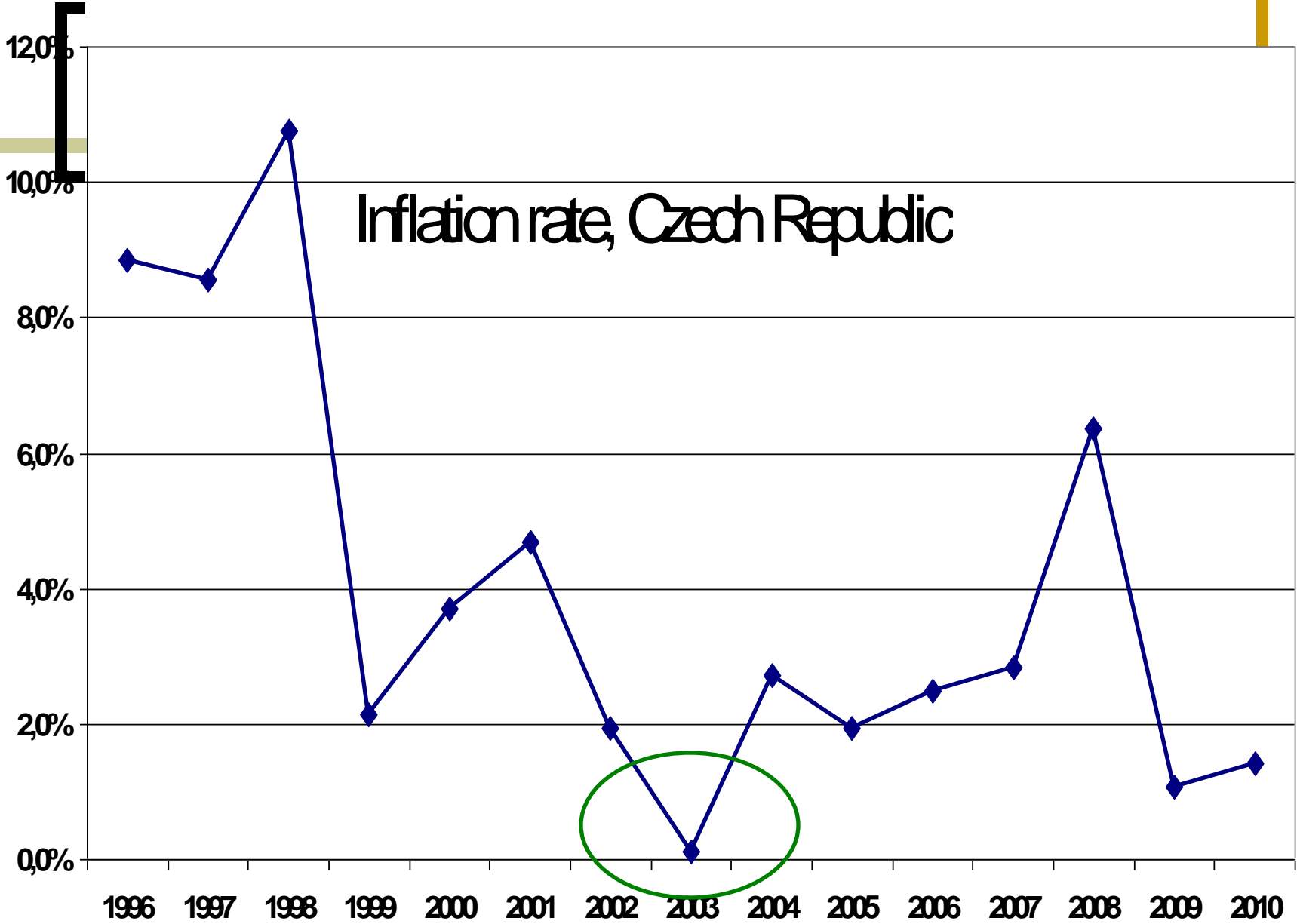
- **Price** = amount of money needed to buy a good.
- **Inflation rate** = $\Delta P/P$ = the percentage change in the average level of prices (e.g. $\pi = 5\%$ p.a.).
- **Deflation** = decrease in the average level of prices. (e.g. $\pi = -1\%$ p.a.), negative inflation.
- **Disinflation** = decrease in the inflation rate (e.g. $\pi_1 = 5\% \rightarrow \pi_2 = 3\%$)
- **Price level stability**: $\pi = 0\%$ p.a.

- Since prices are quoted in terms of money, the supply of money, the demand for money, and its impact on the economy will be explained.

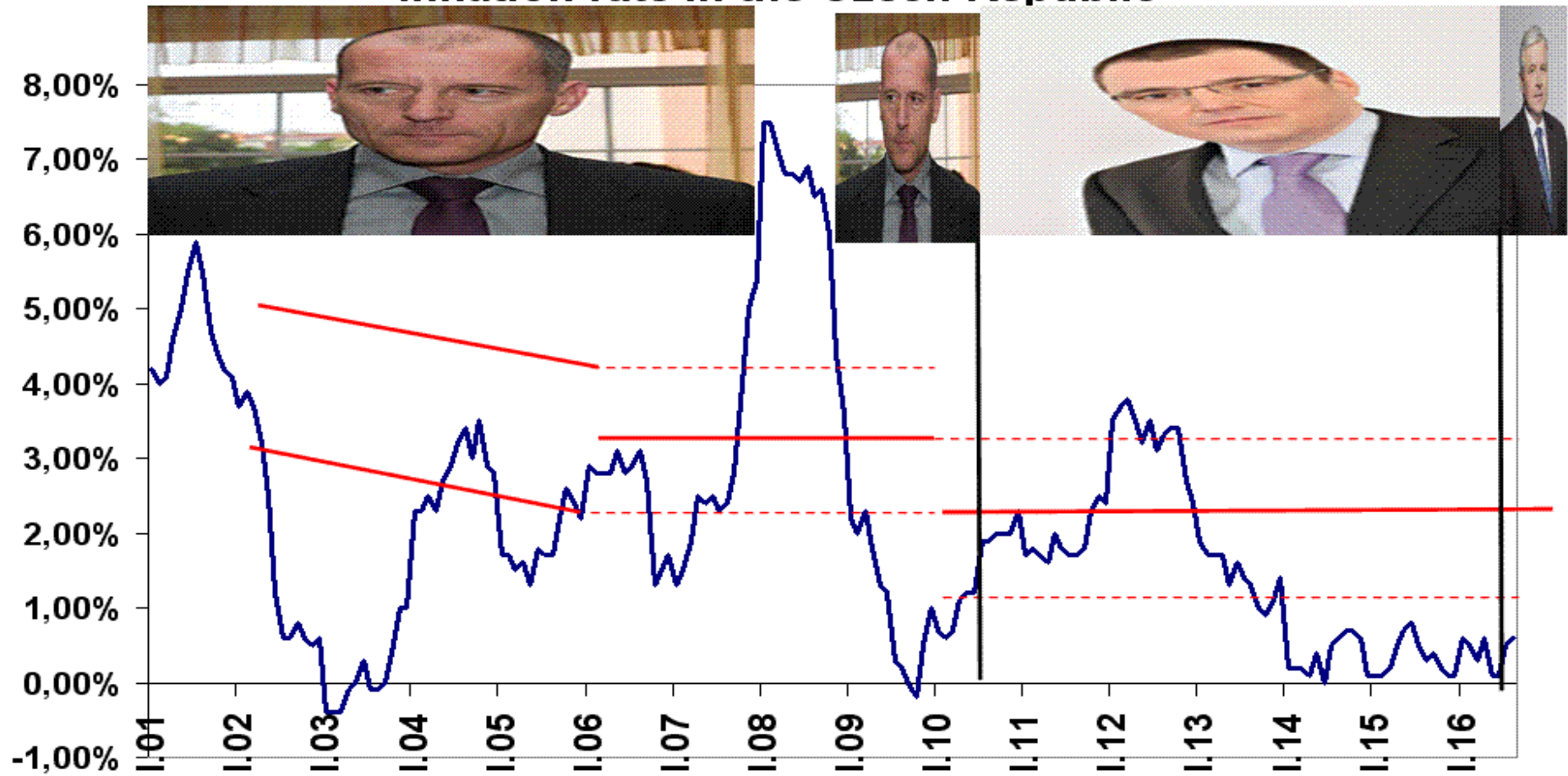
CPI in the Czech Republic (data)

source: www.cnb.cz

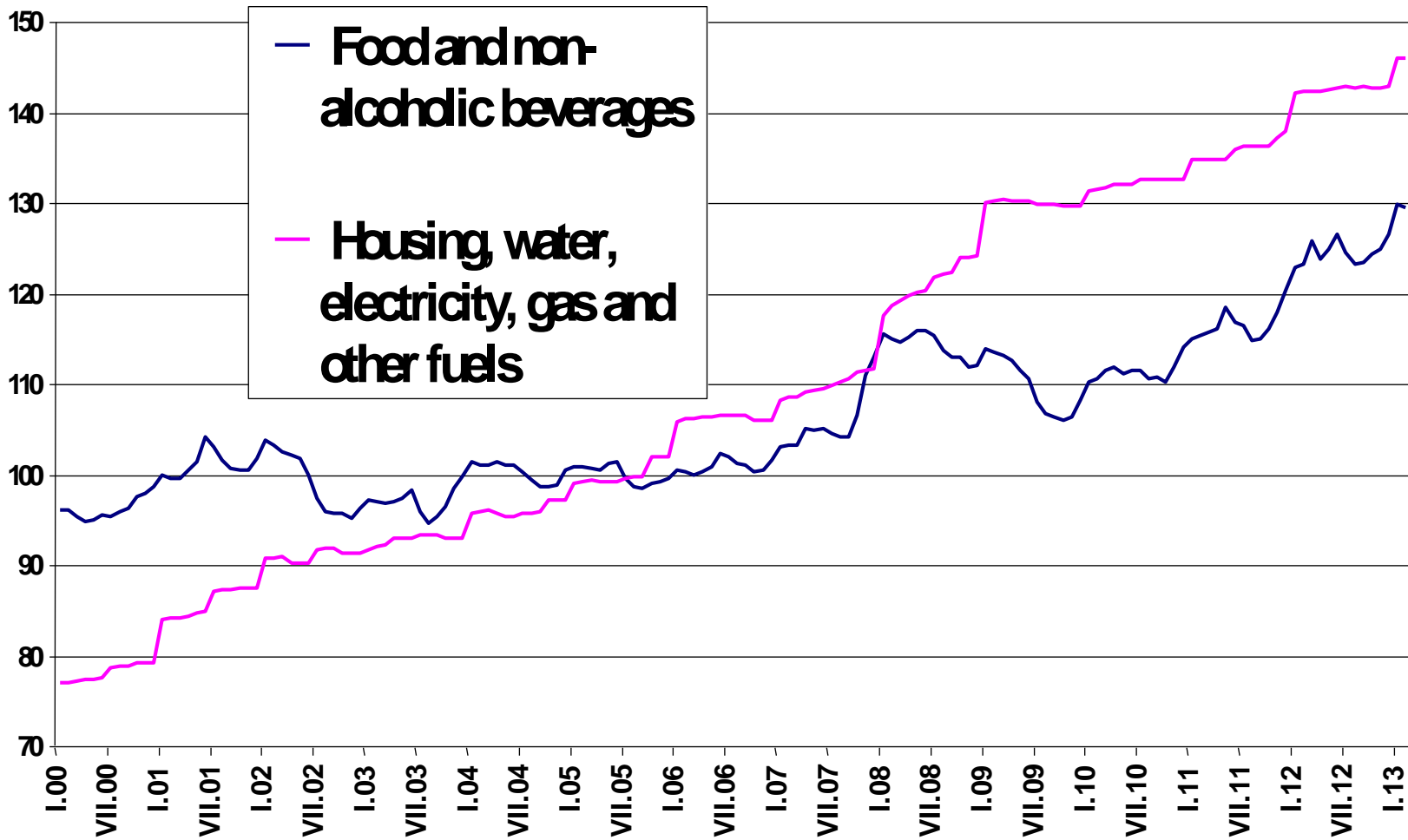




Inflation rate in the Czech Republic



Food and rents in the CR



The Quantity Theory of Money

- How does the quantity of money affect the economy?
- **QTM** - the quantity of money in the economy is linked to transactions.
- Suppose that the supply of money in the economy is \$10. In the first half of the year, 5 bottles of beer are sold each for \$2. The owners of money then buy 1 lb. of ham for \$10.
- The total value of transactions over the year:
 - $\$2 \times 5 + \$10 \times 1 = \$20$
 - $M \times V$ (Velocity of circulation) = total of M was transacted twice/year.

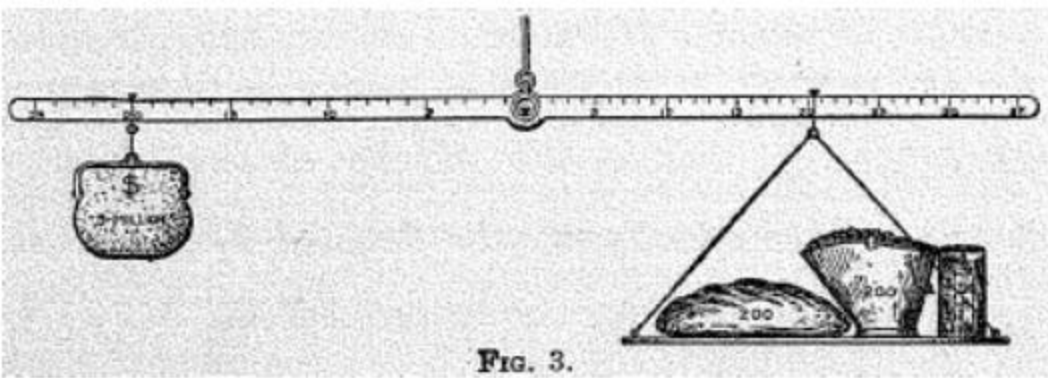
Stock

Velocity of circulation

➤ $\$10 \times V = \$2 \times 5 + \$10 \times 1$

➤ $M \times V = \sum p_i q_i$

Flow



of Money

Fisher (1911): The Purchasing Power of Money:

Let us begin with the money side. If the number of dollars in a country is 5,000,000, and their velocity of circulation is twenty times per year, then the total amount of money changing hands (for goods) per year is 5,000,000 times twenty, or \$100,000,000. This is the money side of the equation of exchange...

200,000,000 loaves of bread at \$.10 a loaf,
10,000,000 tons of coal at 5.00 a ton, and
30,000,000 yards of cloth at 1.00 a yard.

The value of these transactions is evidently \$100,000,000, i.e. \$20,000,000 worth of bread plus \$50,000,000 worth of coal plus \$30,000,000 worth of cloth. The equation of exchange therefore (remember that the money side consisted of \$5,000,000 exchanged 20 times) is as follows:—

$\$5,000,000 \times 20$ times a year
= 200,000,000 loaves \times \$.10 a loaf
+10,000,000 tons \times 5.00 a ton
+30,000,000 yards \times 1.00 a yard.

The Quantity Theory of Money

- If we aggregate over the entire economy (and over all transactions), we may write:

$$M \times V_T = P \times T \quad \text{IDENTITY}$$

- T ... the total number of transactions during a period of time
- P ... average price of the transaction
- PT ... number of currency units exchanged in the given period of time
- M ... quantity of money
- V_T ... **transactions velocity of money**

The rate at which money flows in the economy

The Quantity Theory of Money

- Number of transactions T is difficult to find so it is substituted by the total output in the economy Y .
- Assume that Y is proportional to T : $T = aY$
- $M \times V_T = P \times T$
- $M \times V_T = P \times aY$
- $M \times V_T/a = P \times Y$
- $M \times V_Y = P \times Y$
- V_Y ...Income velocity of money

The Quantity Theory of Money

- V is a ratio of nominal GDP (PY) to the quantity of money (M): $V = PY/M$
- Assume that V is constant and exogenous $V = \bar{V}$

$$M \times V = P \times Y$$

- If V is constant, a change in the quantity of money (M) must lead to a one-to-one change in nominal GDP (PY).

The Quantity Theory of Money

- Recall that in the classical model:

$$Y^* = F(K_{\text{fixed}}, L_{\text{fixed}})$$

- $M \times V = P \times Y$

Fixed

$$\uparrow M \Rightarrow \uparrow P$$

Classical Dichotomy

The quantity theory implies that the price level is proportional to the money supply.

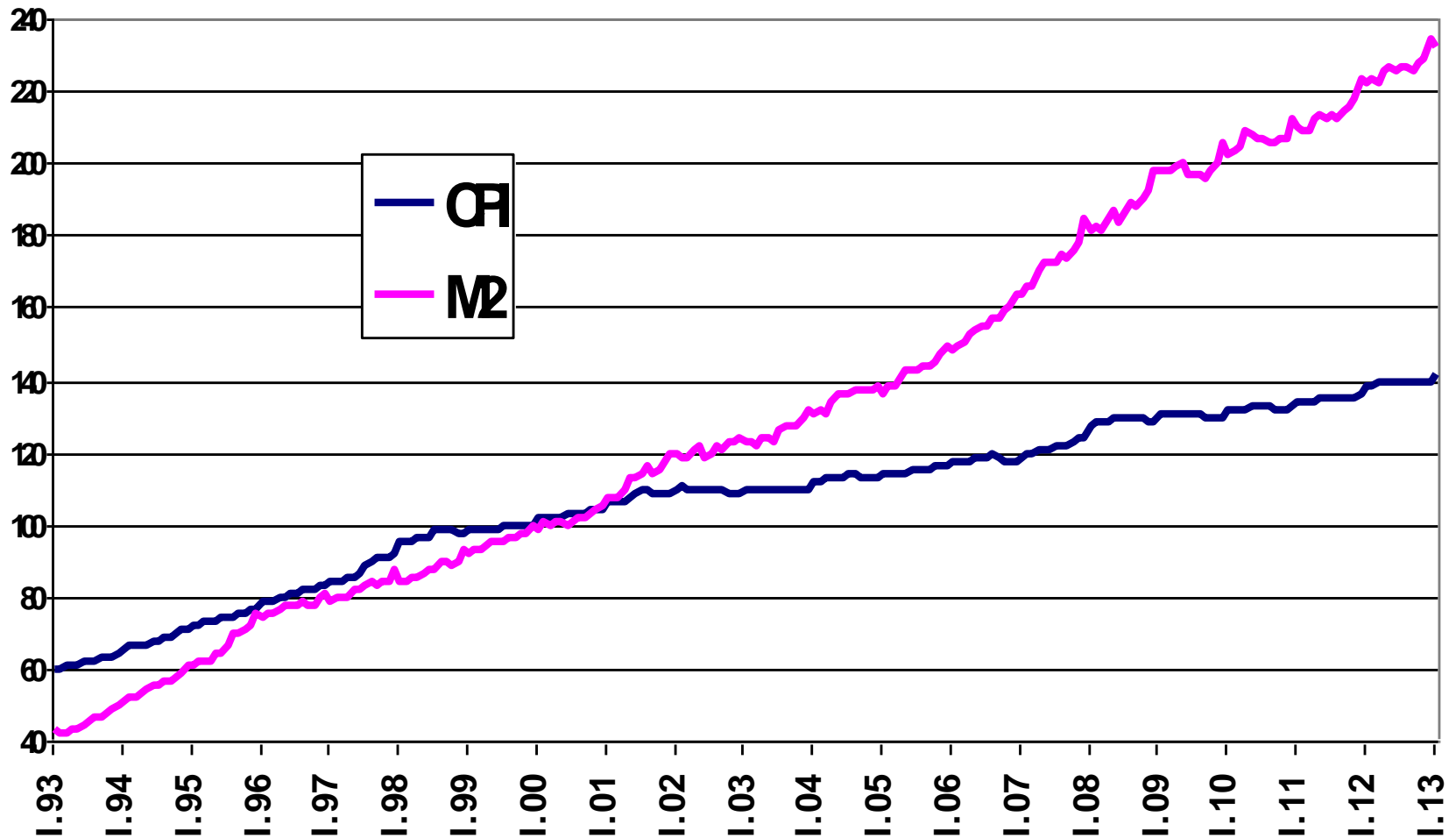
MONEY IS NEUTRAL

- Does not affect Y
- Does not affect relative prices

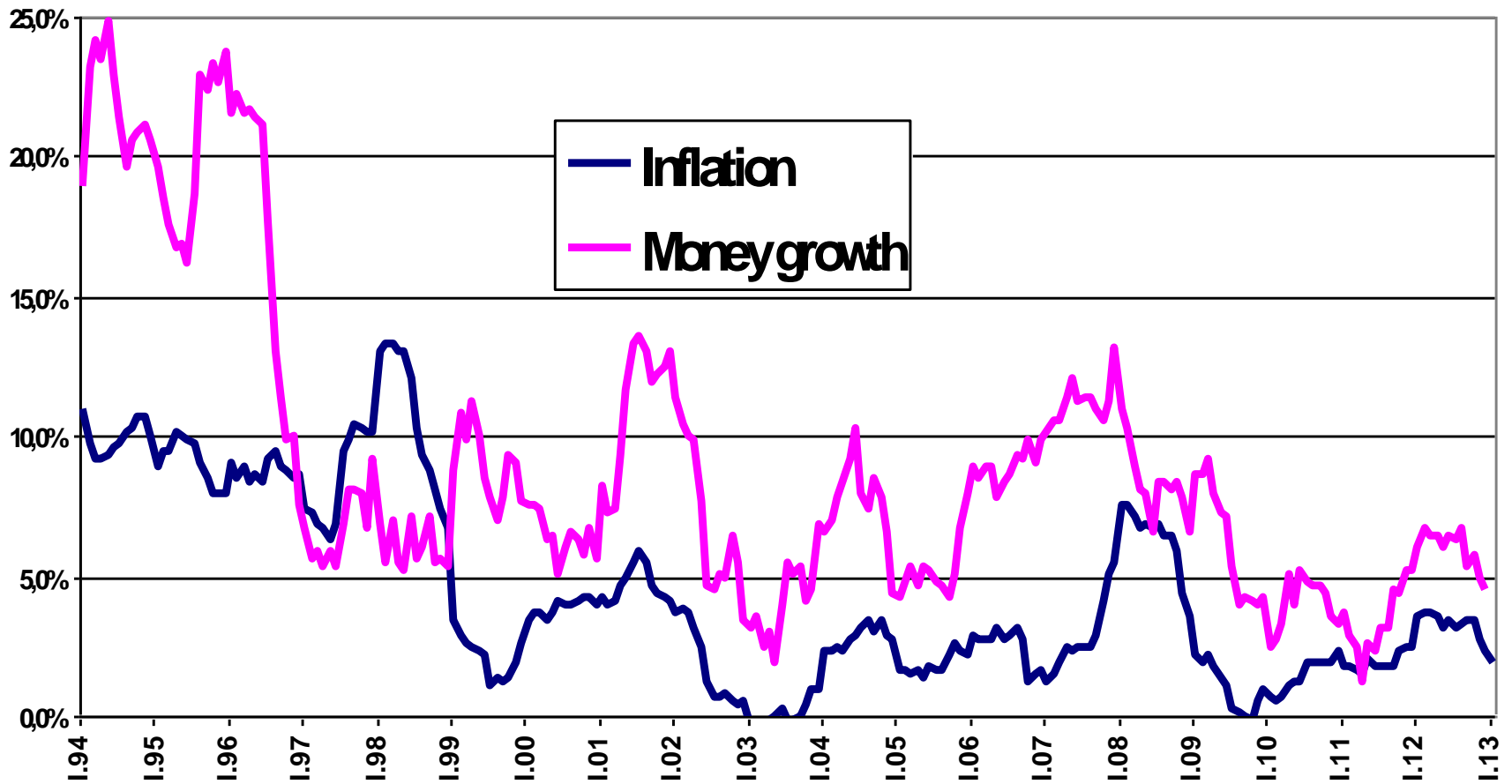
The Quantity Theory of Money

- $M \times V = P \times Y$
- $\% \Delta M + \% \Delta V = \% \Delta P + \% \Delta Y$
- $\% \Delta V = 0$ *by assumption*
- $\% \Delta Y$ *depends on the growth of K, L and A . All constant by assumption $\Rightarrow \% \Delta Y = 0$*
- *Hence, the growth in the money supply ($\% \Delta M$) determines the rate of inflation ($\% \Delta P = \pi$).*

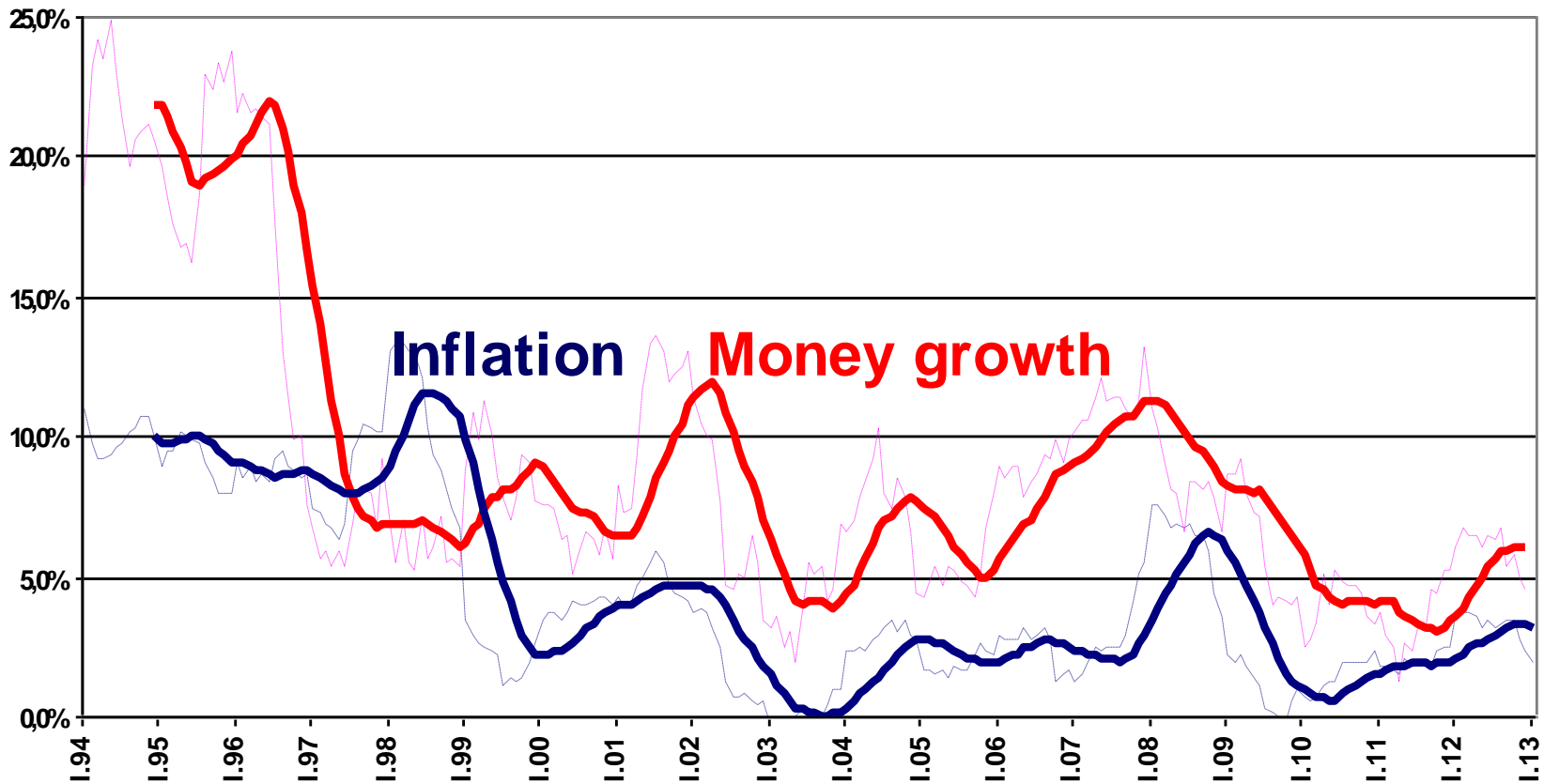
Money and prices in the CR



Money and prices in the CR



Money and prices (MA-12)



The Demand for Money

- The relationship between M_s and P has been rather technical so far.
- We need a more subtle explanation.
- The key question is: Why do people hold money?
 - Acquisition of income and its spending are not synchronized.
 - Holding money makes it easier to make transactions.
 - Hence, people demand money and we will model their money demand function.

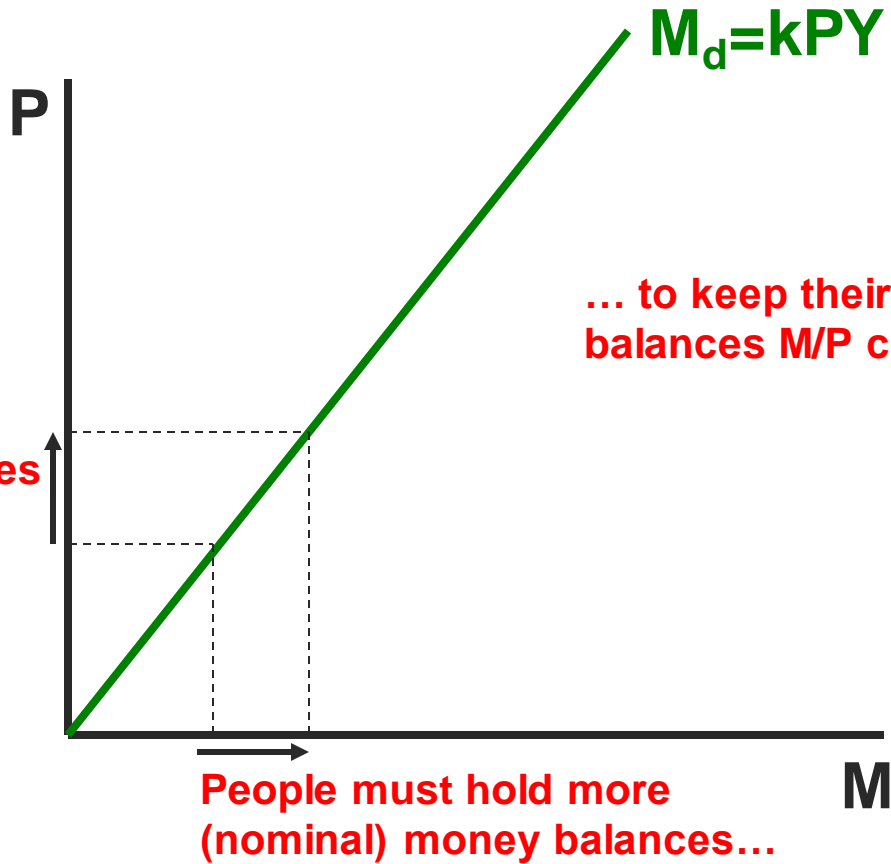
The Demand for Money

- The money demand function should be similar to the demand for a particular good.
- The “good” here is the ability to make transactions.
- Greater income results in a higher demand for goods, so greater income should lead to a higher demand for money.

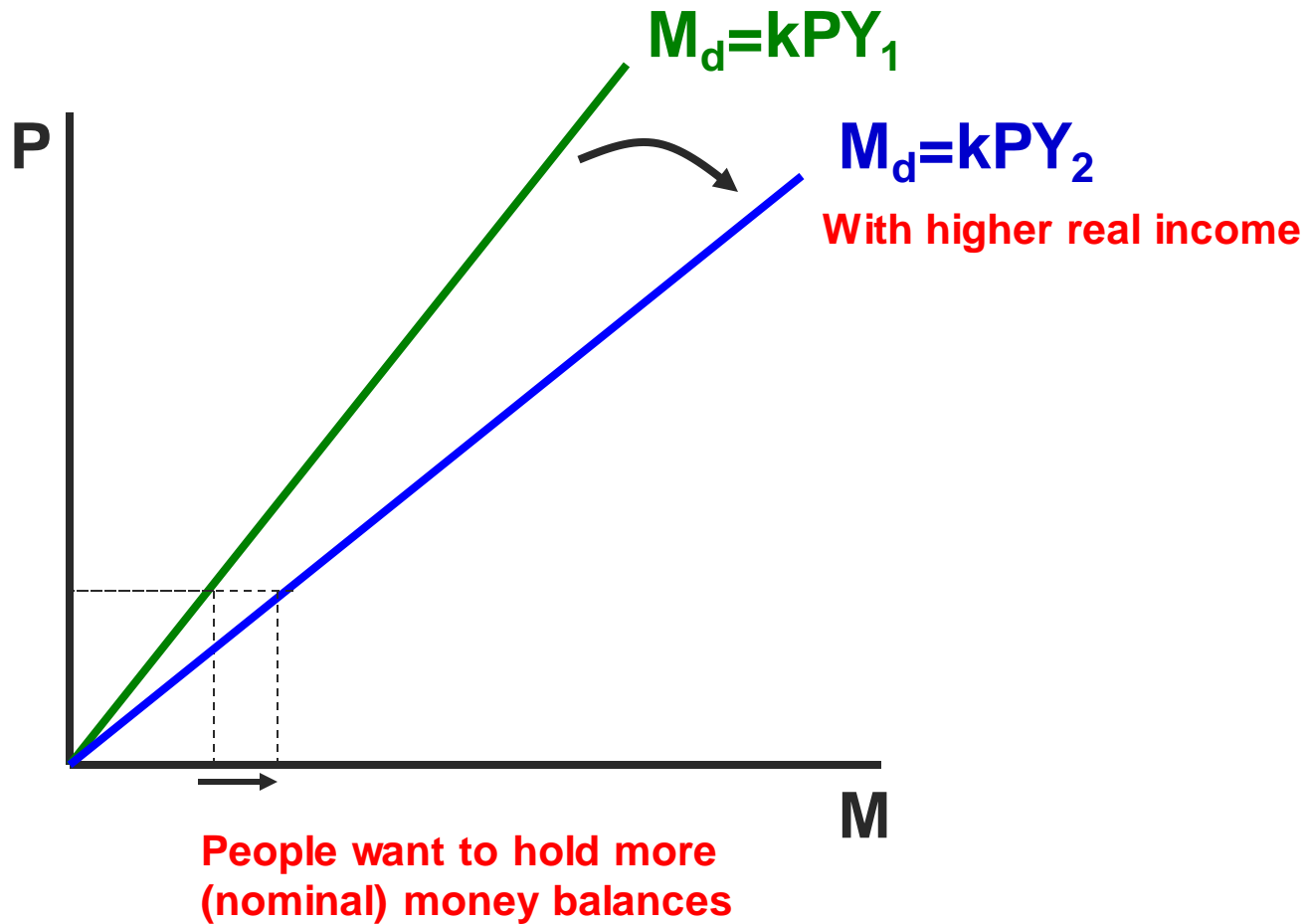
$$M_d = kPY$$

k ... fraction of income people want to hold in the form of money.

The Demand for Money

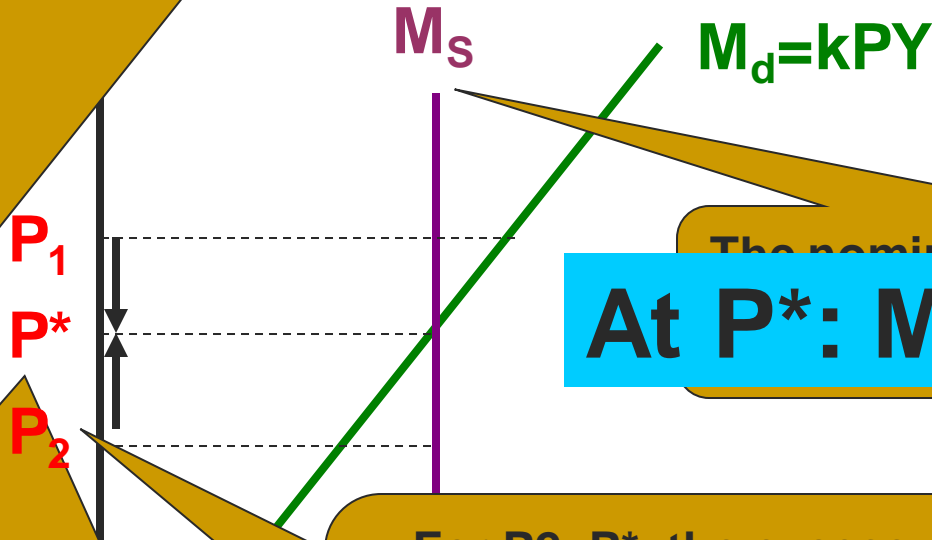


The Demand for Money



Price level

For $P_1 > P^*$, the excess of money demand over money supply will push the price level down as people reduce their purchases of goods in the effort to get more money balances.



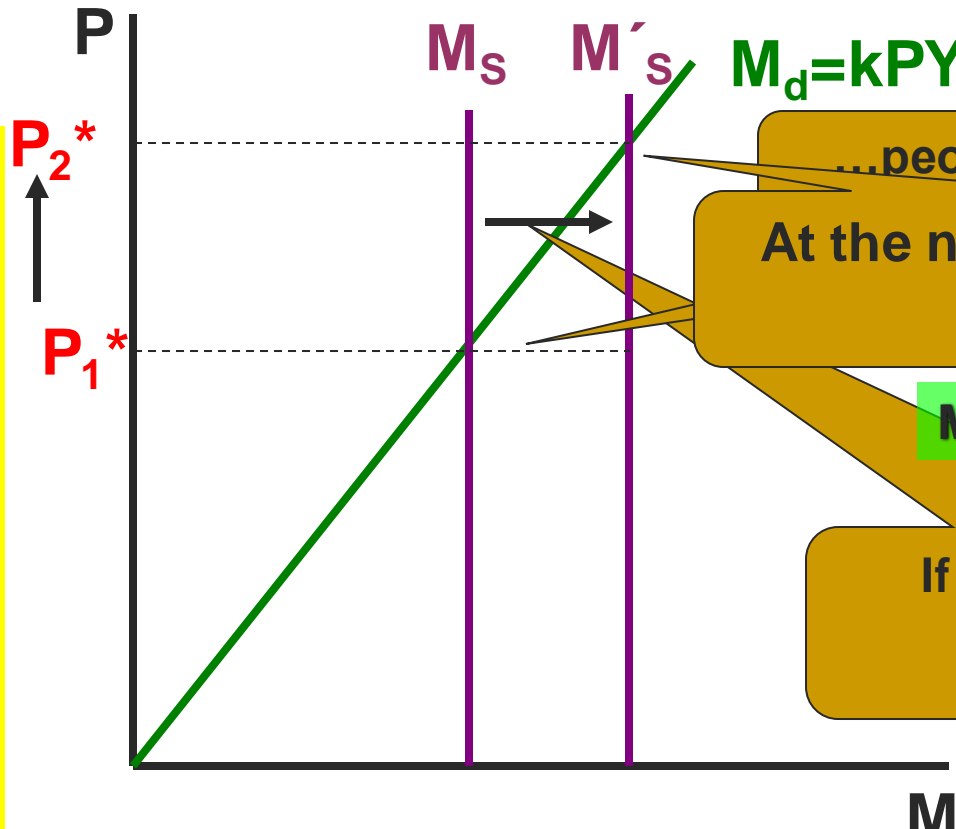
The nominal money supply is given
At $P^* : M_s = M_d$ (banking)

There is only one price level at which the given amount of money supply M_s is voluntarily held by the public, where $M_s = M_d$.

For $P_2 < P^*$, the excess of money supply over money demand will increase the price level as people raise their purchases of goods in the effort to spend the excess of money balances.

The equilibrium Price level

... At a higher price level P_2^* , people will be satisfied with their higher nominal money balances and the process of spending and increasing the price level halts.



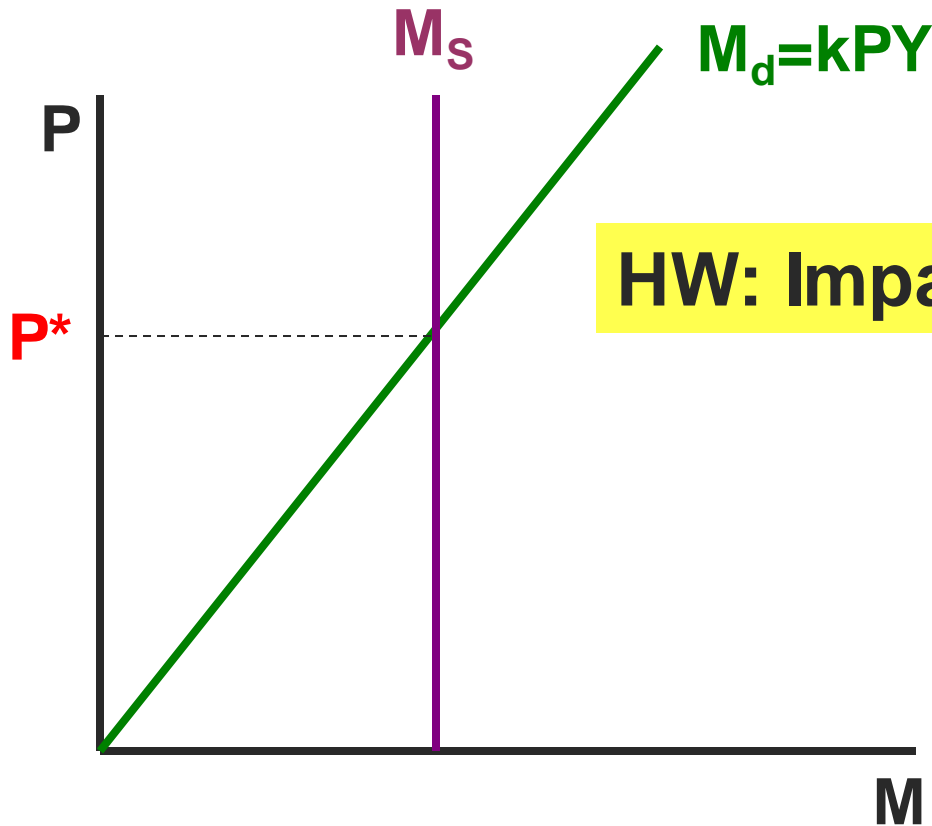
... people hold more money than
At the new equilibrium level P_2^* , $M_s = M_d$ again.

Money is neutral: $\uparrow M \rightarrow \uparrow P$

If the central bank raises the nominal money supply...

...they will spend the excess of money on goods and services. If $Y = Y^*$, P must go up.

The equilibrium Price level



HW: Impact of $\uparrow Y$ on P^*



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