

Lecture 4

Money and Banking, Econ 345

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Summary from previous lecture

- In competitive equilibrium individuals make individually optimal trades and markets clear
- In OLG model without money equilibrium is an autarky (no trades)
- In OLG with money equilibrium money facilitates desired trades
- Monetary equilibrium achieves optimal allocation if money supply is constant

Individual budget constraint

- Young in t acquire m_t dollars of money by giving up m_t/p_t units of their endowment
- Young face budget constraint for c_1 :

$$c_1 + m_t/p_t \leq y$$

- When they become old they face constraint for c_2 :

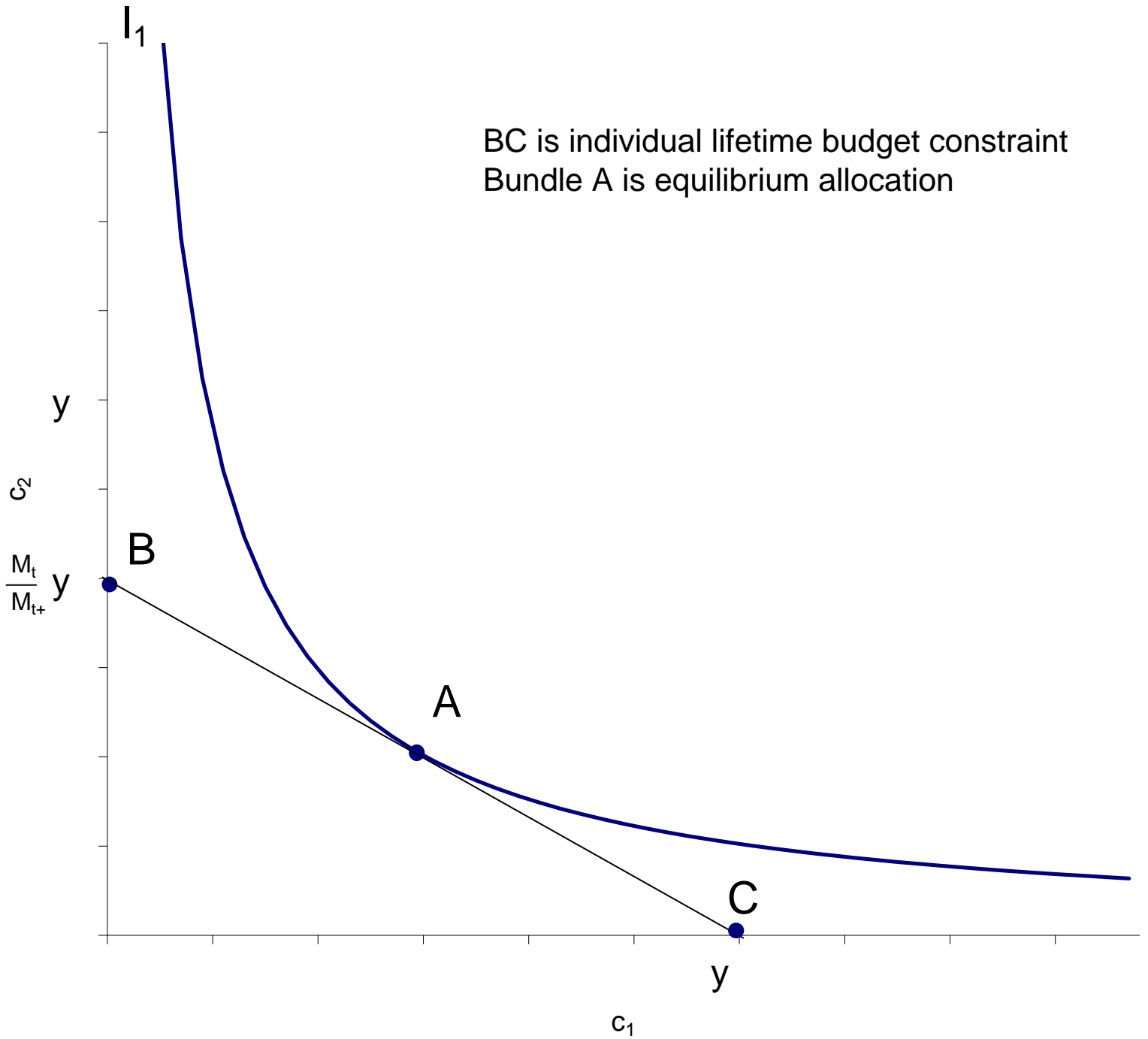
$$c_2 \leq m_t/p_{t+1}$$

- Combining two constraints above yields *lifetime budget constraint*:

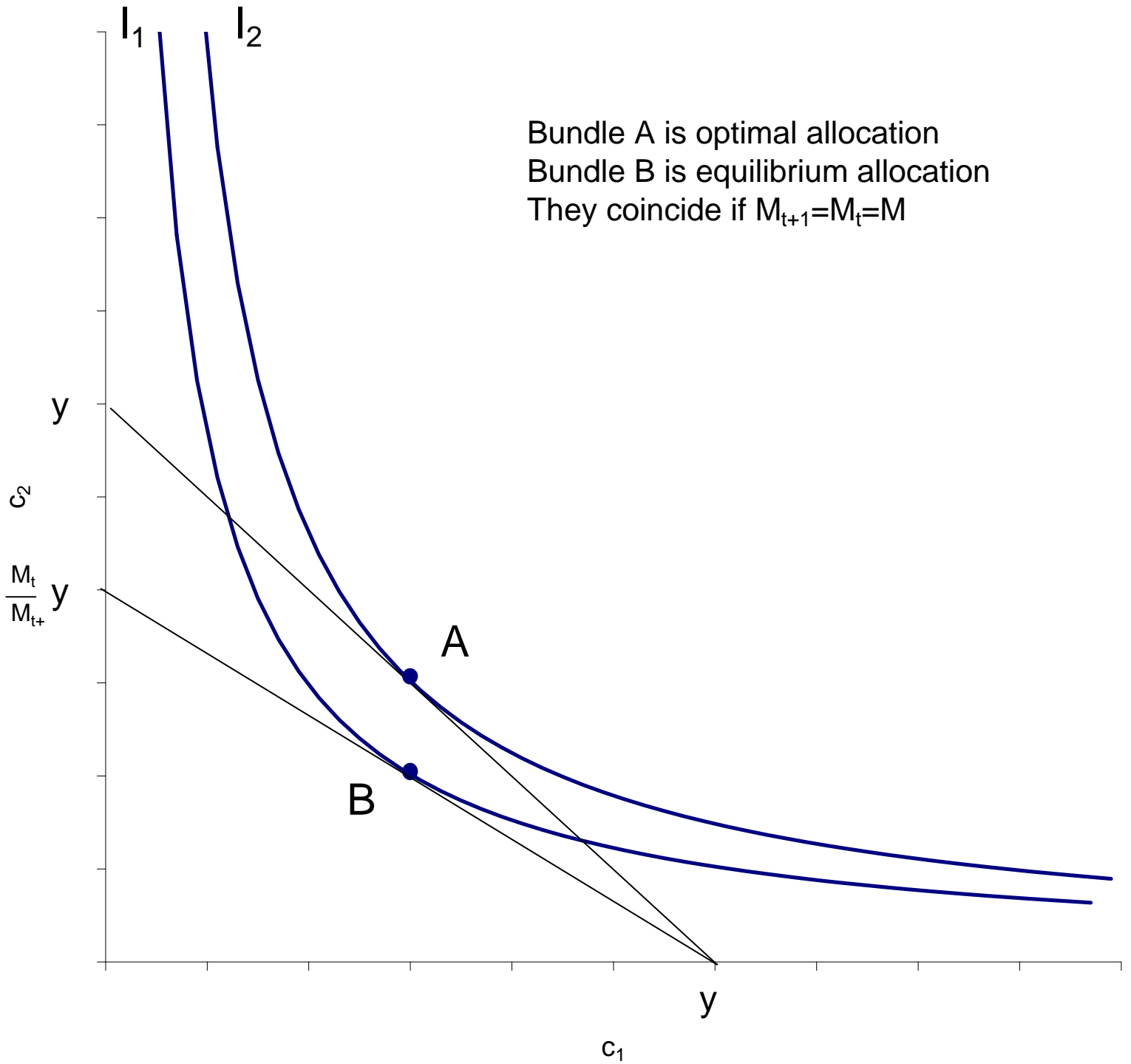
$$c_1 + \frac{p_{t+1}}{p_t} c_2 \leq y$$

- $\frac{p_t}{p_{t+1}}$ - *real rate of return of fiat money*

Lifetime budget constraint and equilibrium allocation



Equilibrium allocation is optimal if M is constant



Finding the real rate of return on fiat money

- In monetary equilibrium money market clears
 - total money demand in $t =$ total money supply in t
- Total money demand in t is $N_t(y - c_1)p_t$ dollars
- Total money supply in t is M_t dollars, so

$$N_t(y - c_1)p_t = M_t$$

- We can use it to find return on money:

$$\frac{p_t}{p_{t+1}} = \frac{N_{t+1}}{N_t} \frac{M_t}{M_{t+1}}$$

- for constant population price is proportional to total money supply
 - Quantity Theory of Money

Velocity of Money

- Denote Y_t - GDP per capita, M_t - money holdings per capita, P_t - price level
- Money velocity V_t is the average number of times (per period) that a dollar is spent to buy Y_t

$$V_t = \frac{P_t Y_t}{M_t}$$

- In OLG model velocity is (will be in Homework 1)

Testable predictions of the Quantity Theory of Money

Quantity Theory of Money predicts that

1. 1% increase in P_t is associated with 1% increase in M_t (keeping Y_t constant)
2. 1% increase in Y_t is associated with 1% increase in real money demand M_t/P_t
3. Velocity is constant

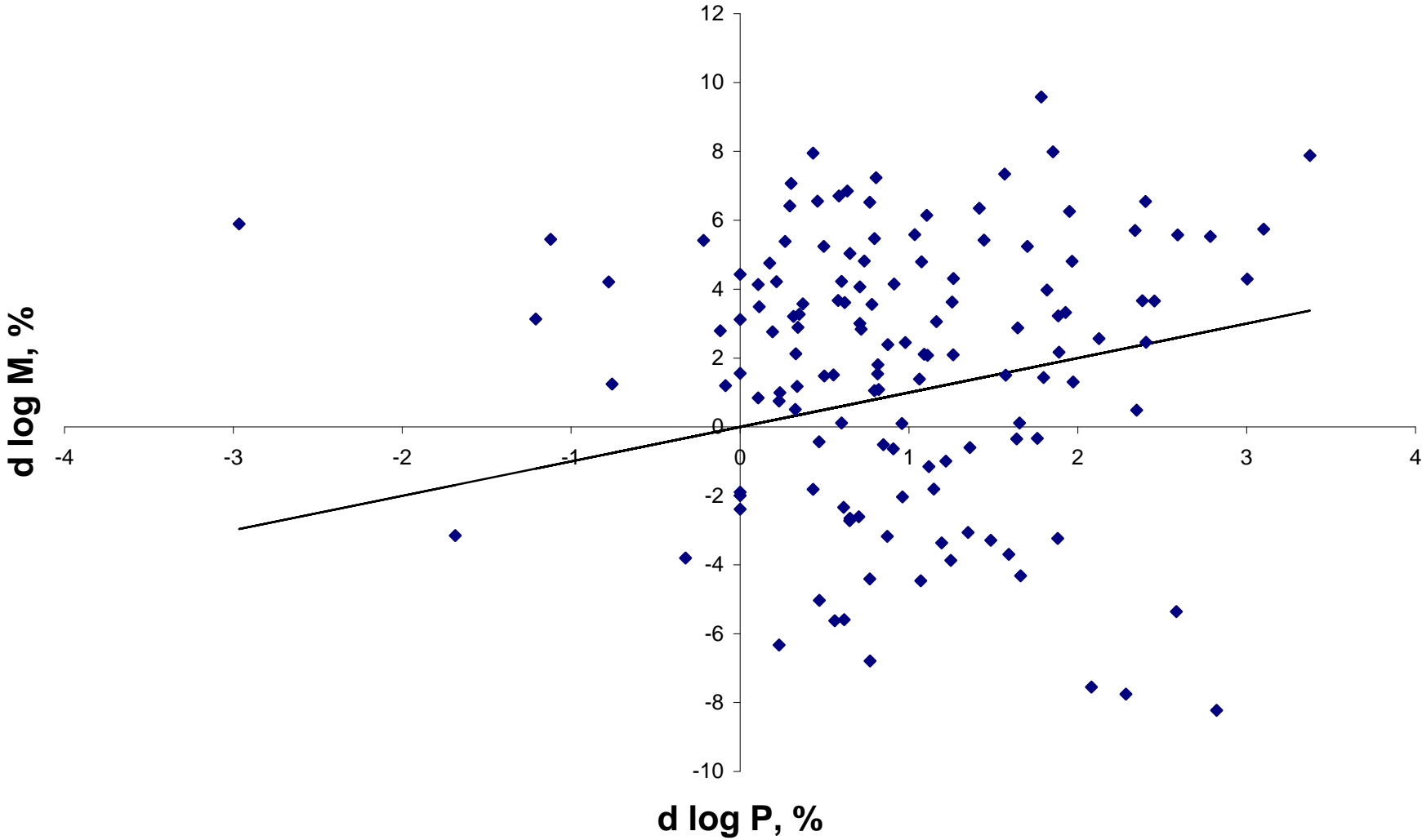
$$V_t = \text{const}$$

4. Change in nominal interest rate does not affect real money demand M_t/P_t or velocity V_t

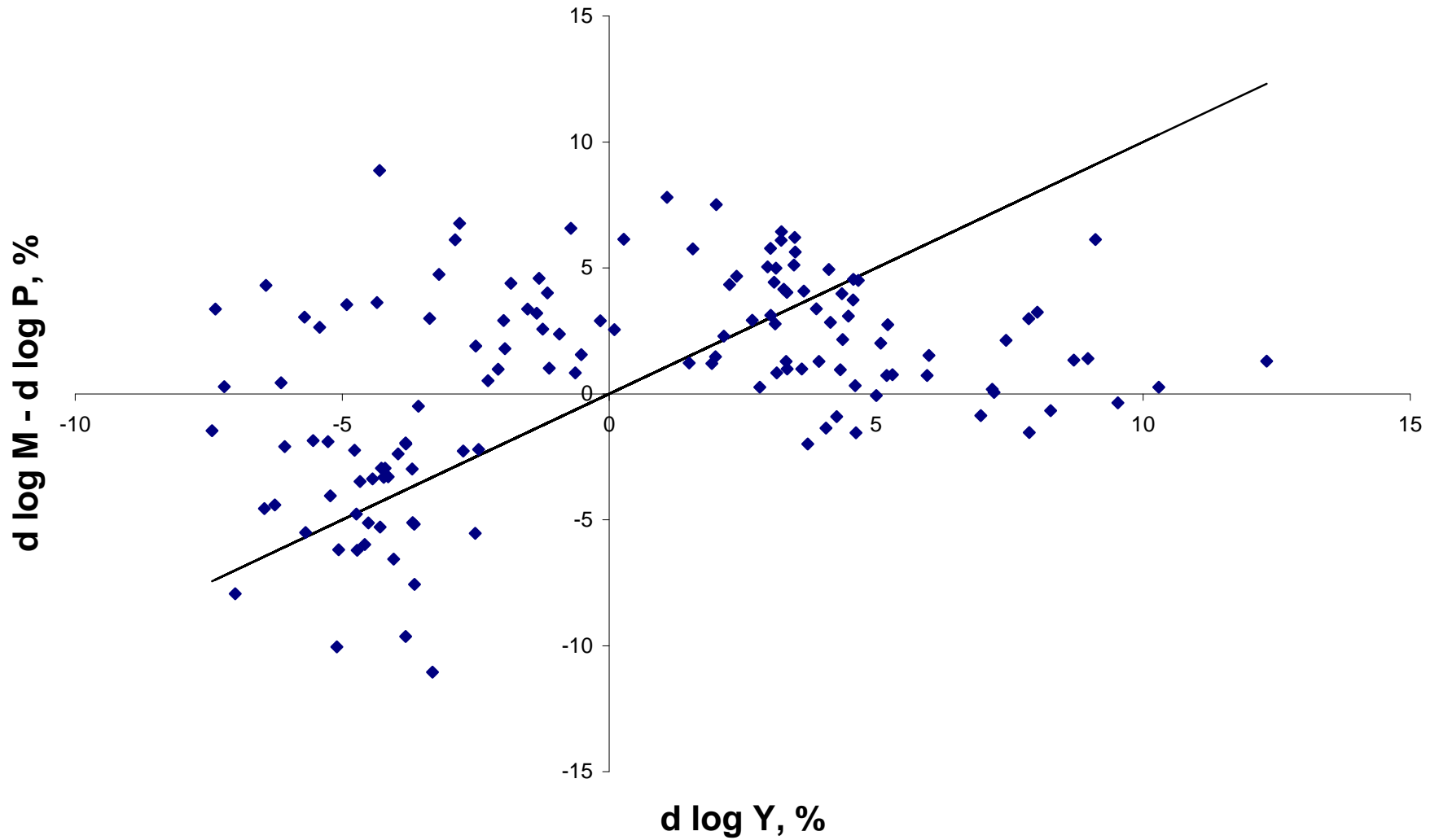
Data

- Data file on the website
- Quarterly data, 1975:2 - 2009:1
- P_t - GDP deflator
- Y_t - GDP per capita deflated by P
- M_t - M1+ (Currency outside banks and chartered bank deposits) per capita

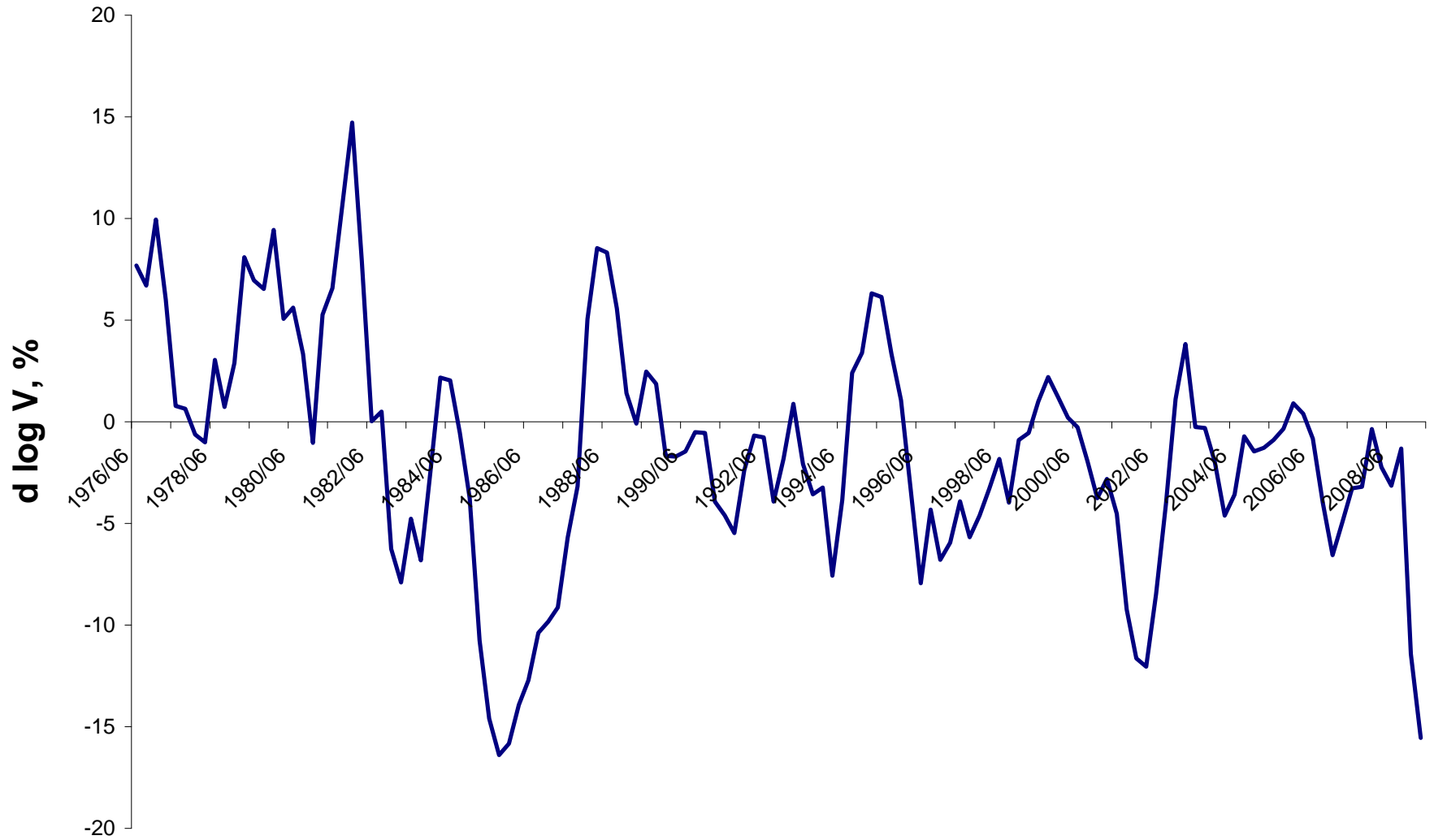
Is 1% increase in P associated with 1% increase in M?



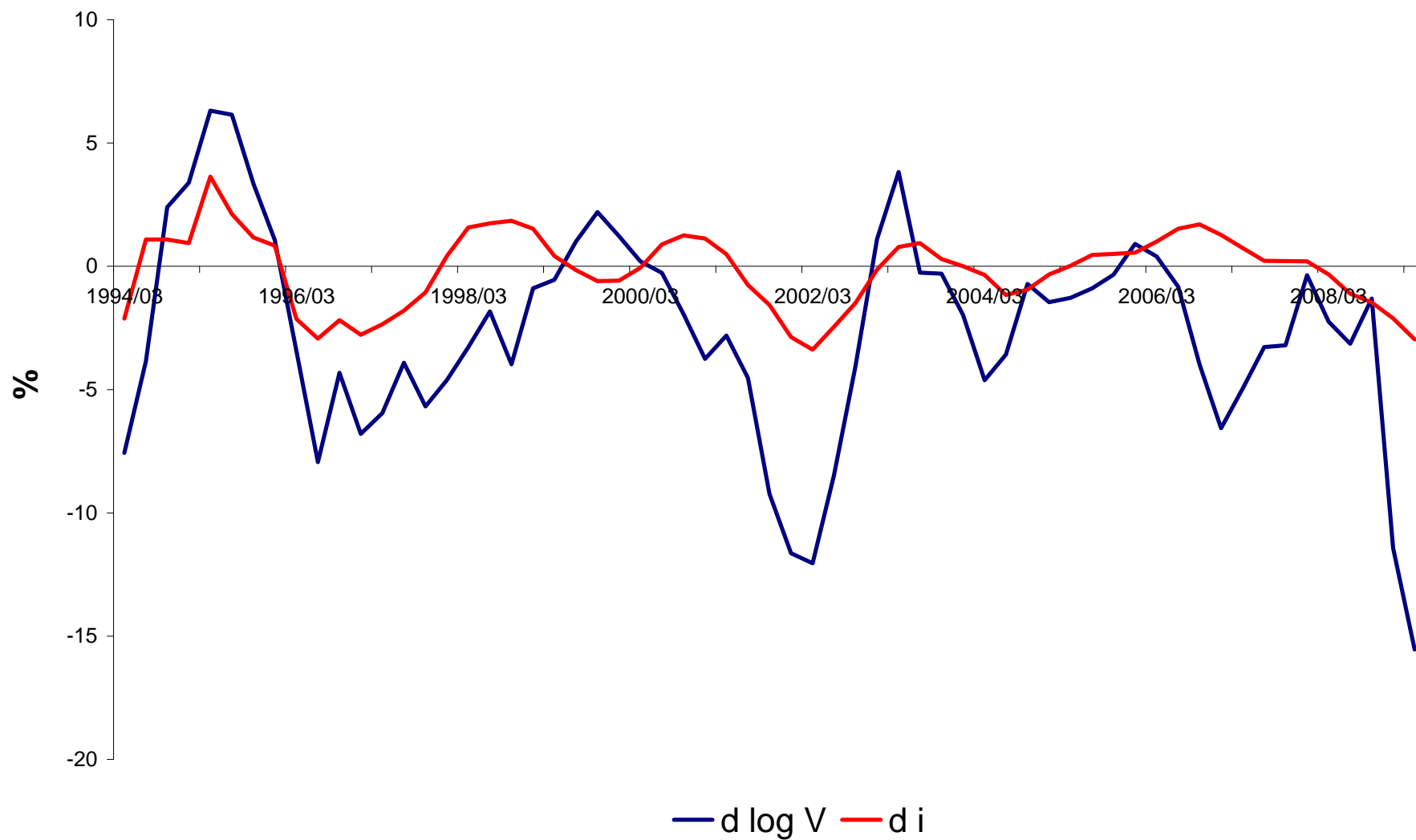
Is 1% increase in Y associated with 1% increase in M/P?



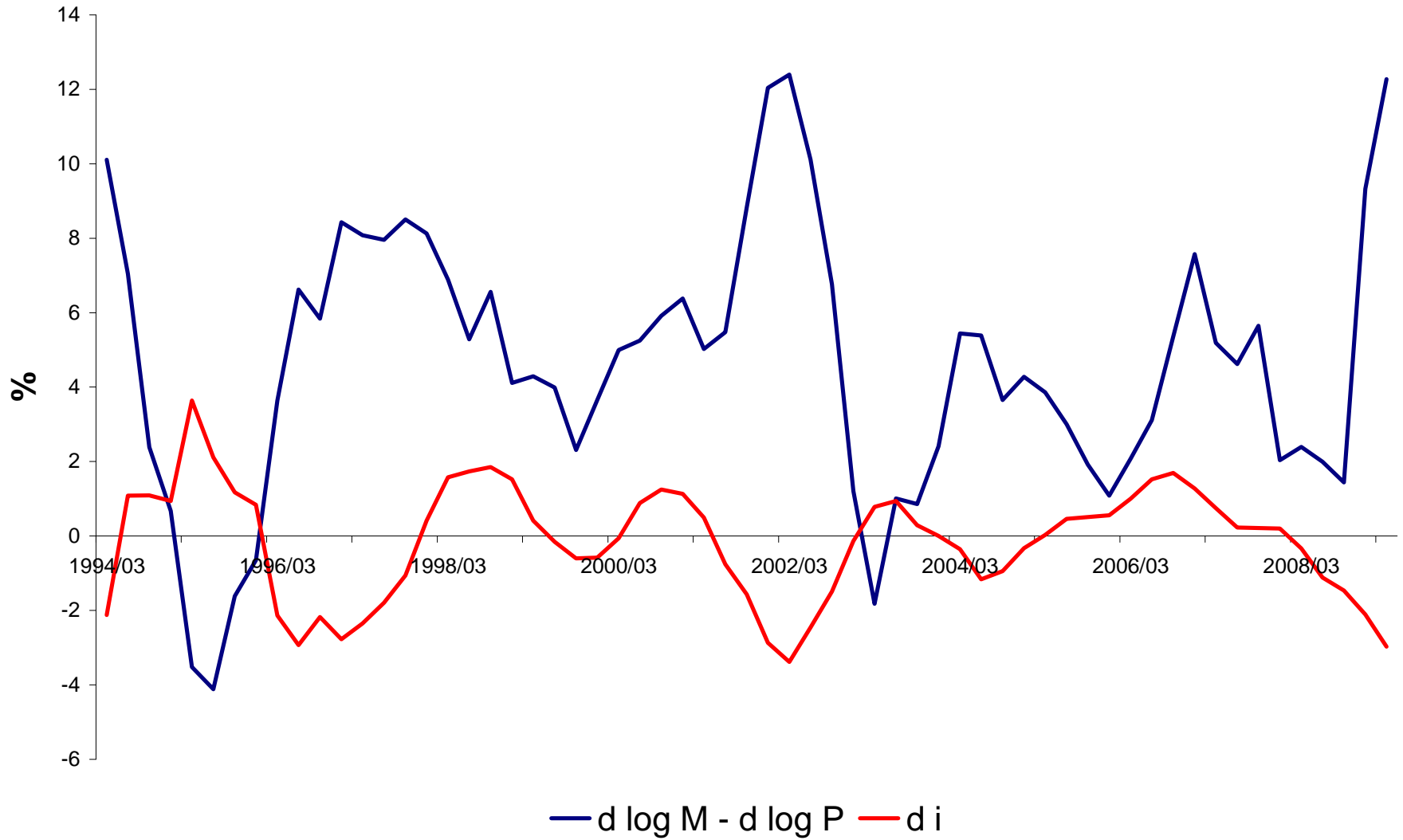
Money velocity is not constant



High interest rate increases money velocity



High interest rate decreases money demand



Summary

- Quantity Theory of Money predicts that price level is proportional to money stock
- Data rejects this prediction
- Money demand and velocity are not constant over time and depend on the nominal interest rate

Reading

Champ-Freeman Ch. 1
Mishkin-Serletis Ch. 21