L4. Purchasing Power Parity, Price Convergence and the Balassa-Samuelson Effect

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So far we have assumed:

Single tradable good (real ER always equal to 1);

Purchasing power parity (absolute version)

$$Z_t \equiv E_t \frac{P_t^*}{P_t} = 1$$

Purchasing power parity (relative version)

$$\Delta z_t \equiv \Delta e_t + \pi^*_t - \pi_t = 0$$

Based on simple arbitrage principle.

Relative version of the PPP theory

- Over history many countries choose to either fix or manage the nominal exchange rate
- Policy makers believe that by stabilizing the nominal exchange rate they import low foreign inflation

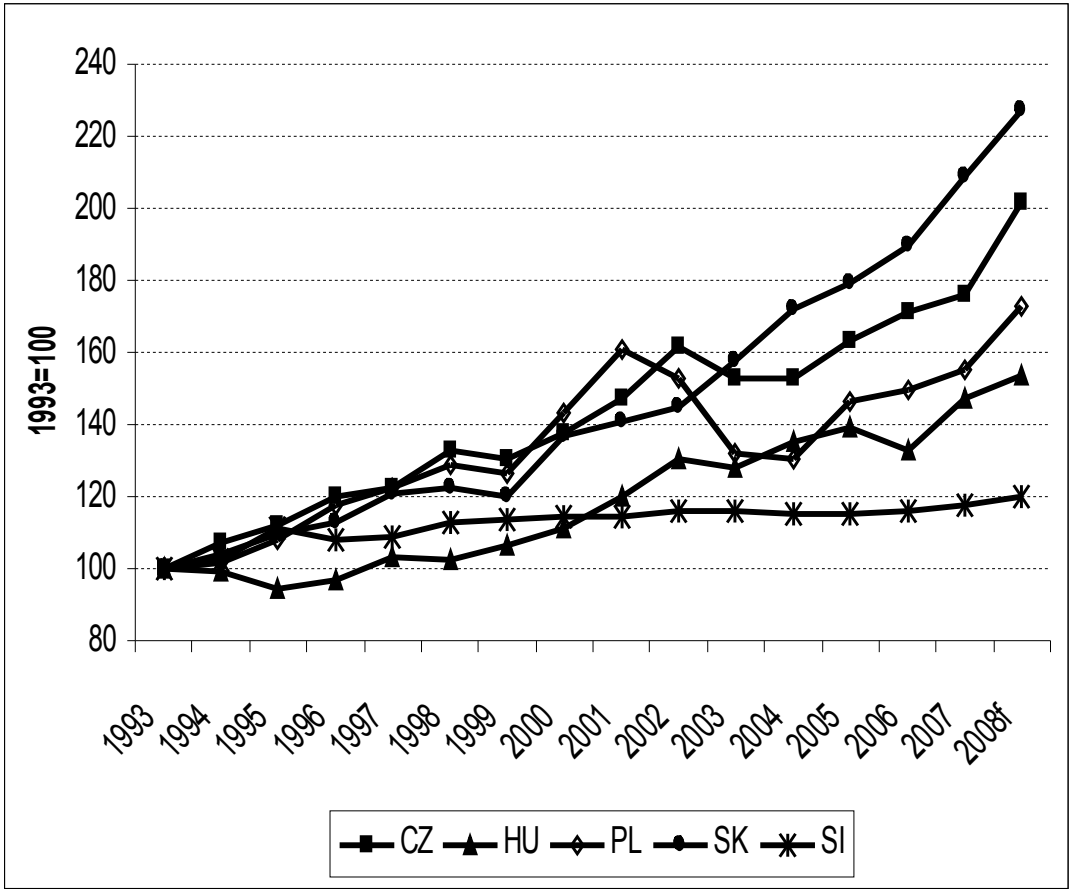
$$\Delta s = \pi - \pi^*$$

which implies

$$\pi = \pi^* + \Delta s \text{ and } \pi = \pi^* \text{ if } \Delta s = 0$$

Does the relative version of the PPP theory hold?

- If the PPP held at least on average the real exchange rate would be constant (on average)
- Obviously it has not been so in many countries

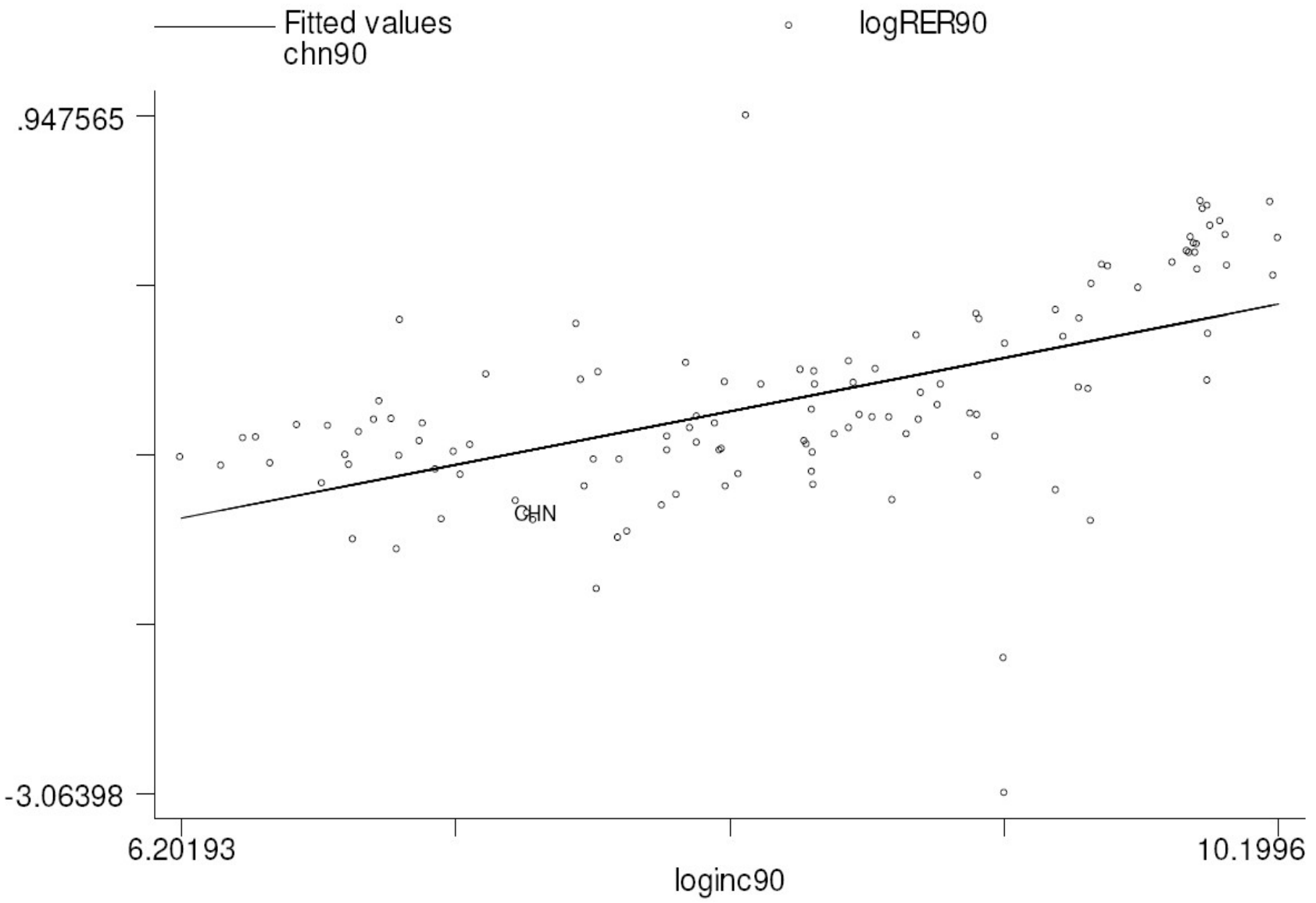


Penn Effect

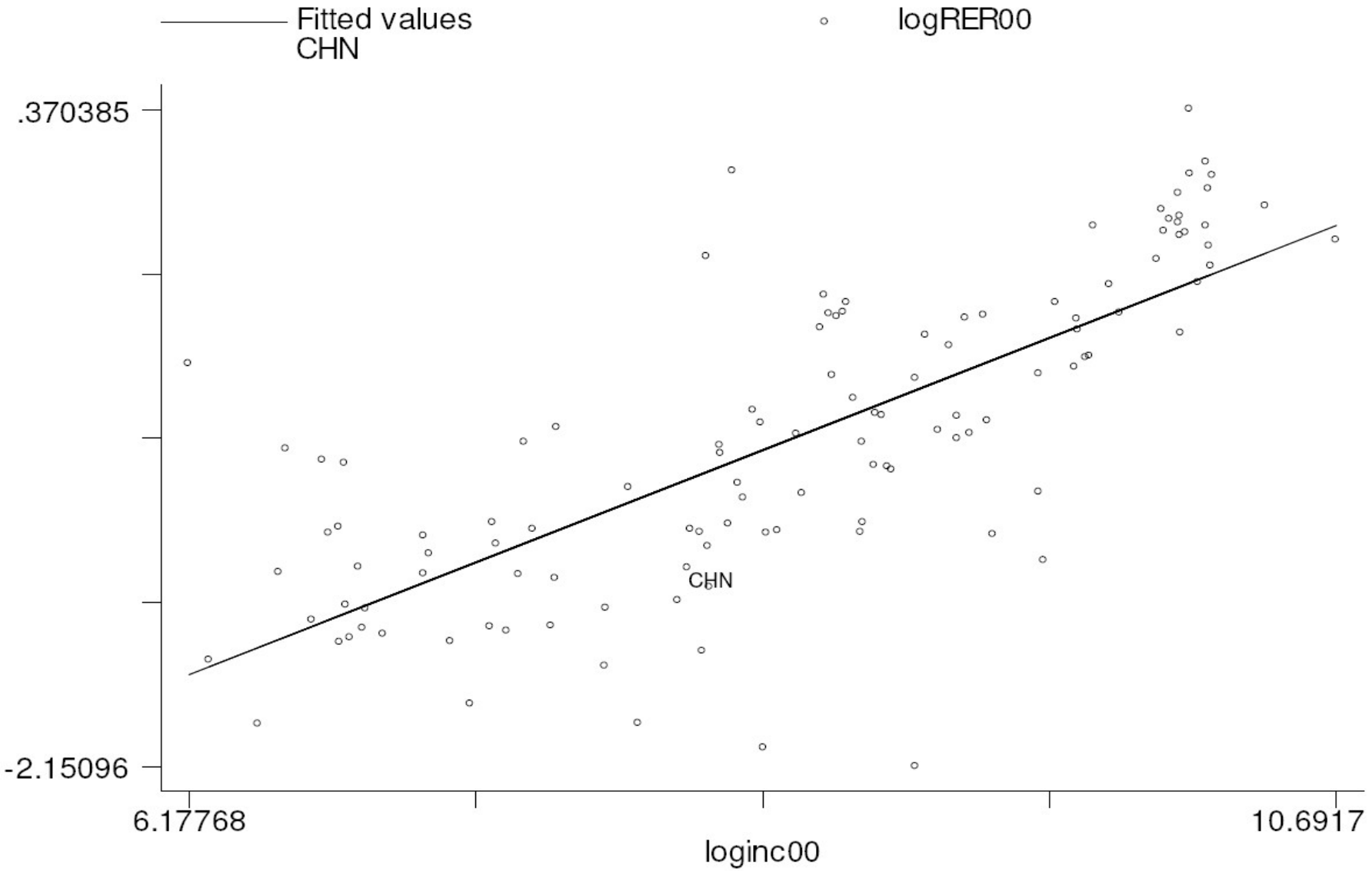
- International Comparisons Program (ICP)
  - Initiated in the mid-1900s
  - Led by economists from University of Pennsylvania
- Ratio of tradable goods prices to nontradables prices tends to be lower in high-income countries than in low-income countries
- Real exchange rates is systematically related to the ratio of GDP per capita to U.S. GDP per capita.

→ Equilibrium real exchange changes with the level of GDP per capita.

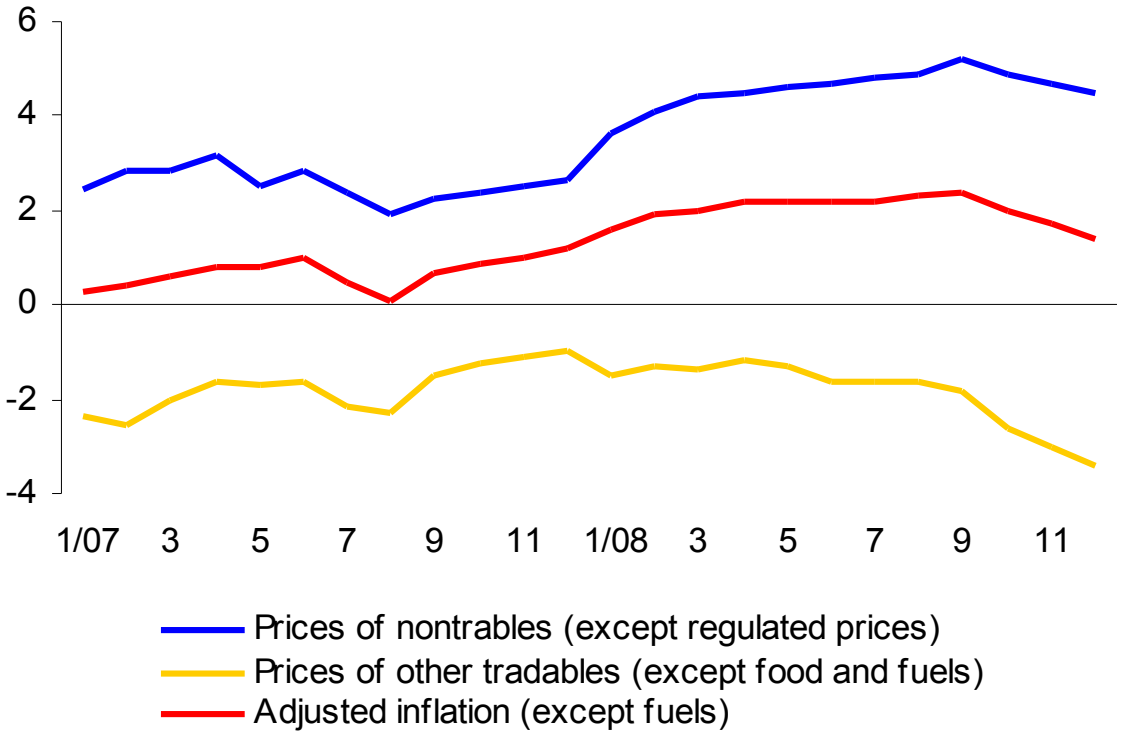
Cross-Country Regression for 1990



Cross-Country Regression for 2000



Nontradable prices grow faster in a converging economy



Source: CNB (2009) Inflation Report, February

- Difference between tradables and nontradables reflects the trend real exchange rate appreciation
- Negative tradables inflation is an outcome of the choice of low inflation target

Balassa-Samuelson explain why …

- What have all those countries in common is an undergoing "convergence" process
  - They grow faster than the developed countries
  - Because their productivity growth is higher
- Balassa-Samuelson effect
  - Tradable and nontradable sectors
  - Higher productivity growth in the tradable sector leads to higher growth of real wages
  - Wage growth spillover to the nontradable sector
  - Low (or zero) productivity growth in the nontradable sector means that relative prices of nontradables rise to finance growing wages
  - Change in relative prices of nontradable to tradable goods
  - Real exchange rate appreciation

B-S with One-Factor P.F.

$$Y_T = A_T L_T \qquad Y_N = A_N L_N$$

$$p_T = p_T^* = 1 \qquad p_N = \frac{w}{A_N} = \frac{A_T}{A_N}$$

$$P \equiv (p_T)^{\gamma} (p_N)^{1-\gamma} = 1^{\gamma} \left(\frac{A_T}{A_N} \right)^{1-\gamma} = \left(\frac{A_T}{A_N} \right)^{1-\gamma}$$

$$GDP_{nom} = A_T \frac{L_T}{L_T + L_N} + p_N A_N \frac{L_N}{L_T + L_N} = A_T$$

$$\frac{P}{P^*} = \left(\frac{A_T / A_N}{A_T^* / A_N^*} \right)^{1-\gamma} = \left(\frac{GDP_{nom}}{GDP_{nom}^*} \right)^{1-\gamma} \left(\frac{A_N^*}{A_N} \right)^{1-\gamma}$$

Implication for nominal prices

- Balassa-Samuelson effect is about relative prices
  - It does not explain how nominal prices of tradables and nontradables will change
  - That depends of chosen monetary policy strategy
    - Independent monetary policy
      - What is the chosen inflation objective
    - Fixed (managed) exchange rate
      - What is the chosen rate of crawl?

Independent monetary policy

- Central bank chooses its inflation objective
  - It is mantra 'one' of monetary economics
- Nonstationary *real* exchange rate has an implication for the path of the *nominal* exchange rate:
- Recall the real exchange rate definition (relative version of PPP):

$$\Delta \bar{z}_t = \Delta \bar{e}_t + \bar{\pi}^*_t - \bar{\pi}_t$$

If $\Delta \bar{z}_t \neq 0$ because of the convergence process …

Independent monetary policy

Home economy		Foreign economy
Trend real ER appreciation	- 4	Inflation target = 2
Inflation target	2	

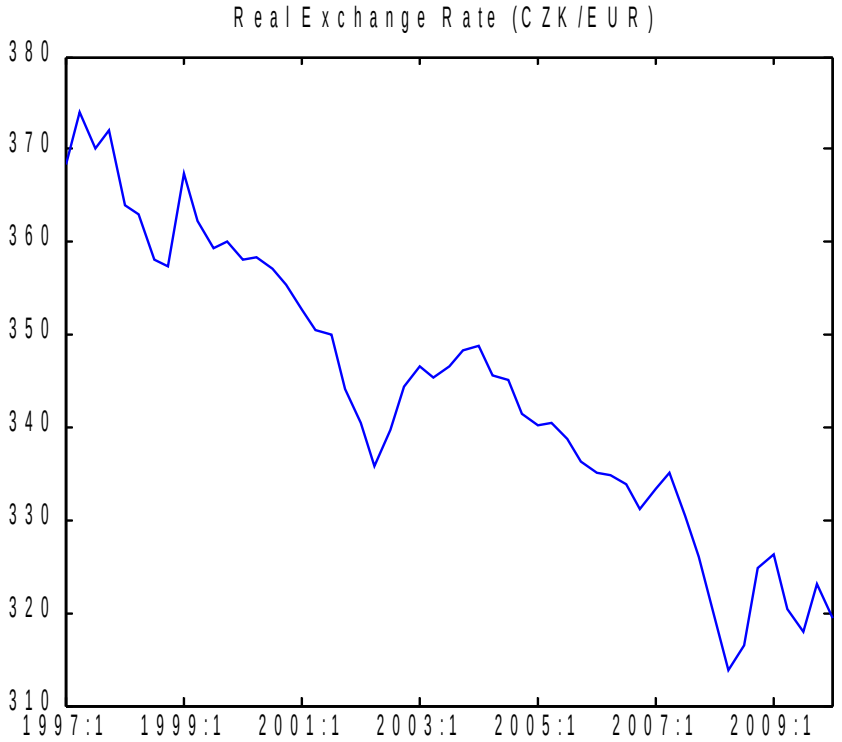
$$\Delta \bar{z}_t = \Delta \bar{e}_t + \bar{\pi}^*_t - \bar{\pi}_t$$

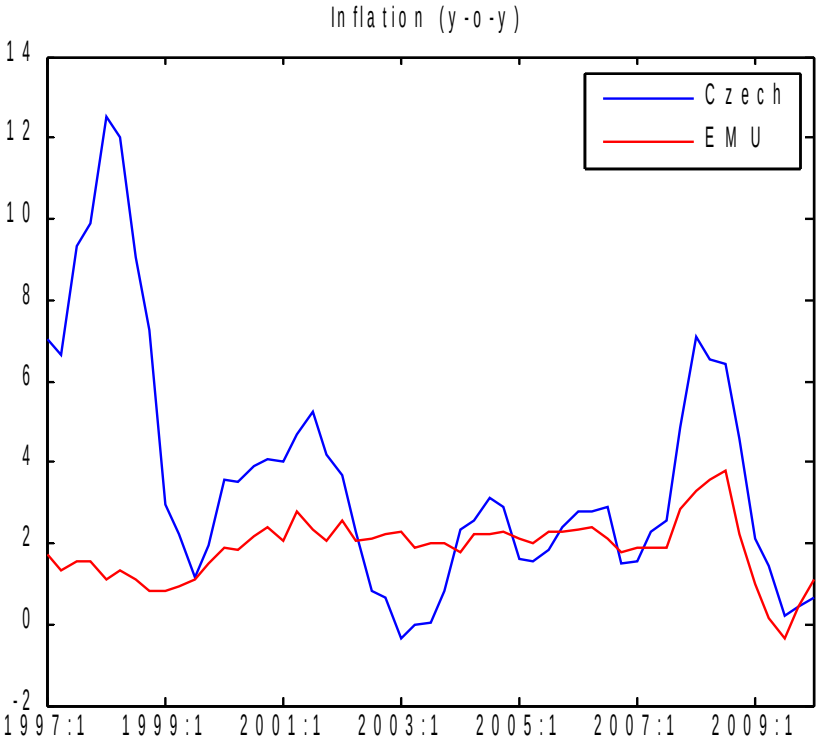
$$-4 = \Delta \bar{e}_t + 2 - 2$$

$$\Delta \bar{z}_t = -4 \Rightarrow \Delta \bar{e}_t = -4$$

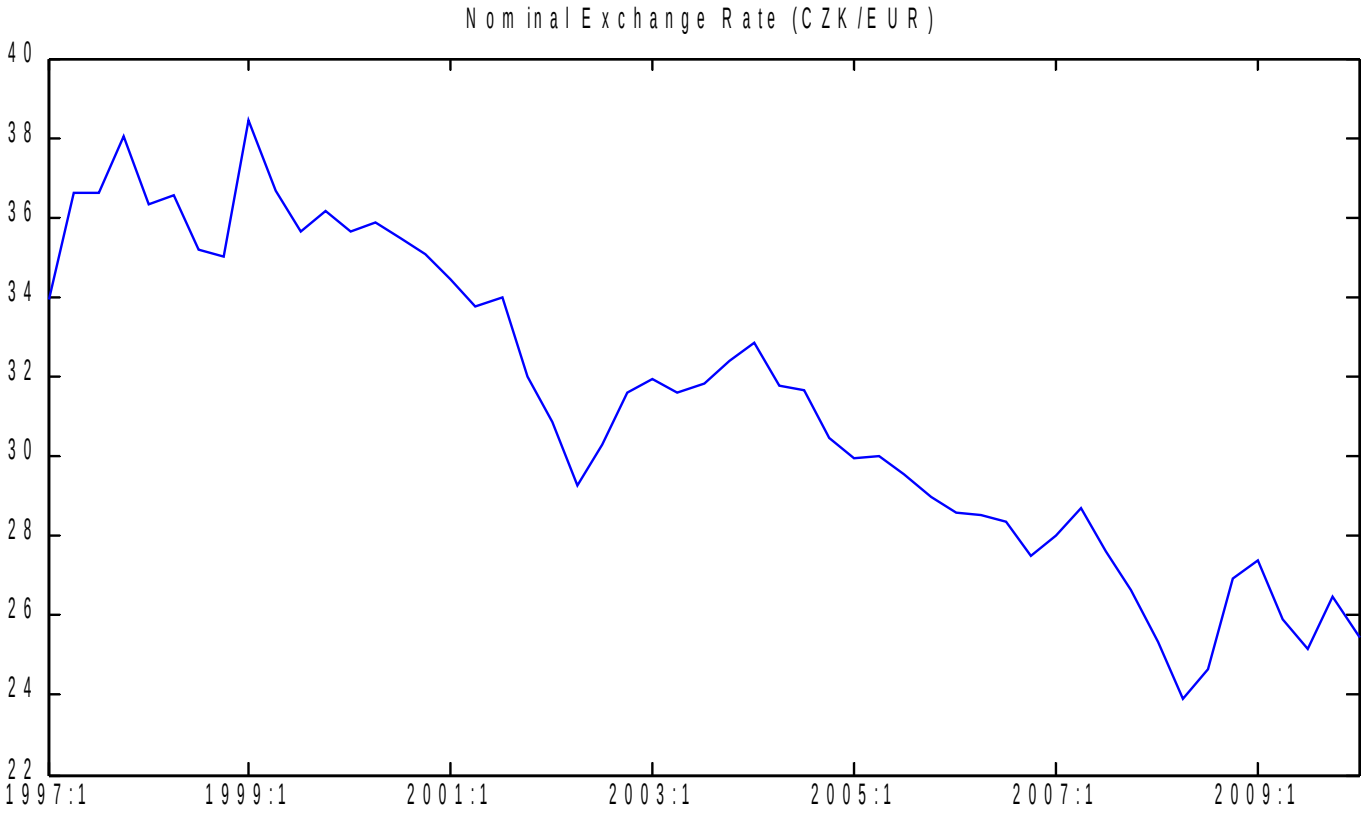
Inflation target of 2% requires annual nominal appreciation of 4%

Trend real appreciation and close to zero average inflation differential





Results in trend nominal appreciation



Non-independent monetary policy

- Central bank fixes or manages the nominal exchange rate
  - There is no clear inflation objective
- Nonstationary *real* exchange rate has an implication for domestic inflation
- Recall the real exchange rate definition (relative version of PPP):

$$\Delta \bar{z}_t = \Delta \bar{e}_t + \bar{\pi}^*_t - \bar{\pi}_t$$

If $\Delta \bar{z}_t \neq 0$ because of the convergence process while $\Delta \bar{e}_t = 0$

Fixed exchange rate

Home economy		Foreign economy
Trend real ER appreciation	- 4	Inflation target = 2
$\Delta \bar{e}_t$	0	

$$\Delta \bar{z}_t = \Delta \bar{e}_t + \bar{\pi}^*_t - \bar{\pi}_t$$

$$-4 = 0 + 2 - \bar{\pi}_t$$

$$\Delta \bar{z}_t = -4 \Rightarrow \bar{\pi}_t = 6$$

Fixed exchange rate implies domestic inflation of 6%

Conclusions

- PPP does not hold in a cross-country comparison;
- The B-S model consistent with the cross-country and panel data comparisons at aggregate level;
- Benchmark scenario: 2 % real growth differential; real exchange rate appreciation of about 1.1-1.6 % (But!…);
- Mapping on nominal prices depends on chosen monetary policy strategy
- Statement that a converging economy must have higher inflation is nonsense