Maintaining Low Inflation:
Money, Interest Rates, and Policy Stance

Samuel Reynard

Swiss National Bank

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"Mainstream Monetary Policy Analysis Circa 2006: Are There Reasons for Concern?" – JME 2007

Outline of the presentation

- Discuss some issues with mainstream analysis and the use of Taylor rules as measures of monetary policy stance

- Present monetary stylized facts

  → characterize the money/output/price relationships

  → address criticisms

  → discuss role of short-term velocity and output gap movements in inflation dynamics

  → discuss usefulness of money for monetary policy

- Use monetary facts to interpret apparent changes in inflation dynamics

Mainstream monetary policy analysis (New Keynesian models)

- models linearized around inflation steady-state…

- … or trend inflation: CBs objective?
  - exogenously given (random walk)
  - or estimated jointly with NKPC parameters
  - in empirical work, inflation is de-trended

- implication: monetary policymakers minimize small inflation fluctuations around assumed changing target, which represents main observed inflation swings
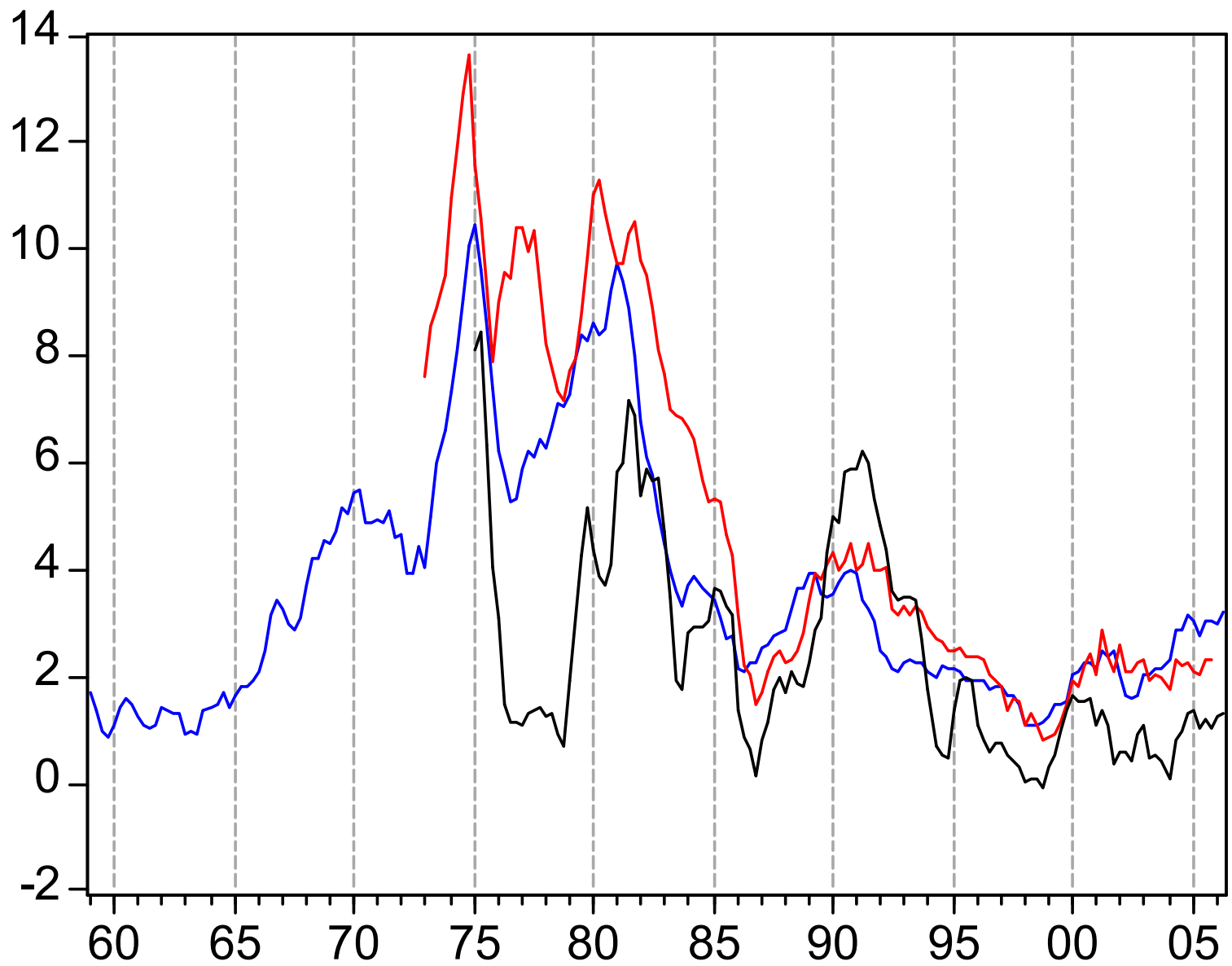
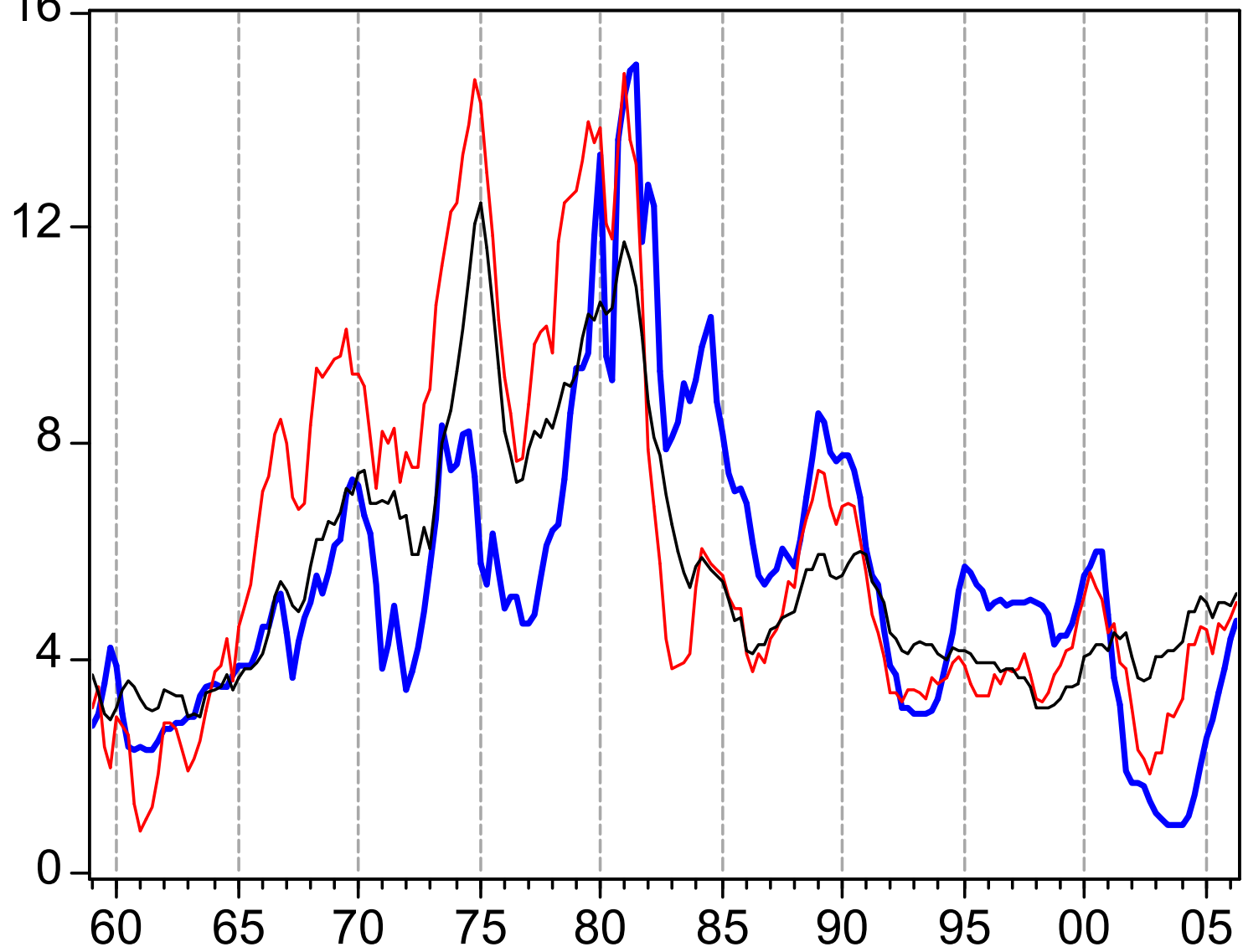Woodford, Michael, 2006. "How important is money in the conduct of monetary policy?" ECB conference on the role of money

"the trend inflation rate is *also* determined within the system: it corresponds to the central bank's target rate, incorporated in the policy rule" (p.13)

Taylor Rule
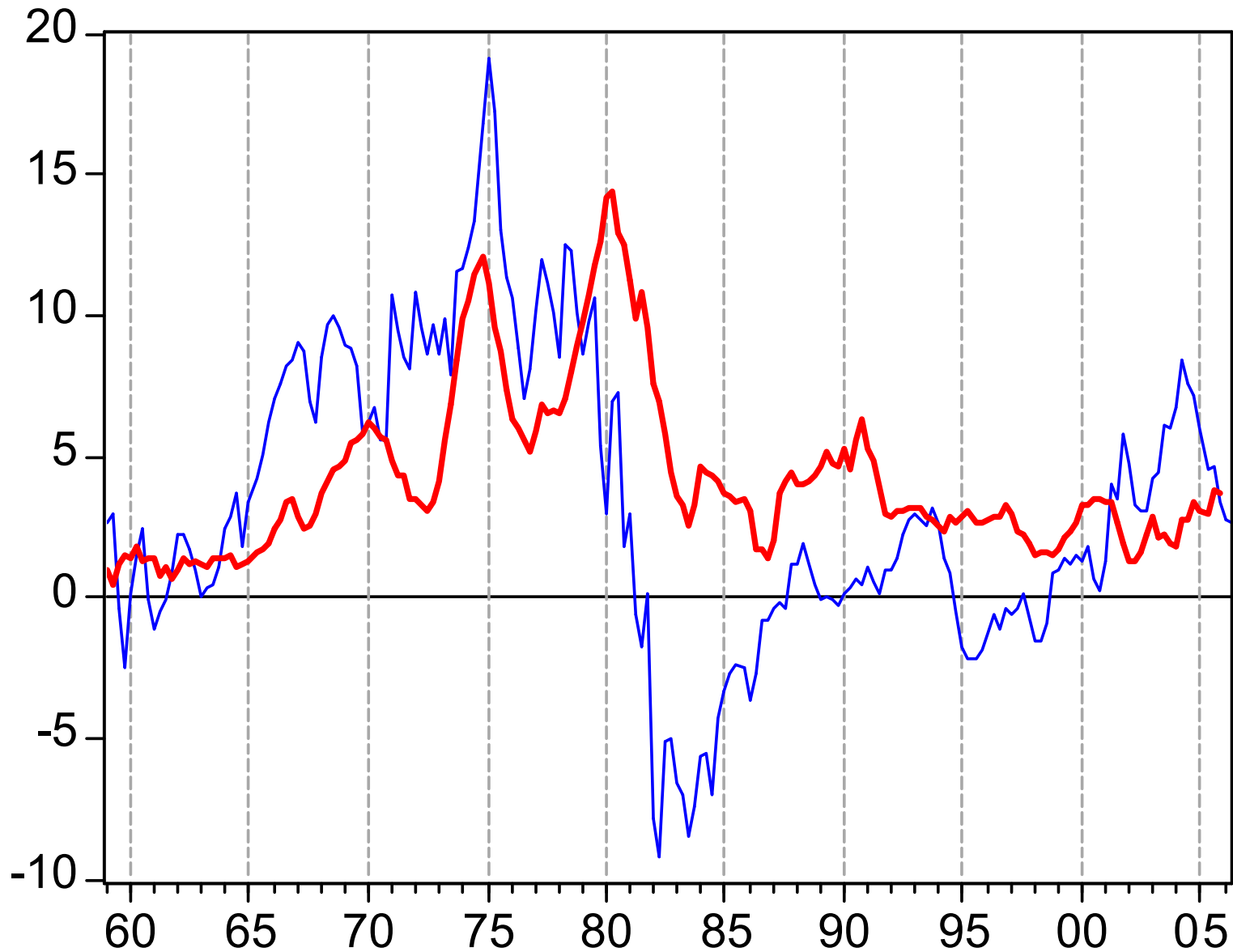
$$i = r^* + \pi^* + 1.5\left(\pi - \pi^*\right) + 0.5\left(y - y^*\right)$$

US

Taylor rule implied target

$$\pi_t^* = 2\left(\pi_t + r^* - i_t\right) + \pi_t + \left(y_t - y_t^*\right)$$
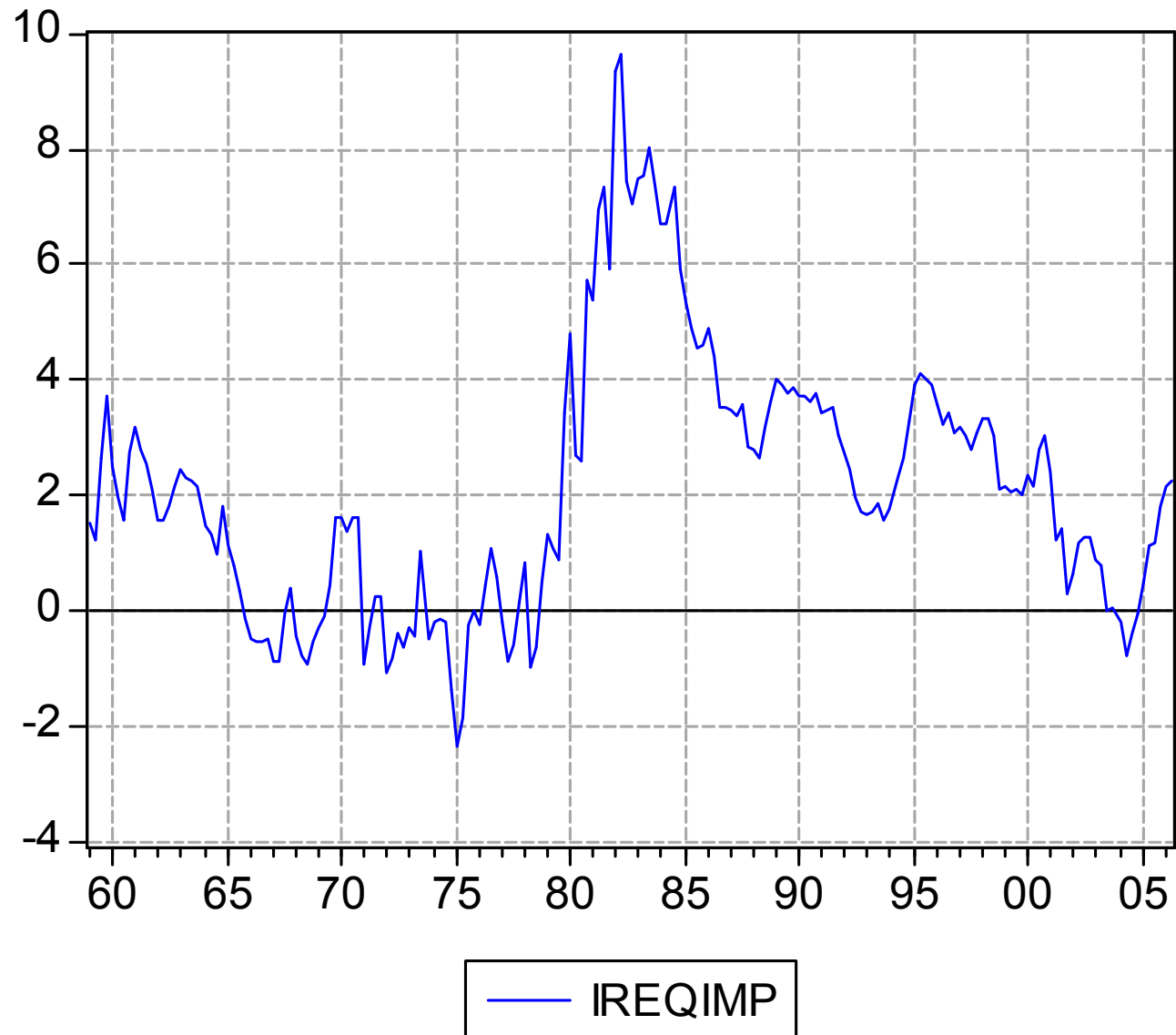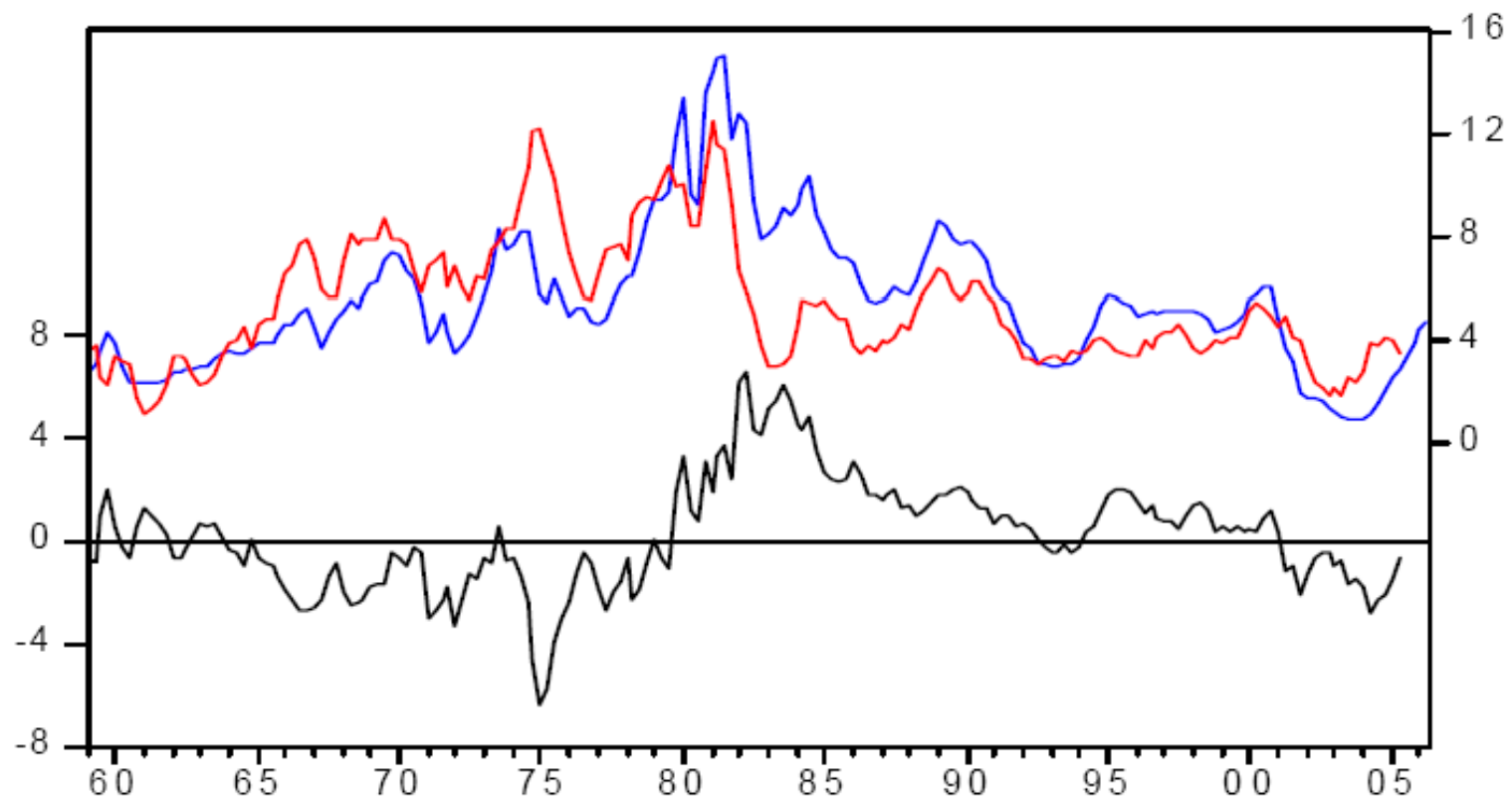
Implicit equilibrium real interest rate

Fig 2:   Taylor rule rate (blue), 3-month interest rate (red), and spread (black)   [Reynard, JME 2007]

Steady-state considerations have been overlooked in inflation dynamics and optimal policy empirical studies

e.g. Clarida/Gali/Gertler QJE 2000

calibrate an equilibrium real rate of 0.75% over the 1960-1979 period, and an inflation objective of 4.25%

and an inflation objective of 3.6% in the 1980-1996 period
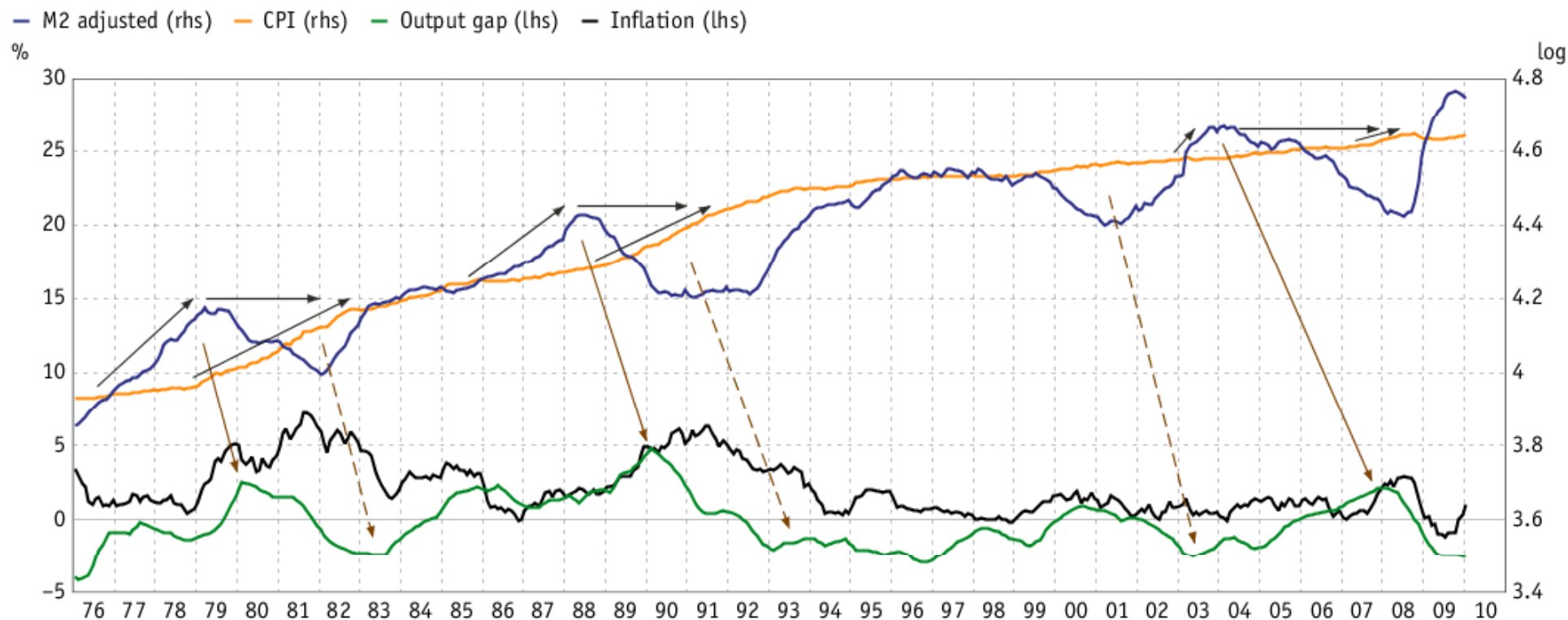
$$m_t^* \equiv c + m_t - y_t^* + \beta \dot{i}_t^*$$

$\beta \dot{i}_t^*$ Equilibrium velocity adjustment – Reynard (2006) "Money and the great disinflation"

Significant short-term dynamic relationship between money growth and subsequent inflation

One-to-one low-frequency relationship between money growth and inflation
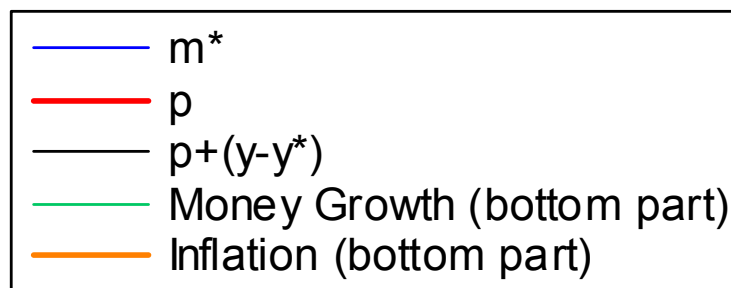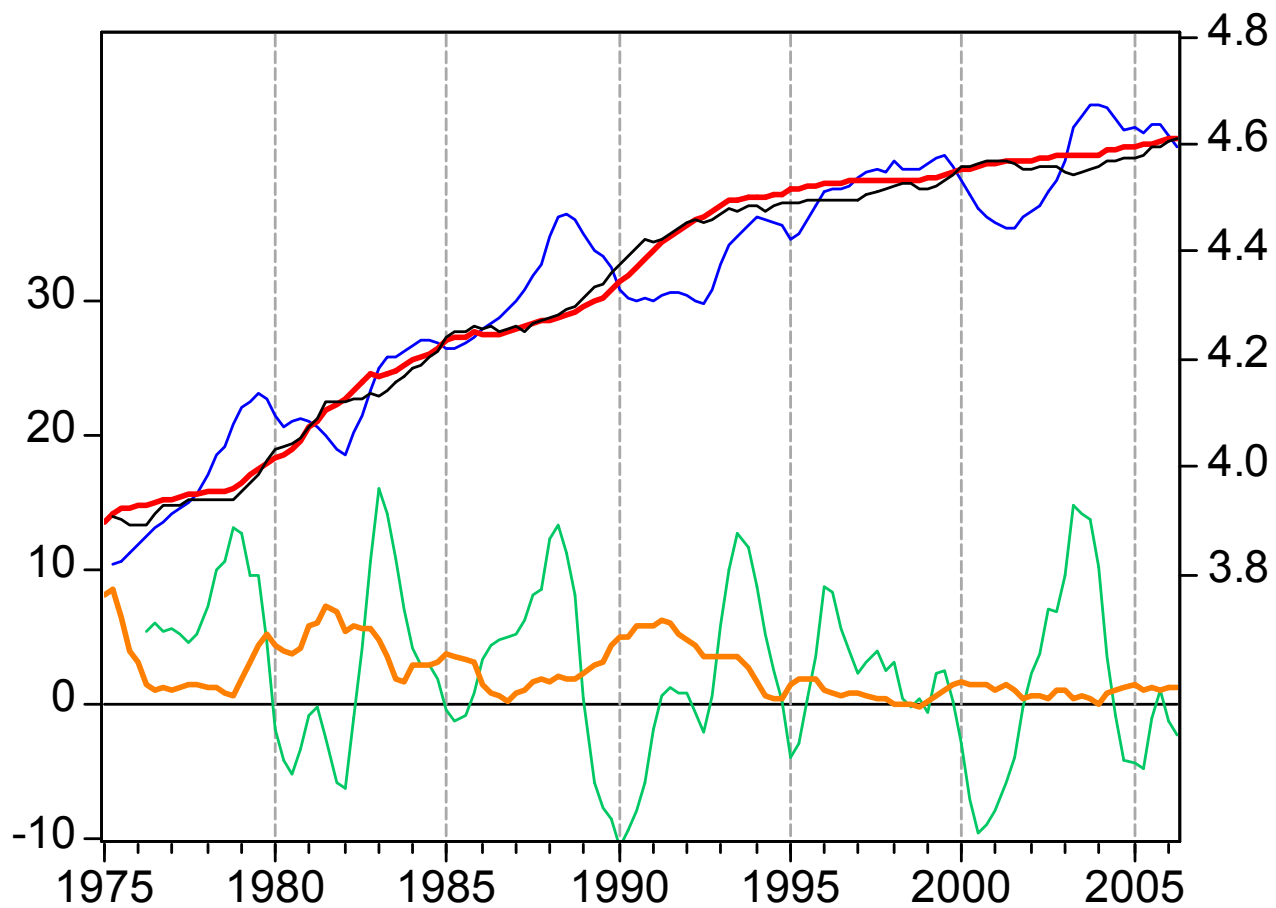
M2 adjusted, prices and output gap

— M2 adjusted (rhs)　— CPI (rhs)　— Output gap (lhs)　— Inflation (lhs)

Interpretation of graph: Increases in the money level (blue line) above the price level (red line) have been followed (cf. downward solid brown arrows), after a two to four-year lag, by positive output gaps (green line) and by proportional and persistent increases in the price level (upper-part black arrows). In contrast, when the money level has decreased or has been below the price level, it has been followed (cf. downward dashed brown arrows), again after a few years' lag, by negative output gaps and by decreasing inflation rates (black line).

Switzerland   m*: adjusted money level (log)   p: price level (log)

Legend:
- m*
- p
- p+(y-y*)
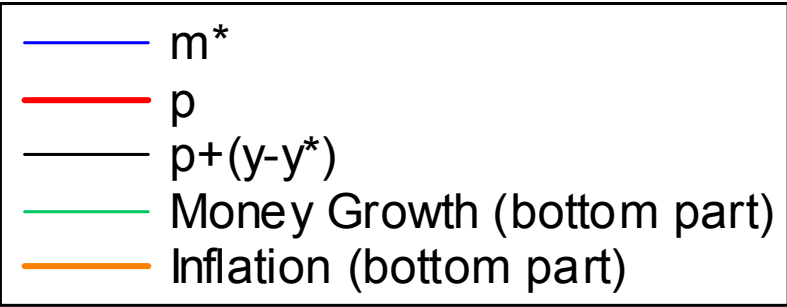- Money Growth (bottom part)
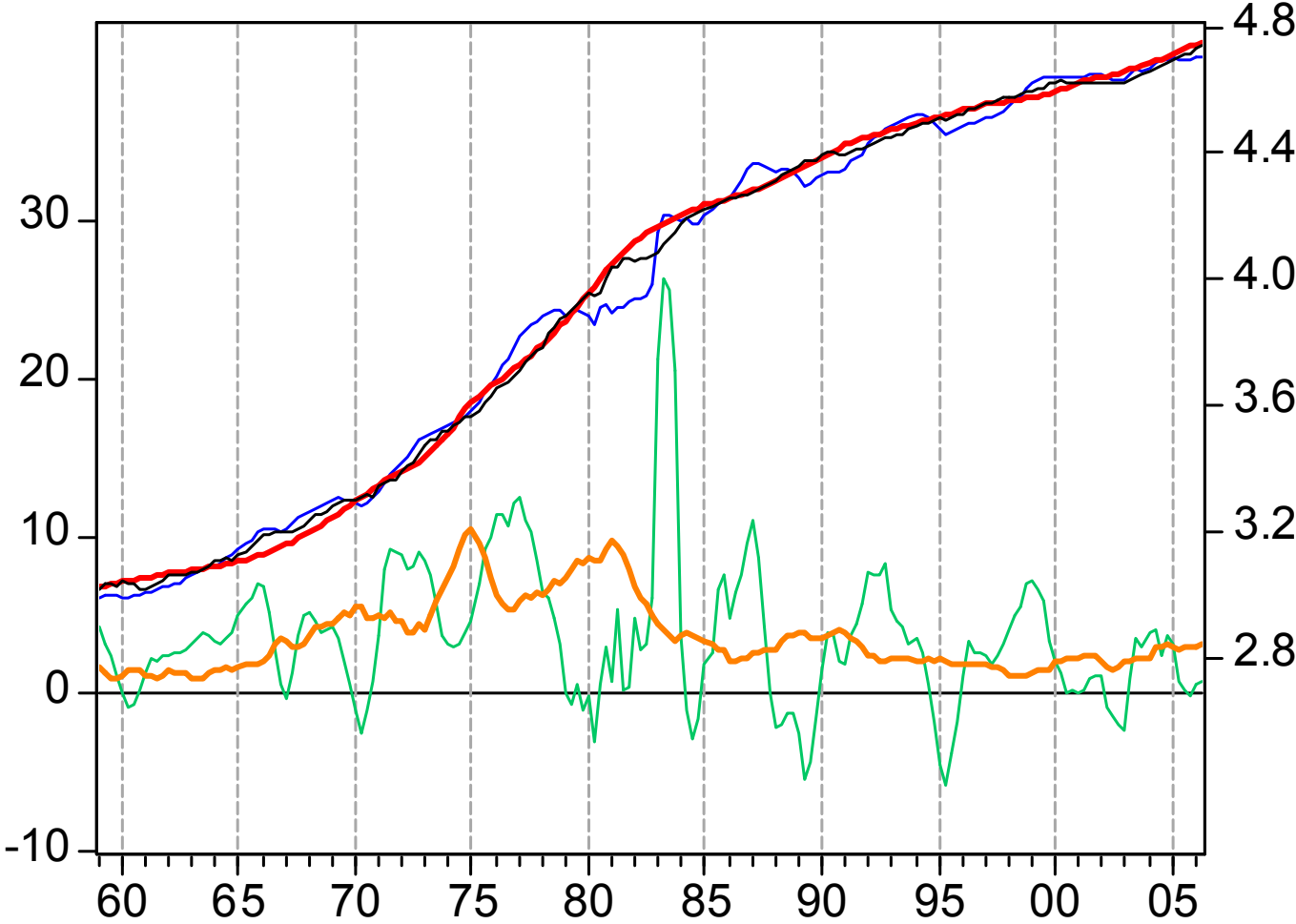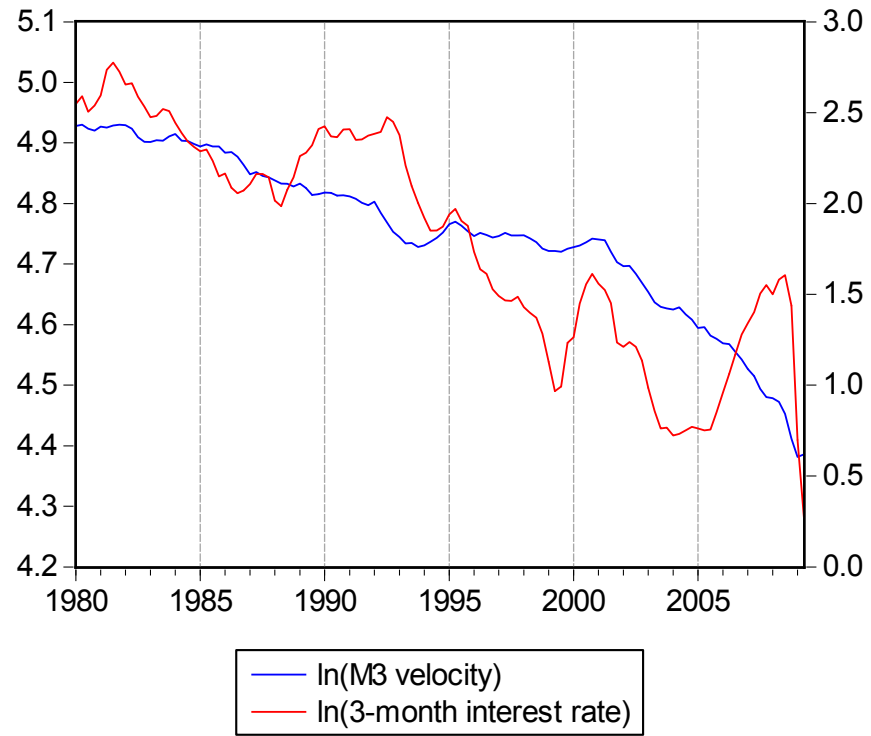- Inflation (bottom part)

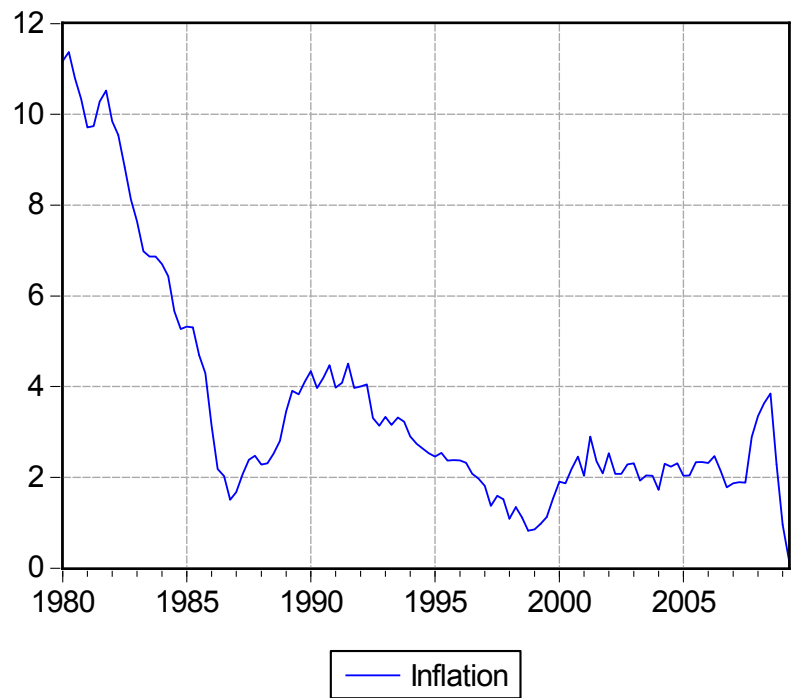## M2 velocity

Source: SNB Research Unit - Monetary Information Online   2010-04-26 04:28
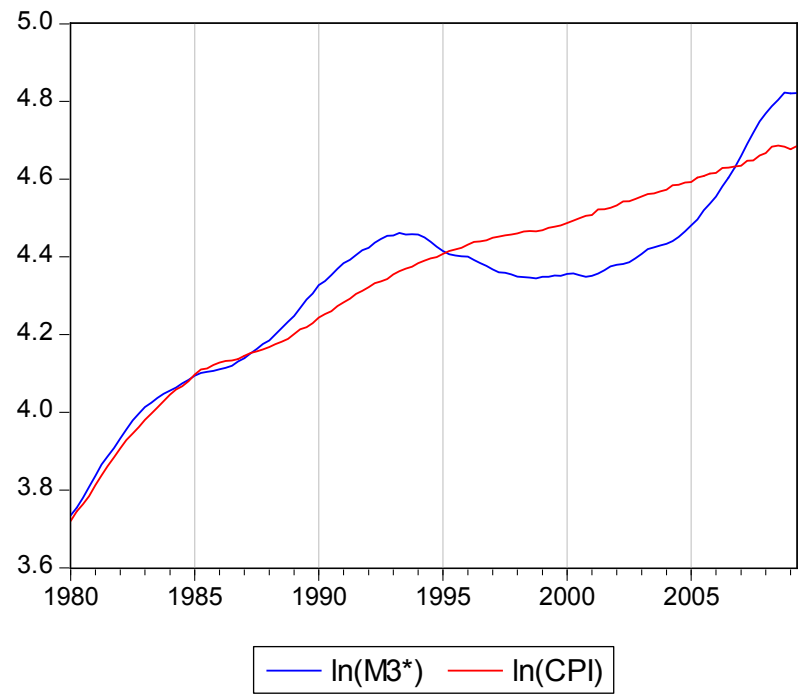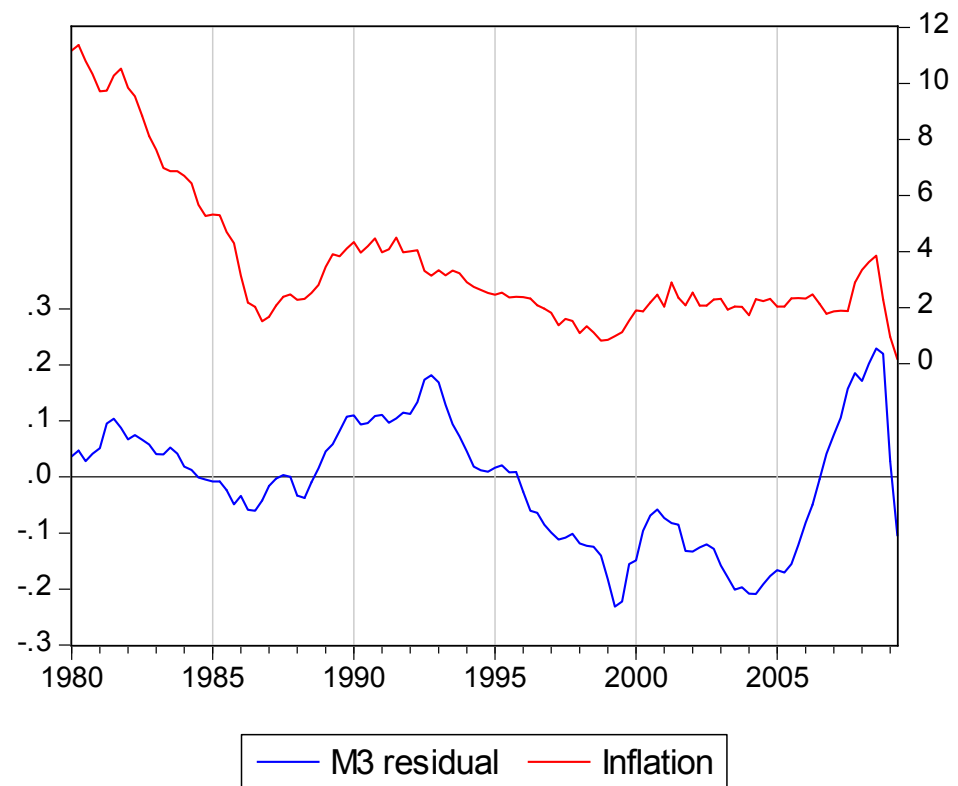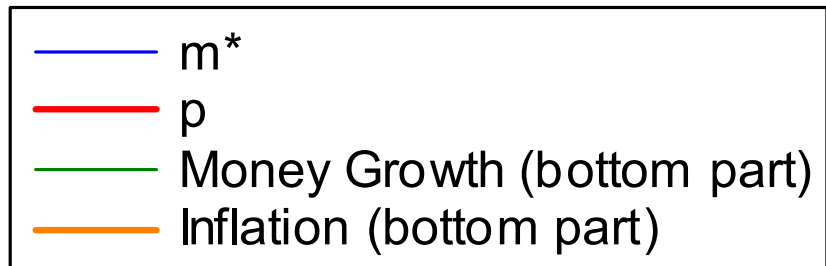
US

Legend:
- m*
- p
- p+(y-y*)
- Money Growth (bottom part)
- Inflation (bottom part)

	ln(M3 velocity)
	ln(3-month interest rate)

EA

Legend:
- m*
- p
- Money Growth (bottom part)
- Inflation (bottom part)
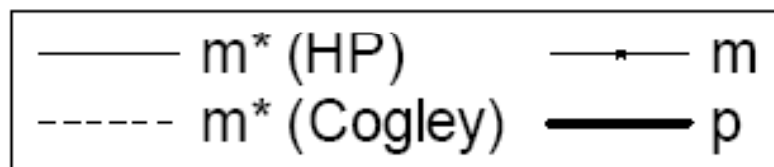
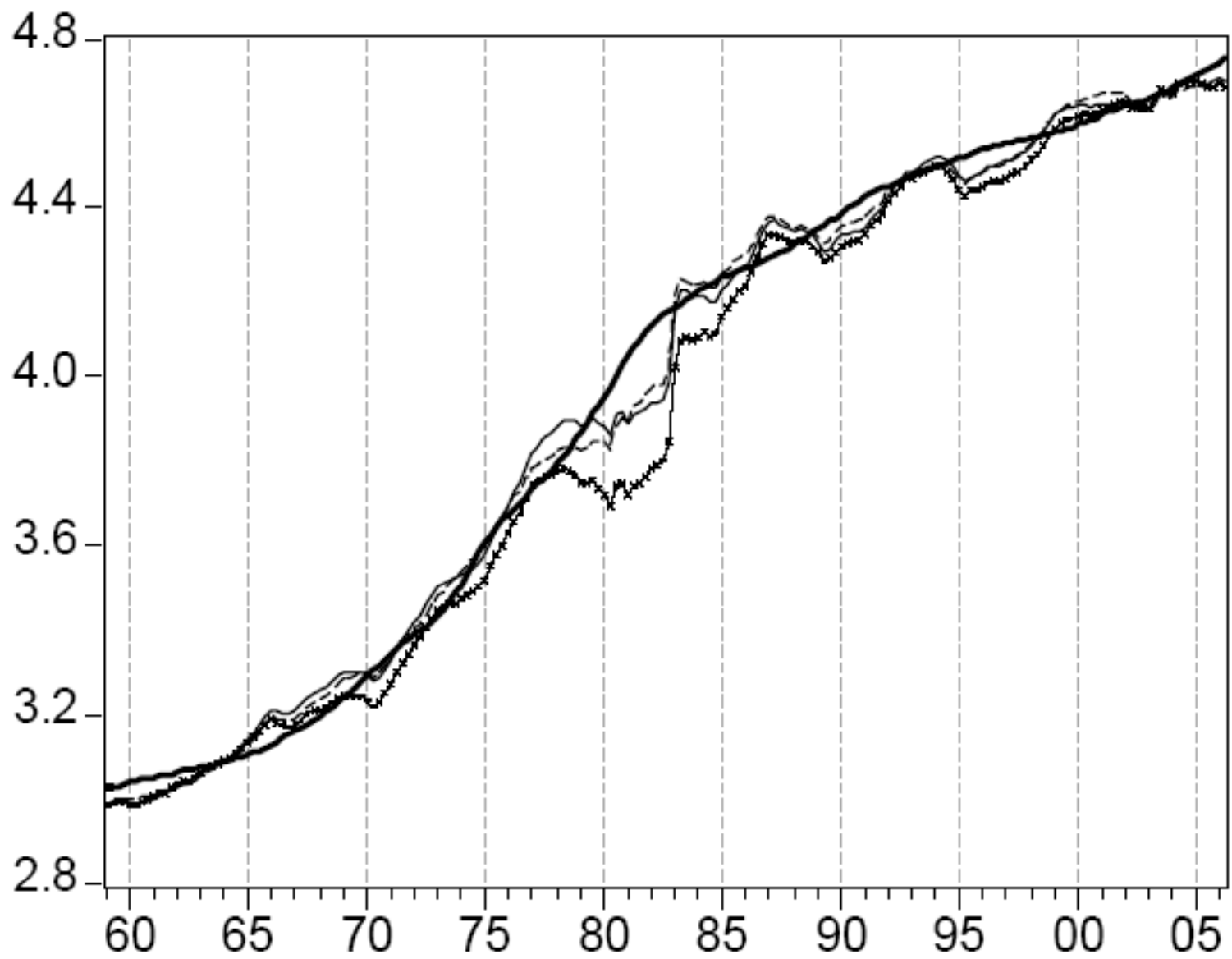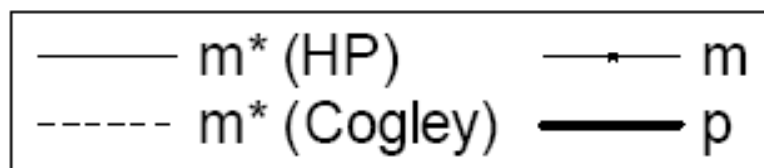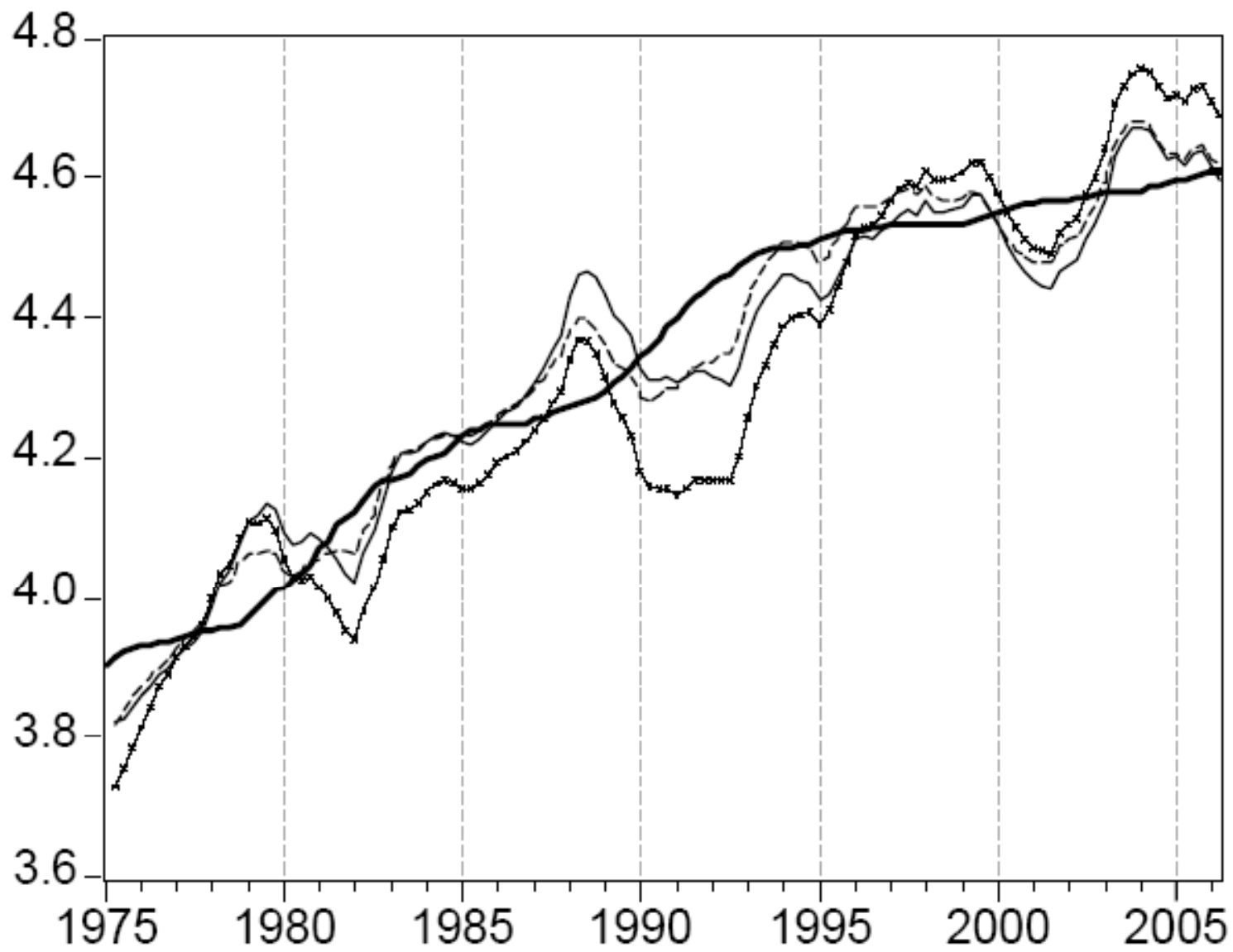|		
—— m* (HP)	—•— m	
- - - m* (Cogley)	▬▬ p	
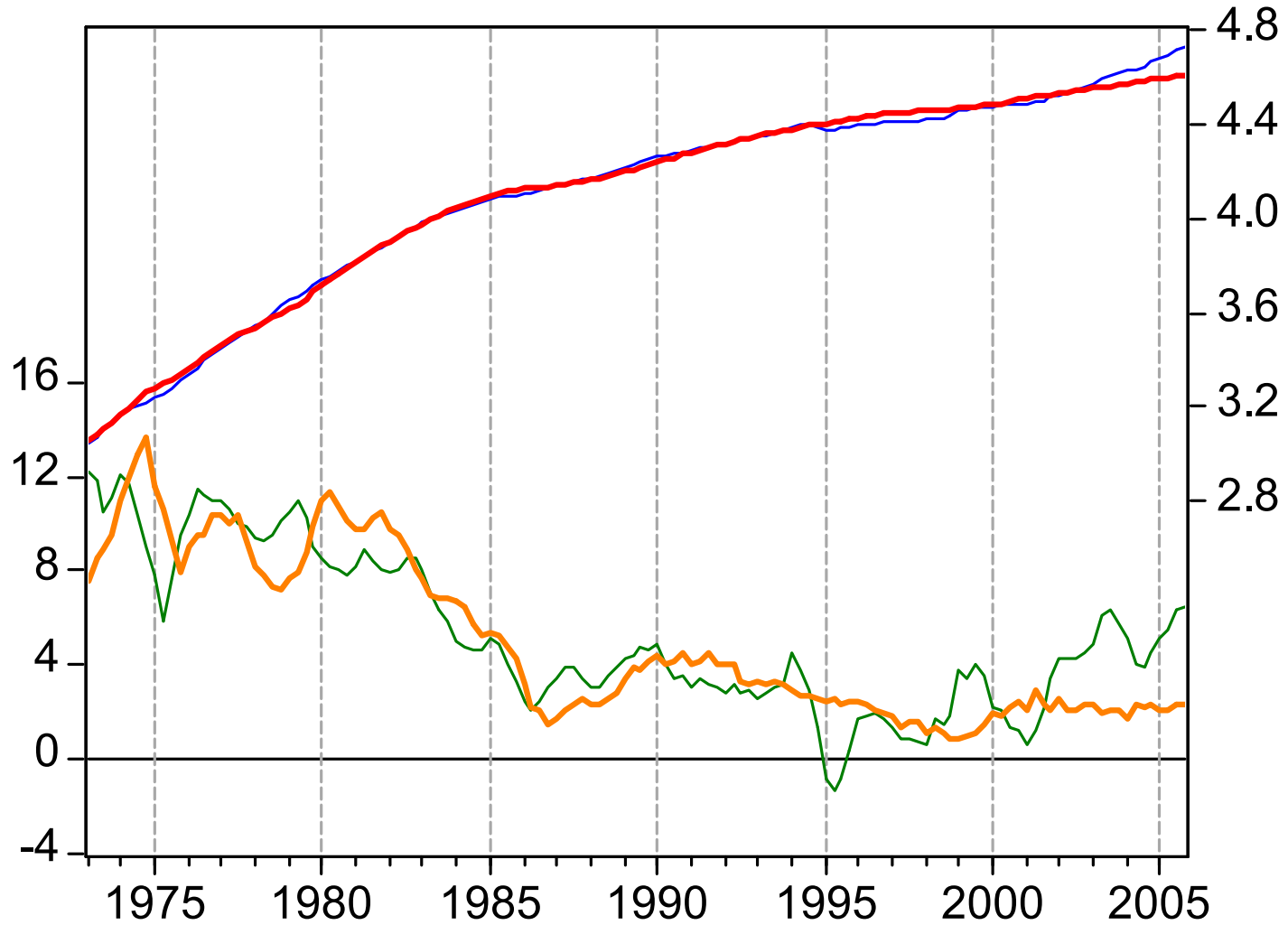
$$m_t = -c + p_t + y_t - \beta i_t + \varepsilon_t$$

$$m_t^* - p_t = (y_t - y_t^*) + \beta \left(i_t^* - i_t\right) + \varepsilon_t$$

$$p_t^y \equiv p_t + (y_t - y_t^*)$$
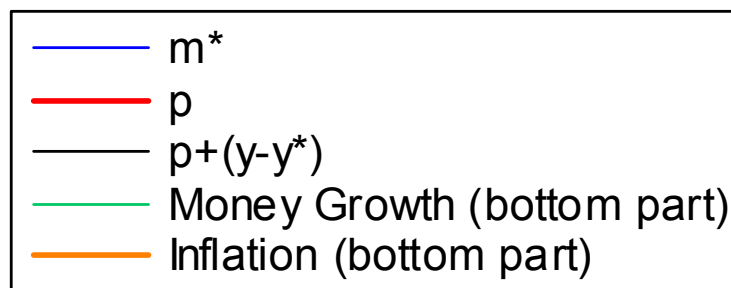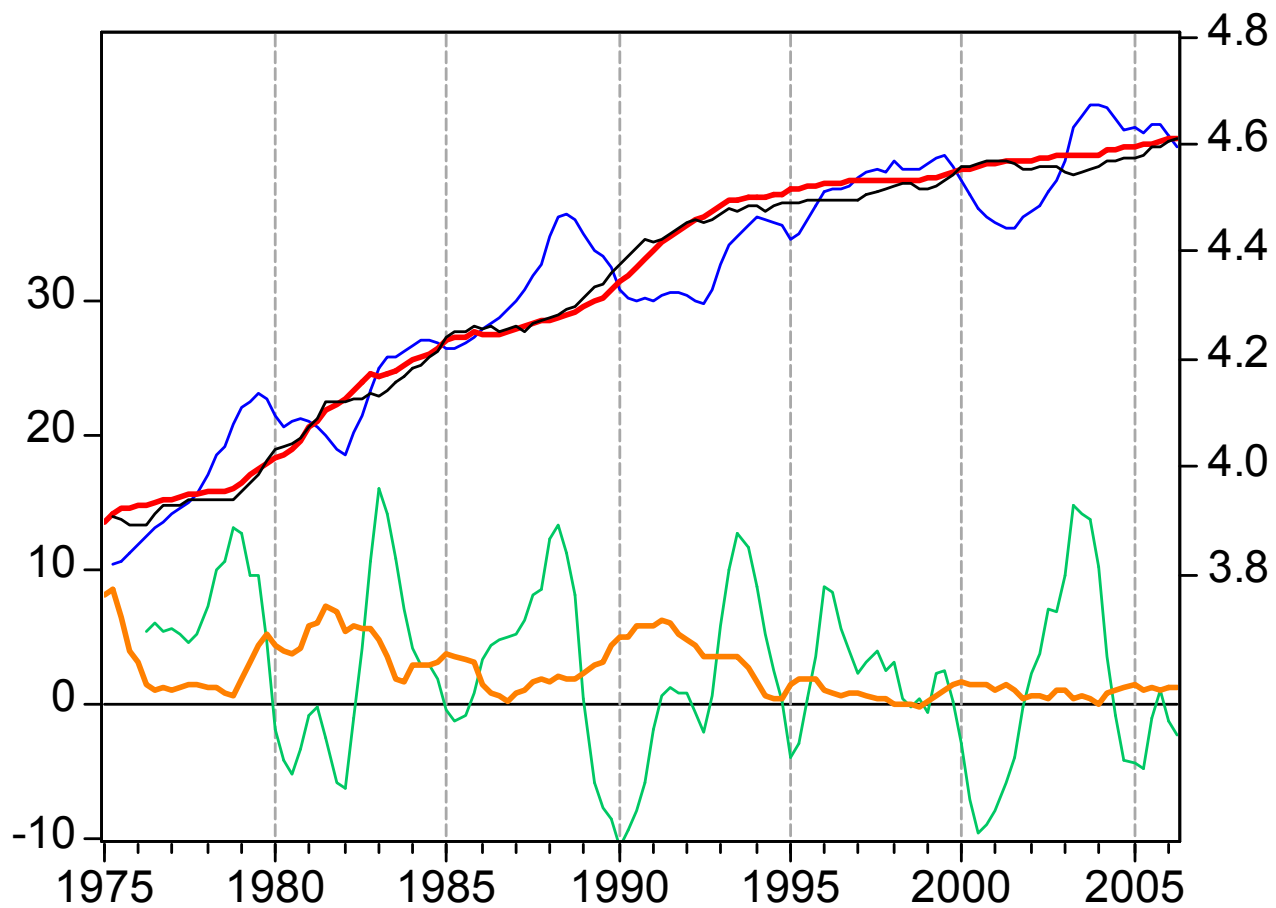
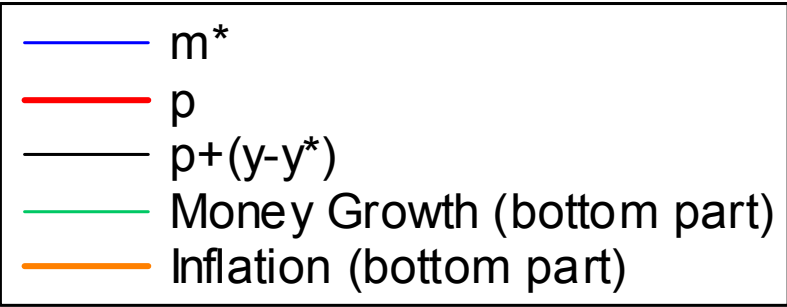short-term velocity movements can also be expressed as $m_t^* - p_t^y$

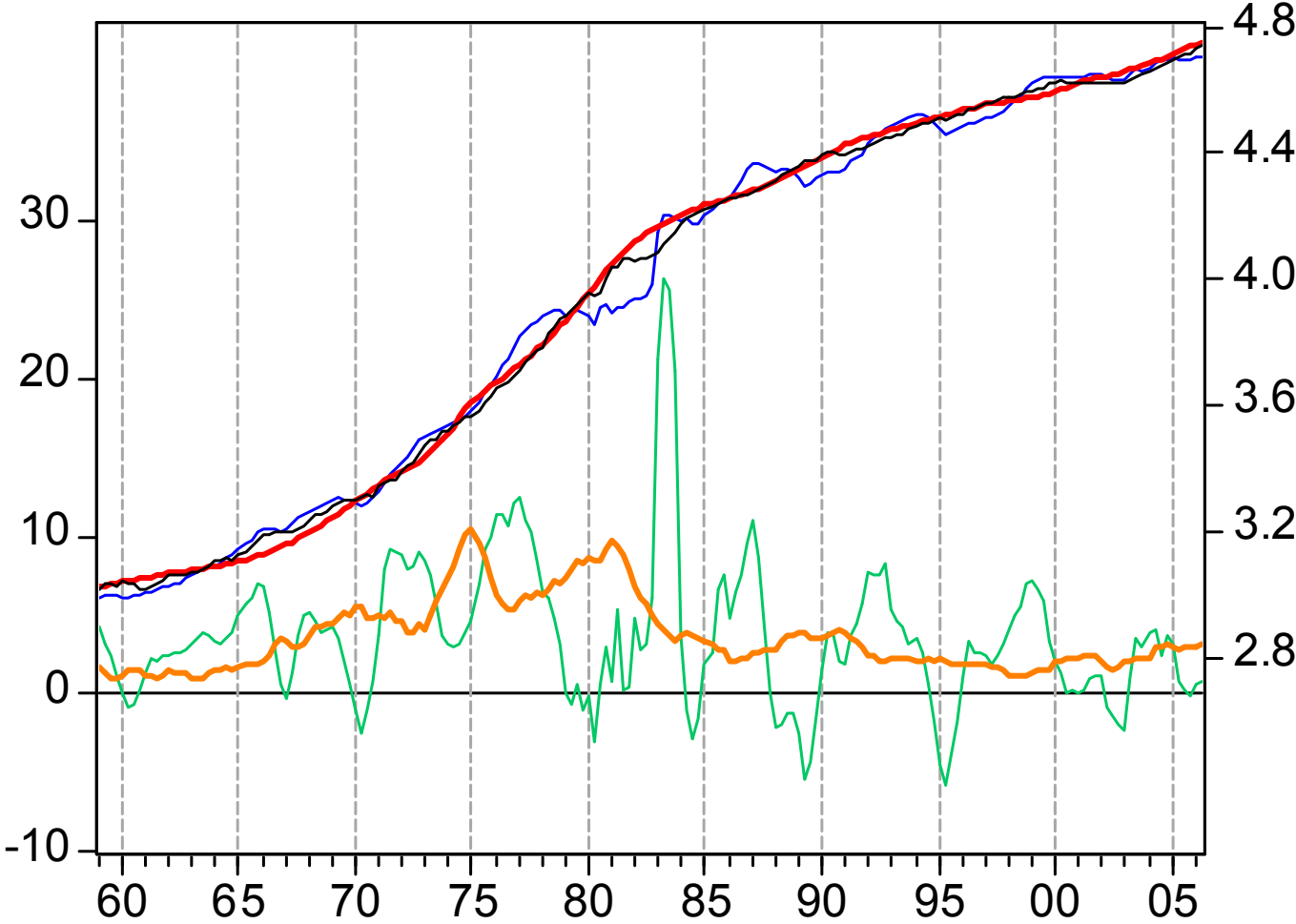**Switzerland**   m*: adjusted money level (log)   p: price level (log)

Legend:
- m*
- p
- p+(y-y*)
- Money Growth (bottom part)
- Inflation (bottom part)

US
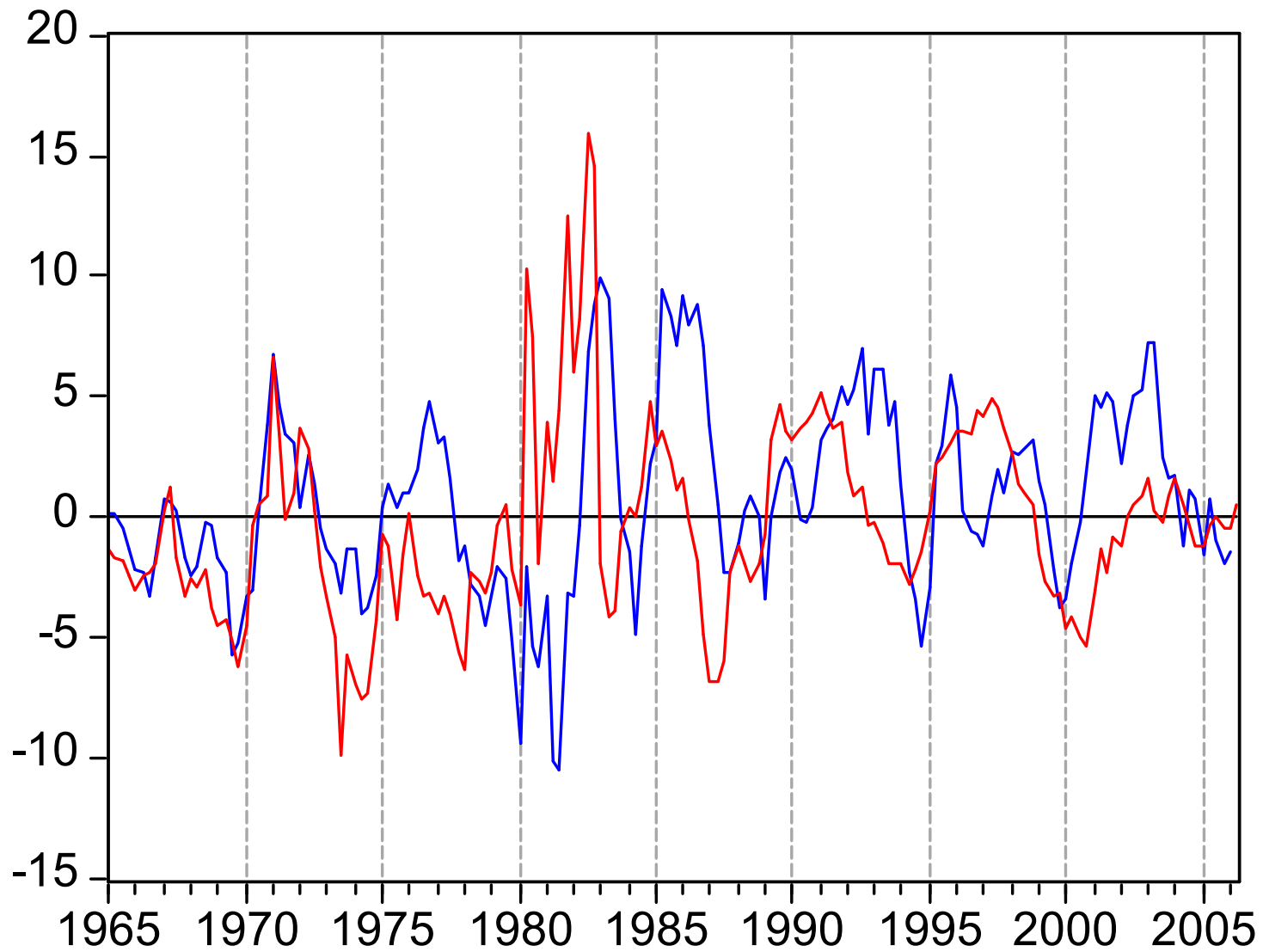
Legend:
- m* (blue)
- p (red)
- p+(y-y*) (black)
- Money Growth (bottom part) (green)
- Inflation (bottom part) (orange)
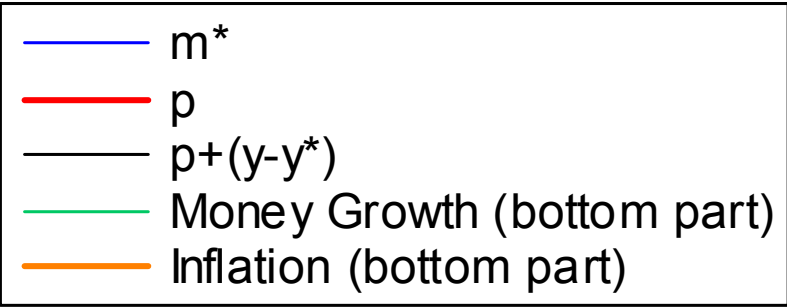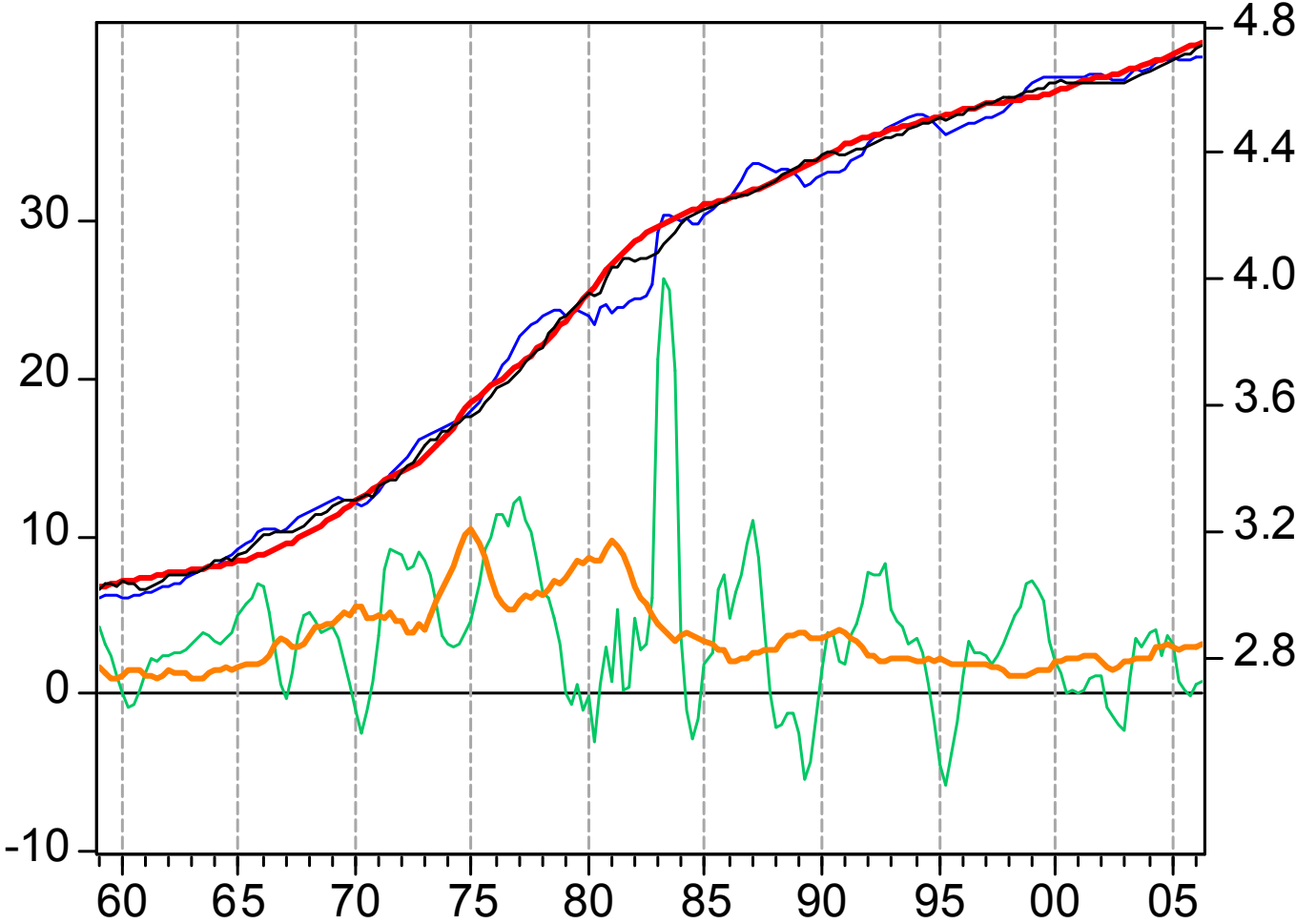
Usual Criticisms

- Velocity "shocks" weaken the signal of money regarding future inflation

→ assumption: monetary policy affects economy only via short-term interest rate

→ not supported by facts

- If money is used to offset other fundamental shocks, the link between money and inflation disappears

→ not supported by facts

→ other fundamental shocks seem quantitatively small

Apparent changes in inflation dynamics

- Lower inflation volatility
- Flattening of the Phillips curve
- Lower inflation persistence

$$\pi_t = \alpha + \rho\pi_{t-1} + \sum_i \delta_i \Delta\pi_{t-i} + \sum_j \gamma_j \left(y_{t-j} - y_{t-j}^*\right) + s_t$$

US

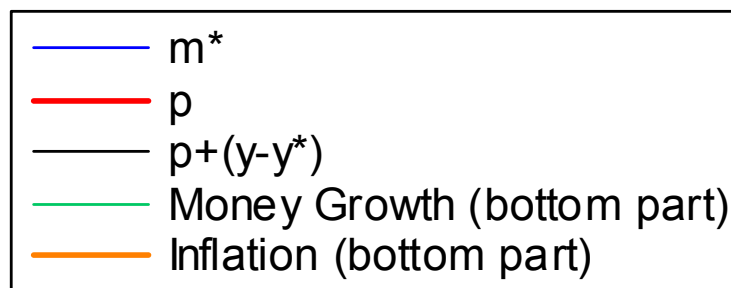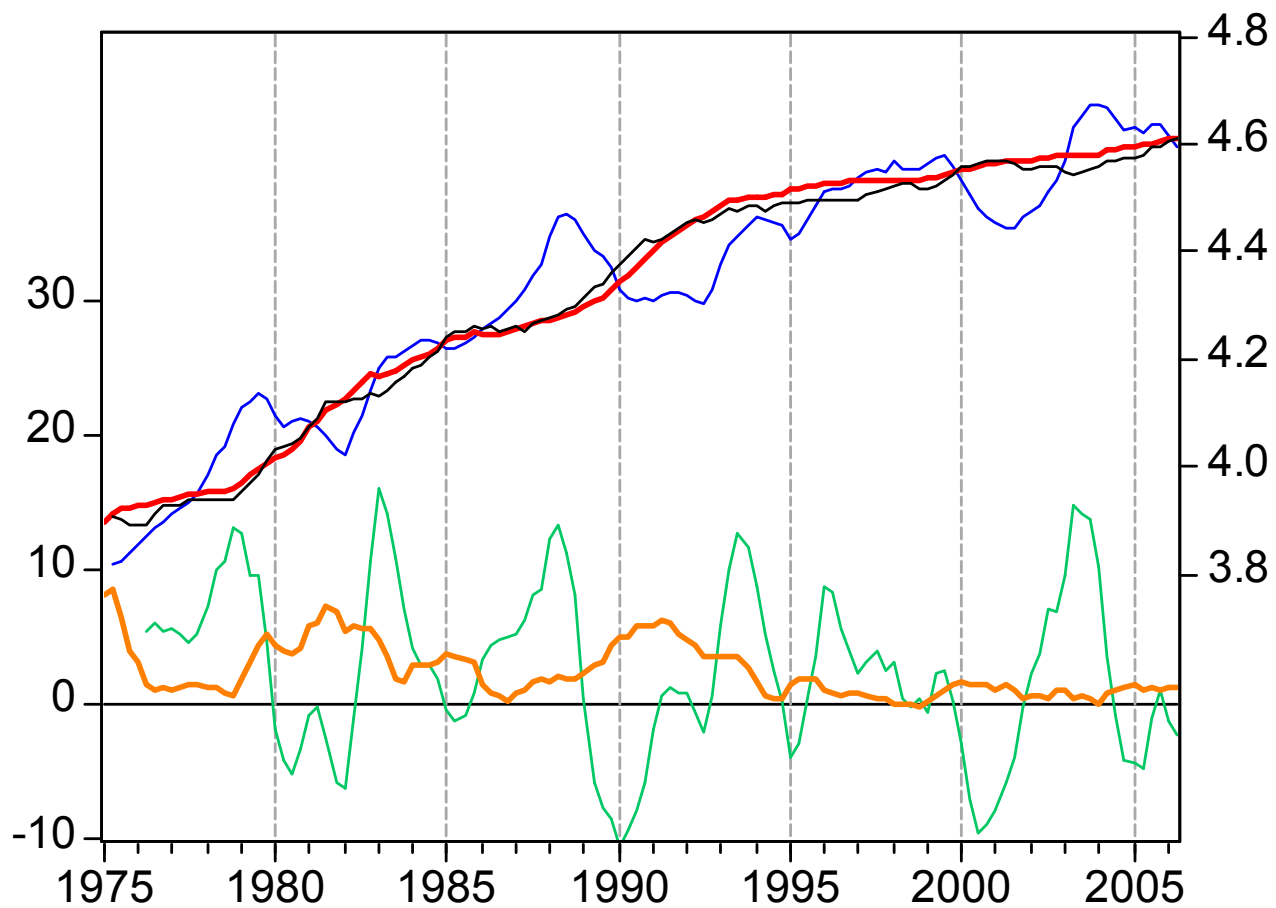|	
——	m*
——	p
——	p+(y-y*)
——	Money Growth (bottom part)
——	Inflation (bottom part)

Switzerland   m*: adjusted money level (log)   p: price level (log)

mu*: (adjusted) money growth rate

	π	μ^*	$\Delta\pi$	$y - y^*$	$m^* - p$
US					
59-79	4.22	4.42	0.09	0.46	1.93
70-79	6.41	6.21	0.12	-0.42	2.94
79-06	3.18	3.01	-0.06	-1.26	-2.41
59-06	3.63	3.62	0.01	-0.52	-0.54
85-06	2.45	2.46	0.01	-0.67	-0.77
90-06	2.29	2.31	0.01	-0.84	-1.30
94-06	2.11	1.52	0.02	-0.55	-0.83
CH					
76-93	3.21	3.36	0.00	-0.19	0.65
76-02	2.42	2.56	0.00	-0.65	-0.72
85-02	2.00	1.68	-0.04	-0.40	-1.88
94-02	0.85	0.96	0.01	-1.56	-3.47
EA					
73-79	9.33	9.95	0.09	0.18	-0.53
80-03	3.69	3.75	-0.09	0.00	-0.57
73-03	4.97	5.15	-0.05	0.04	-0.56
85-03	2.58	2.90	-0.04	0.00	-0.69
94-03	1.93	2.43	-0.01	-0.06	-1.39

Conclusions

- Practical issues with current monetary policy modeling

- Useful information of money for subsequent inflation trends & fluctuations around trends

- Inefficiency of disregarding money in model building & policy making