

Money and monetary policy: The ECB experience 1999 - 2006

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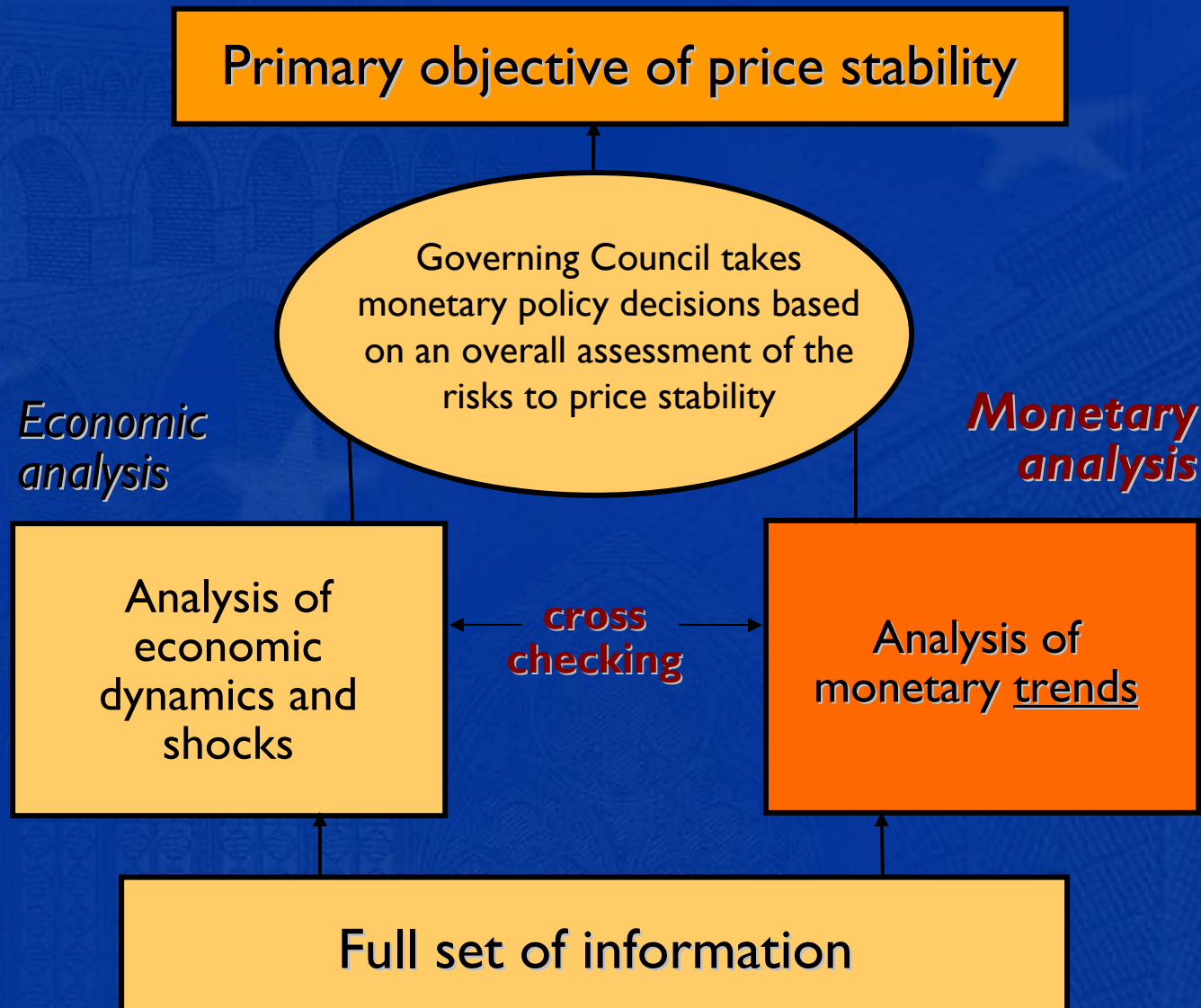
(co-authors L. Reichlin, H. Pill, M. Lenza)

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Key Questions

- 1) How was monetary analysis conducted in practice?
(Tools and evolution)**
- 2) What has been the performance of monetary analysis in
quantifying risks to price stability?**
- 3) How has monetary analysis been used in monetary policy
decisions?**

The ECB's monetary policy strategy



Structure of the briefing for the Governing Council

- **Monetary pillar**
- **Quarterly Monetary Assessment**
 - **Input**
 - tools based on money demand
 - broad monetary analysis
 - inflation forecasts
 - **Output**
 - M3 corrected for judgmental factors
 - quantitative measures of risks to price stability
 - overall qualitative assessment of risks to price stability
- **Economic pillar**
- **Macroeconomic projection exercise**
 - (biannual done by Eurosystem staff, intermediate by ECB staff)
 - **Presentation of projections of ranges of key economic indicators up to a horizon of 9 quarters, risks for the projections and analysis of underlying forces**

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Monetary analysis: Money Demand

Reference value for annual M3 growth 4½%

(potential output 2-2½%, inflation below 2%, decline in velocity trend ½% to 1%)

$$\Delta m_t^* = \Delta p_t^* + \beta \Delta y_t^*$$

Stylised long-run demand for real money

$$m_t - p_t = k + \beta y_t + \gamma i_t$$

Excess liquidity measures

- Real money gap

$$RMG_t = (m_t - p_t) - (k + \beta y_t^* - \gamma i_t^*)$$

- Other excess liquidity measures

P-star model and inflation forecasts derived from P-star model

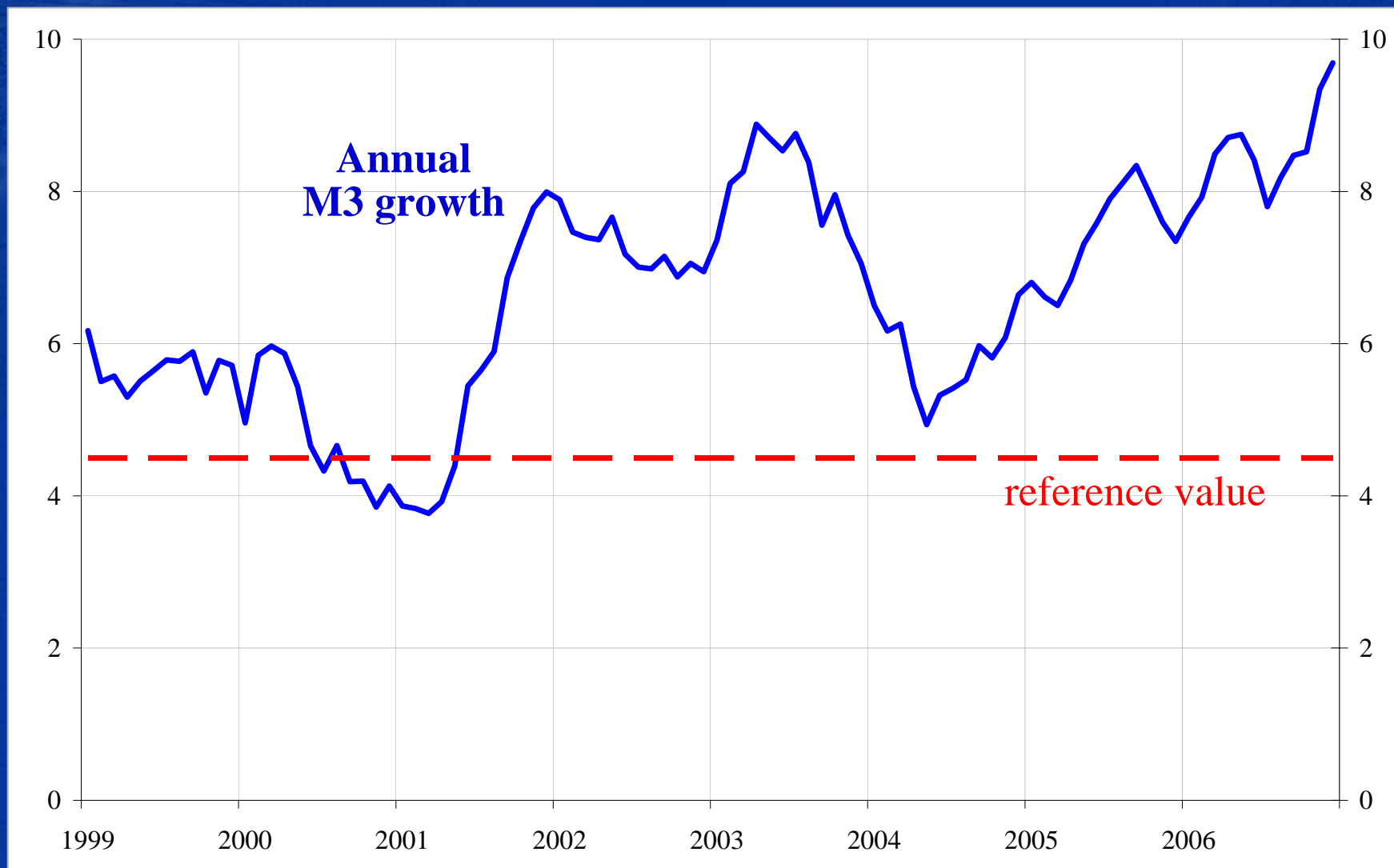
$$p_t^* = m_t + v_t^* + y_t^*$$

$$-(p_t - p_t^*) = RMG_t$$

RMG gives information about likely future evolution of prices

Monetary Analysis: Annual M3 growth and the reference value

annual percentage change, sa



Source: ECB, taken from QMA 2006 Q4

Monetary analysis: Evolution

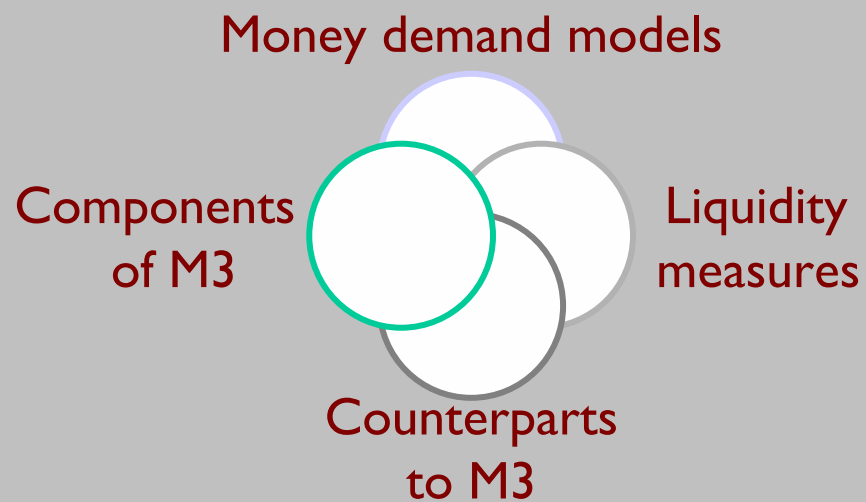
Challenges

- Technical factors (e.g. introduction of remuneration of required reserves)
- Statistical problems (e.g. non-resident holdings of marketable instruments)
- Economic behaviour not captured by conventional determinants of money demand (e.g. portfolio shifts)

Practical responses in real time

- 1) Broadening of the monetary analysis and derivation of M3 corrected for judgmental factors
- 2) Stronger weight on reduced form equations for forecast
- 3) Freeze estimates of parameters of money demand equations, de-emphasise outcomes based on money demand models using headline M3 (excess liquidity measures derived from headline M3 and the reference value only used to provide risk scenarios, not central view)

Broadening of the monetary analysis



These tools/elements have both an aggregate and sectoral dimension

Real Time Response I: Analysis of determinants of portfolio shifts

Analysis of broad set of indicators of portfolio shifts into money not captured by standard money demand models:

- Measures of uncertainty concerning future income
- Measures of financial market volatility and risk aversion (capturing potential asymmetric effects)
- Quantitative indicators of portfolio decisions concerning domestic and foreign assets

→ **Derive levels of M3 free from money holdings stemming from temporary extraordinary portfolio decisions of economic agents and hence unlikely to be used for spending activities.**

Portfolio shifts I

- **Indicators to monitor and quantify portfolio shifts**

Group 1: Measures of uncertainty

- Consumer confidence
- Changes in unemployment

Group 2: Financial market indicators

- Exchange rate USD-euro
- DJ Eurostoxx index
- Implied stock market volatility
- Conditional correlation between stock and bond return
- Earnings yield premium
- Equity funds flows

Group 3: Monetary indicators

- Money market fund shares/units
- Loans to the private sector
- Net external assets
- Comparison US M2/ euro area M3
- Divisia M3 index

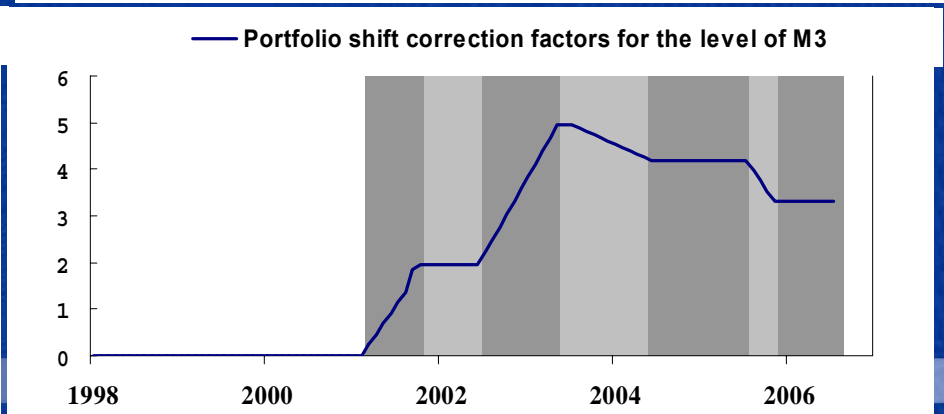
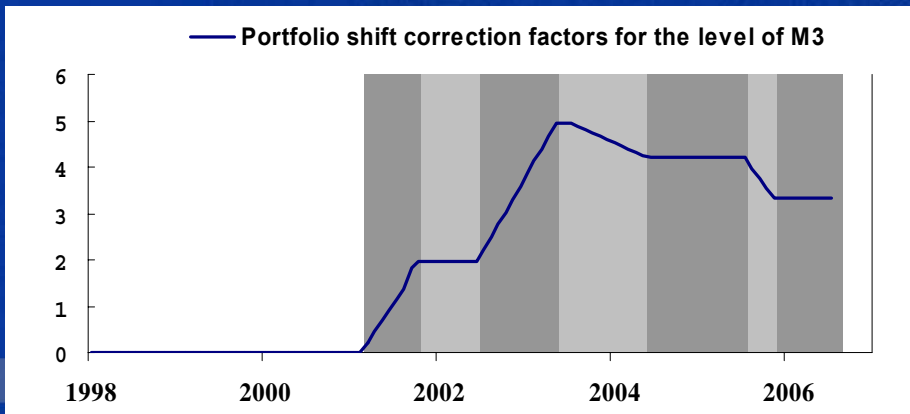
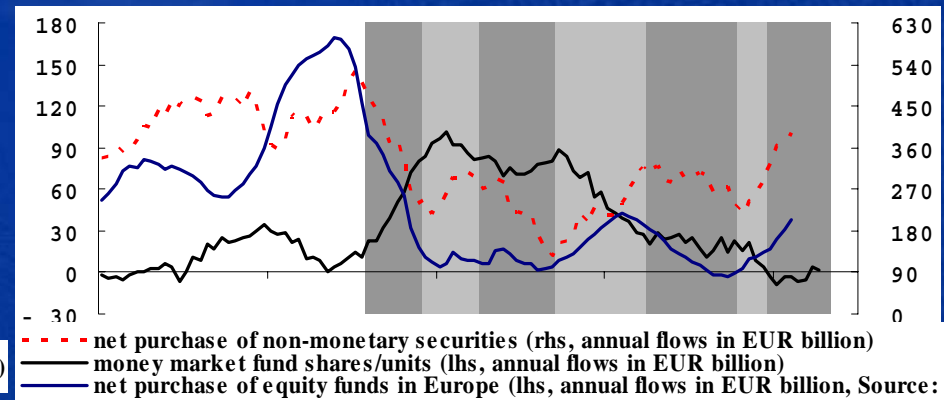
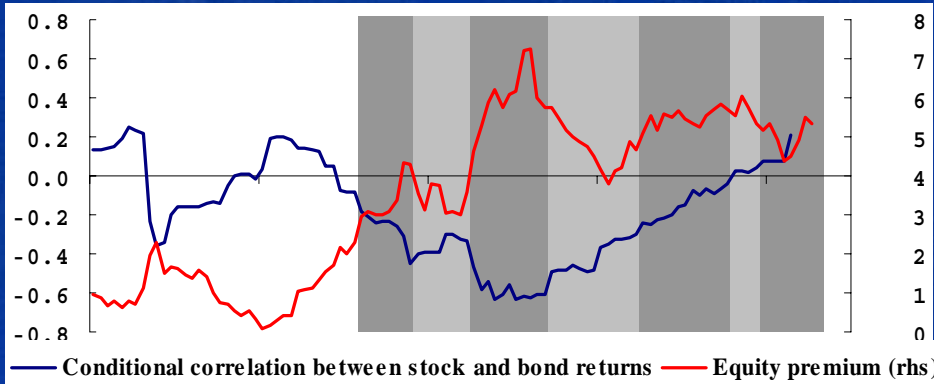
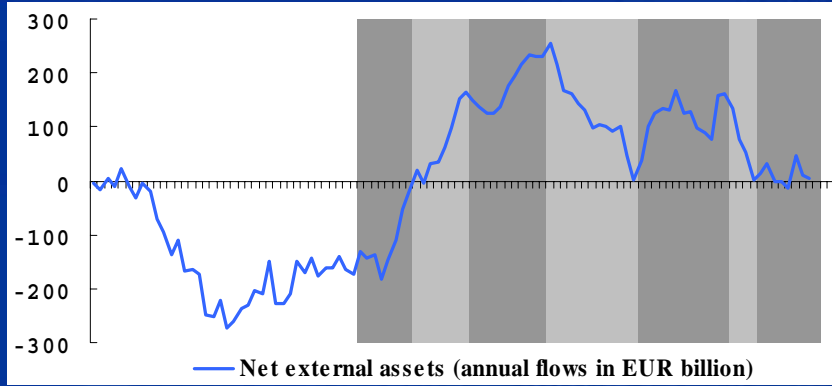
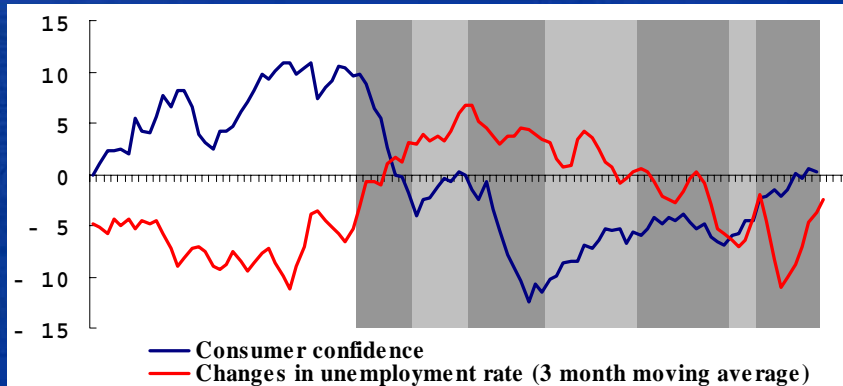
Group 4: Financial account/BOP indicators

- Monetary Presentation of BoP
- net external assets
- Net purchase of non-monetary securities

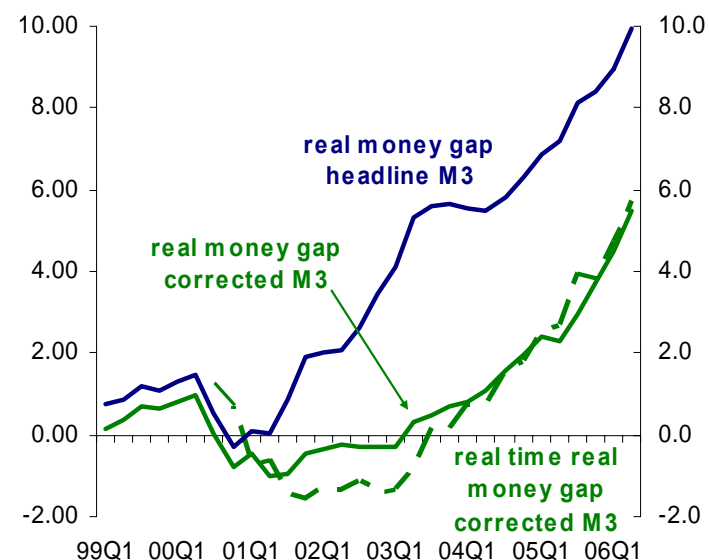
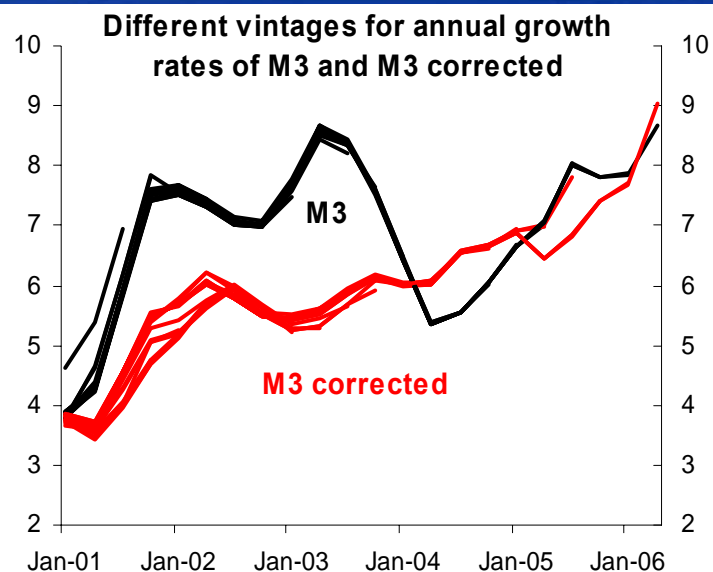
Monitoring tools:

- One-step-ahead forecast error for M3 from reg-ARIMA model
- Standard money demand model
- Liquidity preference shock derived from a small SVAR model

Example for judgemental analysis: The quantitative impact of extraordinary portfolio shifts on M3



Real Time Response II: Real time versus ex post assessment of effects of portfolio shifts



- Ex post assessment does not differ significantly from assessment in real time

- 2001 - 2003 Judgmental analysis captured in real time shocks to money demand contrary to standard money demand models

- Mid 2004 - present Liquidity pressures stemming from money creation via credit (no correction)

Real Time Response 2: Bivariate Inflation Forecast (Nicoletti-Altimari, 2001)

$$\pi_{v,t+h} = a_v + b_v(L)\pi_{v,t}^s + c_v(L)x_{v,t} + e_{v,t+h}$$

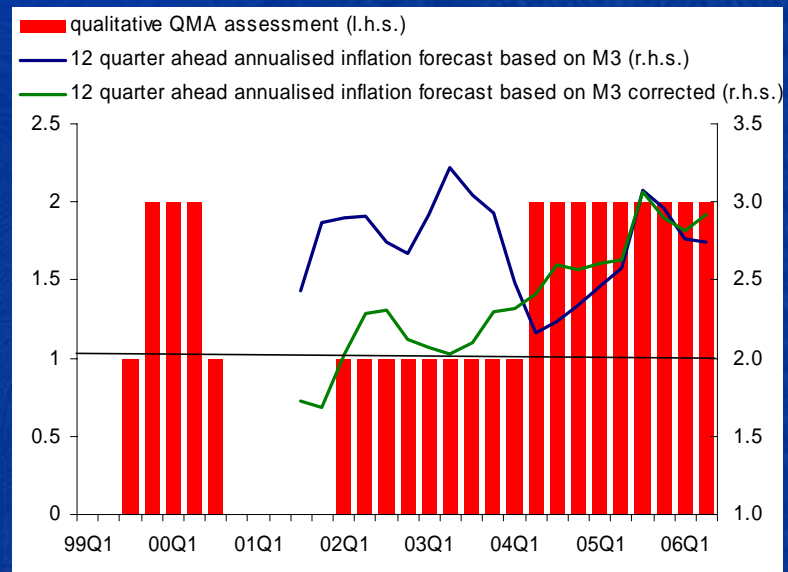
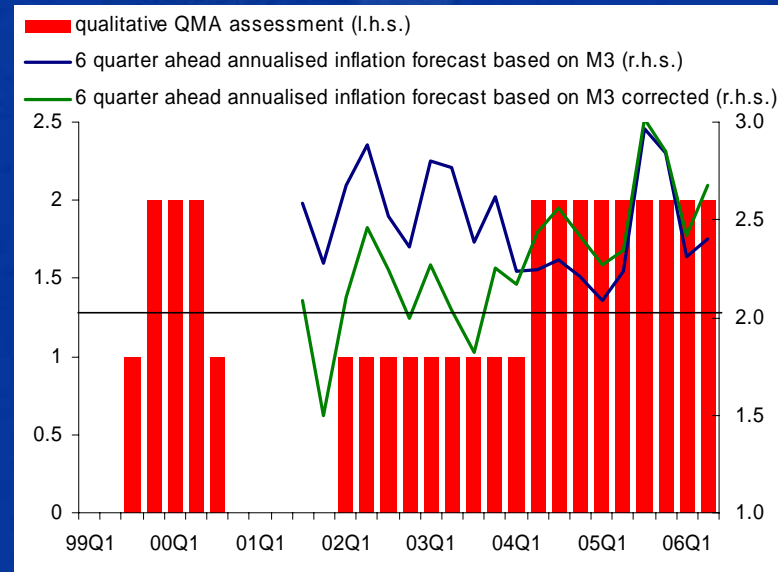
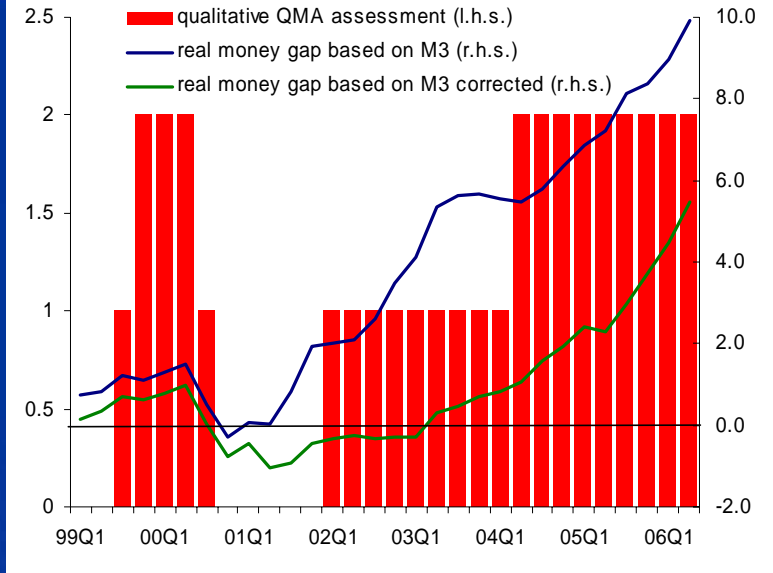
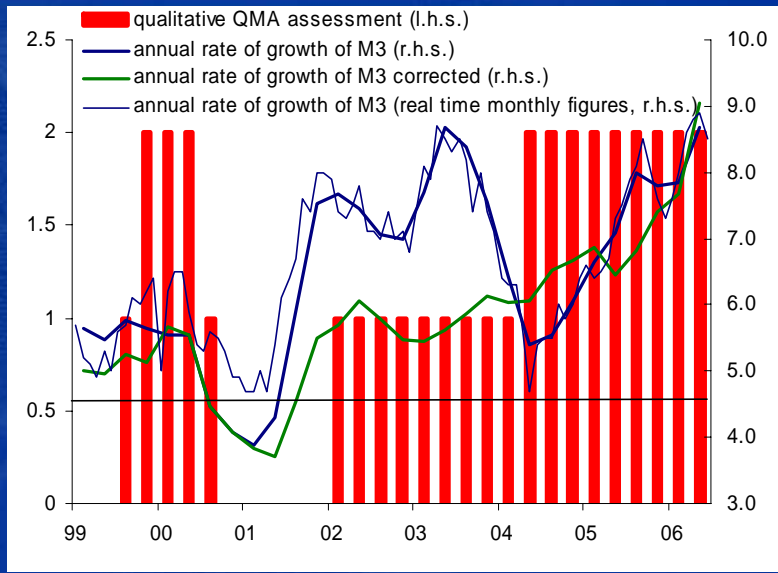
$\pi_{v,t+h}$ equals the annualised h-period change in the HICP

$\pi_{v,t}^s$ equals the two quarter moving average of the q-o-q change in the HICP

$x_{v,t}$ equals the four quarter moving average of the q-o-q change in money

Monetary analysis: Summary indicators: 4 phases

coding from -2 (clear downward risks) to +2 (clear upward risks)



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Inflation forecasting evaluation

Target: annualised inflation over the next six quarters

- Money based forecasts against two benchmarks: Economic Analysis projections and naïve forecasts

	MSE relative to RW	BIAS	Variance of forecast error
M3	1.86	0.28	0.11
M3 corrected	1.04	0.01	0.11
BMPE	2.40	-0.45	0.04
BMPE/M3	0.48	-0.08	0.04

Inflation forecast evaluation

- **BMPE and M3 forecasts significantly biased, opposite sign**
- **The judgmental correction of M3 corrected the bias of the inflation forecast but not volatility of forecast errors**
- **The random walk forecast outperforms these three forecasts in MSE sense**
- **The forecast combination BMPE/M3 is smooth and unbiased and outperforms the random walk forecast**
- **The M3 forecast adds information to the BMPE (enc. test)**

Forecast encompassing

- Is it possible to find a convex linear combination of the **BMPE** ($\pi_{v,t+h}^B$) and **money** ($\pi_{v,t+h}^M$) forecasts that **significantly outperform the BMPE forecast** (allowing for a bias term k)?

$$\pi_{t+h} - \pi_{v,t+h}^B = k + \lambda(\pi_{v,t+h}^M - \pi_{v,t+h}^B) + \eta_{t+h}$$

- **Encompassing tests: results**

Parameter	k	λ
M3	0.27*** (0.06)	0.24** (0.09)
M3 corrected	0.35*** (0.04)	0.22** (0.08)

Newey-West corrected standard errors in paranthesis. Three stars indicate that the coefficients are significant at 1% level, two stars at 5% level, one at 10% level

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QMA and Introductory Statement: indicators

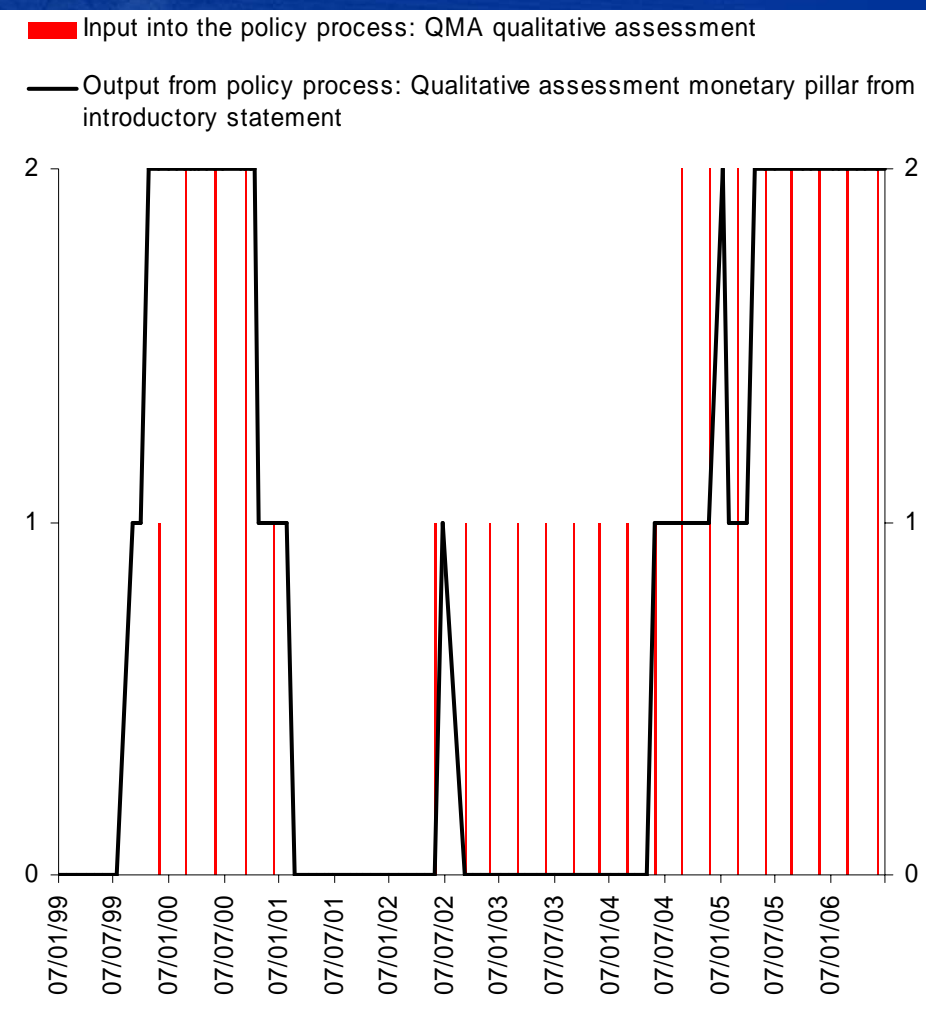
- **One measure of input: QMA qualitative assessment of risks to price stability**

Qualitative indicators coding the wording of official documents:

- **One measure of output: Monetary pillar assessment of risks to price stability stemming from monetary analysis
(compare with indicator of economic pillar assessment)**

Money and monetary policy: narrative approach

Qualitative input and output into/from the policy process



(coding of -2 hints at downward risks to price stability, coding of 2 indicates upward risks to price stability)

- **Overall, coincidence of QMA assessment and Introductory Statement assessment of risks to price stability stemming from monetary pillar.**

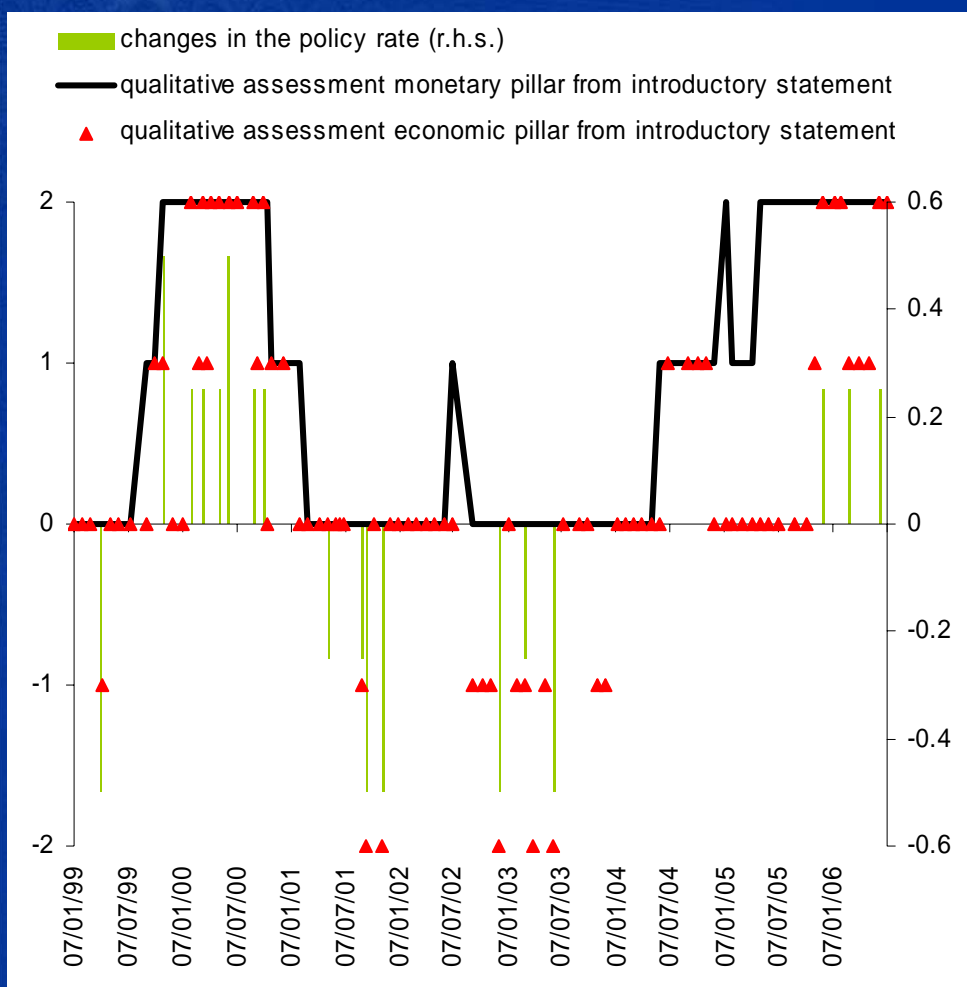
- **Exception: 2002-2004.**

- **Portfolio shifts. Monetary analysis presented a benign scenario but upside risks.**

- **Introductory statement did not take the upside risks assessment from the QMA into account.**

Money and monetary policy: narrative approach

Qualitative input and output into/from the policy process



(coding of -2 hints at downward risks to price stability, coding of 2 indicates upward risks to price stability)

- **Qualitative indicators coding the wording of Introductory Statement for economic and monetary analysis pillars**
- **High degree of correlation: difficult to identify role of two pillars in shaping interest rate decisions**
- **Indications from monetary pillar understated in 2002-2004 (portfolio shifts)**
- **Indications from monetary pillar for policy move in December 2005 very important.**

Summary and Conclusions

- **Monetary analysis has evolved over time to cope with several challenges: data, institutions and portfolio shifts → tools have been developed to identify shifts in supply and demand of money in real time**
- **Money has provided a valuable input for the assessment of price stability, complementing the economic analysis assessment**
Challenges: signals not always easy to identify (signal from qualitative assessment sometime blurred, forecast too volatile)
- **When signal from monetary analysis has differed from that of economic analysis, the economic analysis has played a larger role during a period where the monetary signal was blurred (2002-2004), but indication from monetary analysis played an important role in the interest rate move in December 2005**
Challenge: communication