

Liquidity, Inflation and Asset Prices in a Time-Varying Framework for the Euro Area

Christiane Baumeister

Eveline Durinck

Gert Peersman

Ghent University

Motivation

- One “pillar” of ECB policy strategy: money aggregates as an indicator of risks to price stability
 - Has been subject to intense criticism
 - Gerlach (2004) and Hofmann (2006): distortions of relationship between money growth and inflation over time
 - ECB: “no mechanical reaction but a comprehensive assessment of the liquidity situation based on information about the balance sheet context as well as the composition of M3 growth”
 - Gerlach (2007) and Fischer, Lenza, Pill and Reichlin (2008): there is a reaction, but also depends on information from the economic analysis
 - Link between excess liquidity and future inflation is probably not constant over time and depends on other factors as well

Motivation

- Monetary analysis could provide early information on emerging financial imbalances (asset price bubbles)
 - Christiano, Motto and Rostagno (2006): theoretical support for correlation between strong credit growth and boom-bust episodes in asset prices
 - Detken and Smets (2004): high-cost booms in asset prices often follow rapid growth in money and credit stocks
 - Also episodes in history where excess money growth is not followed by financial imbalances
 - Growing literature which shows that the impact depends on the underlying state of the economy
 - Asset price boom-busts, financial liberalization, business cycle, ...
 - Information of liquidity for asset prices is probably also not constant over time and state dependent

This paper

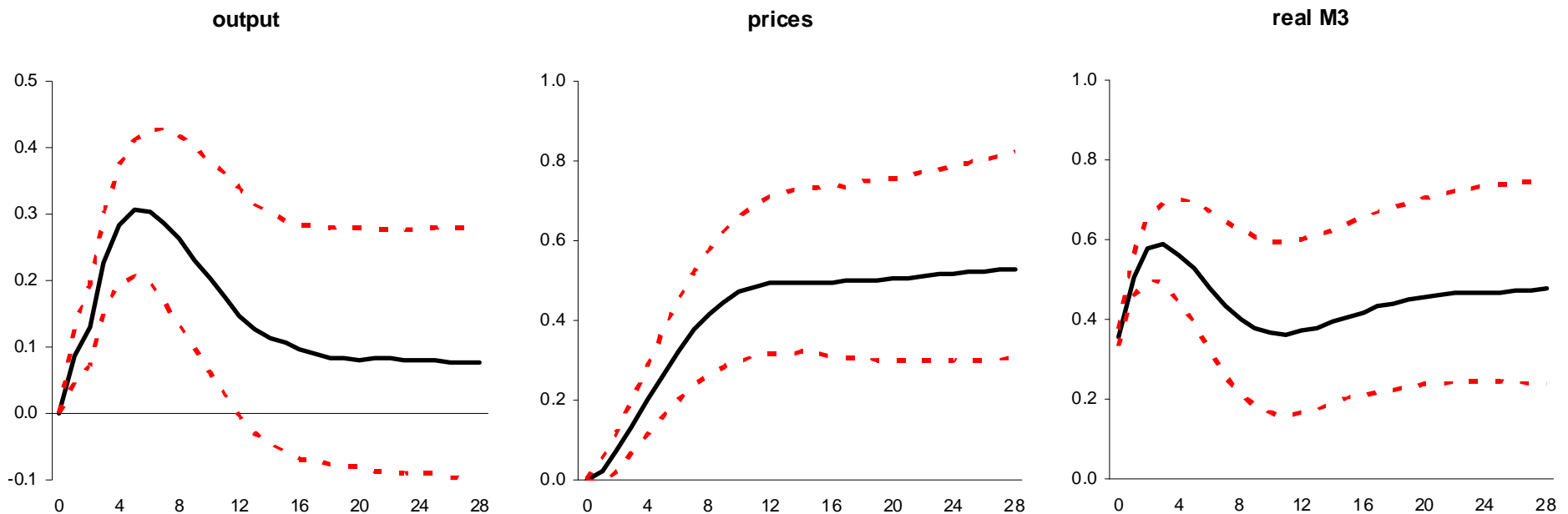
- Investigates the link between money, economic activity, asset prices and inflation in a time-varying and state dependent framework for the Euro area
 - SVAR to estimate the impact of liquidity shock
 - Benchmark
 - Distinction between the source of increased liquidity (M1, M3-M1 and credit)
 - Time-varying effects of liquidity shocks on the economy
 - A simple sample split (mid-eighties)
 - BVAR with time-varying parameters and stochastic volatility
 - Liquidity shocks and the state of the economy
 - Does the impact depend on the state of the economy (asset price boom-busts, business cycle, credit cycle, monetary policy, ...)?

Impact of liquidity shocks

- Benchmark SVAR for the period 1971Q1-2005Q4
 - Real GDP growth, HICP inflation, interest rate, real asset prices growth and money growth (M3)
 - Aggregate asset prices, property prices and equity prices
 - Recursive identification: exogenous shocks to liquidity which are not related to endogenous developments due to business or asset price cycles (“excess liquidity” like money overhang)

Impact of liquidity shocks

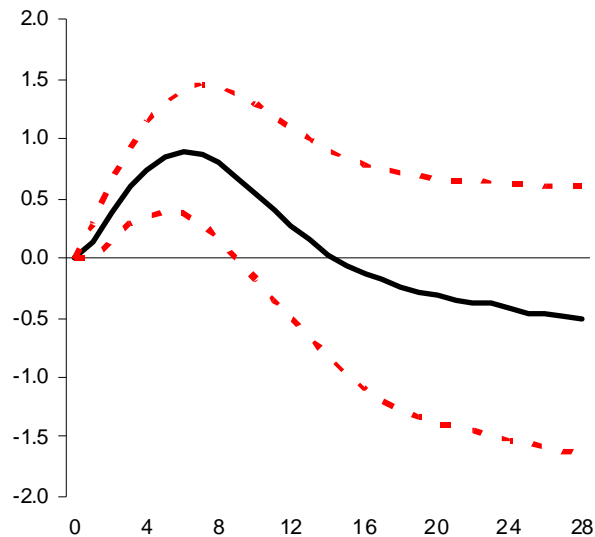
- 1% long-run rise in M3
 - Temporary positive effect on real GDP
 - Impact on prices is less than proportional: there is a permanent rise of real money holdings



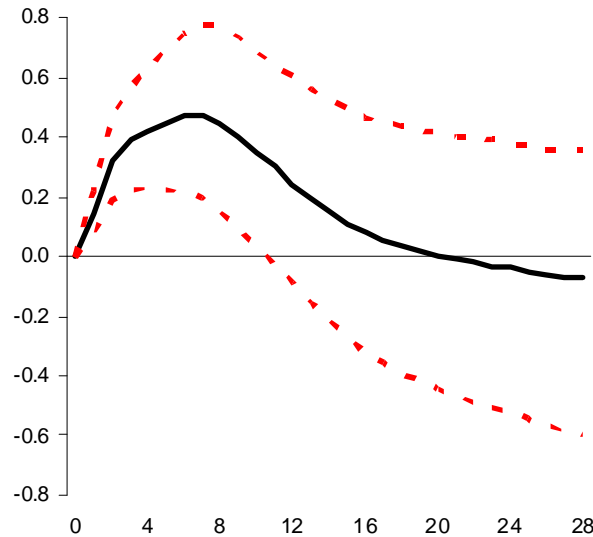
Impact of liquidity shocks

- 1% long-run rise in M3
 - Significant positive impact on real asset, property and equity prices

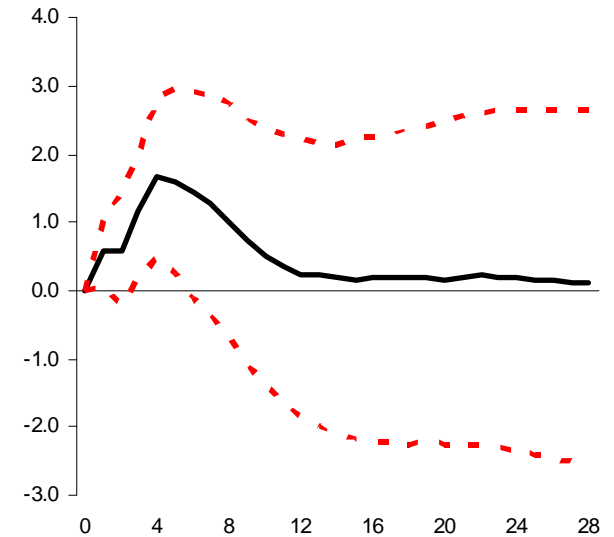
real asset prices



real property prices

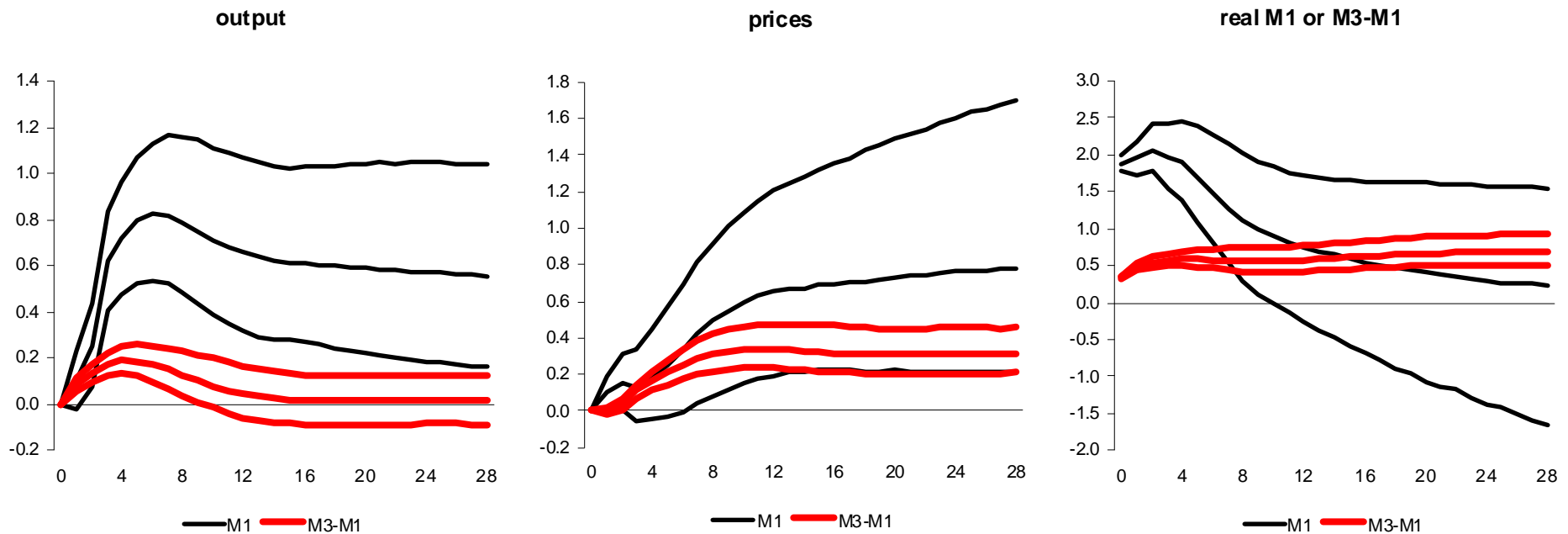


real equity prices



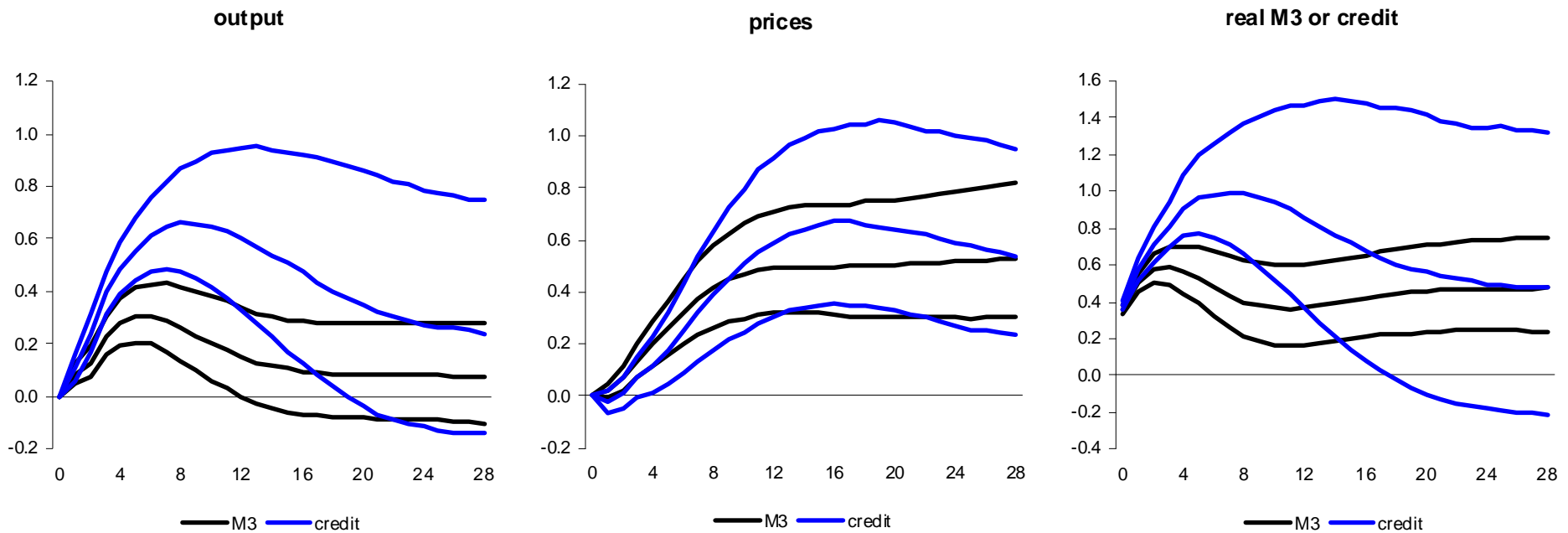
Impact of liquidity shocks

- Distinction between shocks to M1, M3-M1 and credit
 - Rise in M1 has a proportional impact on prices and a considerable effect on output (spending indicator)
 - M3-M1 has a much lower effect on output and prices: there is a permanent rise in real money holdings (change in portfolio preferences)



Impact of liquidity shocks

- Distinction between shocks to M1, M3-M1 and credit
 - Impact of shock in counterpart credit is similar as M3, except a stronger effect on output
 - No noticeable differences for impact on real asset prices

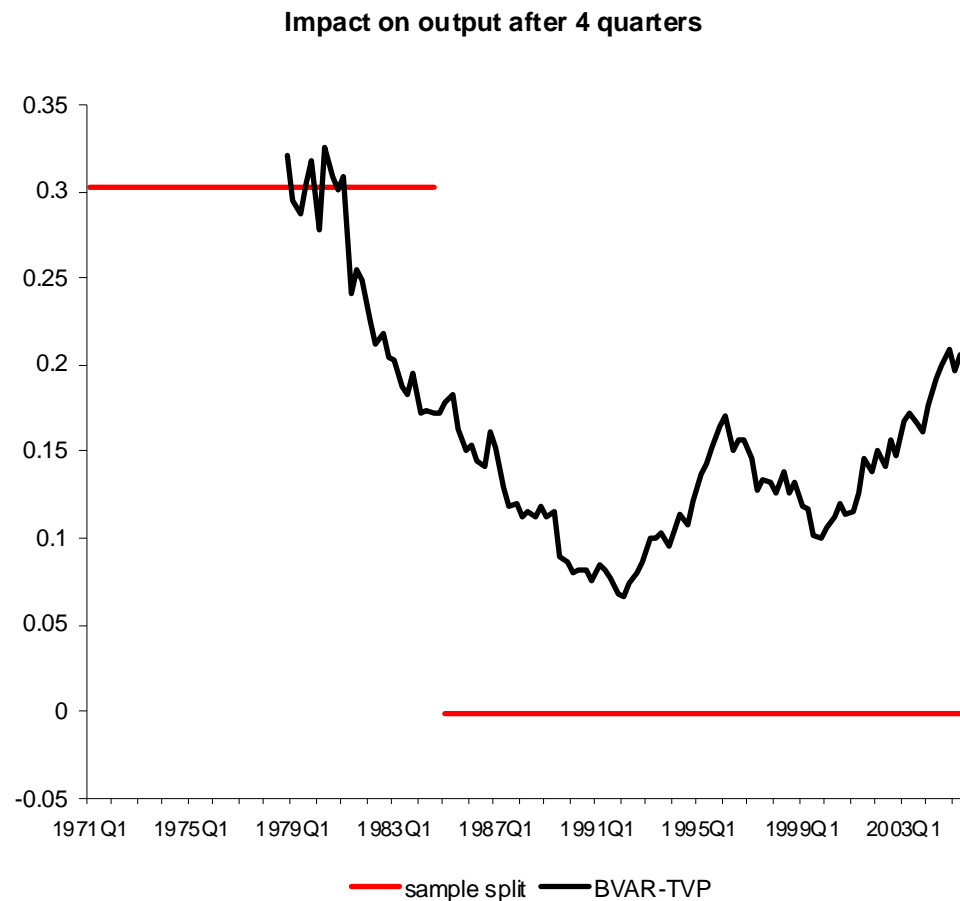


Time varying effects of liquidity shocks

- A simple sample split
 - Pre and post 1985
- Bayesian VAR with time-varying parameters and stochastic volatility
 - In the spirit of Cogley and Sargent (2002, 2005), Primiceri (2005), Benati and Mumtaz (2007)
 - Allows for smooth transitions over time and captures possible nonlinearities
 - Volatility of liquidity shocks is allowed to change over time (heteroscedasticity of the shocks)
 - Note: 1971-1978 is used as a training sample to calibrate the priors

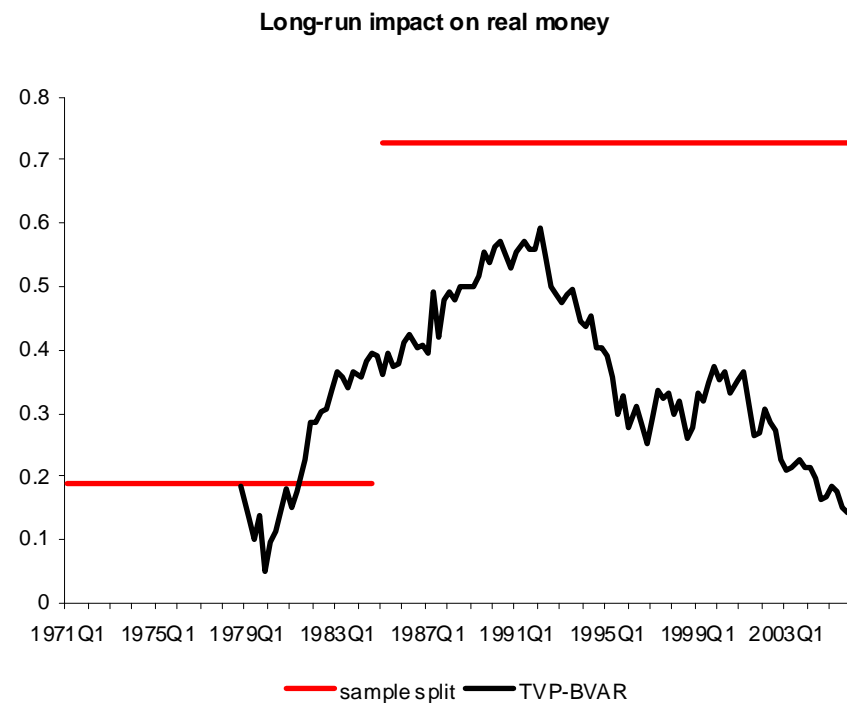
Time varying effects of liquidity shocks

- Impact on output is significantly smaller for post 1985 period, but rises again during certain periods



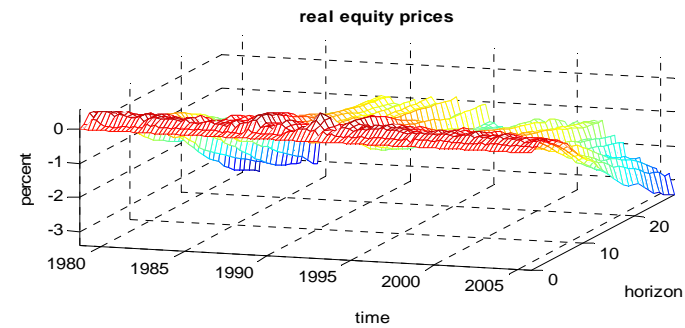
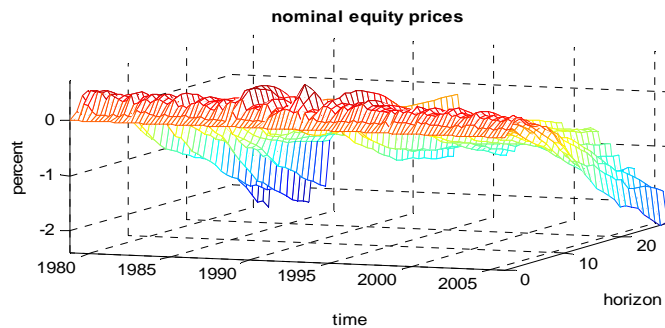
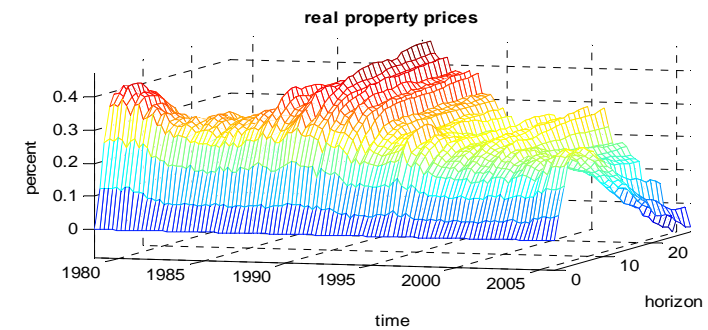
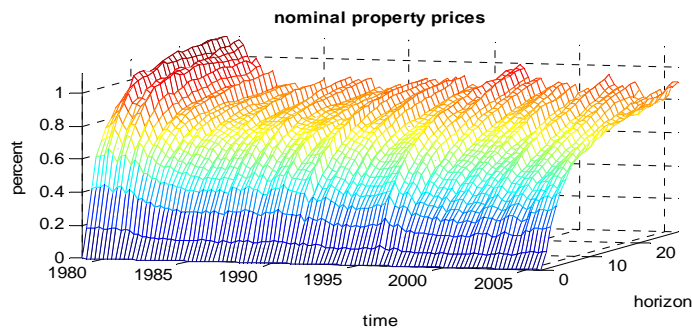
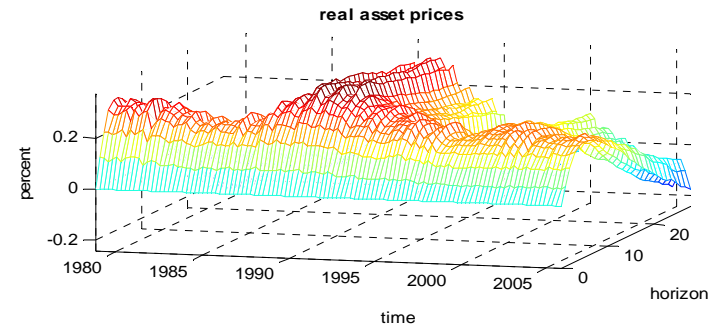
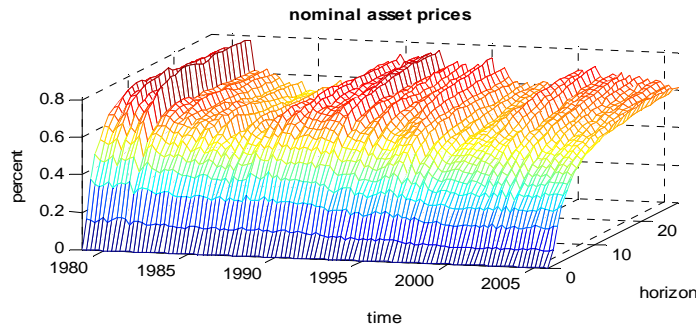
Time varying effects of liquidity shocks

- (near) proportional impact on prices before early 1980s while more permanent effect on real money holdings afterwards
- But: impact on inflation is also varying over time with noticeable increased impact in more recent period



Time varying effects of liquidity shocks

- Time-variation for asset prices not very clear



Liquidity and the state of the economy

- Growing literature arguing that the impact depends on the underlying state of the economy which can also affect the time-varying results
 - We consider 5 regimes simultaneously
- Single equation approach for output growth, inflation, nominal and real asset price growth

$$\Delta y_t = \alpha C_t + \sum_{i=1}^n \lambda_i \Delta y_{t-i} + \sum_{i=1}^n \beta_i \varepsilon_{t-i}^{liq} + u_t$$

$$\Delta y_t = \alpha C_t + \sum_{i=1}^n \lambda_i \Delta y_{t-i} + \sum_{i=1}^n \beta_i \varepsilon_{t-i}^{liq} + \sum_{j=1}^k \sum_{i=1}^n \gamma_{j,i} state_{t-i}^j \varepsilon_{t-i}^{liq} + u_t$$

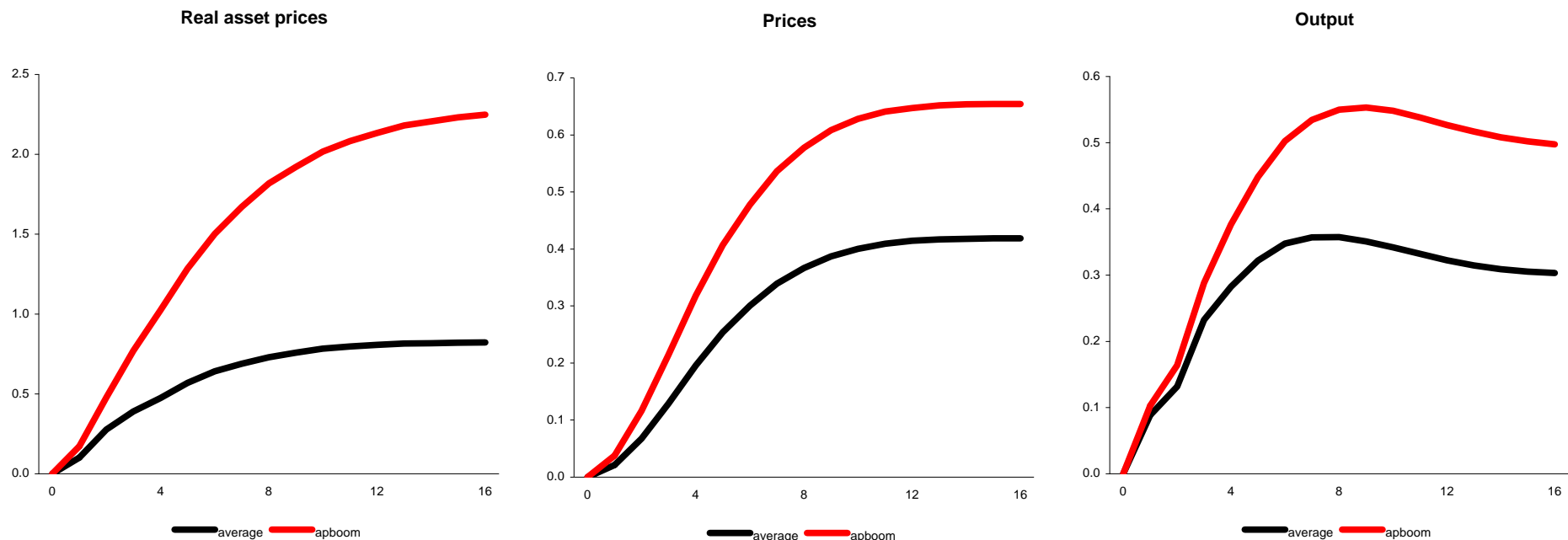
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Liquidity and the state of the economy

- Asset price booms and busts
 - Bank behavior changes in asset price booms
 - Herring and Wachter (2003) and Adrian and Shin (2008)
 - Rising bank capital and stronger balance sheets of banks: more willing to hold loans and possibilities for additional lending
 - Value of collateral on outstanding loans rises, reducing the risk on existing portfolio: more additional lending possible
 - Behavioral characteristics of banking sector (e.g. moral hazard)
 - Self-reinforcing process via the financial accelerator (asset prices as collateral), wealth effects, Tobin's q channel
 - Empirically confirmed by Adalid and Detken (2007) and Goodhart and Hofmann (2007) in cross section dimension
 - Asset price boom regime: when real aggregate asset price index exceeds its trend by more than 10% for at least three quarters

Liquidity and the state of the economy

- Asset price booms and busts: results
 - Stronger impact on output, inflation and real asset prices
 - Not significant for property prices
 - Also stronger effect on output and real asset prices in a bust
 - Including property prices
 - Economically very relevant!

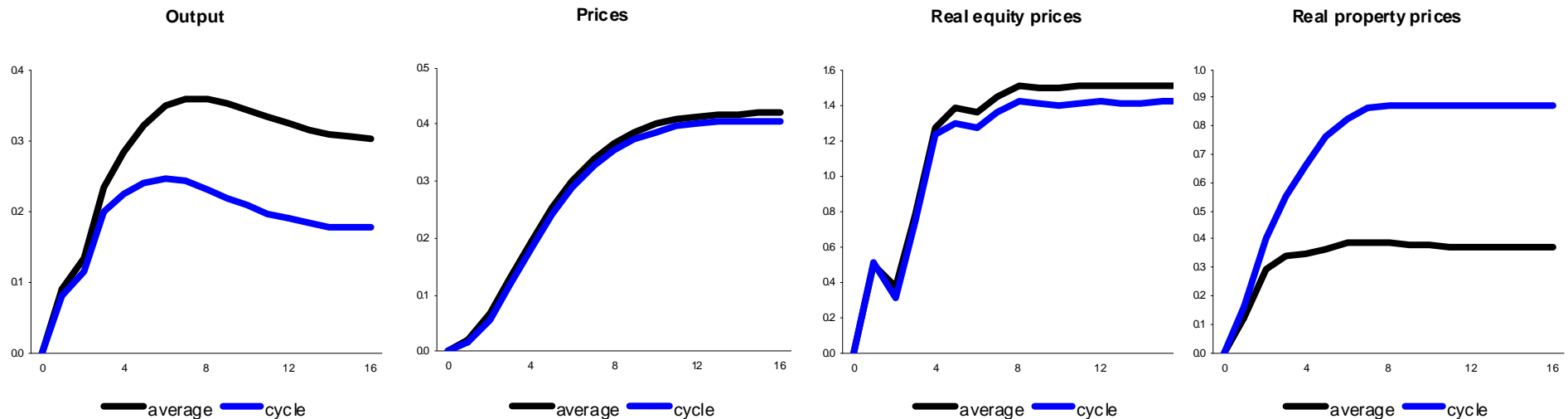


Liquidity and the state of the economy

- Business cycle
 - Financial accelerator weaker in booms: less external financing, high collateral and cash-flow values
 - Bernanke and Gertler (1989)
 - Weaker effect on economic activity and prices
 - Convex short-run aggregate supply curve
 - Weaker effect on economic activity + stronger effect on prices
 - Peersman and Smets (2002): output effects of monetary policy stronger in recessions
 - Economic boom: when real GDP growth is above its trend for at least three quarters

Liquidity and the state of the economy

- Business cycle
 - Weaker impact on output in economic booms
 - Consistent with financial accelerator (-) and convex supply (-)
 - No asymmetry for inflation and equity prices
 - Financial accelerator (-) and convex supply (+) cancelling each other out?
 - Stronger impact on property prices
 - Dominance of convex supply curve (+) in property market?
 - Economically also very important

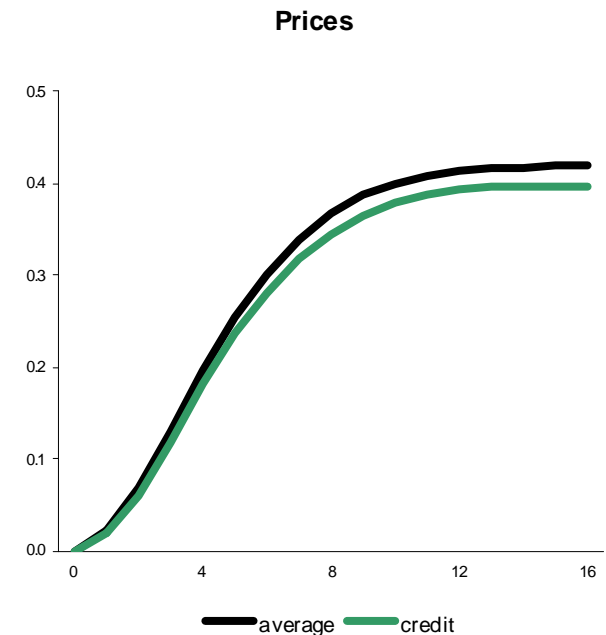
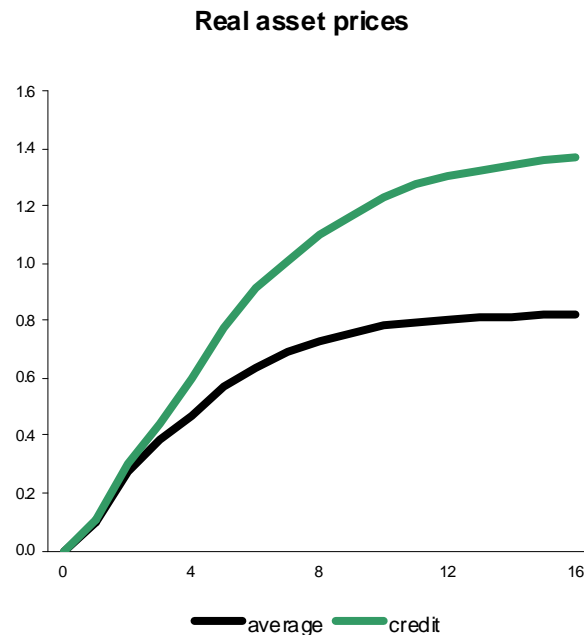
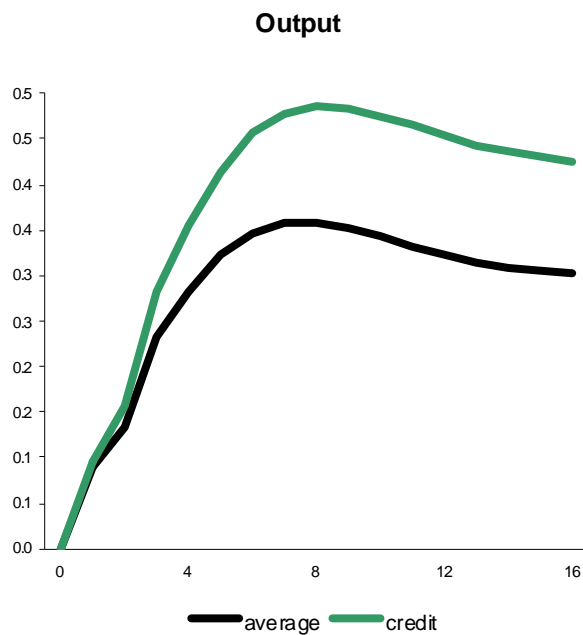


Liquidity and the state of the economy

- Financial deregulation and liberalization
 - Safest segment of borrowers shifts away from the banking sector towards the capital and stock markets
 - Strengthens the financial accelerator channel: search for new customers leads banks to smaller and riskier borrowers which increases the importance of collateral
 - Confirmed by evidence of Borio, Kennedy and Prowse (1994), Goodhart, Hofmann and Segoviano (2004) and Calza, Monacelli and Stracca (2006)
 - Credit boom: minimum three quarters in which money/credit to GDP ratio grows faster than its trend

Liquidity and the state of the economy

- Financial deregulation and liberalization
 - Stronger effect on output and all types of asset prices
 - Inflation depends on the specification
 - Economically very important



Liquidity and the state of the economy

- Inflation regimes
 - Borio and Lowe (2002) and Borio (2006): improved central bank credibility and increased globalization could reduce the impact of liquidity shocks on inflation, which could instead be translated into higher asset prices
 - Goodhart and Hofmann (2007): increased responsiveness of asset prices over time
 - Gerlach (2004) and our results: reduced impact on inflation over time
 - Inflation boom: inflation is at least three quarters higher than its trend value
 - Results
 - No robust asymmetry

Liquidity and the state of the economy

- Monetary policy stance & positive versus negative liquidity shocks
 - Restrictive monetary policy stance implies weak balance sheets of firms and a stronger financial accelerator
 - Balke (2000), Atanasova (2003) and Calza and Sousa (2005): stronger output and inflation effects at times of tight policy
 - Similar reasoning to expect stronger effects of negative liquidity shocks relative to positive liquidity shocks (because liquidity constraints more binding)
 - Convex short-run aggregate supply curve also predicts stronger output effects but a weaker impact on prices
 - Cover (1992): stronger effects of negative money supply shocks
 - Oliner and Rudebush (1995): financial accelerator is stronger after restrictive monetary policy shocks
 - Restrictive monetary policy: when actual interest rate is higher than interest rate obtained from Taylor rule

Liquidity and the state of the economy

- Monetary policy stance & positive versus negative liquidity shocks
 - Restrictive monetary policy stance
 - Somewhat stronger effect on output and asset prices but not robust
 - Weaker impact on inflation but economically relative small
 - Negative versus positive liquidity shocks
 - Negative shocks have significant stronger effects on output and all types of asset prices
 - Weaker effect on inflation
 - Economically relevant asymmetry



Conclusions

- Economic consequences depend on the source of liquidity shock
 - M1: proportional effect on prices and strong effect reaction
 - M3-M1: much lower impact on output and prices: there is a permanent rise in real money holdings
- Impact is time-varying and depends on state of the economy
 - Stronger effects during asset price booms and busts
 - Weaker impact on output and stronger impact on property prices in economic booms
 - Stronger effect on output and asset prices in credit booms
 - Negative shocks to liquidity have significant stronger effects on output and asset prices while impact on inflation is weaker