# Changes in euro area monetary transmission?

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# Motivation

- **several recent developments have potential to alter economic structures and therefore euro area monetary transmission:**
  - run-up to and creation of EMU
  - globalization
  - financial innovation
  - [financial crisis]
- ***a priori*, strength and direction of possible changes unclear**
- **so far, empirical literature concentrated either on …**
  - …a specific factor that may have caused changes (e.g. Altissimo et al. (2006), **Boivin et al. (2009)** on effects of EMU, Borio/Filardo (2007) and Calza (2008) on effects of globalization...)
  - …a specific transmission channel which may have been altered (e.g. deBondt (2005), Leuvensteijn et al. (2008), **Kok Sørensen/Werner (2009)** on interest rate channel, Altunbas et al. (2007) on credit channel…)
  - …or both (e.g. **Marqués/Gambacorta (2009)** on effect of financial development on bank lending channel, Upper/Worms (2003) on effect of globalisation on interest rate channel …)
- **mixed results: most studies find changes, some do not**

# Our approach

- **all in all, existing literature does not allow for clear conclusion regarding (direction of) change in overall monetary transmission:**
  - *mixed results:* particular driving factors and specific transmission channels difficult to identify and to separate empirically
  - *effect on overall monetary transmission unclear*: changes in specific transmission channels could offset each other
- **therefore, we take different approach…**

  (A)…by looking at overall monetary transmission to output and inflation → VAR

  (B)…by not concentrating on specific factor → data driven search for breakpoint
- **ad (A): specification of baseline VAR:**

coefficient matrices

$$y_t = k + A(L)\, y_{t-1} + B x_t + u_t$$

vector of endogenous variables:
- *real GDP*
- *GDP deflator*
- *real housing wealth*
- *short-term interest rate*

vector of exogenous variables:
- *non-oil commodity price index*
- *US short-term interest rate*

# Baseline VAR: data and specification

- **minimum set of variables for monetary policy analysis plus…**
  - …housing wealth (improves estimates and proved to be helpful in other contexts, too [e.g. money demand])
  - …exogenous variables (helped to mitigate "price puzzle" in earlier work)

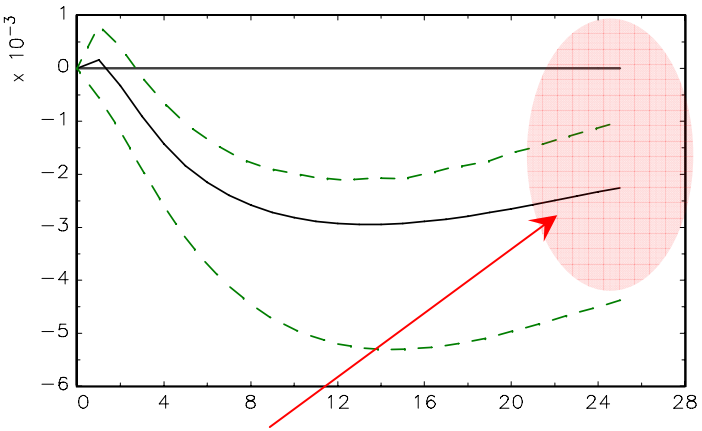
- **data:**
  - quarterly frequency, 1980:1 – 2006:4
  - housing wealth includes value of land; only available semi-annually, therefore interpolated (ECB (2006))
  - sources: AWM data base (Fagan et al. (2001)), official ECB statistics, Fed St. Louis data base (FRED)

- **all variables except interest rate enter VAR in log levels, information criteria (HQ and SC) point to two lags**

- **monetary policy shocks identified by Choleski-decomposition** (ordering: GDP, prices, housing wealth, interest rate)

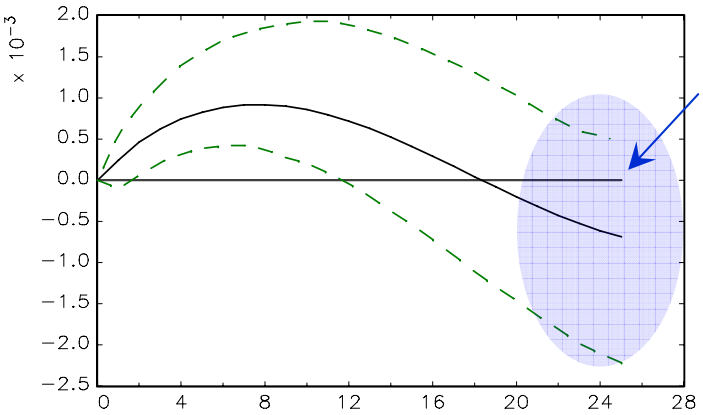
# Baseline VAR: IRFs to monetary policy shock

real output



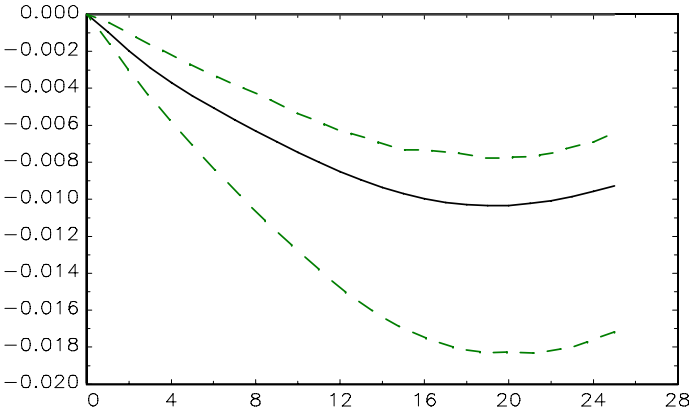

long run effects on real output

prices

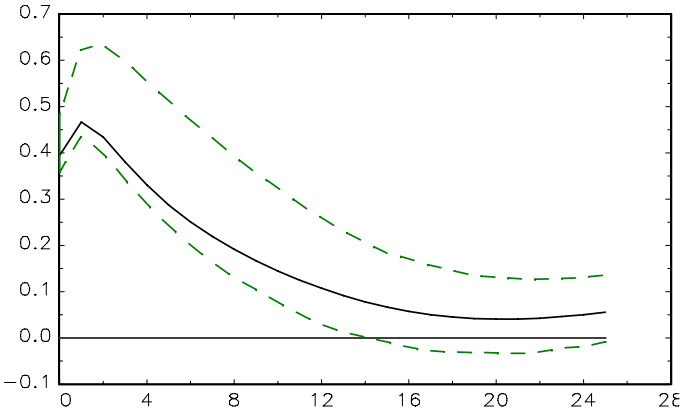



no long run effect on prices

housing wealth




short term interest rate




The dashed lines represent 95% Hall (1992) percentile (1000 bootstrap replications).

# Searching for a breakpoint

- **our hypothesis: implausibility of IRFs due to changes in economic structure / monetary transmission**

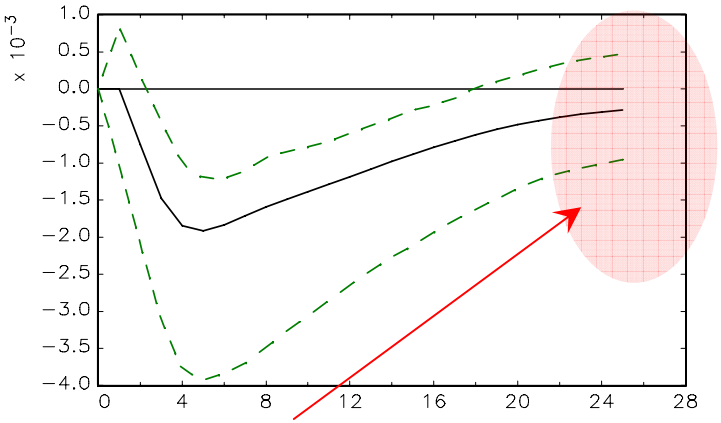
- **ad (B): break point search without *a priori* restrictions ("let the data speak")**
  - sample-split Chow tests → possible break point around 1996
  - Ploberger, Krämer and Kontrus (1989) fluctuation-test → parameter instability for mid-1990s

- **we view this as evidence in favour of breakpoint in 1996:1:**
  (for a similar result, see Breitung/Eickmeier (2008))


- **re-estimate baseline VAR for both sub-periods**

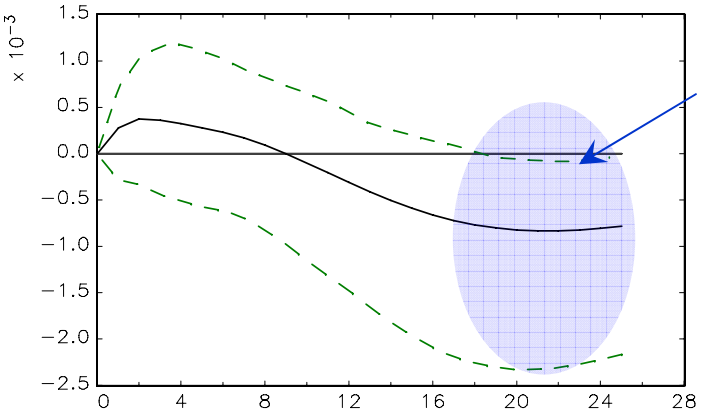
# IRFs to monetary policy shock, 1980-1996

real output



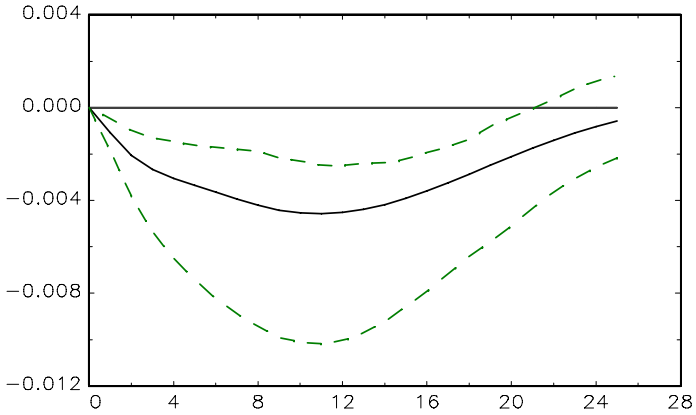

no long run effect on real output

prices

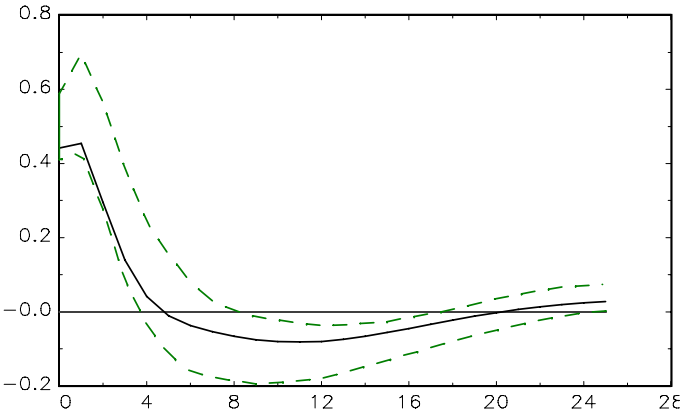



(slightly significant) long run effect on prices

housing wealth




short term interest rate

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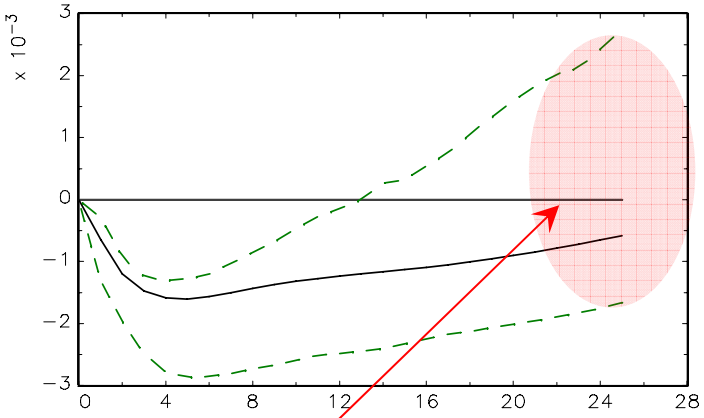
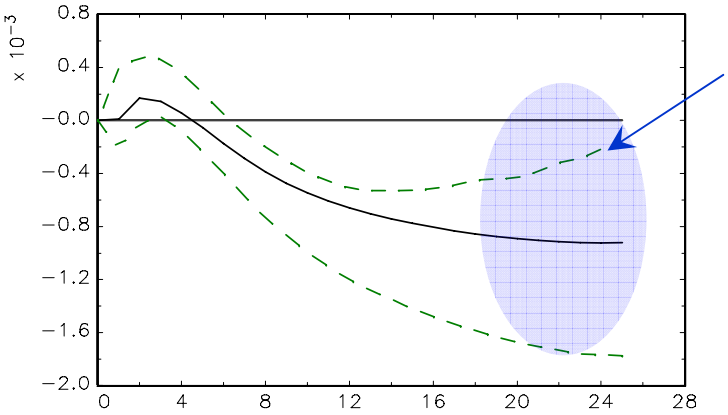
# IRFs to monetary policy shock, 1996-2006

real output



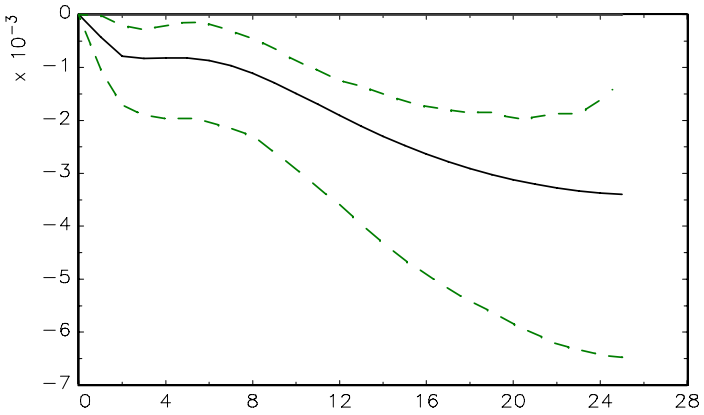

prices



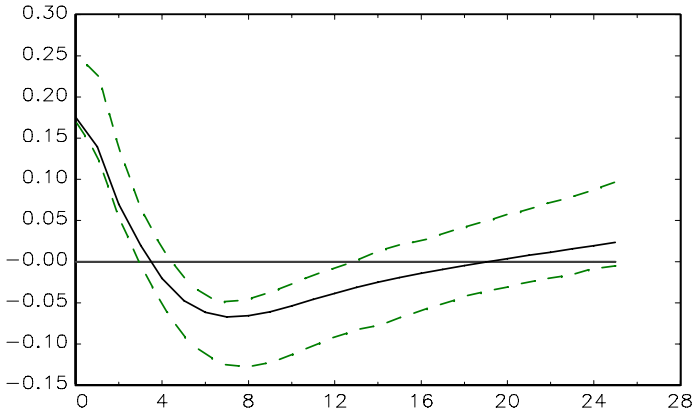

long run effect on prices

no long run effect on real output

housing wealth




short term interest rate

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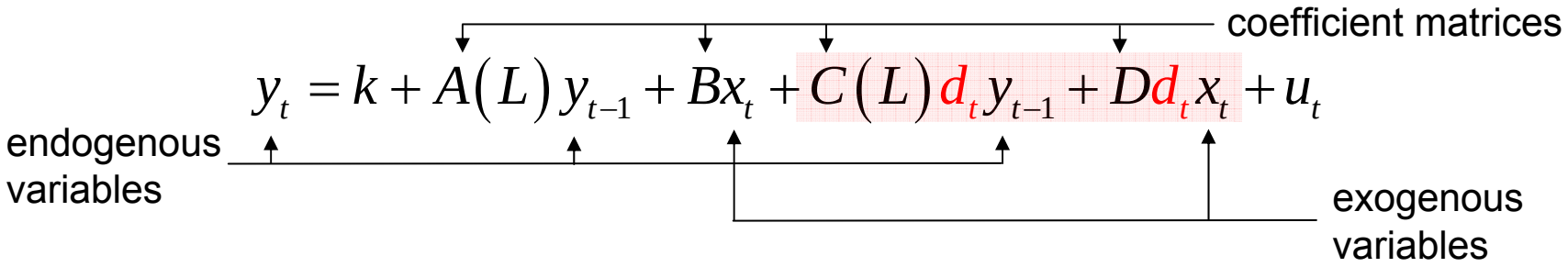
# VAR with breakpoint in 1996

- **just by allowing for breakpoint in 1996, implausible results vanish *for both sub-periods*; IRFs now in line with "stylized facts":**
  - output shows significant short-run negative reaction and is not affected in the long-run
  - prices show significant negative long-run response (and no "price puzzle")
  - output reacts faster than prices
- **at first sight, IRFs seem to differ across sub-periods: after 1996…**
  - …output and prices seem to react stronger, output seems to react earlier
  - …interest rate reaction seems to be more pronounced
  - … persistent negative reaction of housing wealth which is not present in pre-1996 period

# Testing for significant differences in IRFs

- **extended VAR to check significance of IRF differences:**




- **with dummy** $d_t = \begin{cases} 0 \text{ for } t \le 1996{:}1 \\ 1 \text{ for } t > 1996{:}1 \end{cases}$

- **compute confidence bands with bootstrapping procedure:**

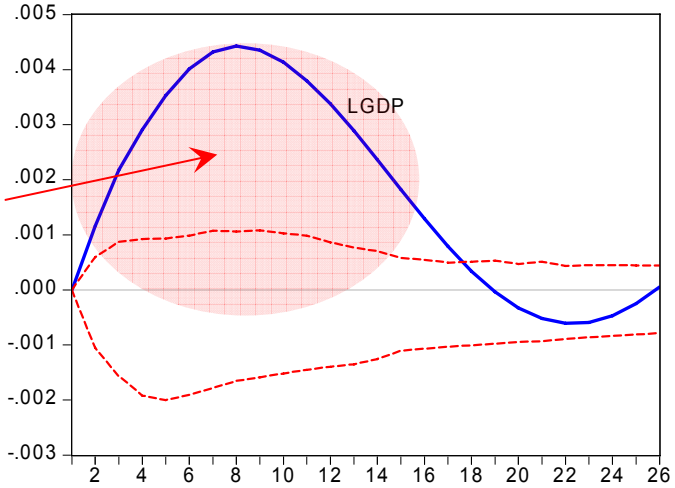
  (1) estimate VAR, compute IRFs for $d$ = 0 and for $d$ = 1; take IRF differences

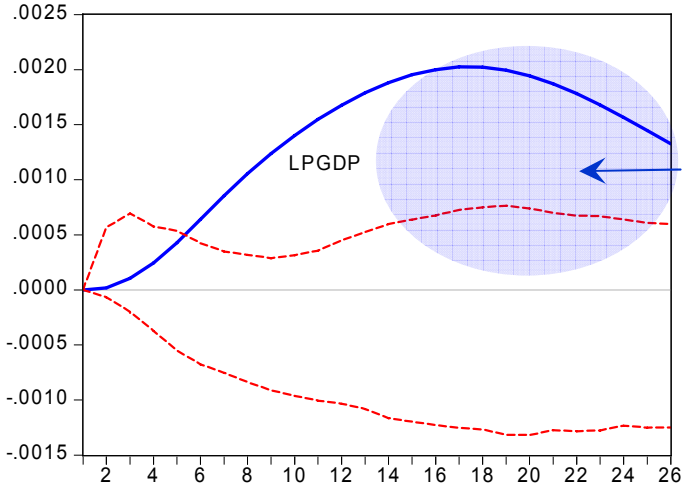
  (2) compute bootstrap time series recursively based on $d$ = 0 (i.e. assuming no break, that is an unchanged data generating process)

  (3) re-estimate VAR using bootstrap time series, compute IRFs for $d$ = 0 and for $d$ = 1, take IRF differences

# Testing for significant differences in IRFs

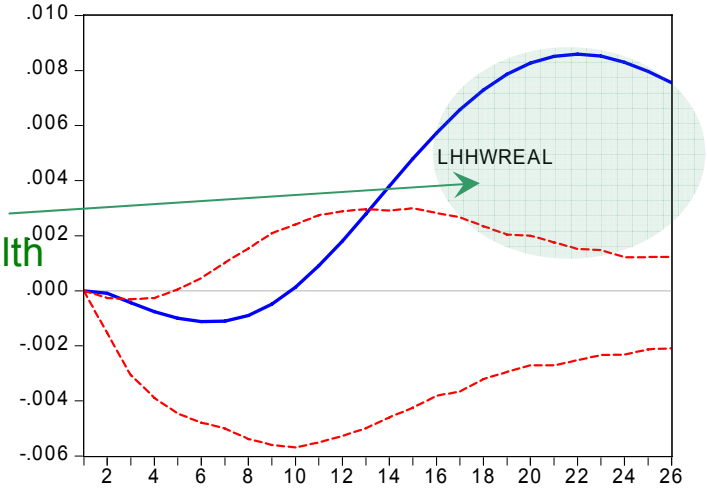
real output reacts stronger in post-1996 period

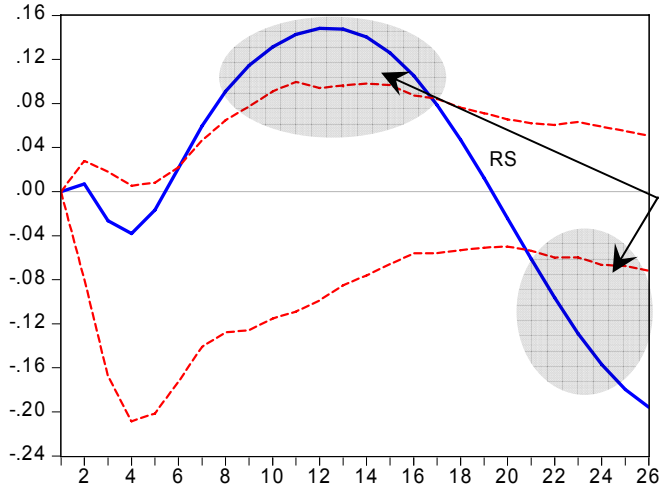



prices react stronger in post-1996 period

persistent negative reaction of housing wealth in post-1996 period




interest rate reaction more pronounced in post-1996 period

The dashed lines represent 95% standard percentile (500 bootstrap replications).

# Robustness checks

- **these findings are robust against broad range of variations:**
  - alternative shock identification schemes
  - adding (log of) M3 or long-term interest rate
  - using alternative commodity prices index, substituting CPI (HICP) for GDP deflator, substituting house prices for housing wealth
  - estimating in differences
  - including real exchange rate and excluding housing wealth
  - shifting breakpoint between 1990 and 1998:


- **however, shifting breakpoint to 1999 turns results upside down: output and inflation react *less strongly* in post-break period…**
- **…which is in line with Boivin et al. (2009) who *assume* breakpoint in 1999 in order to analyse effects of EMU on MT**

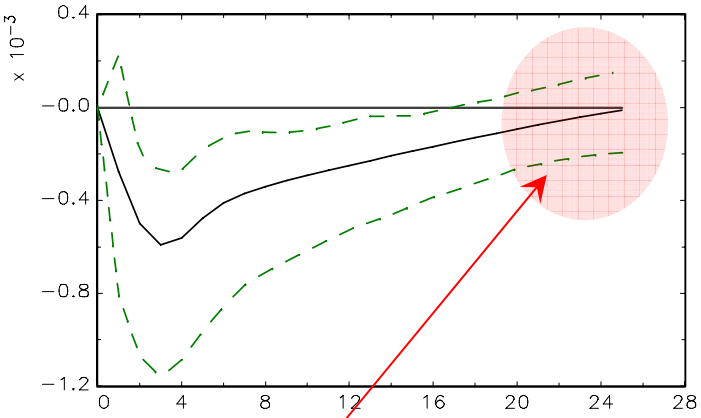
# A second breakpoint and an interim period?

- **second breakpoint around 1999?**


- **since "interim period" too short for explicit formal analysis…**
- **…we apply indirect test:** *if IRFs for **1980-1996** and **1999-2006** do not differ, while IRFs for **1980-1996** and for **1996-2006** differ (as we have found), then this would indicate a "unusual" period **1996-1999** (and hence break in 1999)*
- **this is indeed what we find:**
  - euro area monetary transmission after 1999 is not very different from how it used to be before 1996 …
  - … while interim period 1996-1999 is very likely to differ considerably from the time before and after

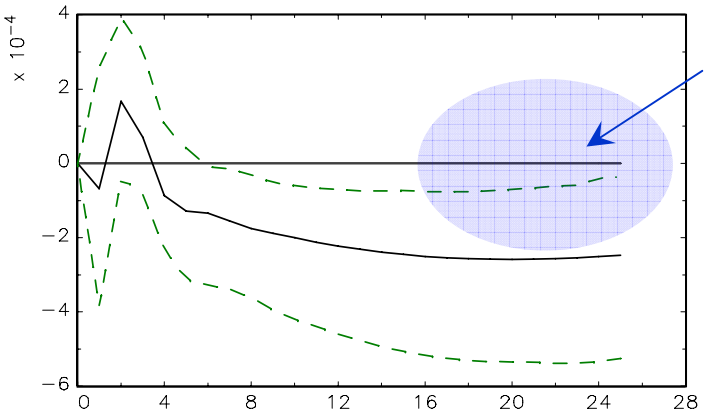
# IRFs to monetary policy shock, 1999-2006

real output



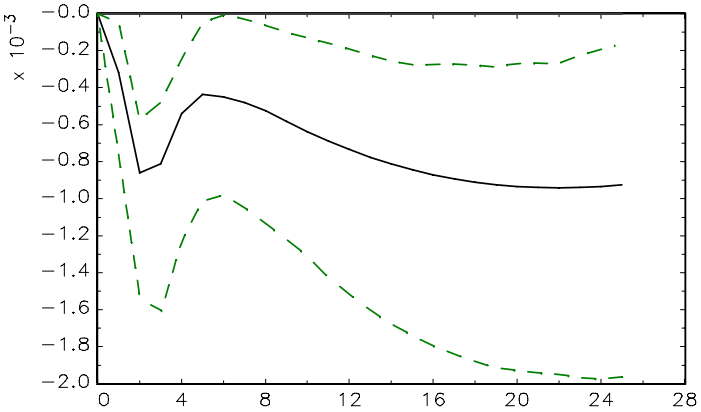

no long run effect on real output

prices

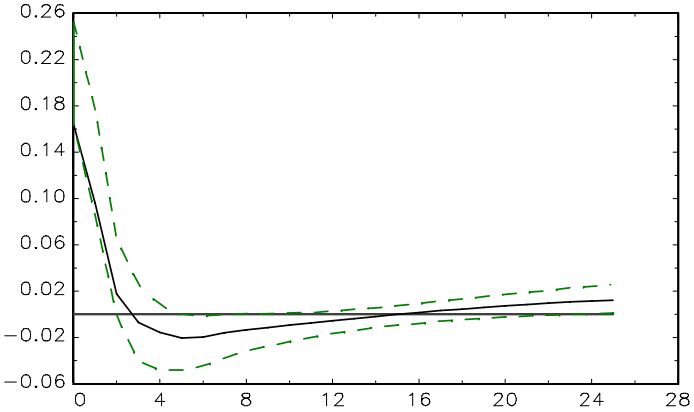



long run effects on prices

housing wealth



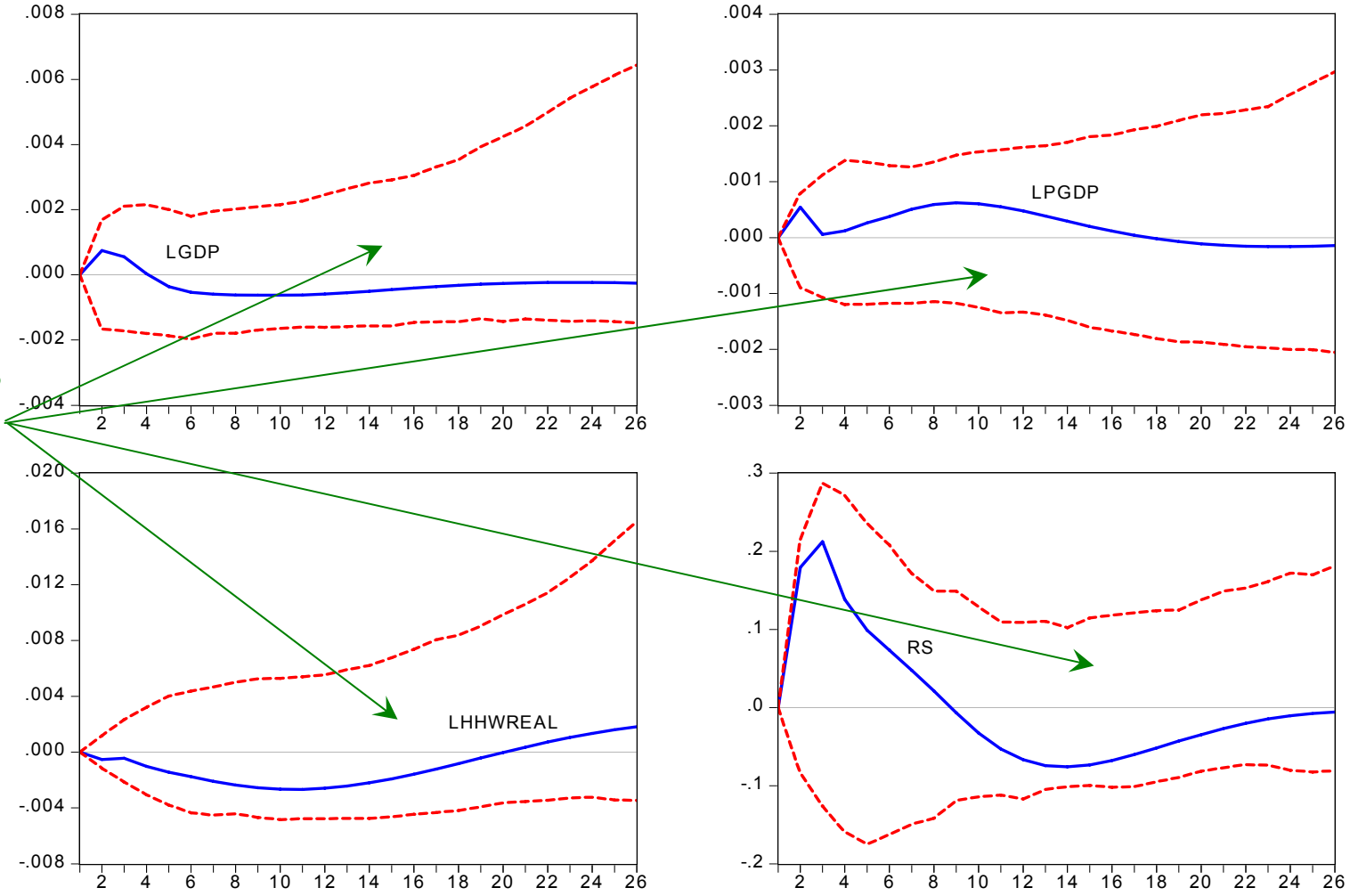

short term interest rate




The dashed lines represent 95% Hall (1992) percentile (1000 bootstrap replications).

# Testing for significant differences in IRFs

No significant differences between IRFs for pre-1996 period and IRFs for post-1999 period

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# Summary of main empirical results

**(1) there have been notable changes in euro area monetary transmission around 1996 and around 1999.**

**(2) these changes did not alter key "stylized facts": long-run real neutrality holds and monetary policy can control inflation in the long-run.**

**(3) we do not find significant differences in overall monetary transmission between post-1999 and pre-1996 period:**

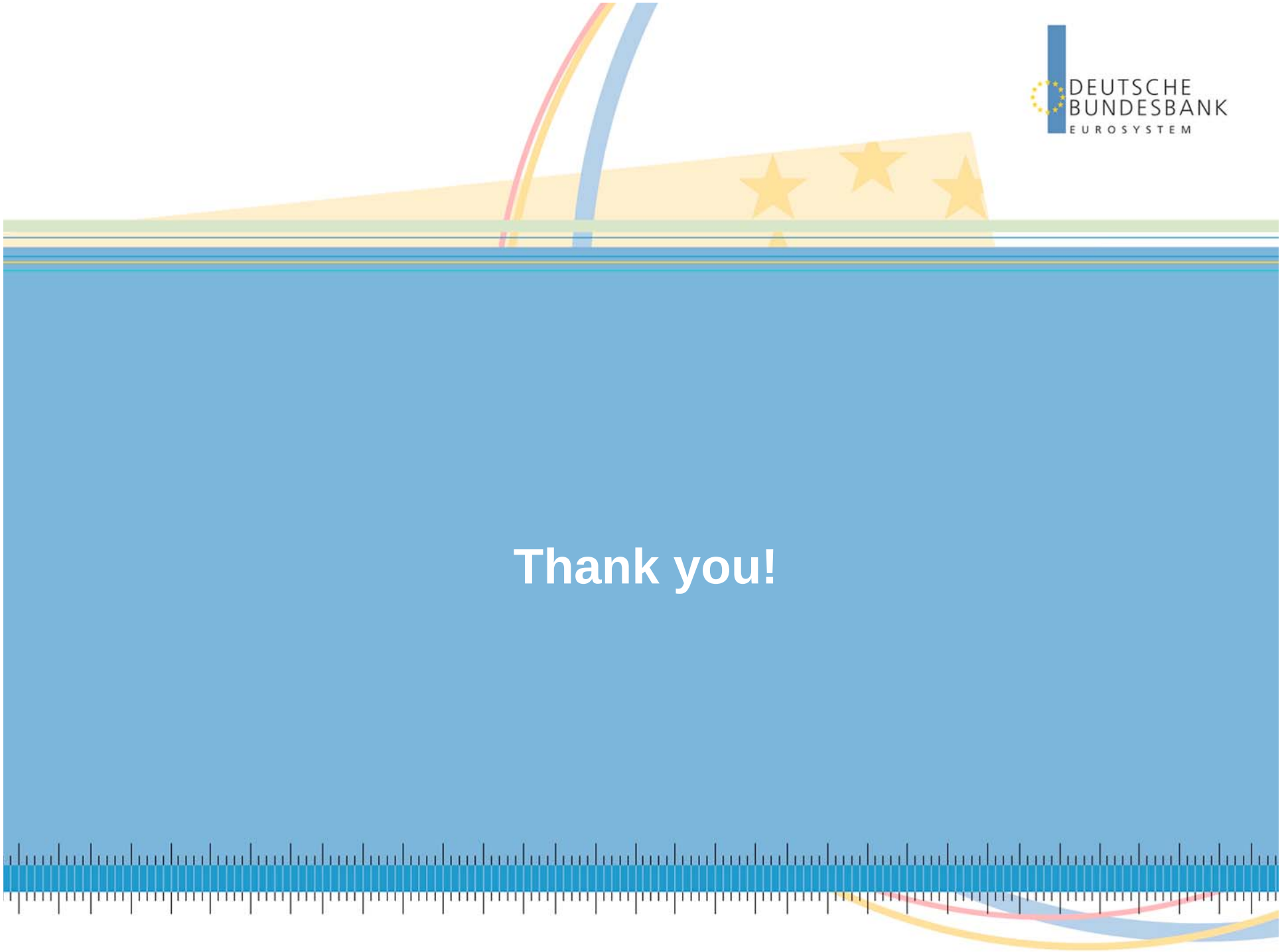
- compatible with hypothesis of "atypical" interim period 1996-1999 between two periods with unchanged monetary transmission
- however: due to data limitations difficult to distinguish this case from a *transition period* to a different regime in post-1999 period

# Conclusions and policy implications

- **these results have implications for research and monetary policy in the euro area:**
  - some IRFs differ significantly across sub-periods; therefore: **ignoring possibility of breaks could considerably bias estimations**
  - the changes found in empirical analysis do not alter “stylized facts”: **general guiding principles of Eurosystem monetary policy remain adequate**
  - changes/interim period aggravate(s) empirical analysis of monetary policy, increasing uncertainty under which monetary policy operates; therefore: **monetary policy should not risk to concentrate on a too restricted set of indicators** for making decisions

# Further research

- **the following avenues for further research seem worthwhile to us:**
  - **which factors** are behind reported changes and interim period?
    - *three prominent candidates: financial innovation, globalization and EMU*
    - *"timing" that resulted from our data-driven analysis naturally points to run-up to and creation of EMU*
  - do results hold **for other countries** as well (possible research strategy: FAVAR including national data)?
    - *is it general phenomenon (e.g. if due to globalization)?*
    - *do results hold for single EMU member countries?*
  - do results point to a more general problem relevant **for other related issues** as well?
    - *if results mirror general characteristic of euro area economy, then this could also have implications **e.g. for money demand**, **Phillips curve** and other issues*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Thank you!