International Food Commodity Prices and Missing Dis(Inflation) in the Euro Area

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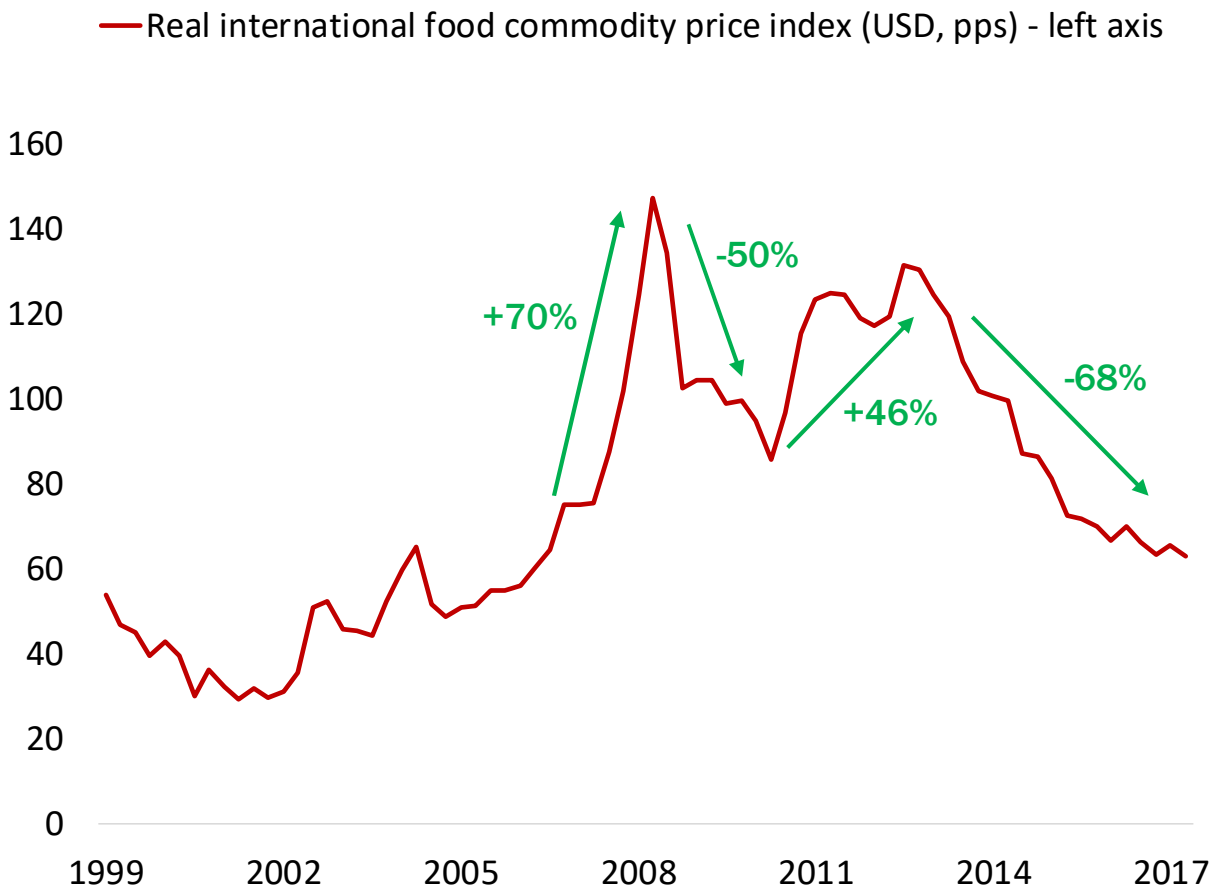
Motivation of research agenda

- Surprisingly little is known about macroeconomic effects of disruptions in global food commodity markets (e.g. no quantitative evidence for advanced economies)
  - E.g. 17% of US household expenditures are food related, of which (in turn) 14% raw commodities: this corresponds to ±900 USD food commodity expenditures per capita per year (compared to e.g. ±750 USD crude oil)
- Climate change: there will be a rise in variability and frequency of extreme weather events in major agricultural producing regions (IPCC, 2019)
  - E.g. extreme droughts in Russia and Eastern Europe in summer 2010 raised global real food commodity prices by almost 30%
- Needed to analyze effects of policies that may influence food prices: public food security programs, agricultural trade policies, ethanol subsidies, …

This paper

- **Relevance of fluctuations in international food commodity prices for euro area inflation dynamics: there have been substantial price swings, while food commodities are critical input factor in food production function**



This paper

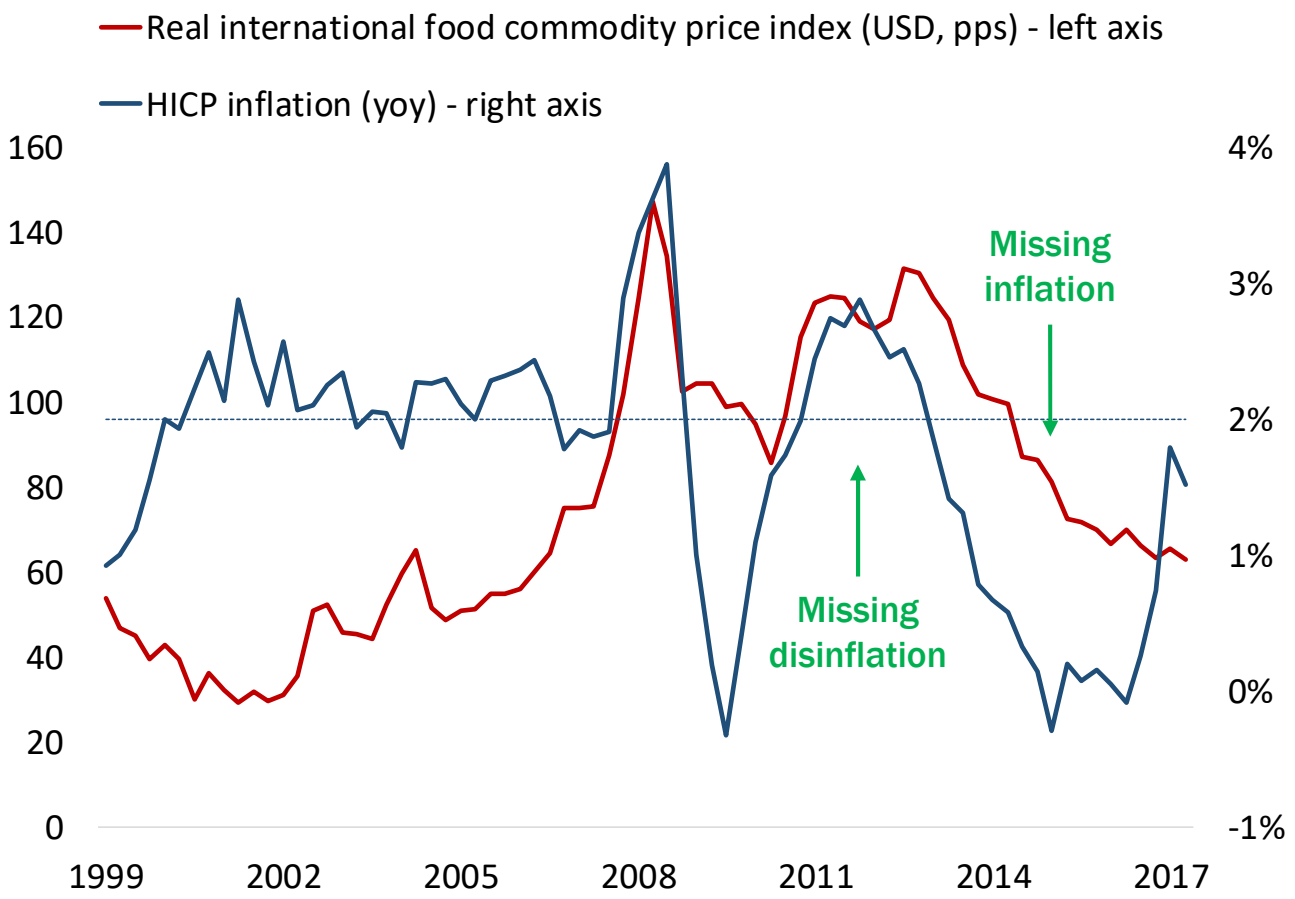
- Food related items have, in turn, very large share in Harmonized Index of Consumer Prices

HICP – Food related items	**27.4%**
Processed food	12.1%
Unprocessed food	7.5%
Catering services	7.8%
HICP – Industrial goods excluding Energy	**26.3%**
HICP – Energy	**9.7%**
HICP – Services excluding catering	**36.6%**
HICP – Overall index	**100.0%**

- Are even more important for formation of inflation expectations of households
  - Survey of Norges Bank: 61% of households consider “prices of food” as factor that influences inflation expectations most

This paper

- **Swings international food commodity prices could have contributed to so-called "twin puzzle" of missing disinflation/inflation after Great Recession**



Existing studies

- E.g. Fed, ECB, IMF: reduced-form time series models that only explore unconditional co-movement in data: ***pricing chain assumption***

  - In essence, these studies regress changes in consumer prices on contemporaneous and lagged changes in food commodity prices

  - Can be informative about signaling role (correlation) of food commodity prices for future inflation, but cannot be given causal interpretation

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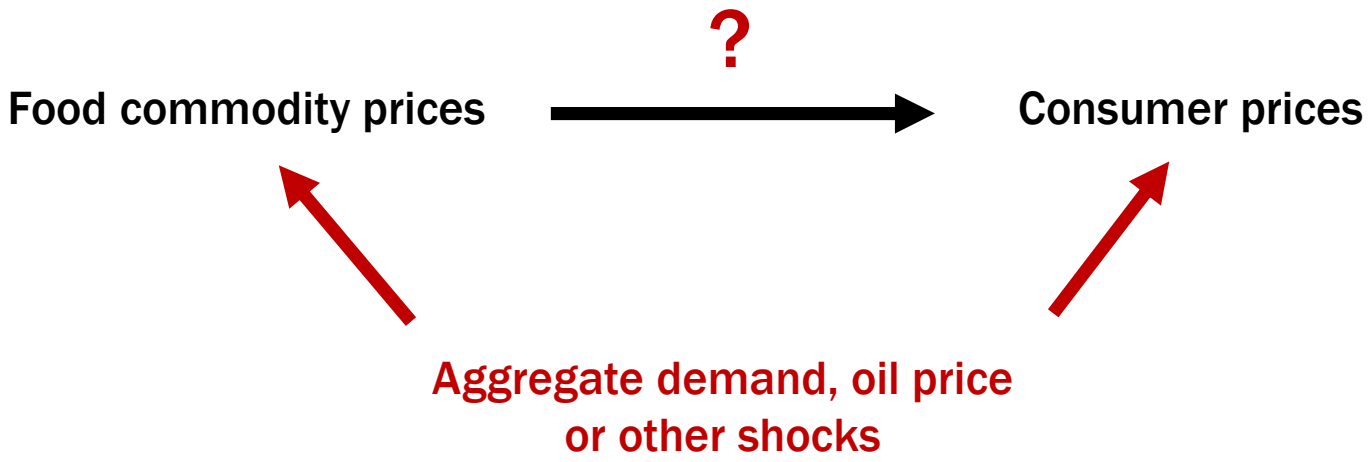

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Contribution of this paper

- Estimation of causal effects of shifts in international food commodity prices on euro area inflation dynamics for period 1970Q1–2016Q4

  - Methodology: Structural Vector Autoregressive (SVAR) models with external instruments in spirit of Stock and Watson (2012), Mertens and Ravn (2014)

    - Unanticipated harvest shocks are used as an external instrument to identify exogenous food commodity price shocks

  - Examination of contribution to "twin puzzle" of missing deflation/inflation and relevance for inflation fluctuations

  - Analysis of pass-through

SVAR model for euro area with external instruments

$$Y_t = \alpha + A(L)Y_{t-1} + u_t$$

International variables

- ✓ International real food commodity prices (USD)
- ✓ International real crude oil prices (USD)
- ✓ Real exports euro area
- ✓ Euro/USD exchange rate

Euro area variables

- ✓ Real GDP
- ✓ Real personal consumption
- ✓ Short-term interest rate
- ✓ HICP

- Baseline sample period 1970Q1–2016Q4; 4 lags
- Identification with external instrumental variable: not full shock series, but reflects an exogenous component of target shock

Unanticipated harvest shocks

- Explore fact that harvests cannot respond within quarter to economic shocks due to time lag of 3-10 months between planting and harvest of cereal commodities
  - While actual harvests are subject to unanticipated autonomous shocks: e.g. caused by weather variation, pests or diseases
- FAO publishes annual harvest data of four most important staples (corn, wheat, rice and soybeans) for 192 countries since early 1960s
  - De Winne and Peersman (2016): combine annual harvest data with crop calendars of each country to construct quarterly harvest volumes

Country	Crop	Month											
		J	F	M	A	M	J	J	A	S	O	N	D
Kazakhstan	Wheat												

Planting Harvesting

Unanticipated harvest shocks

- Estimate series of unanticipated (non-European) harvest shocks

$$Q_t = c + trend + C(L)X_t + D(L)Q_t + v_t$$

Prediction errors are unanticipated harvest shocks

  - Q_t: two-thirds of global (non-European) harvest volume of corn, wheat, rice and soybeans constructed as in De Winne and Peersman (2016)

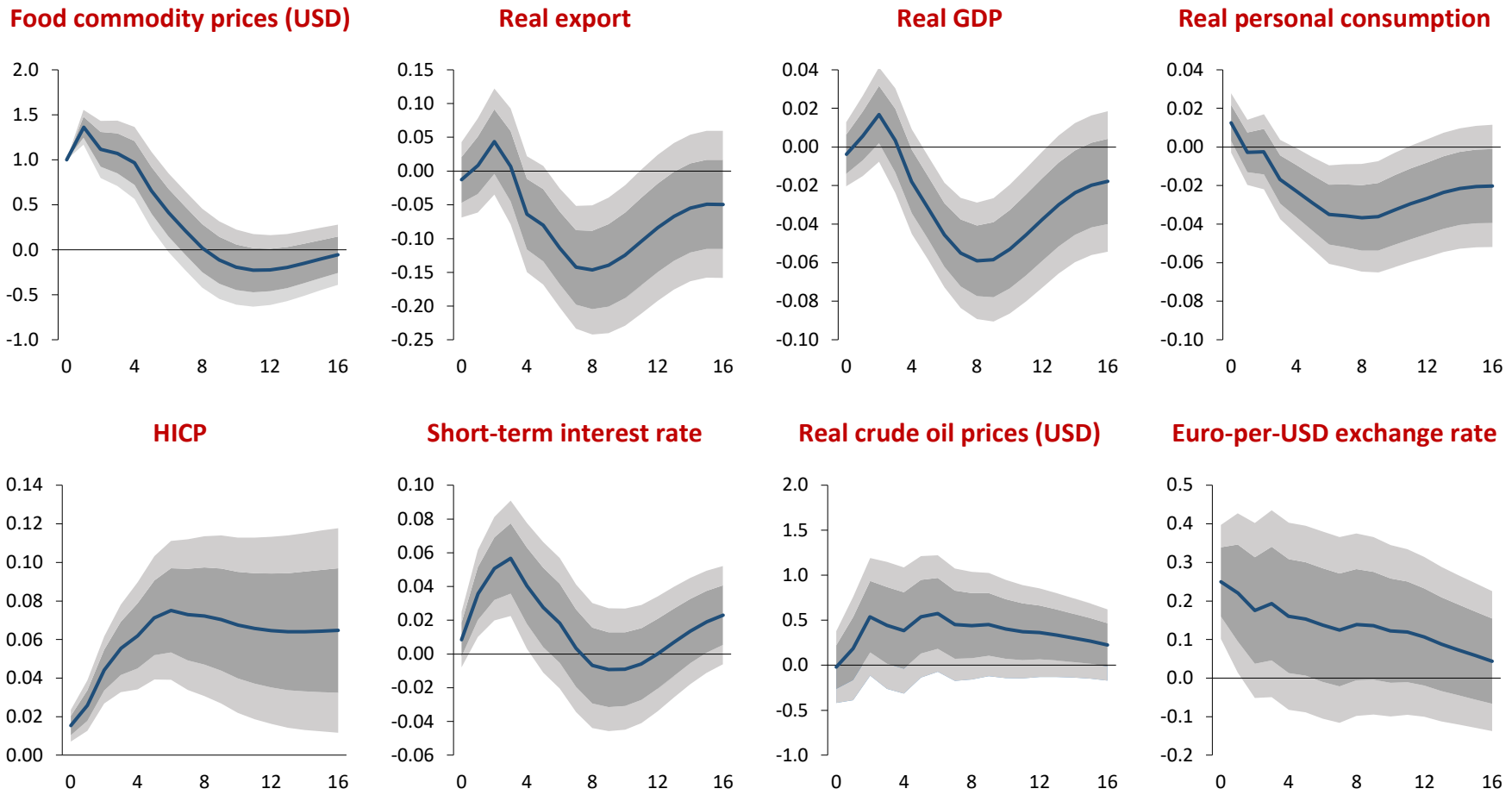
  - X_t vector of control variables that may influence harvests with a lag of 1 or more quarters: 8 lags of food commodity prices (narrow and broad index), global economic activity, crude oil prices

- Harvest shocks turn out to be strong instrument for food commodity price innovations: F-statistic and robust F-statistic are respectively 13.9 and 17.4

  - Note: standard deviation of shock is 4.3% of global harvest volume

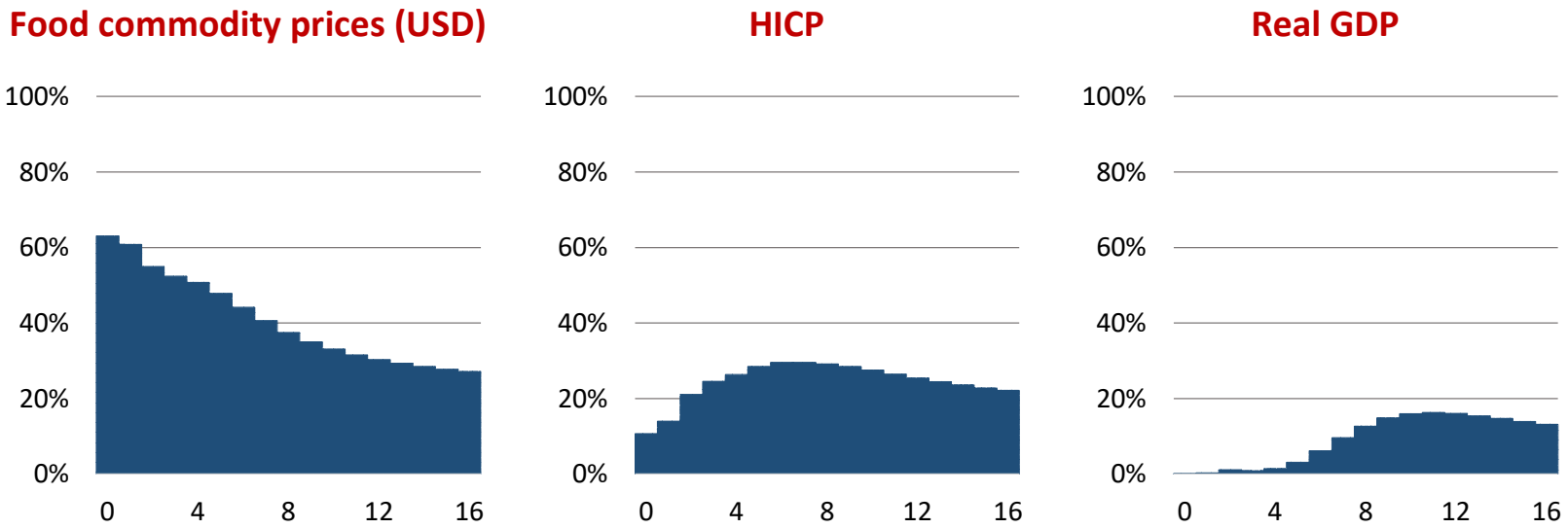
Baseline VAR results

- **Effects of 1% increase in real international food commodity prices**

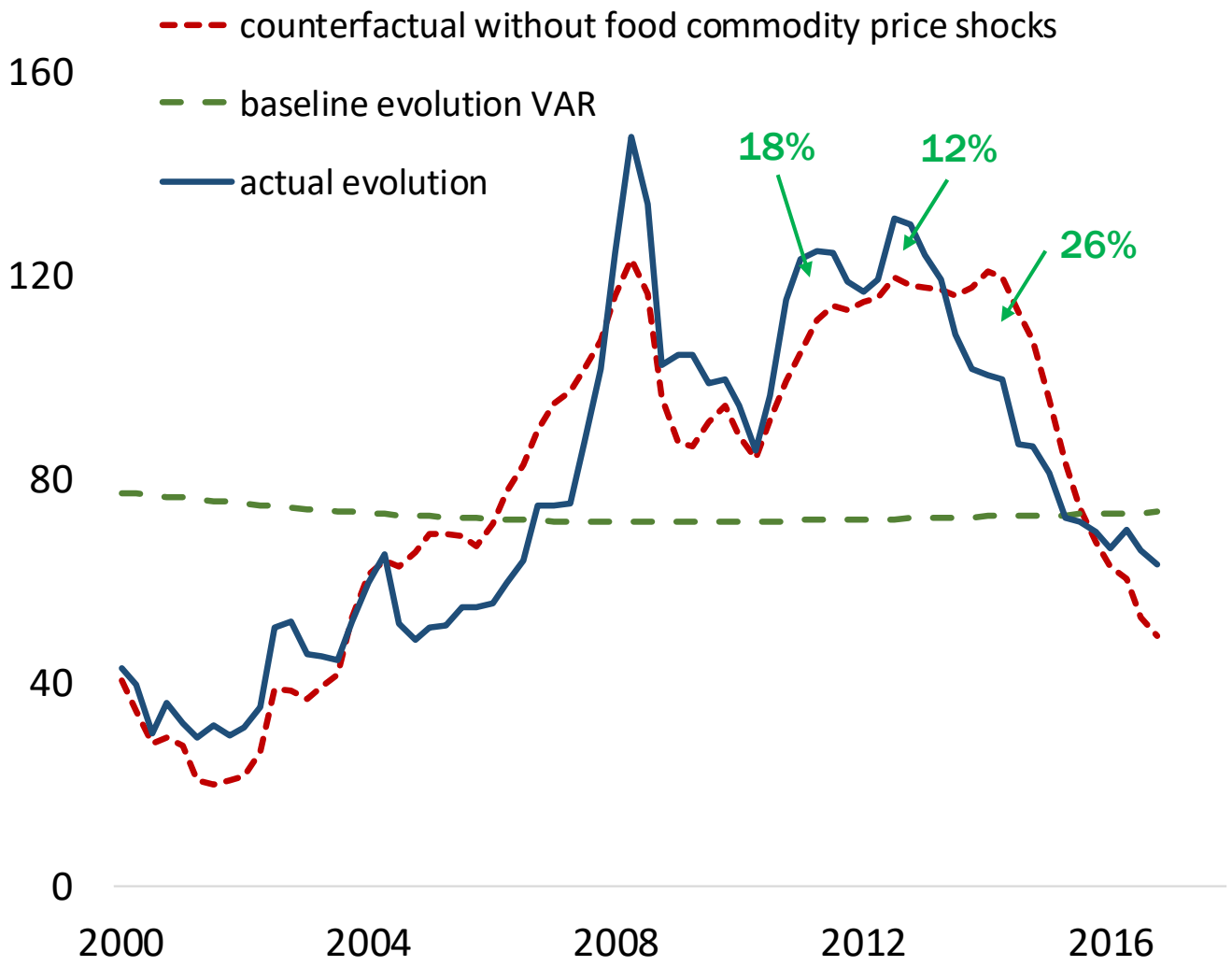


Contribution to forecast error variances

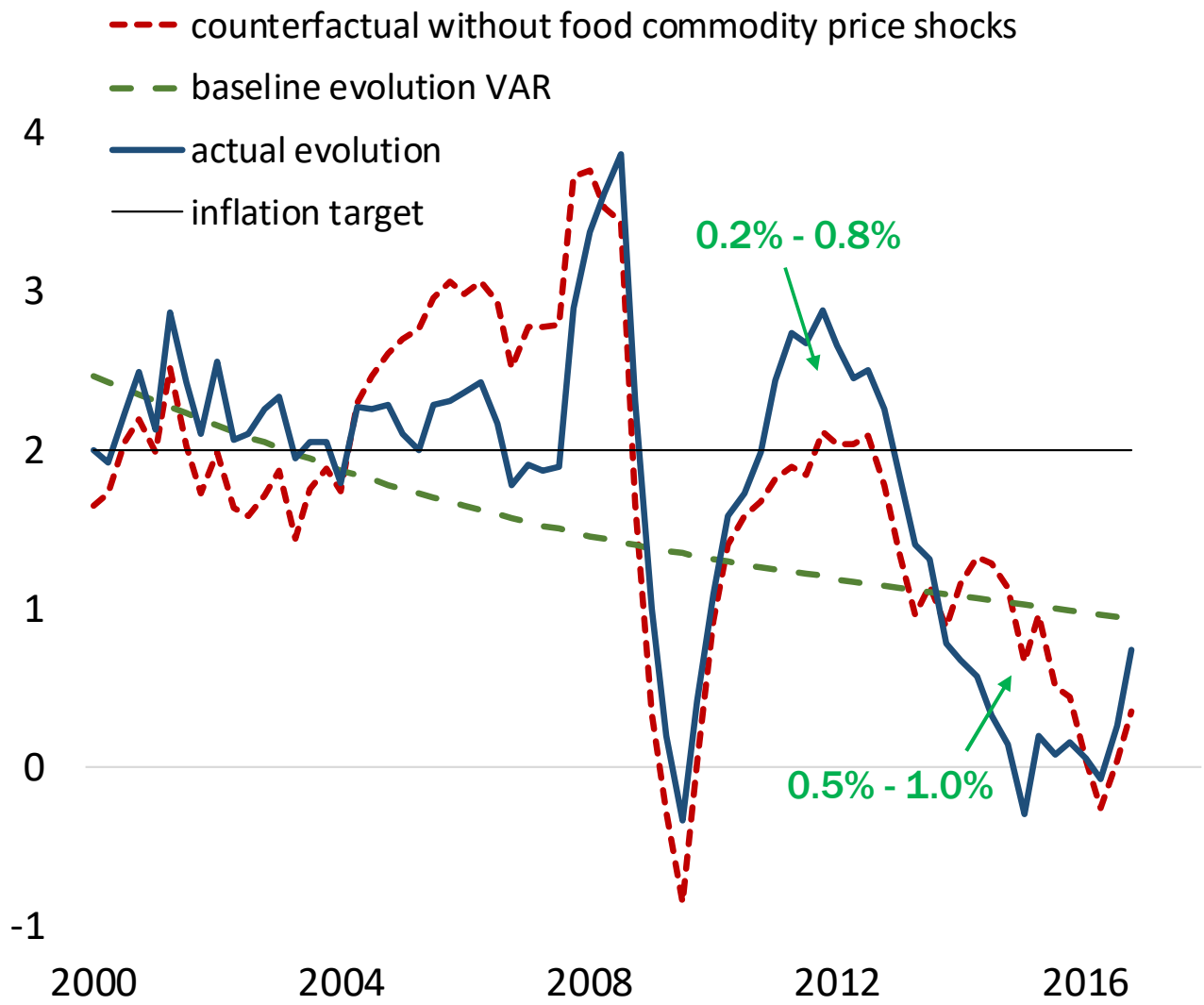
- Exogenous international food commodity price shocks explain 25% - 30% of the forecast error variance of the HICP



Impact on food commodity prices: counterfactual analysis

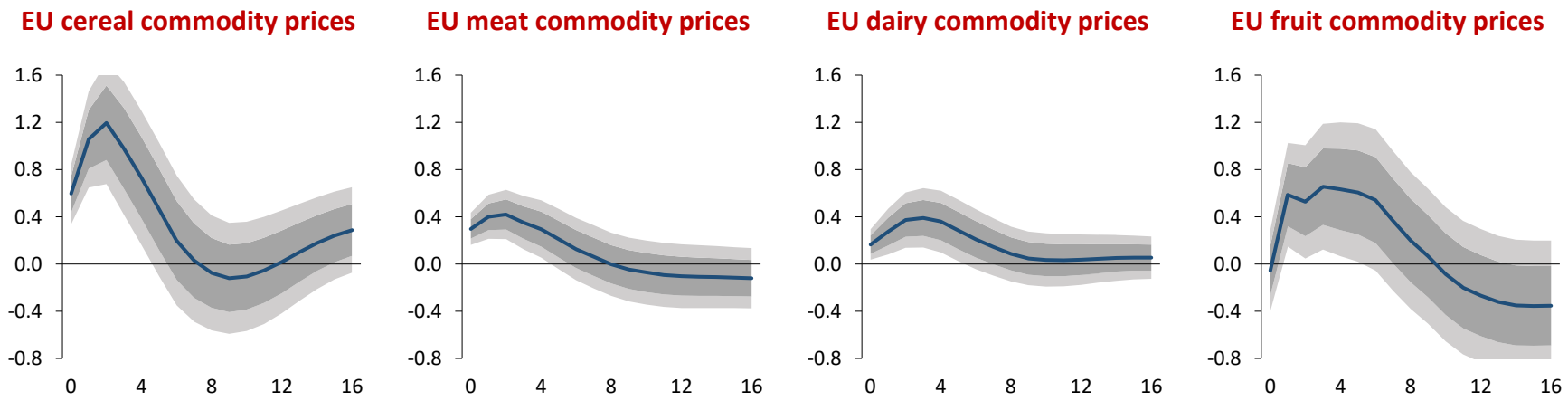


Impact on annual HICP inflation: counterfactual analysis



Effects through the food production chain

- Construction of (sub)indexes for EU farm-gate and internal market prices

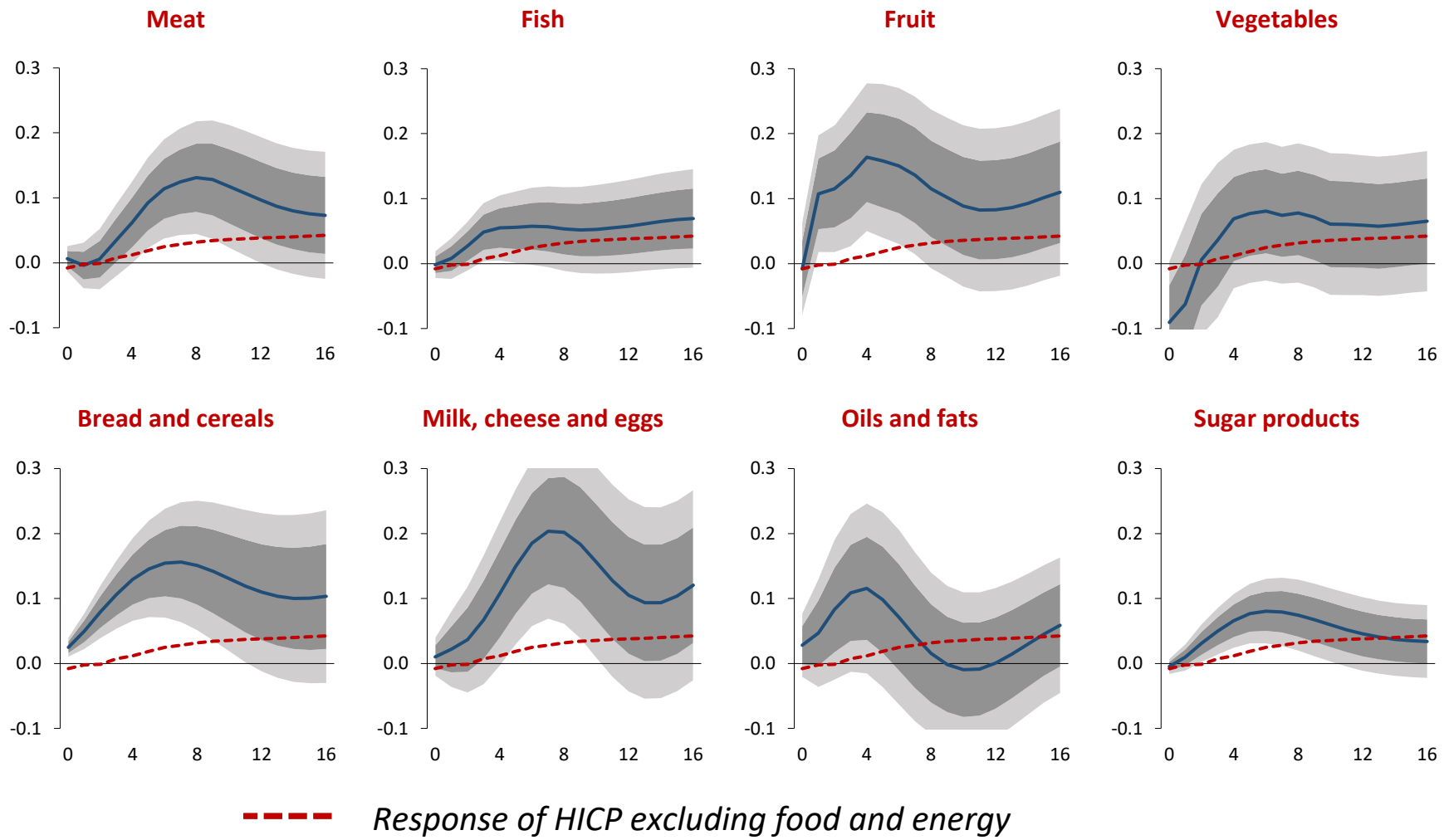


  - Not only a rise of international food commodity prices (=import prices), also a (less than proportional) rise of EU internal market and farm-gate prices

    - Note: large fraction of cereal commodities are used to feed animals, which augments production costs of meat and dairy products

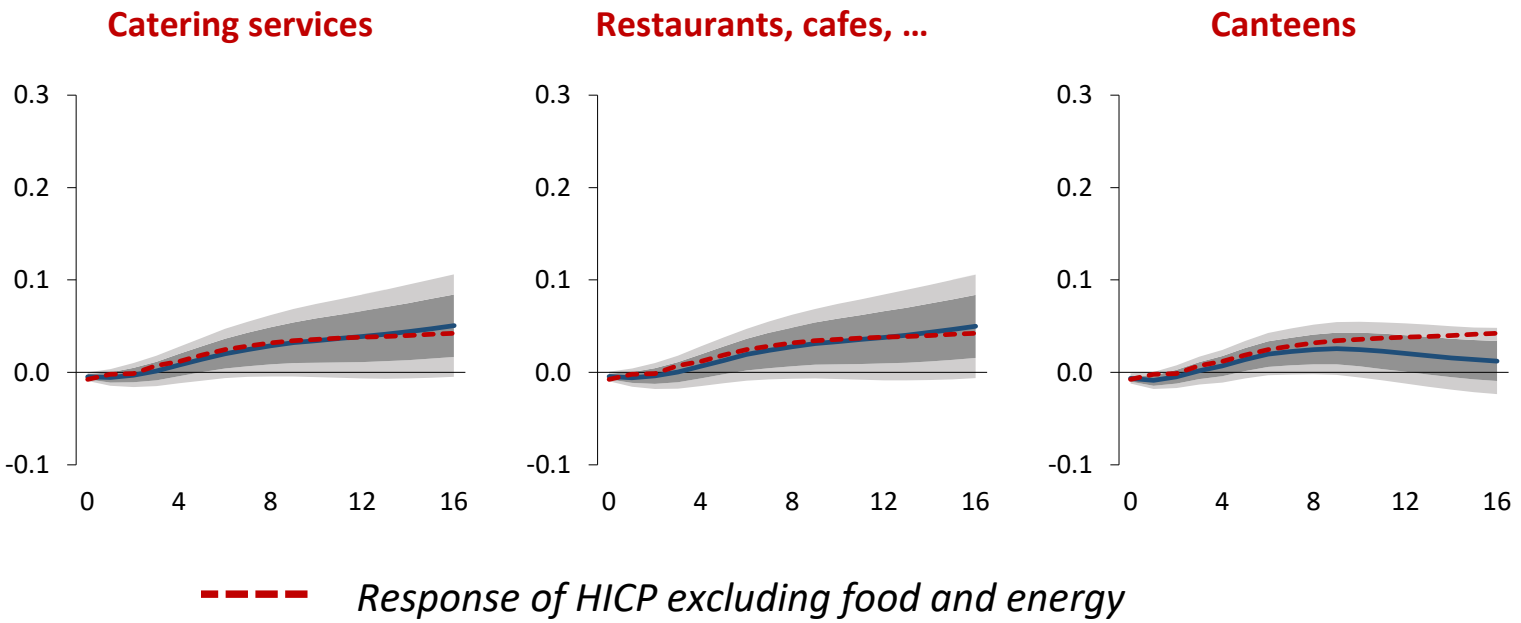
Effects through the food production chain

- **Significant (less than proportional) pass-through to retail prices of food in HICP**



Effects through the food production chain

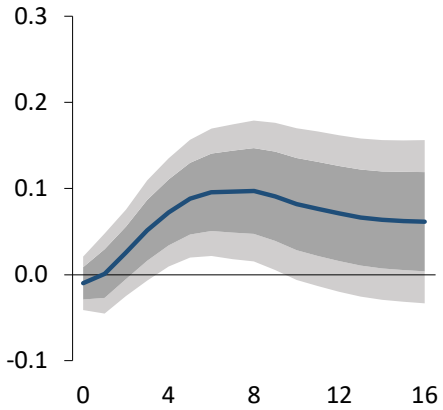
- Impact on food *services* is, however, not larger than impact on non-food products



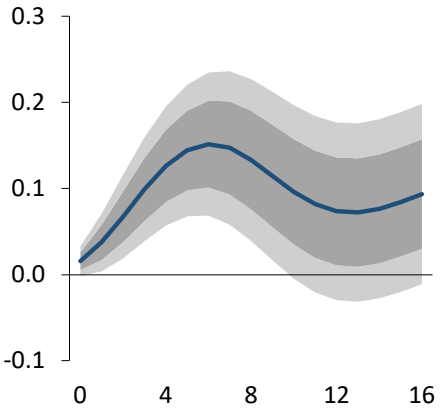
Indirect effects of international food price shocks

- There is also significant increase of HICP excluding food and energy, as well as HICP energy…

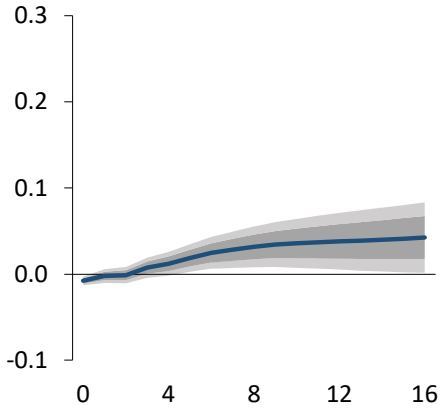
HICP - unprocessed food



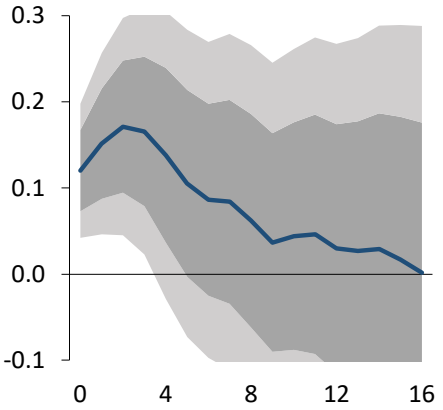
HICP - processed food



HICP - excl energy and food

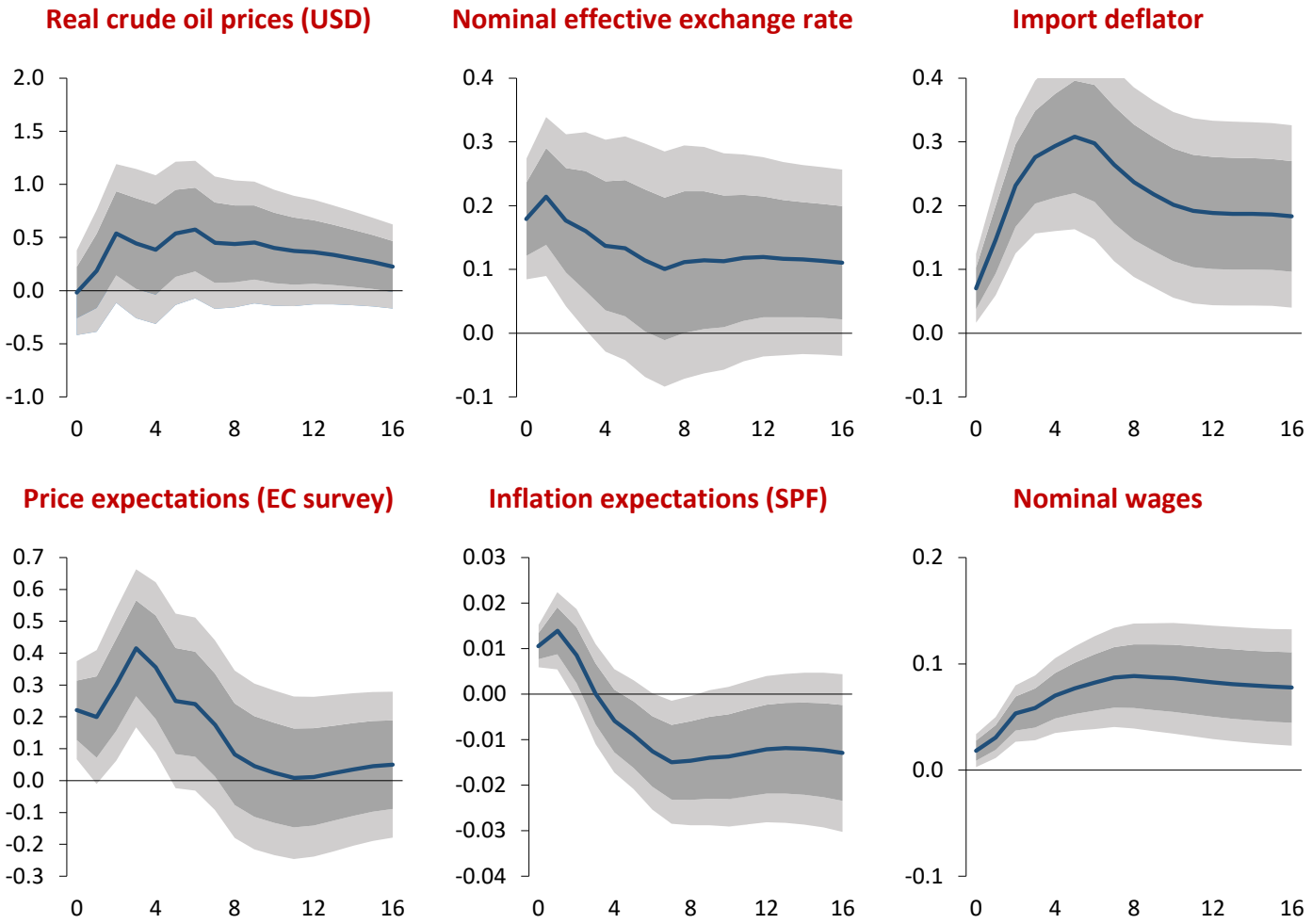


HICP - energy



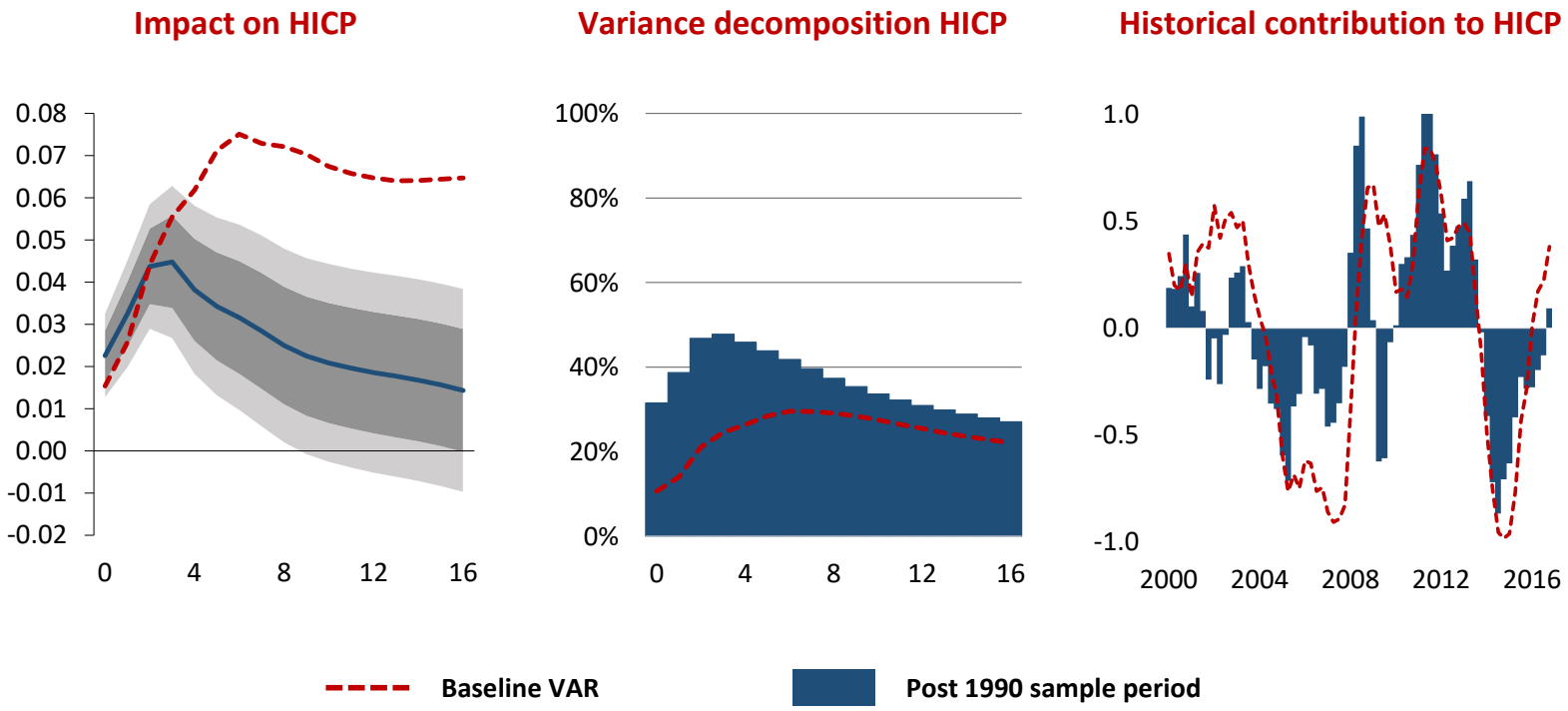
Indirect effects of international food price shocks

- Can be explained by depreciation of euro (higher import prices, including oil prices in euro's) and second-round effects via rising inflation expectations and wages



Post-1990 sample period

- There appears to be smaller and less persistent impact on HICP in more recent sample period (1990Q1–2016Q4)
  - Does not matter for variance decomposition and contribution to twin puzzle after Great Recession



Post-1990 sample period

- Effects through food production chain are quite similar in post-1990 sample

- Indirect effects on HICP excluding energy and food have changed: more subdued depreciation and much less second-round effects via rising wages

- On other hand: there have been spillover effects of food commodity price shocks on oil prices in recent sample period, resulting in stronger impact on HICP energy

  - Peersman et al. (2019): NOT because of biofuels, but spillovers between commodity prices as a consequence of price discovery in more globalized and financialized commodity markets in the presence of informational frictions

Conclusions

- Fluctuations in food commodity prices matter for euro area inflation dynamics
  - Relatively strong impact on HICP, explaining 25%-30% of forecast variance
  - Economic relevant influence on both missing deflation and inflation in aftermath Great Recession
- Direct transmission channel through the food production chain, but also indirect effects via depreciation of euro and second-round effects of rising wages
- There appears to be time-variation in the pass-through: smaller and less persistent effects due to reduction of the indirect effects