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, ...
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

<table>
<thead>
<tr>
<th>HICP – Food related items</th>
<th>27.4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processed food</td>
<td>12.1%</td>
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<tr>
<td>Unprocessed food</td>
<td>7.5%</td>
</tr>
<tr>
<td>Catering services</td>
<td>7.8%</td>
</tr>
<tr>
<td>HICP – Industrial goods excluding Energy</td>
<td>26.3%</td>
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<tr>
<td>HICP – Energy</td>
<td>9.7%</td>
</tr>
<tr>
<td>HICP – Services excluding catering</td>
<td>36.6%</td>
</tr>
<tr>
<td>HICP – Overall index</td>
<td>100.0%</td>
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- 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
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*

  ![Food commodity prices → Consumer prices](image)

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


  - 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

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

<table>
<thead>
<tr>
<th>International variables</th>
<th>Euro area variables</th>
</tr>
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<tbody>
<tr>
<td>✓ International real food commodity prices (USD)</td>
<td>✓ Real GDP</td>
</tr>
<tr>
<td>✓ International real crude oil prices (USD)</td>
<td>✓ Real personal consumption</td>
</tr>
<tr>
<td>✓ Real exports euro area</td>
<td>✓ Short-term interest rate</td>
</tr>
<tr>
<td>✓ Euro/USD exchange rate</td>
<td>✓ HICP</td>
</tr>
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</table>

- 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

<table>
<thead>
<tr>
<th>Country</th>
<th>Crop</th>
<th>Month</th>
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<tbody>
<tr>
<td>Kazakhstan</td>
<td>Wheat</td>
<td>June</td>
</tr>
<tr>
<td></td>
<td></td>
<td>July</td>
</tr>
<tr>
<td></td>
<td></td>
<td>August</td>
</tr>
<tr>
<td></td>
<td></td>
<td>September</td>
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![Diagram showing planting and harvesting months for Kazakhstan wheat](chart.png)
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
Exogenous international food commodity price shocks explain 25% - 30% of the forecast error variance of the HICP.
Impact on food commodity prices: counterfactual analysis

- **counterfactual without food commodity price shocks**
- **baseline evolution VAR**
- **actual evolution**

18% 12% 26%
Impact on annual HICP inflation: counterfactual analysis

- counterfactual without food commodity price shocks
- baseline evolution VAR
- actual evolution
- inflation target

0.2% - 0.8%
0.5% - 1.0%
• 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

### Response of HICP excluding food and energy

- Meat
- Fish
- Fruit
- Vegetables
- Bread and cereals
- Milk, cheese and eggs
- Oils and fats
- Sugar products
Effects through the food production chain

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

**Catering services**

**Restaurants, cafes, ...**

**Canteens**

*Response of HICP excluding food and energy*
There is also significant increase of HICP excluding food and energy, as well as 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

![Graphs showing real crude oil prices, nominal effective exchange rate, import deflator, price expectations, inflation expectations, and nominal wages.](image_url)
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