

Monetary policy transmission in Denmark

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New evidence on the Monetary Transmission Mechanism
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The views presented here do not necessarily reflect those of Danmarks Nationalbank.

This paper

Vast empirical literature on monetary policy transmission:

- ▶ Primarily on major, advanced economies (US, Euro area, UK).
- ▶ Little evidence from small, open economies.

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Monetary policy transmission in Denmark:

- ▶ Small, very open economy.
- ▶ Fixed exchange rate policy vis-à-vis Euro:
 - Danish policy rates closely mirror ECB policy rates.
 - We analyze transmission of conventional ECB policy shocks to Denmark.

What we do

Use the leading method to identify ECB monetary policy shocks:

- ▶ High-frequency identification.
- ▶ Jarocinski and Karadi (2020) approach to remove information effects.

Impulse-response estimation:

- ▶ Bayesian Local Projections (Ferreira, Miranda-Agrippino and Ricco, forthcoming):
 - Addresses bias-variance tradeoff in VARs and LPs.
 - Use BVAR IRFs as priors in a LP.

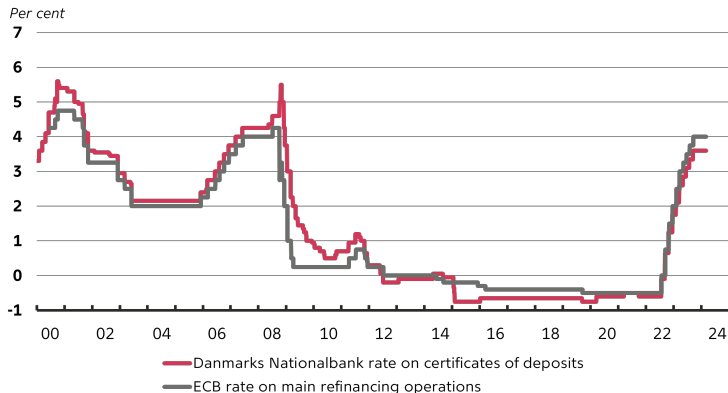
Findings

ECB monetary policy shocks work as expected in Denmark:

1. Tighter policy reduces output and consumer prices.
2. ... at both short and long lags.
3. Transmission magnitude and speed mirrors that of euro area.
4. Price effects are more pronounced for tradeables.

IDENTIFICATION

Danish policy rates follow ECB rates



Identification goal:

- ▶ Isolate exogenous changes to ECB rates.

High-frequency identification

Monetary policy surprises:

- ▶ Changes in EUR OIS yields at 1M to 10Y around ECB monetary policy announcements from EA-MPD (Altavilla et al., 2019).

Focus on changes in short end of yield curve:

- ▶ Extract two factors.
- ▶ Rotate factors so only first factor loads on 1M yield:
 - Conventional monetary policy shock \Rightarrow focus of analysis.

Remove information effects using Jarocinski and Karadi (2020) poor man's sign restrictions procedure:

- ▶ Only use shocks with negative comovement between factor and European stock prices.

Estimated monetary policy factors

	First factor		Second factor	
	Loading	R^2	Loading	R^2
<i>OIS 1M</i>	1.0 (0.092)	0.867	0.0 (0.186)	0.0
<i>OIS 3M</i>	0.892 (0.054)	0.913	0.172 (0.18)	0.025
<i>OIS 6M</i>	0.747 (0.063)	0.808	0.37 (0.148)	0.144
<i>OIS 1Y</i>	0.556 (0.112)	0.415	0.729 (0.111)	0.517
<i>OIS 2Y</i>	0.313 (0.145)	0.119	0.967 (0.059)	0.821
<i>OIS 5Y</i>	0.095 (0.122)	0.012	1.0 (0.029)	0.961
<i>OIS 10Y</i>	-0.066 (0.082)	0.01	0.719 (0.036)	0.881

MODEL

Macro data

6 monthly series for 2002M1-2023M2:

- ▶ Danish data:
 - Log industrial production.
 - Unemployment rate.
 - Log HICP.
 - Log HICP, energy.
 - 3M money market rate.
- ▶ US corporate bond spread (BAA-treasury).

Instrument money market rate with monetary policy shock.

Estimating IRFs

Bayesian Local Projections:

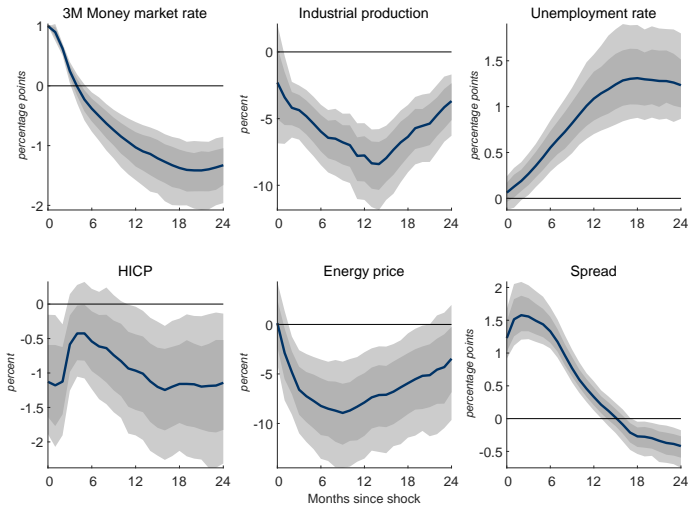
- ▶ Address bias-variance tradeoff in VAR and LP.
- ▶ Use BVAR IRF estimates as priors in LP:
 - Estimate prior tightness for each IRF horizon as maximizer of marginal likelihood (Gianonne et al., 2015).
- ▶ **Why important?** Short sample \Rightarrow (likely) big bias-variance tradeoff.

Solution to handle Covid-19 period:

- ▶ Include dummies for March to May of 2020.

RESULTS

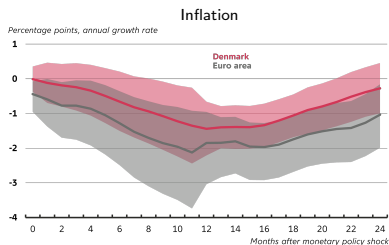
Transmission of ECB policy shock to Denmark



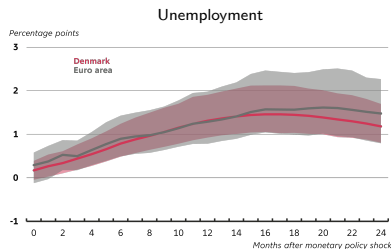
How do effects compare to Euro area?

Approach:

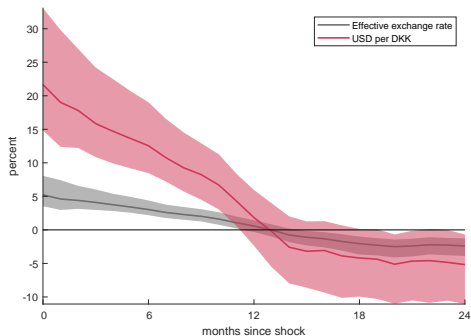
- ▶ Replace all variables by Euro area equivalents and re-estimate model.



(from Danmarks Nationalbank, 2024)



Immediate DKK appreciation



No effects on EURDKK rate:

- ▶ Appreciation occurs solely through EUR changes.

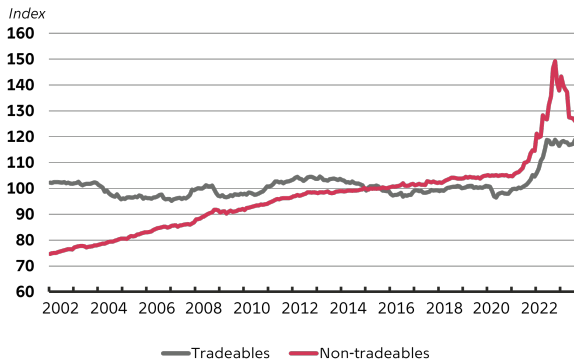
Import-to-GDP ratio $> 50\%$:

- ▶ Potentially important transmission channel.

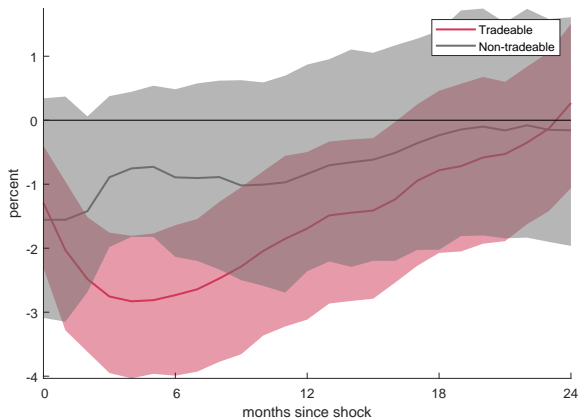
Is import content important for price response?

Split HICP by extra-euro area import share using IO tables:

1. Calculate total (direct + indirect) import shares by NACE code.
2. Match NACE to HICP categories and calculate import shares.
3. Split aggregate HICP index into two by median import share.



HICP effects by tradeability



Conclusion

- ▶ Textbook response of Danish variables to ECB policy shocks
⇒ transmission works
- ▶ Similar IRFs in euro area.
- ▶ Tradeability matters for price response.

References

Altavilla, C., L. Brugnolini, R. S. Gürkaynak, R. Motto and G. Ragusa (2019). Measuring euro area monetary policy. *Journal of Monetary Economics*, vol. 108.

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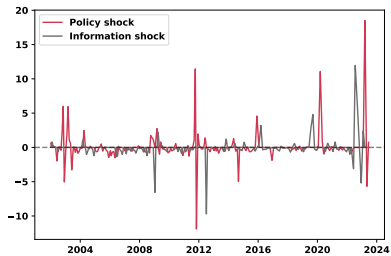
Ferreira, L. N., S. Miranda-Agrippino and G. Ricco (forthcoming). Bayesian Local Projections. *Review of Economics and Statistics*.

Giannone, D., M. Lenza, and G. E. Primiceri (2015). Prior Selection for Vector Autoregressions. *The Review of Economics and Statistics*, vol. 2(97).

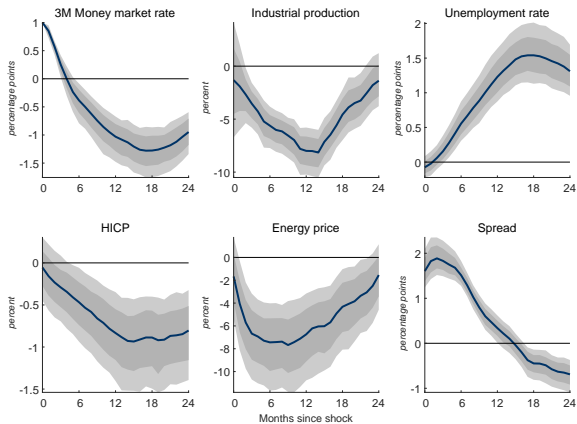
Jarociński, M. and P. Karadi (2020). Deconstructing Monetary Policy Surprises—The Role of Information Shocks. *American Economic Journal: Macroeconomics*, vol. 12(2).

BACKUP SLIDES

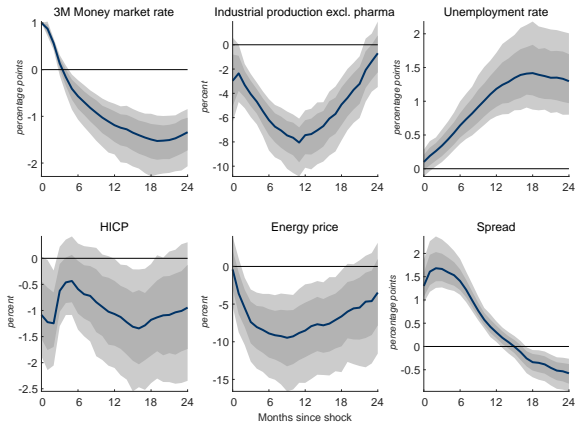
Monetary policy shock series



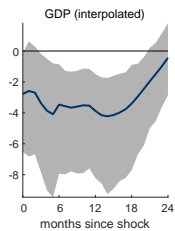
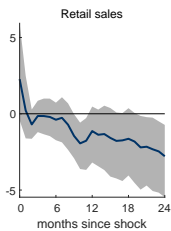
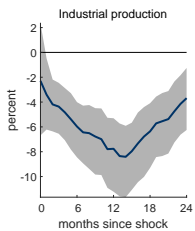
2002-2019 sample



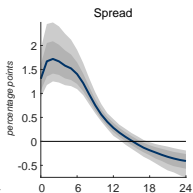
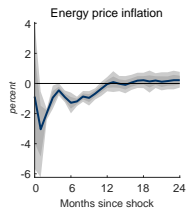
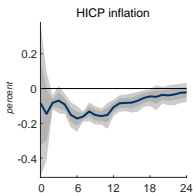
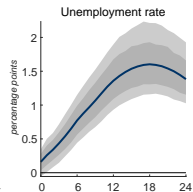
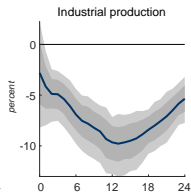
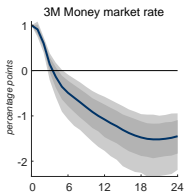
Excluding pharma



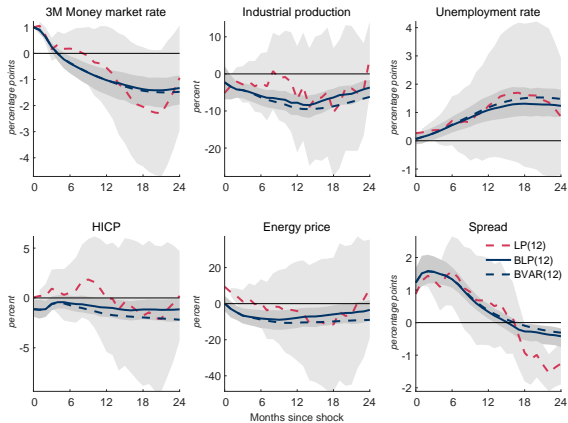
Different activity measures



Inflation instead of levels



BLP vs BVAR vs LP



Prior shrinkage in BLP

- ▶ $\lambda^{(h)} = 1 \Rightarrow$ LP
- ▶ $\lambda^{(h)} = 0 \Rightarrow$ BVAR

