27th Annual DNB Research Conference

The Macroeconomic Effects of Geopolitical Uncertainty

DeNederlandscheBank

EUROSYSTEEM

Geopolitical Surprises and Macroeconomic Shocks

A Tale of Two Events

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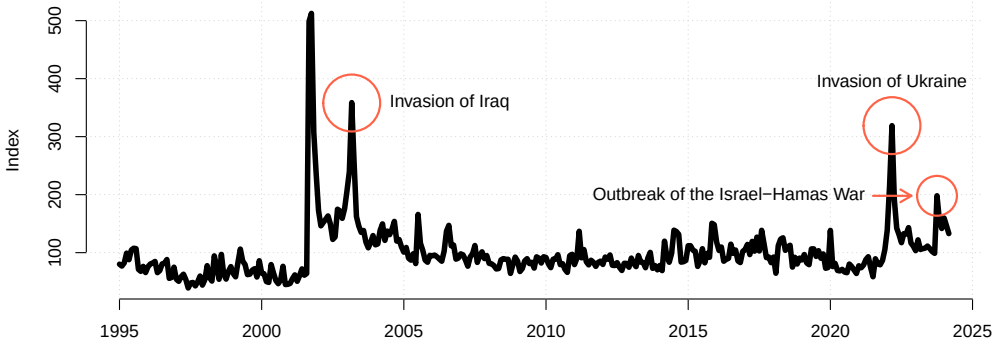
The views expressed in this presentation are those of the authors and do not necessarily reflect the views of the Bank of Finland, the European Central Bank, or the Eurosystem.

Starting point

"How to measure the macroeconomic effects of adverse geopolitical events on euro area economy?"

- **Geopolitical events are extremely heterogeneous**.
- The heterogeneity needs to be taken into account.
- Identification of a homogeneous geopolitical shock tells us very little of the total macroeconomic effect of any geopolitical event of interest.

Geopolitical Risk Index (GPR)



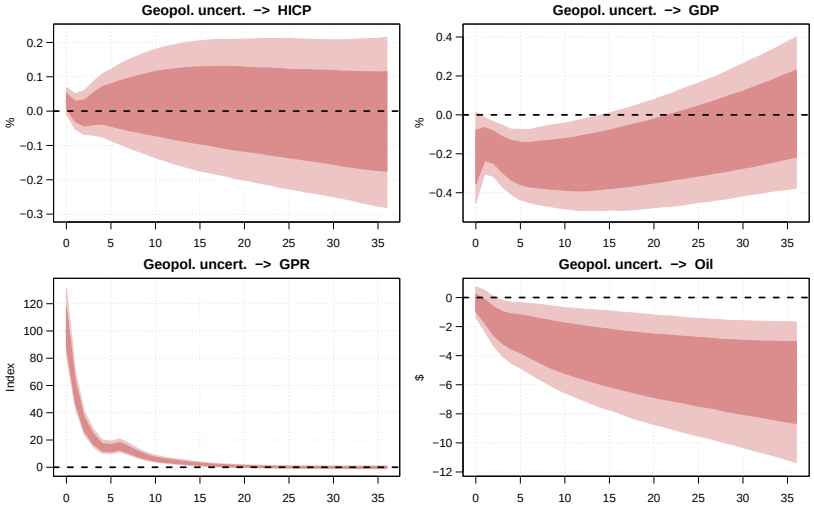
Source: Caldara & Iacoviello (2022)

So what do we do?

- We jointly identify multiple macroeconomic shocks that drive the euro area HICP and GDP.
- We interpret these shocks as transmission channels through which (adverse) geopolitical surprises can transmit to the euro area economy and map the events of interest to a handful of macroeconomic shocks.
- We investigate the effects of two recent major geopolitical events on euro area inflation and GDP:
  - Russian invasion of Ukraine in February 2022
  - Outbreak of the Israel-Hamas war in October 2023

And what do we find?

- Due to heterogeneity, **the effects of adverse geopolitical events on euro area inflation are context dependent and event-specific**.
  - On the other hand, the effects of adverse geopolitical events on euro area production are typically negative.
- Whereas the Russian invasion of Ukraine had a substantial inflationary effect, the outbreak of the Israel-Hamas war had a deflationary effect on euro area inflation.
  - However, both events seemed to have a surprisingly large negative effect on euro area GDP.

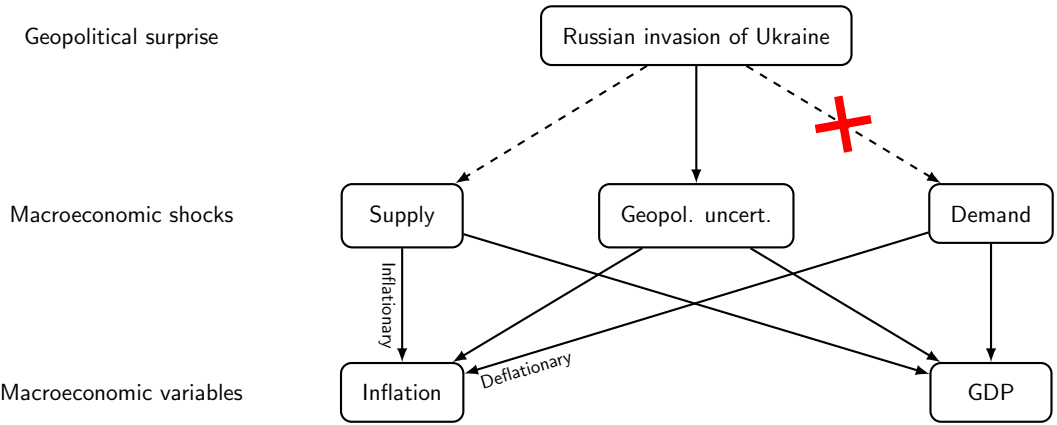

Geopol. uncert. –> HICP
%
Geopol. uncert. –> GDP
%
Geopol. uncert. –> GPR
Index
Geopol. uncert. –> Oil
$

Geopolitical uncertainty shock

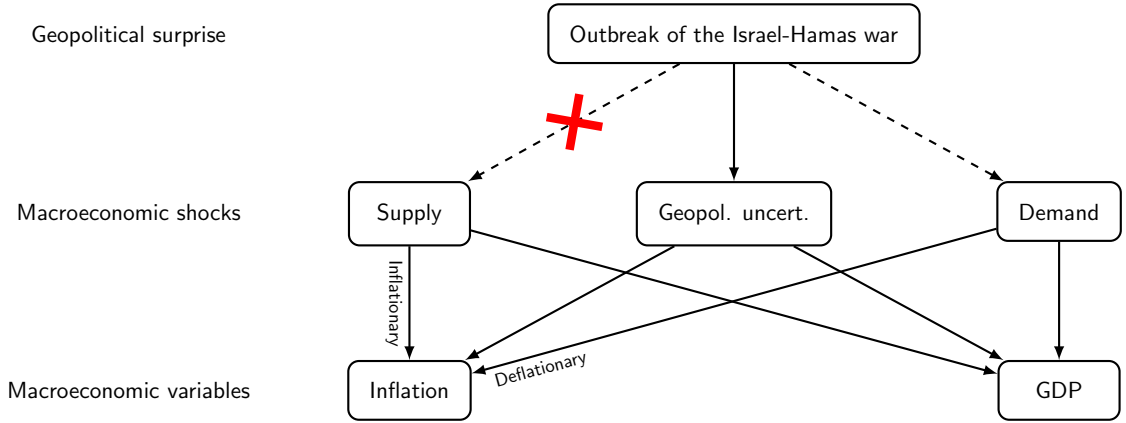
- Impulse responses to a homogeneous geopolitical uncertainty shock (identified using the GPR index of Caldara and Iacoviello, 2022) can be interpreted as **average effects** of heterogeneous geopolitical events.
- Zero inflation response does **not** mean that adverse geopolitical events would not affect euro area inflation. It only means that the response is zero **on average**.

  $\rightarrow$ Inflation response to a random adverse geopolitical event is just as likely to be positive than negative.

Stylized illustration

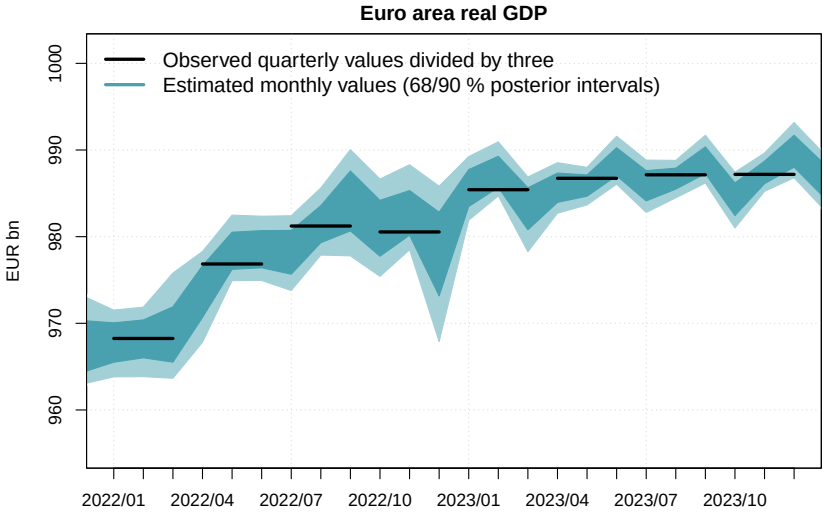


Another stylized illustration



Data/Model

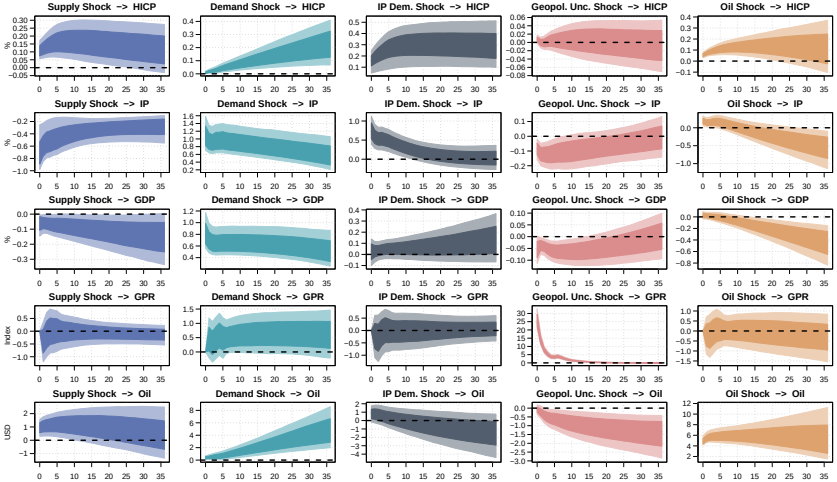
- SVAR model of the form: $y_t = a + A_1 y_{t-1} + ... + A_p y_{t-p} + B\varepsilon_t$.
- Non-Gaussian shocks $\rightarrow$ Shocks are statistically identified.
- 5 variables $\rightarrow$ 5 shocks.
- Data spans from 1995M01 to 2024M03.
- Mixed frequency data: quarterly observations of GDP, monthly observation of all the other variables.


Euro area real GDP
Observed quarterly values divided by three
Estimated monthly values (68/90 % posterior intervals)
EUR bn
1000
990
980
970
960
2022/01
2022/04
2022/07
2022/10
2023/01
2023/04
2023/07
2023/10

Additional identifying restrictions

	Shocks				
Variables	Supply	Demand	IP Demand	Geopol. Uncert.	Oil
HICP	+	+			
IP	-	+			
GDP	-	+			
GPR	0	0	0	+	0
Oil					+

Table: Restrictions on the contemporaneous effects of the shocks used for identification and labeling, i.e. sign- and zero restrictions on the components of the parameter matrix B.


Supply Shock -> HICP
Demand Shock -> HICP
IP Dem. Shock -> HICP
Geopol. Unc. Shock -> HICP
Oil Shock -> HICP
Supply Shock -> IP
Demand Shock -> IP
IP Dem. Shock -> IP
Geopol. Unc. Shock -> IP
Oil Shock -> IP
Supply Shock -> GDP
Demand Shock -> GDP
IP Dem. Shock -> GDP
Geopol. Unc. Shock -> GDP
Oil Shock -> GDP
Supply Shock -> GPR
Demand Shock -> GPR
IP Dem. Shock -> GPR
Geopol. Unc. Shock -> GPR
Oil Shock -> GPR
Supply Shock -> Oil
Demand Shock -> Oil
IP Dem. Shock -> Oil
Geopol. Unc. Shock -> Oil
Oil Shock -> Oil
%
Index
USD

Estimation

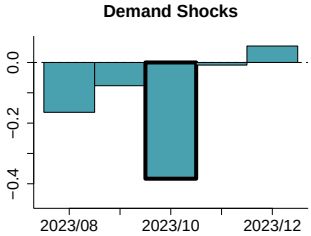
- We sample from the posterior distribution of parameters (and monthly GDP values) using a Hamiltonian MC algorithm (NUTS; total est. time $\sim$ 20 min).
- Flat priors on B (contemporaneous effects of the shocks).
- Hierarchical Minnesota priors on $A_1, ..., A_p$ (autoregressive parameters).

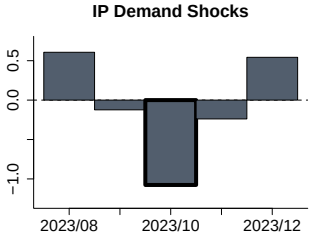
$$p(\theta|y) = \frac{p(y|\theta)p(\theta)}{p(y)} \propto p(\theta) \underbrace{|\det(B)|^{-T} \prod_{i=1}^{n} \prod_{t=1}^{T} f_i(\varepsilon_{it}(\theta); \gamma),,}_{likelihood} \quad (1)$$

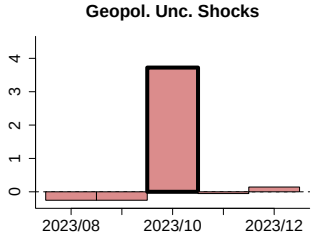
The outbreak of the Israel-Hamas war

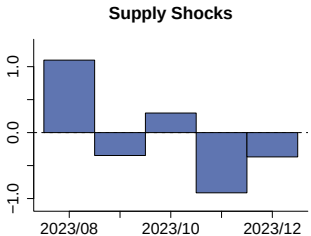
- The outbreak of the Israel-Hamas war in October 2023 seemed to weaken euro area demand by more than geopolitical surprises of similar magnitude (as measured by GPR) do on average.
- No effect on euro area supply.

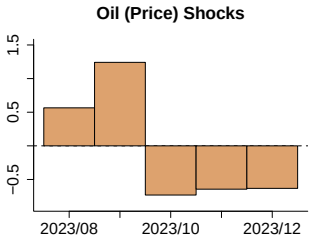
$\rightarrow$ **Deflationary effect on euro area inflation and large negative effect on euro area GDP.**

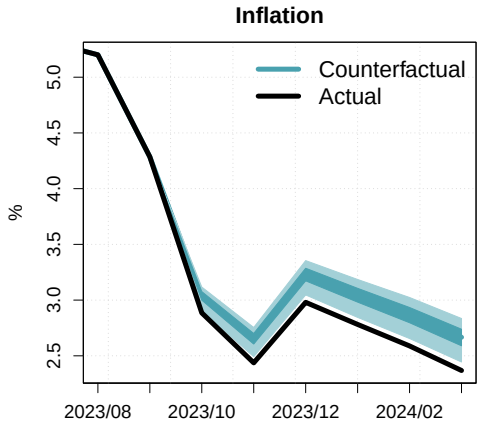

Demand Shocks
0.0
−0.2
−0.4
2023/08
2023/10
2023/12

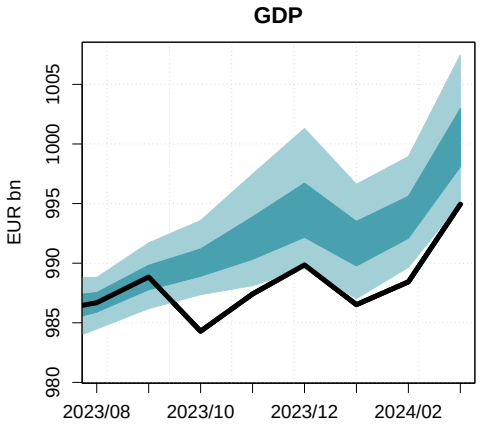

IP Demand Shocks
0.5
0.0
−1.0
2023/08
2023/10
2023/12


Geopol. Unc. Shocks
4
3
2
1
0
2023/08
2023/10
2023/12

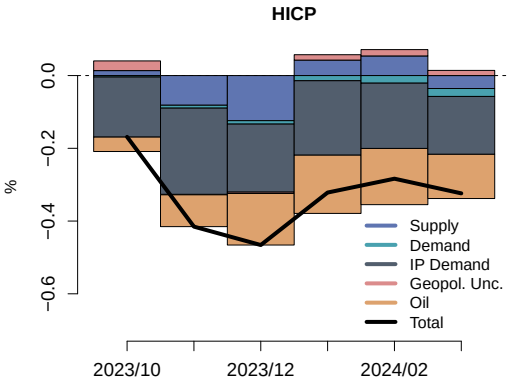

Supply Shocks
1.0
0.0
−1.0
2023/08
2023/10
2023/12

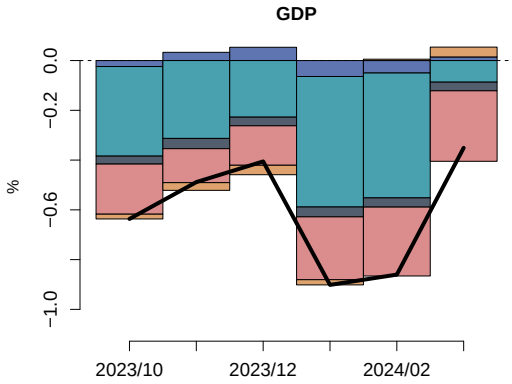

Oil (Price) Shocks
1.5
0.5
−0.5
2023/08
2023/10
2023/12


Inflation
Counterfactual
Actual
%
5.0
4.5
4.0
3.5
3.0
2.5
2023/08
2023/10
2023/12
2024/02


GDP
EUR bn
1005
1000
995
990
985
980
2023/08
2023/10
2023/12
2024/02

Shock contributions to the deviation of HICP and GDP from their projected paths

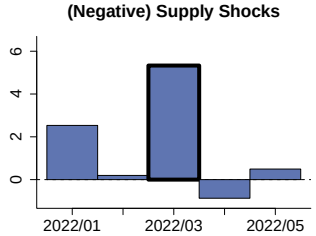


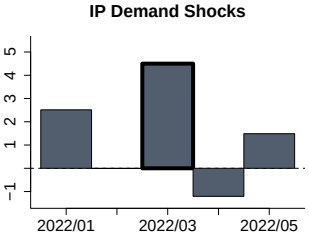


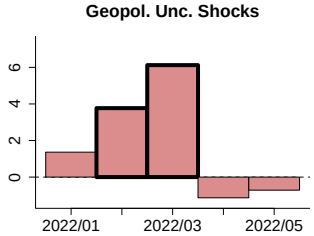
The Russian invasion of Ukraine

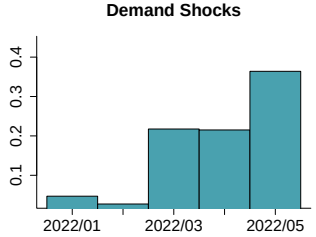
- In the context of the euro area economy, the Russian invasion of Ukraine in February-March 2022 manifested itself as a massive negative supply shock and as a similarly massive adverse geopolitical uncertainty shock.

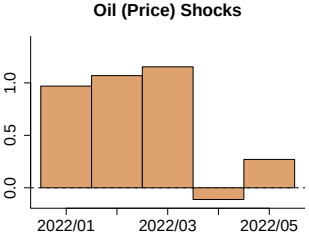
  $\rightarrow$ **Inflationary effect on euro area inflation and large negative effect on euro area GDP.**

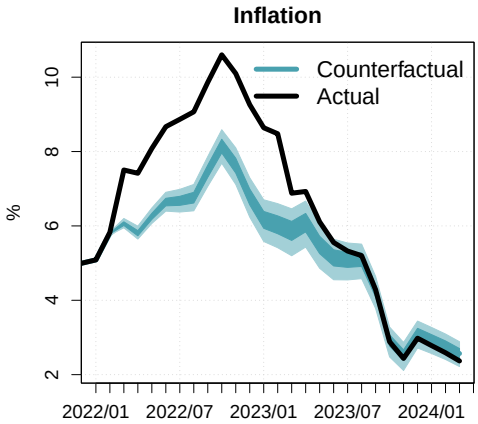

(Negative) Supply Shocks
0
2
4
6
2022/01
2022/03
2022/05

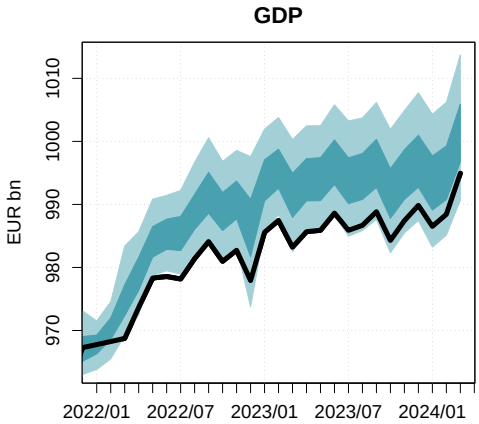

IP Demand Shocks
−1
1
2
3
4
5
2022/01
2022/03
2022/05


Geopol. Unc. Shocks
0
2
4
6
2022/01
2022/03
2022/05

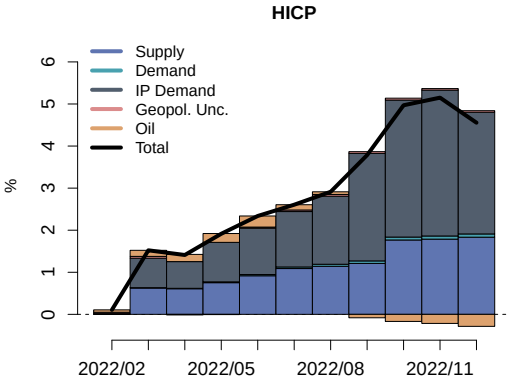

Demand Shocks
0.1
0.2
0.3
0.4
2022/01
2022/03
2022/05

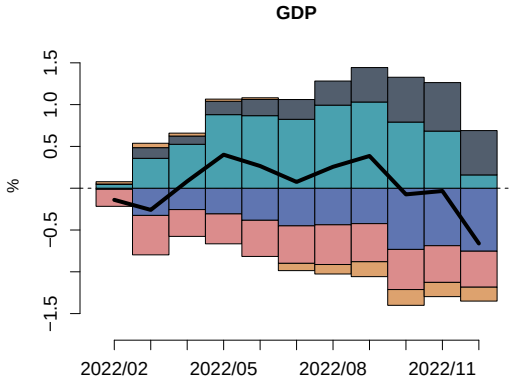

Oil (Price) Shocks
0.0
0.5
1.0
2022/01
2022/03
2022/05


Inflation
Counterfactual
Actual
%
2
4
6
8
10
2022/01
2022/07
2023/01
2023/07
2024/01


GDP
EUR bn
970
980
990
1000
1010
2022/01
2022/07
2023/01
2023/07
2024/01

Shock contributions to the deviation of HICP and GDP from their projected paths





To conclude

- Due to heterogeneity, **the effects of adverse geopolitical events on euro area inflation are context dependent and event-specific**.
- Some adverse geopolitical shocks have deflationary effect on euro area inflation (e.g., the outbreak of the Israel-Hamas war), some have inflationary effect (e.g., the Russian invasion of Ukraine).
- With respect to GDP things seem more straight forward:
  adverse geopolitical shocks tend to have significant negative effect on euro area GDP.

Thank you!