



FEDERAL RESERVE BANK *of* NEW YORK

# The Global Supply Chain Pressure Index

Gianluca Benigno, views are my own and do not represent the views of the Federal Reserve Bank of New York, the Federal Reserve System or the FOMC

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# The Covid-19 Crisis: Supply Chains

- Globalized economy with complex supply chain interlinkages.
- Covid-19 shock along with shift in consumption demand has created stress at supply chains level.
- Question and research applications:
  - How do we measure these disruptions?
  - Macro perspective: Relationship with prices and quantities (inflation, exports and imports).
  - Micro perspective: firms' profitability



# The Global Supply Chain Pressure Index

- Several indicators have been used in recent time to capture disruptions caused by delay in goods' delivery.
  - **Our aim: to bring these together in one indicator, the GSCPI, that provides a bird-eye perspective on these pressures.**
- Global Transportation Costs:
  - Shipping Costs:
    - Baltic Dry Index and Harper Petersen Index
  - Air Freight Costs:
    - BLS In- and Outbound Air Freights Price Indices US vs. Asia and Europe.
- Supply chain components of PMIs for euro area, U.K., U.S. and the 4 main East Asian economies:
  - Backlogs;
  - Delivery times;
  - Purchase Stocks.



# GSCPI: Construction, I

- Data specifics:
  - **Baltic Dry Index:** daily data going back to 1985. Not revised.
  - **Harpex container ship rate index:** weekly data going back to 2001. Not revised.
  - **BLS In- and Outbound price indices:** monthly data going back monthly to 2005 and quarterly pre-2005. Typically published mid-month with a one-month lag. With each release, data up to about six months back get revised.
  - **PMI data:** monthly data, with final survey results pertaining to the previous month published in the first week of the current month. Not revised.
    - China, Korea, Taiwan: going back to 2004.
    - Japan: going back to 2001.
    - Euro area and U.K. going back to 1997.
    - U.S. (Markit & ISM): some back to 1997, some back to 1940s.

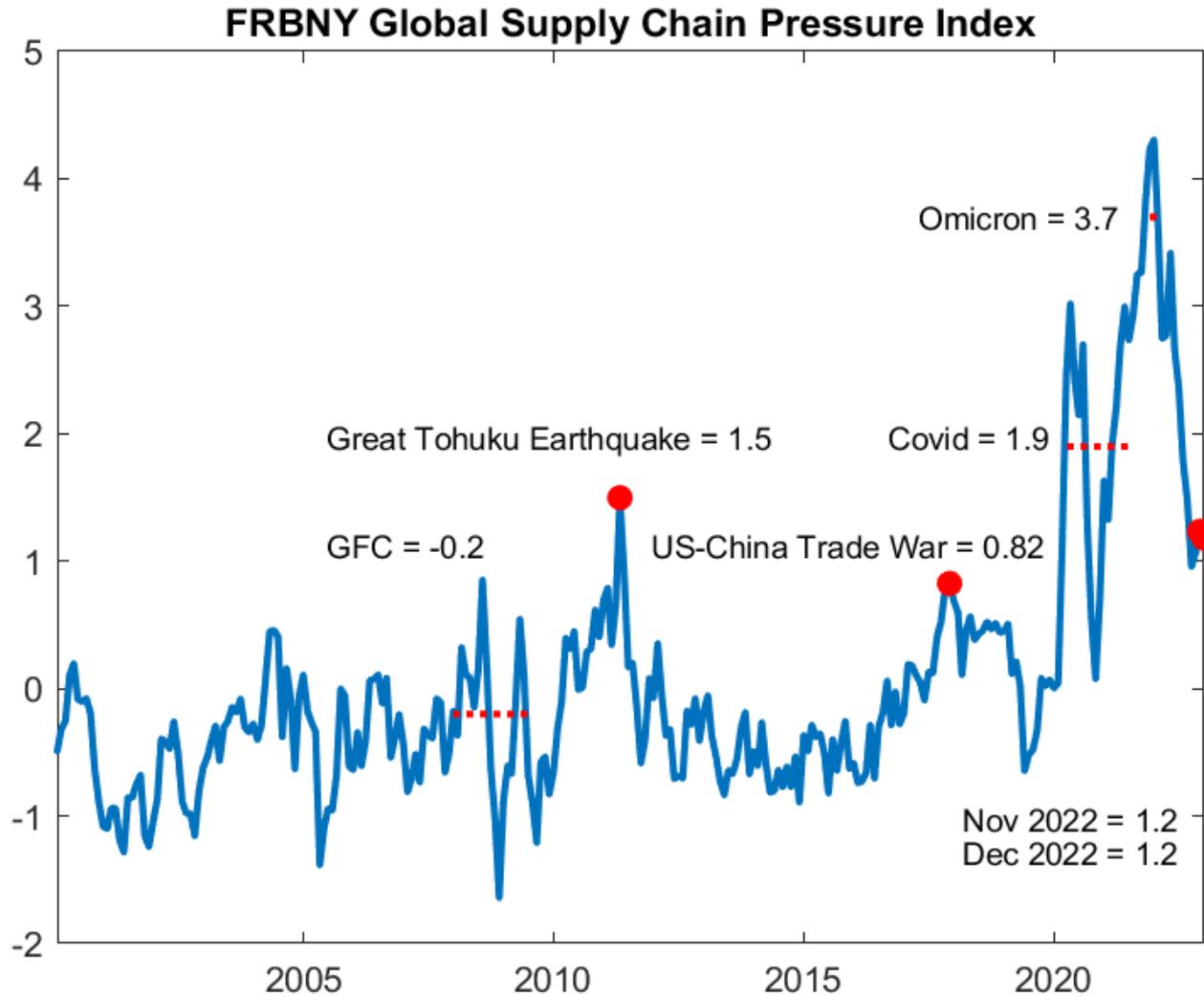


# GSCPI, Construction II

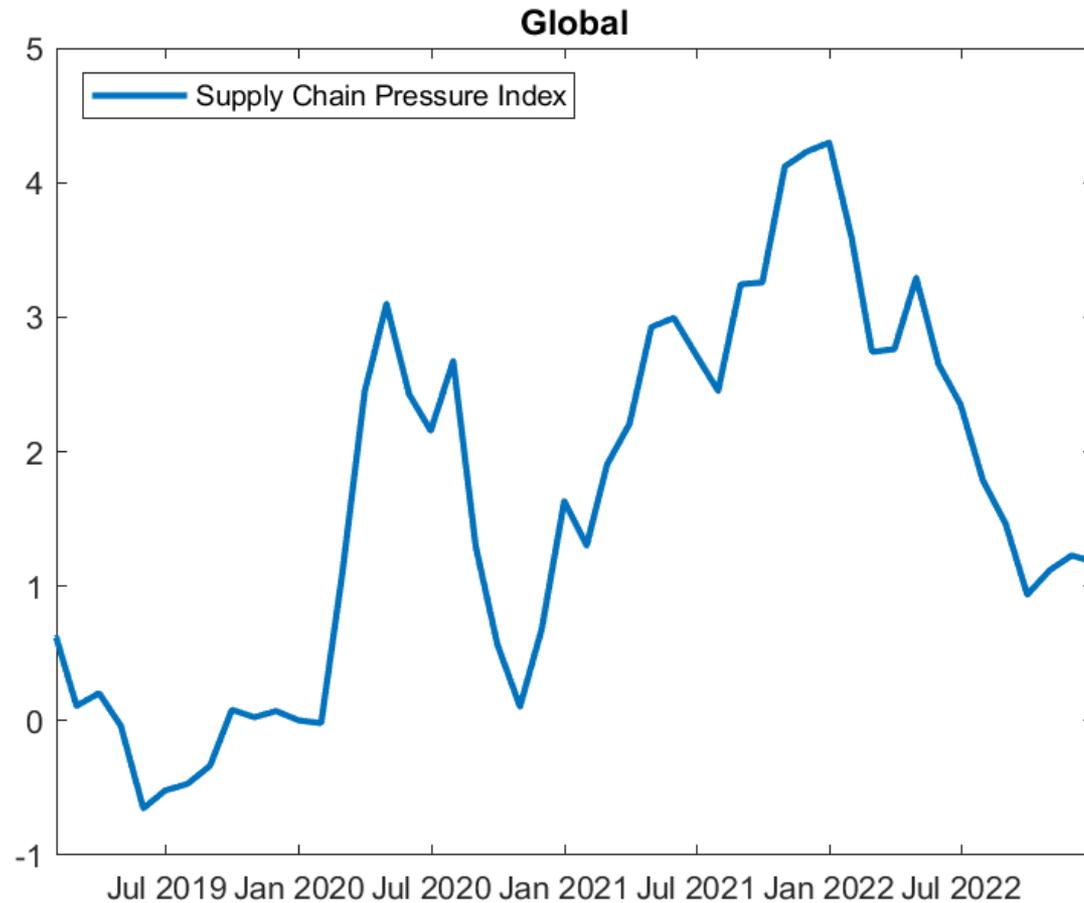
- Idea behind GSCPI: construct parsimonious indicator that provides a bird-eye perspective of developments at the supply level.
- Construction:
  - Collect the various indicators;
  - Isolate supply component;
    - Regress supply chain components of PMIs on corresponding PMI “New Order” data;
    - Regress global transportation costs on GDP-weighted “New Orders” and “Quantities Purchased” from our national PMIs.
  - Use residuals to run a principal component analysis to extract a common global component: GSCPI.



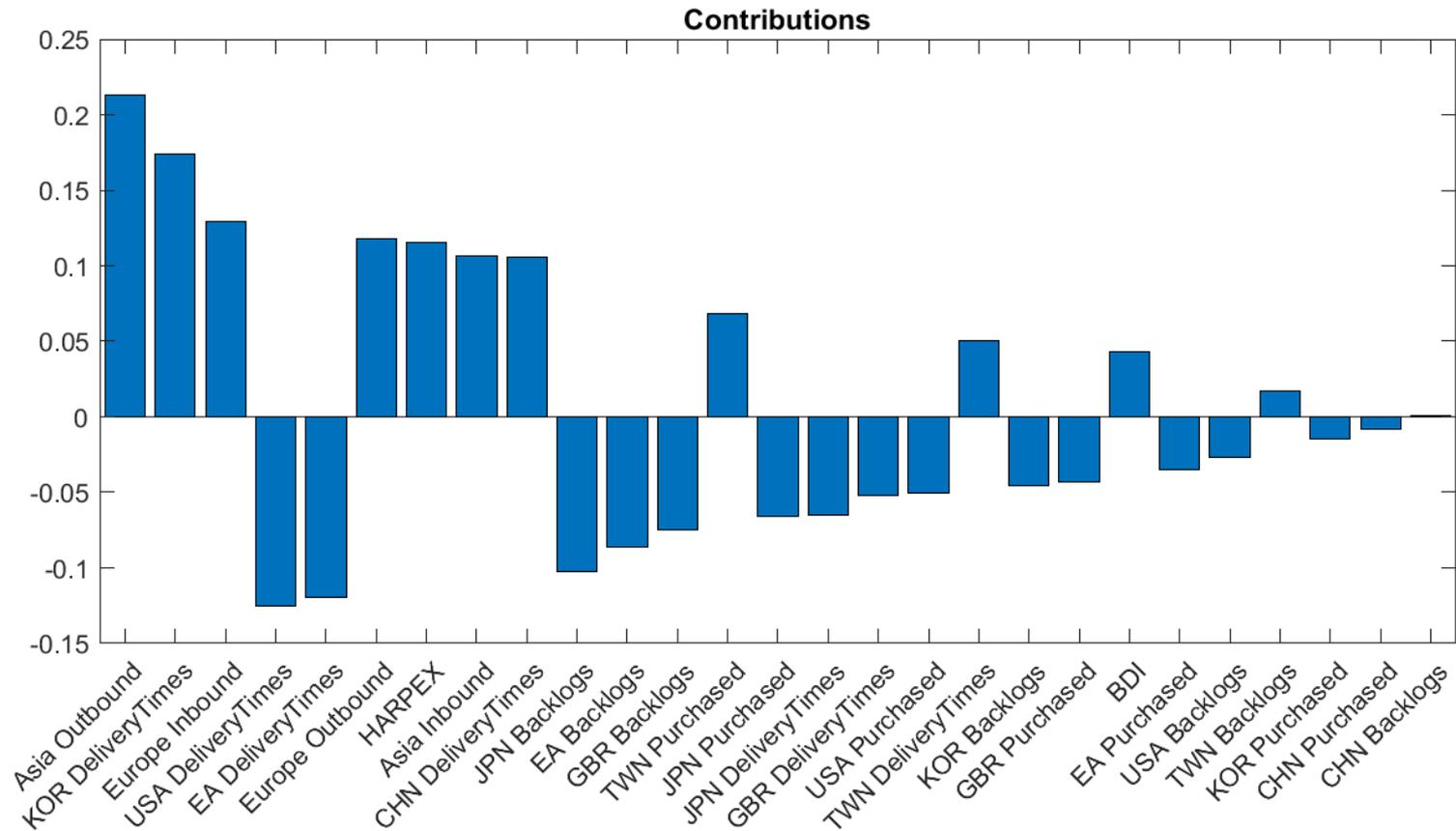
# Global Supply Chain Pressure Index



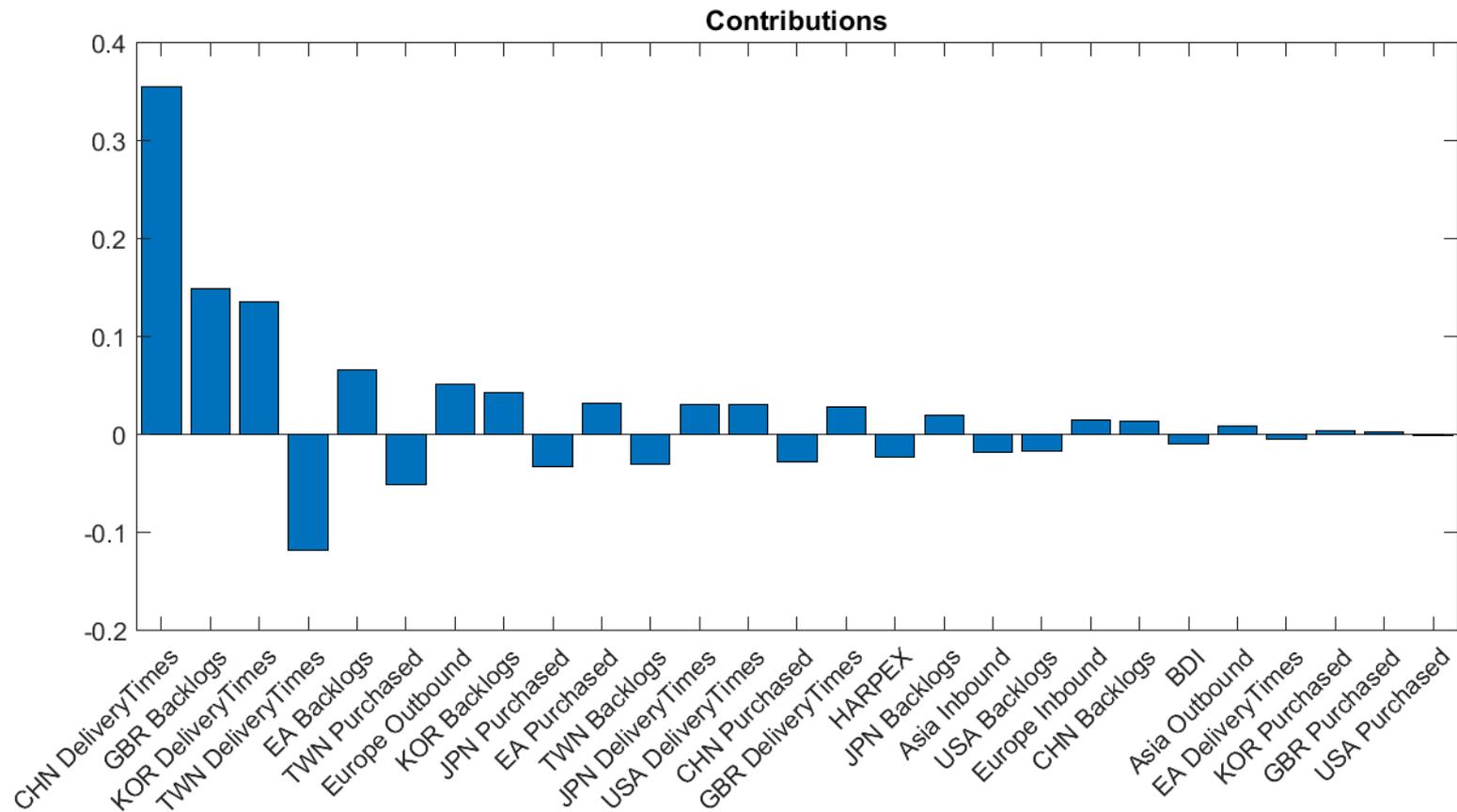
# Global Supply Chain Pressure Index



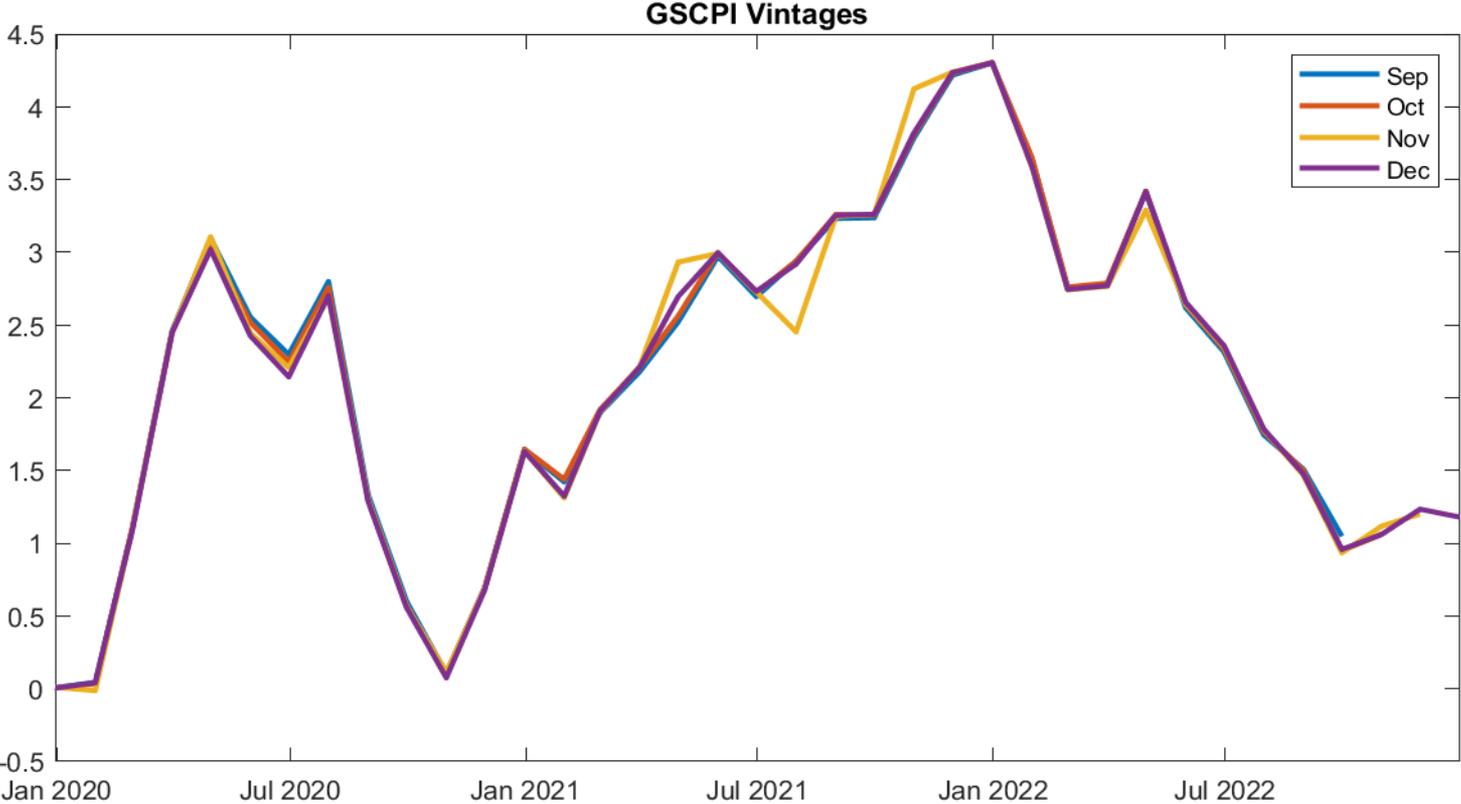
# Underlying Contributions October-December 2022



# Underlying Contributions in March - April 2022

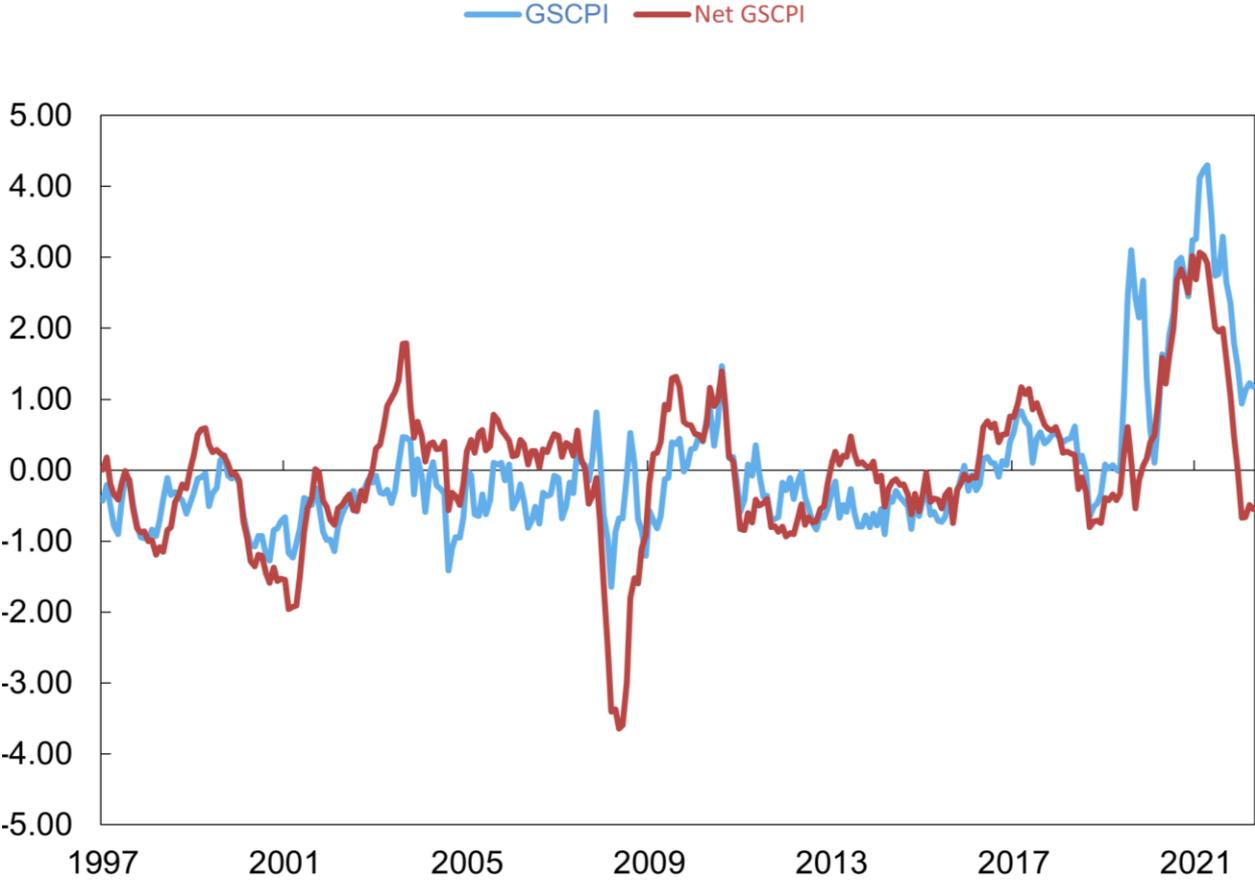


# Previous Releases



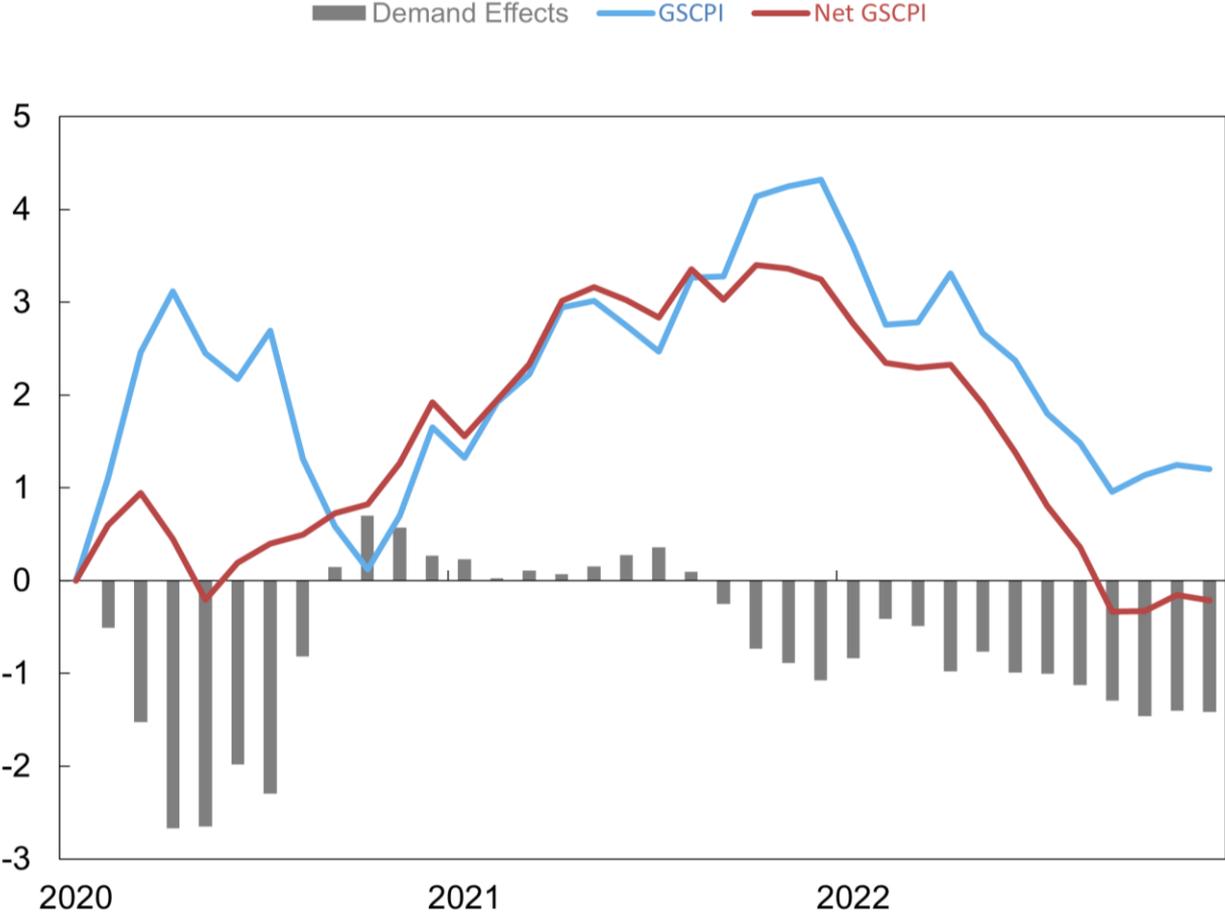
# Net GSCPI

## Global Supply Chain Index



# Demand Effects on Supply Chain

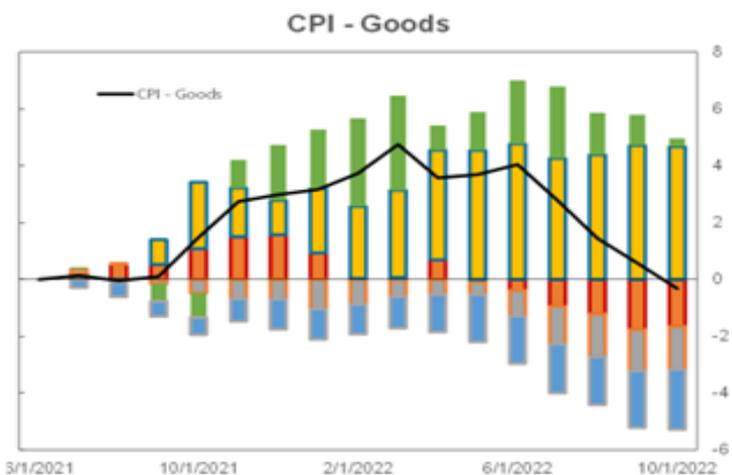
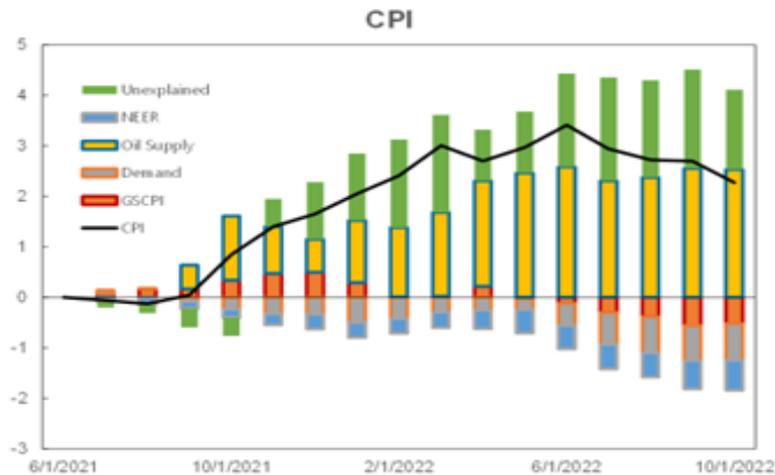
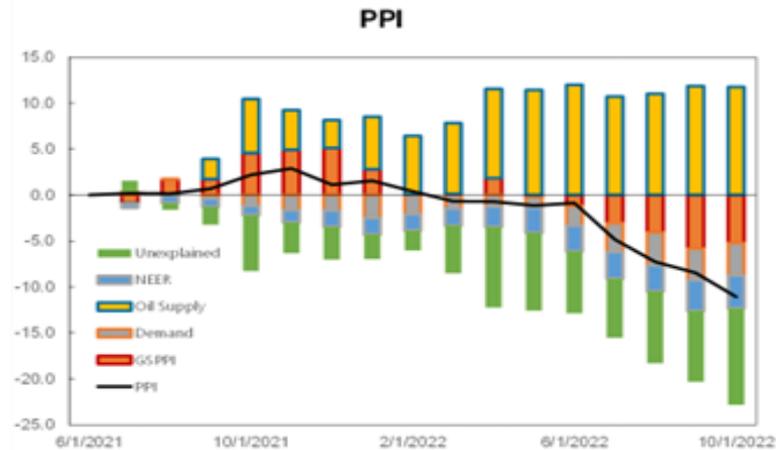
## Demand Effects Analysis



# Application: The Global Supply Side of Inflation

- What is the role of supply chain disruptions in explaining current inflationary pressures?
- Is inflation global or local? And at which level?
- Adopt local projection method to study the response of different measures of inflation to shock to our GSCPI index along with global demand and supply component of oil price changes (as in Groen et al. (2013)).

# Inflation Decomposition



Charts show the out-of-sample estimated contributions to the change in 12-month inflation from the GSCPI, US demand, Oil Supply, NEER, and unexplained. The change is relative to June 2021 and are expressed in log percentage points. The estimation sample for the regression coefficients covers 1998m9 to 2021m6.

# Conclusions

- Monitoring tool to assess supply chain pressures;
- Geopolitical, climate, cyberattack and pandemic event could affect supply chain operations;
- Monetary policy implications in terms of understanding inflation determinants;
- Further refinements and analysis.

# References

- Based on joint work with J. Groen and A. Noble.
- **Product:** Global Supply Chain Pressure Index
- **Paper:** The GSCPI: A New Barometer of Global Supply Chain Pressures (May 2022)
- **Blogs:**  
Global Supply Chain Pressure index: May 2022 Update (May 2022);  
Global Supply Chain Pressure Index: March 2022 Update (March 2022);  
A New Barometer of Global Supply Chain Pressures (January 2022);  
The Global Supply Side of Inflationary Pressures (January 2022)



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Thank you

