The Inflationary Effects of Global Supply Chain Shocks: Evidence from Swedish Microdata

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Disclaimers

The views expressed in this presentation are those of the authors and do not necessarily reflect the position of the Federal Reserve Board or the Federal Reserve System.

Overview

Big Question:

- How do (global) supply chain shocks affect inflation?

This paper:

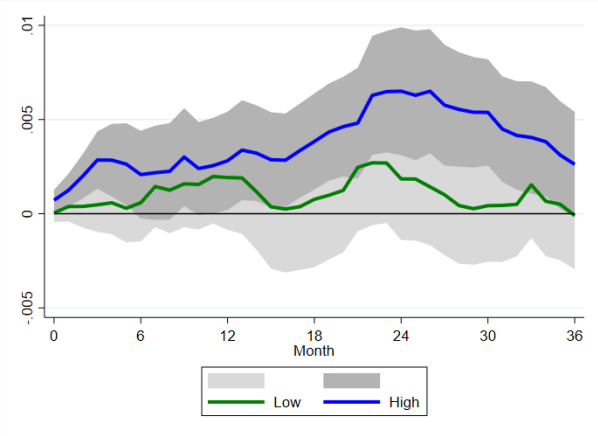
- Take macro and time series effects seriously.
  $\Rightarrow$ Structural VAR with sign restrictions and narrative approach to obtain supply chain shock.
- **And** look at firm-level price setting and heterogeneity.
  $\Rightarrow$ Panel local projection with interaction terms to study micro-level price setting of Swedish firms.

Main Findings

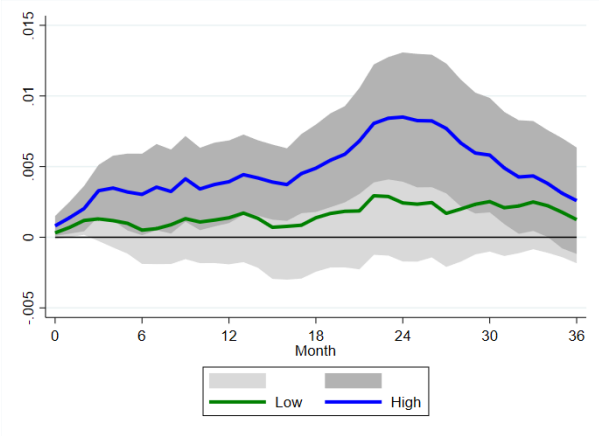
- Supply chain shocks increase producer prices (max increase after 2 years)
- Effects stronger for:
  - Firms that are larger, have a higher export intensity, lower inventories, lower labor share, and are multi-product
  - Domestic sales

Main Findings II

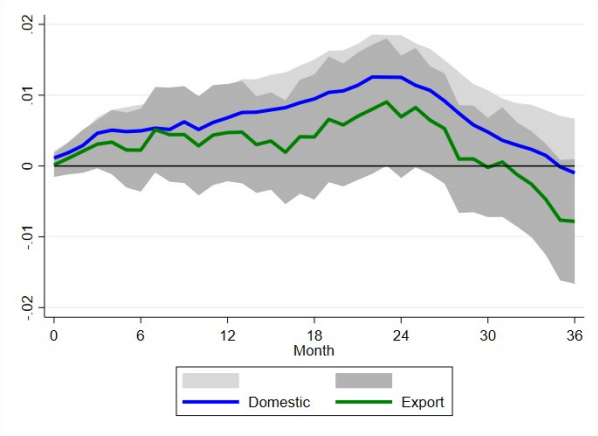
Figure 3: State-dependent response of product-level producer prices



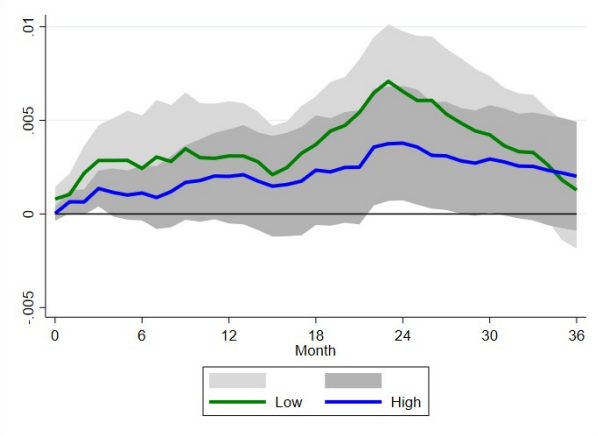
(a) size



(b) export intensity



(c) export vs domestic market



(d) inventories

Structural VAR

Endogenous variables:

- First block: industrial production, consumer price index, import price index
- Second block: RWI/ISL container throughput index, Harpex Petersen Charter Rate Index, Gloabl Supply Chain Pressure index (GSCPI)

Conventional sign restrictions:

- Supply chain shock: increase in shipping costs, decline in container throughput, and increase in supply chain pressure index

Narrative restrictions:

- Negative supply shock around: Tohoku earthquake (2011), Suez Canal obstruction (2021), Shanghai backlog (2022).

Local Projection

$$\log(p_{i,j,f,t+h}) - \log(p_{i,j,f,t-1}) = \alpha_{j,h} + \alpha_{m,h} + \beta_h(share_{f,t} \times shock_t) + \gamma_h X_{t-1} + u_{i,j,f,t+h}$$

- Look at change in firm-product level prices in response to supply shock from SVAR.
- Allow for heterogeneous response depending on firm characteristics.

Summary and Comments

Summary (so far):

- Highly relevant topic.
- Intriguing results.

Comments:

1. Firm Characteristics and Mechanism
2. Other Global Factors
3. Narrative Approach
4. Some SVAR Questions
5. Additional Comments

Firm Characteristics and Mechanism

Baseline story: Shipping supply shock

$\Rightarrow$ Higher intermediates import costs $\Rightarrow$ Higher prices

Exposure to intermediate input cost shocks proxied by export intensity.

Other mechanisms: Shipping supply shock

$\Rightarrow$ Less foreign competition $\Rightarrow$ Higher prices

$\Rightarrow$ Fewer foreign sales $\Rightarrow$ Lower prices
(if excess supply as in Almunia et al. (2021)).

How to separate these channels?

- Export vs. import intensity
- Measures of competition
- Final good vs. intermediate goods; upstream vs. downstream

Distinguishing between these channels relevant for optimal policy.

Firm Characteristics and Mechanism II

- Characteristics are quite highly correlated.

Table 1: Firm Characteristics Overlap

	Export Intensity	Total Sales	Inventory Ratio	Multiple Products	Multiple Product Groups
Export Intensity	100	73	39	85	77
Total Sales	53	100	45	89	78
Inventory Ratio	40	63	100	82	67
Multiple Products	50	73	47	100	86
Multiple Product Groups	53	74	45	100	100

- Run a horse race across variables?
- Run an event study analysis comparing the different types of crises?

Other Global Factors

SVAR has six endogenous variables

- But no variables capturing global real or financial conditions, or global prices.
- Are global supply shocks correlated with macro or financial shocks (e.g. COVID crisis)?
- Are Swedish prices correlated with changes in foreign prices?
- If yes, shouldn't they be in the SVAR?

Narrative Approach

The three crises were quite distinct:

- Tohoku earthquake
  - Mostly affected supply chains of Japanese multinationals (Boehm et al. (2019))
  - Effects independent of mode of transportation
- Suez Canal obstruction (2021)
  - Affected container shipping on an important route.
- Zero-COVID policy
  - Affected production and transportation in China
  - Potential confounding COVID effects in other places.

Questions:

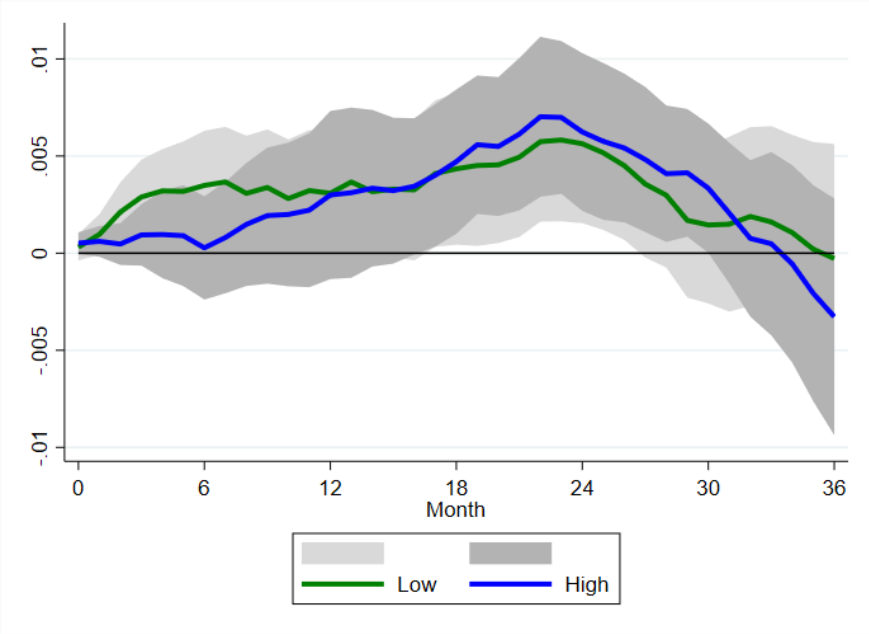
- Would we expect the same price response across these different shocks?
- Are these production supply shocks or transportation shocks? Does this matter?

Some SVAR Questions

- How much identification is coming from the narrative approach over and above the sign restrictions? How important is the post-COVID inflation episode?
- How do you compute confidence intervals in the LP, given that the shocks are estimated? Are standard errors really smaller compared to the reduced form approach?

Additional comments I

- Swedish prices respond the same when GSCPI is high or low. Is this surprising?



(e) Global supply chain pressure index

Which mechanism is consistent with this?

Additional Comments II

- What about also including the Eyjafjallajoekull erruption to study effects on goods shipped by air? Could be a nice comparison to the Suez Canal which only affected shipping.
- More inputs not necessarily more complex - if used for different outputs. Could proxy for size.
- Products / category should proxy for size - not specialization?
- Figure 1: cannot see the 30%

Summary

- Very interesting new project on a highly relevant topic.
- Great to push the macro methods towards testing 'micro' mechanisms and studying firm heterogeneity.
- Looking forward to the next draft!