Discussion of "Stock Market Spillovers via the Global Production Network" by di Giovanni and Hale

Robert C. Johnson
University of Notre Dame

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Overview

How does trade transmit US monetary shocks to equity markets?
What role for direct vs. indirect input network effects?

Ozdagli and Weber (2020) develop spatial regression framework to study cross-sector propagation of MP shocks (via equity market responses).

This paper extends to international context. **GOOD IDEA**.

Discussion Plan:

1. Recap the input-output economics.
2. Comments empirical design.
3. Broader context.

Step 1: Revenue

Country m, sector i.

$$R_{mi} = p_{mi}y_{mi}$$

$$= p_{mi} \left[\sum_n c_{mi,n} + \sum_j \sum_n x_{mi,nj} \right]$$

$$= \sum_n \left(\frac{p_{mi}}{p_{mi,n}} \right) p_{mi,n}c_{mi,n} + \sum_j \sum_n \left(\frac{p_{mi}}{p_{mi,n}} \right) p_{mi,n}x_{mi,nj}$$

$$= \sum_n \left(\frac{b_{mi,n}}{\tau_{mi,n}} \right) E_n + \sum_j \sum_n \left(\frac{\omega_{mi,nj}}{\tau_{mi,n}} \right) \lambda_{nj}R_{nj}$$

Arbitrage: $p_{mi,n} = \tau_{mi,n}p_{mi}$.

Cobb Douglas: $p_{mi,n}x_{mi,nj} = \omega_{mi,nj}\lambda_{nj}R_{nj}$ and $p_{mi,n}c_{mi,n} = b_{mi,n}E_n$, where $E_n = \sum_i \sum_m p_{mi,n}c_{mi,n}$ is final expenditure in destination n.

Should we be adjusting for icebergs? I think not.

Step 2: Expenditure $\leftrightarrow$ Money

Cash-in-advance for *final expenditure*: $E_n = \mathcal{M}_n$.

Revenue is then:

$$R_{mi} = \sum_n \left(\frac{b_{mi,n}}{\tau_{mi,n}} \right) \mathcal{M}_n + \sum_j \sum_n \left(\frac{\omega_{mi,nj}}{\tau_{mi,n}} \right) \lambda_{nj} R_{nj}$$

This is standard input-output system, with exogenous final expenditure. Money shocks travel "backwards" through input-output linkages; only impacts of MP shock are via *expenditure levels*.

In matrix form: $\left[\mathbf{I} - \tilde{\mathbf{\Omega}} \mathbf{\Lambda} \right] \mathbf{R} = \tilde{\mathbf{b}} \mathcal{M}$, where $\tilde{\mathbf{\Omega}}$ collects input use shares and $\tilde{\mathbf{b}}$ collects final expenditure shares, both adjusted by trade costs.

Point of confusion: where are exchange rates?

Step 3: Revenue ↔ Profits

Stacking countries and sectors:

$$\pi = (\mathbf{1} - \lambda - \alpha) \circ \mathbf{R} - \mathbf{f}$$

Note: DRTS, fixed costs.

Log-linearize and plug in for revenue:

$$\hat{\pi} = \left[\mathbf{I} - \tilde{\boldsymbol{\Omega}} \boldsymbol{\Lambda} \right]^{-1} \beta \hat{\mathcal{M}}$$

β is $NJ \times N$, captures $\tilde{\mathbf{b}}$ and share of fixed costs in profits.

Broad Comments on Empirics

1. Profits $\leftrightarrow$ equity returns?

2. Other outcomes?
   - Sectoral revenue or GDP itself.
   - Other asset prices – e.g., exchange rates.

3. Other shocks?
   - Fiscal shocks.
   - Trade policy shocks.

4. Dynamics: spatial vector auto-regressions?

Spatial Auto-Regression (SAR)

From theory: $\hat{\pi} = [\mathbf{I} - \mathbf{W}]^{-1} \beta \hat{\mathcal{M}}$, where $\mathbf{W} \equiv \tilde{\mathbf{\Omega}} \mathbf{\Lambda}$.

Estimation equation: $\hat{\pi} = \beta \hat{\mathcal{M}} + \rho \mathbf{W} \hat{\pi} + \epsilon_t$.

- ▶ β maps shock to profits (equity returns).
    - ▶ Argument for treating β as parameter-to-be-estimated is compelling.
    - ▶ Model is "too stylized" to take seriously:
      e.g., money supply in model; interest rate shock in data.

- ▶ ρ modulates strength of spatial dependence.
    - ▶ This is standard in SAR literature, but what does it mean?
    - ▶ I find argument for estimating ρ less compelling,
      because input-output mechanism is tied to structural model.
    - ▶ Ideally, I would impose $\rho = 1$ initially, and then estimate
      $[\mathbf{I} - \mathbf{W}] \hat{\pi} = \beta \hat{\mathcal{M}} + \epsilon_t$.
    - ▶ Do the data reject $\rho = 1$? Unclear.

Broader Context

Parallel work on network shock transmission in domestic & int'l macro.

Recently, increasing attention to monetary policy in domestic literature.
e.g, Ozdagli and Weber (2020), La'O and Tahbaz-Salehi (2020), Rubbo (2020).

These ideas deserve more careful treatment in int'l (NOEM) literature.

di Giovanni and Hale translate Ozdagli-Weber model to int'l context with few modifications; model embeds strong assumptions.

- ▶ Cobb-Douglas everywhere.
- ▶ Elastic labor supply (fixed real wages).
- ▶ Preset wages and flexible prices with LoOP.
- ▶ Static model with balanced trade.

These choices all matter for spillover mechanics in the model.

Two Issues

Issue 1: Elasticities

▶ If trade responds to relative price, then **W** endogenous.

▶ Elasticities for inputs vs. final goods interact with input-output linkages to shape bilateral demand spillovers.

Issue 2: Nature of price rigidity

▶ Sticky wages vs. prices? Both?

▶ If prices, then PCP, LCP, or DCP? Or monetary union?

Choices switch on/off mechanisms via which input-output linkages matter for propagation.

Open question: how do choices change in spatial weighting matrix, and thus direct/indirect quantification?

Conclusion

Stimulating contribution to active literature.

I look forward to refinement.