

Discussion of “The Network Origins of Bank Influence”
Dewachter, Tielens, and Van Hove (2019)

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Production Networks

- Growing literature on how input-output linkages can
 - (i) function as a mechanism for propagation and amplification of shocks.
 - (ii) translate micro shocks into aggregate fluctuations.

- Most of (theoretical) literature ignores financial shocks/frictions. Focuses on
 - ▶ efficient economies
 - ▶ models with exogenous distortions (e.g., constant markups)

- Despite the fact that financial shocks/frictions can be first-order
 - ▶ Sweden: bankruptcy spillovers due to trade credit ([Jacobson & Von Schedvin, 2015](#))
 - ▶ Spain: propagation of bank credit supply shocks to borrowers' downstream customers ([Alfaro, García-Santana, & Moral-Benito, 2019](#))

This Paper

- Main question:

can the interaction of financial shocks and financial frictions with firm-level input-output linkages matter for macroeconomic outcomes?

- Framework:

New-Keynesian model with various ingredients:

- ▶ heterogenous firm-level input-output relationships (*production network*)
- ▶ monopolistically competitive banking sector
- ▶ heterogenous bank-firm lending relationships (*credit network*)
- ▶ collateral constraints

- Shocks:

- (1) shocks to banks' lending rates
- (2) shocks to firms' collateral constraints

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- Theoretical results:
 - ▶ shocks to banks and to firms' borrowing constraints can propagate via I-O linkages
 - ▶ idiosyncratic bank-level shocks can have macro consequences
 - ▶ a mapping from production and credit networks to aggregate volatility

- Calibration exercise:
 - ▶ calibrate the production network to Belgian B2B VAT dataset
 - ▶ calibrate the credit network to NBB's Corporate Credit Register

- Takeaways:
 - ▶ a measure for banks' systemicness measuring their impact on the real economy
 - ▶ bank-specific shocks can have large effects on aggregate volatility: 44.7% of what an aggregate shock of the same magnitude would cause

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Model: Firms

- Economy consisting of n firms and m banks
- production functions:

$$y_{it} = k_{it}^{1-\delta_i} l_{it}^{\delta_i \phi_i} \prod_{j=1}^n x_{ijt}^{\omega_{ij}}$$

- Marginal costs:

$$mc_{it} = R_{it}^{1-\delta_i} w_{it}^{\delta_i \phi_i} \prod_{j=1}^n p_{jt}^{\omega_{ij}}$$

Model: Entrepreneurs

- Firm-specific capital is produced by a firm-specific entrepreneur, who combines labor with land to produce:

$$k_{it} = n_{it}^{1-\nu_i} h_{it}^{\nu_i}$$

- Entrepreneurs require financing to transform land and labor to capital, but are subject to a collateral constraint:

$$s_{it} \leq \ell_{it} \cdot \text{resale value of land holding}$$

Model: Banks

- Each bank can borrow from households and lend to a subset of firms at constant markups (modeled as monopolistic competition):

$$R_{ibt} = \frac{\mu_{bt}}{\mu_{bt} - 1} R_t$$

- Determines the rental rate of firm-specific capital:

$$R_{it} = \prod_{b=1}^n R_{ibt}^{\psi_{ib}}$$

Closed-Form Characterization: Simplified Model

Proposition

Suppose the collateral constraints never bind. Then,

$$\log(\text{GDP}) = - \sum_{b=1}^m v_b \log \left(\frac{\mu_{bt}}{\mu_{bt} - 1} \right),$$

where

$$v_b = \sum_{i=1}^n \sum_{j=1}^n \theta_i \ell_{ij} \psi_{jb},$$

where $L = (I - \Omega)^{-1}$ is the Leontief inverse and Ψ is the firm-bank lending network.

- **Implication I:** v_b measures the “real systemicness” of shocks bank b
- **Implication II:** network heterogeneity can result in non-trivial macro volatility:

$$\text{var}(\log(\text{GDP})) = \sigma_\epsilon^2 \text{var}(v_1, \dots, v_m)$$

- **Implication III:** disentangling the role of the two types of connections

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- **Implication III:** disentangling the role of the two types of connections

Comment: Simplified Model

- There are **two networks** and **two shocks**.
- The characterization results are for a simplified model with only shocks to borrowing rates:

$$\log R_{it} = \log R_t + \sum_{b=1}^m \psi_{ib} \log \left(\frac{\mu_{bt}}{\mu_{bt} - 1} \right)$$

- Equivalent to correlated markup shocks: a shock to bank b increases the marginal cost of all its borrower, and hence can be cast as the special case of the standard result in the literature:

$$\log \text{GDP} = \sum_{i=1}^n \sum_{j=1}^n \theta_i \ell_{ij} \xi_j \quad \text{versus} \quad \log \text{GDP} = - \sum_{i=1}^n \sum_{j=1}^n \theta_i \ell_{ij} \psi_{jb} \log \left(\frac{\mu_b}{1 - \mu_b} \right).$$

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Comment: Simplified Model

- In contrast, depending on how they are modeled, shocks to collateral constraints,
 - ▶ cannot be cast as exogenous movements in productivities or markups
 - ▶ may result in non-trivial interactions between financial and real sides

- For example, if firms' pledgeable assets are tied to their specific operations (say, firm-specific capital, future cashflow, etc.), shocks to that firm would have heterogeneous effects on its suppliers' and customers'
 - ▶ already in the model, but unexplored
 - ▶ can say anything about the interaction between and input-output linkages and financial constraints?
 - ▶ maybe able to speak to the empirical findings in the literature?

Comment: Firm- vs. Industry-Level Networks?

- Firms in the model are assumed to be either competitive/monopolistically competitive (with constant markups)
 - ▶ Standard assumption in the literature

- Reasonable assumption at the industry level, but less so at the firm level:
 - ▶ it implies that the pass-through of the shocks are 100%
 - ▶ treats the firm-level input-output linkages as exogenous

- Both features lead to an overestimation of the shocks' aggregate effects!

Comment: Policy Implications

- Paper investigates various macro-prudential/financial policy implications:
 - (1) firm-level LTV requirements
 - (2) bank specialization
 - (3) systemically important financial institutions

- The measure used is macroeconomic volatility: $\text{var}(\log(\text{GDP}))$
however, unclear this is the proper welfare-relevant measure.

- Example: tighter LTV ratios for particular “central” firms would reduce macroeconomic volatility, suggesting, a “borrower-based” measure of systemicness for non-financial corporations.
 - ▶ But given these firms’ centrality in the economy, tightening their LTV ratios would probably have the most severe adverse effect on welfare.

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Comment: Leveraging Firm-Level Information?

- The paper can probably do a lot more with the unique firm-level dataset.
- Example from a similar context: [Alfaro, García-Santana, & Moral-Benito \(2019\)](#):
 - ▶ use administrative data for all firms in Spain to estimate bank-year credit supply shocks and firm-year credit demand shocks.
 - ▶ but to study the propagation of the shocks, they have to rely on industry-level I-O data
- Important to know whether one can verify these findings using firm-level data. (probably there are other more interesting possibilities)

Summary

- Nice paper aimed at incorporating financial frictions and bank-firm relationships into a production network setting
- Closed-form results on the impact of credit supply shocks via production networks
- Ambitious calibration using firm-to-firm, bank-to-firm microdata from Belgium

- (Unexplored) theoretically interesting mechanism: financial frictions and production networks
- Proper measure for assessing policy?
- Leveraging firm-level data more?