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:

\[
y_{it} = k_{it}^{1-\delta_i} \prod_{j=1}^{n} x_{ijt}^\omega_{ij}
\]

- Marginal costs:

\[
mc_{it} = R_{it}^{1-\delta_i} \prod_{j=1}^{n} P_{jt}^\omega_{ij}
\]
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:

\[ R_{it} = \prod_{b=1}^{n} R_{ibt}^{\psi_{ib}} \]
Proposition

Suppose the collateral constraints never bind. Then,

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

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 \( \Psi \) 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(GDP)) = \sigma_{\epsilon}^2 \text{var}(v_1, \ldots, v_m)
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• Implication III: disentangling the role of the two types of connections
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$$\text{var}(\log(\text{GDP})) = \sigma^2 \text{var}(v_1, \ldots, v_m)$$

- **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 GDP = \sum_{i=1}^{n} \sum_{j=1}^{n} \theta_{ij} \xi_j \quad \text{versus} \quad \log GDP = - \sum_{i=1}^{n} \sum_{j=1}^{n} \theta_{ij} \psi_{jb} \log \left( \frac{\mu_{b}}{1 - \mu_{b}} \right).
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- No meaningful interaction between the two sides in the simplified model.
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• 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 heterogenous 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?