Discussion of Ayumu Ken Kikkawa, Glenn Magerman, and Emmanuel Dhyne:

"Imperfect Competition and the Transmission of Shocks: The Network Matters"

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Highlights

- Empirics: Markups positively associated with input shares within customers
- Empirics: Larger churn in suppliers when exposed to larger reduction in input prices
- Model: Production in a fixed network
- Model: Formation of firm network
- Theory: Network irrelevance in a benchmark case
- Model calibration
- Counterfactuals

Empirics: Markups positively associated with input shares within customers

$$\mu_{i,t} = \beta \, \mathrm{SctrMktShare}_{i,t} + \gamma \, \overline{s^m_{i\cdot,t}} + \varphi X_{i,t} + \delta_t + \epsilon_{i,t}$$

$$\begin{aligned}
\overline{s^m_{i\cdot,t}} &= \sum_{j \in W_{i,t}} \frac{\mathrm{InputPurchases}_{j,t}}{\sum_{k \in W_{i,t}} \mathrm{InputPurchases}_{k,t}} s^m_{ij,t} \\
&= \frac{\sum_{j \in W_{i,t}} \mathrm{Sales}_{ij,t}}{\sum_{j \in W_{i,t}} \mathrm{InputPurchases}_{j,t}},
\end{aligned}$$

$$s^m_{ij} = \frac{\mathrm{Sales}_{ij}}{\mathrm{InputPurchases}_j}$$

Market powers effects? Product appeal effects?

Empirics: Markups positively associated with input shares within customers

- The interpretation in the paper is that higher markups are due to larger market power
- However, in principle, one could distinguish pure market power effects from product appeal effects
- If a customer has worse outside options (perhaps due to losing another supplier), then its current supplier can charge higher markups due to higher market power. I would call this a pure market power effect.
- On the other hand, if a supplier improves its product and a customer is willing to pay a higher markup for it, then I would call this a product appeal effect.

Empirics: Markups positively associated with input shares within customers

- The regression result may be consistent with either interpretation
- But for economic modeling, this has consequences. In the first case, prices charged to different customers would depend on their outside options. In the second case, prices for the same product would not differ that much.
- Which situation is supported by the data?
- Is there evidence for third-degree price discrimination is the data?

Empirics: Larger churn in suppliers when exposed to larger reduction in input prices

$$\Delta Y_i = \beta \, \Delta CS_i + \gamma \, X_{i,t_0} + \delta_{s(i)} + \epsilon_i$$

Price effects? Cf. Acemoglu, Akcigit and Kerr (NBER Macroeconomics Annual, 2016) vs. Fabinger, Shibuya and Taniguchi (2017)

Model: Production in a fixed network

We introduce oligopolistic competition in firm-to-firm trade in the following way. When selling to firm j, firm i sets price p_{ij} that maximizes variable profits by taking as given prices of j's other suppliers and j's unit cost and output, c_j and q_j. Solving the firm's profit maximization problem yields the following price:

$$p_{ij} = \frac{\varepsilon_{ij}}{\varepsilon_{ij} - 1} c_i$$

$$\varepsilon_{ij} = \rho \left(1 - s_{ij}^m\right) + \eta s_{ij}^m. \tag{15}$$

Model: Production in a fixed network

As mentioned above, we assume that the supplier takes as given the customer's unit cost and output. A plausible alternative would be to assume that the supplier firm internalizes the change in demand for the customer's good when deciding on its price. In that case, the supplier needs to know the output composition of the customer firm to infer the elasticity of demand that it is facing. As firms are not likely to observe the flow of goods that are far from itself in the production chain, we find our assumption to be reasonable.[21]

Model: Formation of firm network

It is important to note that we do not assume firm pair-specific fixed costs for domestic sourcing. Our assumption of fixed costs for domestic sourcing, f_{Di}, is i specific, which implies that given its importing and exporting decisions, a firm only has to evaluate N different sourcing sets for its domestic suppliers: no sourcing, only from the firm with the lowest unit cost, from two firms with the lowest unit costs, and so on. This substantially reduces the number of evaluations, from 2^{N-1} to N.[22] At the same time, the model predicts a strict pecking order in the sourcing strategies. The set of customers of a firm with the most outdegree includes the set of customers of a firm with the second most outdegree, and so on.

Model: Formation of firm network

Definition 1 (Equilibrium under a fixed network)**.** Take as given foreign demand D^* and foreign price p_F. Assume that the total amount of labor associated with the fixed costs is less than the total supply of labor L. An equilibrium for the model where the production network and firms' participation in international trade are exogenous and fixed is a set of variables $\left\{w, P, E, q_i, l^Y\right\}$ that satisfy equations (5)-(7), (9)-(16), (18), and (20)-(22).

Theory: Network irrelevance in a benchmark case

Proposition 1 (Network irrelevance with a common CES parameter)**.** *Suppose that Assumptions 1-4 hold. Denote $\tilde{\sigma}$ as the common CES parameter from Assumption 2. Then the change in aggregate price index in the heterogeneous goods sector, $\hat{P}$, can be expressed as*

$$\hat{P}^{1-\tilde{\sigma}} = \sum_{i\in\Omega} \frac{p_i q_i}{\alpha E + Exports} \left(s_{li} + s_{Fi} \hat{p}_F^{1-\tilde{\sigma}} \right), \tag{23}$$

and the change in aggregate welfare, $\hat{U}$, can be expressed as:

$$\hat{U} = \left(\sum_{i\in\Omega} \frac{p_i q_i}{\alpha E + Exports} \left(s_{li} + s_{Fi} \hat{p}_F^{1-\tilde{\sigma}} \right) \right)^{\frac{-\alpha}{1-\tilde{\sigma}}}. \tag{24}$$

Model calibration

	η	ρ	$\frac{\sigma}{\sigma-1}$
Estimate	1.27	2.78	1.25
s.e.	1.07	0.31	0.05
	η (Labor and goods)	ρ (Firm's goods in production)	σ (Firms' goods in consumption)
Implied value	1.27	2.78	4.99

Estimated moments

Panel A: Targeted moments		
	Data	Model
Fraction of firms sourcing from domestic firms	0.98	0.97
Fraction of importers	0.15	0.17
Fraction of exporters	0.09	0.10
Corr(Indeg, Outdeg)	0.65	0.65

Panel B: Non-targeted moments		
	Data	Model
Corr(Sales, Indeg)	0.48	0.24
Corr(Sales, Outdeg)	0.51	0.33
Corr(Sales_i, Sales_j)	−0.02	−0.06
25th percentile s_{ij}^m	3.1×10^{-4}	3.0×10^{-4}
Median s_{ij}^m	1.8×10^{-3}	3.4×10^{-3}
75th percentile s_{ij}^m	8.2×10^{-3}	4.5×10^{-2}

Conclusions

- Great paper!
- Empirical part looks at important phenomena
- Theoretical/modeling part captures them in computationally tractable way
- Future research along these lines could bring new insights for our understanding of firm network data