Beyond Peers: Cross-Industry Competition and Strategic Financing

Boris Nikolov   Norman Schürhoff   Zepeng Wang

swiss:finance:institute

UNIL | Université de Lausanne

④ Product Market and Strategic Financing

- Network model of product market competition with strategic debt choices
- Firms' products are imperfect substitutes to degrees δ

- G: competitor network adjacency matrix of elements $g_{ij} \in (0,1)$. Assume a block-diagonal structure with $I < N$ blocks.

- $\mathcal{C}_i$: community of firm i, $\mathcal{C}_i = \{i\} \cup G_i \cup \{G_j | j \in G_i\} \cup \{G_k | k \in G_j\} \cup \{G_l | l \in G_k\} \cup ...$

- **Stage 1:** Permanent shocks $\mu_i \sim F_i^\mu(\cdot)$ and $\sigma_i \sim F_i^\sigma(\cdot)$ are realized that determine firm's demand captured by the consumer's marginal utility, $a_i(z_i)$:

$$a_i(z_i) = \mu_i + \sigma_i \times z_i.$$

- **Stage 2:** Debt d_i is chosen strategically by firm owner to maximize firm value. Marginal cost is constant c_i.

- **Stage 3:** Product market decisions x_i (price p_i or quantity q_i) are determined by maximizing equity value $E_i = \mathbb{E}_{\bar{z} \geq z_i \geq z_i^*}[\pi_i(q_i, q_{j \in G_i}, z_i) - d_i]$:

- **Stage 4:** Transitory shock $z_i \sim F_i(\cdot)$ is realized and default occurs accordingly based on a unique default threshold, $z_i^* = z_i^*(d_i, d_{l \in C_i})$

In equilibrium, product market solution is determined by all community members' market capacities:

$$p^C = a(Z) - \Gamma \times \bar{q}(z^*)$$

Firm's market capacity $\bar{q}_i(z_i^*)$ is maximum quantity w/o strategic competition:

$$\underbrace{\frac{\mu_i - c_i}{2b_i}}_{\text{Individual product features}} + \underbrace{u_i(z_i^*)}_{\text{Dependent on debt}}$$

In equilibrium, optimal debt is determined via balancing the marginal cost and the marginal benefit of debt i to all community members through mechanisms of predation, anti-predation, and consumer selection in product market.
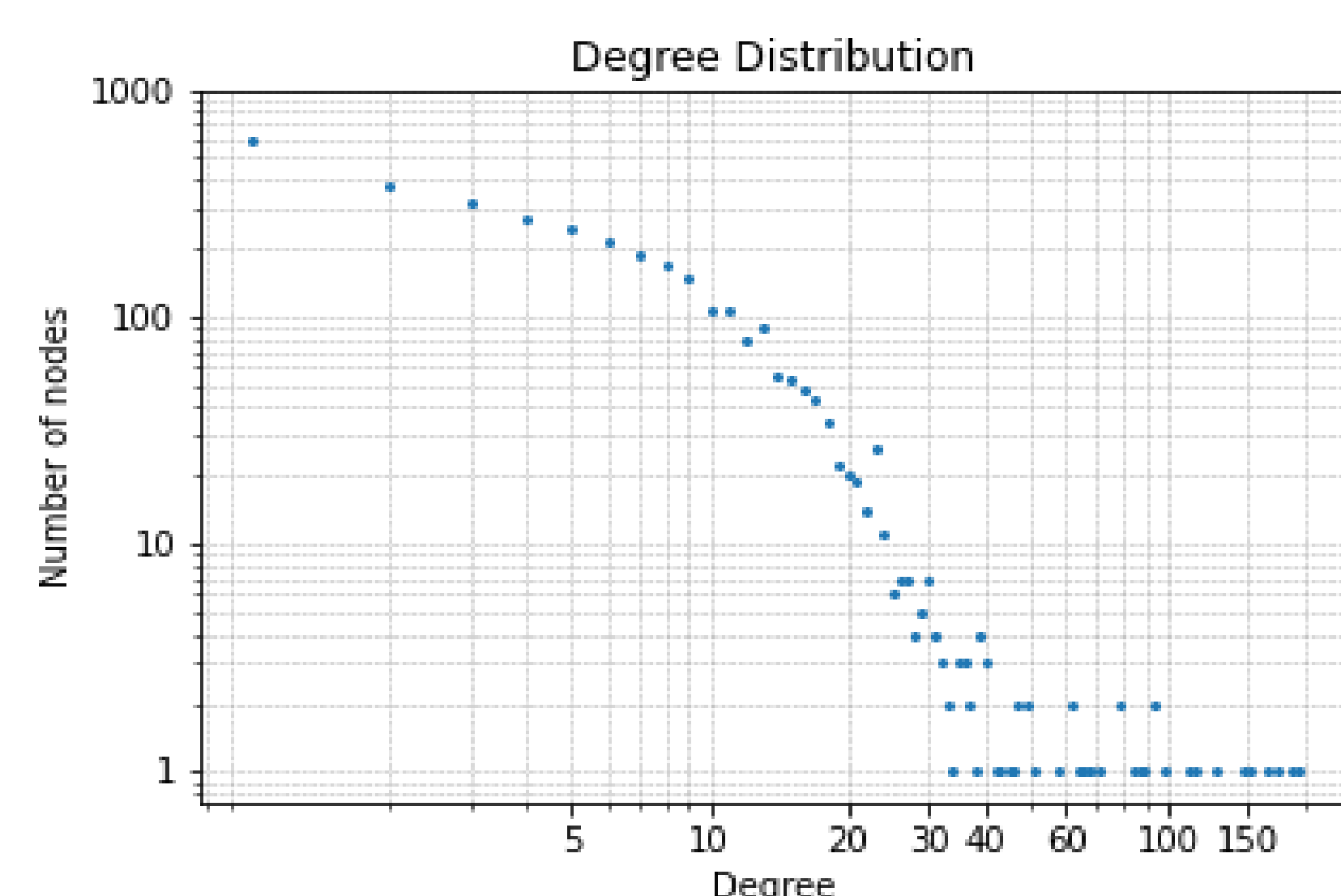
① Main Question

How does the **structure of the competitive environment** *(as opposed to industry) affect* **corporate financing decisions***?*

1. We capture the general competitive environment by a competition network with multiple communities, in which there are directly linked competitors, competitors' competitors (2nd-order neighbours), and beyond.

2. Every firm interacts not only with its industry peers or direct competitors in the network; instead strategic competition is communal.

3. Community is a group of firms that are densely connected within the group and comparatively sparsely connected with firms of other groups. We take network structure within community as a feature of competitive environment.

② Main result

- **Accounting for the network structure of competition is key to rationalizing firm financing.**

Theoretical Prediction: Strategic financing decisions are complementary when a competition community's network follows a heavy-tailed node degree distribution (e.g., core-periphery).

- This holds even if the underlying competition is of the Cournot type with strategic substitutes in product quantities.
- The whole firm network behaves like a chaos system. To determine the precise future of any firm, the precise situations of all network community members need to be known.

Empirical Findings: (via panel regressions with control variables and firm, time, and industry fixed effects)

- Not only direct competitors (1st neighbours), but also indirect competitors (2nd and further neighbours) matter for a firm's financing choices (leverages).
- Complementarity in financial decisions among members of each community.
- The node degrees of the communities and the entire network are heavy-tailed distributed.

③ Competitors Network, SIC industries, and Community Classification

- Firms are indicated by nodes. Every pair of nodes linked by one direct edge is a pair of direct competitors.
  The colors of nodes and edges in Panel A indicate the SIC2 classification for each firm. The colors in Panel B indicate the communities.
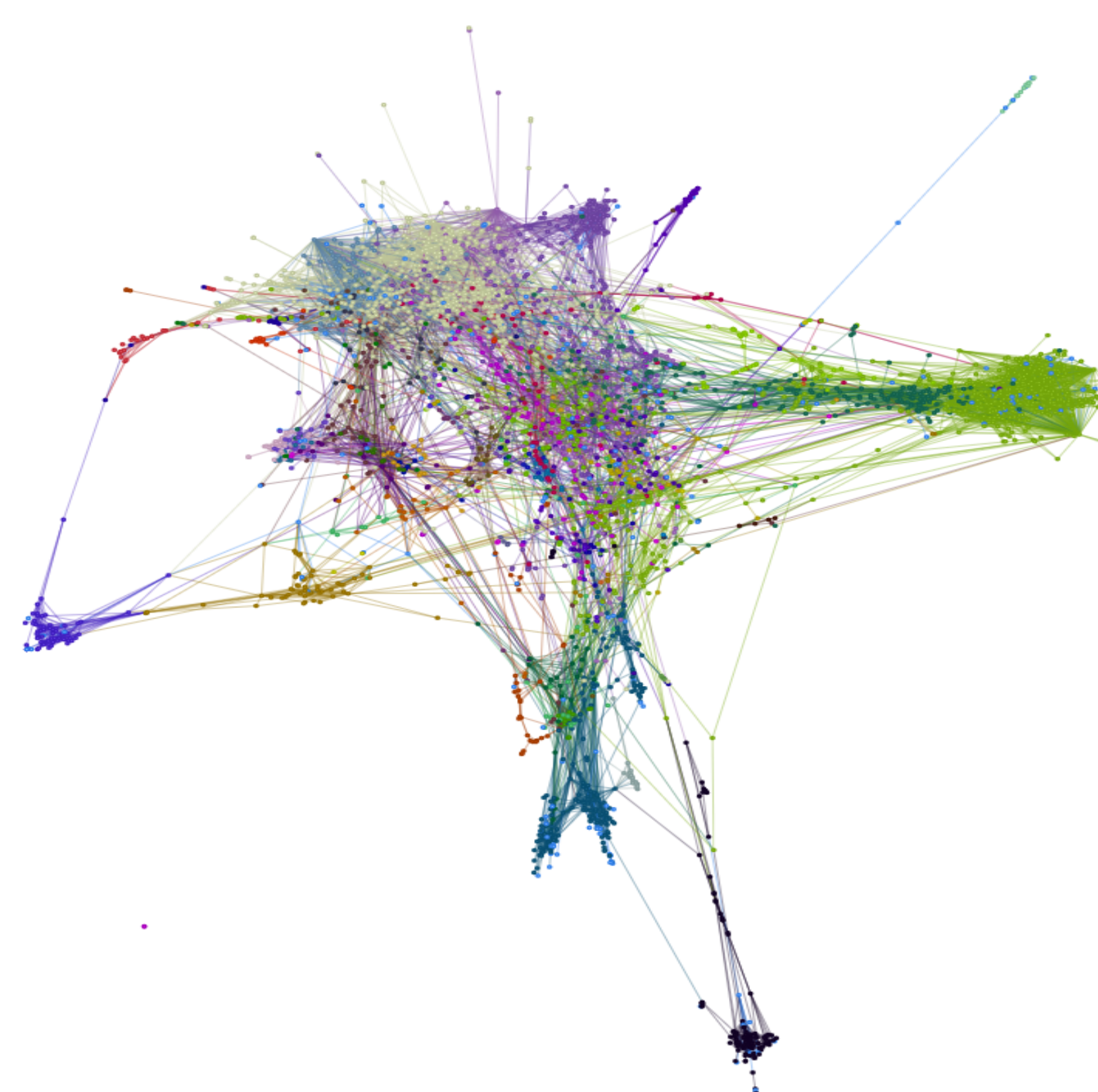
Panel A: Competition network and standard industry classification
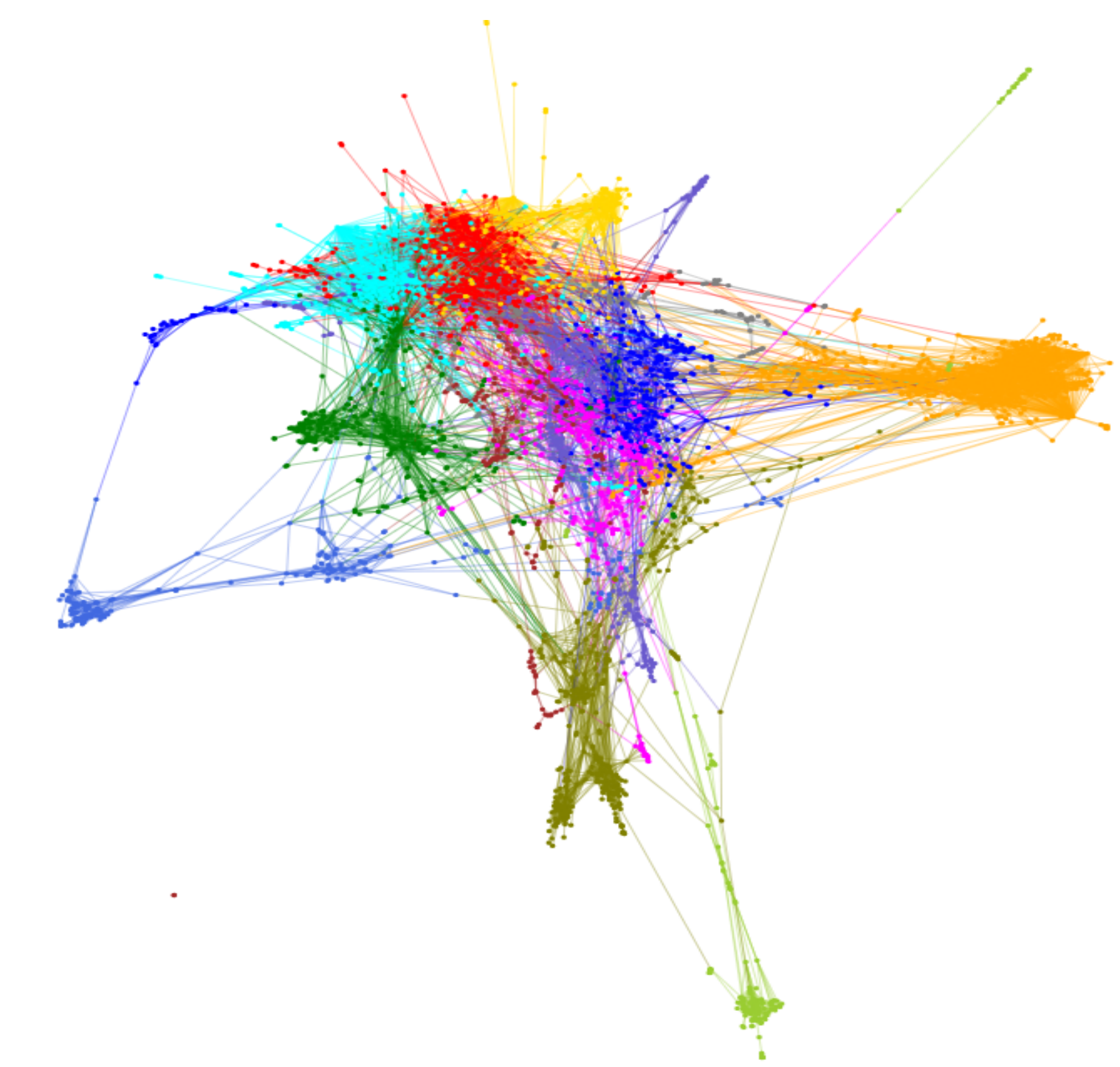
Panel B: Competition network and cross-industry communities