Do Trade Associations Matter to Corporate Strategies?

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Abstract

This paper uses textual analysis and plausibly exogenous instruments based on out-of-industry signals from geographic and director networks to assess the role of trade associations in forming corporate strategies. Companies are most likely to join trade associations when innovative opportunities have declined, and they are older and larger. Joining associations helps members to increase profits and markups, improve risk management, find acquisition partners and improve efficiency. To assess mechanisms regarding higher profits, we consider high dimensional analysis of geographic and technological market exclusivity using firm-pairs and hundreds of strategic decisions to operate in specific markets. Overall we find strong support for the conclusion that associations bring positive and mutually beneficial gains and technologies to their members and their industries, and some evidence of an externality in the form of anti-competitive market-exclusion strategies.

1 Introduction

Trade associations are a major presence in the corporate world. We estimate that there are 5,084 such associations nationwide, and among publicly traded firms, 45.6% belong to 1,428 such associations. Yet despite their prevalence, almost no research in corporate finance has explored the role of trade associations in the formation of corporate finance strategies such as investments, risk management, efficiency, and how associations might impact valuations and accounting performance. This paper provides one of the first systematic explorations of these questions. The absence of existing literature on this topic is likely due to the difficulty of gathering data on associations and memberships, reinforced by the fact that association memberships are endogenous decisions. We address both challenges using large-scale textual analysis techniques and an array of databases to build a rich panel of association memberships and the opportunity set of associations most relevant to each firm in each year. We then use plausibly exogenous variation relating to signals originating from outside the focal industry from geographic and director networks to create instruments that significantly shift association memberships in a firm-year panel database with rigid firm fixed effects.

We focus our study on associations that have a specific industry focus. These associations are interesting in part because their members include direct competitors, and venues for them to meet are rare due to antitrust concerns. The intended role of associations is to create a wide-array of opportunities for value creation, risk management, investment opportunities and efficiency gains to their members. Regulators permit direct competitors to collaborate through associations toward these specific goals as they are likely beneficial both to members and consumers. However, facilitating collaborations with direct competitors can also create tension regarding potential anti-competitive conduct.

Overall, we find significantly higher profits, markups, valuations, improved risk management, efficiency gains, and access to new technologies when firms join trade associations. Many of these outcomes validate the intended role of associations to generate mutually beneficial improvements within their industries. Regarding risk management, for example, these results suggest that joining trade associations serves as a not-previously-documented risk management tool that facilitates operational hedging strategies that can reduce risk.[1] Also

[1] Other examples of operational hedging strategies include geographic diversification (Allayannis et al.

consistent with intended benefits, firms also increase efficiency. This can benefit firms and consumers alike, as such gains are often passed-on at least in part to consumers. Consistent with improved networking, we also find increased acquisitions. These results, identified using instrumental variable regressions are consistent with a positive role in society played by trade associations, which deliver benefits to their industries across an array of corporate policies and risk reduction.

Regarding the possibility of anti-competitive practices, which are not mutually exclusive to the above benefits, the FTC states that most trade associations have stated objectives that lean pro-competitive or neutral. Yet we hypothesize that what transpires in sideline conversations among competitors during association meetings can be different from the association's stated objectives. Ultimately, competing firms might consider tradeoffs when deciding whether or not to engage in anti-competitive conduct. For example, colluding on price might face an unfavorable set of tradeoffs as the FTC explicitly states on its website that any sharing of price information through trade associations is specifically forbidden and would likely result in harsh penalties.[2] In contrast, the website also states that sharing "data other than price [...] is less likely to raise antitrust concerns". Therefore, sharing less-scrutinized non-price information with competitors, even if it is anti-competitive in nature, might be seen as having a more favorable portfolio of costs and benefits.

This regulatory landscape and the tradeoff hypothesis would thus predict that exchanging non-price information about geographical expansion strategies, for example, might face less scrutiny and might be harder to detect by regulators. We thus explore the prevalence of potential geographic market-exclusion strategies where rivals might mutually agree to expand into non-overlapping domestic and foreign markets. This would result in each firm being able to operate in less contested spaces, which basic models of economic competition would suggest are more profitable for the group overall. For example, 5 firms each operating alone in 20% of a geographic region would be significantly more profitable than all 5 firms jointly operating in the entire region. In the former case, monopoly profits would result, whereas a

(2001)), matching international revenues with the purchase of production inputs (Hoberg and Moon (2017)), vertical acquisitions to reduce supply chain risk (Garfinkel and Hankins (2011)) and using multiple suppliers to reduce supply chain risk (Tomlin (2006)).

[2]See Federal Trade Commission's competition guidance for a high level view from the FTC regarding how trade associations are monitored – U.S. Federal Trade Commission. (n.d.) *Spotlight on Trade Associations* Retrieved April 19, 2022, from `https://www.ftc.gov/advice-guidance/competition-guidance/guide-antitrust-laws/dealings-competitors/spotlight-trade-associations`

5-firm oligopoly would reduce overall profits in the second case. Mutual agreement by rivals not to enter one another's markets also might reduce risk, as markets would be stable by design, a result we also find in the form of lower earnings volatility and lower stock return volatility, indicating better risk management.

We gather data on associations from multiple sources. First, we collect information on the U.S. national trade associations of businesses "Encyclopedia of Associations: National Organizations" published by Gale. Next, we identify association memberships using entity-recognition textual analysis applied to public company names to determine their mentions on the annual websites of trade associations using the Wayback Machine from 1999-2022. Finally, to measure firm characteristics and outcomes, we utilize a variety of data sources including Compustat, the Center for Research in Security Prices (CRSP), as well as data shared with us or made public by other researchers. The result is a rich firm-association-year panel database that allows us to track firm membership in associations that can be easily aggregated to a firm-year panel database to facilitate analysis of firm strategies and outcomes.

There are two central challenges with this area of research. First, although there is a central database containing information about associations and their characteristics, companies do not report their association memberships to any central database. As noted above, we address this issue by estimating association memberships using company name mentions in association websites. The result is time-varying and hence is a dynamic network of firms and the associations they are members of.

The second challenge is endogeneity. Central concerns are (A) firms do not choose to join associations at random times, but rather they might join them when they are facing specific types of challenges. (B) Additionally, our inferences might be impacted by unobserved omitted variables. We thus consider two instruments for association memberships rooted in homophily that mitigate these concerns.

Our first instrument is thus based on homophily in geographic networks. Because associations are ultimately a means for communicating and networking among members, our starting point is to identify likely manager connections that are both strong and also exogenous to the given firm's business conditions. For each firm, we identify the set of other firms that are (1) within 100 miles of the focal firm and (2) are not in the same industry sector, and (3) that are roughly the same size as the focal firm (market capitalizations that are within $10X$ larger or smaller than the focal firm). As these managers are running similar-sized companies and are in proximate regions, it is quite likely that these managers network, for example, in local country clubs. Our first instrument is simply the extent to which these local out-of-industry peer-CEO firms are exposed to associations computed as the average number of association memberships of these peers. Because they are in entirely different sectors, this time varying instrument can potentially satisfy exclusion regarding all three forms of endogeneity noted above. Our rigid fixed effects further ensure that geography itself is controlled for. Because CEOs of nearby similar sized firms are likely to network frequently, it also should satisfy the powerful instrument requirement. Indeed, both of our instruments have F-statistics in excess of 10.0, with the first having an F-statistic near 40.0.

Our second instrument is analogous and has similar motivation. This instrument is based on homophily in director networks. For each firm, we thus identify the set of other firms that are (1) connected to the focal firm through a director link either based on overlapping board seats, employment, education, or social clubs, (2) not in the same industry sector, and (3) roughly the same size as the focal firm as defined above. As these connected managers are running similar-sized companies and have a connection, it is quite likely that these managers frequently communicate. Our second instrument is then simply the extent to which these peer-CEO firms are exposed to associations, computed as the average number of association memberships of these peers. Because they are in entirely different sectors, this time varying instrument can potentially satisfy exclusion regarding all three forms of endogeneity noted above.

We begin by documenting when firms join associations. We use non-causal tests splitting our sample into firms that are association members and firms that are not. We then compare their characteristics including size, age, profitability, growth options, investments, and efficiency. We find that higher profits, a reduction in R&D, along with older age and larger size are important indicators of which firms join associations.

We next examine the impact of joining associations on investment, performance, risk management, and corporate efficiency. We use two instrumental variables models using the two instruments described above along with firm and year fixed effects. We document four main findings regarding corporate strategies and performance. First, joining associations results in higher profits and higher markups (we use markups from both De Loecker et al. (2020) and Pellegrino (2023)). Second, regarding risk management, joining associations reduces both return volatility and earnings volatility. Third, joining associations results in higher Tobin's Q and increased investment in the form of R&D, capital expenditures and acquisitions. Finally, we find that joining associations leads to improved efficiency in the form of COGS, asset turnover, and total factor productivity. Overall, these results are consistent with associations providing significant benefits to member firms and their industries as intended by their mandates.

To understand mechanisms for the higher markups we report, we explore geographic and technological operating profiles for association-treated and untreated firms. We use offshoring data from Hoberg and Moon (2017) to explore if firms tend to enter non-overlapping markets as they expand internationally. This data is based on textual analysis of firm 10-Ks to detect where firms sell products abroad, and it covers 236 countries. We explore international expansions at the firm-pair level, and thus consider a high dimensional database of firm-pair-country-year joint offshoring decisions. Our thesis is that competitor firm-pairs that have plausibly exogenous exposure to associations might be more likely to enter foreign markets alone but not together. The main idea is that firms might exchange quid pro quos, where for example, one firm will enter China and India, but the other will enter European markets, thus creating more profitable less contested environments. We use our above-mentioned instruments defined at the firm-pair level to instrument for the extent to which firms with joint high-exposure to associations have more exclusive geographic operating configurations. We find strong and robust evidence that when firms are jointly exposed to associations, that they are indeed more likely to operate in foreign markets in non-overlapping ways.

We run similar analysis regarding technological adoption profiles of firm-pairs by examining technology adoptions of 352 technologies from Cabezon and Hoberg (2022). For technologies, the results favor the pro-efficiency hypothesis over the anti-competitive hypothesis. In this case, competitors are more likely to adopt the same technologies at the same time when they are likely exogenously exposed to more associations. These results are consistent with associations assisting members in identifying and adopting new technologies as they become relevant. These results are important both in the context of understanding corporate strategies, but also regarding insights on the extent to which association-induced conduct is consistent with the intended pro-efficiency mission of associations, or unintended anti-competitive externalities.

We remind readers that our evidence of exclusionary operating profiles across international expansions is suggestive, but not necessarily indicative of associations themselves intentionally promoting anti-competitive conduct. Unsanctioned sideline conversations among members is more likely given regulatory oversight of association programs. Moreover, and indicating a significant bright side of associations, our findings of improved corporate efficiency, risk management, investment, and technology spillovers illustrate success in achieving many beneficial stated goals of associations. Although we do not make claims regarding social welfare, which can be complex given that firms and consumers are often at odds, we note that gains in efficiency and risk management are typically viewed as welfare enhancing as they should result in both higher profits for firms and also lower prices for consumers should some gains be passed on to consumers.

Our paper makes four contributions to the existing literature. First, we propose novel testable hypotheses regarding conduct, financial risk management and efficiency gains through the lens of collaboration. Second, we make methodological contributions relating to trade association data and the use of exogenous variation in geographic networks at a firm-year level and a firm-pair-year level. Third, we find strong evidence of higher profits and markups as well as novel evidence of improved risk management strategies, acquisitions, efficiency gains and technology adoptions. Finally, we conduct novel high-dimensional tests spanning hundreds of strategies that provide novel evidence of potential anti-competitive exclusionary market strategies.

2 Overview and Related Literature

2.1 Related Literature

The earliest mentions of trade associations in the economics literature date back a full century. For example, Sharfman (1926) outlines the general significance of trade associations, describing them as formal organizations that are, in contrast to cartels, designed to function openly. The associations utilize and improve on the combined industry experience of their members, develop operational standards and practices, and promote operational stability by reducing costs, stimulating demand, managing risks, and providing regulatory protection. Theoretical models show that information sharing among members can increase consumer welfare (Kirby (1988)), and increase the total surplus under Cournot competition (Vives (1990)). As an example of gains through sharing resources, Bombardini and Trebbi (2012) show that associations lobby regulators as shared representatives of the industry, especially in sectors with higher competition and lower product differentiation.

While the functioning of trade associations does not necessarily lead to illegal cooperation among members, a concern among regulators is that associations can facilitate price agreements and other forms of collusive strategies that reduce competition. Such actions would potentially violate the Sherman Anti-Trust Act (Oliphant (1926)). Yet the empirical literature on collusion within associations is sparse and restricted to industry-specific case studies. For example, cooperation on prices in trade associations is studied in the British coil rope industry (Howe (1973)), Chilean physicians industry (Ale-Chilet and Atal (2020)), U.S. brewing industry (McGahan (1995)), sugar industry (Sugaya and Wolitzky (2018)), and automobile industry (Bertomeu et al. (2021)).

A larger theoretical literature focuses on firm collusion within industries and notes that trade associations could play a facilitating role. This literature studies cartels, and uses trade associations as examples of coordination mechanisms that might sustain the cartels. In a classic study, Stigler (1964) provides a theory of collusion and self-enforcement of cartels, and later Green and Porter (1984) refine the self-enforcement framework. Also in the theoretical studies of Rahman (2014), Sugaya and Wolitzky (2018), and Awaya and Krishna (2020), various degrees of informational exchange and monitoring among members can happen via trade associations, facilitating collusion. Additionally, there is a growing literature on cartels in the international setting (Loderer (1985), Roller and Steen (2006), Harrington and Skrzypacz (2011), Bourveau et al. (2020), Igami and Sugaya (2022)), and on tacit firm coordination (Bernheim and Whinston (1985), Dutta and Madhavan (1997), Dasgupta and Zaldokas (2019), Ferres et al. (2021), and Lehar et al. (2020)). These studies do not require that firms coordinate within trade associations, but they broadly demonstrate theoretical relationships between industry coordination and firm outcomes. We are not aware of existing studies that draw upon plausibly exogenous variation in memberships to comprehensively examine the impact of trade associations on a wide-array of outcomes ranging from profitability, risk management, investment, operating efficiency, technology adoptions, and potential anti-competitive exclusionary practices in this important setting.

We also note that collusion in trade associations does not have to be on prices (Marshall and Marx (2014)). In the example of the Sugar Institute, Genesove and Mullin (2001) describe "collusion by rules" as member firms coordinate on business by establishing complex contractual production and distribution restrictions. At the same time, the association members did not openly collude on prices. In a separate theoretical framework, Sugaya and Wolitzky (2018) focus on cartels dividing market shares among the members. In their model, a market-segmentation strategy is possible with the assistance of an intermediary, e.g. in our context, a trade association. In particular, this is possible if members can maintain some secrecy regarding their pricing and sales, which facilitates the design of profitable strategies when entering different markets.

Porter (2005) provides a detailed review on detecting collusion, and highlights an example. New York trash haulers used an association to divide the city geographically, allowing haulers to operate uncontested in their local regions. The association enforced this collusion by punishing violations with arson, violence, forced payments, or exorbitant dues. Although more explicit forms of collusion are consistent with our thesis, we also note that associations can facilitate collusion unintentionally by holding regular meetings, thus allowing rivals an opportunity to "meet on the side" to discuss mutually beneficial and potentially anti-competitive quid pro quos. In these cases, it is the provision of fully legal ways for competitors to meet that can create an unintended uptick in anti-competitive practices even though this might not be the intent of associations.

Overall, it is surprising that despite the long history and industry importance of trade associations, that there is a dearth of empirical evidence on the benefits that companies derive from membership and on firm coordination within trade associations. This void is especially large regarding the division of markets, which we study in-depth for international expansions and technological adoptions. This void is likely due to data limitations and the difficulty of addressing complex endogeneity concerns. Our study contributes to filling this gap using novel data and textual analysis, coupled with a novel source of exogenous variation based on geographic networks.

2.2 Trade Associations Background

Trade associations are membership organizations comprised of businesses and industry professionals. They can be industry-specific, including members with closely related business activities, as is the case for the American Petroleum Institute. Other associations are more broad and address general business issues, as is the case for the U.S. Chamber of Commerce. In this paper, we focus only on industry-specific associations and limit attention to those that are economically important enough to include publicly listed companies as their members. We identify 1,428 such associations operating from 1999 to 2022.

Most trade associations have a long history and were formed in the late 19^{th} century or in the 20^{th} century. For example, the American Chemistry Council was formed in 1872 and the National Roofing Contractors Association in 1886. The average (median) founding year in our sample is 1960 (1970). 94.7% associations in our sample have information on the founding year, and only 135 of these associations were formed after 1999, the start of our sample. We exclude these post-1999 associations and associations with missing founding years from our analysis to ensure that the set of associations a company could join in our tests is not endogenously influenced by the formation of new associations.

Trade associations operate using a budget that is funded based on membership dues, sponsor donations, and other revenues.[3] Membership dues are usually modest for publicly listed companies, as they rarely exceed several thousand dollars, suggesting that other sources of funding are more important in associations' budgets. The average (median) budget of an association in our data is $8.0 million ($2.0 million), and the budgets are reported in 63.4% of the association-years. Associations with the largest annual budgets above $200 million include the Pharmaceutical Research and Manufacturers of America, the U.S. Pharmacopeial Convention, the American Rental Association, the American Petroleum Institute, and the National Association of Realtors.

Trade associations use their budgets to pay for their main activities, which include devel-

[3] Matheis M., and Gibbs, B. (2022) Keeping the Right Company When It Comes To Associations. *Oliver Wyman, Insights.* `https://www.oliverwyman.com/our-expertise/insights/2022/apr/keeping-the-right-company-when-it-comes-to-associations.html`.

oping and establishing industry standards, providing public advocacy and political representation, providing education, and coordinating activities across their members. For example, in 2005, the Magazine Publishers of America allocated $40 million to a campaign to "promote the benefits of consumer magazines as an advertising medium".[4] An important aspect of coordinating activities among members includes organizing and hosting meetings, conferences, conventions, and educational events. In our sample, 67.3% of associations reported either a"Yes/No" for holding at least one meeting, conference or convention in a given year, with 99.5% of them reporting "Yes" (the remaining 32.7% associations did not report whether or not they have meetings). The high rate of associations hosting frequent events is important in motivating our thesis rooted in sideline meetings among competitors, and our resulting empirical framework especially regarding potential anti-competitive externalities. Association locations are widely-distributed across the U.S. For example, the District of Columbia, Virginia, Illinois, New York, California, Maryland, and Texas, each have at least 30 associations.

Trade associations cover a wide array of industries, with companies from all Fama-French 12 industries being members. The industries with the highest number of member companies are Finance, Other, Business Equipment, and Manufacturing. Those with the most combined member total assets are Finance, Utilities, Other, and Energy. Industry-focused associations typically represent companies operating within a specific industry, a group of related industries, or a particular industry segment. On average, 69.3% of the assets of members of an association in a given year come from a single top Fama-French 12 industry, which is in line with our sample of associations indeed being industry-focused.

2.3 Trade Associations and Antitrust Regulation

Both U.S. antitrust regulators, the U.S. Federal Trade Commission (FTC) and the U.S. Department of Justice (DOJ), are aware of the potential for anti-competitive practices in trade associations. Outlining their policies in detail, both agencies drafted a 27-page document providing guidelines on how trade associations can facilitate collaborations among competitors without violating antitrust rules (FTC and DOJ (2000)). Both agencies also indicate

[4] Elliott S., (2006, January 11) Advertising: Addenda; 2 Trade Associations To Change Agencies, *New York Times*.

related and more abbreviated information on their websites.[5] The guiding principal is that both agencies acknowledge that there exist many activities that competitors can collaborate on that are both mutually beneficial and also pro-competitive. The guidance states:

For example, a competitor collaboration may enable participants to offer goods or services that are cheaper, more valuable to consumers, or brought to market faster than would be possible absent the collaboration. A collaboration may allow its participants to better use existing assets, or may provide incentives for them to make output-enhancing investments that would not occur absent the collaboration. The potential efficiencies from competitor collaborations may be achieved through a variety of contractual arrangements including joint ventures, trade or professional associations, licensing arrangements, or strategic alliances.

A common theme is that collaborations that enhance efficiency are seen as pro-competitive. These activities can in fact improve consumer welfare, improve product distribution, and ultimately lower product prices. Our thesis includes the prediction that trade associations will generate gains that are pro-competitive and efficiency-improving.

On the other hand, the guidance also specifically references the issue of exclusionary conduct as a risk factor in anti-competitive practices. The document states:

In assessing exclusivity when an agreement already is in operation, the Agencies examine whether, to what extent, and in what manner participants actually have continued to compete against each other.

The DOJ also expresses concern specifically about anti-competitive exclusionary entry into geographical market segments:[6]

Section 2 of the Sherman Act makes it unlawful for any person to "monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several states, or with foreign nations."

[5]U.S. Federal Trade Commission. (n.d.) *Spotlight on Trade Associations* Retrieved April 19, 2022, from `https://www.ftc.gov/advice-guidance/competition-guidance/guide-antitrust-laws/dealings-competitors/spotlight-trade-associations`; U.S. Department of Justice. (n.d.) *Participating in Information Sharing and Trade Associations*, Retrieved April 19, 2022, from `https://www.justice.gov/atr/antitrust-issues-and-your-small-business/participating-information-sharing-and-trade-associations`.

[6]U.S. Department of Justice Archives. (2009, May 11) *Competition and Monopoly: Single-Firm Conduct Under Section 2 of the Sherman Act: Chapter 1.*

Hence our thesis also focuses on the possibility of anti-competitive conduct, and our tests of mechanisms thus look beyond markups alone as we also assess potentially exclusionary strategies relating to how firms expand internationally and adopt new technologies. In the cases we examine, exclusionary practices would manifest as quid pro quo strategies where rivals mutually agree not to enter one anothers' markets, allowing each to operate in specific market segments uncontested.

3 Data and Methods

3.1 Data

We obtain the universe of U.S. national trade associations from Gale "Encyclopedia of Associations: National Organizations", a series of eBooks listing national organizations from 2004 to 2022. We focus on national organizations due to their economic relevance for the public firms in our sample. The data contains the complete set of association names along with association characteristics including locations, budgets, industry classifications, etc. It is organized in the form of an association-year panel, and, to our knowledge, it is the first and most comprehensive database on national organizations. It includes 36,184 organizations, which we track over time using the unique internal association Gale ID and all the versions of association names contained in the encyclopedia.

Our study focuses on associations that include firms as members and cater to one or more specific sectors, as our goal is to test hypotheses related to industries, their organization and performance. The encyclopedia enables us to select a relevant set of organizations, since it includes both SIC and NAICS codes and categorizes associations into functional groups. We select those classified as *Business Associations* by either primary or secondary SIC code 8611 or NAICS code 813910. Next, we select organizations listed in the sections *Trade, Business, and Commercial Organizations*, *Environmental and Agricultural Organizations*, *Engineering, Technological, and Natural and Social Sciences Organizations*, and *Health and Medical Organizations*. Together, these sections represent 91.7% of the business association-years, with *Trade, Business, and Commercial Organizations* being the largest, accounting for about 76.7% of the selected sections. The remaining sections, which we do not use, include general-purpose associations (that likely do not have a specific industry focus) such as *Chambers of Commerce* and others that are focused on non-business issues such as *Public Affairs Organizations*, *Cultural Organizations*, *Educational Organizations*, or *Hobby and Avocational Organizations*. As a result, we estimate that there are 5,084 trade associations of businesses nationwide.

Our goal is to assess membership of U.S. publicly listed firms in industry-focused associations. We assume that if a company is listed on an association's website in a given year, the company is the member of the association in that year. We use associations' URLs from the encyclopedia and web-scrape the corresponding websites from the Wayback Machine, which is the internet archive containing snapshots of websites over time. For each year from 1999 until 2022, we obtain the snapshot closest to the start of the year. Our sample starts in 1999, since prior to that year the website snapshots are sparse. Then, we perform a large number of string searches for association names in the associations' websites. We use historical firm names from two sources, the Center for Research in Security Prices (CRSP) and WRDS SEC Analytics Suite databases. The latter contains company names as they appear in the 10-K reports. We manually read all frequently-found name variations that appear in over 50 website-years to remove strings that likely do not correspond to firm names and that might refer to something else in the website text. In the resulting sample, we retain associations that list at least ten publicly-listed members in any year throughout the sample period to reduce noise associated with false negatives and to focus on the economically relevant set of associations.

For each identified association name match, we link the firm-year to the association database using the available encyclopedia editions, giving preference to earlier years.[7] We limit attention to associations founded before 1999 to mitigate endogenous effects due to the formation of new associations. Regarding company data, we focus on firms with at least $1 million in total assets and sales. Our matching procedure results in 8,308 companies belonging to 1,428 distinct associations from 1999 to 2022. When tracking these associations over time, we also use standardized versions of the names in the lookup procedure in addition to the unique internal association Gale ID and all the versions of association names contained in the encyclopedia.

[7]For the years 2007-2009, the encyclopedia has two editions, and we use the most updated ones for each association Gale ID-year.

Table 1, Panel A shows that on average 45.6% of firms are mentioned on the association websites in a given year. On average a firm belongs to 2.35 associations, with a maximum of 55 associations. We note that our approach may underestimate the true level of association memberships, as associations are not obliged to disclose their members.

We use an array of additional data sources to measure firm policies. We use firm financial information and historical location of firm headquarters from Compustat, and stock return data from Center for Research in Security Prices (CRSP)[8]. We also use data shared with us or made public by other researchers including Hoberg and Phillips (2010, 2016), İmrohoroğlu and Tüzel (2014), Kogan et al. (2017), Hoberg and Moon (2017), De Loecker et al. (2020), Frésard et al. (2020), Cabezon and Hoberg (2023), and Pellegrino (2023).

3.2 Sample Splits by Association Memberships

We report summary statistics in Table 1. Panel A reports unconditional results for our membership variables and Panel B reports results for our instruments. We also find that the association memberships we construct have novel correlations with firm characteristics and outcomes. Panel B of Table 1 splits our firm-year panel database into subsamples with above and below median association memberships. The table shows that association members tend to be larger and older firms, and they exhibit significant differences across many different economic outcomes such as profitability, markups, risk, investments, and efficiency. The results suggest that larger and older firms with relatively weaker performance tend to be members of associations.

Yet these results reflect simple correlations, and we note that the observed differences in characteristics might reflect endogeneity in firm decisions to join associations. For example, association membership could appeal to firms experiencing a decline in sales growth or investment opportunities, especially when such issues might be amenable to improvements via industry coordination. Indeed, a stated goal of associations is to improve efficiency or stimulate output-enhancing investments. Additionally, these differences could be driven by omitted variables. We thus formally study the effects of association membership on firm

[8]Historical location of firms' headquarters is available in Compustat Header History from 2007 onwards. We use the closest and earliest available headquarter ZIP-codes. When historical ZIP-codes are not available, we use the header ones.

economic outcomes using an instrumental variables approach discussed below.

3.3 Motivation of Network-Based Instruments

Our network-based instruments are rooted in the foundation of homophily in networks, the tendency of social ties to form among people with similar characteristics. The instruments exploit spillovers of tendencies to join associations that propagate through social networks of similarly-sized firms (homophily) operating in different industries (ensuring no exposure to own-industry state variables as needed for identification). We consider spillovers in two settings where social ties and resulting spillovers between firms are most likely: (1) when firms are in close geographic proximity, and (2) when firms have director connections via overlapping boards, other employment, educational links, or memberships in social clubs. Intuitively, board members of similar sized firms are likely to engage in useful knowledge spillovers as they are more likely to network.

Network and communication-based instruments are well-motivated in this settings because associations themselves are ultimately about communication and networking. Hence, networking instruments are likely to be powerful. Homophily enhances power because executives and board members of similarly sized firms are likely to network in common social settings, and they especially likely to do so within the same cities. For example, a focal firm CEO can learn about the strategic benefits of associations over lunch with a nearby local CEO running a similar-sized firm that is from an unrelated industry at a local country club. Because we only consider firms that are in entirely different industries, the instruments cannot be influenced by industry-specific or firm-specific economic state variables that might be relevant to why a given firm might endogenously choose to join associations.

Our two instruments are rooted in director connections and close geographical proximity, which are both settings where firms are likely to network intensively, especially in the presence of size-homophily between firms. We further motivate the relevance of size and geographic homophily using a pairwise networking examination that estimates the following regression equation:

$$\mathrm{C}_{ijt} = \beta_1 \mathrm{D}[0;100]_{ijt} + \beta_2 \mathrm{D}(100;500]_{ijt} + \gamma_1 \mathrm{SizeX}[1;10]_{ijt} + \gamma_2 \mathrm{SizeX}(10;50]_{ijt} + \alpha_{jt} + \theta_t + \varepsilon_{ijt}, \tag{1}$$

where C_{ijt} is an indicator for a director connection between firms i and j in year t. D is an indicator for distances between firm-pairs in miles, and $SizeX$ is an indicator for pairwise size-difference bands as indicated. We estimate this equation using a firm-pair-year panel, where both firms in a pair are present in the BoardEx database (which we use to measure director connections). Consistent with our network-instruments, and to ensure no contamination from omitted variables, we exclude all firm-pairs in the same TNIC-2 industries (see Hoberg and Phillips (2010, 2016)) from this calculation. The TNIC-2 industry classification is as granular as 2-digit SIC industry groups.[9]

To examine homophily and social networking tests using the above model, we define our dependent variable to be director connections C_{ijt} that are formed via any of the following situations: overlapping boards, other employment current and past links, educational links, and firm memberships and social clubs. This approach is consistent with Cohen et al. (2008), Fracassi and Tate (2012), Engelberg et al. (2012), Engelberg et al. (2013), and Schmidt (2015). When building these connections, we include all directors belonging to both executive and supervisory boards.[10] Overlapping boards are cases where two firms share a common director. The "other employment" links from Boardex are determined by two distinct directors being jointly employed by the same firm in current or prior years. Educational links indicate directors that graduate from the same institution within one year, and that were in the same degree program, i.e., (1) undergraduate, (2) master, (3) MBA, (4) PhD, (5) law, (6) medicine, (7) other.

Our first RHS variable of interest is geographic proximity, which we define as being within close geographic proximity at 100 miles following Coval and Moskowitz (2001), Engelberg et al. (2012), and Engelberg et al. (2013). To determine the distance between firm-pairs, we convert ZIP codes of each firm's historical headquarter location into longitude and latitude coordinates, and compute geodesic distance between the resulting two firm headquarters. Our use of historical HQ locations allows us absorb time-invariant characteristics of the pair and include tight firm-pair fixed effects (α_{jt}) in our regressions. We also use an indicator for a wider geographic radius of (100;500] miles. Intuitively, we expect director employment and social connections to decay with distance and we thus predict $\beta_1 > \beta_2$.

[9]In unreported results, we additionally exclude vertically related peers based on Frésard et al. (2020) with 10% network granularity. Our results are fully robust.

[10]In BoardEx, such directors are defined by the *Board Position* flag set to "Yes"/"Inside"/"Outside".

Our second RHS variable is size-homophily. We expect social connections to be more likely among similarly-size firms, as the existing literature motivates stronger social ties among peers sharing similar characteristics (McPherson et al. (2001), Currarini et al. (2009), Pool et al. (2015), Hirshleifer (2020)). We define the size difference between two firms as $SizeX = max\{Size1/Size2, Size2/Size1\}$, where $Size$ is each firm's market equity computed following Fama and French (2001). We set the high "homophily" area to be the zone $[1; 10]$, and expect the director connections to decay with the size and hence $\gamma_1 > \gamma_2$.[11]

Table 2 presents the results for equation (1). The dependent variable in column (1) is an indicator for any of the director connections noted above. Column (2) uses an indicator for connections through overlapping boards only; column (3) uses an indicator for any other connections (setting to zero observations for firm pairs connected via overlapping boards); and column (4) uses an indicator for social connections only (while setting to zero observations for firm pairs connected via overlapping boards to identify unique effects). Across all specifications, the director connections decay with distance and size differences: The estimated coefficient for $D[0; 100]$ is more than twice as large than the coefficient for $D(100; 500]$. Also, the estimated coefficient on $SizeX[1; 10]$ is about 30% larger than that for the outer band $SizeX(10; 50]$. The differences in estimated coefficients are highly statistically significant with F-statistics above 27.

This evidence of of close geographic proximity and size homophily being strong indicators of both actual social and professional interactions motivates our instruments. Both director connections and close geographic proximity represent settings with stronger social ties among similarly-sized firms. Thus, the transmission of knowledge about the benefits of association memberships is more likely to be shared among these peers. As we only examine knowledge spillovers from firms in different industries, these instruments are likely exogenous to confounders in the focal industry.

3.4 Construction of Instruments

Our two network-based instruments correspond to two different but related settings where similarly-sized firms likely exhibit stronger social ties and thus association spillovers. Both

[11] Our results are robust to alternative geography and size thresholds.

are based on plausibly exogenous connections from unrelated industries.

To construct the first geography-based instruments for each firm i in a given year, we find all other firms $p \in P$ located within 100 miles from firm i, as motivated by the homophily evidence in the previous section. We require that i and p do not share industry, and thus exclude all the TNIC-2 firm pairs. We also impose the size homophily condition and require i and p to be within ten times of each other by market capitalization ($SizeX[1;10]$). Finally, for each firm i in a given year, we find the weighted-average number of distinct association memberships of its homophily peers ($p \in P$). The weights are inversely proportional to the size difference between i and p: $Geographic\ membership\ spillover_i = \sum_p^P w_{p,i} \times \#memberships_p$. To reduce noise in the membership spillovers, we require each firm i included in this test to have at least ten peers.

To construct the second instrument, $Connections\ membership\ spillover_i$, we require firms i and p to share at least one director connection: via overlapping boards, current or past employment, direct education links, or social club links. All other steps are the same as for the geography-based instrument. Table 1, Panel C summarizes both instruments.

3.5 Regression Specification

In the sections that follow, we estimate standard two-stage IV regression models using our firm-year panel database. The first stage regresses a firm's actual number of distinct association memberships on one of our aforementioned network-based instruments (we will display separate panels for each instrument). The second stage then regresses firm outcomes on the fitted membership values from the first stage. Our two-stage model thus takes the following form:

$$\mathbf{1^{st}\ Stage:}\ \#\ \text{memberships}_{i,t-1} = \gamma \# \text{Instrument}_{i,t-1} + \delta X_{i,t-1} + \alpha_i + \theta_t + \eta_{i,t} \tag{2}$$

$$\mathbf{2^{nd}\ Stage:}\ Q_{i,t} = \beta \#\ \text{memberships predicted}_{i,t-1} + \eta X_{i,t-1} + \alpha_i + \theta_t + \varepsilon_{i,t}, \tag{3}$$

where $Instrument_{i,t}$ is either the firms' *Geographic membership spillover* or its *Connections membership spillover*. The dependent variable $Q_{i,t}$ is a firm-year economic outcome variable, and $X_{i,t-1}$ is a set of controls including firm size and age. We saturate the regressions with year and firm fixed effects.

4 Economic Outcomes

In this section, we test our central hypothesis that associations generate gains for their members along a number of important dimensions. In particular, we examine gains in the form of accounting performance, improved risk management, investment opportunities, and corporate efficiency. Because the link between associations and outcomes is endogenous, as previously noted, we use two-stage instrumental variables models to examine these outcomes. Our first instrument is based on local geographic out-of-industry peers and the intensity of association memberships of likely-connected peers. For parsimony, we will refer to this instrument as the "geographic homophily instrument". The second is based on observed board connections to out-of-industry peers based on board overlap, employment, or reported social connections. We refer to this instrument as the "board connections instrument". Both instruments are based only on information from connections in unrelated industries, and more broadly, both address the general concerns of omitted variable bias and reverse causality. We also include rigid firm and year fixed effects throughout.

4.1 Economic Performance

We first examine ex-post outcomes in the form of profitability measured as return on assets, profit margin, sales growth, and markups. The return on assets (ROA) is computed as operating profits scaled by lag of total assets, profit margin is computed as gross profits scaled by sales, sales growth is computed as a log-difference in sales between years $t-1$ and $t+1$, and the markup measures are borrowed from De Loecker et al. (2020) and Pellegrino (2023). All of our two-stage regressions also include controls for firm size, firm age, as well as firm and year fixed effects. Standard errors are clustered by firm.

The results are reported in Table 3. We present results for the geographic homophily instrument in Panel A. The first column displays the results for the first stage of the two-stage model based on equation (2), and illustrates that the opportunity set size is a highly significant predictor of disclosed association memberships with a t-statistic of nearly 6.0, indicating the instrument is powerful. Columns (2) to (6) display the second-stage results based on equation (3) for each of the above-mentioned dependent variables. We note that the F-statistic in all of these models exceed 28, well above the threshold of 10.0 used in the literature to indicate powerful instruments. The table shows that instrumented associations are a highly significant predictor of profits in the form of ROA and profit margins as well as both measures of markups, with results being significant at the 1% level. These results illustrate that associations likely help their members to increase profits and markups consistent with providing a strong value-proposition for their members. This finding is intuitive and consistent with the significant proliferation of associations in the United States.

We present results for the board connections instrument in Panel B. The first stage results indicate that the geographic-network implied opportunity set size is a significant predictor of disclosed associations with a t-statistic above 9.0. The table also illustrates that the instrument achieves a F-statistics ranging from 57 to 93, consistent with this second instrument also being powerful. Rows (2) to (6) echo the results in Panel A and document that associations appear to help their members to generate significant economic gains across a wide-ranging set of measures. In Panel B, all 5 measures of economic gains (including sales growth) are significant at the 1% level.

Overall these results are consistent with associations providing significant economic gains for their members. In the tables and analyses that follow, we further examine the mechanisms through which these gains materialize. This evidence strongly supports gains that are likely beneficial not only to members, but also to the industries associations serve more broadly, and in many cases, benefits also likely accrue to consumers. Yet we will document some evidence of a potential negative externality in the form of potentially anti-competitive market exclusion strategies later in this paper. We note this evidence here to highlight that the higher markups we report, in particular, are likely the result of multiple treatment effects including both mutually beneficial efficiency gains and risk management in addition to some potential rent-seeking externalities that might benefit members at the expense of consumers.

4.2 Evidence of Risk Management

It is natural to expect that associations can help their members to mitigate risk, an outcome that can improve conditions for members, broader industry participants, and consumers alike. We examine ex-post risk-management outcomes in the form of earnings volatility, stock return volatility, and mentions of the word *risk* in the 10K reports. Earnings volatility is computed as standard deviation of quarterly earnings per share over 12 quarters following Hoberg and Prabhala (2009) (we require at least 6 quarters of available data); Stock return volatility is computed as the standard deviation of daily stock returns for each firm-year; The number of 10-K mentions of any of the words {risk, uncertain*, unpredictab*, instability, volatil*} is the number of 10-K paragraphs that mention risk scaled by the total number of 10K paragraphs. We use the same framework including two-stage IV models and fixed effects as in the prior subsection.

The results are reported in Table 4. As before, we present results for the geographic homophily instrument in Panel A and we again note that our instruments satisfy the powerful instrument requirements. Columns (2) to (6) show that instrumented associations are a highly significant predictor of risk mitigations for all three measures of ex post risk based on both earnings and stock returns. These results are significant at the 1% level. These results illustrate that associations help their members to reduce risk across an array of measures.

We present results for the board connections instrument in Panel B. Rows (2) to (6) echo the results in Panel A and reinforce our conclusion that associations help their members to generate significant risk reductions across a wide-ranging set of measures. Overall the results in this section are consistent with associations providing significant gains in the form of risk-management for their members. As economic agents tend to be risk averse, these risk mitigation gains likely benefit not only members, but also broader industry participants and likely even consumers.

4.3 Evidence on Investments

We also hypothesize that associations might help their members to improve their growth opportunities and thus increase investments including capital expenditures, acquisitions, R&D, patenting, and Tobin's Q. For patenting, we use firm's total number of patents filed in a given year based on data from Kogan et al. (2017) available until 2020. We scale CAPX, R&D, and the number of filed patents by lagged total assets. We compute Tobin's Q as firm's market-to-book value of assets, and use an indicator variable for firm acquisitions. We again use the same framework including two-stage IV models and fixed effects.

Results are reported in Table 5, and we present results for the geographic homophily instrument in Panel A. We again note that our instruments satisfy the powerful instrument requirement. Columns (2) to (6) show that instrumented associations predict increases in acquisitions and increases in innovation including R&D and patenting. The increases in acquisitions are consistent with a positive networking benefit for association members, who form more relationships with lower search costs, resulting in more acquisitions. The increases in innovation indicate that associations likely share novel growth opportunities and technology applications as part of their mandate. Further consistent with a positive effect on growth opportunities and expansion, we also find positive results for Tobins' Q and CAPX. We present results for the board connections instrument in Panel B. Rows (2) to (6) echo the results in Panel A for acquisitions, innovation, Tobins' Q and CAPX.

The results in Panel B reinforce our conclusion that associations help their members to identify improved investment opportunities. We abstain from suggesting any likely welfare implications beyond association members given the complex theoretical relationship between investments (such as acquisitions) and consumers. Yet gains in innovation might lead to new products, which should improve welfare for many.

4.4 Evidence on Efficiency

As noted in Section 2, trade associations often list efficiency gains among their stated goals. Such efficiency gains can be important as regulatory agencies specifically highlight these gains as pro-competitive, and likely beneficial to firms and consumers alike. In this section, we examine ex-post efficiency outcomes in the form of COGS/sales, Sales/Assets (Asset Turnover), and total factor productivity (TFP) as measured by İmrohoroğlu and Tüzel (2014) through 2019. We use the same framework including two-stage IV models and fixed effects as above.

The results are reported in Table 6. As before, we present results for the geographic homophily instrument in Panel A and we again note that our instruments satisfy the powerful instrument requirements. Columns (1) to (3) show that instrumented associations are a highly significant predictor of efficiency gains in the form of lower COGS higher asset turnover and higher TFP. All results are significant at the 1% level. These results illustrate that associations likely help their members to cut costs and improve efficiency, supportive of the positive role of associations envisioned by regulators.

We present results for the board connections instrument in Panel B. Rows (1) to (3) echo the results in Panel A. Moreover, we not only find significant results for COGS and asset turnover, but we also find significant improvements in TFP significant at the 1% level, although with an F-statistic slightly below 10.0. These findings reinforce our conclusion that associations help their members to improve efficiency along multiple dimensions. Because gains in efficiency are often passed onto other industry participants and consumers at least in part, these gains are consistent with benefits for members, industry participants and consumers alike. These results illustrate the positive intended role of associations to improve industry conditions.

4.5 Placebo Test: Geographic or Network Effects?

To further assess the validity of the exclusion requirement regarding our geographic instrument (*Geographic membership spillover*), we consider a placebo test that assesses whether alternative explanations based on time-varying geographic effects such as agglomeration effects might explain our results. As noted in Section 3.4, our geographic instrument is based on exposure to associations from other local firms that specifically are of similar size, i.e., within a $10X$ size band around the focal firm's market capitalization. Our placebo test is based on the fact that relaxing the homophily condition should result in weak social ties and thus weak results. However, relaxing this condition should not change the measure's exposure to potential time varying agglomeration effects or other purely geographic effects (as this placebo holds fixed geography, and hence it only relaxes homophily of the peers).

To implement this test, we reconstruct our *Geographic membership spillover* instrument exactly as described in Section 3.4 with one exception: instead of selecting size-based homophily peers within the $10X$ size band relative to the focal firm, we include firms *outside* the $10X$ size band. All other steps including the selection of out-of-industry peers located within 100 miles from the focal firm remain unchanged. We then rerun the IV models in Tables 3 to 6 using this alternative placebo instrument based on the *outer* size band (*Geographic membership spillover,* $> 10X$). It is important to note that because the inner and outer size bands are both located in the same geographic areas, that if our results were driven by time varying agglomeration effects, then the placebo would generate similar results as our baseline results in Tables 3 to 6.

Table 7 presents the placebo test results. The first stage estimates in Panel A show that the placebo instrument based on the outer size band has the opposite sign from our baseline. Panel B reports the second stage results, which show weak F-statistics between 1.8 and 8.1, well below levels needed to satisfy the strong instrument condition. Panel B also reports the key instrumented coefficients and their t-statistics in columns (1) and (2). These second-stage coefficients are uniformly insignificant or weakly significant with the estimated coefficients having the opposite signs from the baseline. We also note that the number of observations in these regressions is similar to those in Tables 3 to 6, indicating that the non-results for the placebo are not a result of low power or less data. Overall, these results affirm that our baseline geographical instrument captures the effects of homophily-networking among managers of similar-sized firms, and not alternative geographic effects such as agglomeration.

4.6 Network Reflection Considerations

A common challenge associated with network-based instruments is that network transmission can go both ways through the network and peers might be "reflecting" the focal firm. This is known as the "Manski Reflection Problem" (see Manksi (2013)). Our instrument is built on the assumption that focal firm f is learning from its peer firms p. To assess whether reflection effects are driving our results, we follow the network econometrics literature, which shows that tests based on "peers of peers" can establish causality (Bramoullé et al. (2009), Cohen-Cole et al. (2014)) and overcome the reflection problem. Intuitively, f would be learning from p_1 what p_1 learned from p_2. In this setting, f and p_2 are not being connected in the social network or homophily region. We modify our instruments to only draw inferences from these peers of peers, and re-estimate our baseline regressions. Since these modified instruments require indirect information transmission from the peers of peers, we expect the results to be weaker. However, if the information is still valuable and this test has power, the results should agree with the baselines.

We construct the modified version of the geography-based instrument *Geographic membership spillover, PoP* in two stages. In the first stage, we construct our instrument for each

p_1 computing weighted-average association memberships across p_2 just as in the baseline version of the instrument, while imposing an additional condition that each p_2 is not within a $10X$ size band, or located within 100 miles, of the focal firm f. Thus the peers-of-peers are not direct peers of the focal firm. In the second stage for focal firm f, we compute the weighted-average of the averaged association memberships that p_1 has learned from its peers.

Panel A of Table 8 presents the results for our baseline IV estimation from Tables 3 to 6, but using the modified version of the instrument. As expected, the estimates are statistically weaker, but they are in line with the baselines across all the groups of firm outcomes except for the risk-management tests. We also construct the corresponding modified version of our connection-based instrument *Connections membership spillover, PoP*, requiring f and p_2 not to share any director connections and to not to be within $10X$ size band. Panel B shows that the estimation results using this instrument agree with the baselines for all the firm outcomes including risk management, yet they have slightly lower statistical significance levels than do the baselines as expected. We conclude that our results are robust to controlling for the Manski reflection problem.

5 Exclusion Mechanisms

Our results thus far favor the bright-side conclusion that trade associations fulfill their intended pro-efficiency agendas and bring positive effects to the industries they serve. We find likely causal evidence of better risk management, increased investment, improved efficiency, and ultimately higher profits. While the first three strongly favor the bright-side interpretation, the evidence of higher profits and markups could also be consistent with some anti-competitive practices. In this section, we develop specialized mechanism tests that generate separating predictions for these two channels.

In particular, we examine the how firms and their rivals expand across three competitive margins: expanding into new international markets, new technologies, and new product features. The anti-competitive hypothesis predicts exclusionary conduct and that firms will expand in a way that does not overlap with how rivals expand (see our detailed discussion of exclusionary conduct and antitrust regulation in Section 2). For example, peers might coordinate, and a focal firm will expand into Germany but not China, and its peer will expand into China but not Germany. Such conduct is anti-competitive and would result in high profit margins due to the lack of competition in each market. Trade associations might induce exclusionary conduct simply by hosting regular meetings where competitors meet in person, perhaps in sideline meetings not specifically endorsed by the associations themselves.

The pro-efficiency hypothesis would predict diametric opposite expansion patterns. For example, trade associations provide information about efficiency in various markets and all members get the same information at the same time. For example, an association's proceedings might feature information about facilitating low-cost entry into German markets. The consequence is that multiple members will use the information and enter Germany at the same time after the meeting. Hence the pro-efficiency hypothesis predicts that expansion patterns into specific new markets will be positively correlated among rivals who are members. This is opposite the predictions of the anti-competitive hypothesis noted above, which predicts exclusivity. We test these hypotheses by examining expansions into specific countries, technologies, and product features. Our approach is novel, as we are unaware of similar separating-tests in the existing literature.

For each of the three competitive margins, we explore a high-dimensional sample of observed entry decisions at the firm-pair (dyad) $\times$ individual-market $\times$ year level. We use the resulting dyadic panel database to examine the extent to which competitor-pair entry decisions are exclusiVe or positively correlated. We note that endogeneity concerns are present as firms in a dyad might enter disjoint markets due to alternatives such as market conditions that render entry unprofitable to a second-mover, or firms might have different comparative advantages. We thus take several precautions to ensure likely-causal inferences and to link our findings specifically to associations. We first define "abnormal exclusive entry" as the rate of observed exclusive entry within a dyad relative to the expected level given the different sizes of geographic markets. We also saturate our empirical model with high dimensional fixed effects that rule out channels based on unobserved firm or firm-pair characteristics, unobserved market-specific characteristics, and also unobserved market characteristics interacted with firm-pair characteristics. Finally, and most importantly, we use two-stage IV regressions based on plausibly exogenous variation in likely association memberships of the firms in the dyad. In this rigid setting, we can identify whether associations uniquely increase exclusivity (anti-competitive) or decrease exclusivity (pro-efficiency) as firms expand across competitive margins.

5.1 Measuring Pairwise Exclusivity

Let i and j denote two firms in a dyad, t denotes the year, and let m denote a specific geographic market that competitors i and j might enter. For example, a given m can denote Germany and we thus model whether i and j enter and sell products in Germany. Our first variable of interest is $Q_{i,j,m,t}$, which we define to be the extent to which the dyad (i, j) is operating in an exclusive fashion in market m in year t (we define exclusive intensity in detail below). As our goal is to examine actual operations and whether they are exclusive, our sample is comprised of dyad-market-year observations for which either i or j is operating in market m in year t. For example, if neither i nor j were selling products in Germany in year t, then we would not include an observation for this dyad-market-year combination in our sample as the observation has zero weight. However, if at least one firm in the dyad is operating in Germany in year t, then the corresponding observation will be in our sample.

For our baseline extensive-margin geographic tests, we define $Q_{i,j,m,t} = 1$ to indicate exclusivity. Continuing the example of Germany, a dyad is "exclusive" in market m (Germany) in year t if only one of the two firms is selling products in Germany in year t. $Q_{i,j,m,t}$ is defined to be zero otherwise, which would indicate the non-exclusive case of both firms operating in Germany. Under the anti-competitive (pro-efficiency) hypothesis, we expect that dyads will have higher (lower) values of $Q_{i,j,m,t}$ when the dyad is more exogenously exposed to associations holding controls and fixed effects constant.

Finally, because geographic markets have radically different market-sizes, we adjust $Q_{i,j,m,t}$ for market size to compute "abnormal exclusive entry". For example, operating in China is far more prevalent than is operating in Lithuania in our sample. For a given firm operating in a set of markets, we define its "expected exclusive entry" as the new country-by-country weights that obtain by redistributing the firm's total operational mass in proportion to each market's size. We compute market size for each market m as the total operational mass summed over firms in market m in the given year. We then compute "expected exclusive entry" Exp$Q_{i,j,m,t}$ by plugging these counterfactual size-proportional levels of operations into the same formulations of $Q_{i,j,m,t}$ defined above. Finally, we define our variable of interest, "abnormal exclusive entry", as the extent to which a dyad is exclusive relative to its expected value given market sizes:

$$\text{Abn}Q_{i,j,m,t} = Q_{i,j,m,t} - \text{Exp}Q_{i,j,m,t} \tag{4}$$

We next define joint association membership for firms i and j ($\#\text{Associations}_{i,j,t-1}$) as the product of the numbers of associations each firm belongs to in year $t-1$. We then test our hypotheses using the following the two-stage high-dimensional model:

$$\textbf{1}^{\textbf{st}}\ \textbf{Stage:}\ \#\text{Associations}_{i,j,t-1} = \gamma\text{Instrument}_{i,j,t-1} + \delta X_{i,j,t-1} + \alpha_{\{(i,j)\times m\}} + \theta_{\{m\times t\}} + \mu_{i,j,t} \tag{5}$$

$$\textbf{2}^{\textbf{nd}}\ \textbf{Stage:}\ \text{Abn}Q_{i,j,s,t} = \beta\#\text{Associations inst}_{i,j,t-1} + \eta X_{i,j,t-1} + \alpha_{\{(i,j)\times m\}} + \theta_{\{m\times t\}} + \varepsilon_{i,j,t} \tag{6}$$

$\text{Instrument}_{i,j,t-1}$ is the product of firm i's instrument and firm j's instrument in year $t-1$. $X_{i,j,t-1}$ is a vector of controls for size and age of the dyad in year $t-1$ also defined as products for firms i and j, and $\alpha_{\{(i,j)\times m\}}$ is a rigid high dimensional fixed effect to control for unobservables at the firm-pair × market level. $\theta_{\{m\times t\}}$ are market × time fixed effects. To avoid any influence from markets being correlated within dyads, we cluster standard errors at the firm-pair level. Also, because our firm-pair database is symmetric across i and j, we drop any duplicate pairs $\{j,i\}$ when the pair $\{i,j\}$ is already in the database.

We use this two-stage instrumental variables regression model since the choice to join an association is endogenous, and operational configurations might be influenced by other forces. We instrument for $\#\text{Associations}_{i,j,t}$ with our homophily-based plausibly exogenous measures of associations through geographic out-of-industry peers and out-of-industry director connections, as explained earlier in Section 3. As our current panel is based on firm-pairs, we define the pairwise instruments as the product of firm i's instrument and firm j's instrument in year t. A high value of this product would indicate both firms in the dyad are more exposed to associations, and hence this instrument shifts the likelihood that the two firms would have been "treated" by association proceedings. The anti-competitive hypothesis predicts $\beta > 0$. The pro-efficiency hypothesis predicts $\beta < 0$.

We note limitations of our analysis. First, although we can test for the predicted effects of exclusionary conduct, we do not have contractual evidence of exclusion agreements. Second, we do not have evidence of management's unobservable "intent" when they enter new markets, and association proceedings might induce exclusivity through other aspects of association agendas. Yet we are not aware of specific alternative agendas that would promote exclusion, as common treatments of efficiency objectives would promote positively correlated uptakes. Yet to ensure conservative inferences, we will only conclude that our findings appear to be causally linked to association memberships holding fixed our controls and high dimensional fixed effects. Our use of instruments remains helpful as they specifically help to exclude alternative explanations not related to associations themselves. We note for example that our results cannot be explained by alternatives based on the geography of where firms are located or unobserved market conditions. Regarding geographic or agglomeration effects, we note that firms rarely move headquarters, and baseline geographic effects would be absorbed by our firm-pair fixed effects. Importantly, both of our instruments vary significantly within-pairs over time and are not absorbed by the fixed effects. Notwithstanding any mitigating factors, future work exploring these limitations further remains fruitful.

5.2 Geographic Entry into International Markets

In this section, we examine the extent to which overlapping trade association memberships lead firm-pairs expanding into specific international markets to do so using exclusionary or non-exclusionary practices. We implement equations (5) and (6) after defining $Q_{i,j,m,t}$ based on offshoring strategies.

To assess international geographic expansions, we consider the firm-country-time offshoring network developed by Hoberg and Moon (2017) and available up to year 2021, which was constructed using anchor-phrase based textual methods using 10-K mentions of the universe of country names. We focus on whether firms specifically mention the sale of their output to customers in foreign nations. In particular, the database is constructed by searching for any words from the following list regarding whether they appear within a 25-word window relative to a specific country name.

> ***Offshore sales word list:*** *sales, revenue, revenues, customer, customers, consumer, consumers, market, markets, marketed, marketing, marketplace, distribute, distributes, distributed, distributing, distribution, distributions, distributor, distributors, distributorship, dealer, dealers, client, clients, export, exports, exported, exporting, shipments, demand, demands, store, stores, wholesale, wholesaler, receivable, receivables.*

We follow Hoberg and Moon (2017) and deem a company as operating in a given country (extensive margin) if, at least once, it mentions one word from the above list within a 25 word window of mentioning a specific country by name. We define $Q_{i,j,m,t} = 1$ if only one firm in a given dyad in a given year is selling products to the given country and we set $Q_{i,j,m,t} = 0$ otherwise. Then, we compute expected and abnormal exclusive entry as described above. As the offshoring database covers 236 nations, the resulting firm-pair $\times$ country $\times$ year database is large and contains 5.3 million valid observations.

Table 9 displays the results. In column (1) of Panel A, the table displays the first-stage regression based on equation (5) using the geographic out-of-industry peer memberships instrument. We confirm that our instrument is a highly significant and positive predictor of trade association membership overlaps with a t-statistic near 5.0. Stage two of this model, which tests equation (6), is shown in columns (2) and (4) for different sets of fixed effects. For both tests, we find that instrumented associations is a significant and positive predictor of abnormal exclusionary geographic configurations. We find t-statistics that range from 2.3 to 3.6. Panel B of Table 9 displays results for our second instrument, the director-network out-of-industry peer memberships. We again find even stronger results in both the first and second stage that are significant at the 1% level. We also note that the second-stage F-statistics exceed 10.0 in both panels, indicating strong instruments.

These results are consistent with the anti-competitive hypothesis indicating potential exclusionary quid pro quos regarding international expansions. They suggest that competitors in a dyad, when they are exogenously exposed to more associations, more exclusively expand into non-overlapping countries. This allows both to operate in less contested markets and to achieve higher profitability. The intuition for these results is well-articulated by the New York trash haulers' example from Porter (2005) discussed earlier in Section 2. This association-based explicit agreement divided the city among competitors in an exclusionary way. Yet we note that exclusionary quid pro quos can also take place without formal agreements and without the endorsement of the associations themselves (via sideline meetings as discussed above).

5.3 Technology-Based Exclusion

In this section, we examine the extent to which overlapping trade association memberships lead firm-pairs expanding into specific technologies to do so using exclusionary or non-exclusionary practices. We identify technology markets following Cabezon and Hoberg (2023), who use the metaHeuristica software platform to first identify all paragraphs in all 10-Ks that contain the word root "technol*". The authors then extract noun-phrases (specific technologies) from these paragraphs and prune the resulting list of technologies using research assistants to only include those that were materially new and relevant after 1997 (the start of our sample). This process of noun-phrase curation results in 352 unique technologies, which we list in appendix A.1.

For each of the 352 technologies, we first identify which firms mention the given technology in each year. We then define $Q_{i,j,s,t} = 1$ if both firms in a dyad in a given year mention the technology "s" and $Q_{i,j,s,t} = 0$ if only one firm in the dyad mentions the technology (as noted above, we do not include dyads for which no firms in a dyad use the technology). Because this test examines technological adoptions, we limit our sample to firms that are actively patenting. The result is a high dimensional firm-pair x technology x year database with 3,962,342 observations.

We then implement the regression in equation (6) using the same two-stage instrumental variables model used in the previous subsection. The results are displayed in Table 10. The first column shows the result of the first stage regression where we regress the product of the number of actual associations each firm in the dyad belongs to on the instrument and the controls. The instrument is positive and statistically significant with a t-statistic of near 3.5 (for the out-of-industry geographic instrument in Panel Al) and 3.3 (for the out-of-industry board connections instrument in Panel B).

The remaining rows in Panel A display results for the second stage using the geographic instrument. We find that instrumented associations negatively predict exclusivity and the results are significant at the 1% level except column (4), which is significant at the 5% level. We observe similar results in Panel B for the out-of-industry board connections instrument as all results are also negative and significant at the 1% level except column (4), which is significant at the 5% level. In contrast to our results supporting the anti-competitive hypothesis for offshore expansions, these findings for technology adoptions are consistent with the pro-efficiency hypothesis.

5.4 Summary: Efficiency vs Exclusion

Overall the contrasting results for offshore and technology expansions illustrate some support for both the pro-efficiency and the anti-competitive hypotheses. Indeed these hypotheses are not mutually exclusive, and our results suggest that both practices likely occur in different trade association settings. Our earlier finding of higher profits is further consistent with this conclusion as both hypotheses predict higher profits. Yet the breadth of our results overall favors the pro-efficiency hypothesis as we find broad evidence of improved efficiency, lower costs, improved risk management, and higher investment. Yet although pro-efficiency effects appear to dominate, our results for offshoring suggest that one externality of trade associations is some increase in likely exclusionary geographic conduct among rivals (who likely meet on the sidelines during trade association meetings). Yet for technologies, the wide-ranging and intuitive efficiency gains associated with technology adoptions swamp any evidence of exclusionary conduct and the pro-efficiency effects dominate.

6 Conclusion

To our knowledge, this paper provides the first systematic exploration of trade associations and how they impact U.S. public firm performance, risk management, investment, and corporate efficiency. The paper also makes methodological and data contributions by gathering association and membership data via textual analysis on a large number of documents.

We hypothesize that trade associations provide two types of benefits to their members. The first is gains in the form of corporate efficiency, risk management and growth options that improve industry conditions for all. These gains are seen as positive and are welcomed by antitrust regulators. Our evidence indicates a high degree of success on all of these dimensions, and illustrates the positive economic role played by associations.

The second class includes anti-competitive activities that would result in higher profits and markups. Because they are less easily observed by regulators, and easy to facilitate in sideline meetings, we examine market-exclusion strategies. We find evidence of both higher markups and more exclusive geographic operating profiles when firms are influenced by associations. We emphasize that these results are unlikely driven by intentional actions by the associations themselves. Rather, they might be a consequence of bringing competitors together in meeting venues where they might opportunistically meet on the sidelines.

As the decision to join an association is endogenous, we evaluate outcomes using novel instrumental variables based on out-of-industry geographic networks and out-of-industry board connections. All of our results regarding performance, markups, risk management, investment and corporate efficiency are established using two-stage instrumental variables models and we find similar results using both instruments. Our results thus depict strong evidence of positive contributions from associations alongside some evidence of a negative externality in the form of potentially anti-competitive market-exclusion strategies as a side-effect of allowing competitors to frequently interact in large meetings.

To examine anti-competitive market-exclusion strategies, we use high-dimensional panel-data regressions that examine the geographic operating configurations and the new technology adoptions of firms and their competitors. These tests use instrumental variables and high dimensional fixed effects that rule out many alternative interpretations. We find that trade associations likely facilitate some anti-competitive geographical exclusionary strategies among members. On the other hand, pro-efficiency gains from technology adoptions are large and overcome any evidence of exclusionary strategies relating to technology adoptions.

Key limitations of our study are that we do not have direct contractual evidence of exclusion, and we are unable to detect the intent of firms that are selecting geographic operating configurations. Yet our use of instruments and rigid high-dimensional fixed effects links our market expansion results specifically to association memberships. Future work further exploring mechanisms remains fruitful. We also believe future work can benefit from our framework for examining exclusion hypotheses over a wider array of corporate strategies.

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Table 1: Summary statistics

Summary statistics are reported for our sample based on annual firm observations from 2000 to 2022. Panel A summarizes corporate membership in national trade associations. *# memberships* denotes a number of distinct national trade associations in which a company is a member in a given year. *Member {0/1}* is an indicator for a company being a member in at least one association in a given year. Panel C summarizes firm characteristics for firms which are members of at least one association in a given year (*Member* = 1) versus non-members (*Member* = 0). t-statistics are based on the standard errors clustered by company. Panel B summarizes instruments for the association membership. The instrument *Geographic membership spillover* measures association membership spillovers from other geographically closely located firms. It is a weighted average of these other firms' association membership counts, where these other firms also belong to different industries from and similar in size to the focal firm. The weights are inversely proportional to size differences between the other firms and the focal firm. The instrument *Connections membership spillover* is constructed analogously, but instead of memberships of closely located firms, it uses memberships of other firms connected to the focal firm via overlapping boards, current and past employment, education, and social clubs. Membership variables and instruments are lagged, and all the variables in the table are winsorized at $1/99^{\text{th}}$ percentile within a year.

Panel A: Membership in trade associations	Mean (1)	Median (2)	SD (3)	Min (4)	Max (5)	Obs (6)
# memberships	2.354	0.000	5.844	0.000	55.000	117,518
Member {0/1}	0.456	0.000	0.498	0.000	1.000	117,518

Panel B: Split of firm characteristics by association membership	*Member* = 1		*Member* = 0		*Test for difference in means*	
	Mean (1)	Obs (2)	Mean (3)	Obs (4)	(1)-(3) (5)	t-stat (6)
ln(Total assets)	7.292	53,536	6.111	63,982	1.181	30.86***
ln(Age)	2.730	53,536	2.106	63,982	0.623	43.15***
ROA	0.094	53,536	0.035	63,982	0.059	24.20***
Profit margin	0.343	53,536	0.243	63,982	0.100	9.92***
Sales growth	0.171	53,536	0.215	63,982	-0.044	-7.89***
ln(DLEU Markup)	0.316	53,536	0.287	63,982	0.029	7.67***
ln(GHL Markup)	0.399	53,536	0.432	63,982	-0.034	-3.86***
Earnings volatility	0.086	53,536	0.107	63,982	-0.021	-10.02***
Stock returns volatility	2.759	53,536	3.166	63,982	-0.407	-23.96***
# Risk mentions/10K size	0.051	53,536	0.056	63,982	-0.004	-9.91***
Capex/Total assets$_{t-1}$	0.048	53,536	0.044	63,982	0.004	4.53***
Acquisition {0/1}	0.170	53,536	0.101	63,982	0.069	21.76***
R&D/Total assets$_{t-1}$	0.038	53,536	0.046	63,982	-0.008	-6.64***
# Patents/Total assets$_{t-1}$	0.007	53,536	0.005	63,982	0.002	6.14***
Tobin's Q	1.531	53,536	1.572	63,982	-0.041	-1.86*
COGS/Sales	0.657	53,536	0.757	63,982	-0.100	-9.92***
Asset turnover	0.907	53,536	0.719	63,982	0.187	14.42***
Total factor productivity	-0.280	53,536	-0.379	63,982	0.099	9.98***

Panel C: Instruments	Mean	Median	SD	Min	Max	Obs
Geographic membership spillover	2.760	1.733	3.180	0.115	27.199	69,463
Connections membership spillover	3.978	2.532	4.433	0.181	38.323	81,093

Table 2: Firm connections and homophily

The table presents the regression estimation results of equation (1) using a firm-pair-year panel. In column (1), the dependent variable *Any firm connection 0/1* is an indicator for the firm-pair sharing a connection via overlapping boards, current and past employment, education, and social clubs. In column (2), the dependent variable *Overlapping directors 0/1* is an indicator for the firm-pair sharing a connection via overlapping boards only. In column (3), the dependent variable *All other connections 0/1* is an indicator for the firm-pair sharing a connection via current and past employment, education, and social clubs, set to zero the pairs connected via overlapping boards. In column (4), the dependent variable *Social clubs 0/1* is an indicator for the firm-pair sharing a connection via social clubs, set to zero the pairs connected via overlapping boards. $D[0, 100]$ and $D(100, 500]$ are indicators for respective intervals of distance in miles between firms, and $SizeX[0; 10]$ and $SizeX(10; 50]$ are indicators for respective intervals of size differences. All the regressions include firm-pair and year fixed effects. Standard errors are clustered by firm-pair. The symbols ***,**,* denote statistical significance at 1%, 5%, and 10% levels.

	Any firm connections {0/1} (1)	Overlapping directors {0/1} (2)	All other connections {0/1} (3)	Social clubs {0/1} (4)
D[0;100]	1.4038***	0.1113***	1.2925***	0.4917***
	(15.62)	(6.71)	(14.41)	(10.21)
D(100;500]	0.4848***	0.0141	0.4707***	0.2182***
	(8.32)	(1.64)	(8.10)	(7.52)
SizeX[0;10]	0.3427***	0.0133***	0.3294***	0.1834***
	(23.37)	(7.80)	(22.49)	(24.14)
SizeX(10;50]	0.2278***	0.0048***	0.2230***	0.1211***
	(19.08)	(3.81)	(18.68)	(19.13)
Pair F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Observations	104,871,630	104,871,630	104,871,630	104,871,630
R^2	0.62	0.60	0.61	0.53
F-statistic, $\beta_{D[0;100]} = \beta_{D(100;500]}$	90.61	29.84	72.60	27.07
F-statistic, $\gamma_{SizeX[1;10]} = \gamma_{SizeX(10;50]}$	159.27	48.65	136.80	173.07
SD_Y	25.7980	3.2540	25.6211	12.7595
$Mean_Y$	7.1693	0.1060	7.0633	1.6555

Table 3: Firm profitability, sales growth, markups and association membership

The table presents the instrumental variables estimation results using the firm-year panel data. In Panel A, the instrument *Geographic membership spillover* measures association membership spillovers from other geographically closely located firms. It is a weighted average of these other firms' association membership counts, where these other firms also belong to different industries from and similar in size to the focal firm. The weights are inversely proportional to size differences between the other firms and the focal firm. In Panel B, the instrument *Connections membership spillover* is constructed analogously, but instead of memberships of closely located firms, it uses memberships of other firms connected to the focal firm via overlapping boards, current and past employment, education, and social clubs. In both panels, column (1) presents the first-stage results, where the dependent variable (*# memberships*) is the number of distinct associations in which a firm is a member in a given year. Columns (2)-(6) display the second-stage regression results. The dependent variables are: return on assets *ROA* computed as operating income scaled by lag of total assets; *Profit margin* computed as sales net of cost of goods sold scaled by sales; (*Sales growth*) computed as a natural logarithm of a ratio of total sales in year $t+1$ over total sales in year $t-1$; *ln(DLEU Markup)* is from De Loecker et al. (2020); and *ln(GHL Markup)* is from Pellegrino (2023). All the regressions include the natural logarithms of firm total assets and age as control variables, and firm and year fixed effects. The instruments and the control variables are lagged, and all the variables are winsorized at 1/99$^{\text{th}}$ percentiles within a year. Standard errors are clustered by firm. F-statistic corresponds to Kleibergen and Paap (2006) Wald test for weak instruments. The symbols ***,**,* denote statistical significance at 1%, 5%, and 10% levels.

Panel A: Instrument is Geographic membership spillover	1^{st} *stage*	2^{nd} *stage estimates*				
	# memberships	ROA	Profit margin	Sales growth	ln(DLEU Markup)	ln(GHL Markup)
	(1)	(2)	(3)	(4)	(5)	(6)
Geographic membership spillover	0.2231***					
	(5.98)					
# memberships predicted		0.0200***	0.0405***	0.0542***	0.0163***	0.0349***
		(4.84)	(4.28)	(5.02)	(3.78)	(3.26)
ln(Total assets)	0.2176***	-0.0083***	-0.0155*	-0.2735***	0.0239***	-0.0171***
	(4.48)	(-2.82)	(-1.70)	(-25.53)	(9.71)	(-2.58)
ln(Age)	0.3994***	-0.0026	-0.0238*	-0.1497***	-0.0011	-0.0259***
	(5.09)	(-0.74)	(-1.95)	(-11.04)	(-0.34)	(-3.02)
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	68,083	65,166	68,083	54,266	52,682	35,750
F-statistic		36.03	35.82	40.51	36.13	27.75
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$		0.1109	0.2251	0.3011	0.0905	0.1937
SD_Y		0.1948	1.0426	0.5558	0.2073	0.4653
Mean_Y		0.0633	0.2884	0.1933	0.3007	0.4153

Panel B: Instrument is Connections membership spillover	1^{st} *stage*	2^{nd} *stage estimates*				
	# memberships	ROA	Profit margin	Sales growth	ln(DLEU Markup)	ln(GHL Markup)
	(1)	(2)	(3)	(4)	(5)	(6)
Connections membership spillover	0.3134***					
	(9.38)					
# memberships predicted		0.0137***	0.0244***	0.0326***	0.0113***	0.0227***
		(6.69)	(5.01)	(6.20)	(5.18)	(4.15)
ln(Total assets)	0.1003*	-0.0109***	-0.0115	-0.2628***	0.0250***	-0.0083
	(1.73)	(-4.33)	(-1.45)	(-28.63)	(12.02)	(-1.51)
ln(Age)	0.4595***	-0.0027	-0.0159	-0.1357***	-0.0024	-0.0245***
	(6.21)	(-0.97)	(-1.49)	(-12.39)	(-0.91)	(-3.35)
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	80,287	76,989	80,287	66,123	63,379	42,701
F-statistic		86.49	87.90	93.29	82.60	57.18
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$		0.0828	0.1475	0.1972	0.0683	0.1371
SD_Y		0.1948	1.0426	0.5558	0.2073	0.4653
Mean_Y		0.0633	0.2884	0.1933	0.3007	0.4153

Table 4: Firm risk and association membership

The table presents the instrumental variables estimation results using the firm-year panel data. In Panel A, the instrument *Geographic membership spillover* measures association membership spillovers from other geographically closely located firms. It is a weighted average of these other firms' association membership counts, where these other firms also belong to different industries from and similar in size to the focal firm. The weights are inversely proportional to size differences between the other firms and the focal firm. In Panel B, the instrument *Connections membership spillover* is constructed analogously, but instead of memberships of closely located firms, it uses memberships of other firms connected to the focal firm via overlapping boards, current and past employment, education, and social clubs. In both panels, column (1) presents the first-stage results, where the dependent variable (*# memberships*) is the number of distinct associations in which a firm is a member in a given year. Columns (2)-(6) display the second-stage regression results. The dependent variables are: *Earnings volatility* computed as standard deviation of quarterly earnings per share over 12 quarters following Hoberg and Prabhala (2009) up to year 2020 requiring at least 6 quarters of data available; *Stock returns volatility* computed as standard deviation of firm daily stock returns within a company-year; *# Risk mentions/10K size* is the number of paragraphs in which a company mentions one of the words {risk, uncertain*, unpredictab*, instability, volatil*} in its 10K report, scaled by the total number of paragraphs in the report. All the regressions include the natural logarithms of firm total assets and age as control variables, and firm and year fixed effects. The instruments and the control variables are lagged, and all the variables are winsorized at $1/99^{th}$ percentiles within a year. Standard errors are clustered by firm. F-statistic corresponds to Kleibergen and Paap (2006) Wald test for weak instruments. The symbols ***,**,* denote statistical significance at 1%, 5%, and 10% levels.

Panel A: Instrument is Geographic membership spillover	2^{nd} *stage estimates*		
	Earnings volatility	Stock returns volatility	# Risk mentions/ 10K size
	(1)	(2)	(3)
# memberships predicted	-0.0082***	-0.0746***	-0.0004
	(-3.22)	(-3.76)	(-1.18)
ln(Total assets)	0.0017	-0.0522***	0.0011***
	(0.62)	(-3.51)	(4.78)
ln(Age)	0.0058	-0.2032***	-0.0014***
	(1.58)	(-9.88)	(-4.79)
Year F.E.	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes
Observations	58,494	67,545	62,000
F-statistic	41.75	35.32	41.88
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$	-0.0453	-0.4141	-0.0020
SD_Y	0.1769	1.5264	1.4584
$Mean_Y$	0.0969	2.9758	2.5774

Panel B: Instrument is Connections membership spillover	2^{nd} *stage estimates*		
	Earnings volatility	Stock returns volatility	# Risk mentions/ 10K size
	(1)	(2)	(3)
# memberships predicted	-0.0067***	-0.0367***	-0.0002
	(-4.33)	(-3.65)	(-1.27)
ln(Total assets)	0.0001	-0.0458***	0.0010***
	(0.04)	(-3.63)	(5.03)
ln(Age)	0.0062*	-0.1930***	-0.0013***
	(1.92)	(-11.10)	(-4.88)
Year F.E.	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes
Observations	70,573	79,964	74,319
F-statistic	94.85	88.27	91.75
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$	-0.0405	-0.2220	-0.0013
SD_Y	0.1769	1.5264	1.4584
$Mean_Y$	0.0969	2.9758	2.5774

Table 5: Firm investments and association membership

The table presents the instrumental variables estimation results using the firm-year panel data. In Panel A, the instrument *Geographic membership spillover* measures association membership spillovers from other geographically closely located firms. It is a weighted average of these other firms' association membership counts, where these other firms also belong to different industries from and similar in size to the focal firm. The weights are inversely proportional to size differences between the other firms and the focal firm. In Panel B, the instrument *Connections membership spillover* is constructed analogously, but instead of memberships of closely located firms, it uses memberships of other firms connected to the focal firm via overlapping boards, current and past employment, education, and social clubs. In both panels, column (1) presents the first-stage results, where the dependent variable (*# memberships*) is the number of distinct associations in which a firm is a member in a given year. Columns (2)-(6) display the second-stage regression results. The dependent variables are: *Capex/Total assets*$_{t-1}$ is the firm's annual capital expenditures scaled by a lag of total assets; *Acquisition {0/1}* an indicator for a company that acquired any stake in another company in a given year based on SDC Platinum database; *R&D/Total assets*$_{t-1}$ is the firm's annual research and development expenses scaled by a lag of total assets; *# Patents/Total assets*$_{t-1}$ is the firm's total number of patents filed in a given year based on data from Kogan et al. (2017) available until 2020, scaled by a lag of total assets; *Tobin's Q* is the firm market value of assets scaled by its book of assets. All the regressions include the natural logarithms of firm total assets and age as control variables, and firm and year fixed effects. The instruments and the control variables are lagged, and all the variables are winsorized at $1/99^{\text{th}}$ percentiles within a year. Standard errors are clustered by firm. F-statistic corresponds to Kleibergen and Paap (2006) Wald test for weak instruments. The symbols ***,**,* denote statistical significance at 1%, 5%, and 10% levels.

Panel A: Instrument is Geographic membership spillover	*2^{nd} stage estimates*				
	Capex/Total assets$_{t-1}$	Acquisition {0/1}	R&D/Total assets$_{t-1}$	# Patents/Total assets$_{t-1}$	Tobin's Q
	(1)	(2)	(3)	(4)	(5)
# memberships predicted	0.0112***	0.0608***	0.0072***	0.0013***	0.4111***
	(5.35)	(5.52)	(5.29)	(3.93)	(5.29)
ln(Total assets)	-0.0139***	-0.0478***	-0.0253***	-0.0048***	-0.5088***
	(-13.27)	(-8.94)	(-20.65)	(-11.32)	(-14.38)
ln(Age)	-0.0155***	-0.0394***	-0.0019	-0.0034***	-0.3521***
	(-9.89)	(-4.98)	(-1.61)	(-6.90)	(-7.14)
Year F.E.	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes
Observations	66,578	68,083	68,083	61,816	67,695
F-statistic	34.48	35.82	35.82	43.30	34.49
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$	0.0622	0.3375	0.0400	0.0070	2.2834
SD_Y	0.0662	0.3390	0.0955	0.0227	1.6229
Mean_Y	0.0460	0.1325	0.0422	0.0059	1.5531

Panel B: Instrument is Connections membership spillover	*2^{nd} stage estimates*				
	Capex/Total assets$_{t-1}$	Acquisition {0/1}	R&D/Total assets$_{t-1}$	# Patents/Total assets$_{t-1}$	Tobin's Q
	(1)	(2)	(3)	(4)	(5)
# memberships predicted	0.0077***	0.0380***	0.0043***	0.0009***	0.2819***
	(7.57)	(7.58)	(6.93)	(4.29)	(7.89)
ln(Total assets)	-0.0134***	-0.0446***	-0.0226***	-0.0048***	-0.4854***
	(-15.50)	(-10.56)	(-21.00)	(-12.39)	(-18.39)
ln(Age)	-0.0137***	-0.0366***	-0.0018*	-0.0032***	-0.3273***
	(-11.86)	(-6.26)	(-1.95)	(-7.59)	(-9.53)
Year F.E.	Yes	Yes	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes	Yes	Yes
Observations	78,733	80,287	80,287	73,694	79,883
F-statistic	87.45	87.90	87.90	95.93	84.98
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$	0.0466	0.2302	0.0262	0.0056	1.7057
SD_Y	0.0662	0.3390	0.0955	0.0227	1.6229
Mean_Y	0.0460	0.1325	0.0422	0.0059	1.5531

Table 6: Firm efficiency and association membership

The table presents the instrumental variables estimation results using the firm-year panel data. In Panel A, the instrument *Geographic membership spillover* measures association membership spillovers from other geographically closely located firms. It is a weighted average of these other firms' association membership counts, where these other firms also belong to different industries from and similar in size to the focal firm. The weights are inversely proportional to size differences between the other firms and the focal firm. In Panel B, the instrument *Connections membership spillover* is constructed analogously, but instead of memberships of closely located firms, it uses memberships of other firms connected to the focal firm via overlapping boards, current and past employment, education, and social clubs. In both panels, column (1) presents the first-stage results, where the dependent variable (*# memberships*) is the number of distinct associations in which a firm is a member in a given year. Columns (2)-(6) display the second-stage regression results. The dependent variables are: *COGS/Total sales* computed as cost of goods sold scaled by sales; *Asset turnover* computed as sales scaled by average of contemporaneous and lagged total assets; and *TFP* borrowed from İmrohoroğlu and Tüzel (2014) up to the last well-populated year of 2019. All the regressions include the natural logarithms of firm total assets and age as control variables, and firm and year fixed effects. The instruments and the control variables are lagged, and all the variables are winsorized at 1/99$^{\text{th}}$ percentiles within a year. Standard errors are clustered by firm. F-statistic corresponds to Kleibergen and Paap (2006) Wald test for weak instruments. The symbols ***,**,* denote statistical significance at 1%, 5%, and 10% levels.

Panel A: Instrument is Geographic membership spillover	2^{nd} *stage estimates*		
	COGS/Total sales	Asset turnover	Total factor productivity
	(1)	(2)	(3)
# memberships predicted	-0.0405***	0.0292***	0.0968***
	(-4.28)	(3.78)	(4.32)
ln(Total assets)	0.0155*	-0.1785***	0.0270
	(1.70)	(-24.05)	(1.61)
ln(Age)	0.0238*	0.0634***	-0.1118***
	(1.95)	(8.28)	(-5.43)
Year F.E.	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes
Observations	68,083	68,083	30,921
F-statistic	35.82	35.82	25.84
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$	-0.2251	0.1620	0.5378
SD_Y	1.0426	0.7533	0.5271
Mean_Y	0.7116	0.8097	-0.3232
Panel B: Instrument is Connections membership spillover	2^{nd} *stage estimates*		
	COGS/Total sales	Asset turnover	Total factor productivity
	(1)	(2)	(3)
# memberships predicted	-0.0244***	0.0258***	0.0549***
	(-5.01)	(5.84)	(6.01)
ln(Total assets)	0.0115	-0.1915***	0.0666***
	(1.45)	(-28.51)	(5.91)
ln(Age)	0.0159	0.0586***	-0.1045***
	(1.49)	(8.47)	(-7.36)
Year F.E.	Yes	Yes	Yes
Firm F.E.	Yes	Yes	Yes
Observations	80,287	80,287	38,165
F-statistic	87.90	87.90	65.10
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$	-0.1475	0.1560	0.3322
SD_Y	1.0426	0.7533	0.5271
Mean_Y	0.7116	0.8097	-0.3232

Table 7: Placebo test: Geographic or network effects

The table repeats regressions from Tables 3-6 using placebos for the instruments. The table uses a modified version of the instrument *Geographic membership spillover* with membership spillovers from other firms with $> 10X$ size difference and $[0; 100]$ miles distance from the focal firm. All the specifications include the same set of control variables and fixed effects as in the baselines.

Instrument is Geographic membership spillover, placebo with $SizeX, > 10X$ and $[0; 100]$ miles radius

1[st] stage estimates	$\beta_{\text{Geo memb spill, placebo}}$ (1)	t-stat (2)	Observations (3)	
# memberships	-0.0508***	(-2.79)	66,210	
2[nd] stage estimates	$\beta_{\text{\# memberships predicted}}$ (1)	t-stat (2)	Observations (3)	F-stat (4)
Profitability, sales growth, and markups				
ROA	-0.0423**	(-2.24)	63,390	6.87
Profit margin	0.0229	(0.67)	66,210	7.81
Sales growth	-0.0879*	(-1.73)	52,690	6.49
ln(DLEU Markup)	-0.0024	(-0.26)	51,114	5.98
ln(GHL Markup)	-0.0295	(-0.97)	34,832	3.28
Risk management				
Earnings volatility	-0.0081	(-0.63)	56,791	7.01
Stock returns volatility	0.3368**	(2.44)	65,610	7.51
# Risk mentions/10K size	0.0006	(0.55)	60,126	7.38
Investments				
Capex/Total assets$_{t-1}$	-0.0093*	(-1.94)	64,729	7.49
Acquisition {0/1}	-0.0423	(-1.42)	66,210	7.81
R&D/Total assets$_{t-1}$	0.0007	(0.21)	66,210	7.81
# Patents/Total assets$_{t-1}$	-0.0032*	(-1.67)	60,059	7.06
Tobin's Q	-0.1770	(-1.58)	65,812	8.10
Efficiency				
COGS/Sales	-0.0229	(-0.67)	66,210	7.81
Asset turnover	-0.0004	(-0.01)	66,210	7.81
Total factor productivity	-0.1486	(-1.24)	30,005	1.80

Table 8: Reflection: Learning from peers of peers

The table repeats regressions from Tables 3-6 using instruments constructed based on the peers of peers of the focal firms. To ensure a clean test of the Manski (1993) reflection problem, the peers of peers of each focal firm exclude any firms that are direct peers of the focal firm itself. In Panel A, *Geographic membership spillover, PoP* is the modified version of the geography-based instrument, and in Panel B *Connections membership spillover, PoP* is the modified version of the connection-based instrument. All the specifications include the same set of control variables and fixed effects as in the baselines.

Panel A: Instrument is Geographic membership spillover, PoP, based on peers of peers

1^st^ stage estimates	$\beta_{\text{Geo memb spill, PoP}}$ (1)	*t*-stat (2)	Observations (3)
# memberships	0.2858***	(5.06)	35,968

2^nd^ stage estimates	$\beta_{\text{\# memberships predicted}}$ (1)	*t*-stat (2)	Observations (3)	*F*-stat (4)
Profitability, sales growth, and markups				
ROA	0.0078***	(2.68)	34,212	24.29
Profit margin	0.0374***	(3.58)	35,968	25.59
Sales growth	0.0094	(1.00)	28,293	28.35
ln(DLEU Markup)	0.0040	(1.32)	27,143	24.08
ln(GHL Markup)	0.0107	(1.07)	18,123	12.20
Risk management				
Earnings volatility	-0.0028	(-1.04)	30,867	28.75
Stock returns volatility	0.0213	(1.38)	35,728	25.59
# Risk mentions/10K size	0.0001	(0.30)	33,262	27.53
Investments				
Capex/Total assets$_{t-1}$	0.0027***	(3.25)	35,096	25.97
Acquisition {0/1}	0.0385***	(3.82)	35,968	25.59
R&D/Total assets$_{t-1}$	0.0036***	(3.64)	35,968	25.59
# Patents/Total assets$_{t-1}$	0.0016***	(4.00)	32,780	28.90
Tobin's Q	0.1279***	(3.08)	35,728	25.97
Efficiency				
COGS/Sales	-0.0374***	(-3.58)	35,968	25.59
Asset turnover	0.0143**	(2.27)	35,968	25.59
Total factor productivity	0.0342**	(2.28)	15,223	19.06

Panel B: Instrument is Connections membership spillover, PoP, based on peers of peers

1^st^ stage estimates	$\beta_{\text{Connect memb spill, PoP}}$ (1)	*t*-stat (2)	Observations (3)
# memberships	0.2350***	(8.10)	77,425

2^nd^ stage estimates	$\beta_{\text{\# memberships predicted}}$ (1)	*t*-stat (2)	Observations (3)	*F*-stat (4)
Profitability, sales growth, and markups				
ROA	0.0223***	(6.47)	74,162	62.45
Profit margin	0.0335***	(4.93)	77,425	65.57
Sales growth	0.0520***	(5.59)	63,690	62.83
ln(DLEU Markup)	0.0133***	(4.67)	60,904	52.51
ln(GHL Markup)	0.0382***	(3.24)	40,947	20.05
Risk management				
Earnings volatility	-0.0112***	(-4.78)	67,970	65.16
Stock returns volatility	-0.0942***	(-5.41)	77,151	65.48
# Risk mentions/10K size	-0.0004	(-1.94)	71,704	69.38
Investments				
Capex/Total assets$_{t-1}$	0.0098***	(6.80)	76,045	65.00
Acquisition {0/1}	0.0573***	(6.89)	77,425	65.57
R&D/Total assets$_{t-1}$	0.0038***	(5.37)	77,425	65.57
# Patents/Total assets$_{t-1}$	0.0009***	(3.38)	70,967	65.61
Tobin's Q	0.2708***	(6.81)	77,036	65.85
Efficiency				
COGS/Sales	-0.0335***	(-4.93)	77,425	65.57
Asset turnover	0.0336***	(5.49)	77,425	65.57
Total factor productivity	0.0713***	(4.54)	36,977	33.90

Table 9: Firm coordination on offshore expansion activities and association membership

The table presents the instrumental variables estimation results using the firm pair-country-year panel data. In Panel A, the instrument *Geographic membership spillover*$_{ij}$ is the product of the corresponding instruments for firms i and j. For each firm, the instrument measures association membership spillovers from other geographically closely located firms. It is a weighted average of these other firms' association membership counts, where these other firms also belong to different industries from and similar in size to the focal firm. The weights are inversely proportional to size differences between the other firms and the focal firm. In Panel B, the instrument *Connections membership spillover*$_{ij}$ is constructed analogously, but instead of memberships of closely located firms, it uses memberships of other firms connected to the focal firm via overlapping boards, current and past employment, education, and social clubs. Column (1) presents the first-stage results, where the dependent variable (*# membership overlaps*$_{ij}$) is the number of overlapping association memberships for firms i and j. Columns (2) and (3)-(6) display the second-stage results. The outcomes are the "abnormal exclusive entry" variables computed following equation (4), where $Q_{i,j,m,t}$ is defined as *Same country {0/1}*$_{ij}$, an indicator for firms i and j jointly mentioning a country in their annual reports net of the expected joint country mention, multiplied by -1 (as explained in our methods, this -1 factor ensures a higher value indicates exclusivity). Standard errors are clustered by firm-pair. F-statistic corresponds to Kleibergen and Paap (2006) Wald test for weak instruments. The symbols ***,**,* denote statistical significance at 1%, 5%, and 10% levels.

Panel A: Instrument is Geographic membership spillover	1^{st} *stage*	2^{nd} *stage*	1^{st} *stage*	2^{nd} *stage*
	# membership overlaps$_{ij}$	Same country $\{0/1\}_{ij}$	# membership overlaps$_{ij}$	Same country $\{0/1\}_{ij}$
	(1)	(2)	(3)	(4)
Geographic membership spillover$_{ij}$	0.0009***		0.0008***	
	(4.89)		(4.41)	
# membership overlaps$_{ij}$ inst		0.1491***		0.1084**
		(3.56)		(2.32)
ln(Total assets)$_{ij}$	0.0018***	0.0002	0.0016***	0.0003*
	(4.79)	(1.24)	(4.04)	(1.68)
ln(Age)$_{ij}$	0.0216***	-0.0002	0.0217***	0.0004
	(8.66)	(-0.14)	(8.47)	(0.30)
Same SIC code $\{0/1\}_{ij}$	0.0008	0.0064	-0.0005	-0.0008
	(0.07)	(1.53)	(-0.04)	(-0.16)
Product similarity$_{ij}$	0.2341***	0.0209	0.1962***	0.0956***
	(3.29)	(0.90)	(2.72)	(4.08)
Year × Country F.E.	Yes	Yes	Yes	Yes
Firm pair$_{ij}$ F.E.	Yes	Yes	No	No
Firm pair$_{ij}$ × Country F.E.	No	No	Yes	Yes
Observations	2,895,509	2,895,509	2,223,035	2,223,035
F-statistic		23.91		19.47
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$		0.0762		0.0584
SD$_Y$		0.4863		0.4863
Mean$_Y$		0.1599		0.1599

Panel B: Instrument is Connections membership spillover	1^{st} *stage*	2^{nd} *stage*	1^{st} *stage*	2^{nd} *stage*
	# membership overlaps$_{ij}$	Same country $\{0/1\}_{ij}$	# membership overlaps$_{ij}$	Same country $\{0/1\}_{ij}$
	(1)	(2)	(3)	(4)
Connections membership spillover$_{ij}$	0.0007***		0.0006***	
	(7.44)		(6.86)	
# membership overlaps$_{ij}$ inst		0.1444***		0.1062***
		(5.65)		(3.61)
ln(Total assets)$_{ij}$	0.0029***	0.0000	0.0026***	0.0000
	(8.26)	(0.02)	(7.18)	(0.25)
ln(Age)$_{ij}$	0.0161***	0.0001	0.0171***	0.0013
	(6.95)	(0.12)	(7.12)	(1.56)
Same SIC code $\{0/1\}_{ij}$	-0.0019	0.0044	-0.0034	-0.0066*
	(-0.17)	(1.36)	(-0.31)	(-1.87)
Product similarity$_{ij}$	0.1828***	0.0309	0.1561**	0.1065***
	(2.73)	(1.60)	(2.31)	(5.43)
Year × Country F.E.	Yes	Yes	Yes	Yes
Firm pair$_{ij}$ F.E.	Yes	Yes	No	No
Firm pair$_{ij}$ × Country F.E.	No	No	Yes	Yes
Observations	3,415,207	3,415,207	2,761,915	2,761,915
F-statistic		55.28		47.01
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$		0.0805		0.0617
SD$_Y$		0.4863		0.4863
Mean$_Y$		0.1599		0.1599

Table 10: Firm coordination on technology expansion and association membership

The table presents the instrumental variables estimation results using the firm pair-technology-year panel data. In Panel A, the instrument *Geographic membership spillover*$_{ij}$ is the product of the corresponding instruments for firms i and j. For each firm, the instrument measures association membership spillovers from other geographically closely located firms. It is a weighted average of these other firms' association membership counts, where these other firms also belong to different industries from and similar in size to the focal firm. The weights are inversely proportional to size differences between the other firms and the focal firm. In Panel B, the instrument *Connections membership spillover*$_{ij}$ is constructed analogously, but instead of memberships of closely located firms, it uses memberships of other firms connected to the focal firm via overlapping boards, current and past employment, education, and social clubs. Column (1) presents the first-stage results, where the dependent variable (*# membership overlaps*$_{ij}$) is the number of overlapping association memberships for firms i and j. Columns (2)-(3) and (5)-(6) display the second-stage results. The outcomes are the "abnormal exclusive entry" variables computed following equation (4), where $Q_{i,j,m,t}$ is defined as *Same technology {0/1}*$_{ij}$, an indicator for firms i and j jointly mentioning a technology in their annual reports net of the expected joint technology mention, multiplied by -1 (as explained in our methods, this -1 factor ensures a higher value indicates exclusivity). Standard errors are clustered by firm-pair. F-statistic corresponds to Kleibergen and Paap (2006) Wald test for weak instruments. The symbols ***,**,* denote statistical significance at 1%, 5%, and 10% levels.

Panel A: Instrument is Geographic membership spillover	1^{st} *stage*	2^{nd} *stage*	1^{st} *stage*	2^{nd} *stage*
	# membership overlaps$_{ij}$	Same technology $\{0/1\}_{ij}$	# membership overlaps$_{ij}$	Same technology $\{0/1\}_{ij}$
	(1)	(2)	(3)	(4)
Geographic membership spillover$_{ij}$	0.0017***		0.0017***	
	(3.50)		(3.61)	
# membership overlaps$_{ij}$ inst		-0.5084***		-0.1187**
		(-3.37)		(-2.42)
ln(Total assets)$_{ij}$	-0.0018**	-0.0023***	-0.0019**	-0.0002
	(-2.29)	(-4.24)	(-2.34)	(-0.88)
ln(Age)$_{ij}$	0.0265***	0.0077	0.0269***	-0.0006
	(4.69)	(1.43)	(4.89)	(-0.35)
Same SIC code $\{0/1\}_{ij}$	-0.0204	-0.1225***	-0.0202	-0.0536***
	(-0.95)	(-7.21)	(-0.95)	(-6.78)
Product similarity$_{ij}$	0.2629	0.0877	0.1878	0.0452
	(1.58)	(0.81)	(1.18)	(1.26)
Year × Technology F.E.	Yes	Yes	Yes	Yes
Firm pair$_{ij}$ F.E.	Yes	Yes	No	No
Firm pair$_{ij}$ × Technology F.E.	No	No	Yes	Yes
Observations	3,962,342	3,962,342	3,113,849	3,113,849
F-statistic		12.26		13.01
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$		-0.3476		-0.0853
SD_Y		1.0710		1.0710
Mean_Y		0.3970		0.3970

Panel B: Instrument is Connections membership spillover	1^{st} *stage*	2^{nd} *stage*	1^{st} *stage*	2^{nd} *stage*
	# membership overlaps$_{ij}$	Same technology $\{0/1\}_{ij}$	# membership overlaps$_{ij}$	Same technology $\{0/1\}_{ij}$
	(1)	(2)	(3)	(4)
Connections membership spillover$_{ij}$	0.0007***		0.0007***	
	(3.37)		(3.14)	
# membership overlaps$_{ij}$ inst		-0.5211***		-0.1025**
		(-3.19)		(-2.09)
ln(Total assets)$_{ij}$	0.0003	-0.0023***	0.0002	-0.0002
	(0.47)	(-4.70)	(0.22)	(-1.20)
ln(Age)$_{ij}$	0.0246***	0.0051	0.0254***	-0.0021
	(4.45)	(1.03)	(4.74)	(-1.24)
Same SIC code $\{0/1\}_{ij}$	0.0233	-0.0752***	0.0178	-0.0392***
	(1.20)	(-4.43)	(0.94)	(-6.09)
Product similarity$_{ij}$	0.2548	0.1066	0.1886	0.0567*
	(1.56)	(1.02)	(1.20)	(1.71)
Year × Technology F.E.	Yes	Yes	Yes	Yes
Firm pair$_{ij}$ F.E.	Yes	Yes	No	No
Firm pair$_{ij}$ × Technology F.E.	No	No	Yes	Yes
Observations	4,460,460	4,460,460	3,609,534	3,609,534
F-statistic		11.37		9.88
$\beta_{\#\text{memb pred}} \times \sigma_{\#\text{memb pred}}$		-0.3770		-0.0775
SD_Y		1.0710		1.0710
Mean_Y		0.3970		0.3970

A Appendices

A.1 Technology Noun Phrases

We now list the noun phrases used in our technological diffusion tests in Section 5 of the paper. We note that this list is identical to the one presented in Cabezon and Hoberg (2023) and we include it here for convenience.

List of Technology Noun Phrases: 1xrtt, 3d printing, 3g networks, 3g tech, 3g technology, 3g wireless, 4g lte, 4g wireless, 5g mobile, 5g technologies, 5g technology, 5g wireless, a-chip, acid batteries, adas, adc, adc technology, adsl2, advanced metering infrastructure, analog cellular, android, angioplasty, antisense drugs, antisense technology, apis, artificial intelligence, ash removal system, asic, asics, autonomous driving, autonomous vehicles, biomarkers, biosimilars, blockchain, blockchain technology, bmc, broadband access, bvs2, c1 expression system, c1 host technology, c1 technology, carbon capture, carbon nanotubes, cas9, cas9 technology, cdma, cdma technology, cdma2000, cell phone, cell phones, cellular mobile telephones, cellular networks, cellular telephones, checkpoint inhibitors, chip sets, circuit board, circuit boards, clean coal technologies, clean energy technologies, cloning, closed cycle cooling, cloud, cloud applications, cloud computing, cloud environments, cloud infrastructure, cloud offerings, cloud platform, cloud services, cloud solutions, cloud technologies, cloud technology, cmos, computer vision, connected home, core dna delivery technology, corn oil extraction technologies, cpe, cpu, crispr, dark fiber, data warehousing, dense wavelength division multiplexing, desalination, digital cameras, digital compression technology, digital signal processors, digital subscriber line, direct broadcast satellite, dna delivery technology, dna microarrays, dna screening, drones, drug discovery technologies, dsl, dsl services, dsl technology, duplex technology, e-mail, electric vehicle, electrodes, electronic warfare, electroporation, embryonic stem cells, encapsulation technology, ethernet, evlt, excimer laser technology, excimer lasers, fiber lasers, fiber network, fiber optic, fiber optic cable, fiber optics, fiberglass, flash memory, flat panel, flat panel display, flat panel display technology, flat panel displays, flue gas desulfurization, flue gas desulfurization equipment, fpgas, fuel cell technologies, fuel cell technology, fuel cell vehicles, fuel switching, gas turbines, gbps, gene delivery technology, gene editing, gene editing technologies, gene therapies, genetic engineering, genome editing, genome editing technologies, genome editing technology, genotyping, global positioning system, gprs, gprs technology, gps, gps technology, gpus, gsm technology, gtc, gtl technology, handheld computers, haptics, hard disk drives, hdtv, hes cells, home automation, hspa, hybrid mrna technology, hydraulic fracturing operations, iaas, igcc, image capture, immtor technology, instant messaging, interactive television, ion batteries, iq technology, knockout mice, lan, lans, laser, laser beam, laser printers, laser technology, laser vision correction, lcd, led, led lighting, leds, liquid crystal display, liquid crystal displays, lnp technology, local area network, local area networks, local loop, lte, m2m, machine learning, machine vision, machine vision systems, magnetic resonance imaging, mammography, mammography systems, mass spectrometry, membrane technology, memory chips, microarrays, microcomputers, microdisplays, micron process technology, microphones, microspheres, microturbines, mm wafers, mobile app, mobile phone, mobile phones, mobile technologies, mobile telephone control units, mobile tv, monoclonal antibody, motherboards, mouse technology, mp3, mr3 technology, mri, mri systems, mri technology, mrna technology, nanometer process technology, natural gas processing, netbooks, ngs, notebook pcs, nuclear transfer technology, ofdma, oled displays, oled technologies, oled technology, oleds, operating system, optical fiber, optical signals, optical technology, pacs, papnet, pcb, pcr, pda, pdas, pegylation technology, personal digital assistant, personal digital assistants, pet technology, phage display technology, photomasks, photovoltaic solar cells, positron emission tomography, post-combustion control technologies, power grid, power inlay technology, private cloud, prk, protein engineering technology platform, psd, public cloud, pulse combustion technology, pv modules, pv solar, qds, quantum dots, radio frequency identification, rechargeable batteries, recombinant dna technology, recombinant proteins, rf filters, rf products, rfics, rfid, rfid technology, rnai, rnai technology, rnai therapeutic, rnai therapeutics, robots, rom drives, sales force automation, satellite, satellite radio, satellite systems, satellites, scanner, scr, scs, search engine optimization, search engines, selective catalytic reduction, selective catalytic reduction technology, semiconductor wafers, sensor, sensor technology, sfd technology, sige, silicon wafers, sips, sirna, small molecule drugs, smart card, smart card technology, smart cards, smart grid, smart grid technology, smart home, smart meters, smart phone, smart phones, smartphone, smartphones, sms, solar modules, solar panels, specific emission control technologies, sram, ssds, stem cell, stem cell research, stem cell technologies, stem cell technology, stem cells, sulfate concentrations, svp technology, t therapies, taeus technology, tap technology, tdma, tdma technology, text imaging solutions, tft, therapeutic vaccines, thin film solar, tma, tmr, tomography, transdermal patch, ultrasound technology, usb, video compression technology, virtual private networks, vocalid, voip, wan, water purification, wide area networks, wifi, wind turbines, wireless broadband, wireless internet, wireless local loop, wireless phones, wireless telephones, x-ray, x-rays, xmap technology, zfns, zfp technology.