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Resource accumulation through economic ties: Evidence from venture capital ☆

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Ties between similar partners in economic and financial networks are often attributed to concerns about agency costs. In this paper, we distinguish the underlying motives for tie formation between sets of potential partners in the network, thus informing the relative importance of agency cost and resource accumulation in tie formation across firms. We develop a robust and generalizable methodology that allows for the inference of similarity and/or cumulative advantage motives in the potential presence of resource trading. We estimate the model using venture capital (VC) co-investment networks, employing factor analysis to characterize orthogonal, interpretable resources for VC firms. In the VC setting, value-added resources other than capital appear to be exchanged for capital, but not for one another. We find little evidence for similarity motives as the primary driver of matching, suggesting that concerns over agency conflicts in partnering are dominated by the desire to accumulate higher levels of certain resources.

1. Introduction

Economic and financial networks frequently exhibit ties (e.g., syndication activity, strategic alliances, joint ventures, or contracting) between similar partners. Observers often infer that a preference for similarity drives the pairing, particularly as a means to avoid agency costs. However, similarity along a particular dimension can also result from a desire for resource accumulation with highly endowed partners or resource exchange across dimensions with differently endowed partners. In this paper, we propose a rigorous methodology to infer the motives underlying the choice of partner in the formation of such economic ties, and thus inform the relative

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importance of agency costs and resource accumulation in the formation of economic ties.

We develop a robust and generalizable methodology that allows for the identification of seeking a similar versus highly or differently endowed partner, and estimate our model in a setting in which organizational networks are of primary importance: the VC industry. Our findings suggest that concerns over agency conflicts are not a primary concern in our setting, but instead are dominated by the desire to accumulate distinct resources for the production function. Furthermore, in the VC setting, value-added resources other than capital appear to be able to exist separately from capital and still be exploited effectively.

Organizations form economic ties through shared activity in many financial and product markets. For example, lenders often prefer to syndicate corporate loans over being the sole source of capital; financial institutions tend to co-underwrite securities offerings; biotechnology and pharmaceutical companies regularly engage in strategic alliances and joint ventures for the development of new drugs; and venture capital and private equity firms often syndicate their investments in private companies. These ties form networks that have been shown to influence governance, investment performance, and competition (Robinson and Stuart, 2007; Hochberg, Ljungqvist, and Lu, 2007, 2010; Lindsey, 2008).

Importantly, while there has been a great deal of empirical work on the *effects* of tie formation, there is little empirical work characterizing *how* and *why* organizations choose the partners with whom they engage in economic activity. In contrast to the literature on social networks among individuals, it is unclear in an organizational setting that explicit preferences for similarity would underlie the motive to tie. Similarity-based motives for organizational network ties are generally attributed to the avoidance of agency conflicts, as disparate levels of a given resource may lead to expropriation, to hold-up due to informational advantages, or to extraction of rents from different outside options (e.g., Casamatta and Haritchabalet, 2007; Cestone, Lerner, and White, 2007).

Alternatively, firms may choose partners in an effort to aggregate particular resource endowments. They may therefore seek the highest-endowed partner, with the desirability ranking of a prospective partner independent of an organization's own resource levels. We refer to this driver as *cumulative advantage*. Cumulative advantage suggests that output of the production function underlying the shared economic activity is increasing over the observed levels of input, and thus that the input is important to the organization.

Furthermore, organizations may be endowed with multiple resources and, thus, examining similarity versus cumulative advantage alone may not give a complete picture of underlying motives for ties. Given the existence of multiple resources, it is possible that firms also distribute resources, i.e., trade, in addition to aggregating them. If organizations lack the full set of resources required to fulfill their objectives, they may form economic ties to trade distinct resources (e.g., Eisenhardt and Schoonhoven, 1996). Critically, for resource trading to be possible, it must be the case that agency concerns are either sufficiently small or resolvable through other means such that firms with differing endowments can engage in joint activity (e.g., one firm has more expertise and less available capital for investment, while the other firm has more available capital and less expertise). Both cumulative advantage and resource trading reflect a desire to accumulate particular resources for production, and we regard both as different forms of resource accumulation.

To distinguish the underlying motives for network ties, we develop a methodology that allows us to test for the presence of similarity-based matching, cumulative advantage, and resource sharing in the formation of network ties. Existing work in the area tends to examine a single firm attribute (such as experience or location) in isolation, and typically focuses on the question of whether potential partners are similar in that particular attribute, often making inferences from coefficient loadings on differences in the observed level of the attribute for each partner. However, because multiple theoretical motivations for the formation of a partnership may lead to the observation of ties amongst partners that are similar in an attribute, previously employed approaches are insufficient to capture questions relating to the economics underlying organizational ties.

Contrary to what one might expect, we show that it is insufficient to simply interpret negative coefficients on measures of absolute differences in resource levels between partners alone as evidence for similarity-based motives. Similarly, it is insufficient to interpret positive coefficients on sums of resource levels alone as evidence for cumulative advantage motives. Instead, our methodology explicitly separates the effects of variation in the endowments of the more-highly endowed and the less-endowed partners, allowing us to analyze the two variations separately. We can thus distinguish between gains from partnership that increase when the more-highly endowed partner in a pair becomes weaker or the less-endowed partner becomes stronger (consistent with a desire for similarity) versus gains that accrue when either of the partners in the pair is more-highly endowed (consistent with a desire for cumulative advantage).[1]

Our methodology models the gains from tie formation between a pair of firms or organizations as a function of the resources of the pair, as well as interactions among resources, which allows us to capture patterns related to the above motives of tie formation. Under the identifying

[1] Importantly, our empirical examination of cumulative advantage and similarity in matching differs from standard assortative matching with the equilibrium constraint of a single tie (e.g., Becker, 1973; Shimer and Smith, 2000), in which the equilibrium outcome is observed similarity, i.e., high types pair with high types and low with low. Both anecdotal evidence and our examination of the data suggest that VCs do not face a similar constraint; rather, they can have multiple simultaneous co-investment partners in multiple portfolio companies and, thus, we are able to observe many more ties between high-type and low-type firms than assortative matching under a single-tie capacity constraint would predict. Importantly, if capacity for tying were sufficiently constrained, cumulative advantage motives would be indistinguishable empirically from similarity-based motives, creating a bias toward finding evidence in support of the search for similar types, which we do not find.