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Organizational status growth and structure: An alliance network analysis

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ABSTRACT

Considering the status system emerging from a structure of corporate affiliations, we examine how alliance patterns among firms affect their changing organizational statuses and the structural development of the status system itself. Firm status is conceptually grounded in sociological theories of status and network analysis. The empirical setting we investigate is the network of alliances among firms in the Global Information Sector. The results indicate a negative effect of initial firm status on the growth rate of individual status, which is associated with the different patterns of alliance affiliations among firms with different status levels. Affiliation patterns also affect the extent of variation in the gap between status strata and firm mobility along the status hierarchy. The results highlight the importance of understanding the structural aspects underlying firm status attainment.

The social status of an actor is commonly considered to be a relational phenomenon that may inform about the actor's individual attributes (Merton, 1968). Status research within the context of industries and markets derives the status of firms from their affiliation record with other firms (Podolny, 1993, 2005). Alliances established for purposes of obtaining access to resources relevant to attaining various competitive advantages in the marketplace may have the side-effect of informing other industry members about: (1) extant intangible and otherwise difficult-to-assess corporate attributes and capabilities that make the affiliated firms appealing as alliance partners (e.g., trustworthiness, compromise and cooperative culture, ability in joint ventures management, R&D assets, innovation know-how, forthcoming products, market information, power to control competition, lobbying capability), and (2) their embeddedness within the industry to further those corporate assets (Podolny, 1993, 2005; Stuart, 2000). Therefore, a firm's extant alliance record—from which its status derives—constitutes an important piece of information that members of an industry may use when assessing the potential competitive advantage they might obtain by affiliating with that firm.

Despite its fundamental conceptual relevance, almost no empirical or theoretical studies consider the relationship between the structural-relational and the individual dimensions of status (for exceptions, see Podolny and Phillips, 1996 and Bothner et al., 2010a). The primary aim of this article is to investigate how the affiliation patterns that prevail in a status system may either enhance or diminish the chances for status attainment of the actors belonging to that system. This analytical issue may have important qualifying implications for general status research programs on actors' status attainment and for research considering the effects of status on actor behaviors or outcomes. Our investigation focuses on the status of firms: we examine firm status attainment and the structural features of the status system that emerges from, and that varies according to, the changing corporate alliances among firms in the Global Information Sector (GIS) between 1991 and 2000.

We investigate three interrelated questions about the relational structure of the GIS status system and the statuses of firms in that system: (1) whether firms' affiliation patterns vary according to their extant status levels and affect their status attainment, (2) whether the level of status of a firm has a positive, negative, or null effect on its subsequent status growth, and (3) whether these dynamic and structural processes affect two structural aspects of the status system (i.e., variation in the status gap between firms at the top and the bottom of the status hierarchy, and firm mobility along the status hierarchy).

The following section reviews relevant literature on social status—with emphasis on organizational research—and explains aspects of the conceptual relationship between firm status and firm alliances in innovation-driven industries. Next, we present the theoretic propositions to be investigated. Then follows a description of the dataset, the status measure, and the methods of data analysis. The final two sections present the results and draw conclusions about the relationship between the structure of a status system and the status of its participants.

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1. Conceptualization of firm status derived from alliances networks

Our investigation presumes the conceptualization of status as a *relational-based asset* that an actor possesses as a consequence of its *acceptance* by others (Merton, 1968; Podolny, 1993). The asset consists of positive *expectations* about the actor's attributes and capabilities—whose appeal fostered its past acceptance and will support its future acceptance by others. As we discuss below, the more highly-regarded the accepting actors are in terms of their own attributes and capabilities the more status (and, hence, positive expectation) they confer to the accepted focal actor.

The form of acceptance we analyze is as an affiliate member in corporate alliances. Besides allowing access to resources relevant for attaining competitive advantages in the marketplace, strategic alliances indicate that firms accepted as alliance partners possess intangible and otherwise difficult-to-assess appealing attributes and capabilities. Firms' consideration of the affiliation records of potential alliance partners is an important factor in the alliance formation process that occurs at an economic sector. The level of attractiveness as a potential alliance partner that derives from a firm's affiliation record identifies the position it occupies in the hierarchy of the sector's status system. The status strata of that hierarchy are characterized by distinct levels of expectation about the attributes and capabilities of those belonging to them (Weber, 1947; Merton, 1968).[2]

Social network researchers use *prominence* concepts and measures—such as Bonacich's centrality measure, described in Section 3—to define status hierarchies of actors in a system of relationships (Knoke and Burt, 1983).[3] Actors are prominent to the extent that their involvement in many relationships makes them more relevant to other actors in the system; and, the higher the prominence of the actors affiliated with the focal actor, the higher its own prominence. Social status is closely associated not only with others' recognition of attributes and capabilities but also with the concepts of deference, esteem, and honor. High-status actors are those outstanding in receiving recognition or deference from, or being esteemed or honored by, other actors (Weber, 1947; Whyte, 1943; Blau, 1995, 1964; Goode, 1978). These relational behaviors can be understood as "status flows" from actor to actor, whereas a position in the status hierarchy refers to the actual stock of recognition, deference, esteem, or honor, that an actor accumulates. Recognition and deference may be reflected in many specific types of social actions, such as advice requests, imitative behaviors, positive citations, use of products, or solicitations to become an alliance partner (Podolny and Stuart, 1995).

In an industrial context, firms strive for competitive advantage by partnering with other firms that can contribute positively to their performance (Gulati, 1998; Ahuja, 2000; Baum et al., 2000; Rowley et al., 2000; Jensen, 2003; Shipilov et al., 2006).[4] The most appropriate partners tend to be firms whose corporate attributes and capabilities have made them attractive partners in the past (Podolny, 1994, 2005). The extensive affiliation records of these appealing firms—besides placing them in top strata of the status hierarchy—enhance their chances to advance via collaborative synergies and endorsement not only their own corporate capabilities but also those of the firms affiliating with them, thereby, providing competitive advantage to their allies. Thus, firms in an industry may consider the competitive advantages from partnering with other firms by taking into consideration the affiliation records—i.e., the statuses—of the set of potential partners. A firm's affiliation record provides information which others may use to make inferences about the extent to which the organization possesses appealing attributes and capabilities. It also enables them to assess the potential of that firm's affiliation network to further its own attributes and capabilities as well as those of its alliance partners.

Firms entering an alliance to attain some type of competitive advantage typically gain status as a result of their acceptance in the alliance (Podolny, 1993, 1994, 2005; Podolny and Stuart, 1995; Stuart, 2000). In contrast to forms of relationships not entailing a reciprocal acceptance, the agreement to form an interorganizational alliance implies that both partners have positively assessed each other. Being solicited as a potential partner signifies that the soliciting firm positively assesses the corporate attributes and capabilities of the solicited firm (e.g., its trustworthiness, compromise and cooperative culture, ability in joint ventures management, R&D assets, innovation know-how, forthcoming products, market information, power to control competition, lobbying capability). In this regard, Stuart (2000) indicates that semiconductor firms invited to join alliances are stringently evaluated beforehand by the soliciting firm. Similarly, the solicited firm also assesses the soliciting firm before accepting the invitation to ally. Other industry members interpret the mutual selection of the soliciting and solicited firms as a consequence of both firms possessing valuable corporate attributes and capabilities. Stuart argues that an unintended outcome of the alliance formation process is that the chosen partners gains status within the industry; and, the higher the status of the choosing partner, the more status the chosen one gains. The network of alliances in an industry can be, thus, understood as constituting a status system that provides information about the statuses of all firms. And the extant alliances of a firm may have implications—beyond those directly associated with the resource exchanges that justified the alliance—for its corporate performance because those alliances may affect the firm's capability both to improve its corporate attributes and competitive advantages through those partnering relationships, and to be perceived by industry members as an attractive partner for future alliances (Podolny, 1993, 1994, 2005; Stuart, 2000).

Importantly, the status transference process in innovation-driven industries (where capability for technological innovation is a key element for competitiveness and alliance formation) differs crucially from the process taking place in the types of industries

[2] The hierarchical dimension of status underlies extensive research programs on social mobility (Sorensen, 1994), occupational status attainment (Blau and Duncan, 1967; Goldthorpe and Hope, 1974) and firm reputations (Shrum and Wuthnow, 1988; Fombrun and Shanley, 1990; Fombrun, 1996). Nevertheless, firm reputation has more commonly been investigated outside the relational approach that sociologists typically use to investigate status (Washington and Zajac, 2005; Jensen and Roy, 2008). Firm reputation studies typically involve hierarchical evaluations of corporations according to their credibility, reliability, responsibility, and trustworthiness by peer informants or knowledgeable experts. Reputations are also measured by specific data on corporate quality and past performance. For example, economists usually equate firm reputation to the actual or perceived quality of its products (Shapiro, 1983; Allen, 1984). Sociologists have also studied actor reputations as a social construction resulting from narratives about their identities (Ducharme and Fine, 1995; Fine, 1996; Bromberg and Fine, 2002).

[3] Our focus is on the hierarchical dimension of status. Role analysts (Linton, 1936; Merton, 1957; Nadel, 1957; Blau, 1977) and social network analysts (Lorrain and White, 1971; Wasserman and Faust, 1994: 348–356, 462–465) also suggest a nonhierarchical dimension to differentiate statuses. Role scholars define nonhierarchical social statuses as positions in a social structure, occupied by a set of actors, whose social roles are identified by their distinctive pattern of interactions with the occupants of all other status positions in the social system. In network terms, a nonhierarchical status position is identified by the similarities in relational ties among subsets of actors in a network. Actors that jointly occupy a status position may lack direct ties to one another, but they are structurally equivalent by having identical, or very similar, patterns of present and absent ties to the actors occupying other status positions.

[4] Other empirical studies of the corporate performance benefits from alliance participation are McConnell and Nantell (1985), Baum and Oliver (1991), Hagedoorn and Schakenraad (1994), Chung (1996), Mitchell and Singh (1992), Powell et al. (1996), Singh and Mitchell (1996), and Uzzi (1996).

examined in Podolny's research program (Podolny, 2005). In industries such as banking and wine making (Podolny, 1994; Podolny and Phillips, 1996; Benjamin and Podolny, 1999) *product quality level* is crucial for firm differentiation and market segmentation; hence, firms producing high-quality products *lose* status in the eyes of consumers and other industry actors if they become associated with firms that focus their production on lower-quality market segments. Under those circumstances, status only "leaks" away from the high-status to the low-status partner (Podolny, 2005: 31–33). Such status transference limitation does not apply to industries where the strategic assessment of potential partners is fundamentally based on their technological innovation capabilities rather than on the quality of the market segment where firms decide to focus their production or service (Fine, 1998; Leung, 2002; Filson and Gretz, 2004; Hargadon, 2005). In innovation-driven industries, such as those constituting the Global Information Sector, an alliance partner's appeal is fundamentally based on its possession of, or potential to access, innovation resources. Technological innovation typically depends on large financial investments, ability to combine rapidly numerous specific human and material resources, as well as on marketing potential to turn innovation profitable. In highly competitive innovation environments, rapid access to key singular and costly resources is easier to achieve by forming strategic alliances, which become crucial for firm competitiveness in the marketplace (Cantwell, 1992; Hagedoorn, 1993; Hagedoorn and Schakenraad, 1994; Shan et al., 1994; Hagedoorn et al., 2000; Ahuja, 2000).

According to the preceding arguments, in industries where innovation capability is the key driver, higher firm status results from multiple alliances with other firms of either higher or lower status than the focal firm. Nevertheless, a focal firm's status gain from an alliance is greater when the partner has high-status (i.e., a partner with many affiliations with firms possessing attractive assets for superior performance) because (1) the alliance will signal to other industry participants that the focal firm has particular assets that its high-status partner could not obtain by itself or from its other affiliates, and (2) the alliance embeds the focal firm within the rich network of alliances of the high-status partner, which may contribute to enhancing the focal firm's corporate attributes and capabilities. On the other hand, a firm's affiliation with a lower-status firm does *not* hinder a focal firm's status because, despite the lesser potential to draw benefits from the lower-status firm's affiliation network, this firm still can positively contribute to the alliance endeavors—and thus further the attributes and capabilities of its higher-status partner—with the specific assets that makes it to be an attractive partner. Our empirical measure of status (described in Section 3 below) captures the differing contributions that a firm's alliance partners make to its status level depending on the unequal affiliation records of those partners.

Finally, reliance on firm affiliation records to evaluate potential alliance partners is likely to be more relevant in industrial contexts where direct evidence for assessing firms' assets is deficient (Podolny, 1994, 2005; Podolny et al., 1996; Stuart et al., 1999; see also Spence, 1974; Wilson, 1985; Fombrun and Shanley, 1990; Rao, 1994). The greater the uncertainty involved in assessing corporate attributes and capabilities, the more a firm may need to rely on its affiliation record as indirect evidence of the quality of its corporate attributes and capabilities. Similarly, that firm would also need to rely more on "who is affiliated with whom" to learn about which potential partners could most likely contribute to improving its own corporate assets and competitive advantage in the marketplace. Given the inherent uncertainty in innovation activities, firms in industries where capability for technological innovation is a key element for competitiveness and alliance formation may be more likely to rely on status signals to evaluate potential partners (Podolny and Stuart, 1995; Stuart, 2000).

2. Status system structure and individual firm status attainment

Despite the increasing relevance of social status in organizational research, the relationship between the structure of a status system and the individual firm statuses notably lacks both theoretical and empirical attention (for exceptions, see Podolny and Phillips, 1996; Bothner et al., 2010a,b). A key issue of that relationship is the effect that the structure of affiliations in a status system may have on the level of individual statuses that its participants attain, which, in turn, is reflected in other aspects of the structure of the status system. We investigate that reciprocal relationship by examining three interrelated topics: (1) whether firms' affiliation patterns vary according to their extant status levels and affect their status attainment, (2) whether the initial level of status of a firm has a positive, negative, or null effect on its subsequent status growth, and (3) whether these dynamic and structural processes affect two structural aspects of the status system (i.e., variation in the status gap between firms at the top and the bottom of the status hierarchy, and firm mobility along the status hierarchy). The next sections consider basic arguments and propositions about these issues.

2.1. Affiliation patterns of firms with different status levels and their effect on status attainment

The sociological conceptualization of status derived from actor affiliations implies that the structural analysis of affiliation patterns by actors with different status levels is a crucial research task for understanding status-growth processes and explaining actors' differential status attainments. We focus on who allies with whom, in terms of partner status levels, examining whether firms in the Global Information Sector tend to form alliances with status equals (i.e., *homophily*) or with status unequals (i.e., *heterophily*). With regard to high-status firms, the predominance of a homophily affiliation pattern in the GIS would imply that their high status fundamentally results from alliances with other high-status firms. This pattern entails a limitation in the status growth of high-status firms because of the restricted pool of potential partners available for increasing their number of alliances with other high-status firms. With regard to low-status firms, the predominance of a homophily alliance pattern implies an even more severe limitation in their individual status growth because forming alliances with the restricted pool of other low-status partners only confers minor status gains.

The alternative pattern of alliances in the industry, a tendency toward heterophilous affiliations, suggests that high-status firms attain status primarily as a consequence of partnering with many low-status firms. Because status gain depends on partners' status levels, heterophily implies that higher-status firms gain less status from each additional alliance with low-status firms compared to the status gains that lower-status firms obtain from those alliances. Importantly, the ties of each low-status firm with high-status firms would necessarily be few—the reason why those firms remain with a low-status level.

Homophily and heterophily are fundamental social mechanisms underlying and explaining the role of organizational status in alliance-formation processes and, therefore, also individual status-growth and differential organizational status attainment. Several scholars in organization studies have recently advocated better theory construction by taking an explicit mechanism-based rather than paradigm-driven approach to organizational theory and research (Davis and Marquis, 2005; Anderson et al., 2006). Social mechanisms are theoretical "cogs and wheels" (Hernes, 1998: 74) that provide a detailed explanation of how and why a

relationship occurs and the causal connections generating outcome effects.[5]

In that regard, observing in an specific industry a predominant affiliation pattern based on firms' status levels (i.e., homophily vs. heterophily) may be affected by both particular corporate strategies associated to firms' alliance records (i.e., status levels) and institutional aspects of the industry. Examples include: governmental regulations on market competition and collaboration that limit alliances between dominant firms in the industry (which might be those of higher status-alliance record); feasibility and incentive for the dominant firms to create oligopoly market structures; collusive practices among dominant firms aiming at controlling competition from challenging newer firms; feasibility of firms' business development through alliances to the extent that they may become challengers of dominant firms in the industry; birthrate of new firms; importance of creating scale economies through alliances to finance innovation and enhance firm competitiveness; relevance of setting technological standards supported by the dominant firms to achieve a controlling position in the industry; high uncertainty level in innovation success that compels a strategy of R&D outsourcing; firm-newness related advantages for higher innovation capability vs. firm-oldness related liability for flexible and dynamic innovation activity; feasibility of innovation diffusion through informal networks linking multiple alliance partners; institutionalized cooperative culture among former alliance partners.

The following propositions summarize the preceding arguments on the relationship between affiliation patterns and status attainment.

Proposition 1.1. *Homophily implies that high-status firms attain their high status affiliating among themselves, a pattern that limits their individual status growth because of the restricted pool of potential partners.*

Proposition 1.2. *Homophily implies that low-status firms limit their status growth because alliances with firms in the restricted pool of potential low-status partners confer only minor status gains.*

Proposition 1.3. *Heterophily implies that high-status firms attain their status level affiliating with many low-status firms, and low-status firms hold only few affiliations with the high-status firms.*

Proposition 1.4. *Heterophily implies that high-status firms gain less status from each additional alliance with low-status firms compared to the status gains that low-status firms obtain from those alliances.*

These propositions span two levels of analysis: structural-relational patterns of affiliation at the industry level (homophily vs. heterophily tendencies) and individual status at the organizational level (firms' extant status level and their status growth). They summarize how those structural tendencies may affect individual firms' status attainment. We investigate these propositions by analyzing the structural affiliation patterns of GIS firms at different status levels using the block analysis and QAP regression models described in Section 3 below. The analyses examine the implications of the affiliation patterns that prevail in the Global Information Sector for the status attainment of firms with different status levels.

[5] Examples of social mechanisms include differentiation and aggregation in hierarchies, threshold-based propensity to join collective actions, and the diffusion of innovations through networks. Hedström and Swedberg (1996) proposed a typology of general social mechanisms: *situational mechanisms* from macro to micro; *action-formation mechanisms*, from micro to micro; and *transformational mechanisms*, from micro to macro. The first and third types of mechanisms are most relevant to the investigation of status growth processes given its dual focus on the structure of the status system and on individual organizations' status attainments.

2.2. Effect of initial firm status level on firm status growth

Merton (1968) theorized the cumulative advantages that high-status provides in the field of scientific activity, a process he termed the Matthew Effect.[6] The Matthew Effect suggests an exponential accumulation of status: to the extent that the attributes and capabilities of higher-status actors are regarded as superior, the higher an actor's initial status, the more other actors will recognize its merits, devote resources to it, or solicit its collaboration. These behaviors further enhance the capabilities and status of initially higher-status actors relative to lower-status actors with less recognition, resource commitments, or solicitations from others. Over time, the status gap between higher-status and lower-status actors increases.

Podolny (1993) considered the Matthew Effect in a market context exploring the effects of firm status on corporate performance. His results indicate that higher-status firms are able to set higher prices and lower their production costs for a given quality level of good or service, which allows subsequent better performance and revenue growth (see also Smith, 1993; Podolny, 2005; Podolny and Stuart, 1995; Podolny et al., 1996; Benjamin and Podolny, 1999). However, in the only published organizational status-growth research, Podolny and Phillips (1996) found no evidence to support the Matthew Effect's key implication of an increasing status gap between initially low- and high-status actors. They suggest that the status growth of the high-status banks syndicated to broker securities trade may be bounded by their willingness to accept exclusively high-status partners, which severely limits the number of alliances they can establish and, consequently, their status growth.

In the context of interorganizational alliances, the Matthew Effect logic implies a *positive relationship* between initial firm status and subsequent status growth. Higher-status firms would experience higher status growth than the lower-status firms because, provided that high status signals desirable corporate attributes and capabilities attractive to potential partners, their initial high status confers them a competitive advantage in forming new partnerships—especially alliances with the other, more attractive, high-status firms—which is key to raising status. As we argue above, when firms evaluate a potential alliance partner, they may lack direct evidence about the quality of some key corporate attributes and capabilities (e.g., trustworthiness, compromise and cooperative culture, ability in joint ventures management, innovation capability). Hence, they may resort to considering the candidate's affiliation record as an alternative indicator for inferring the quality of those attributes and capabilities. A candidate firm with a more prominent affiliation record and, consequently, higher status may appear to be more attractive as an alliance partner and will have a better chance to be chosen as an affiliate than firms with lower affiliation record. Those alliances will contribute to enhance its corporate capabilities and will raise its status level relative to the lower-status firms. Such cumulative status process acting to the advantage of higher-status firms will increase the status gap between these and the lower-status firms.

The logic of the Matthew Effect suggests that high-status firms will raise their status because, period after period, they are successful in forming new alliances that ensure their competitive advantage in the marketplace. However, high-status firms might not be able easily to increase their level of alliance activity because (1) they already have many alliances formed among themselves—which has conferred them their high status levels, and

[6] In a series of articles about status and social networks, Bothner and colleagues (2004, 2010a,b, 2011) develop formal models to assess parameters of the Matthew Effect and other status inequalities.

(2) they might be reluctant to ally with many low-status firms—an alternative strategy for increasing status—because only a few of those low-status firms may be appear to be attractive partners that could provide significant competitive advantage in the marketplace to the high-status firms. On the other hand, under such structural constraints, just a few affiliations between high- and low-status firms would be sufficient for those low-status partners to gain status at a higher rate than their high-status counterparts, generating a trend contrary to the Matthew Effect, i.e., a *negative relationship* between initial firm status and subsequent status growth: the higher the initial status of a firm, the lower its likelihood of gaining additional status.

Various corporate strategic concerns may explain the attractiveness deficit of low-status firms and the consequent reluctance of high-status firms to form alliances with them, thus contributing to specify the underlying social mechanisms driving the affiliation patterns observed in an industry. For example, low-status firms' lack of innovation expertise cooperating with other firms may suggest they would hardly contribute to R&D synergies to an alliance. They may also lack the necessary experience for the co-management and consequent success of a joint venture. Low-status firms' inferior trustworthiness, reputation, and achievements obtained from previous alliances may imply less concern about being dishonest and, therefore, higher hazard of intellectual property leakage while the alliance with the high-status firm takes place. The participation of low-status firms for establishing industry standards promoted by the dominant firms in the industry may be irrelevant. The opportunity cost of resources devoted to collaborating in the development of the forthcoming product of a low status firm may be high and uncertain. Contributing to the success of a low-status firm may imply a high risk of nurturing a future important competitor. Moreover, collusion agreements among high-status firms may exist that prevent the business development of promising low-status firms. Several of these concerns may also explain the reluctance of low-status firms to ally among themselves. In the case of lack of expertise in managing joint ventures and cooperative innovation projects, the concern about affiliating with low-status partners would be exacerbated; whereas a high-status partner may compensate for the expertise deficiency of a low-status partner, such compensation is unfeasible when both partners have a poor track record in previous alliances. The poor alliance records of two potential low-status partners may also imply mutually reinforced distrust about their respective trustworthiness, compromise, and cooperative capabilities.

A third alternative with regard to the association between initial firm status and status growth implies a growth pattern that is random and independent of initial status level, i.e., *null relationship* between initial firm status and subsequent status growth: firms with different initial levels of status experience no systematic higher or lower status growth rate in a later period.[7] The foregoing considerations on the effect of firms' status levels on their subsequent status growth lead to a pair of opposed propositions:

Proposition 2.1. *Higher-status firms gain more status over time relative to lower-status firms because the attractiveness conferred by their initial high status level gives them a competitive advantage in forming new alliances, especially with other high-status firms. This competitive advantage would foster the tendency of homophilous pattern expressed in* Propositions 1.1 and 1.2.

Proposition 2.2. *Higher-status firms gain less status over time relative to lower-status firms because* (*a*) *the extant numerous affiliations among high-status firms exhausts the pool for additional affiliations among these firms* (*as indicated in* Proposition 1.1), (*b*) *they may be reluctant to form numerous heterophilous alliances with low-status firms* (*the opposite of* Proposition 1.3), *and* (*c*) *the heterophilous alliances that high-status firms may form confers them only small status gains relative to the status gains that their low-status counterparts obtain* (Proposition 1.4).

These propositions relate a phenomenon of individual dimension—the effect of a firm's initial status level on its status growth—with several aspects concerning to structural firm affiliation patterns (i.e., alliance formation competition and preferences, pool of potential patterns, and status gain attained from alliances with firms of different status levels). We analyze the effect of initial firm status level on the status growth of GIS firms using the growth regression model described in Section 3. The results of this analysis will indicate which of the structural processes underlying those two opposed propositions are more prevalent in the GIS.

2.3. Structural aspects of the status system

The processes described in the two preceding subsections are closely related to two structural aspects of the status system emerging from a network of affiliations: the variation in the status gap between firms at the top and the bottom of the status hierarchy, and firm mobility along the status hierarchy. Again, the following arguments and propositions related to those two aspects combine individual level elements with structural ones.

2.3.1. Consequences of the status growth patterns for the status system structure

Regarding the effect of initial firm status level on subsequent firm status growth, the positive relationship suggested by the Matthew Effect logically implies that (1) the status gap between firms at the top and firms at the bottom of the status hierarchy will increase, and (2) the status positions of firms in the status hierarchy will remain unaltered; that is, firms will keep their status positions: initially high-status firms will remain high in the status hierarchy and low-status firms will remain low. Conversely, a negative effect of initial status on status growth would decrease the status gap between firms at the top strata and firms at the bottom strata of the status hierarchy. Such negative effect would also foster changes in the positions that firms occupy in the status hierarchy, with some initially lower-status firms moving into positions above some initially higher-status firms.

Proposition 3.1. *A positive relationship between initial status level and subsequent status growth* (Proposition 2.1) *implies that* (*a*) *the status gap between firms at the top and the bottom of the status hierarchy will increase, and* (*b*) *the positions of the firms in the status hierarchy will remain largely unaltered.*

Proposition 3.2. *A negative relationship between initial status level and subsequent status growth* (Proposition 2.2) *implies that* (*a*) *the status gap between firms at the top and the bottom of the status hierarchy will diminish, and* (*b*) *the positions of the firms in the status hierarchy will be altered over time, with some initially lower-status firms moving into positions above some of the initially higher-status firms.*

2.3.2. Consequences of the affiliation patterns for the status system structure

The affiliation patterns of firms with different status levels also have implications for the structure of the status system. A status system predominantly emerging from a tendency toward *homophilous* partnerships (i.e., low- and high-status firms mainly

[7] This alternative is analogous to Gibrat's Law, which states that firm-size growth rates are distributed independently of firm size (Gibrat, 1931; Sutton, 1997).

affiliating with firms of similar status) would keep the status positions of the firms largely unaltered over time because firm mobility along the status hierarchy requires that some of the low-status firms establish more affiliations with high-status firms than do some of the originally high-status firms. Moreover, in a status system where partnerships are commonly homophilous, the status gap between firms at the top and the bottom of the status hierarchy would increase as a consequence of the differential status gains attained in alliances among high-status firms and in those among low-status firms. Conversely, a status system emerging predominantly from *heterophilous* partnerships would exhibit changes in the positions that firms occupy in the status hierarchy from period to period because some of the low-status firms (those establishing alliances with high-status firms in a given period) would experience significantly higher status growth than some of the originally high-status firms (those with a diminishing number of alliances with other high-status firms). Eventually, if this firm mobility process through the status hierarchy becomes a generalized phenomenon, a decrease in the gap between firms at the top and the bottom of the status hierarchy would occur.[8]

Proposition 3.3. *A tendency toward homophilous relationships (Propositions 1.1 and 1.2) implies that (a) the status gap between firms at the top and the bottom of the status hierarchy will increase; and (b) the positions of the firms in the status hierarchy will remain largely unaltered.*

Proposition 3.4. *A tendency toward heterophilous relationships (Propositions 1.3 and 1.4) implies that (a) the status gap between firms at the top and the bottom of the status hierarchy will diminish; and (b) the positions of the firms in the status hierarchy will be altered over time, with some initially lower-status firms moving into positions above some of the initially higher-status firms.*

3. Data, status measure and methods

We examine the relationship between the structure of affiliations in a status system and the individual statuses of its members by analyzing a longitudinal dataset of firms in the Global Information Sector that participated in interorganizational alliances from 1991 to 2000. This decade spans the formative years of the sector's strategic alliance network. Our investigation requires identifying firm statuses at several periods, their variation over time, and the alliance patterns of firms at different status levels. We investigate the propositions about whether homophily or heterophily alliance patterns prevail among firms with different status levels; whether these alliance patterns affect the status levels that firms can attain during an interval; whether initial firm status level affects subsequent status growth; and how these dynamic and structural processes affect two aspects of the status system structure (i.e., variation in the status gap between firms at the top and the bottom of the status hierarchy, and firm mobility along the status hierarchy). This section describes the dataset, status measure, and analytic models.

3.1. Dataset: alliances in the Global Information Sector

The dataset consists of 145 core firms in the Global Information Sector, defined as the four subsectors in the information sector as defined by the North American Industrial Classification System (NAICS)—publishing; motion pictures and sound recording; broadcasting and telecommunications; information services and data processing services—plus two related manufacturing subsectors—computers and electronic products and semiconductor manufacturing. The two manufacturing subsectors were added because, during the initial data collection, many alliances were observed between equipment manufacturers and software and content-provider firms. Machines, programs, and content are frequently jointly developed by diverse information sector firms. The firms are mostly North American, European, and Asian firms. By systematically reading reports in several business press archives, such as Newspaper Abstracts and Lexis-Nexis Academic Universe, we extracted information about all new alliance announcements between 1991 and 2000 that involved two or more of the core GIS corporations.[9] We found a total of 3370 strategic alliances among GIS firm spanning the decade. We stored these data in organization-by-organization annual matrices that show the number of alliances announced between pairs of firms in a given year. We also collected additional corporate information about firm size, age, headquarters country, and main industrial activity from Hoovers online (http://www.hoovers.com/) and from printed annual volumes of the Directory of Corporate Affiliations (National Register, 1989–2000).

3.2. Firm status measure: status scores computation

As we argue above, a firm's status derives from its affiliation record. The status measure used in our analysis of the GIS alliance network is derived from the alliances that a focal firm forms each year with the other firms participating in the alliance network. Each alliance partner does not contribute equal magnitudes to a focal firm's status. The status contributed by a partner depends on its status (i.e., its own affiliation record), which, in turn, depends on the statuses of all firms in the partner's alliance network. This interdependency of statuses is expressed formally as:

$$p_i = p_1 z_{i1} + p_2 z_{i2} + \cdots + p_j z_{ij} + \cdots + p_N z_{iN}$$

where the status, p, of focal firm i is the result of adding some of the p_N statuses of the N firms included in the relational system analyzed. If firm i has no alliances with firm j, then $z_j = 0$; if firm i has one or more alliances with firm j, then z_j equals the number of alliances between the firms in the dyad. Hence, focal firm i's status is the weighted sum of its partners' statuses, p_j.

As in any alliance system, the GIS alliance network is symmetric, in the sense that organizations must mutually agree to be partners and, hence, sending and receiving relations are not differentiated (the cell entries in an annual symmetric matrix indicate the number of alliances announced between a pair of firms during a specific year). A standard network measure used in empirical research on

[8] Ultimately, if all firms in the industry would end up forming similar numbers of alliances with the initially higher and the initially lower status firms, the hierarchical form of the status system would fade away entirely.

[9] The selection of firms for the GIS strategic alliance dataset began with the annual Fortune 500, Fortune 1000, and Fortune Global 500 lists. We identified about 250 corporations in the GIS subsectors that appeared at least once on those lists. Based on corporate profiles from Hoovers, Infotrac, Standard & Poors, and Directory of Corporate Affiliations, we added 150 top competitors of these organizations. Using information about these 400 corporations' primary product or service, we classified firms into four-digit Standard Industrial Classification (SIC) categories matching the six GIS subsectors defined by the NAICS. After eliminating all organizations with primary SIC codes outside the GIS subsectors, we ranked the remaining firms within each GIS subsector by their 1998 revenues, then selected the top half of each subsector based on revenues because resource constraints prevented collecting data on all firms. The firms identified through these procedures were included in every study year, unless they disappeared (through merger with another GIS firm). Affiliation announcements appear in the business press sources, but very little is reported by the press about the implementation, success and failure, and termination of relations. Consequently, we have data only on new alliance announcements, which is the situation in the large majority of strategic alliance research studies. If an alliance occurred involving a subsidiary, it was attributed to the parent organization. We did not obtain information that allows differentiating among types and purposes of alliances.

status processes is Bonacich eigenvector centrality (Bonacich, 1972, 1987; Wasserman and Faust, 1994: 205–210; Bothner et al., 2010a, 2011).[10] For investigations of symmetric relational systems, this measure takes the general form of the preceding equation, and assigns a score to each actor in the system that indicates its status within the network. We used the UCINET network software program (Borgatti et al., 2002) to compute annual Bonacich eigenvector centrality scores for firms in the GIS alliance networks. These scores appear as elements of the eigenvector corresponding to the largest positive eigenvalue of the alliance matrix of firms participating in one or more alliances.[11] We computed each firm's annual status score from the ten alliance matrices of years 1991–2000.[12]

Our firm status measure covaries with a widely used indicator of firm reputation evaluated by knowledgeable industry experts. Since 1983, *Fortune* magazine has annually published a list of "America's most admired companies" for as many as ten firms in each of several industries, based on ratings provided by executives, directors, and analysts. In 1997, Fortune began publishing an annual list of global most admired companies. Appendix A reports analyses of variance of our status measure for the annual subsets of GIS firms appearing in the *Fortune* lists. We classified these firms into three reputation categories according to their *Fortune* scores: (1) firms above approximately the 75th percentile in *Fortune* scores, (2) firms below the 75th percentile, and (3) firms not appearing in the *Fortune* lists. From 1991 to 2000, the firms in the top *Fortune* reputation category had the highest mean on our firm status measure, followed by the lower-ranked firms, and trailed by the unrated firms (in 9 of the 10 years the mean differences were statistically significant). These findings indicate that our firm status scores, derived from GIS alliance network data, covary moderately with a hierarchical reputation order as perceived by informants from the GIS industries.

3.3. Correlation analysis and variance tests of status scores at different periods

We analyze firm mobility along the status hierarchy by calculating Pearson correlations between the firm status scores for every pair of years from 1991 to 2000 (i.e., firms' status scores in t_1 correlated with their status scores in t_2). This correlation analysis reveals the extent to which the GIS firms maintained their positions in the status hierarchy over time. Finding less than perfect correlations of firm status measures for different pairs of years (i.e., $r_{t_1,t_2} \ll 1.00$) indicates that firm mobility occurs along the status hierarchy, with some firms changing their positions relative to one another. We also examine variation in the gap between firms at the top and the bottom of the GIS status hierarchy by using analysis of variance to test the null hypothesis that the variance of status scores in the status system remained unchanged from year t to year $t+1$; that is, that the *variance* of the status hierarchy neither increased nor decreased from year to year.

3.4. Block analysis

We examine whether alliances primarily occur among GIS firms of the same or different status levels by analyzing the ten matrices containing the annual number of alliances for every pair of firms in the GIS for each year of the decade analyzed. We partition each relational data matrix into three discrete subsets of alliances based on whether the pair of affiliated firms had high or low-status levels. We defined two status groups: the high-status group includes firms with status scores (i.e., Bonacich eigenvector centrality scores) above the 75th percentile of the distribution of status scores for a given year. The low-status group contains all firms with status scores below that cut point. Our analysis of homophily/heterophily alliance patterns requires defining three differentiated blocks of alliances in a given annual matrix. These blocks indicate: alliances between two high-status firms; alliances between two low-status firms; and alliances between a high- and a low-status firm. After identifying the members of each block, we calculated its density, that is, the mean number of observed alliances in the block divided by the number of pairs of firms. (Because a pair of firms can have more than one alliance during a year, block density may exceed unity.) The comparison of these three means shows the extent of homophily and heterophily in the GIS alliances during each year.

3.5. QAP regression models

We also analyze the predominant homophily/heterophily alliance patterns by organizational status levels (i.e., whether the alliances occur mostly among firms with the same or with different status levels) by estimating regression models with the Quadratic Assignment Procedure (QAP) (Krackhardt, 1987, 1988). QAP is a robust method for analyzing matrices of dyadic-relational data (i.e., where pairs of actors are the units of analysis), which are characterized by interdependencies among the observations and, hence, by correlated error terms in the regression equation. If OLS estimation methods were used, that condition would produce incorrect estimates of standard errors (most typically they are too small, resulting in p-values that are too low). QAP circumvents this problem by basing its estimation of standard errors on a simulation process consisting of numerous repeated random permutations of the rows and columns of the observed matrix of dyadic relations.[13] We used UCINET to estimate the QAP regression models.

QAP estimates regression models where the independent and dependent variables are in relational matrix form. To investigate whether homophily or heterophily exists in the GIS we analyze a set of models (one for each interval, that is, a pair of adjacent years from 1991 to 2000) that consider the frequency of alliances

[10] Alternative prominence measures have been defined depending on whether the network of relationships is formed by nondirected or directed ties. In networks of nondirected (symmetric) ties, which do not distinguish between sending and receiving relations, a prominent actor simply participates in a larger volume of relationships. Several indicators quantify prominence in nondirected networks, including degree, closeness, betweenness, information (Freeman, 1979, 2000) and Bonacich centrality eigenvector (Bonacich, 1972, 1987). For networks consisting of directed (asymmetric) ties, where sending and receiving relations can be distinguished, a prominent actor receives relatively more ties than it initiates to others (Knoke and Burt, 1983; Wasserman and Faust, 1994: 169–219 summarize a series of relational prominence measures).

[11] The largest positive eigenvalue accounts for the largest percentage of the data variance in the matrix and, hence, it provides the least error in simplifying data information from the relational matrix to the vector of status scores. For this status measure to be robust, the ratio of the largest eigenvalue to the next largest eigenvalue should be at least 1.50. The eigenvalue ratios in each of the 10 years greatly exceeded that value.

[12] In a given year, we excluded from the computation of status scores any firms that do not participate in alliances (the excluded percentages range between 25% of the GIS firms in 1991 and 9% in 1997). By definition, firms without alliance activity do not affect the status measure of the other firms in the industry and do not contribute to status generation in the status system. Moreover, other firms in the industry cannot deduce any status information about the firms with no alliances by observing their affiliation activity. The few firms with at least one alliance in a given year have status scores approximating zero and are included in the analysis. The status scores obtained from these computations range up to 0.413.

[13] The simulation randomly permutes paired rows and columns of the observed matrix, although using the same permutation for the rows as for the columns, thus preserving any dependence among elements of the same row or column (i.e., the elements in every initial row vector or column vector remain together in a same vector after the random permutation). That procedure results in numerous simulated matrices in which any association of the variables in a model has been eliminated by their respective random permutations. Thus, the permutations provide scrambled datasets that simulate the null hypothesis of no association among variables. Using these permutations, QAP generates an empirical sampling distribution of

among firms of same or different status levels (the QAP analyses require dividing firms in two status groups, high- and low-status, as defined in the preceding block analysis). The dependent variable in our models is the number of alliances between each dyad of firms at the end of an interval ($t+1$), which is obtained from the square matrix (excluding diagonal entries) containing the number of alliances for each pair of firms in the GIS in the second year of the interval analyzed. The models require a set of three dummy variables as covariates (measured at the beginning of the interval considered) that indicate whether firms in each dyad had high- or low-status at the start of the interval (t). That is, the first dummy variable is a square matrix whose cells indicate whether a pair of organizations consists of two high-status firms (1 if so, 0 otherwise). The second dummy variable is a matrix that indicates whether a dyad consists of one high-status firm and one low-status firm. The reference (baseline) dummy variable, excluded from the model, is a matrix that indicates whether a dyad consists of two low-status firms.

3.6. Status growth regression model

We estimated the effect of initial firm status level on status growth by applying the model specification used in previous research on organizational size growth (Barnett, 1994; Baron et al., 1994) and in the only previous empirical research on organizational status growth (Podolny and Phillips, 1996).[14] The model is expressed formally as:

$$\frac{S_{i,t+1}}{S_{i,t}} = S_{i,t}^{\omega-1}\ \exp(\boldsymbol{\beta}\mathbf{x})$$

or, alternatively,[15]

$$\ln(S_{i,t+1}) = \omega\ \ln(S_{i,t}) + \boldsymbol{\beta}\mathbf{x}$$

where $S_{i,t+1}$ is status score of firm i in the later period; $S_{i,t}$ is status score of firm i in the initial period; and their ratio is proportionate status growth, that is, the relative change in status that occurs between the two periods. The magnitude of ω indicates the form and strength of the effect of initial firm status on proportionate status change. The vector $\boldsymbol{\beta}\mathbf{x}$ includes control covariates to hold constant other effects on growth. The log-linear form of the model accommodates the constraint that proportionate status growth must be nonnegative (i.e., as a proportion, it must range between 0 and 1). For the specified model, the three possible empirical outcomes and their interpretations are (see Figs. 1–3):

If $\omega > 1$, initial status has increasing returns to status growth (positive effect).
If $\omega < 1$, initial status has diminishing returns to status growth (negative effect).
If $\omega = 1$, status growth is random and independent of initial status (null effect).

The control variables in the model include firm founding year, two firm size measures (number of employees and sales volume), dummy variables for subsets of primary SIC codes (audiovisual access; audiovisual content; audiovisual and telecommunication equipment; computer equipment; computer software; printing and publishing of newspapers, periodicals and books; semiconductors and related equipment; telecommunication access) and dummy variables for the firm's headquarters region (Asia, Europe, North America, and rest of the world). These variables control for effects on the status measures that may originate from firm age, size, primary industry, or main geographic location.

4. Results

Table 1 presents Pearson correlations of the firms' status scores for all pairs of years during the decade (e.g., firm status scores in t_1 correlated with the status scores in t_2). All correlations are well below unity; therefore, substantial change clearly occurs from period to period in the positions of the firms in the status hierarchy, with some higher-status firms losing status relative to some lower-status firms. The magnitudes of the changes of firm positions in the status hierarchy at different periods are roughly equal across intervals of varying durations.[16] Focusing on the results expressed in the main diagonal of Table 1, we observe substantial change in the positions that individual firms occupy in the status hierarchy from one year to the next—the time intervals specifically considered in our research. The GIS status system exhibits some firm mobility along the status hierarchy (the structural pattern of the status systems expressed in Propositions 3.2[b] and 3.4[b]). The results presented in the following tables explore whether (1) the specific relationship we find between GIS firms' initial statuses and their status growth and (2) the affiliation patterns we observe among GIS firms of same and different status level are consistent with the changes in the positions of the firms in the status hierarchy stated in Propositions 3.2[b] and 3.4[b] and evidenced in the results presented in Table 1. That is, we expect a negative relationship between initial status level and subsequent status growth (Proposition 3.2[b]), and a pattern of heterophilous affiliations (Proposition 3.4[b]).

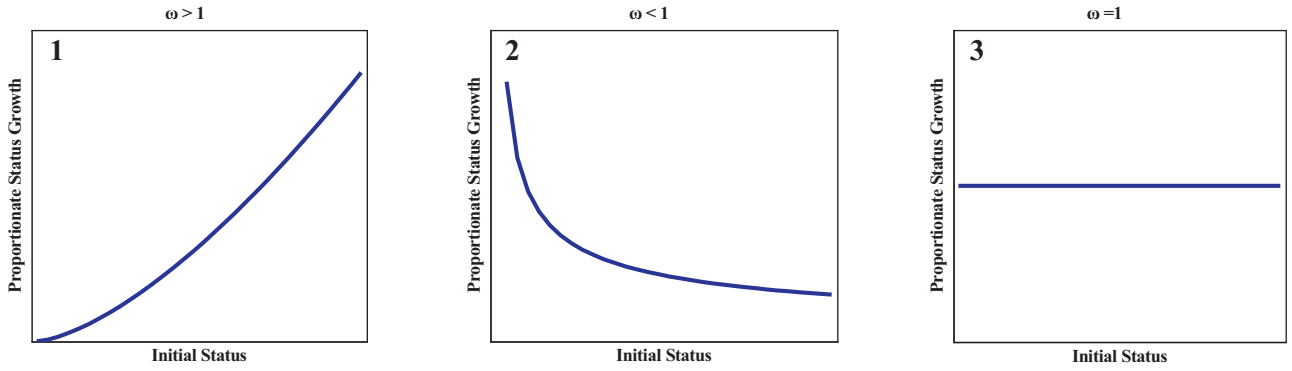
To examine the status system's structural aspect of variation in the gap between firms at the top and the bottom of the GIS status hierarchy (Propositions 3.1[a]–3.4[a]), we tested the null hypothesis that the variance of status scores in the status system remained unchanged from year t to year $t+1$; that is, that the variance of the status hierarchy neither increased nor decreased from year to year. Our F-test results (available from the authors upon request) did not allow rejection of this equal-variance null hypothesis for eight of nine pairwise comparisons. The sole exception was the first period, 1991–92, where the later variance was slightly greater. Thus, the evidence supports neither an annual increase in the status gap (therefore questioning that a Matthew Effect occurs in the GIS) nor any significant decrease of the gap in the status hierarchy. The gap stability observed in the GIS status hierarchy may suggest several possible combinations of the processes of individual status growth and affiliation patterns considered in this article. The

the model's regression coefficients under the null hypothesis. By comparing this sampling distribution to the sample regression coefficient observed in the data, we reject the null hypothesis if the sample coefficient falls into an extreme high or low percentile of the sampling distribution under the null hypothesis. QAP reports the observed regression coefficient and its p-value, which indicates the likelihood of the computed relationship occurring by chance. For example, a p-value less than 0.01 indicates that fewer than one percent of regression coefficients produced by the random permutations are as extreme as the coefficient observed in the data. Thus, that p-value indicates that the probability of drawing samples with coefficients at least as large as the observed sample statistic, from a population whose parameter equals zero, is less than one in one hundred.

[14] The equation of the baseline model presented in Podolny and Phillips (1996) has a simplified exponent, ρ, which is equivalent to our exponent $\omega - 1$. This variation results in different reference values for our ω or their ρ (i.e., 1 in our model, 0 in theirs) for interpreting the form and strength of the effect of initial status on status growth, but it does not affect the substantive interpretation of the results obtained by the two specifications.

[15] $S_{i,t+1}/S_{i,t} = S_{i,t}^{\omega-1}\ \exp(\boldsymbol{\beta}\mathbf{x})$; $\ln(S_{i,t+1}/S_{i,t}) = \ln(S_{i,t}^{\omega-1}\ \exp(\boldsymbol{\beta}\mathbf{x}))$; $\ln(S_{i,t+1}) - \ln(S_{i,t}) = \ln(S_{i,t}^{\omega-1}) + \ln(\exp(\boldsymbol{\beta}\mathbf{x}))$; $\ln(S_{i,t+1}) = \ln(S_{i,t}) + \ln(S_{i,t}^{\omega-1}) + \ln(\exp(\boldsymbol{\beta}\mathbf{x}))$; $\ln(S_{i,t+1}) = \ln(S_{i,t}^{\omega-1+1}) + \boldsymbol{\beta}\mathbf{x}$; $\ln(S_{i,t+1}) = \omega\ \ln(S_{i,t}) + \boldsymbol{\beta}\mathbf{x}$.

[16] Similar high levels of positive correlations between pairs of contiguous years and across longer intervals reveals that the GIS status system remained approximately as stable in shorter periods as in longer terms.



Figs. 1–3. Possible effects of initial status on status growth.

Table 1
Pearson correlations: firms' status scores in t_1 correlated with their status scores in t_2 to measure firm mobility along status rankings, 1991–2000.

	1991	1992	1993	1994	1995	1996	1997	1998	1999
1992	.518***								
1993	.608***	.831***							
1994	.657***	.545***	.613***						
1995	.675***	.558***	.561***	.653***					
1996	.514***	.660***	.646***	.591***	.633***				
1997	.493***	.667***	.702***	.560***	.614***	.727***			
1998	.407***	.618***	.684***	.555***	.491***	.582***	.772***		
1999	.604***	.599***	.681***	.638***	.702***	.781***	.743***	.735***	
2000	.546***	.509***	.606***	.629***	.630***	.684***	.799***	.660***	.786***

*** $p < .001$ (two-tailed tests).

results of our examination of these processes in the GIS will allow us to disentangle how their interplay contributes to the observed status gap stability.

Table 2 presents the results of a series of nine QAP regression models examining the homophily/heterophily affiliation patterns among GIS firms of same and different status level (Propositions 1.1–1.4). The independent dummy variables of these models categorize the status levels of firm dyads at the start of an interval (t), and their dependent variable is the number of alliances between each dyad at the end of the interval ($t+1$). The reference dummy variable is "two low-status firms"; hence, the coefficients for the two included dummies represent dyadic status-level effects relative to that omitted category. In all nine models (one for each annual interval), the coefficients for the dummy variable indicating dyads of two high-status firms are significantly positive. The coefficients for the dummy indicating dyads comprised of one high-status and one low-status firm are also positive—but of lower magnitude than the coefficient for two high-status firms—and significant in every year. These results reveal that firms of high-status in period t ally more frequently in period $t+1$ among themselves than with low-status firms, and that low-status firms ally more often with high-status firms than among themselves.

We further explore homophily/heterophily affiliation patterns among GIS firms performing block analyses for each of the ten years investigated. Columns in Table 3 present the block densities for alliances among firms at the same status levels and among firms at different status levels in a given year. The results of this static analysis are consistent with the dynamic QAP results. That is, most alliances occur among high-status firms and very few occur among low-status firms. Alliances between high-status and low-status firms occur less often than among high-status firms, but more frequently than among low-status firms.

The empirical evidence of the QAP regression and the block analyses provides some support for both the homophilous and heterophilous affiliation patterns, depending on the status levels of the firms involved in the alliance. High-status firms primarily affiliate with other high-status firms; i.e., homophily prevails among them. However, we find no evidence that low-status firms primarily ally with one another; that is, no significant homophily occurs among low-status firms. Low-status and high-status firms

Table 2
QAP regression models: alliance activity regressed on partner firms' statuses, 1991–2000.

	1991–1992	1992–1993	1993–1994	1994–1995	1995–1996	1996–1997	1997–1998	1998–1999	1999–2000
Two high-status firms	.410	.723	.960	.735	.784	.709	.846	1.016	1.329
	.222	.347	.284	.297	.291	.330	.355	.337	.427
	.000	.000	.000	.000	.000	.000	.000	.000	.000
One high-status and one low-status firm	.050	.093	.193	.121	.177	.085	.116	.187	.162
	.055	.091	.115	.099	.134	.080	.098	.126	.105
	.035	.004	.003	.000	.000	.002	.001	.000	.001
Constant	.051	.073	.208	.121	.093	.105	.055	.060	.052
Adjusted R-square	.047	.116	.081	.086	.087	.105	.121	.113	.175
Number of firms	106	100	119	124	125	124	127	120	111
Number of observations	11,130	9900	14,042	15,252	15,500	15,252	16,002	14,280	12,210

Note: In the rows for the two covariates, the first figure that appears in the set of three values is the unstandardized coefficient, the second figure is the standardized coefficient, and the third figure is the effect's significance (one-tailed tests). The reference category in the models is "two low-status firms".

Table 3
Block analysis: block densities of alliance activity by partner firms' statuses, 1991–2000.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Two high-status firms	2.037	.887	.952	2.366	1.338	1.523	.972	1.425	1.952	1.863
One high-status and one low-status firm	.491	.076	.093	.395	.214	.223	.098	.168	.224	.203
Two low-status firms	.154	.049	.065	.095	.108	.065	.052	.045	.041	.049
Number of high status firms	26	25	30	31	31	31	32	30	28	27
Number of low status firms	80	75	89	93	94	93	95	90	83	77
Total number of firms	106	100	119	124	125	124	127	120	111	104

also enter into heterophilous alliances, but not as extensively as the homophily observed among high-status firms. These affiliation differences between the high- and the low-status firms hold consistently from 1991 to 2000. The observed very high proportion of alliances involving only high-status partners, and the much smaller proportion of alliances involving affiliations between high and low status firms, result from the unequal attractiveness as a potential partner of firms having unequal affiliation records (i.e., different status levels). Those patterns generate a specific affiliation structure that may affect the status growth of GIS firms with differing initial status levels. Specifically, Proposition 2.2 states that predominance of homophilous preference for alliance formation among high-status firms, coexisting with some alliance activity between high- and low-status firms, results in higher-status firms gaining less status over time relative to the lower-status firms. The following status growth regression analyses examine this issue.

Table 4 presents the results of regression models examining, from 1991 to 2000, the direction and strength of the effect that initial firm status has on the status growth of GIS firms (Propositions 2.1 and 2.2). The estimated coefficients in each column correspond to the regression of the dependent variable for one year on the same status measure for the preceding year (e.g., natural logarithm of the status scores of 1992 regressed on the logged status scores of 1991; see the second status growth equation in Section 3) as well as on the control variables. The coefficients for initial firm status are significantly lower than 1.000 in each of the nine periods ($p < .001$), leading to the conclusion that the higher the initial status of a firm, the lower its status gain at the end of the annual period

Table 4
OLS regression models: proportionate status growth regressed on initial firm status and control variables, 1991–2000.

	1991–1992	1992–1993	1993–1994	1994–1995	1995–1996	1996–1997	1997–1998	1998–1999	1999–2000
Initial firm status	.296***	.407***	.457***	.303***	.561***	.393***	.549***	.596***	.603***
	(.095)	(.100)	(.087)	(.064)	(.109)	(.098)	(.101)	(.072)	(.104)
Firm founding year	-.001	−.006	−.009*	−.001	−.001	.004	−.007*	−.002	.002
	(.004)	(.004)	(.004)	(.003)	(.003)	(.003)	(.004)	(.003)	(.003)
Firm size: employees ($\times 10^{-6}$)	1.553	.829	−2.296	2.260	1.688	.385	6.898	2.654	.177
	(3.473)	(3.734)	(3.471)	(2.623)	(3.505)	(3.606)	(3.567)	(1.776)	(2.133)
Firm size: sales ($\times 10^{-6}$)	6.721	7.148	23.980	11.200	6.178	26.360	−10.270	−.074	1.081
	(20.248)	(22.051)	(19.172)	(14.588)	(1.432)	(14.736)	(14.463)	(2.787)	(3.219)
Asia	.460	.109	1.054	–	–	.164	–	.088	1.442**
	(.613)	(.680)	(.552)			(.580)		(.374)	(.494)
Europe	–	–	2.251***	.108	.080	–	.046	.900**	–
			(.441)	(.456)	(.554)		(.529)	(.332)	
North America	1.951***	.935	–	.238	.442	.258	1.118*	–	.338
	(.471)	(.478)		(.404)	(.382)	(.386)	(.468)		(.389)
Rest of the world	.904	.903	.390	.402	1.301	.151	.523	.366	.509
	(1.532)	(1.618)	(1.120)	(.916)	(1.068)	(1.112)	(1.114)	(.820)	(1.017)
Audiovisual access	2.659**	.358	2.026**	1.464**	–	1.464*	1.464	–	–
	(.967)	(.830)	(.666)	(.512)		(.512)	(.512)		
Audiovisual content	1.397	2.436*	2.870**	1.319	.096	.875	1.408	.011	1.356
	(1.186)	(1.091)	(.870)	(.688)	(.805)	(.791)	(.835)	(.674)	(.833)
Audiovisual and telecomm. equipment	3.698***	1.701*	3.028***	1.916***	1.455*	1.087	1.087	2.469***	1.552
	(1.009)	(.755)	(.626)	(.516)	(.616)	(.639)	(.639)	(.573)	(.781)
Computer equipment	4.028***	2.331**	2.268***	2.579***	1.370*	1.542*	1.205	2.397***	1.542*
	(1.040)	(.715)	(.603)	(.482)	(.595)	(.616)	(.667)	(.529)	(.616)
Computer software	3.376**	1.895*	1.703**	2.463***	.847	1.879**	1.455*	2.535***	1.149
	(.1048)	(.734)	(.617)	(.476)	(.603)	(.600)	(.670)	(.524)	(.749)
Printing and publishing	–	.498	–	–	.786	–	–	.828	.448
		(.896)			(.706)			(.661)	(.797)
Semiconductor and related equipment	3.775**	–	3.224***	1.259*	2.603**	1.563	1.006	2.618***	1.583
	(1.096)		(.764)	(.629)	(.791)	(.868)	(.845)	(.639)	(.877)
Telecommunication access	3.924***	1.618*	2.503***	1.378**	.803	.593	1.568*	1.454**	.593
	(1.023)	(.698)	(.579)	(.475)	(.568)	(.574)	(.619)	(.517)	(.574)
Constant	−4.988	8.167	−22.222	−1.677	−1.661	−12.902*	9.809	.848	.477
Adjusted R^2	.520	.448	.549	.537	.408	.406	.421	.703	.585
Number of firms	90	96	109	115	116	117	111	105	96

Notes: Standard errors in parentheses. For the null hypothesis about initial firm status, the population regression coefficient equals 1.00. Dummy variables without coefficients in a given year act as the reference categories for that specific year. Models also included two dummy variables (not presented here), each indicating whether a case had missing values in variables 'firm size: employees, or firm size: sales'; this technique allows retention of those cases in the analysis. Of those dummies, only the 1998–1999 sales coefficient was significant.

* $p < .05$ (two-tailed test).
** $p < .01$ (two-tailed test).
*** $p < .001$ (two-tailed test).

relative to initially lower-status firms. (Analyses using longer intervals [1991–1995 and 1996–2000] produce equivalent results to the analyses of annual intervals we present in Table 4).[17]

The estimated coefficients indicate considerable differences in average status growth among firms with different initial status scores. For example, in the 1991–1992 interval, the estimated effect of initial status on status growth is $\omega = .296$, which means that, on average and conditional on the values of the other covariates in the model (see the first status growth equation model in Section 3):

$$\frac{S_{i,t+1}}{S_{i,t}} = S_{i,t}^{.296-1} = S_{i,t}^{-.704}$$

To illustrate, compare the estimated 1991–1992 status growths of two firms whose 1991 initial status scores differ by 0.1 units ($S = 0.2$ and $S = 0.3$), relative to a third firm whose 1991 initial status level is $S = 0.1$. The status growth of the firm with $S = 0.2$ is 200% lower than the status growth of the firm with $S = 0.1$, while the status growth of the firm with $S = 0.3$ is 280% lower than the growth of the firm with $S = 0.1$.[18] These calculations underscore the substantive conclusion from the status-growth analyses of firms in the GIS from 1991 to 2000: the higher a firm's initial status, the smaller its status growth relative to a firm with initially lower status; hence, initial high status has diminishing returns to status growth. This evidence is consistent with Proposition 2.2. We further consider the theoretic implications of these results in the final section.

Table 4 also reports the effects of the firm size, age, geographic headquarters region, and industry control variables for each regression. Several coefficients are statistically significant, particularly those for industries in the GIS sector, hence indicating the importance of holding those effects constant when estimating the status growth dynamics. Nevertheless, alternative specifications of the regression models that excluded all the control variables yielded results for the effect of initial firm status on status growth that were basically equivalent to those presented in Table 4.

5. Conclusion

We present a theoretical and analytical framework to examine the organizational status system that emerges from a network of alliances among firms seeking competitive advantages in a technology-driven sector. Our investigation focuses on describing the relationship between structural aspects of the status system and the statuses of the participating firms. The analyses reveal some fundamental aspects of how the relational structure of the GIS status system conditions the status growth of firms with differing initial status levels. The preference for and the feasibility of different affiliation strategies to be undertaken respectively by the high- and the low-status firms affect their unequal status attainment, which underscores the importance of investigating patterns of actor relationships to explain status variation among firms. We also examine how firm affiliation patterns and their effects on firm status growth affect two structural aspects of the status system.

Our relational-structural analyses (i.e., QAP and block analyses) show that GIS high-status firms create many alliances among themselves but are disinclined to ally with low-status firms. High-status firms would be interested in affiliating among themselves because these alliances tend to provide more competitive advantages than are created by alliances with low-status firms (competitive advantages which are related to the affiliation records of potential alliance partners, i.e., to their status levels). Nevertheless, the trend of homophilous affiliations among high-status firms limits their chances to increase the already numerous alliances among them, thus, restricting their status growth if they persist in pursuing a homophilous alliance strategy (Proposition 1.1). The negative effect of initial firm status on status growth shown in our status growth analysis is consistent with the presence in the GIS of such a structural restriction on high-status firms for increasing their status levels (Proposition 2.2). This research finding is coincident with the interpretation provided in the only previous organizational status-growth research (Podolny and Phillips, 1996).

Low-status GIS firms present a different affiliation pattern. They rarely affiliate with one another—hence, supporting our arguments on the reluctance/attractiveness partner selection preferences based on corporate strategies related to the affiliation records of potential partners (i.e., their status levels). Low-status firms have more alliances with high-status firms than among themselves, although the density of high-low status alliances is still much lower than the density of alliances among high-status firms. This relational structure provides substantial opportunities for low-status firms to increase their alliance activity with high-status partners, and, thereby to attain large status gains. As we argue in Proposition 1.4, low-status firms gain more status than high-status firms from their heterophilous affiliations. We conclude that the disparity in alliance opportunities with attractive high-status partners faced by the high- and the low-status firms in the GIS status system is the structural aspect of that system accounting for the observed pattern in the status growth regression models: the higher the initial status of a firm, the lower its status gain over time relative to initially lower-status firms—an opposite pattern to the Matthew Effect's logic of exponential status accumulation (Proposition 2.2 states the arguments about these structural and firm status-growth processes). Importantly, this conclusion indicates that a structural difference in alliance opportunities may counteract to some extent the effect that corporate strategic partner selection preferences (based on the unequal affiliation record of potential partners) could have on individual status attainment.

We also examined how the status growth and the affiliation patterns found in the GIS relate to two aspects of the GIS status system structure (Propositions 3.1–3.4 on the variation in the gap of the status hierarchy and firm mobility along it). The test results on the change in the variance of firm status scores at different periods showed neither an annual increase in the status gap between firms at the top and the bottom of the status hierarchy nor any significant decrease of the gap over time. We interpret this status gap stability as the consequence of the interplay of two structural and firm growth processes: (1) the smaller status growth rates we found associated with higher initial firm status restrain any sizable increase over time of the status gap between firms at the top and firms at the bottom of the status hierarchy (Proposition 3.2[a]), (2) on the other hand, the prevalent homophilous affiliation tendency among high-status firms, and the much higher number of alliances they form compared to low-status firms, restrain any substantial decrease of the status gap in the status hierarchy. That is, the low level of heterophilous relationships found between high- and low-status firms and the very low number of affiliations among low-status firms cannot drive a significant diminution of the status gap resulting from the negative effect of initial firm status on status growth, which suggests the need to qualify Propositions 3.2[a] and 3.4[a] to take into consideration the amount of heterophilous affiliations and the strength of the effect of initial firm status on status growth. Nevertheless, our correlation analyses of firm status scores at different periods indicate substantial individual firm mobility along the status hierarchy, resulting in changes in the status positions that individual firms occupy from one year to the next. This mobility process is consistent both with the negative effect of initial firm status on status growth (Proposition 3.2[b])

[17] Separate analyses based only on firms headquartered in North America, Europe, or Asia yield similar results.

[18] $S_{1,t}^{-.704} - S_{2,t}^{-.704} = 0.1^{-.704} - 0.2^{-.704} = 5.1 - 3.1 = 2$; and $S_{1,t}^{-.704} - S_{3,t}^{-.704} = 0.1^{-.704} - 0.3^{-.704} = 5.1 - 2.3 = 2.8$.

and the presence of heterophilous relationships between high- and low-status firms (Proposition 3.4[b]).

Further research comparing the structural characteristics of the status systems of other industries is needed to learn more about possible variations in the structural shape of status systems, and to better understand how the specific affiliation patterns prevalent in an industry may affect the individual status attainment of the participant firms, their chances of mobility along the hierarchy of the status system, and changes in the gap between the different strata of the hierarchy. Future research could also investigate how specific affiliation patterns followed by groups of firms defined by characteristics other than status level (for example, by their industrial subsectors, market segments, or geographic location) affect their status attainment.

Knowledge about how the relational structure of a status system affects its participants' status attainments may help to improve the assessments that firms make of status (i.e., of potential partners' affiliation records) to infer individual corporate attributes and capabilities. Our investigation indicates that the alliance patterns followed by the high- and low-status firms in the GIS affect their chances for new alliance formation and, therefore, the status levels they can attain. We have shown that the prevalent affiliation pattern followed by the GIS high-status firms limits their ability to take full advantage of their status attractiveness because of the limited opportunities to form additional affiliations with other high-status firms. Furthermore, the reluctance of high-status firms to ally with many low-status firms closes off an alternative method for their status growth and also limits the status growth of the low-status firms. In sum, our investigation suggests that firms' status levels as a signal of corporate attributes and capabilities may be conditioned by the dominant structural pattern of affiliations present in an industry.

Our investigation reveals a core aspect of organizational status: it is constrained by firms' embeddedness within the extant relational structure of their industry. Relational structures may either limit or enhance the affiliation opportunities available to a firm and, thus, the status level that it can achieve. Therefore, the relational structure of an industry should be taken into account by firms when they use status as a signal of corporate attributes and capabilities. Our research indicates that the constraints posed by the relational structure of an industry on firm status attainment may refer not only to the likely limitation on how many affiliations an actor can handle (an aspect less relevant for organizations than for people), but also to the prevailing industry affiliation patterns between groups of firms with different status levels, which may originate in various corporate strategies and institutional features of the industry. In this regard, industry-specific studies considering their distinctive strategic and institutional aspects are needed to advance our current understanding of firm preferences for alliance partners with unequal affiliation record (i.e., different status levels).

Social status, a core concept in sociology and increasingly relevant in organizational and market studies, deserves further theoretical and empirical attention to understand better its formative and consequential processes (both individual—e.g., status attainment—and collective—e.g., status inequality levels and potential mobility along the status hierarchy). We believe that undertaking a longitudinal analytical perspective is essential in the structural study of status formation and change. Future methodological and empirical research should continue to elaborate strategies for identifying and measuring the changes in interorganizational relations that underlie the development of status systems. Another crucial future direction for status research is to further examine social mechanisms that may explain the relationship between organizational status and alliance-formation processes. In this regard, we discussed how corporate strategic preferences, institutional industry features and concerns about affiliating with firms that present a low alliance record may explain the predominance of a specific homophily/heterophily affiliation pattern and firms' differential status attainment. Disentangling the specific effect of different social mechanisms will require more elaborate research designs than used in our investigation, such as collecting information from organizational agents directly involved in creating and maintaining their firms' alliance portfolios.

Finally, firms may benefit from examining the structural and dynamic aspects of the status systems to which they belong, as well as from considering the status consequences of entering into new alliances—in addition to the non-status outcomes that alliances generate. Formalizing an agreement to work with another firm may have important implications for a firm's social standing within an organizational field. Organizational agents who learn how to assess the effects of the prevailing interorganizational affiliation patterns in their industry on firm status attainment may more effectively deploy that information strategically. Firms that incorporate such information into their partner selection strategy may be more successful in attaining—in addition to other corporate resources—an optimal status level. Although status concerns may not be the primary criterion for choosing alliance partners, careful evaluation before choosing among otherwise equivalent alternatives could pay off in subsequent collaborative opportunities and other long-term benefits related to a firm's social standing. Status is a valuable, socially constructed resource that can help to leverage better access to other valued resources. By becoming sensitive to the affiliation origins of corporate status, companies can learn how to manage their interorganizational alliances in ways that not only enhance their status but ultimately also contribute to better corporate outcomes.

Appendix A. Analyses of variance of firm status scores for GIS organizations, classified by *Fortune* most admired American or global company reputations, 1991–2000

Year	*Fortune* reputation category			$F_{df1,df2}$	η^2
	Above 75%	Below 75%	Unranked		
1991 USA	0.15	0.07	0.06	$F_{2,103} = 5.7^{**}$	0.101
1992 USA	0.15	0.08	0.04	$F_{2,97} = 8.4^{***}$	0.146
1993 USA	0.14	0.07	0.04	$F_{2,116} = 5.4^{**}$	0.086
1994 USA	0.10	0.06	0.06	$F_{2,121} = 2.0$	0.032
1995 USA	0.13	0.06	0.05	$F_{2,122} = 7.1^{**}$	0.104
1996 USA	0.10	0.07	0.05	$F_{2,121} = 4.0^{*}$	0.062
1997 Global	0.22	0.08	0.03	$F_{2,124} = 48.8^{***}$	0.440
1998 Global	0.15	0.07	0.03	$F_{2,119} = 19.0^{***}$	0.246
1999 Global	0.13	0.07	0.03	$F_{2,108} = 14.9^{***}$	0.216
2000 Global	0.09	0.08	0.02	$F_{2,101} = 9.6^{***}$	0.158

* $p < .01$.
** $p < .005$.
*** $p < .001$.

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