

*Network analysis has been used extensively in the study of interorganizational relations. This article reviews the literature over the past fifteen years and organizes it into three theoretical traditions: the resource dependence model, the social class framework, and the institutional model. It is shown that network methods have enabled researchers to describe phenomena, such as interorganizational fields, that were previously inaccessible. It is also shown how social networks help to explain the formation of interorganizational ties and how interorganizational relations, conceptualized as social networks, can explain organizational power as well as the strategies decision makers pursue.*

## Networks of Interorganizational Relations

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**F**or decades, a closed-system framework dominated organizational analysis. Although some works, such as Selznick's (1949) study of the Tennessee Valley Authority, had focused on organizational environments, it was only in the 1970s that the environment began to play a major role in organizational research. As attention shifted to the environment, researchers focused more on interorganizational relations. At the same time, network analysis was emerging from the small groups lab and being applied to real life settings. Because of its focus on the relations among social actors, network analysis was seen by many organizational researchers in the 1970s as a logical way to study relations among organizations (Van de Ven, Emmett, and Koenig 1975; Evan 1978; Aldrich and Whetten 1981; Paulson 1985). We argue that network analysis has contributed greatly to both interorganizational analysis and organizational theory in general. We focus on three approaches to the study of inter-

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*AUTHORS' NOTE: Research for this article was supported by a National Science Foundation Presidential Young Investigator Award (SES-8858669 and SES-9196148) to Mizruchi and a National Science Foundation Research Grant (SES-8887258) to Galaskiewicz. Please address correspondence to Mark S. Mizruchi, Department of Sociology, University of Michigan, Ann Arbor, MI 48109-1382.*

SOCIOLOGICAL METHODS & RESEARCH, Vol. 22, No. 1, August 1993 46-70  
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organizational relations: the resource dependence, social class, and institutional perspectives. Although we recognize the value and richness of network studies using qualitative methods (for example, Stern 1979; Eccles and Crane 1988; Powell 1990), we shall restrict ourselves to applications employing quantitative techniques.

## *THEORETICAL BACKGROUND*

### *THE RESOURCE DEPENDENCE FRAMEWORK*

Although it has roots in Selznick's work as well as in Emerson (1962), Blau (1964), and Thompson (1967; also Levine and White 1961; Litwak and Hylton 1961; Katz and Kahn 1966), the resource dependence model received its first interorganizational treatment in a collection of articles edited by Zald (1970) and its most comprehensive treatment in Pfeffer and Salancik (1978). The basic principle of the resource dependence model is that organizations operate in turbulent and uncertain environments, over which they attempt to gain control. Because critical resources are often controlled by other organizations, organizations must find ways to ensure a smooth and predictable flow of resources from other organizations. One strategy is to co-opt the source of the dependence; another is to use one's ties to leverage resources from the other organization; a third is to make alter dependent on ego (Cook, 1977). Once an interorganizational strategy has been pursued, a network of relations is created that may constrain actors' subsequent behavior. Although most of the early studies employed the individual organization as the unit of analysis, later resource dependence theorists conceptualized the organization/environment interface in interorganizational network terms (Rogers 1974; Benson 1975; Stern 1979; Boje and Whetten 1981).

### *THE SOCIAL CLASS FRAMEWORK*

Concurrently with the rise of the resource dependence framework, social class theorists were developing an alternative analysis of the corporation in American society. Influenced by the work of C. Wright Mills (1956), these theorists argued that the linkages among dominant

corporate actors had social as well as economic roots. The linkages between corporations or among firms, foundations, universities, country clubs, policy-making groups, and government agencies were viewed as having more to do with ensuring the continued dominance of upper class/capitalist interests than with helping to meet the resource needs of organizational actors.

This perspective was first articulated by Domhoff (1967) and Zeitlin (1974; see also Sonquist and Koenig 1975; Useem 1984). These theorists were most interested in the linkages across institutional sectors. Other class theorists were more interested in the social organization of the economy. Studies of the disproportionate power of banks (Mintz and Schwartz 1985), the role of family holdings and interest groups (Scott 1979, 1987), and the influence of class-based networks on corporate behavior (Ratcliff 1980) dominated the literature in the 1980s.

#### *THE INSTITUTIONAL FRAMEWORK*

Organizations do not have free rein to pursue resources, but rather must behave in accordance with the laws and traditions of their societies. As cultural systems become more complex and the power of the state and dominant subcultures permeate the boundaries of the organization, decision makers are forced to adapt accordingly, even if doing so runs contrary to their resource needs or the interests of the top management team.

DiMaggio and Powell's (1983) article was the first within the institutional framework to focus explicitly on interorganizational fields as networks (see also Carroll, Goldstein, and Gyenes 1988). The network among individuals in different organizations was identified as an important element in explaining how organizations come to look alike and behave similarly. Studies taking off from DiMaggio and Powell's statement include Galaskiewicz (1985a; Galaskiewicz and Wasserman 1989; Galaskiewicz and Burt 1991) and Fligstein (1990).<sup>1</sup>

#### *DISCUSSION*

Despite their differences, there is considerable overlap among these three perspectives. One could argue that networks between corpora-

tions and cultural, educational, and government agencies are efforts to influence the social definitions under which organizations operate, a position consistent with both the institutional and social class models. Studies of political interest groups (Clawson and Neustadt 1989; Laumann and Knoke 1987; Mizruchi 1989), traditionally identified with the resource dependence or social class perspectives, could be viewed within the institutional framework as examples of how organizations seek to co-opt political actors who represent generalized belief systems.

Much of the social welfare literature on interorganizational relations could be classified into either the resource dependence or institutional frameworks. In his study of employment service agencies, for example, Aldrich (1976) found that an important predictor of interorganizational resource transactions was the presence of a government mandate to interact (see also Hall, Clark, Giordano, Johnson, and VanRoekel 1977). Warren, Rose, and Bergunder (1974) found that an important component of interorganizational coordination was the "institutionalized thought structure" shared by administrative staff in different organizations. And Galaskiewicz and Shatin (1981) found that human service organizations were more likely to cooperate if their administrators had similar cultural and religious heritages, especially if operating in turbulent environments.

Finally, within the massive literature on interlocking directorates, work by Mintz and Schwartz (1985), Mizruchi (1982), and Roy and Bonacich (1988) borrows from both the resource dependence and social class perspectives, as does the more recent work on corporate behavior by Ornstein (1984), Palmer, Friedland, and Singh (1986), and Mizruchi (1989, 1992). Although we try to keep the three theoretical frameworks distinct in the review that follows, in reality, much of the research in this field defies easy categorization.

### *GLOBAL NETWORK STRUCTURES*

Researchers have used both relational and positional methods to describe the global structure of networks. Relational techniques focus on direct ties between actors and often identify **densely** connected cliques of organizations using graph-theoretic techniques. A widely

used algorithm developed by Alba (1973), for example, was based on the identification of "maximal complete subgraphs," or groups in which each actor is tied to every other actor (see also Mokken 1979). Positional techniques focus on ties to third parties and identify actors that are "structurally equivalent," that is, have identical relations with other members of the group (Lorrain and White 1971). One popular structural equivalence implementation, based on discrete distance, is blockmodeling, developed by White, Boorman, and Breiger (1976); another is a clustering approach based on continuous distances, employed by Burt (1982).

#### *RELATIONAL TECHNIQUES FOR THE STUDY OF GLOBAL STRUCTURES*

The classic study by Sweezy (1953), in which the American business community was found to be organized into a series of interest groups dominated by a major family or financial institution, provided the impetus for network analyses of interlocking directorates. In one of the first such studies, Levine (1972) employed multidimensional scaling to produce a spherical mapping of the relations among 70 large U.S. nonfinancial firms and 14 large financial institutions. Levine found that the firms were organized into a series of geographically based clusters centered around financial institutions. Sonquist and Koenig (1975) employed graph theory to analyze the interlocks among 797 large U.S. firms. Using the algorithm developed by Alba (1973), they identified 32 cliques of varying size and density, most of which were, as in Levine's study, regionally based with a bank in the center. A pioneering study by Dooley (1969) found geographically based cliques using a similar technique. Fennema and Schijf (1979) and DiDonato, Glasberg, Mintz, and Schwartz (1988) provide comprehensive reviews of this early work on interlocks.

Researchers using relational techniques have also studied organizational fields at the community level. Using smallest space analysis, Laumann and Pappi (1976) looked at the overlapping memberships among 65 organizations. They found that highly specialized organizations tended to occupy the periphery of the network, with more integrative organizations in the center. In a related study, Galaskiewicz (1979) focused on the flows of money, information, and support among 73 organizations in a midsized American community. Galaskiewicz

found considerable clustering by functional areas, with coordinating organizations again in the center of the networks. In a similar study, Rogers (1974) found homogeneous clusters of agricultural, social welfare, and environmental organizations. These studies suggested that differentiation was based primarily on activity or functional area, with similar organizations at a shorter social distance from one another.

#### *POSITIONAL TECHNIQUES FOR THE STUDY OF GLOBAL STRUCTURES*

Researchers have also employed positional approaches to study the global structure of networks. Breiger, Boorman, and Arabie (1975) reproduced Levine's findings, using blockmodels to identify clusters of firms. Allen (1978) factor analyzed the interlock matrix among 250 large U.S. corporations in both 1935 and 1970. He also found a structure of geographically based groups, often led by a financial institution. He argued that, because the groups in 1970 were less discrete than those in 1935, the corporate elite structure had become more diffuse.

Positional techniques have also been used at the community level. Knoke and Rogers (1979) constructed blockmodels of a network of 159 public and private agencies in 16 Iowa counties. In contrast to the research described above, they found little homogeneity within blocks and considerable diversity in the relations among blocks. However, in a principal components analysis designed to identify structurally equivalent actors, Galaskiewicz and Krohn (1984) found that clusters in two communities were composed of organizations having similar activities. They also found a distinct hierarchical ordering among positions, with organizations in the most dominant positions having reputations for being more influential in community affairs. Finally, Knoke and Wood's (1981) and Knoke's (1983) analyses of networks of money, information, and support of 32 and 70 social influence organizations, respectively, also produced homogeneous clusters based on the groups' activities.

Despite the apparent differences between relational and positional clustering techniques, they have consistently yielded similar results. In studies of interlocking directorates, both techniques have identified geographically based clusters, with banks among the most central

firms. Allen (1982) compared his factor analysis results with those based on a hierarchical cluster analysis and found striking similarities between the two. In community studies based on a variety of inter-organizational relations, both techniques grouped together organizations of similar types. One reason for the convergence between the two approaches is that members of maximal complete subgraphs automatically share a certain number of ties in common (the other members of the subgroup). This increases the likelihood that they will be structurally equivalent in terms of the larger network (Mizruchi 1984). Burt (1982) argued that relational clustering techniques could be viewed as a subset of positional techniques. Some authors dispute this claim, however (Wasserman and Faust 1993).

Global analyses of interorganizational networks have provided detailed and provocative descriptions of the structure and differentiation within networks. They have failed to provide systematic evidence on the origins or behavioral consequences of these structures, however. We shall address these issues in the following sections.

### *THE EMERGENCE OF INTERORGANIZATIONAL NETWORKS*

Laumann, Galaskiewicz, and Marsden (1978) criticized the literature on interorganizational relations for ignoring the factors that lead to the creation of global networks. Several studies have taken on this challenge, however (Schermerhorn 1975; Van de Ven 1976; Oliver 1990). In this section, we examine (a) the effect of organizations' positions in the economy on the formation of interfirm ties, and (b) the effect of ties between individuals in different organizations on the formation of cooperative relations at the interorganizational level.

### *POSITION IN THE ECONOMY AND INTERFIRM TIES*

Several studies hypothesized that firms with high levels of dependence on external financing would be more likely to have representatives of financial institutions on their boards. The findings of these studies have been equivocal, however. Analyses by Dooley (1969), Pfeffer (1972), Pfeffer and Salancik (1978), Mizruchi and Stearns (1988), and Lang and Lockhart (1990) supported this contention. But

Allen (1974) failed to find support, and Pennings (1980) found mixed levels of support, depending on the measure of capital dependence.

Burt (1983) showed that one could predict interlocks at the level of the establishment by examining the structure of economic transactions at the industry level. An industry has high "structural autonomy," according to Burt, to the extent that its own concentration is high and the concentration of the industries with which it transacts business is low. Burt showed that an industry's structural autonomy is positively associated with its profitability (see Ziegler 1984 for a similar study of Germany). He argued further that establishments in industry A will attempt to co-opt representatives of establishments in industries that exert market constraint on A's profits. Burt's findings indicate a positive association between constraint and director interlocks between firms in different industries.

Burt's findings on profitability and concentration echo those produced by industrial organization economists (Scherer 1980) and resource dependence theorists (Pfeffer and Salancik 1978). The unique aspect of Burt's model is the explicit attempt to conceptualize interindustry transactions as a social structure. An industry's ability to provide a resource on which other industries are dependent (that is, its centrality in interindustry transaction networks), and its own social structure (its level of concentration), are the bases for its profitability. Similarly, industries that are constrained are compelled to co-opt those upon whom they are dependent.

As noted earlier, researchers in the social class tradition have argued that interlocks are based more on social class ties than on organizational resource needs. Based on this suggestion, a novel test of the resource dependence model was proffered by Koenig, Gogel, and Sonquist (1979), Ornstein (1980), and Palmer (1983): If interlocks between firms reflect ongoing business relations, then ties that are accidentally broken (through death or retirement) should be replaced. These studies indicated, however, that the vast majority of accidentally broken ties were not replaced. This suggested to some that the resource dependence model of interlocking was inadequate.

These claims were moderated in subsequent studies, however. Ornstein (1984) and Palmer et al. (1986) refocused their attention onto the determinants of the reconstitution that did exist. Stearns and Mizruchi (1986), meanwhile, argued that the resource dependence



model would not necessarily suggest that most broken ties would be reconstituted. For one thing, some firms will replace a broken tie by establishing a new interlock with a different firm in the same industry, creating what Stearns and Mizruchi call a functional, as opposed to a direct, reconstitution. Moreover, a tie may not be reconstituted when broken, but it may still, at one time, have been indicative of a dependence relation between firms. Nor does failure to reconstitute a tie guarantee that the newly established interlock will not reflect a resource dependence relation. In recent years, most researchers have emphasized the compatibility of the resource dependence and class models (see Ornstein 1984, p. 230; Palmer et al. 1986; Mizruchi 1989), although occasional debates still take place (see Pfeffer 1987; Soref and Zeitlin 1987).<sup>2</sup>

#### *NETWORKS AMONG PERSONS AND COOPERATIVE INTERORGANIZATIONAL RELATIONS*

Granovetter (1985) argues that organizational decision makers use their social networks to overcome the uncertainty and distrust that often plague market exchanges. In this respect, social networks are a means of reducing transaction costs. This can be seen as a trade-off: enter the marketplace and incur the costs of verifying the credibility of prospective partners and/or hammering out detailed contracts; or enter into business relations with firms and people one already knows and trusts (or who have honorable reputations), and hope that the savings in transaction costs will offset the higher price that one may pay for goods and services.

In a study of firms' relations with investment banks, Baker (1987b) showed how pre-existing ties between companies and the interpersonal ties of company employees influence subsequent cooperative relations. Baker's financial officers also reported that their firms often used nonmarket ties (such as family, business and professional, and college and professional school ties) to reduce uncertainty and ensure satisfactory performance when assembling the financing for a deal. This latter finding again suggests that existing social networks influence subsequent interorganizational relations.

Much of the new work on intercorporate relations outside of North America has attempted to account for the character of global network

structures. Scott (1987), for example, showed that the different forms of interfirm relations in Britain, France, and Germany can be traced to their three distinct paths of historical development: (a) the "entrepreneurial" system in Britain, in which development was generated by small, family-owned firms; (b) the "holding" system in France, characterized by a series of interest groups centered around specific family or financial interests; and (c) the "hegemonic" system in Germany, based on alliances of large banks and commercial firms, by means of shared loan consortia, stockholding, and director interlocks (see also Stokman, Ziegler, and Scott 1985). Much of the new institutional research on interfirm structures in East Asia attempts to account for variations in network structures (see, for example, Hamilton, Orru, and Biggart 1987; Gerlach 1992; see Scott 1991 for a review of this literature).

#### *EFFECTS OF NETWORK POSITION ON ORGANIZATIONAL BEHAVIOR AND STRATEGY*

Once interorganizational networks are in place, they influence subsequent organizational behavior and strategy. We believe that the consequences of network ties remains the key issue in demonstrating the value of network analysis. Research has focused on the effects of interorganizational network structures on four outcomes: organizational power, performance, strategic decision making, and noneconomic activities such as philanthropy and political contributions.

#### *NETWORK DETERMINANTS OF POWER*

Interorganizational network analyses have repeatedly demonstrated a correlation between centrality and power. Both Laumann and Pappi (1976) and Galaskiewicz (1979) found that the more central the organization, the greater its reputation for influence in community affairs or in a functional area (see also Miller 1980; Boje and Whetten 1981; Knoke 1983; Perrucci and Lewis 1989). As Galaskiewicz (1979) noted, it was not the level of resources per se that determined an organization's power, but rather "the set of resources that actors [could] mobilize through their existing set of social relationships" (p. 151).

The way in which network centrality is measured can influence one's substantive conclusions. Moving beyond measures based on the raw number of ties, Bonacich (1972) adapted an eigenvector measure that took into account the centrality of those with whom one was tied, and Freeman (1979) presented a measure based on actors' "betweenness." More recent modifications include those by Mizruchi, Mariolis, Schwartz, and Mintz (1986), Bonacich (1987), Stephenson and Zelen (1989), Tam (1989), and Friedkin (1991).

Mizruchi and Bunting (1981), for example, examined a network of 166 large firms in 1904 using four measures, including three variants of the Bonacich eigenvector measure. As they moved from the least to the most sophisticated of the four measures, the centrality of firms in the network shifted sharply. Mintz and Schwartz (1985) distinguished between "hubs" (units tied to many less central units) and "bridges" (units tied to a few highly central units). And Mizruchi et al. (1986) introduced the distinction between "reflected" and "derived" centrality, the quantitative analogues to hub and bridge centrality. In a study of major American railroad companies between 1886 and 1905, Bonacich and Roy (1986) examined the relations between centrality (using Bonacich's measure) and power. Using financial control over other railroads as their indicator of power, they found that centrality in the entire network was a poor predictor of power, but that centrality within one's interest group (identified by a latent class analysis) was a strong predictor. This suggested that centrality will be a poor predictor of power if the network is highly fragmented, as was the system they studied. Although numerous studies have found positive associations between centrality and power, then, these findings must be interpreted with care. The effects may depend on the way centrality is measured.

#### *NETWORK DETERMINANTS OF ORGANIZATIONAL PERFORMANCE*

If interlocking is a successful method of co-optation, then *ceteris paribus*, heavily interlocked firms should be more profitable than less interlocked firms. Studies of the effect of interlocking on profitability have been inconclusive, however. Burt (1983) found that once market constraint among industries was controlled, the effect of interlocking on profits was nearly zero. Pennings (1980), employing a variety of

indicators of both interlocking and profitability, found similarly inconclusive results. On the other hand, using the concept of enterprise groups, or groups of firms tied together through ownership and directorate ties (Berkowitz, Carrington, Kotowitz, and Waverman 1979), Carrington (1981) found a positive association between interlocking and profitability. And Meeusen and Cuyvers (1985) found a positive association between interlocks with banks and profitability in Belgium and the Netherlands (although they also found a negative relation between interlocks with financial holding companies and profitability).

One problem with the interlock-profits link is that heavily interlocked firms are often those that are in financial difficulty (Dooley 1969; Meeusen and Cuyvers 1985, p. 63; Mizruchi and Stearns 1988; also Boeker and Goodstein 1991 on hospitals). Mintz and Schwartz (1985) suggest that representatives of a firm's banks often take seats on a firm's board during financial crises. This suggestion was supported in interviews with bankers conducted by Richardson (1987). The possibility that interlocks can be indicative of financial distress as well as strength suggested the possibility of a curvilinear relation between interlocking and profitability. Bunting (1976) proposed an inverted U-shaped model of the interlocking-profitability relation. The results of his analysis of 167 large U.S. firms in seven different years between 1904 and 1974 provide support for the model. Richardson (1987) applied a cross-lagged panel model to data on 200 large Canadian firms to examine the simultaneous effects of interlocks on profitability and vice versa. His findings confirm those of Dooley (1969) and Mizruchi and Stearns (1988), that interlocking is a result of low or declining profits. Richardson found no support for the view that interlocking improved subsequent profitability, however.

It appears that interlocking directorates have little impact upon profits among U.S. firms. Interlocks may, however, have a positive impact on profits in nations in which the division of labor among financial institutions differs from that in the United States, such as Canada, Belgium, and the Netherlands. Perhaps alternative types of interorganizational relations, such as joint ventures, equity sharing, or long term contracts between suppliers and customers have a more consistent impact on performance, but this has yet to be demonstrated empirically.

*NETWORK DETERMINANTS OF CORPORATE STRATEGIES*

Researchers within the resource dependence, social class, and institutional models have had a long-standing interest in organizational behavior and corporate strategy. If networks bind and constrain, as well as provide opportunities for interaction, as suggested by Granovetter (1985), then an organization's network position should influence its behavior and strategies.

Indeed, researchers have discovered several ways by which networks influence strategies. Ratcliff (1980), for example, showed that banks embedded in local networks of interlocking directorates, and whose directors were members of prominent social clubs in St. Louis, were more likely to engage in lending to corporations and less likely to engage in mortgage lending than banks that were peripheral in these networks. Palmer, Friedland, Jennings, and Powers (1987) found that firms that were owned and controlled by either family coalitions or banks were less likely to employ the multidivisional form than firms that were management controlled. In a study of the use of "greenmail," the private repurchase of company stock, Kosnik (1987) found that firms that resisted greenmail had more outside directors and more directors who represented firms with which the focal firm had transactions than did firms that paid greenmail. Studies by Cochran, Wood, and Jones (1987), Singh and Harianto (1989), and Wade, O'Reilly, and Chandratat (1990) found that the proportion of outside directors on a firm's board was positively associated with the existence of "golden parachute" policies for the firm's top executives. Davis (1991), in a study of the adoption by firms of takeover defenses (known as "poison pills"), found that firms were more likely to adopt poison pills when they shared directors with firms that had already adopted. Baysinger, Kosnik, and Turk (1991) found a negative association between the proportion of outside board members and firms' research and development expenditures. And Goodstein and Boeker (1991) found an association between changes in corporate governance (including board structure) and changes in strategies relating to service delivery among hospitals.

Research has also shown that networks influence the ways in which organizations secure resources. Stearns and Mizruchi (forthcoming) showed that the type of financial institution represented on a nonfinancial firm's board is associated with the type of financing the firm

employs. Firms with insurance company officers on their boards, for example, were more likely to employ long-term debt, the form in which insurance companies specialize. Firms with commercial bankers on their boards were more likely to employ short-term debt.

A familiar prescription in the strategy literature is that firms diversify their portfolios to minimize dependence on any one source. In a study of the relations between 18 agencies and their United Fund in 66 cities, Pfeffer and Leong (1977) found, as predicted by the resource dependence model, that the relation between outside funds raised and allocations from the United Fund was larger for agencies that were less dependent upon the Fund and on whom the Fund was more dependent (see Provan, Beyer, and Kruytbosch 1980). In a study of firms' use of investment banks, Baker (1990) found that firms with relatively low levels of debt and without high dependence on a single investment bank were more likely to establish relations with many investment banks. This improved their ability to manage their transactions.

#### *NETWORK DETERMINANTS OF PARTICIPATION IN NONECONOMIC ACTIVITY*

As noted above, proponents of the social class model have suggested that interlocking directorates reflect the presence of a dominant class that exercises power in the cultural, social, and political arenas. The first attempts to assess this argument focused on individuals who sat on multiple corporate boards. Useem (1979) and R. E. Ratcliff, Gallagher, and K. S. Ratcliff (1979) found that interlocked directors were disproportionately involved in leadership positions in cultural, philanthropic, and policy-making organizations (see also Moore 1979). Ogliastri and Davila (1987) have identified a similar pattern in Colombia. Taira and Wada (1987) provide a fascinating discussion of the career life-cycle patterns of Japanese elites. Noting that elites generally begin their careers in government positions and then move to positions in private industry, Taira and Wada suggest that this places enormous pressure on government to be subservient to business. These studies, however, focused on the role of individuals in organizations rather than on organizations per se.

Social networks can also be important in the corporate funding of nonprofit organizations. Galaskiewicz (1985a, 1985b) found that

firms whose executives were enmeshed in the social networks of the Minneapolis-St. Paul philanthropic elite gave more money to charity than did more peripheral firms. Galaskiewicz and Wasserman (1989) showed that companies gave more money to specific charitable organizations if those organizations were previously funded by firms whose CEO or giving officer was socially tied to the donor's CEO or giving officer. Given the reluctance of firms to give away profits, peer pressure was an important factor in stimulating charitable contributions. In deciding to whom to contribute, it made more sense to rely on the "good word" and "good deeds" of those one knew and trusted than to try to verify the credibility of the nonprofit on one's own.

Mizruchi (1989, 1992), has shown that networks can affect firms' political behavior. Based on a model derived from the resource dependence and social class models, Mizruchi found that market constraint between firms was positively associated with the similarity of firms' political contribution patterns. In addition, firms that had indirect interlocks through banks and insurance companies (and thus were more structurally equivalent) were more likely to contribute to the same candidates than were firms that were tied to one another. One possible reason for this finding is that structurally equivalent actors are in contact with a large number of similar sources of influence. Alternatively, actors that are in similar structural positions may, as a result of competition, strive to emulate one another, as suggested by Burt (1987).

Analysts have also attempted to link network position with economic and political power. Wallace, Griffin, and Rubin (1989), borrowing from Perrone (1984), argued that the power of labor across industries was a function of workers' ability to disrupt the operation of the economy, which was viewed as a function of the industry's centrality in the network of interindustry transactions. As expected, they found that workers in central industries had higher wages than workers in peripheral industries.

Jacobs (1988) argued that the political power of business should vary as a function of its level of social organization. Employing a longitudinal design, he operationalized business power in terms of corporate tax rates, based on the assumption that powerful groups will pay lower taxes. The social organization of business was operationalized in terms of the concentration of assets among the largest 100 U.S.

manufacturing firms. Consistent with his prediction, Jacobs found that corporate tax rates declined as concentration increased. Along a similar line, Mizruchi (1992, ch. 8) has shown that industries with high levels of concentration and whose largest members contribute to the same political candidates are more likely to be successful in securing the passage of relevant legislation in Congress.<sup>3</sup>

### *DISCUSSION*

Despite the extensive research showing that networks have consequences for organizational behavior, only recently have sociologists begun to examine the role that networks play in the formation and operation of markets. White (1981, 1988; Leifer and White 1987) has suggested that producers in a market select appropriate niches based on the volume-revenue curves of the other members of one's industry. Thus a firm's relation to other producers in its industry, rather than information about demand for its product, becomes the determinant of the firm's production and price schedule. Berkowitz (1988) and Friedmann (1988) have provided important reconceptualizations of markets at the interfirm and international levels, respectively. In his recent work on "structural holes," Burt (1992) notes that strategically located firms can restrict the flow of information in markets. And Baker (1984) has shown that, on the floor of the Chicago stock exchange, the size, density, and fragmentation of various communication networks affect the volatility of prices.<sup>4</sup>

Other topics that would benefit from further applications of network analysis include sponsorship events, joint ventures, public-private partnerships, and other short-term cooperative efforts between organizations (Faulkner and Anderson 1987). The literature on governmental and nonprofit organizations is replete with studies that show that network ties are crucial in overcoming interorganizational collective action problems (see Turk 1977; Rogers and Whetten 1982).

### *CONCLUSION*

Network analysis has had a growing impact on the field of interorganizational relations, contributing to research within the resource



dependence, social class, and institutional models. This approach has allowed us to understand the ways in which organizational decision making is embedded in social structures, at both the interpersonal and interorganizational levels. Administrators and executives are enmeshed in an elaborate network of social relations both within and across organizations. Whether they are viewed as benefits or obstacles, these networks influence the choices and strategies that organizational decision makers pursue.

The network perspective has also allowed analysts to predict how organizations will behave in response to power-dependence relations. Extensive research has demonstrated that organizations will seek to co-opt the sources of external threats (Pfeffer and Salancik 1978; Burt 1983). The network approach has enabled us to identify and operationalize the sources of these threats. Centrality within a network of resource transactions gives actors an edge in bargaining, for example. Many, if not most, studies within the resource dependence tradition now take into account an organization's network centrality as well as its structural position.

Network analysis has also made contributions to both institutional theory and the social class model. It has informed the study of mimetic behavior among firms (DiMaggio and Powell 1983) and has enabled researchers to specify precisely how contagion takes place—whether through direct contact among agents (Galaskiewicz and Wasserman 1989) or through contact with the same, or similar, third parties (Galaskiewicz and Burt 1991; Mizruchi 1992). And it has enabled researchers to demonstrate the economic and political consequences of social relations among firms (Ratcliff 1980; Clawson and Neustadt 1989; Mizruchi 1992).

Network analysis has begun to infiltrate the population ecology model as well. This link was first suggested by Aldrich (1982) and McPherson (1983). DiMaggio (1986) argued that the population ecology concept of a "niche" can be operationalized as a group of structurally equivalent organizations. Burt (1992) has developed this idea in his recent work on market niches. And Miner, Amburgey, and Stearns (1990), in a study of Finnish newspapers over a 200-year period, have shown that network ties can affect the likelihood of survival among firms and thus influence an industry's long-run population dynamics.

The study of interorganizational relations has benefited greatly from network analysis, but much remains to be done. Although a dialogue has developed between network analysis and the transaction cost model (Aldrich 1982; Burt 1983, pp. 72-74; Granovetter 1985; Powell 1990), we have found no studies that test whether social relations across organizational boundaries affect make or buy decisions (such as those studied by Walker and Poppo 1991). We would expect this effect to exist given the importance of uncertainty and the potential for opportunism in such situations. In the coming years, we envision a more careful mapping of interfirm joint ventures and equity arrangements (Powell 1990), a more careful analysis of network position and corporate performance, more work on the use of interpersonal networks to gain access to capital and other scarce resources, and more sophisticated efforts to describe market structures.

## NOTES

1. Baker (1987a) has described the definition of money as the nature of transactions between sectors of the financial community and the institutions that are in positions to determine this definition. Fombrun and Shanley (1990), based on a *Fortune* survey of corporate executives, found that firms' reputations for quality and their financial conditions were associated with their conformity to socially defined norms such as charitable contributions.

2. In an important study of broken ties in the Netherlands, Stokman, Van der Knoop, and Wasseur (1988) argued that the nature of executive career patterns and the limited pool from which directors are recruited play a major role in the extent of reconstitution. Their study adds an additional dimension to resource dependence and social class models of interlocks. See Zajac (1988) for a related argument.

3. See Knoke (1993 this volume) for a thorough review of work on interorganizational influence networks and power.

4. In a survey of investors, Shiller and Pound (1989) found that decisions to purchase stock were influenced by word-of-mouth communication.

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