Social Networks, CEO Background, and Corporate Financing: A Dyadic Analysis of Similarity of Borrowing by Large U.S. Firms, 1973-1993[*]

Mark S. Mizruchi

University of Michigan

Linda Brewster Stearns

University of California, Riverside

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ABSTRACT

Organizational researchers have increasingly demonstrated that social relations among firms are associated with various organizational strategies. In this paper we examine the extent to which economic, organizational, and social network factors affect the use of debt financing by large American corporations. Examining the more than 43,000 dyadic relations among 165 large U.S. firms at five time points over a 20-year period, we find that pairs of firms that have director interlocks, similar numbers of financial institution representatives on their boards, and CEOs with career backgrounds in finance and accounting were more likely than firms without these qualities to engage in similar levels of borrowing between 1973 and 1983. In the 1988-1993 period, however, financial factors such as similar levels of retained earnings and similar recent performance took on a more important role in predicting similarity of borrowing, while the social network factors became less significant. Further analysis suggests that pressures brought on by the merger movement of the 1980s and the increased external monitoring of firms by the financial community in the early 1990s may have led to the increased relative importance of financial versus social factors. We conclude that corporate financing is socially embedded, but this embeddedness is historically contingent.

In the past two decades, organizational theorists have increasingly turned their attention to the social embeddedness of firm behavior. The acknowledgement that firm strategies are affected by both their location in interorganizational networks and by the meaning systems that frame their managers' decision making options has taken a prominent place within the organizational literature. This approach has been applied to a broad range of topics, including, to name just a few, mergers and acquisitions (Haunschild, 1993; Stearns and Allan, 1996; Palmer and Barber, 2001), adoption of the multidivisional form (Fligstein, 1985; Palmer, Jennings, and Zhou, 1993), takeover defense strategies (Davis, 1991), board-CEO relations (Wade, O'Reilly, and Chandratat, 1990; Zajac and Westphal, 1995; Westphal and Zajac, 1997; Geletkanycz and Hambrick, 1997), and even firms' decisions to move from the NASDAQ stock market to the New York Stock Exchange (Rao, Davis, and Ward, 2001).

Although organizational researchers have become increasingly bold in terms of the firm strategies they have studied, there are some issues that are assumed to remain the purview of economists, and have therefore attracted little attention. One of these issues involves the ways in which firms manage their capital; that is, the basis on which firms determine their financing strategies. In this paper, we apply the tools of organizational analysis to address this most "economic" of topics. We examine the extent to which intra and interfirm social relations affect firms' use of external debt financing. Using data on large American corporations over a 20-year period, we develop a series of hypotheses about the factors that account for the similarity of financing strategies among firms.

A small but growing literature on financing has recently emerged in organizational research. Most of this work involves the analysis of credit and the effectiveness of credit-rating systems (Carruthers and Cohen, 2001; Guseva and Rona-Tas, 2001) or the acquisition of venture capital (Podolny, 2001; Sorenson and Stuart, 2001). Uzzi (1999) has examined the determinants of whether "mid-market" firms gain access to capital, as well as the interest rate on the funds they borrow. He has shown that the social relations between firms and their banks have significant effects on both of these variables. While Uzzi's concern is with whether middle-sized firms are able to acquire capital and if so, the price that they pay for it, our study examines

the largest U.S. corporations, for whom access to capital is less problematic. We focus on firms that are able to borrow, and for whom the level of external financing is a strategic decision. Because our data cover a 20-year time frame, we also examine whether the determinants of firms' borrowing decisions vary over time. As we show, the effects of social network and financial variables on firm financing are historically contingent. We argue that the variations in these effects over time were a consequence of the changing character of the pressures that firms faced from their capital suppliers and the capital market.

CORPORATE FINANCING AS AN ORGANIZATIONAL STRATEGY

All firms, regardless of industry, require capital. If firms had sufficient levels of cash generated from retained earnings, there might be no need to raise external funds. Firms could borrow when interest rates were favorable, while investing their cash in alternative outlets, or they could use their cash for expansion and eschew external financing altogether. The extent to which American corporations have depended on external financing has been the subject of debate for much of the twentieth century (Berle and Means, [1932] 1968; Lintner, 1959; Mintz and Schwartz, 1985). Most observers now acknowledge that this dependence has fluctuated over time (Stearns, 1986; Stearns and Mizruchi, 1993a). Regardless of how much external financing firms require, it is clear that they engage in a substantial amount of it.

Corporations can raise external capital in a number of ways, and the types and complexity of financing have increased significantly in recent years. Traditionally, three mechanisms have pervaded: equity, short-term notes, and long-term bonds. Equity is the issue of stock. As corporations emerge from birth, they will often make an initial public offering (IPO) to raise the capital necessary for continued expansion.[1] Existing public corporations will also issue stock as a means of acquiring additional capital. Among the largest American

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[1] In recent years IPOs have also been associated with leveraged buyouts and subsidiary spinoffs. In the case of leveraged buyouts, after taking firms private, many financiers have turned around and taken the

corporations, equity has not been a dominant form of financing, accounting for no more than 15 percent of long-term financing in the United States between 1945 and 1980 (Stearns, 1986) and for no more than 17 percent during the 1980s. Even with stocks at historically high prices, equity equaled less than 18 percent of corporate long-term financing between 1990 and 1999.

Short and long-term debt have been the primary means of corporate financing. Short-term debt is debt payable within one year. This is usually used for immediate needs, such as financing in peak manufacturing or selling cycles, financing shipment or storage of goods, and to cover cash needs when long-term financing is unavailable. Much, although not necessarily all, of these funds come in the form of loans from commercial banks or commercial paper sold in public capital markets. Short-term debt can also include what is called trade credit, in which a supplier "lends" goods to the firm on the promise of future payment. Long-term debt is debt with a maturity date of more than one year. This form of debt tends to be for larger, more extensive projects such as expansion of production facilities or acquisition of another firm. Long-term debt has several forms, including privately-placed bonds (often handled by insurance companies), term loans (usually issued by commercial banks), and public bonds (typically placed by investment banks). Stearns and Mizruchi (1993a) provide a more detailed discussion of types of financing and the division of labor among financial institutions.

Although these different forms of external financing may have different purposes and different sources, each is ultimately the result of a decision by managers, whether the firm's chief financial officer or the CEO or alternative official. Just as corporate managers make decisions on whether to acquire another firm, relocate a production facility, or adopt an alternative organizational structure, they also make decisions on how they will finance each of their activities. If adoption of the multidivisional form is a strategy, so is the use of long-term debt as opposed to equity. As Barton and Gordon noted, "the question of how to finance the firm... represents a fundamental functional (financial) decision which should support and be consistent with the long-term strategy of the firm" (1987:67).

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company public, thereby "cashing in" on the subsequent IPO. In other cases, firms have placed their subsidiaries in the public market as a means of generating funds.

Finance economists have paid considerable attention to the ways in which firms structure their financing. A huge literature has emerged, in which economists attempt to identify optimal levels of debt and equity under varying conditions. Empirical research on actual firm financing has yielded less clear results, however. Stewart Myers (1984), in his Presidential address to the American Finance Association, suggested that financial economists knew little about how firms actually determined their financing strategies.

Myers himself came up with a model that is consistent with a considerable amount of organizational theorizing. Advancing what he called the "modified pecking order" theory, Myers suggested that given a preference, managers would apply internal financing, debt, and equity in that order. This hierarchy of preferences matched perfectly the level of managerial autonomy associated with them. By using retained earnings, the firm retains the highest level of autonomy, since there is no other organization to place restrictions on the firm's use of its capital. The use of debt, on the other hand, renders the firm potentially subject to the dictates, or at least the influence, of the lender. Banks routinely place restrictive covenants on their loans. These covenants, which may include limits on dividends paid to stockholders as well as restrictions on types of future debt, may restrict the firm's freedom of action. Equity creates an even greater potential loss of autonomy. If ownership becomes sufficiently concentrated, stockholders can begin to assert control over the firm's operation. As Useem (1996) has illustrated, this control has in recent years been more than hypothetical even for some of the largest American corporations.

Organizational theorists and transaction cost economists have maintained similar views regarding the use of internal financing. In the resource dependence model (Pfeffer and Salancik, 1978), firm managers will try to rely on internally generated resources to avoid dependence on external actors, in this case, banks and other financial institutions. In the transaction cost model (Williamson, 1988), managers try to avoid the use of external financing to the extent that the surrender of autonomy involved in their use exceeds whatever cost savings result. Because the use of internal financing removes the transaction costs involved in dealing with banks and other financial institutions, according to Williamson, firms will generally prefer this strategy. Both of these models yield predictions similar to those of the modified pecking order theory.

In a series of recent articles, Stearns and Mizruchi (1993a; 1993b; Mizruchi and Stearns, 1994) have shown that even controlling for a series of factors, firms' use of external financing was strongly affected by their level of retained earnings. In other words, firms that had high levels of cash tended to use it for their financing, even when the cost of capital was controlled. This finding is consistent with economic as well as organizational theory. The question that remains is whether organizational analysis can make a unique contribution to the study of corporate financing. Three findings from the Stearns and Mizruchi studies suggest that it can.

First, Mizruchi and Stearns (1994) showed, consistent with an argument by Fligstein (1990), that firms whose CEOs had their functional backgrounds in the financial wing of the firm were more likely than were other firms to use high levels of external financing. This finding suggested that the strategic orientation of a firm's leader, shaped by his or her experiences and resulting worldviews, played an independent role in the firm's handling of its financing. Second, Mizruchi and Stearns (1994) also showed that firms that had representatives of financial institutions on their boards of directors used higher levels of external financing than did firms without financial representation on their boards. This finding was consistent with the view that firms' social network ties within the business community can have an independent effect on their economic behavior. And third, related to the previous finding, Stearns and Mizruchi (1993a; 1993b) showed that the specific type of external financing a firm used, whether short-term debt, long-term public borrowing, or long-term private borrowing, could be accounted for by the specific type of financial representative who sat on the firm's board. Firms with commercial bankers (who specialize in short-term debt) on their boards used higher levels of short-term debt than did other firms. Firms with insurance company executives (who specialize in long-term private debt) on their boards used higher levels of long-term private financing than did other firms. And firms with investment bankers (who specialize in long-term public debt) on their boards used higher levels of long-term public financing than did other firms. These findings gave further specificity to the second one, by showing a match between a firm's behavior and the areas of expertise of its board members.

The Stearns-Mizruchi studies contain an important problem, however: the indirect means by which the embeddedness interpretation was tested. The authors assumed that the presence of a financial representative on the board conveyed information that led to a single, specific strategy: the use of higher levels of financing. It is possible that the bankers on a firm's board will advise the firm to borrow, in the same way that surgeons have a tendency to recommend surgery. On the other hand, there is no assurance that bankers will recommend higher levels of debt. Moreover, focusing only on the presence of financial representatives on a firm's board does not address the issue of whether a firm's borrowing, whether high or low, is affected directly by the behavior of firms to which it is socially tied. Two bankers, each of whom sits on the board of a different firm, might suggest very different strategies for the two firms, while bankers who sit on two or more boards might convey similar types of advice to each.

This leads us to consider an alternative approach. Instead of focusing on a firm's *level* of external financing, we propose to examine the extent to which pairs of firms engage in *similar* levels of financing, regardless of whether their individual levels are high or low. This approach is consistent with the existing organizational literature, in which researchers examine whether firms adopt the same behaviors (such as acquisitions or poison pills) as do the firms with which they are socially connected. Why groups of firms engage in similar financing strategies may also be explainable in terms of the firms' social relations with one another.

FINANCING AS AN ISOMORPHIC PROCESS

In a seminal article, Granovetter (1985) argued that economic behavior was embedded in networks of social relations. By this he meant that actions such as individuals' decisions to buy and/or sell, corporations' decisions to expand or downsize, or even state agencies' decisions on economic policy were made not in isolation, but were affected by the influences of those to whom decision makers were tied.

Granovetter's goal was to counter thinking, both economic and sociological, that viewed human behavior in isolation from its social context. Much economic theorizing assumes the presence of atomistic actors, who behave in accordance with exogenously formed utility functions. But much sociological theorizing, by treating internalized norms as the trigger for social action, assumes atomistic, voluntaristic action as well, Granovetter suggested. Using Williamson's (1975) transaction cost model as an illustration, Granovetter suggested that whether economic actors behaved opportunistically or cooperatively depended on the extent to which they had ongoing, non-instrumental social relations. The resulting feelings of trust developed over time, according to Granovetter, and served to mitigate the potential for opportunism. It is not that Williamson's account is wrong, therefore, but rather that it is contingent on the existence of social relations. Where these relations are absent, less trusting behavior of the type described by Williamson is more likely to occur (Uzzi, 1996).

But actors' embeddedness in social networks across firms affects not only their level of trust. It also conveys information and ideas about prescribed forms of behavior. Operating in an uncertain environment, firm officials look to their peers for ideas about appropriate strategies. In recent years, a number of studies have suggested that these strategies diffuse across interfirm networks. Galaskiewicz and Wasserman (1989) showed that firms' contributions to non-profit organizations in a major metropolitan area could be accounted for in part by the firms to which they were tied. Firm officials mimicked the contribution patterns of their peers, as a result of both direct discussion and observation. Mizruchi (1989; 1992) showed that corporate political contributions were affected by a range of interfirm ties. Firms that shared directors were more likely than unconnected firms to contribute to the same political candidates. Davis (1991) showed that firms were more likely to adopt "poison pill" takeover defenses when firms with which they shared directors had previously adopted them. Haunschild (1993) showed that firms whose officers sat on the boards of firms that had recently engaged in acquisitions were more likely to make acquisitions themselves. And Palmer et al. (1993; 1995) showed that firms' director ties with other firms affected their probablilty of adopting the multidivisional form and being the target of either friendly or hostile takeover bids. These studies suggest that

embeddedness in interfirm social networks has tangible effects on the choices that firm officials make.

Several of these studies (Davis, Haunschild, and Palmer et al. among those listed above) have been framed in terms of the adoption of an innovation. In Davis's study, for example, the adoption of a poison pill is a discrete event that follows the classic pattern of most diffusion processes. Strang and Soule (1998) review a wide range of studies that model organizational and other economic behaviors in terms of diffusion processes. Others (Galaskiewicz and Wasserman, 1989; Mizruchi, 1992) have examined similarities in general behaviors among firms, behaviors that constitute non-discrete events. All of these studies, however, either implicitly or explicitly treat similarity of behavior among firms as their outcome variable of interest.

This focus on behavioral similarity dovetails with a major theoretical statement in organizational sociology. In a now-classic article, DiMaggio and Powell (1983) argued that during the twentieth century, organizations increasingly came to resemble one another, a process they term (using ecological imagery) "isomorphism." DiMaggio and Powell outlined several sources of isomorphism, including competition, coercion, mimicry, and professionalization. Although this has been an extremely influential formulation, it has been criticized for understating the diversity of organizational forms and behaviors (Hannan and Freeman, 1989). One solution to this debate is to assume that isomorphism is neither prevalent nor rare, but rather, variable. In this way, we can focus on the factors that account for why isomorphism is greater in some situations than in others; in other words, the extent to which members of organizational fields develop similar structures or behaviors. This is what we propose to do in the present study. Following an increasingly used approach in organizational analysis, we examine the similarity of financing strategies between dyads (that is, pairs) of firms. We ask the question, "What determines the extent to which a given pair of firms uses similar levels of external financing?"

MODEL AND HYPOTHESES

Two major approaches have dominated the recent literature on the isomorphism of organizational strategies and structures: a neo-institutionalist model that focuses on the symbolic and cultural underpinnings of organizational behavior and a social network model that emphasizes the social structural constraints and opportunities that shape organizational action. Organizational researchers have also incorporated ideas from political sociology as well as from neoclassical and institutional economics. In an earlier paper (xxxx), we drew on these perspectives to develop a model of corporate financing. We posited four theoretically salient dimensions on which financing was based: the firm's anticipated return on a particular act of borrowing; the availability of internal funds; the strategic orientation of the firm; and the embeddedness of the firm's decision making apparatus. Because our primary focus in the present paper is on the ways in which socially constructed conceptions and interfirm relations affect the similarity of financing strategies, we shall derive our hypotheses from the latter two factors. Because it is also important to identify the extent to which similarity in financing strategies is accounted for by similarities in the firms' financial conditions, we shall include the similarity of anticipated return and retained earnings in our models. Theoretically, however, we are more interested in the effects of the firms' strategic orientations and network embeddedness. We discuss each of these factors in turn.

Strategic orientation of the firm. Both neoclassical and institutional economists believe that firms strive to maximize the efficiency of their operations and decisions. Economists and economic historians such as Chandler (1977), Williamson (1985), and North (1990) go so far as to suggest that economic institutions constitute efficient solutions to production and distribution problems. It is not necessary to believe that organizations and institutions are efficient to believe that actors view efficiency as a goal (Gibbons, 1999:146). Exactly what constitutes an efficiency maximizing solution is not always clear, however. Economic sociologists have suggested that what is viewed as an efficient solution is both socially constructed and historically specific: socially constructed in that actors may collectively come to believe that an approach is efficient, even when there is no objective evidence that this is the

case (McGuire, Granovetter, and Schwartz, 1993); historically specific in that what is collectively identified as an efficient solution at one point in time may be very different from what is viewed as efficient at another point (Fligstein, 1990).

Fligstein (1990) has argued that during the course of the twentieth century, the definition of the most efficient way to organize and operate a firm (what he calls a "conception of control") underwent a series of shifts. In the early part of the century, the American firm was viewed primarily from the perspective of the productive process, which Fligstein calls the manufacturing conception of control. Beginning in the 1920s, through the 1950s, firms focused their attention primarily on distribution, which Fligstein calls the sales and marketing conception of control. From the 1960s onward, firms focused less on what they produced or how they distributed the product and more on accumulating profits by whatever means possible, without regard to industry or product, a process Fligstein calls the finance conception of control.[2]

Among Fligstein's arguments is that the firm's conception of control will be reflected in the functional background of its chief executive officer. Firms that operate under a sales conception of control, for example, will tend to be led by CEOs whose origins were in the sales and marketing wing of the firm (or another firm). Fligstein also suggests that firms operating under a finance conception of control will have higher levels of external financing, a necessary component to their tendency to engage in frequent acquisitions (1990:15). If this is the case, then firms whose CEOs come from backgrounds in a finance or accounting wing will have higher levels of external financing than firms whose CEOs originate in other functional areas. Mizruchi and Stearns (1994) found support for this suggestion in their study of the borrowing behavior of 22 large American corporations from 1956 through 1983.

This argument is also consistent with DiMaggio and Powell's (1983) discussion of normative isomorphism. In DiMaggio and Powell's view, one source of the similarity of firm behavior is the process of common socialization processes that CEOs experience. These

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[2] Given the deconglomeration among American firms in the early 1990s, as well as the renewed emphasis on "core competence," it is unclear how long this third conception has existed, and whether it has been replaced by a fourth approach. Regardless of what applies to the post-1990 period, this overall description corresponds with much of what is known about the economic history of the twentieth century United States.

common processes may occur as a result of having gone to school at similar periods or from engaging in similar kinds of tasks. It follows from this argument that firms whose CEOs have had common functional backgrounds should be more likely to engage in similar behavior than will firms whose CEOs come from different backgrounds. With regard to financing in particular, if, as Fligstein suggests, firms with CEOs from finance backgrounds have higher levels of external financing than do firms with CEOs from other backgrounds, then we would expect pairs of firms in which both CEOs come from finance backgrounds to exhibit similar levels of borrowing. This suggests the following:

> H1: Pairs of firms whose CEOs have functional backgrounds in finance or accounting will exhibit more similar levels of borrowing than will pairs of firms in which one or both CEOs have functional backgrounds in other areas.[3]

Embeddedness of the firm's decision making apparatus. As we noted above, a basic tenet of economic sociology is the idea that the behavior of firms is socially embedded. We have argued that if this proposition is correct, then financing decisions by firms should also be affected at least in part by the firms' social ties with other firms. The most commonly studied type of social tie between firms is the interlocking directorate, which occurs when a director of the board of one firm sits on the board of another. Interlocks have been shown to affect a wide range of corporate behaviors, including mergers and acquisitions, adoption of takeover defense strategies, adoption of the multivisional form, and political contributions. Mizruchi (1996) provides a review of this literature.

Interlocks among the largest corporations provide a forum for officers of several major firms to meet. As board members discuss issues of relevance to the focal firm, those who sit on

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[3] Although we are predicting that dyads in which both CEOs hail from finance backgrounds will behave more similarly than will dyads without such properties, it is possible, based on DiMaggio and Powell's argument, that dyads in which CEOs have common functional backgrounds in either manufacturing or sales might also engage in similar financing strategies. Because, unlike in the case of finance CEOs, it is unclear why manufacturing or sales CEOs would have any particular propensity toward a particular *financial* strategy, we decided to focus only on common finance CEOs. As an empirical check on Hypothesis 1,

the boards of other firms have experiences and insights from which they can draw. Haunschild (1993) found that firms whose CEOs sat as outside directors on the boards of firms that had recently acquired another firm were more likely to engage in subsequent acquisitions themselves. Davis (1991) found that firms whose directors sat on the boards of firms that had recently adopted a poison pill were more likely to adopt a poison pill themselves. It appears that in both of these cases, the interlocks served as devices for the transmission of information. Exposure to the strategies of other firms increased the probability that firms would adopt similar strategies.

Given the potential for discretion in financing decisions, it is possible that just as ideas about acquisitions or structuring decisions may disseminate through interlocks, so might ideas about financing strategies. A firm's decision to embark on a major new venture, for example, will quite likely generate questions about financing. Various strategies for acquisition of capital would therefore be a logical subject for discussion at board meetings. We therefore suggest that the presence of shared directorships may be a factor in the isomorphism of firms' financing strategies. This suggests the following:

H2: Pairs of firms with board of director overlaps will exhibit more similar

levels of borrowing than will pairs of firms without such overlaps.

Although we hypothesize that direct interlocks between firms will have a positive effect on the similarity of financing strategies, it is not the only network effect that is potentially important. There are several ways in which firms can be defined as interlocked. The most basic, as in our previous example, is the case in which a member of firm A's board sits on the board of firm B. This is a direct interlock between firms A and B. It is also possible that members of the boards of firms A and B do not sit on each other's boards, but sit together on the board of firm C. In this case, firms A and B could be viewed as interlocked, but indirectly, through C, rather than directly with one another. Useem (1984) has suggested that one benefit of interlocks is that they provide what he calls "business scan," that is, the ability to gain

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however, we examined the effects of common CEO backgrounds in all functional areas, not just finance. None of these models yielded a significant coefficient. The analyses are available on request.

information across a wide range of firms. The benefits of business scan are analogous to those of "weak ties," as described by Granovetter (1973). Because indirect interlocks in most cases reach a wider scope of actors than do direct ties, it is possible that indirect interlocks may have an even greater impact on the diffusion of practices than do direct interlocks. Indirect interlocks are also an indicator of the extent to which firms are structurally equivalent, or simultaneously tied to the same third parties (White, Boorman, and Breiger, 1976). Burt (1987) argued that such actors tend to be in intrinsically competitive positions, which lead them to mimic one another's behavior.

In a study of corporate political contributions, Mizruchi (1992), found that although direct interlocks was moderately associated with similarity of contribution patterns between firms, the number of indirect interlocks between firms was a consistently stronger predictor. This suggests that indirect interlocks might provide an even stronger basis for isomorphism than do direct interlocks. If this is the case, then the presence of indirect interlocks may serve as a basis for the transmission of ideas about firm strategies, including financing. This suggests the following:

> H3: Pairs of firms with higher numbers of indirect board of director overlaps will exhibit more similar levels of borrowing than will pairs of firms with lower numbers of indirect interlocks.

By examining the extent to which direct and indirect interlocks between the firms affect the firms' similarity of financing behavior, we are providing a far more grounded analysis of embeddedness than in the earlier Mizruchi and Stearns study, in which embeddedness was assessed in terms of whether a firm had a financial representative on its board. Because we are looking only at ties between and among manufacturing firms, however, it is possible that we will ignore the potentially important role of financial directors. Just as we expect dyads in which both firms have CEOs from finance backgrounds to behave similarly, it is possible that dyads in which both firms have financial representation on their boards will also behave similarly. This is especially worth examining given the consistently strong effect of this variable in both the

Mizruchi and Stearns (1994) and the Stearns and Mizruchi (1993a; 1993b) studies. If the findings from these studies are correct, we would expect dyads in which both firms have similar levels of financial board representation to exhibit similar financing behavior. This suggests the following:

> H4: Pairs of firms with the simultaneous presence or absence of representatives
> of financial institutions on their boards will exhibit more similar levels of
> borrowing than will pairs of firms in which one has financial representation and
> the other does not.

Additional Factors Affecting the Isomorphism of Financing Strategies

In addition to our primary hypothesized effects on similarity of firm financing strategies, there are several other factors, most of which involve the firms' relative financial condition, that must be taken into account. These include the firms' anticipated return on borrowing, the similarity of their retained earnings, their relative size, whether they operate in the same industries, and their prior use of debt.

Anticipated return on borrowing. It is an economic truism to state that firms will pursue policies to the extent that the expected return exceeds the expected cost. More specifically, firms are assumed to try to maximize the difference between anticipated return and cost. A firm's anticipated return on external financing is extremely difficult to measure in the absence of access to a firm's internal decision making process. On the advice of a financial economist, Mizruchi and Stearns (1994) measured anticipated return as a function of a firm's recent growth and profitability minus a standardized score for its bond rating (which reflects the cost of borrowing to the firm). They found, interestingly, that firms with high levels of anticipated return from borrowing tended to borrow *less* than firms with lower anticipated returns. The apparent reason for this finding was that well-performing firms had higher levels of retained earnings, and thus required fewer funds. Regardless of whether high anticipated returns

lead to higher or lower levels of external financing, however, we expect that firms that have similar levels of anticipated return will engage in similar levels of borrowing.

Availability of internal funds. We mentioned above that social scientists for several decades debated about the extent to which American corporations have relied on internal and external financing. Stearns (1986) showed that American corporations were relatively flush with retained earnings in the period from the end of World War II into the mid-1960s. Beginning around 1966, however, American firms began to increase their use of external financing, a trend that continued into the early 1980s. Stearns argued that the relative autonomy of corporate managers fluctuated over time, based on their level of dependence on external financing. The mere use of external financing does not constitute proof of dependence on financial institutions, however. As we have seen, firms might borrow even when they have retained earnings sufficient to finance their investments. Reasons for the use of external financing include low interest rates, tax benefits of borrowing (Modigliani and Miller, 1963), and lucrative alternative investment opportunities for retained earnings (Herman, 1981). To show that borrowing corresponds to need, it is necessary to control for the cost of capital and the anticipated return on borrowing. Stearns and Mizruchi (1993a) and Mizruchi and Stearns (1994) showed that even when controlling for the cost of capital and the anticipated return on borrowing, the availability of retained earnings was a strong, negative predictor of a firm's level of borrowing. This suggested that need was a significant factor in determining whether and how much firms borrowed. If firms with abundant retained earnings have lower levels of borrowing than do firms with more scarce amounts of cash, then firms with similar levels of retained earnings should exhibit similar financing behavior.

Firm size. We are aware of no research that describes the relative use of external financing by size. Managerialists assumed that large size was associated with higher levels of profitability, which in turn would lead to increased retained earnings and less of a need for external financing. On the other hand, to the extent that they are in a stronger position than smaller firms, large firms might have easier access to capital. Because size is not necessarily correlated with performance, there is no assurance that size will be correlated with a firm's level of borrowing. It is plausible to assume, however, that firms of widely varying sizes will be less

likely to pursue similar strategies than will firms of similar sizes. Given the potential for variation in strategies among firms of different sizes, we shall include relative firm size as a control.

Industry. The effect of industry on the use of external financing is better established than the effect of size, since industries vary systematically in their production and distribution processes. The studies by Stearns and Mizruchi (1993b) and Mizruchi and Stearns (1994) revealed significant variation in borrowing across industries. Motor vehicle producers tended to be more likely than average to use short-term debt and less likely than average to use long-term public bonds, for example. Soaps and cosmetics firms were more likely than average to use long-term public bonds but less likely to use short-term debt. Aerospace firms used higher than average levels of total debt, while pharmaceutical firms used lower than average amounts. Clearly, there are significant differences across industries. For this reason, it is likely that a pair of firms operating in the same primary industry will exhibit more similar uses of financing than will a pair of firms operating in different primary industries. We shall therefore control for whether the members of a dyad operate in the same primary industry.

Prior debt. The amount that a firm borrows may depend in part on how much it has borrowed in the past. This could operate in two ways. On one hand, a firm that has recently taken on a significant amount of debt may be less likely to take on new debt. On the other hand, a firm that has a history of high usage of debt may continue to maintain a similar strategy. In either case, the level of new debt that a firm incurs cannot be assumed to be independent of the outstanding debt that the firm has from its previous actions. Mizruchi and Stearns (1994) found that a firm's debt ratio in the previous year was a consistently strong positive predictor of the level of debt it acquired in a given year. This suggests that a pair of firms with similar debt ratios will have a greater tendency toward similar financing decisions in a given year than will a pair of firms with less similar debt ratios. We therefore include the difference in prior debt ratios as a control. [4]

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[4] Useem (1996) argues that institutional investors have become increasingly active in corporate decision making. If Useem is correct, then it is possible that pairs of firms with similar levels of institutional stockholdings will exhibit certain similarities in behavior. Although we do not make a theoretical claim that pairs of firms with similar levels of institutional stockholdings will have similar financing strategies, we considered this variable as a control in our initial analyses. Because of missing data, the use of this variable led to the loss of nearly 20 percent of our observations beyond those already lost due to other missing data.

DATA AND MEASURES

The data for our analysis are derived from a 40-year time series, collected as part of a larger project on the determinants of corporate financing among large American corporations. We began with the 200 largest manufacturing firms in the United States in 1955, the first year in which *Fortune* compiled its list of the 500 largest corporations. These 200 firms were followed yearly, through 1994. During the 40-year period, 80 of the 200 original firms disappeared, either through bankruptcy or, more often, through acquisition by other firms. By 1994, only 120 of the original 200 firms remained. Had every firm survived for the entire period, and had we complete data on every firm for every year, the data set would have included 8,000 company-year observations. The disappearance of firms and other missing data left us with a final total of 6,088 company-years.

As noted above, the units of analysis for this paper are not company-years per se, however, but the dyadic relations among firms across years. Were we to examine every dyad for every year, our analysis would include more than 500,000 dyads. We are also missing data on several key variables prior to 1963 and on a smaller number prior to 1970. As a tractable solution, we decided to examine all dyadic relations among firms in the data set for five different years, at five-year intervals. Our five years were 1973, 1978, 1983, 1988, and 1993.[5] The number of firms in the data set for the five years were 165, 158, 142, 113, and 104 respectively. Because all of our relations between pairs of firms are assumed to be symmetric (the similarity of i with j is the same as the similarity of j with i), the number of dyads in a given year equals $N(N-1)/2$ where N is the number of firms. This yields a set of 13,530 dyads in

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The variable was significantly positively associated with similarity of borrowing in only one year, 1988, and its inclusion did not affect the strength of the other coefficients for the models in which it was included. We therefore decided to exclude the institutional stockholding variable from our initial analyses. We do develop and test a hypothesis about its role at a later point in the paper, however.

[5] Because computation of our anticipated return variable required data from three years prior to the year of interest, 1973 was the first year that we could feasibly analyze.

1973, 12,403 in 1978, 10,011 in 1983, 6,328 in 1988, and 5,356 in 1993, for a total of

47,628 dyads for the five years combined. Missing data reduced this total to 43,802.

Our dependent variable is the extent to which the members of a dyad exhibit similar

financing strategies. Our focus is on firms' use of long and short-term debt, which we also refer

to as borrowing. We operationalize this variable as

$$S_{ij} = -1 \; \left| \; (N_{it} / A_{it}) - (N_{jt} / A_{jt}) \; \right|$$

where S_{ij} is the similarity of the firms' financing behavior, N_{it} and N_{jt} equal the amount of new

long-term debt and notes payable taken out by firms i and j in year t, and A_{it} and A_{jt} equal firms

i and j's total assets in year t (as a standardization). In other words, we are examining the

difference in new debt to assets between the two firms in the dyad. The difference score is

multiplied by negative one to transform it to a similarity score.

Similarity of the firms' anticipated return on borrowing was computed as follows: For

each firm, we took the product of the firm's mean profitability (return on assets) and growth

(change in assets over prior assets) over the three years prior to the year in question. We then

took the absolute value of the difference between these two values, and multiplied this sum by

negative one, to transform the difference score into a similarity score. Mizruchi and Stearns

(1994) had measured what they called the expected return on borrowing by taking standardized

scores of what we are calling anticipated return, and subtracting from them standardized scores

of estimates of the firm's bond rating (as an indicator of its cost of borrowing). Further analysis

from that study revealed, however, that the use of anticipated return, defined as we are doing

here, would have yielded results virtually identical to those using their expected return measure.

Because we lacked data on firms' bond ratings for every year of the current study, we decided

to use the less cumbersome anticipated return measure.

Similarity of retained earnings was computed by taking the absolute value of the

difference between the two firms' retained earnings, standardized by assets, for the prior year.

This value was also multiplied by negative one to transform it to a similarity score.

Similar strategic orientation was operationalized in two ways. In accordance with Hypothesis 1, we created a dummy variable, coded 1 if firms i and j both had CEOs with functional backgrounds in finance or accounting and 0 otherwise. To examine whether having CEOs from the same functional background (rather than just from common financial backgrounds) was associated with similarity of borrowing, we created a separate dummy variable, coded 1 if firms i and j had CEOs from the same functional background, regardless of whether it was manufacturing, sales, or finance, and 0 otherwise. Direct interlocks was simply the number of individuals who sat simultaneously on the boards of firms i and j. Indirect interlocks was the number of times in which board members from firms i and j sat together on the boards of firms k. Similarity of financial representation was a dummy variable, coded 1 if firms i and j simultaneously either had or did not have a representative from a financial institution on their board, and 0 otherwise.

Similarity of firm size was computed as the absolute value of the difference in assets of firms i and j, multiplied by negative one to transform it to a similarity score. Same industry was a dummy variable, coded 1 if firms i and j operated in the same primary industry and 0 otherwise. And similarity of prior debt was computed as the absolute value of the difference between firms i and j's debt ratio (total debt to assets) from the previous year, multiplied by negative one to transform it to a similarity score.

Our data came from three primary sources. All data on board members and CEOs were entered directly from back issues of *Standard & Poor's Directory of Corporations* and were cross-checked with comparable issues of *Moody's Industrial Manual*. All instances of discrepancies were looked up and resolved individually by research assistants. Financial data were derived from a data set, commissioned by the authors, assembled by Standard and Poor's Compustat service.

ESTIMATION PROCEDURE

Our data exhibit two qualities that must be taken into account in identifying an appropriate form of analysis. First, although we examine interfirm dyads at five different time points, each set of dyadic analyses makes sense only in a given year. In that sense, although we include lagged exogenous variables, our data are basically cross-sectional. At the same time, because, within a given year, each firm appears in multiple dyads, our observations within each year are not statistically independent. An increasing number of organizational researchers have worked with dyadic data over the past two decades (Laumann and Knoke, 1987; Mizruchi, 1989; 1992; Podolny, 1994; Gulati, 1995; Stuart, 1998; Sorenson and Stuart, 2001), and researchers have developed a number of ways to handle dyads. Lincoln (1984) suggested inserting controls for firm-level variables whose omission might bias the result of dyadic analyses. Mizruchi (1989) suggested a fixed effects approach, in which the researcher inserts into the equation dummy variables for N-1 actors, coding the values 1 for each member of the dyad represented by the case and 0 for all other actors. Krackhardt (1988) suggested the use of the quadratic assignment procedure, in which relation matrices are permuted to examine whether the findings are artifacts of the structure of the network rather than genuine relations among the actors in question. Several researchers have used quadratic assignment subsequent to Krackhardt's call (Mizruchi, 1992; Koput, Powell, and Smith-Doerr, 1998; Gulati and Gargiulo, 1999).

Quadratic assignment (QAP) is an approach to the analysis of multiple network data by which one retains the structure of relations among actors (that is, all of the values on the dyadic variables) but rearranges the individuals assigned to each set of values. These rearranged matrices are then used as predictors of the dependent variable matrix, which is preserved in its original state. If the statistical associations from the original OLS regression remain after the individuals are sorted on the exogenous variables, this suggests that those associations are spurious, the result of some characteristic of the network structure rather than of relations among the specific actors in the analysis. Ideally, one would want to examine all possible permutations of the original matrix. The number of such permutations is N!, however. With a network of even ten firms, there would be more than 3.6 million possible permutations. An alternative is to extract a random sample from the population of N! permutations. A routine for

such extraction is available in the network analysis program UCINET 5.0 (Borgatti, Everett, and Freeman, 1999). The results of the permutations provide a convenient statistical test. If one conducts 1,000 random permutations, then the number of times among those 1,000 simulations in which the coefficient from the simulation exceeds the coefficient from the analysis of the actual data provides the basis for computing a probability value for the coefficient. If the coefficient from the random permutations exceeds the actual coefficient in 35 of the 1,000 simulations, for example, it indicates that the probability that the actual coefficient is the result of random sampling error is about .035. This provides the basis for assessing statistical significance. A second advantage of the QAP procedure is that because computation of the probability value is done by a simple count of the number of times the simulated values exceed the actual values, the test is non-parametric. There is thus no requirement that the residuals of the endogenous variable be normally distributed. This means that QAP can be used for any type of regression analysis, not simply OLS. One can perform an OLS regression for any data set, and then identify the probability of random error by means of the QAP simulations.

The 20-year sweep of our data allows us to consider the possible effects of changes in the factors that affect the similarity of financing across historical periods. In the analysis that follows, we adopted the following procedure. Initially, we performed an OLS regression analysis on the full sample of dyads from all five years combined. As a component of this analysis, we included year dummy variables to account for year-specific variation. Because there was systematic variation in the effects of our exogenous variables across the five different years, and because one of the five years constituted a significant outlier, we subsequently analyzed the entire group of dyads with the one outlier year removed. We then examined each of the five years individually, initially conducting OLS regressions and then supplementing them with quadratic assignment analyses.

RESULTS

Table 1 presents means, standard deviations, and correlations among the exogenous variables for the five years combined. As is evident from the table, virtually none of the correlations among the exogenous variables is large enough to suggest possible statistical estimation problems. The negative means of the quantitative similarity variables are a consequence of our operationalization, in which we multiplied computed difference scores by negative one to transform the variable to a similarity score. Our dependent variable, as well as the four quantitative similarity variables (similarity of assets, anticipated return, debt ratio, and retained earnings), are all sharply right-skewed. To account for this, we reexamined our equations with logarithmic transformations. Because the results based on the transformed data were virtually identical to those based on the raw values, we have chosen to present the findings based on the latter. Results based on the log-transformed variables are available on request.

TABLE 1 ABOUT HERE

Equation 1 of Table 2 presents the results of our regression analysis based on the 43,802 dyads, from all five years, for which we had complete data. As noted above, although these are OLS estimates, we included year dummy variables for four of the five years in our data set. The strongest predictor of similarity of borrowing is simply the similarity in the firms' size (measured in total assets). Firms operating in the same primary industry are more likely to have similar borrowing patterns, but this effect is only marginally significant. Interestingly, firms with similar recent levels of debt are actually less likely to exhibit similar current borrowing patterns. This finding is plausible, however, given our earlier discussion about the multiple consequences of substantial recent borrowing; for some firms, extensive recent borrowing reduces the probability of current borrowing, while for other firms recent borrowing increases the probability of current borrowing. Were these tendencies to be entirely counteracting, we would probably expect to observe no association between similarity of recent debt ratio and current borrowing. As we shall see, however, this finding appears to be driven by the peculiarities of one outlier year.

TABLE 2 ABOUT HERE

Turning to our other predictors, as expected, similar levels of both retained earnings and anticipated return are both positively associated with similarity of borrowing. Beyond similarity of size, these two variables are the strongest predictors in the model. Consistent with our expectations, firms that have experienced similar levels of recent profitability and growth, and thus have reason to expect similar levels of future return, are more likely to engage in similar levels of borrowing than are firms with different recent performance histories. We observe an even stronger effect for retained earnings. Firms with similar levels of retained earnings are significantly more likely than are firms without such similarities to engage in similar levels of borrowing. This coefficient, which exceeds its standard error by a factor of 66, is the second strongest predictor in the model. As in the Mizruchi and Stearns (1994) study, in which retained earnings was revealed to be the strongest predictor of a firm's level of borrowing, firms that have similar levels of retained earnings are likely to have similar levels of borrowing.

The strategic orientation and network embeddedness variables fare less well. Dyads in which both firms have CEOs from finance backgrounds are more likely to exhibit similar levels of borrowing, as predicted by H1. Neither the similarity of the number of representatives from financial institutions on the firms' boards nor either direct or indirect interlocks is associated with similarity of borrowing patterns, however. In fact, the effect of indirect interlocks is actually negative (although, given our use of one-tailed statistical tests, we treat this effect as non-significant): firms with higher numbers of indirect interlocks are less likely to have similar levels of borrowing.

On what basis can we explain this finding? One possible source is in the fluctuations among the various years in our sample. Examination of the year dummy variables in Equation 1 reveals that the year 1988, and to a lesser extent 1993, has an enormous effect on the outcome. Dyads in 1988 are sharply less likely to have similar levels of borrowing than are dyads in the remaining four years. Although this lower mean level of similarity in 1988 does not guarantee that the slopes of the substantive variables will differ across years, it suggests that we should examine carefully the effect that this particular year has on our findings. As our first step in

examining whether 1988 was an outlier in terms of the effects of our exogenous variables, we removed the dyads for that year and recomputed the equation. The results of this analysis, for the remaining 38,131 dyads, are presented in Equation 2 of Table 2. The differences are striking, and the findings are more in accordance with expectations in virtually every respect. All four quantitative similarity variables are now strong positive predictors of similarity of borrowing patterns. The effect of common CEOs from finance backgrounds remains positive. Similarity of the number of representatives of financial institutions on the firms' boards is now significantly positively associated with similarity of borrowing. And firms with high numbers of indirect interlocks are more likely than firms with fewer indirect ties to have similar levels of borrowing. Presence in the same primary industry is also negatively associated with similarity of borrowing, but the effect is close to zero. And the presence of direct interlocks between firms, although positive, is not a significant predictor of similarity of borrowing. Given the findings from earlier studies, in which indirect interlocking was found to be a stronger predictor of similarity of behavior than was direct interlocking (Mizruchi, 1992), this finding is not surprising.

Because of the discrepancies in our findings with and without the dyads from 1988, we examined the data in more detail by looking at each of the five years individually. This is also useful because it allows us to conduct quadratic assignment analyses to ensure that the results observed in Equation 2 of Table 2 are not spurious consequences of characteristics of the networks from which they were derived. Table 3 presents the results of five multiple regression equations, one for each of the five years for which we have data. Because quadratic assignment makes use of OLS coefficients but adjusts the probability values to reflect the relation between the observed and randomly derived coefficients, we present the OLS coefficients with their associated T-statistics and quadratic assignment probability values.

TABLE 3 ABOUT HERE

Before discussing our findings, we must address one, potentially important, issue. As is evident from the table, the number of firms in our analysis declines significantly over time, from 165 in 1973 to 104 in 1993. Because the number of dyads is a geometric function of the

number of actors, the number of dyads in the individual years declines even more sharply, from more than 12,000 in 1973 to fewer than 5,000 in 1993. Given this decline in dyads over time, we must consider the possibility that any observed changes in our findings are the result of sample selection bias (Berk, 1983). To the extent that the forces that affect our dependent variable are also associated with the probability that firms will remain in the sample in a subsequent period, our findings from the later periods might reflect changes in the population of firms rather than changes in the behavior of the remaining firms.

The sharpest declines in the number of firms in the sample occurred between 1978 and 1983 (an attrition of 16 out of 158 firms) and between 1983 and 1988 (an attrition of 29 of 142 firms). Because our findings remained very similar between 1978 and 1983 but changed significantly between 1983 and 1988, it is the latter interval that raises the most serious questions about selection bias. To address this issue, we applied a two-stage selection bias model developed by Heckman (1979), using an algorithm in LIMDEP (Greene, 1995:637-641). In this approach, the investigator estimates a probit model predicting the probability of a firm's survival, in this case the probability of firms from 1983 surviving through 1988. This model yields a variable, λ, which represents a hazard rate, the instantaneous probability that a dyad will disappear from the sample, conditional on being at risk of disappearing (Berk, 1983:391). The λ is then included as a regressor in the substantive equation for 1988. Our primary question, then, was whether controlling for λ, the effects of the exogenous variables in our 1988 equation continued to hold. Because λ was computed at the firm level, in our dyadic analysis we computed the product of the λs of the two firms in the dyad. This constituted the joint probability that a pair of firms would survive.

Results of the selection model are presented in Tables 4A and 4B. Table 4A contains the selection equation, a probit model in which the units of analysis are 139 firms in 1983 and the dependent variable is whether the firm survived into 1988. We identified four variables that we believed would affect a firm's probability of survival, plus a fifth variable that served as an

instrument for computational purposes.[6] As is evident from the table, large firms, those with

high anticipated return (recent growth and profitability) and retained earnings, and CEOs from

non-finance backgrounds had higher survival rates than did firms without these characteristics.

That larger and better-performing firms were more likely to survive is not surprising. That firms

with finance CEOs were more likely to disappear is less obvious, but is consistent with an

earlier finding by Davis and Stout (1992), who found that firms with finance CEOs were more

likely to become targets of acquisition attempts during the 1980s.

TABLE 4A ABOUT HERE

TABLE 4B ABOUT HERE

Table 4B contains the substantive equation for 1988, with λ included as a control. As

is evident from a comparison of the coefficients in Table 4B with those of Equation 4 of Table 3,

insertion of the selection bias term (λ) had virtually no effect on the strength of the remaining

coefficients. The selection term itself, although strongly significant in the OLS analysis, became

non-significant in the quadratic assignment (two-tailed p=.289). These findings suggest that the

substantial changes observed between 1983 and 1988 were the result of actual changes in firm

behavior, and not a result of changes in the population of firms.

Moving on to our analyses (and returning to Table 3), the findings in the individual years

reveal some interesting trends. Overall, the effects of the strategic orientation and social

network variables are generally significant, and consistent with our hypotheses, in 1973, 1978,

and 1983. The effect of indirect interlocks on similarity of borrowing is generally stronger than

that of direct interlocks over the three years. This finding is consistent with those, found in a

variety of contexts (Burt, 1987; Galaskiewicz and Burt, 1991; Mizruchi, 1989; 1992), that

suggest that structural equivalence (in which actors are tied to the same third parties) is a

stronger source of similar behavior than is cohesion (in which actors are directly tied to one

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[6] Estimation of the Heckman model is facilitated if the selection equation contains at least one variable that is
not also included in the substantive equation. As our instrument, we used the number of representatives of

another). The effects of similar strategic orientation (common finance CEOs) and similar numbers of financial directors on the firms' boards are significant in only one and two of the three years respectively, and the two reach significance in alternate years. But the overall effect of these four variables, the three network effects and common finance CEO background, is clearly positive during the 1973-1983 period.

By 1988, however, the three network effects are not only not significant but run in the opposite-from-expected direction. Only the effect of common presence of finance CEOs is significant in the expected direction in 1988, yet this variable is not significant in either 1978 or 1983. By our final year of data, 1993, none of the four strategic orientation and network variables is a significant predictor of similarity of borrowing. The anticipated return and retained earnings effects, although present in the earlier years, remain strong in both 1988 and 1993. Only in 1983 are these variables not significant predictors of similarity of borrowing. The primary difference between 1988 and the earlier years, then, is the absence of effects of the three social network variables. The primary characteristic of 1993 is the non-significant effects of both the social network and strategic orientation variables.

THE CHANGING NATURE OF EMBEDDEDNESS

If the significant changes that we observe between the 1973-1983 period and 1988-1993 are not due to changes in the population of firms, then to what can they be attributed? Why, in particular, did the social ties among firms affect their financing strategies in the earlier period but not in the later one? Any attempt to address this question raises two immediate difficulties. First, there is the pervasive problem in historical explanation of overdetermination: the large number of possible causes relative to number of observations. In our case, we have a single general event- the one-time decline, between 1983 and 1988, in the effects of our social network variables in predicting similarity of corporate borrowing- and several possible causes. A second difficulty that complicates our analysis is the fact that we are working with dyadic

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financial institutions on the board of firm i, a variable that was not correlated with our other predictors.

data. Our variable of interest is not a firm's level of financing, but rather, the extent to which a given pair of firms engages in similar levels of financing. This means that historical changes that affect the behavior of individual firms will not necessarily affect the similarity of behavior among these firms. Changes in dyadic variables are by definition interaction effects, because they involve changes in the *relative* behavior between firms. These are more difficult than firm-level effects to identify, and to interpret.

Still, the first place to look to examine the changing nature of the social network effects on financing is to ask what differences distinguished the 1973-1983 period from the post-1983 one. Prior to the mid-1980s, even if large American corporations were borrowing relatively high levels of capital, they were engaged in this borrowing for a wide range of reasons, no one of which dwarfed the others in significance. The year 1988 was at the peak of the 1980s merger wave, which, although not unique in American history, was unique in the extent to which mergers were financed by debt as opposed to equity (Stearns and Allan, 1996). Mergers and acquisitions require enormous amounts of capital, and much firm borrowing during that period was clearly driven by this phenomenon. Because mergers and acquisitions were so prevalent during the late-1980s, we suggest that pairs of firms in 1988 were more likely to borrow for similar reasons than were pairs of firms in the 1973-1983 period. This would explain two of our most prominent findings in 1988: the unusually strong effects of three of the four financial condition variables (similarity of assets, anticipated return, and retained earnings) and the strong effect of CEOs from finance backgrounds.

The latter finding is especially compatible with the merger and acquisition wave story. In Fligstein's argument (1990:15-16), firms with a finance conception of control (as indicated by CEOs from finance backgrounds) will be more likely to engage in acquisitions and therefore more likely to engage in high levels of borrowing. A pair of firms operating under a finance conception of control should therefore be more likely to have similar levels of borrowing. It is possible that this effect could operate consistently across time. If our interpretation is correct, however, it would suggest that the salience of the presence of finance CEOs is greatest during merger waves, and particularly among firms engaged in acquisitions.

Our data set includes information that allows a partial test of this interpretation. Although there are numerous missing cases (between 20 and 25 percent per year), our data set contains a variable on whether a firm was engaged in one or more acquisitions in a given year. This gives us an opportunity to examine the effect of acquisitions on borrowing levels, as well as the relation between acquisitions and CEO background. To do this, we created a dummy variable, coded one for cases in which both firms in a dyad participated in acquisitions, and zero otherwise. We then inserted this variable into our equations predicting the similarity of borrowing between firms. We began by computing OLS regression equations for each of the five years. Where OLS results yielded significant effects of the common participation in acquisitions variable, we then conducted quadratic assignment analyses to verify the results. The simultaneous involvement in acquisitions was positively associated with similarity of borrowing in only two of our five years, 1973 and 1988. These were also the two years in which the common finance CEO variable was a significant positive predictor. As is evident in Equations 1 and 2 of Table 5, however, the quadratic assignment analyses revealed that neither of these common acquisition effects was significant.[7]

TABLE 5 ABOUT HERE

Our discussion suggests, however, that the effect of common finance CEOs would be especially strong during merger waves. If this is the case, then the effect of common finance CEOs should also be relatively large for firms that were involved in acquisitions. To test this hypothesis, we constructed an interaction term for dyads in which the firms simultaneously had finance CEOs and were involved in acquisitions. As illustrated in Equations 3 and 4 of Table 5, the interaction term was significantly positive in 1988 (although only marginally significant in the quadratic assignment analysis), but not significant in 1973. In other words, the effect of common participation in acquisitions was greater for finance CEO firms in 1988, but was not so in 1973. The combination of finance background CEOs and participation in acquisitions

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[7] Because of considerable numbers of missing data on the acquisitions variable, these equations were not directly comparable to those reported in Table 3. In no case among the five years did the insertion of the

therefore led to more similar firm borrowing levels primarily during the merger wave of the late 1980s. Our interpretation still does not account for the positive main effect of the finance CEO variable in 1973. Overall, however, our findings are suggestive enough to warrant further, more detailed, investigation of the role of CEO background factors across varying historical conditions.

But why, if 1988 was unique, do the effects of the financial variables remain strong (and even increase in the case of similarity of debt ratio) in 1993? We believe that there are two reasons for this. First, the period after 1983 was characterized by a significant shift in the role of commercial banking in the United States. Davis and Mizruchi (1999) show that between the early 1980s and the early 1990s, the significance of commercial banks in the American economy declined sharply. In 1983, given the severe recession from which the country had not yet emerged, we would expect firms to rely on social network cues as a means of dealing with uncertainty. The recession of the early 1990s was not nearly as severe as that of a decade earlier, so levels of uncertainty might not have been as high. But unlike the early 1980s, by the early 1990s, several large American banks were experiencing major financial difficulties. The major banks were therefore reluctant to lend to firms, especially those that were considered high-risk. From a lender's perspective, firms with high debt ratios are, other things being equal, considered to be higher-risk than are firms with low debt ratios. This meant that banks might have been less likely to lend to high debt ratio firms in 1993 than they had been in other years. This could account for the suddenly strong effect of similarity of debt ratio on borrowing.

A second, related, reason for the decline in the social network effects and the increase in economic ones involves a change in the culture in the banking and investment community that developed during the 1980s (especially after the stock market crash of 1987) and continued through the recession of the early 1990s. As described in detail by Useem (1996), the decade of the 1980s witnessed an increased effort by the investment community, especially large institutional stockholders, to become more actively involved in the monitoring of firms in which they held stock. In the period from the end of World War II to the 1980s merger wave, outside members of corporate boards were rarely expected to ask probing, detailed questions

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acquisitions variable affect the strength of the coefficients of the remaining variables, however.

of top officers (Mace, 1971; Hirsch, 1982; Lorsch and MacIver, 1989). Corporate officers were more likely to explain their decisions in general, symbolic terms, largely free of the kind of monitoring that had characterized firms in the days of family and financial control in the early 1900s. As this situation changed during the 1980s, firms were increasingly forced to justify their decisions, in explicit economic terms, to investment analysts. If firm officials were under increasing pressure to account for every decision in clear economic terms, it follows that factors such as the firm's assets, retained earnings, previous level of debt, and anticipated return based on recent growth and profitability would play an increasingly important role in financing decisions. This is consistent with our finding that the similarity of our four financial variables became stronger predictors of similarity of borrowing in our 1988 sample, while the effects of the social network variables declined.

Our data permit us to evaluate this argument empirically. As noted above, Useem suggests that the increasing pressures on corporate managers in the late-1980s and early-1990s emanated in part from the growing activism of institutional stockholders. We attempted to control for this factor by creating a variable to measure the similarity in a pair of firms' levels of institutional stockholdings. Our expectation was that firms with similar levels of institutional stockholdings would be more likely to engage in similar levels of borrowing than would firms with dissimilar levels of institutional stockholdings. As noted in footnote 4, we omitted this variable from our reported analyses because its inclusion would have necessitated the loss of nearly 20 percent of our observations. We also noted that the effects of this variable for the five years combined failed to support our expectations and had no effect on the magnitudes or significance of the remaining coefficients. If our argument is correct, however, we should find a positive association between similarity of institutional stockholdings and borrowing for 1988 and 1993. To test this hypothesis, we recomputed our 1988 and 1993 equations with similarity of institutional stockholdings included. We measured similarity of institutional stockholdings as the absolute difference in the proportion of the two companies' stock that was held by institutional investors, based on data reported in *Business Week*. Results of this analysis are reported in

Table 6.[8] Inclusion of the institutional stockholdings variable reduced our sample size more than 20 percent, from 5,671 to 4,371. But, consistent with our hypothesis, the effect of similarity of institutional stockholdings on similarity of borrowing was positive, although, as with the acquisitions*finance CEO interaction term, the effect was only marginally significant. The coefficients of the other exogenous variables were virtually unaffected by the insertion of the institutional stockholdings variable, with two exceptions: the effect of similarity of retained earnings, which was strongly positive in every equation involving 1988, became slightly negative, and insignificant, in this analysis; and the effect of membership in the same industry became significantly positive. The model R^2 also declined markedly, from greater than 50 percent in our other equations involving 1988 to only seven percent here. This suggests that the sample of firms for which we have complete data on institutional stockholdings may not be representative of our full sample. Moreover, we were unable to reproduce a similar effect of similarity of institutional stockholdings for 1993.[9] We therefore recommend caution regarding the finding on the similarity of institutional stockholdings, pending further investigation. We do note the enormous increase in the effect of similarity of debt ratio in 1993 (see Table 3). This variable was not a significant predictor in any of the years prior to 1993 but became, along with similarity of retained earnings, the strongest predictor in that year. This finding is consistent with our suggestion that firms increasingly based their financing decisions, either voluntarily or in response to pressure, on conventionally-accepted financial criteria.

TABLE 6 ABOUT HERE

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[8] We were also able to code data for the two years on the concentration of institutional stockholdings, which we measured as a dummy variable coded one when both firms in a dyad had individual institutional stockholders with a five percent or greater share (a widely-used indicator of stock sufficient for control of a company) and zero otherwise. Results using this variable (not reported here but available on request) were virtually identical to those using the measure described above.

[9] Because non-significant results from OLS regressions rarely produce significant results in quadratic assignment, we did not conduct QAP analyses for 1993. We therefore do not report the 1993 equations here. Results of our OLS equations, in which the effects of the institutional stockholding variables were non-significant, are available on request. The effects of the remaining variables for 1993 were similar to those in Equation 5 of Table 3.

If we accept the above account of increased pressure from investors to justify decisions in economic terms, does this mean that social network factors are no longer significant in understanding corporate financing? Although this is one possible interpretation of our findings, we believe that it would be premature to embrace it at this juncture. First, it is possible that our findings in 1988 and 1993 represent either anomalies, or a temporary stage during which financial factors surged to the forefront. Second, it is possible that some of the factors that affected the reduction of our social network effects are themselves socially embedded. It is well-established, for example, that a firm's merger activity can be accounted for by its positions in interfirm social networks (Haunschild, 1993; Palmer et al., 1995). If firms' involvement in merger activity played a role in reducing the effects of our social network variables on borrowing, then social network factors might affect borrowing indirectly through their effect on acquisitions. Finally, and most importantly, it is also necessary to consider the extent to which the increased monitoring by institutional investors was itself a product of diffusion through social networks. There is evidence, for example, that various forms of accounting rationality have been used to gain legitimacy with organizations' external constituents (Mezias, 1990; Carruthers and Espeland, 1991). Diffusion through social networks can be both a consequence and cause of efforts to establish the legitimacy of an organizational strategy. Rather than assume that the increased focus on economic criteria is a fully exogenous variable, then, we should consider the extent to which this emphasis was itself a consequence of more general pressures on businesses to conform to a socially constructed set of prescribed behaviors.

CONCLUSION

We began this paper by suggesting that organizational theory may be able to account for even the most seemingly "economic" of behaviors. We have tested this claim by examining the extent to which social network ties between firms have an independent effect on the firms' financing strategies. Corporations raise capital in a number of ways, and finance economists have produced an extensive literature attempting to identify appropriate levels of firms' use of

debt and equity. Although we accept the principle that financing is likely to be heavily determined by economic criteria, we have also suggested that managers, especially of the largest, most powerful firms, have a degree of discretion in the financial decisions they make. This discretion means that financing can be thought of as a strategy, in the same way that diversification or divestment can be viewed as a strategy. The existence of discretion also suggests that firm managers may be subjected to influences beyond those prescribed by standard financial theories. We have suggested that corporate financing may be influenced by the same kinds of social structural factors that have been shown to affect a range of corporate behaviors, from adoption of the multidivisional form to patterns of political and charitable contributions.

Our findings suggest that financing decisions, even among the largest firms, are socially embedded but the extent of this embeddedness is historically contingent. Social embeddedness had a stronger effect on financing behavior from the early 1970s through the early 1980s than it did from the late 1980s through the early 1990s. In the earlier period, firms whose directors were interlocked with the same third-party firms were significantly more likely than non-interlocked firms to engage in similar levels of borrowing. Firms that had similar numbers of representatives of financial institutions on their boards, and whose directors were directly interlocked, were also more likely to exhibit similar borrowing patterns, although to a lesser extent than the indirectly interlocked firms. These effects disappeared in the 1988-1993 period, however. In these years, only the presence of CEOs from finance backgrounds, indicating a common strategic orientation, was significant among the non-financial variables in predicting similarity of firm borrowing patterns, and only in 1988, not 1993. Similarities in financial factors, although important in both periods, increased in importance in the later period, corresponding to the decline in the effects of the social network variables.

Whether these changes represent larger historical trends, or whether they are specific to the particular years we studied, is a question that will require further work. As suggested above, we can examine additional years, and we can examine the extent to which the increasing focus on financial criteria can itself be explained by social network factors.

This study does have limitations. Although we have taken sample selection bias into account for the firms that disappeared from our sample over time, there are further selection issues to consider. We are dealing only with the largest firms in the American economy. Because our data set originated in 1955, our sample reflects the industries that were dominant at that time. It therefore lacks companies in the industries that have emerged in recent years, such as computer software and hardware. We should also note that regardless of the social network and CEO background effects that we identified, economic factors, where they operate, account for a larger component of variation than do the non-economic variables.

Still, corporate financing is an area that has been seen as "off-limits" to organizational theorists. The fact that we can identify statistically significant effects of social network and social background variables on firm financial behavior represents further evidence for the social embeddedness of organizational behavior.

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Table 1

Means, Standard Deviations, and
Correlations Among Variables
(n=43802)

	Mean	SD	2	3	4	5	6	7	8	9	10
1. Similarity of Financing	-0.102	.540	466	159	045	368	011	013	-011	-002	-001
2. Similarity of Assets	-11.803	265.346		072	014	174	003	005	-000	003	-003
3. Similarity of Anticipated Return	-0.011	.019			006	208	006	015	-005	013	025
4. Similarity of Debt Ratio	-1.830	2.496				214	055	034	-024	-016	000
5. Similarity of Retained Earnings	-0.177	.181					016	001	-024	018	039
6. Same Industry	.091	.287						012	-006	-033	004
7. Both Firms Finance CEO	.128	.335							-018	001	003
8. Similarity of Financial Directors	.222	.415								002	001

9. Direct Interlocks   .033   .204
322

10. Indirect Interlocks   .205   .659

Decimal points are omitted from the correlation coefficients to conserve space.

Table 2

Determinants of Similarity of Corporate Borrowing
(OLS Estimates with Year Dummy Variables)

Independent Variables	(1)	(2)
Constant	0.091****	-0.029****
	(18.705)	(-35.513)
Similarity of Assets	0.001****	0.000****
	(101.047)	(18.411)
Similarity of Anticipated Return	2.042****	0.235****
	(17.903)	(12.347)
Similarity of Debt Ratio	-0.003****	0.007****
	(-3.626)	(44.283)
Similarity of Retained Earnings	0.856****	0.117****
	(66.161)	(47.669)
Same Industry	0.010*	-0.001
	(1.414)	(-0.418)
Both Firms Finance CEO	0.031***	0.005***
	(2.408)	(2.405)
Similarity of Financial Directors	-0.006	0.002***
	(-1.142)	(2.348)
Direct Interlocks	-0.014	0.002
	(-1.279)	(0.879)
Indirect Interlocks	-0.008	0.003****
	(-2.270)	(4.540)
Year 1978	-0.021****	-0.003***
	(-3.703)	(-2.853)
Year 1983	-0.008	0.004****
	(-1.236)	(3.722)
Year 1988	-0.178****	
	(-24.528)	
Year 1993	0.091****	-0.003**
	(11.483)	(-2.477)
N	43802	38131
R^2	.324	.171

Equation 1 includes all five years. Equation 2 excludes 1988.
*p < .10; **p < .05; ***p < .01; ****p < .001; probabilities for
substantive variables are one-tailed; those for controls are
two-tailed. Unstandardized coefficients are reported, with T
statistics in parentheses.

Table 3

Determinants of Similarity of Corporate Borrowing
(OLS Estimates with Quadratic Assignment Probabilities)

Independent Variables	1973 (1)	1978 (2)	1983 (3)	1988 (4)	1993 (5)
Constant	-0.047**	-0.036**	-0.054	0.605****	-0.001****
	(-48.704)	(-24.754)	(-49.483)	(23.064)	(-0.520)
Similarity of Assets	0.000**	-0.000	0.000	0.001****	0.001**
	(5.709)	(-1.640)	(0.332)	(29.032)	(15.628)
Similarity of Anticipated Return	0.625**	0.806*	0.252	27.155***	0.191*
	(19.200)	(7.518)	(5.247)	(28.938)	(5.457)
Similarity of Debt Ratio	0.001	-0.002	0.000	-0.011	0.010***
	(1.838)	(-4.889)	(1.273)	(-2.042)	(30.790)
Similarity of Retained Earnings	0.024*	0.176***	0.007	2.425***	0.182***
	(5.837)	(27.729)	(1.736)	(42.544)	(30.712)
Same Industry	-0.001	0.005	-0.002	0.010	0.005
	(-0.833)	(2.135)	(-1.069)	(0.215)	(0.866)
Both Firms Finance CEO	0.017**	0.013	-0.013	0.563****	0.006
	(6.084)	(3.584)	(-3.805)	(6.394)	(0.637)
Similarity of Financial Dirs.	-0.005	0.006*	0.006**	-0.048	0.001
	(-4.682)	(3.317)	(4.775)	(-1.528)	(0.268)
Direct Interlocks	0.001	0.003*	0.002*	-0.065	-0.000
	(0.603)	(0.659)	(0.805)	(-1.035)	(-0.053)
Indirect Interlocks	0.002*	0.004*	0.004**	-0.085	0.003
	(2.202)	(3.664)	(5.023)	(-3.663)	(0.843)
N	12403	11325	9453	5671	4950
Number of firms	165	158	142	113	104

R^2		.052	.082	.012	.528	.409

*p < .10; **p < .05; ***p < .01; ****p < .001; probabilities for substantive variables are one-tailed; those for control variables are two-tailed. Unstandardized coefficients, with OLS T-statistics in parentheses and quadratic assignment probabilities.

Table 4A

Sample Selection Model for 1988

Selection Equation:

Probit Model of Firm Survival, 1983-1988

Independent Variables	Probit coefficient (T-statistic)
Constant	-1.341 (-1.210)
Firm Size (in assets)	0.209* (1.601)
Anticipated Return	33.621*** (2.348)
Retained Earnings (t-1)	1.849** (1.961)
Finance CEO	-0.521* (-1.550)
Number of Financial Directors	-0.041 (-0.462)
Same Industry	0.010* (1.414)
N	139
χ^2	15.669
df	5
p	.008

*p < .10; **p < .05; ***p < .01; ****p < .001; all tests were one-tailed.

Table 4B

Sample Selection Model for 1988

Substantive Equation:

Determinants of Similarity of Corporate Borrowing
(OLS Estimates with Quadratic Assignment Probabilities)

Independent Variables	Regression coefficient (OLS T-statistic)
Constant	0.509**** (16.501)
Similarity of Assets	0.001*** (28.655)
Similarity of Anticipated Return	26.551*** (27.983)
Similarity of Debt Ratio	-0.014 (-2.566)
Similarity of Retained Earnings	2.466*** (42.806)
Same Industry	0.016 (0.341)
Both Firms Finance CEO	0.525*** (5.573)
Similarity of Financial Directors	-0.048 (-1.504)
Direct Interlocks	-0.068 (-1.074)
Indirect Interlocks	-0.073 (-3.114)
Lambda (λ)	0.943 (5.719)

N	5565
Number of firms	106
R^2	.532

*p < .10; **p < .05; ***p < .01; ****p < .001; probabilities for substantive variables are one-tailed; those for controls are two-tailed. Unstandardized coefficients are reported, with T statistics in parentheses. Probabilities are based on the quadratic assignment procedure.

Table 5

Effects of Participation in Acquisitions on Similarity of Borrowing
(OLS Estimates with Quadratic Assignment Probabilities)

Independent Variables	1973 (1)	1988 (2)	1973 (3)	1988 (4)
Constant	-0.047***	0.703****	-0.047***	0.705***
	(-44.644)	(23.405)	(-44.642)	(23.471)
Similarity of Assets	0.000**	0.000***	0.000*	0.000***
	(4.950)	(24.613)	(4.950)	(24.608)
Similarity of Anticipated Return	0.646**	40.754***	0.646**	40.921***
	(18.485)	(36.706)	(18.482)	(36.738)
Similarity of Debt Ratio	0.001	-0.020	0.001	-0.020
	(1.805)	(-3.084)	(1.803)	(-3.039)
Similarity of Retained Earnings	0.022***	2.437***	0.023*	2.434***
	(4.938)	(40.231)	(4.938)	(40.160)
Same Industry	-0.002	-0.032	-0.002	-0.031
	(-1.145)	(-0.663)	(-1.147)	(-0.654)
Both Firms Finance CEO	0.017**	0.445***	0.017**	0.395***
	(5.693)	(4.251)	(5.653)	(3.647)
Similarity of Financial Dirs.	-0.005	-0.059	-0.005	-0.059
	(-4.522)	(-1.721)	(-4.521)	(-1.717)
Direct Interlocks	0.001	-0.057	0.001	-0.056
	(0.369)	(-0.860)	(0.366)	(-0.842)
Indirect Interlocks	0.002*	-0.070	0.002*	-0.070
	(2.497)	(-2.854)	(2.498)	(-2.849)
Both Firms in Acquisitions	0.006	0.056	0.006	0.052
	(2.532)	(1.620)	(2.515)	(1.485)
Acquisitions * Finance CEO			0.003	0.755*
			(0.106)	(1.801)

N	10585	4753	10585	4753
Number of firms	146	98	146	98
R^2	.054	.585	.052	.585

*p < .10; **p < .05; ***p < .01; ****p < .001; probabilities for substantive variables are one-tailed; those for control variables are two-tailed.

Table 6

Effect of Common Institutional Stockholdings
on Similarity of Corporate Borrowing, 1988
(OLS Estimates with Quadratic Assignment Probabilities)

Independent Variables	Regression Coefficient (OLS T-statistic)
Constant	-0.111** (-20.308)
Similarity of Assets	0.002*** (11.728)
Similarity of Anticipated Return	1.936** (11.672)
Similarity of Debt Ratio	-0.001 (-0.799)
Similarity of Retained Earnings	-0.048 (-3.476)
Same Industry	0.031*** (4.144)
Both Firms Finance CEO	0.058** (3.598)
Similarity of Financial Directors	0.004 (0.705)
Direct Interlocks	-0.006 (-0.549)
Indirect Interlocks	-0.011 (-3.107)
Similarity of Institutional Stockholdings	0.001* (3.810)
N	4371
Number of firms	94
R^2	.076

*p < .10; **p < .05; ***p < .01; ****p < .001; probabilities for
substantive variables are one-tailed; those for controls are
two-tailed. Unstandardized coefficients are reported, with T
statistics in parentheses. Probabilities are based on the
quadratic assignment procedure.