THE GENDER OF SOCIAL CAPITAL

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ABSTRACT

Legitimacy affects returns to social capital. I begin with the network structure of social capital, explaining the information and control benefits of structural holes. The holes in a network are entrepreneurial opportunities to add value, and persons rich in such opportunities are expected to be more successful than their peers. Accumulating empirical research supports the prediction. However, women here pose a puzzle. The entrepreneurial networks linked to early promotion for senior men do not work for women. Solving the gender puzzle is an occasion to see how network models of social capital can be used to identify people not accepted as legitimate members of a population, and to describe how such people get access to social capital by borrowing the network of a strategic partner.

KEY WORDS: • gender • legitimacy • social capital • social networks • structural holes

Introduction

There is a delightfully descriptive word in Yiddish, mishpokhe, that refers to people who are 'one of us'. The word is specifically about extended family, but it is popularly used to refer to people who are one of us. Rosten (1989, 338) illustrates with Chase Manhattan Banks's advertising campaign built around the slogan 'You have a friend at Chase Manhattan'. In a window of the bank next to a Chase Manhattan branch there appeared a sign: '—BUT HERE YOU HAVE MISHPOKHE!'

This paper is about people who are not mishpokhe, the outsiders who are not one of us. In other words, this article is about each of us at one time or another. No matter who you are, there are certain projects in which you are an insider, mishpokhe, and others in which you are an outsider. Example outsiders are an economist arguing the merits of his model to an audience of sociologists, an American pitching a deal to a Japanese investor, a woman arguing the merits of a business policy to a

sexist male, a baby-faced youngster proposing a new theory to a seasoned pro, a manager representing her group's interests on a team composed of managers from another group. The list is as infinite as the differences among us.

I study outsiders to understand how legitimacy affects returns to social capital. In the interpersonal politics of competition, legitimate members of the population, mishpokhe, are twice advantaged. Investors are more likely to believe they understand the motives and probable actions of someone like themselves, which means they feel more confident in predicting the future behavior of mishpokhe. Second, it is easier for investors to trust mishpokhe because his or her reputation among us will be tarnished if investors are treated poorly.

The key for outsiders breaking into the game is to borrow social capital rather than build it. Legitimate members of a population succeed by building their own social capital. Illegitimate members of the population have to borrow. In my analysis, based on a probability sample of senior managers in one of America's leading computer and electronic equipment manufacturers, the illegitimate members of the population turn out to be women and young men. The young men eventually compete as legitimate members of the population when they enter the more senior ranks (like an assistant professor promoted to a position with tenure). Women remain illegitimate across the senior ranks. My concern is the network mechanism by which illegitimate members of a population gain access to social capital, but the results raise a broader question about the gender of social capital. Is it a man's game? I argue that it is not, but I cannot dismiss the question. I begin with an introduction to social capital as a network phenomenon, explaining the information and control benefits of structural holes.

The Network Structure of Social Capital

Some people enjoy higher incomes. Some are promoted faster. Some are leaders on more important projects. As a factor responsible for such inequality, there are two ways to understand social capital: relative to human capital, and as a form of network structure.

The human capital story is that inequality results from differences in individual ability. The usual evidence is on general populations, as is Becker's (1975) pioneering analysis of income returns to education, but the argument is widely applied by senior managers to explain who gets

to the top of corporate America—managers who make it to the top are smarter, or better educated, or more experienced. Human capital is surely necessary to success, but it is useless without the social capital of opportunities in which to apply it.

Cast in diverse styles of argument, social capital can be distinguished in its etiology and consequences from human capital (e.g. Coleman 1990; Bourdieu and Wacquant 1992; Burt 1992; Putnam 1993; Lin 1998). With respect to etiology, social capital is a quality created between people whereas human capital is a quality of individuals. Investments that create social capital are therefore different in fundamental ways from the investments that create human capital (see Coleman 1988, 1990, for elaboration). I focus in this paper on consequences, a focus in network analysis for many years (see Breiger 1995, for an integrative review of contemporary research on inequality and social structure). With respect to consequences, social capital is the contextual complement to human capital. Social capital predicts that returns to intelligence, education and seniority depend in some part on a person's location in the social structure of a market or hierarchy. While human capital refers to individual ability, social capital refers to opportunity. Some portion of the value a manager adds to a firm is his or her ability to coordinate other people: identifying opportunities to add value within an organization and getting the right people together to develop the opportunities. Knowing who, when, and how to coordinate is a function of the manager's network of contacts within and beyond the firm. Certain network forms deemed social capital can enhance the manager's ability to identify and develop opportunities. Managers with more social capital get higher returns to their human capital because they are positioned to identify and develop more rewarding opportunities.

Structural Holes

Structural hole theory gives concrete meaning to the social capital metaphor. The theory describes how social capital is a function of the brokerage opportunities in a network. The following is a brief synopsis (from Burt 1997a) sufficient to set the stage for the subsequent gender results (see Burt 1992, for detailed discussion).

The structural hole argument draws on several lines of network theorizing that emerged in sociology during the 1970s, most notably Granovetter (1973) on the strength of weak ties, Freeman (1977) on betweenness centrality, Cook and Emerson (1978) on the power of

having exclusive exchange partners, and Burt (1980) on the structural autonomy created by network complexity. More generally, sociological ideas elaborated by Simmel (1922) and Merton (1957), on the autonomy generated by conflicting affiliations, are mixed in the hole argument with traditional economic ideas of monopoly power and oligopoly, to produce network models of competitive advantage. In a perfect market, one price clears the market. In an imperfect market, there can be multiple prices because of disconnections between individuals, and holes in the structure of the market, which leaves some people unaware of the benefits they offer one another. Certain people are connected to certain others, trusting certain others, obligated to support certain others, dependent on exchange with certain others. Assets get locked into suboptimal exchanges. How an individual is positioned in the structure of these exchanges can be an asset in its own right. That asset is social capital, in essence a story about location effects in differentiated markets. The structural hole argument defines social capital in terms of the information and control advantages of being the broker in relations between people otherwise disconnected in social structure. The disconnected people stand on opposite sides of a hole in social structure. The structural hole is an opportunity to broker the flow of *information* between people, and *control* the form of projects that bring together people from opposite sides of the hole.

Information benefits. The information benefits are access, timing and referrals. A manager's network provides access to information well beyond what he or she could process alone. It provides that information early, which is an advantage to the manager acting on the information. The network that filters information coming to a manager also directs, concentrates and legitimates information received by others about the manager. Referrals get the manager's interests represented in a positive light, at the right time, in the right places.
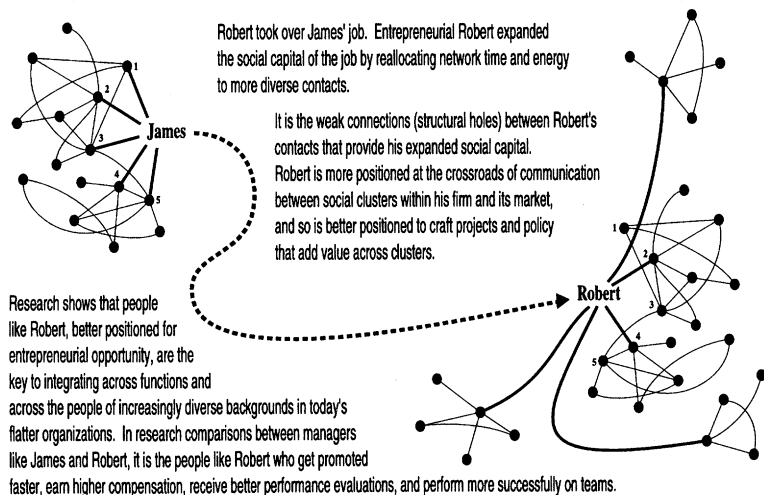
The structure of a network indicates the redundancy of its information benefits. There are two network indicators of redundancy. The first is cohesion. Cohesive contacts—contacts strongly connected to each other—are likely to have similar information and therefore provide redundant information benefits. Structural equivalence is the second indicator. Equivalent contacts—contacts who link a manager to the same third parties—have the same sources of information and therefore provide redundant information benefits.

Non-redundant contacts offer information benefits that are additive rather than redundant. Structural holes are the gaps between non-

redundant contacts (see Burt 1992, 25–30, on how Granovetter's 1973, weak ties generalize to structural holes). The hole is a buffer, like an insulator in an electric circuit. A structural hole between two clusters in a network need not mean that people in the two clusters are unaware of one another. It simply means that they are so focused on their own activities that they have little time to attend to the activities of people in the other cluster. A structural hole indicates that the people on either side of the hole circulate in different flows of information. A manager who spans the structural hole, by which I mean a manager who has strong relations with contacts on both sides of the hole, has access to both information flows. The more holes spanned, the richer the information benefits of the network.

Figure 1 provides an example. James had a network that spanned one structural hole. The hole is the relatively weak connection between the cluster reached through contacts 1, 2 and 3, and the cluster reached through contacts 4 and 5. Robert took over James's job and expanded the social capital associated with the job. He preserved connection with both clusters in James's network, but expanded the network to a more diverse set of contacts. Robert's network, with the addition of three new clusters of people, spans 10 structural holes.

Information benefits in this example are enhanced in several ways. The volume is higher in Robert's network simply because he reaches

Robert took over James' job. Entrepreneurial Robert expanded the social capital of the job by reallocating network time and energy to more diverse contacts.

It is the weak connections (structural holes) between Robert's contacts that provide his expanded social capital. Robert is more positioned at the crossroads of communication between social clusters within his firm and its market, and so is better positioned to craft projects and policy that add value across clusters.

Research shows that people like Robert, better positioned for entrepreneurial opportunity, are the key to integrating across functions and across the people of increasingly diverse backgrounds in today's flatter organizations. In research comparisons between managers like James and Robert, it is the people like Robert who get promoted faster, earn higher compensation, receive better performance evaluations, and perform more successfully on teams.

Figure 1. The network structure of social capital

more people indirectly. Also, the diversity of his contacts means that the quality of his information benefits is higher. Each cluster of contacts is a single source of information because people connected to one another tend to know the same things at about the same time. Non-redundant clusters provide Robert with a broader information screen, and therefore greater assurance that he will be informed of opportunities and impending disasters (access benefits). Further, since Robert's contacts are only linked through him at the center of the network, he is the first to see new opportunities created by needs in one group that could be served by skills in other group (timing benefits). He stands at the crossroads of social organization. He has the option of bringing together otherwise disconnected individuals where in the network it would be rewarding. And because Robert's contacts are more diverse, he is more likely to be a candidate for inclusion in new opportunities (referral benefits). These benefits are compounded by the fact that having a network that yields such benefits makes Robert more attractive to other people as a contact in their own networks.

Control benefits. The manager who creates a bridge between otherwise disconnected contacts has a say in whose interests are served by the bridge. The disconnected contacts communicate through the manager, giving the manager an opportunity to adjust his or her image with each contact (the structural foundation for managerial robust action, Padgett and Ansell 1993). More, the sociological theories of Simmel and Merton describe the role of people who derive control benefits from structural holes (see Burt 1992, 30–2, for review). It is the *tertius gaudens* (literally 'the third who benefits'), a person who benefits from brokering the connection between others. As the broker between two otherwise disconnected contacts, a manager is an entrepreneur in the literal sense of the word—a person who adds value by standing between others (Burt 1992, 34–6; see Martinelli 1994, for historical review of the term in economic sociology). There is a tension here, but not the hostility of combatants. It is merely uncertainty. In the swirling mix of preferences characteristic of social networks, where no demands have absolute authority, the *tertius* negotiates for favorable terms. Structural holes are the setting for *tertius* strategies, and information is the substance. Accurate, ambiguous or distorted information is strategically moved between contacts by the *tertius*. The information and control benefits reinforce one another at any moment in time and cumulate together over time.

Networks rich in structural holes present opportunities for entrepre-

neurial behavior. The behaviors by which managers develop these opportunities are many and varied, but the opportunity itself is at all times defined by a hole in the social structure around the manager. In terms of the structural hole argument, networks rich in the entrepreneurial opportunities of structural holes are entrepreneurial networks, and entrepreneurs are people skilled in building the interpersonal bridges that span structural holes.

Predicted Social Capital Effect

Managers with contact networks rich in structural holes know about, have a hand in, and exercise control over, the more rewarding opportunities. They monitor information more effectively than it can be monitored bureaucratically. They move information faster, and to more people, than memos. These entrepreneurial managers know the parameters of organization problems early. They are highly mobile relative to people working through a bureaucracy, easily shifting network time and energy from one solution to another. More in control of their immediate surroundings, entrepreneurial managers tailor solutions to the specific individuals being coordinated, replacing the boiler-plate solutions of formal bureaucracy. There is also the issue of costs; entrepreneurial managers offer inexpensive coordination relative to the bureaucratic alternative. In sum, managers with networks rich in structural holes operate somewhere between the force of corporate authority and the dexterity of markets, building bridges between disconnected parts of the firm where it is valuable to do so. They have more opportunity to add value, are expected to do so, and are accordingly expected to enjoy higher returns to their human capital. The prediction is that in comparisons between otherwise similar people like James and Robert in Figure 1, it is people like Robert who should be more successful.[1]

The social capital difference between James and Robert can be measured by the relative extent to which their contact networks are constrained. Network constraint C is an index, computed from the structure of relations around a person, that varies from 0 toward 100 with the extent to which the person's relations are directly or indirectly concentrated in a single contact (see Appendix for detailed discussion). Constraint is lower in large networks. It is higher in dense or hierarchical networks. The range of network constraint scores across the sample managers to be discussed is illustrated by the 20 to 54 difference between Robert and James, respectively, in Figure 1.

Evidence of the Predicted Social Capital Effect

Three lines of empirical evidence emerged in sociology during the 1970s to support the argument that structural holes are a competitive advantage. First, laboratory experiments have been used to show that resources distributed through a small-group exchange network accumulate in people with exclusive exchange relations to otherwise disconnected partners (e.g. Cook and Emerson 1978; Cook et al. 1983; Markovsky et al. 1988). Second, census data have been used to describe how producer profit margins increase with structural holes in the producer network of transactions with suppliers and customers. Burt (1983) describes the association in 1967 with profits in American manufacturing markets defined at broad and detailed levels of aggregation, and extended the results into non-manufacturing through the 1960s and 1970s (Burt 1988, 1992). Burt et al. (1996) extend the results through the 1980s. Using profit and network data on markets in other countries, similar results have been found in Germany during the 1970s and 1980s (Ziegler 1982; Burt and Freeman 1994), Israel during the 1970s (Talmud 1992, 1994), Japan in the 1980s (Yasuda 1993), and Korea in the 1980s (Jang 1997).

Third, and most relevant to the evidence to be presented here, survey data have been used to describe the career advantages of having a contact network rich in structural holes. The earliest and most widely known is Granovetter's (1973, 1974) demonstration that white-collar workers find better jobs, faster, through weak ties that bridge otherwise disconnected social groups. Lin worked with several colleagues to present evidence of the importance of ties to distant contacts for obtaining more desirable jobs (e.g. Lin et al. 1981; Lin and Dumin 1986; Lin 1998). Similar empirical results appear in Campbell et al. (1986), Marsden and Hurlbert (1988), and Flap and De Graaf (1989). Moving to the top of organizations, Burt (1992, 1997a, b), Burt et al. (1997) and Podolny and Baron (1997) present survey evidence from probability samples of managers. Senior managers with networks richer in structural holes are more likely to get promoted early, receive more positive job evaluations, and take home higher compensation.

Working with more limited data, Gabbay (1997) shows how promotions occur more quickly for sales people with strong-tie access to structural holes (cf. Meyerson, 1994, on manager income as a function of strong ties; Pennings et al. 1997, on accounting firm survival as a function of strong partner ties to client sectors), and Sparrowe and Popielarz (1995) innovatively reconstruct past networks around managers to esti-

mate an event-history model of how structural holes in yesterday's network affect the likelihood of promotion today. The benefits that accrue to individuals aggregate to the management teams on which they serve. Studying quality management teams in several midwest manufacturing plants, Rosenthal (1996) shows that the teams composed of employees with more entrepreneurial networks are significantly more likely to be recognized for their success in improving the quality of plant operations (cf. Krackhardt and Stern 1988, on higher group performance with cross-group friendships between students; Ancona and Coldwell 1992, on team success as a function of the teams external network; Fernandez and Gould 1994, on organizations in broker positions within the national health policy arena being perceived as more influential).[2]

These results are consistent with Coleman's (1988, 1990) use of a network metaphor to motivate his social capital explanation of why certain children perform better in school. Children perform better if they have a constrained network in which friends, teachers and parents are all strongly connected to one another. The imagery is the same as in structural hole theory, a small network of interlocked relations constrains action. Constraint from parents and teachers has positive long-term consequences for children, forcing them to focus on their education (cf. Hirschi 1972, on the negative consequences of network constraint from delinquent friends). However, at some point on the way to becoming an adult, the child shaped by the environment becomes responsible for shaping the environment. Constraint, positive for children, is detrimental to adults, particularly adults charged with managerial tasks at the top of their firm (see Portes and Landolt 1996, for more diverse examples).

Women Pose a Puzzle

Figure 2 contains illustrative evidence of the predicted social capital effect and evidence on women that seems to contradict the predicted effect. I have network, background and performance data on senior managers with one of the largest American firms in electronic components and computing equipment. The respondents are a probability sample of the more than 3000 people just below the rank of vice-president (the firm employs more than 100,000 employees). The managers are all employed in the same firm, but their firm is the size of a small city, scattered across separate parts of the country, and diverse corporate functions (sales, service, manufacturing, information systems,

engineering, marketing, finance and human resources). Company personnel records on all managers in the study population were combined with survey network data on a representative sample of 284 managers who completed survey questionnaires for the study in the fall of 1989 (Burt 1992, 118–26).

The horizontal axis in Figure 2 is a network constraint measuring the
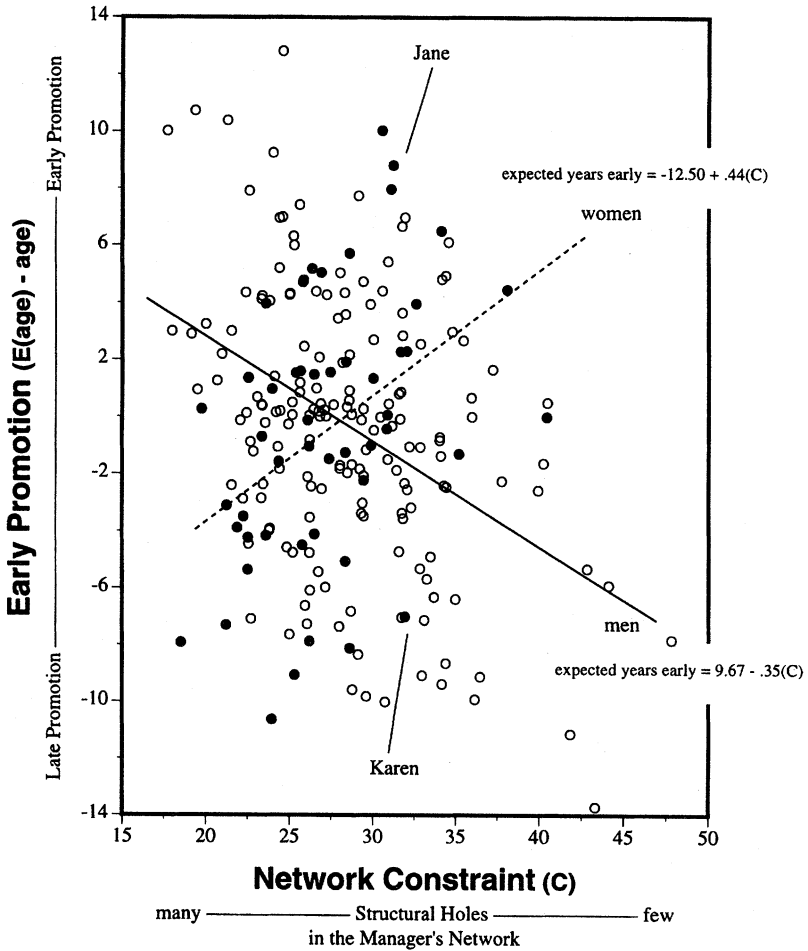
Figure 2. Gender difference in social capital effect

lack of social capital. Each manager described his or her network of key contacts within and beyond the firm: (i) Contacts were identified with nine name-generator questions on diverse kinds of relations such as informal discussion and socializing, political support, critical sources of buy-in for projects, authority relations to supervisor and promising subordinates, and so on. (ii) Relations with and between contacts were distinguished by name-interpreter questions into four categories of emotional closeness and a correspondence model was used to scale the categories from zero (distant or total strangers) to one (especially close). Some managers have sparse networks of disconnected contacts (minimum density is .07). Others have dense networks of interconnected contacts (.82 maximum density). On average, the manager networks are as dense as observed in other studies (e.g. .47 average density across the managers, versus .42 average density for Americans with more than a high school education in the 1985 General Social Survey of Americans). Managers with networks rich in structural holes—like Robert in Figure 1—have low-constraint networks and so appear to the left of the graph in Figure 2. Managers like James in Figure 1 are at the other extreme, to the right of the graph.

The vertical axis in Figure 2 is early promotion. Financial compensation in this study population is too closely tied to job rank to measure the relative success of individual managers. Time to rank provides a criterion variable. Whether promoted internally or hired from the outside, people promoted to senior rank in large organizations have several years of experience preceding their promotion. For reasons of competence and legitimacy, a certain amount of time must pass before people are ready for promotion to senior rank (see Merton's 1984, theoretical analysis of the socially expected duration associated with time in a role, entry to the role, and exit; Burt 1992, 196–7, on using socially expected durations to measure competitive success). How much time, is an empirical question the answer to which differs between individual managers.

To identify early-promotion factors in the population, I predicted age at promotion to current rank from the kind of work a manager does (rank, function and plant location) and personal background (education, race, gender and seniority; see Burt 1992, 126–31, for details). The human-capital diversity question is whether women or minorities wait longer for their promotions. There are no level or slope differences between white and non-white managers. There is a significant level difference between men and women, reflecting efforts to bring women into the senior ranks. The average woman promoted to these ranks is

3 years younger than a comparable man.[3] Women arrive at their senior ranks significantly earlier than comparable men. The point of the results to be presented is that the women arrive by a very different route.

Residuals from the regression prediction are the vertical axis in Figure 2. The residuals distinguish managers by how early they were promoted relative to their peers. Expected age at promotion, E(age), is the average age at which a manager with a specific personal background (education, race, gender and seniority) is promoted to a specific rank within a specific function (rank, function and plant location). Early promotion is the difference between when a manager was promoted to his or her current rank and a human capital baseline model predicting the age at which similar managers are promoted to the same rank to do the same work; E(age) −age. A score of −5.5, for example, indicates a manager promoted 5.5 years behind similar managers promoted to the same job. Managers promoted earlier than expected are at the top of the graph in Figure 2. Managers promoted late are at the bottom.[4]

*Gender Difference in Returns to Social Capital*

The graph includes senior men (hollow dots) and their female colleagues (solid dots). The aggregate association between early promotion and network constraint is clearly negative (-3.4 *t*-test), but it is a compound of two very different effects.

Early promotion for the men has the expected negative correlation with constraint (-5.4 *t*-test). Early promotions in Figure 2 go to senior men with more social capital, i.e. to the men with the entrepreneurial networks rich in the information and control benefits of structural holes. Constraint varies in the graph from 17 to 48 points around a mean of 28. The $-.35$ slope for men in the graph means that each point of additional constraint is associated with an average promotion delay of 4 months (-5.4 *t*-test, $p < .001$).

The reverse is true for women (3.1 *t*-test). Trace the slopes for men and women back to the hypothetical case of a manager whose contacts are so scattered that he or she has zero network constraint. Such a manager, if a man, would reach senior rank 10 years early (9.67 regression intercept). The same manager, if a woman, would be 12.5 years late (-12.50 intercept). The implication, contrary to the predicted social capital effect, is that women do better with a small network of interconnected contacts.

Consistent Gender Difference

The first question is whether the gender difference is real. Graphs in Figure 3 show a consistent gender difference across different kinds of
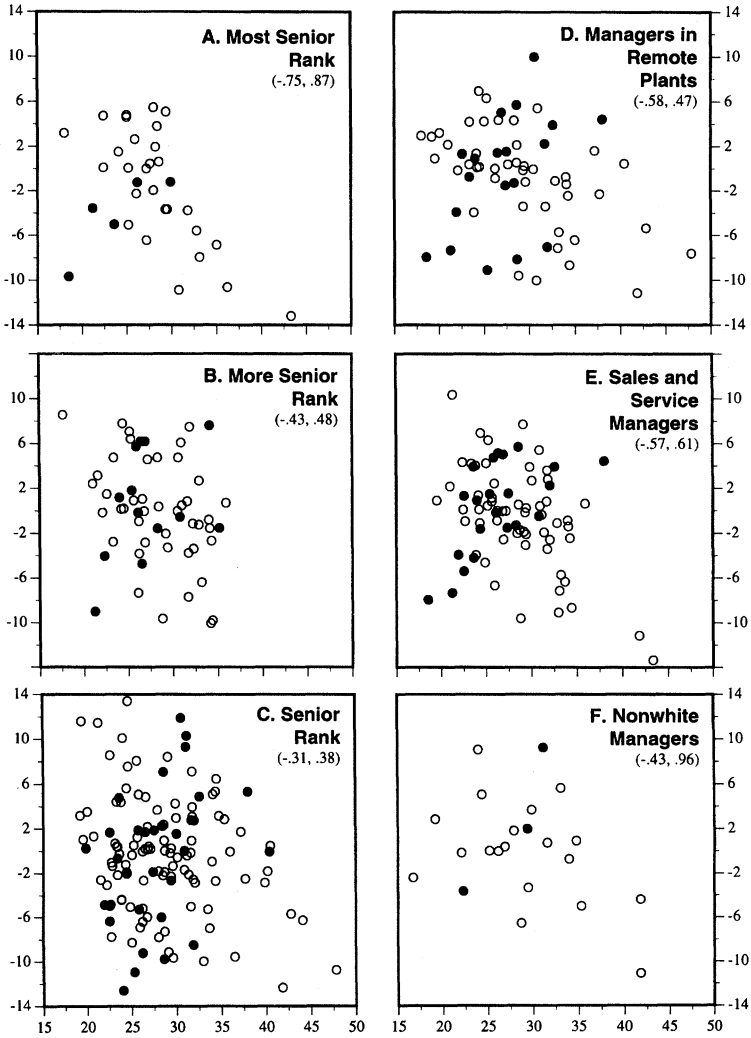
Figure 3. Gender difference is consistent
(same axes as in Figure 2, solid dots are women, correlation is listed for men
then women)

managers. Graphs A, B and C show the consistent difference across job ranks. At the senior rank, early promotion has a negative correlation with network constraint for men, positive for women ($-.31$ versus .38). At the most senior rank in the study population, the greater value of social capital is indicated by the increased negative correlation for men ($-.75$). The correlation is similarly increased for women in the opposite direction (.87).

Social capital is more valuable to managers on the edge of the firm (Burt 1997a). Having a job at a remote plant is an example of working on the edge of the firm. The firm has a cluster of plants around its corporate headquarters, with other plants scattered across the country. Social capital is more valuable to the managers in remote plants since they have to monitor the firm from a greater distance. It is more valuable for men and women, but again in the opposite direction ($-.58$ versus .47 promotion-constraint correlations for men than women in graph D of Figure 3; $-.32$ versus .38 in the plants close to corporate headquarters). Sales and service is another example of having a job on the edge of the firm. Managers in these field functions have to understand client interests in other firms. Social capital is more valuable for men and women in the field function, but again in the opposite direction ($-.57$ versus .61 in graph E of Figure 3; $-.32$ versus .38 for employees not in sales or service).

Further, the difference is more gender than minority. Women are a minority among senior managers (14 percent of the study population), and the social complications of being a minority in the organization (Kanter 1977, 206 ff) could in some way account for the gender difference in Figure 2. However, non-white managers are even more of a minority (8 percent of the study population), and graph F in Figure 3 shows that network constraint has a negative association with early promotion for non-white managers—as long as they are men. I cannot reliably estimate the correlation for non-white women because there are only three in the sample, but their correlation of .96 is more consistent with other women than non-white men.

I conclude that (i) the correlation between early promotion and network constraint is positive for women, and (ii) where the correlation is stronger for men, it is stronger for women—but in the opposite direction.

Three Reasons Why Women Should Be Different

There are arguments with which one could make sense of the gender difference (Milkman and Townsley 1994, provide general review). I

discuss three popular lines of argument to show how the arguments do not account for the gender difference in this population.

Social support. One line of argument focuses on emotional differences between men and women. Where men are drawn to the rough and tumble of an entrepreneurial network, women are argued to be more comfortable in a small circle of supportive mutual friends. People perform better where they are more comfortable. Therefore, men can thrive in an entrepreneurial network and women do better with clique networks.[5] The women in Figure 2 hold senior corporate positions, so they could be argued to have risen above emotional differences that elsewhere distinguish men from women. But if there is a preference for cliques, I should see women more often in cliques. In fact, the senior women have no tendency to build more dense networks (0.2 t-test), and a significant tendency to build larger networks (2.4 t-test)—which means less, not more, constrained networks than men (-2.0 t-test).[6] In other words, the women have no less access than men to the information and control benefits of structural holes that advance men's careers (cf. Ibarra 1997). They differ in how the firm reacts to their access.

Pink collar jobs. A second line of argument focuses on how women are treated. Women end up in 'pink collar' jobs, low-opportunity jobs are more often held by women. This is a rich literature in sociology. An exemplar is Baron and Bielby's work showing women concentrated in certain kinds of less attractive jobs (e.g. Baron and Bielby 1985; Baron et al. 1986; Bielby and Baron 1986; cf. Cohen et al. 1995).

Of course, averages across all jobs in a large organization need not describe jobs at the top. The sample women in this study population are randomly scattered across ranks (4.33 chi-square, 3 d.f., $p = .23$), corporate functions (10.86 chi-square, 10 d.f., $p = .15$), and 29 combinations of rank and function (32.63 chi-square, 28 d.f., $p = .25$).[7] It would be difficult to explain the Figure 2 difference between men and women with an argument about women working in jobs different from those in which men work.

Moreover, there is no gender difference in the constraint of the corporate authority networks that define their jobs. To study social capital and network content following Podolny and Baron (1997), I computed constraint from different kinds of relations (Burt 1997c). The managers in this firm describe a behavioral distinction between their personal discussion relations (confiding, socializing, career advice) and the corporate authority relations that define their jobs (supervisor and

essential sources of buy-in). The tendency reported previously for women to have less constrained networks is only true of personal discussion networks. Men and women in these senior ranks are no differently constrained in their networks of authority relations (0.5 t-test), and are no different in the irrelevance of that constraint to early promotion (1.4 t-test for slope difference between women and senior men).

Combat-birth metaphor. A third line of argument focuses on women reacting to how they are treated. Women with dense networks of female colleagues have a competitive advantage in breaking through the 'glass ceiling' into the senior ranks. Such women can better look out for one another's interests—speaking up for one another in the other's absence, and informing one another of developing opportunities.[8] The sample women do include a higher proportion of other women among their key contacts (9.2 t-test; see Kanter 1977; Brass 1985, Ibarra 1992 for similar evidence). Excluding spouses, 31 percent of the average woman's network is other women—45 percent of her personal discussion network (cf. McPherson and Smith-Lovin 1987, on induced versus choice homophily). Men cite women more in proportion to the population. Women are 14 percent of the study population and 13 percent of the average man's contacts (13 percent of all non-kin contacts, 13 percent of personal discussion non-kin contacts).

However, preference for female contacts does not explain the gender difference in Figure 2. Two reasons: First, there is no tendency for women citing a higher proportion of other women to have more constrained networks (0.1 t-test). Women in constrained and unconstrained networks equally prefer other women as contacts. It is men who show an effect of gender preference. Men in constrained networks include significantly fewer women among their contacts (-2.7 t-test). Second, early promotion has no association with a preference for women. Women with constrained networks tend to be promoted early (3.1 t-test in Figure 2). The prediction is unaffected by the extent to which the woman includes other women among her contacts (3.0 t-test for network constraint, -0.2 t-test for proportion women in her network). Senior men with constrained networks tend to be promoted late (-5.4 t-test in Figure 3). This prediction too is unaffected by the extent to which the man includes women among his contacts (-5.2 t-test for constraint, 0.9 t-test for proportion women in his network).

From Gender to Legitimacy and Borrowed Social Capital

I solved the gender puzzle by looking more closely at the networks around the women. What I found is illustrated in Figure 4 with a comparison between two of the women, Jane and Karen (pseudonyms). To make their network differences more obvious, neither woman is included in the sociogram of her network. If you turn back to Figure 2 you can see Jane and Karen indicated one above the other in the data. Network constraint is similar for them, so they are at about the same point on the horizontal axis of Figure 2. They are very different on the vertical axis. The two women hold the same rank in the firm, but Jane was promoted 9 years earlier than other women in her line of work with the same personal background. Karen was promoted 7 years late. I am looking for something in their networks to explain the promotion difference. Aggregate constraint is the same for both women. The component variables in network constraint are displayed in Figure 4. The explanation is not size. Jane's eight contacts are similar to Karen's nine. The explanation is not density. The average strength of relation between contacts is .36 in both networks.

Hierarchy Indicates Borrowed Social Capital

The difference is hierarchy. A network is hierarchical to the extent that links between contacts are indirect through a central person (other than the manager him or herself). Measurement details are given in the Appendix (Figure 9 is a quick reference). Jane's network is hierarchical because so many of her contacts are connected through Sam (a pseudonym). Sam has especially close ties with all but two of Jane's contacts, and close ties with the remaining two. More, there would be few relations between contacts if Sam were removed from the network. In contrast, Karen's contacts are connected directly. With respect to hierarchy in the networks of the other sample managers, Jane's network is two standard deviations above average. Karen's is three standard deviations below average.

I also know something about the contacts in each network. I know from Karen's network questionnaire that her network is concentrated in her immediate work group. Her boss, contact 5, is the most central contact in her network. He has especially close relations with three of the four other contacts, and close relations with another four. Contacts 3, 4, 6, 7, 8 and 9 are all other people who work with Karen under her boss.
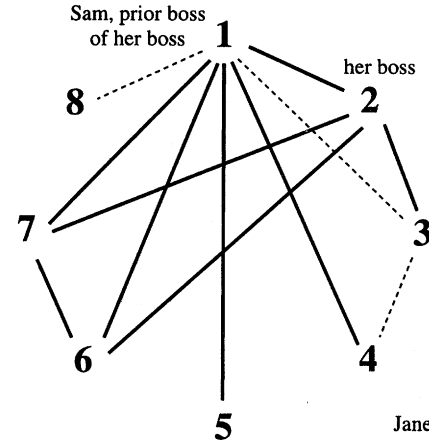
**Jane: Level 2
Early Promotion**

bold line is especially close,
dashed line is close,
no line is distant or strangers

	Jane	Karen	COMPARISON
	9	-7	Promotion (years early)
	.31	.34	Constraint (about same)
	8	9	Size (about same)
	.36	.36	Density (about same)
			Hierarchy (high vs. low)
	.16	.01	constraint
	.55	.17	betweenness
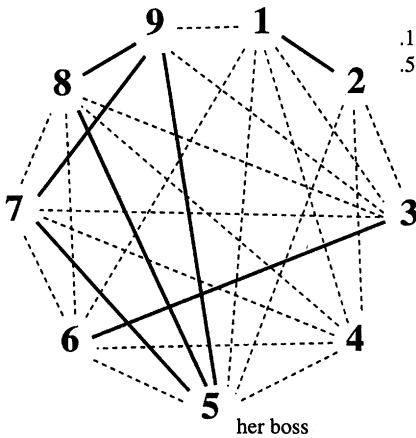
**Karen: Level 2
Late Promotion**

Figure 4. Discovering hierarchy

Jane's network has a broader reach. From her questionnaire, I know that only two of her eight contacts are from her work group; contact 3 and her boss, contact 2. Jane's other ties are essential sources of buy-in beyond her group (contacts 1, 4, 5 and 6), and people further removed who Jane cites as valuable sources of support and advice. The key to this network is understanding Sam's role in it. Sam is Jane's sponsor in the

organization.[9] Jane's boss maintained a strong relation with his prior boss, Sam. On her boss's recommendation, Jane represented her group in a project under Sam's direction. Sam was impressed with Jane and took her under his wing, brokering introductions to other senior managers. Senior managers dealing with Jane felt that they were dealing indirectly with Sam, which greatly simplified Jane's work with them.

The hierarchy in Jane's network indicates borrowed social capital. The point is illustrated in Figure 5. At the top of Figure 5 is the dyad between a new manager and a sponsor. The sponsor's network,
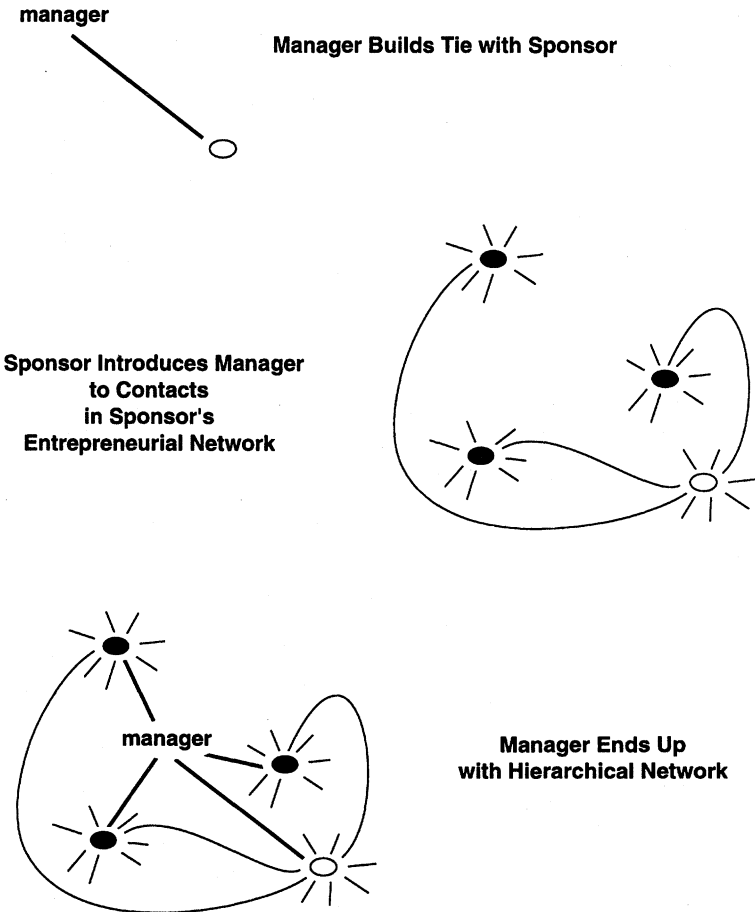

Figure 5. Hierarchical network indicates a borrowed entrepreneurial network

displayed in the middle of Figure 5, is composed of strong ties to disconnected contacts. In other words, the sponsor has social capital in the form of an entrepreneurial network rich in structural holes. When the sponsor introduces the manager to his key contacts at the bottom of Figure 5, the manager ends up with a hierarchical network. The same would not be true if the sponsor had a clique network (connect the three contacts in the middle sociogram). Introducing the manager to the sponsor's already connected contacts would only expand the clique to one more member. Everyone is before and after connected to everyone else.

Success Contingent on Borrowed Social Capital Indicates a Legitimacy Problem

Borrowing social capital can be a productive strategy (Raider and Burt 1996). Every manager needs a sponsor at one time or another. Company leaders don't have time to check into the credibility of everyone making a bid for broader responsibilities. They are looking for fast, reliable cues about managers on whom they do not already have information. A manager deemed suspect for whatever reason—a new hire, someone just transferred from another country, a new addition to a cohesive group—needs an established insider to provide the cues, sponsoring the manager as a legitimate player to open the mind of a contact not ready to listen seriously to the manager's proposal.

Borrowed social capital is especially obvious when relationships cross corporate or cultural boundaries. It is official in Japan. There are industry-specific directories of people available to help outsiders develop relations with Japanese firms.[10] The people in these directories are usually retired corporate executives who prefer the active life of consulting to life in a window seat. These people bring no technical skills, for they were too long at the top to know the technical details of their industry. They bring connections. Without the proper personal connections, outsiders don't do business in Japan. Corning Glass is a concrete illustration. Corning has a history of joint ventures that give Corning access to a market where the partner firm is established. Nanda and Bartlett (1990) offer illustrative examples in the United States and Europe (see Gulati 1995, for more systematic evidence of third-party effects on alliances), but I particularly enjoy their quote from a Corning executive commenting on the result of Corning's alliance with the Japanese firm Asahi (Nanda and Bartlett 1990, 14):

> When our salespeople began calling on the Japanese TV set manufacturers, we felt

as if a veil came over them when they dealt with us. Their relationships with their Japanese suppliers ran very deep, while they were very distant with us. Last week, Asahi people escorted me to a meeting with the worldwide TV tube manager of a large Japanese company and introduced me properly to him. We had extremely fruitful conversation. I wouldn't have even been able to meet him and discuss issues between us if it were not for the Asahi connection.

It is one thing to occasionally borrow social capital to succeed in a new venture. It is another to have to borrow social capital for all your ventures. If borrowing social capital is a strategy through which suspect outsiders (however suspect outsiders are defined in a study population) get access to the benefits of social capital, then a category of people for whom success depends on borrowing social capital is a category of people deemed suspect.

The women in Figure 2 seem to be just such a category of people. Jane and Karen illustrate a systematic pattern. Promotions come earlier to women with more hierarchical networks (2.6 t-test, $p = .01$), which means that promotions come earlier to women who borrow social capital.

Combine that point with the results in Figures 2 and 3. There are two strategies for building social capital. The direct strategy is to build your own social capital by establishing strong ties to disconnected groups in the firm and beyond. The results in Figures 2 and Figure 3 show that building your own is not a productive strategy for women in this organization. Women who have entrepreneurial networks are promoted late. The alternative strategy is to borrow the social capital of someone, a sponsoring strategic partner, already connected to disconnected groups in the firm and beyond. This is the route by which women in this firm get promoted. The fact that women fall behind when they build their own social capital, and move ahead when they borrow social capital, implies that they have a legitimacy problem in this firm.

My interpretation of that implication is that the gender difference in Figure 2 is not a difference between men and women in particular so much as it is a generic difference between insiders and outsiders—where the insider–outsider distinction is, in this study population, correlated with gender. Here are four points to support my interpretation:

Hierarchy versus size and density. Hierarchy—indicating borrowed social capital—is alone responsible for the positive association across women between network constraint and early promotion. The results in Table 1 separate network size, density and hierarchy components in the social capital effect for the senior men and women in Figure 2.

Table 1. Components in the social capital effect

	Senior men			Women		100 Least legitimate		Women and Entry-Rank Men		
Multiple correlation:	.40	.49	.42	.46	.37	.72	.41	.22	.37	.28
Intercept	9.67	2.35	−12.50	−.98	3.98	−9.39	7.21	−6.34	−2.45	1.67
Network constraint (C)	−.35 [−.40] (−5.4)	—	.44 [.42] (3.21)	—	—	—	—	.20 [.22] (2.3)	—	—
Network size (number of contacts)	—	.48 [.27] (3.8)	—	−.43 [−.18] (−1.4)	−.55 [−.23] (−1.6)	.27 [.13] (1.5)	−.20 [−.10] (−1.0)	—	−.27 [−.14] (−1.5)	−.30 [−.15] (−1.6)
Network density (average tie between contacts)	—	−.21 [−.43] (−5.7)	—	.10 [.21] (1.6)	−.01 [−.02] (−0.1)	.01 [.01] (0.1)	−.22 [−.44] (−4.1)	—	.08 [.17] (1.8)	−.00 [−.01] (−0.1)
Network hierarchy Constraint from many concentrated in one contact	—	−.21 [−.23] (−3.0)	—	.37 [.35] (2.6)	—	.69 [.80] (7.9)	—	—	.34 [.30] (3.2)	—
Betweenness concentrated in one contact	—	—	—	—	.13 [.25] (1.7)	—	.11 [.24] (2.2)	—	—	.10 [.23] (1.9)

Note: These are ordinary least-squares estimates of row variables predicting early promotion. Standardized estimates appear in [brackets] and routine *t*-tests appear in (parentheses). The row variables are described in the Appendix.

The aggregate negative correlation for senior men between early promotion and network constraint is a composite of effects consistent with direct access to social capital: Larger networks are associated with early promotion (3.8 t-test). Less dense networks are associated with early promotion (-5.7 t-test). Less hierarchical networks are associated with early promotion (-3.0).

The aggregate positive correlation for women is the effect of only one constraint component; hierarchy. The women promoted early with constrained networks in Figure 2 were not promoted because they focused their attention on a small number of contacts (negligible -1.4 t-test for network size in Table 1), nor because they built dense networks of interconnected contacts (negligible 1.6 t-test for network density in Table 1). It is because they have more hierarchical networks (2.6 t-test for network hierarchy in Table 1, $p = .01$).

Size-sensitive hierarchy. Second, the hierarchy effect is stronger with hierarchy measures that reflect the volume of social capital borrowed. Betweenness hierarchy measures the extent to which there exists one contact who brokers connections between other contacts in a network. Betweenness does not vary with the number of brokered connections (see Figure 9 in the Appendix; betweenness hierarchy is 100 in all three hierarchical networks, regardless of network size). In contrast, constraint hierarchy increases linearly with the size of a hierarchical network. In other words, betweenness hierarchy measures the extent to which a manager has borrowed social capital, while constraint hierarchy measure the volume of structural holes in the borrowed social capital. The results in Table 1 show stronger early promotion associations with constraint hierarchy; i.e. early promotion is more likely with borrowed richer in structural holes.

Sponsor legitimacy. The third bit of supporting evidence concerns the source of borrowed capital. Analysis elsewhere shows that the boss makes a poor sponsor (Burt 1992, Ch. 4). Supervisors are expected to sponsor their subordinates. What they say about their subordinates reflects on their own work. Competent bosses usually say positive things about their subordinates. Having a more distant strategic partner means that there are two people in different places sponsoring the manager when new opportunities arise. This adds a corroborating external voice to the boss's sponsorship. The strategic partner around whom the hierarchical network is built has to be sufficiently close to sponsor the manager, but sufficiently distant to lie untarnished by day-

to-day arguments, and speak with an authoritative voice of ostensible objectivity.
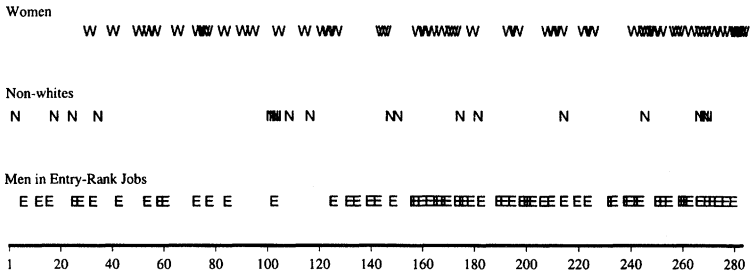
Sample Managers in Rank Order of Legitimacy
(more legitimate to the left, less legitimate to the right)

	Mean Rank		Rank (p = .01; < .001 for entry rank)
		Most Senior	94
All	143	More Senior	116
		Senior	131
Education (p = .54)		Entry	172
College or less	132		
Graduate	145	**Function** (p = .86)	
		Sales	136
Race (p = .54)		Service	145
White	143	Manufacturing	161
Nonwhite	141	Engineering	134
		Marketing	145
Sex (p < .001)		MIS	128
Men	135	Finance	146
Women	177	Human Resources	130
Seniority (p = .12)		**Plant Location** (p = .55)	
Recent hire	139	Core	146
Long with the firm	146	Remote	134

Figure 6. Detecting diversity problems

Illegitimate men. Fourth, the pattern of effects suggesting that women face a legitimacy problem in the firm also occur for a category of men who are more obviously suspect as senior managers.

There is a two-step network test for diversity problems. First, rank managers by their legitimacy, where legitimacy can be measured by the extent to which their success does not depend on borrowed social capital.[11] The 284 respondent managers are ranked on the horizontal axis of Figure 6. The managers to the left are people for whom early promotion is primarily associated with having a large network of disconnected contacts. Hierarchy is just another form of network constraint. Managers to the right of Figure 6 are the people for whom early promotion is associated with having a large hierarchical network

organized around a central contact. For these managers, hierarchy is a competitive advantage indicating that they have indirect access to social capital through a central contact. Table 1 contains estimates of social capital effects for the managers in ranks 185 through 284 (the 100 least legitimate managers in the sample). Early promotion is dramatically dependent on hierarchy (7.9 t-test, $p < .001$).

The second step is to look for kinds of managers that are as a group low in the legitimacy rank order. I tested for differences between numerous categories of managers, but found significant differences for only two; women and entry-rank men. Mean ranks are reported at the bottom of Figure 6 for the categories of managers used to define strata in the sampling frame. I tested for differences on two variables: position in the legitimacy rank-order, and the legitimacy measure on which the rank-order is based. Only women and entry-rank men stand out as categories significantly different in legitimacy from other managers.

The gender difference at the bottom of Figure 6 tells me something that I already know; namely, women have less legitimacy than men in this study population. The average man is at rank 135 among the 284 sample managers. The average woman is significantly lower at rank 177.

The other significant distinction is job level. The highest legitimacy scores on average are for men in the most senior jobs. However, they are not significantly higher than other managers (1.1 t-test). The men who stand apart are in the lowest level of this study population; men who have just entered the population of senior managers. Their average rank in the legitimacy rank-order is 172, significantly lower than other managers (4.5 t-test, $p < .001$). Up to this point in the paper, I have not included entry-rank men in the regression equations predicting early promotion because they are so clearly distinct from other senior men. Adding them to the women in Table 1 yields an even more significant association between early promotion and network hierarchy (see the last three columns in Table 1).

This is an important point because it means that the gender difference in Figure 2 and Figure 3 extends beyond women to at least one category of men. Entry-rank men are the new arrivals to the senior manager population (akin to assistant professors just hired from graduate school). They are senior managers in the firm, but they have only just entered senior management. They have to establish their legitimacy as members of the senior management. Similar stories can be told about other groups. Non-whites are an obvious minority within the firm, and have a historical claim to not being accepted at the top of the white establish-
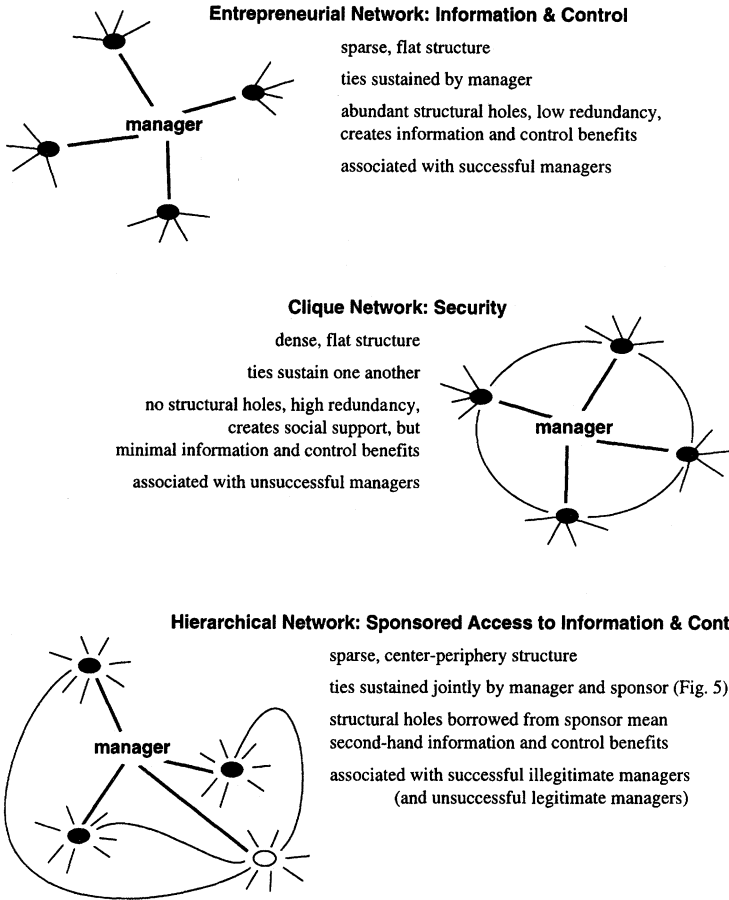
ment. However, the structural analysis shows no significant legitimacy difference between white and non-white managers in this population. It is women and youngsters who are deemed suspect.

Not all women and entry-rank men are illegitimate. Three categories of minority managers are distinguished at the top of Figure 6; non-whites, women and entry-rank men. Each N in the graph at the top of Figure 6 marks a rank held by one of the non-white managers. There is no significant legitimacy difference between white and non-white managers because non-white managers are so widely spread across the rank order. Some are at the top of the rank order, others are at the bottom. Each W marks a rank held by a woman and each E marks a rank held by a man in an entry-rank job. The Ws and Es are concentrated at the bottom of the rank order, as indicated by the averages for women and entry-rank men at the bottom of Figure 6. But look at the spread of Ws and Es across the whole rank order. The Ws and Es to the left of the graph are women and entry-rank men who are accepted as legitimate players—in the sense that their odds of early promotion increase with the extent to which they have their own entrepreneurial network.

Conclusion: Network Forms of Social Capital

In conclusion, the network form of social capital varies with legitimacy. Key distinctions are illustrated in Figure 7. Providing security but no access to structural holes, a network untended degenerates into a clique—an interconnected set of mutual friends. The information and control benefits of structural holes that constitute social capital lie in two directions away from a clique. One direction is for a manager to *build* his or her own social capital with strong ties to otherwise disconnected groups. This leads to the entrepreneurial network in Figure 7, associated with more successful senior men in this chapter's study population. Senior men compete through entrepreneurial networks for direct access to the information and control benefits of structural holes. Anything less than the direct access of an entrepreneurial network is associated with less successful senior men. The alternative is to *borrow* the social capital of an established manager who has strong ties to otherwise disconnected groups. This leads to the hierarchical network in Figure 7, associated with more successful women and entry-rank men in this chapter's study population.

Figure 8 contains summary evidence for the distinctions in Figure 7. The top graph shows that senior men, women and entry-rank men have

Entrepreneurial Network: Information & Control

sparse, flat structure

ties sustained by manager

abundant structural holes, low redundancy,
creates information and control benefits

associated with successful managers

manager

Clique Network: Security

dense, flat structure

ties sustain one another

no structural holes, high redundancy,
creates social support, but
minimal information and control benefits

associated with unsuccessful managers

manager

Hierarchical Network: Sponsored Access to Information & Control

sparse, center-periphery structure

ties sustained jointly by manager and sponsor (Fig. 5)

structural holes borrowed from sponsor mean
second-hand information and control benefits

associated with successful illegitimate managers
(and unsuccessful legitimate managers)

manager

Figure 7. Network forms of social capital

the same kinds of networks in the study population. I divided the
manager networks into four kinds. Flat structures (constraint hierarchy
below average) are distinguished from hierarchical structures (average
or higher constraint hierarchy). Flat structures are divided into entrepre-
neurial networks (constraint below average) versus clique networks
(average or higher constraint). Hierarchical structures are divided into
those in which the boss is the central contact versus others.[12] Managers
in this firm are encouraged to 'network'. Entrepreneurial networks are
the mode in Figure 8, and the distribution of networks among senior
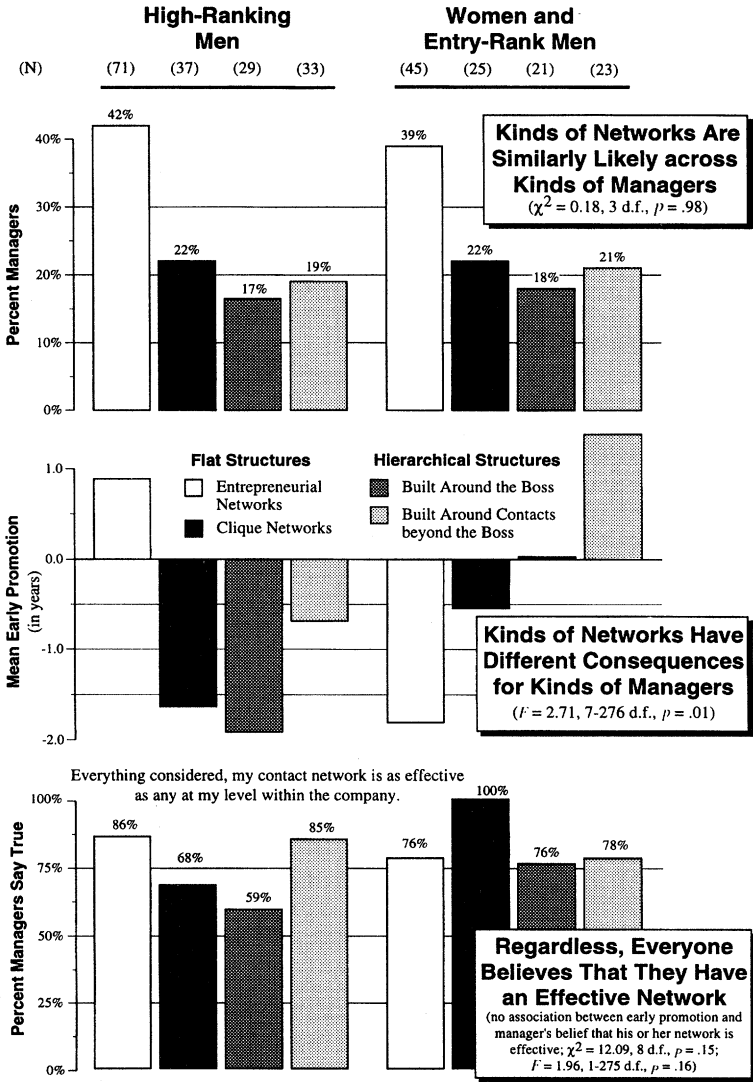men is the same among women and entry-rank men. In fact, kinds of

Figure 8.

networks occur in similar proportions among every kind of manager within the firm.[13] This is an important point for observers who claim that certain kinds of people tend to build certain kinds of networks (e.g. women build cliques, men build entrepreneurial networks). Figure 8

shows that women and entry-rank men build the same networks built by senior men.

What is different between managers is what happens to them as a consequence of their network. In the middle of Figure 8, entrepreneurial networks are the only form associated with early promotion for senior men. Promotions come late to senior men in cliques, or worse, senior men whose contacts are borrowed from their boss. At the other end of the legitimacy continuum, entrepreneurial networks are the worst choice for women and entry-rank men looking for early promotion. Promotions come significantly late when they build their own entrepreneurial network.

What began as an empirical puzzle for the structural hole argument, is resolved as richer empirical support. The difference between entrepreneurial and hierarchical networks is further empirical support for the central premise of the argument; namely, social capital is a matter of access to the information and control benefits of structural holes. Women and entry-rank men are exceptions that prove the rule. They do not have equal access to the benefits of social capital, but the network conditions that benefit their careers indirectly are the same network conditions that directly benefit the careers of senior men. The positive correlation between early promotion and network constraint for women and entry-rank men is a reduced-form coefficient. It is the combination of a strong relation to a sponsor and the entrepreneurial network of the sponsor. The two combine to define a hierarchical network around the manager, and it is access to the sponsor's entrepreneurial network that is associated with early promotion. A strong relation to a sponsor with a clique network does not lead to early promotion. The fact that hierarchy, not density, is associated with the success of women and entry-rank men means that borrowing is only as valuable as the network you borrow. Whether a manager has direct access to structural holes, or indirect access through the borrowed network of an entrepreneur, he or she has social capital to the extent that he or she has access (direct or indirect) to structural holes.

Optimum Networks

There is a practical implication for individuals: Pick a network for what it can do, not for the kind of people who pick it. The managers studied here seem oblivious to the value of their networks. The third panel in Figure 8 shows the percentage of managers in each category who said

that 'their network was as effective as any at my level within the company'. The negligible test statistics in the figure show no differences between managers. Entrepreneurial networks are optimum for senior men, but those with hierarchical networks are as enthusiastic about their networks. Hierarchical networks are optimum for women and entry-rank men, but those with entrepreneurial networks (the worst choice for these managers) are as enthusiastic about their networks.

If there is optimizing behavior here, it is difficult to see. Kinds of networks have career implications for kinds of managers, but kinds of networks are randomly distributed across kinds of managers, and managers are poor judges of whether their network is right for their job. Ignorant of social capital theory, managers often look to successful colleagues for behavioral guidelines. The point illustrated in Figure 8 is that people should pick a network for what it can do, not for the kind of people who pick it. Where legitimacy is not an issue, competition is through entrepreneurial networks for direct access to the information and control benefits of structural holes. Where legitimacy is an issue, the optimum strategy is to compete through a hierarchical network for indirect access to the structural holes in an established person's network.

There is also a practical implication for the firm. The distinction between network forms of social capital in Figure 7 provides a useful diagnostic of diversity problems within a labor market. The people needed to support an idea have to take seriously the entrepreneurial manager to whom the idea is attributed. Certain categories of people (defined by gender, race or other attributes) are in certain organizations not taken seriously as a source of ideas. Returns to social capital can be used to sort managers into those accepted as legitimate players in the population versus those deemed suspect. The latter, 'illegitimate entrepreneurs', have to borrow the social capital of a sponsor to benefit from the information and control advantages of structural holes. Women and entry-rank men in this papers study population are most likely to be promoted early when they build their network within the entrepreneurial network of a strategic partner beyond their boss. Even working within the limits of a clique network, or their boss's network, is preferable to building their own entrepreneurial network (in terms of early promotion). The fact that women and entry-rank men fall behind when they build their own social capital, and move ahead when they borrow social capital, indicates that they have a legitimacy problem in this firm. It is one thing to occasionally borrow social capital to succeed in a new venture. It is another to have to borrow social capital for all your

ventures. If borrowing social capital is a strategy through which suspect outsiders get access to the benefits of social capital, then a category of people for whom success depends on borrowing social capital is a category of people deemed suspect. The social capital analysis provides more than a method of identifying groups of people deemed suspect. Instead of distinguishing people by broad attributes of age, race, gender and treating everyone as equal within the same category, the network analysis provides a manager-specific measure of legitimacy (Figure 6). Legitimacy is keyed to the social situation of a person, not to the person's attributes. This is a powerful shift in the analysis of diversity problems.

APPENDIX
Network Constraint Components

Network constraint (a function of size, density and hierarchy) measures the concentration of relations in a single contact (Burt 1992, 50 ff). Contact-specific constraint, the extent to which manager i's network is concentrated in the relation with contact j is defined as follows: $c_{ij} = (p_{ij} + \Sigma_q p_{iq} p_{qj})^2$, for $q \neq i,j$, where p_{ij} is the proportion of i's relations invested in contact j. Measuring indirect connections, the sum $\Sigma_q p_{iq} p_{qj}$ is the portion of i's relations invested in contacts q who are in turn invested in contact j. The sum in parentheses is the proportion of i's relations directly or indirectly invested in i's relationship with contact j. The sum of squared proportions, $\Sigma_j c_{ij}$, is a network constraint index C measuring the concentration of direct and indirect relations in one contact. I multiply the constraint index C—as well as the density and hierarchy components below—by 100 to discuss social capital effects per point of constraint.

I use the relative contributions of the size, density and hierarchy components to make inferences about diversity problems. Results in Table 2 and Figure 9 illustrate the associations between the components, the aggregate, and early promotion. The regression results in Table 2 predict early promotion for the senior men in Figure 2. The hypothetical networks in Figure 9 illustrate how constraint varies with size, density and hierarchy. Relations, usually continuous, often asymmetric, are simplified in Figure 9 to binary and symmetric. Also, the figure only displays relations between contacts. Relations with the respondent manager are not presented.

Size

Constraint is more severe in smaller networks because they contain few alternative contacts to provide information, and play against one another. An increasing number of contacts decreases, on average, the proportional strength of relations, p_{ij}, in the constraint model. In the first column of Figure 9, a manager citing three disconnected contacts has a constraint of 33, which

decreases to 20 for the manager citing five contacts, and 10 for the manager citing ten. At maximum density in the second column of Figure 9, constraint is 93 for the manager citing three strongly connected contacts, 65 for the manager citing five such contacts, and 36 for the manager citing ten.
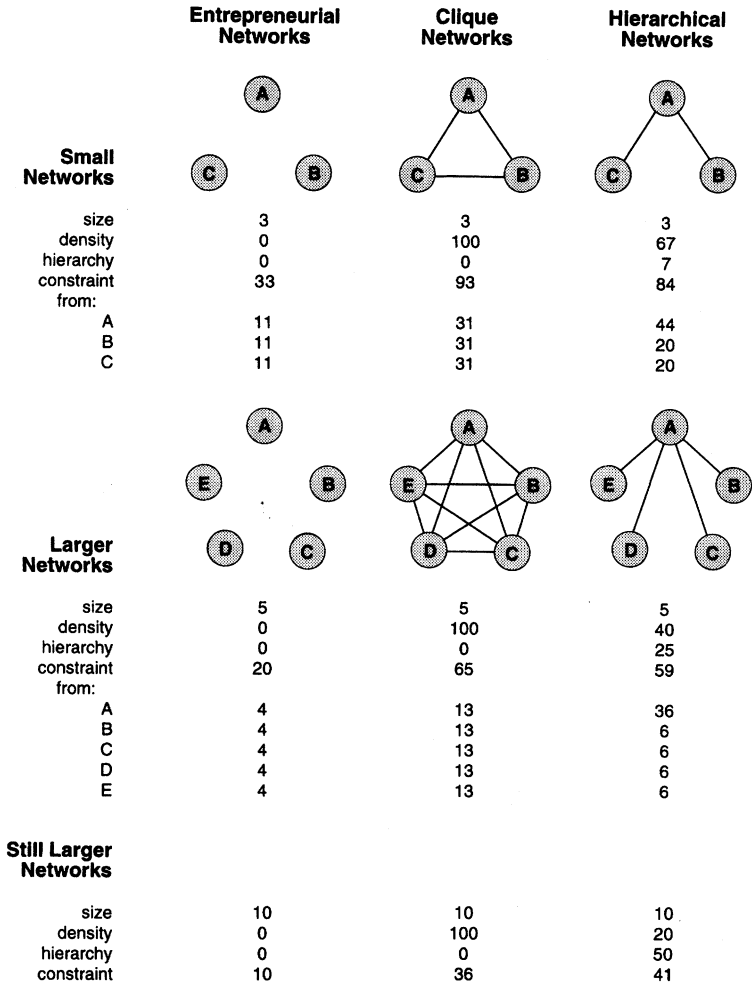
There are two size variables in Table 2. The simpler is number of contacts. The second variable, C-size, is the size component in the constraint model. This measures the extent to which a manager's relations are concentrated in a single contact. The two size variables covary. As the number of contacts increases, the proportion of a manager's network allocated to any one contact decreases ($-.86$ correlation). Both size variables have significant associations in Table 2 with early promotion (3.9 t-test in model I, versus -3.2 in model II).[14]

Table 2. Components in the social capital effect for senior men

Network variables	I	II	III	IV	V
Multiple correlation:	.51	.48	.47	.54	.49
Intercept	−.79	10.26	2.88	12.06	2.35
Size:					
Number of contacts	.49	—	.22	.05	.48
	[.27]		[.12]	[.03]	[.27]
	(.39)		(1.3)	(0.3)	(3.8)
C-size		−.47			
	—	[−.23]	—	—	—
		(−3.2)			
Density:					
Average relation between contacts	−.12	−.12	—	−.11	−.21
	[−.25]	[−.25]		[−.22]	[−.43]
	(−3.1)	(−3.3)		(−3.0)	(−5.7)
C-density			−.34		
	—	—	[−.19]	—	—
			(−1.9)		
Hierarchy:					
Constraint from many concentrated in one contact	—	—	—	—	−.21
					[−.23]
					(−3.0)
Betweenness concentrated in one contact	−.09	−.10	−.11		
	[−.27]	[−.29]	[−.33]	—	—
	(−3.6)	(−3.9)	(−4.5)		
C-hierarchy				−1.51	
	—	—	—	[−.43]	—
				(−4.7)	

Note: These are ordinary least-square estimates of row variables predicting early promotion. Standardized estimates appear in [brackets] and routine t-tests appear in (parentheses). The row variables are explained in the text.

	Entrepreneurial Networks	Clique Networks	Hierarchical Networks
Small Networks			
size	3	3	3
density	0	100	67
hierarchy	0	0	7
constraint	33	93	84
from:			
A	11	31	44
B	11	31	20
C	11	31	20
Larger Networks			
size	5	5	5
density	0	100	40
hierarchy	0	0	25
constraint	20	65	59
from:			
A	4	13	36
B	4	13	6
C	4	13	6
D	4	13	6
E	4	13	6
Still Larger Networks			
size	10	10	10
density	0	100	20
hierarchy	0	0	50
constraint	10	36	41

NOTE — Network density, hierarchy, and constraint scores are multiplied by 100 to match computer output

Figure 9. Constraint $= f$(size, density, hierarchy)
(network scores are multiplied by 100; hierarchy is constraint then between-ness)

Density

Constraint is more severe in more dense networks because dense networks contain, in effect, fewer alternative contacts. Strongly interconnected contacts are more likely to have the same information, and are more difficult to play against one another. Density increases the indirect connections component in

the constraint model ($\Sigma_q\, p_{iq} p_{qj}$). For all sizes, density is 0 in the first column of Figure 9, and 100 in the second column of the figure. At each size, constraint is much higher in the second column of Figure 9 than in the first column.

There are two network density variables in Table 2. The more familiar of the two is the average strength of relation between contacts, which is presented in Figure 9. The other, C-density, measures the extent to which a manager's strongest relations are with contacts strongly tied to other of the manager's contacts. This is the density component in the constraint model.[14] The two density variables are correlated (.42), and have similar negative correlations with early promotion ($-.33$ and $-.35$ respectively). Both density variables have negative associations with early promotion (-3.1 t-test in model I, -1.9 in model III).[15]

Hierarchy

Constraint is more severe in more hierarchical networks because hierarchical networks contain, in effect, fewer alternative contacts. A network is hierarchical to the extent that it is organized around one of the contacts. A manager is more constrained when one central contact has exclusive relations with the manager's other contacts (see Burt 1992, 56–62, on the constraint-significance of the difference between exclusive and strong relations, building on the small-group experiments with exchange networks). The central contact gets the same information available to the manager and cannot be avoided in manager negotiations with each other contact. More, the central contact can be played against the manager by third parties because information available from the manager is equally available from the central contact since manager and central contact reach the same people.

Hierarchy and density both increase, but in different ways, the indirect connections component in the constraint model ($\Sigma_q\, p_{iq} p_{qj}$). Density measures the average strength of indirect connection. Hierarchy measures the concentration of indirect connection through one contact. No one contact is more connected than others in the minimum and maximum density networks in the first two columns of Figure 9. Hierarchy is zero. In the third column, one contact is strongly connected to all others, who are otherwise disconnected from one another (except through the manager citing them who is not reported in the sociograms). The hierarchy is evident in the relative levels of constraint posed by individual contacts. Contact A poses more severe constraint than the others because network ties are concentrated in A. Note how constraint increases with hierarchy and density. Constraint is high in the dense and hierarchical three-contact networks (93 and 84 points, respectively). Constraint is 65 in the maximum-density five-contact network and 59 in the hierarchical network, even though density is only 40 in the hierarchical network. In the ten-contact networks, constraint is lower in the maximum-density network than it is in the hierarchical network (36 versus 41), and density is only 20 in the hierarchical

network. In short, density and hierarchy are correlated, but distinct, components in network constraint.

There are three network hierarchy variables in Table 2. All measure the extent to which a manager's network is concentrated in the hands of one contact. (i) The first variable measures the extent to which constraint is concentrated in the hands of one contact.[16] Constraint hierarchy is zero in the first two columns of Figure 9 (because all contacts poses equal constraint) and non-zero in the third-column networks (because contact A is the disproportionate source of constraint by dint of A's exclusive connections with the other contacts). Constraint hierarchy increases with network size because the difference between minimum and maximum constraint is larger in larger hierarchical networks (as reported in the third column of Figure 9; 7 in the three-contact hierarchical network, 25 in the five-contact network, and 50 in the ten-contact network). (ii) The second hierarchy variable is Freeman's (1977) betweenness index, also displayed in Figure 9. Betweenness measures the extent to which one contact stands between all others. It varies from 0 in the first two columns of Figure 9 (because no contact stands between the others), to its 100 maximum in the column-three networks (because contact A provides the only connection between contacts, putting aside the manager). Independent of network size, betweenness hierarchy equals 100 in all of the networks in the third column of Figure 9.[17] (iii) The third hierarchy variable, C-hierarchy, is the hierarchy component in the constraint model.[14] This measures the extent to which a manager's contacts concentrate their relations in one central contact and covaries with betweenness hierarchy (.57 correlation with betweenness hierarchy versus .23 correlation with constraint hierarchy). Their differences notwithstanding, all three hierarchy variables have significant negative associations with early promotion (t-tests at the bottom of Table 1 vary from -3.0 to -4.7).

The results in Table 2 show that size, density, and hierarchy make significant independent contributions to the social capital effect on early promotion. At the same time, the three components covary to define social capital. If I predict early promotion from all seven variables in Table 2, I get a .56 multiple correlation. I get almost the same level of prediction without the two size variables (.55 multiple correlation), or without the two density variables (.52), or without the three hierarchy variables (.45). Judging from the multiple correlations, the hierarchy variables make the most independent contribution to social capital. The summary point is that all three network constraint components matter, and they covary to define social capital. This need not always be true. Hierarchy is the critical component for identifying minority managers deemed suspect (Figure 6).

NOTES

1. I focus on rewards to the individual manager (Brass 1992; Lazega 1994; Breiger 1995, review related works). I assume that managers with entrepreneurial contact networks add value to their firm, and therefore receive from the firm compensation in

one form or another that is above average. The more general argument is to describe how the firm is shaped by managers searching for early information to resolve corporate and market uncertainties. For that more general argument, see Stinchcombe (1990).

2. There is a process element missing in these studies that can be seen in other styles of analysis. Historical accounts offer a glimpse of the process by which brokers built bridges across structural holes (e.g. Padgett and Ansell 1993; on Cosimo Medici's rise to power in Renaissance Florence as a broker between conflicting interests; DiMaggio 1992, esp. pp. 129–30, on the creation of New York's Museum of Modern Art and the role of Professor Paul Sachs's strong ties to the previously disconnected worlds of museums, universities, and finance). Ultimately, there is no substitute for direct observation. Kotter's (1982) cases illustrate the information and control advantages of an entrepreneurial network in performing the two tasks of the successful general manager; reading the organization for needed business policy, and knowing what people to bring together to implement the policy. Mintzberg (1973) is similarly rich in case material on the central importance to managers of getting their information live through personal discussions rather than official channels. Sutton and Hargadon (1996) offer rich detail on an institutional case (cf. Allen and Cohen, 1969 on gatekeepers). They describe a firm, IDEO, that relies on brainstorming to create product designs. The firm's employees work for clients in diverse industries. In the brainstorming sessions, technological solutions from one industry are taken where useful to other client industries where the solutions are rare or unknown. The firm makes its margin by brokering the flow of technology between industries. Sutton and Hargadon's evidence on IDEO offers process detail that corroborates the more authoritative, but static, survey evidence of the social capital value of structural holes.

3. The exact zero-order difference is 3.4 years (4.0 t-test), which is 3.1 years in a multiple regression holding constant the other variables in the age regression equation (3.9 t-test), and 2.8 years in the same regression excluding sample men older than the oldest women (3.8 t-test).

4. Tests for the statistical significance of social capital effects are adjusted downward for degrees of freedom lost in defining early promotion as a residual score (ordinary least-squares t-tests are multiplied by .97, the square root of 268/284, to decrease t-tests in proportion to the lost degrees of freedom). Most of the background variables have little association with age at promotion, but I take the conservative route of holding them all constant to define early promotion.

5. Kanter (1977), South et al. (1982), Brass (1985), Maniero (1986), and Ibarra (1992, 1997) provide illustrative kinds of evidence for this argument, but the argument seems more widely circulated in the business press; e.g. Klieman's (1980, 25, 28) popular book on women's networks:

> To know that, on the job, there are a handful of people with your best interests in mind, who are there to lean on, to share information with, who care about what happens to you— especially when so often the Big Bosses are invisible and do not care—can make moving ahead on the job a real possibility. And the road to better jobs, better pay, better working conditions need not be so filled with frustration, barriers, and lack of information. Instead, it can have good feelings—and positive results—connected with it. ... Through network-ing, you will find the group support you now lack, a circle of friends who understand the reality of working 9 to 5. ... 'We really respect each other,' a middle-management woman says of the four women in her company at her level who share problems and insights.

'When there's trouble, we give advice. It doesn't mean anyone has to take it. But they know they have a friend. You've got to have a friend.'

6. That women do not more often build cliques still leaves the question of women performing better in cliques because they are more emotionally comfortable in a clique. The question is answered later, where density is a negligible factor in early promotions going to women in more constrained networks.

7. My sampling obscures the tendency for women in this study population to be human resource managers (though there are no significant differences in the proportions of kinds of managers in the sample and study population, Burt 1992, 120). Women are a minority in the study population (14 percent). They are less of a minority in the sample (18 percent) because I drew a minimum of five women from each of 32 categories in the sampling frame. There is no tendency in the study population for men and women to work in different functions (3.71 chi-square, 7 d.f, $p = .81$), except in human resources (29.92 chi-square, 1 d.f., $p < .001$)—5 percent of the senior men are HR managers versus 12 percent of the senior women. The HR gender difference is negligible in the sample (0.50 chi-square, 1 d.f., $p = .83$). The HR gender difference notwithstanding, the difference in Figure 2 between sample men and women cannot be attributed to women working in jobs different from men because men and women in the sample are equally likely to work in each kind of job (holding constant the relative numbers of sample men and women).

8. Again, Klieman (1980, 14–15) provides tradebook illustration of the argument:

> As a direct result of the past decade, during which women have lobbied for equal rights and representation, many corporations named one woman to a top post, local governments put one woman in a high position, and the media have one or two women in visible spots. Women, one by one, are getting more responsible jobs, and their tasks and the weight of what they do hang heavier on them just because they are women. Because they are 'token', it isn't politic for them to show any doubts or confusion, as a man in the same position might do. These women, then, are spearheading the formation of business and professional networks throughout the United States. By joining forces with one another, they give and get mutual support and also provide the climate for more women to enter management. . . . Women have always shared job information, but by joining formal or informal networks we commit ourselves to helping other women.

9. Sponsor is my word, not Jane's. I telephoned Jane in 1993, four years after the original study, in the course of preparing the graphic in Figure 4 for an MBA course. I identified Jane and Karen from the sample data distributions because they nicely illustrated the hierarchy association with early promotion, but I wanted more information on Jane to bring her to life for the business students. I called the telephone extension I had for her from the original study, and was transferred to her new number. I explained the nature of the call, and was graciously given a better understanding of Sam's role in her work at the time of the study.

10. I am grateful to James E. Schrager for calling my attention to these directories. Professor Schrager's knowledge of them comes from their importance in his work arranging partnerships between American and Japanese firms through his firm, Great Lakes Consulting Group.

11. The legitimacy variable is based on subsampling (Finifter 1972). Table 1 contains regression equations predicting early promotion from network size, density and hierarchy. The regression coefficient for hierarchy, call it b, indicates the extent to which success depends on borrowed social capital (holding constant size and density,

the measures of direct access to the social capital of structural holes). Delete a manager from the sample, and re-estimate the equation to get a new estimate bi with manager i deleted. If bi is more positive than b, then hierarchy is more associated with early promotion without the deleted manager, which means that borrowed social capital is less critical to the manager's success. If bi is less positive than b, then hierarchy is less associated with early promotion without the deleted manager, which means that borrowing social capital is more critical to the manager's success. Repeat this procedure for each manager. The legitimacy criterion variable is $bi - b$. Positive values indicate managers who have direct access to social capital (left of Figure 6). Negative values indicate managers whose success depends on borrowed social capital (right of Figure 6).

12. Boss centrality is a continuous variable. For this illustration, I computed the ratio of constraint posed by the boss over the average contact-specific constraint c_{ij} in a manager's network, then looked for a cut-off that highlighted the benefits of a hierarchical network and divided the hierarchical networks into two categories of roughly equal numbers of managers. The cut-off is one. A hierarchical network is built around the boss if the boss poses more constraint than the average contact in the network.

13. The chi-square statistic in Figure 8 shows that the kinds of networks are independent of the distinction between senior men versus women and entry-rank men. They are similarly independent of a distinction between men and women (4.10 chi-square, 3 d.f., $p = .25$), a distinction between people long with the firm in their function versus people more recently hired (1.22 chi-square, 3 d.f., $p = .75$), a distinction between the four job ranks (3.80 chi-square, 9 d.f., $p = .92$), and a distinction between the eight functional areas (23.96 chi-square, 21 d.f., $p = .30$).

14. Given contact-specific constraint, c_{ij}; $(p_{ij})2 + 2p_{ij}(\Sigma_q p_{iq} p_{qj}) + (\Sigma_q p_{iq} p_{qj})2$, $q \neq i,j$, the aggregate constraint index, C, is a sum of three variables; $\Sigma_j (p_{ij})^2 + 2\Sigma_j p_{ij}(\Sigma_q p_{iq} p_{qj}) + \Sigma_j(\Sigma_q p_{iq} p_{qj})^2$. The first variable in the expression, C-size in the text, is a Herfindal index measuring the extent to which manager i's relations are concentrated in a single contact. The second variable, C-density in the text, is an interaction between strong ties and density in the sense that it increases with the extent to which manager i's strongest relations are with contacts strongly tied to the other contacts. The third variable, C-hierarchy in the text, measures the extent to which manager i's contacts concentrate their relations in one central contact.

15. The density component in network constraint, C-density, is less useful for distinguishing size and density effects. It includes size variance because relations are measured as proportions. Number of contacts is correlated .08 with density, $-.67$ with C-density. The stronger correlation between size and C-density affects the results in Table 2. Number of contacts has a 3.9 t-test association with early promotion in model I holding density constant, which drops to a 1.3 t-test in model III when C-density is held constant.

16. This is the Coleman–Theil inequality index applied to contact-specific constraint scores, and is the hierarchy variable in the original structural hole analysis of these data (for reasons given there, Burt 1992, 70 ff). The index is the ratio of $\Sigma_j r_j \ln(r_j)$ divided by $N \ln(N)$, where N is number of contacts, r_j is the ratio of contact-j constraint over average constraint, $c_{ij}/(C/N)$, and c_{ij} is the level of constraint contact j poses for the manager. The index equals zero if all contact-specific constraints equal the average. It approaches 1.0 to the extent that all constraint is from one contact.

17. Let b_j equal the mean indirect connection from manager i through contact j between

two other contacts k and q: $\Sigma_k \Sigma_q z_{ij} z_{jk} z_{jq} / ([N - 1][N - 2])$, $j \neq k,q$ and $k \neq q$. Betweenness hierarchy is the ratio of Σ_j ($b$max $-$ b_j) divided by $N - 1$, where $b$max is the largest value of b_j in the manager's network. One contact will have b_j equal to $b$max. When all other b_j are zero, the ($b$max $-$ b_j) sum to $N - 1$ and the index is 1.0. When all b_j are equal, the ($b$max $-$ b_j) sum to 0.0 and the index is 0.0. I tried Freeman's aggregation with contact-specific constraint scores, but obtained weaker results than reported in Table 2 for the Coleman–Theil model. I tried the Coleman–Theil aggregation with betweenness scores b_j, but obtained weaker results than reported in Table 2 for the Freeman model. I therefore report both aggregation models in Table 2.

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