Interlocking Directorates Behind the S&P Indices

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In preparation for other uses of the data, this is a technical report on the interlocking directorates among companies used to define three widely-used market indices of the American economy at the turn of the century: The S&P 500 describing the performance of large companies (contains the 30 companies that define the Dow Industrial index and considered one of the best benchmarks of overall U.S. market performance), the S&P SmallCap 600 describing the performance of small companies, and the S&P MidCap 400 describing the performance of companies intermediate between the large and small. I draw primarily on director and company data assembled by the Investor Responsibility Research Center (IRRC), obtained from the Wharton Research Data Service (WRDS). The time interval described is 1999 through 2003 — an interval spanning the two years preceding and two years following the first year of the century.

I make nine points in this report. With respect to the study population: (1) The IRRC data are not a panel through the five years so much as a sequence of cross sections. Companies are selected for the indices because their performance is believed to indicate broader market performance. I refer to a selected company as an "index

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company." Table 1 shows the number of companies, directors, and individuals observed in the five years from 1999 through 2003. About 1,500 companies are observed each year. The average board of directors contains nine or ten people, so about 15,000 directorships held by 12,000 individuals are observed each year (one individual can sit on more than one board). (2) The index companies overlap extensively with the familiar Fortune 1000 roster. Larger companies are more likely to appear in each year of the IRRC data.

With respect to personal connections between boards of the index companies, let "single-seat" directors refer to people who sit on the board of a single index company during a year and let "multi-seat" or "interlocking" directors refer to people who sit on the boards of two or more index companies, creating a link between the boards on which they sit. Interlocking seems to be about social standing and information. Directors brought in from other companies are status-enhancing to the board and looking to learn things useful in their own situation. The CEO who invited them is looking for quotable advice and counsel from prestigious experts, expressed in a civil, sympathetic way.

Interlocks correlate with roles on the board and director demography: (3) The average board has an affiliated Chairman of the Board (Chairman) corroborating the Chief Executive Officer (CEO), single-seat independents serving on board committees, and interlocking directors (affiliated and independent) used on committees as channels to external information. (4) The more boards on which a director sits, the more likely the director is a woman, a minority, and over the age of 65.

Interlocks correlate with company characteristics: (5) Interlocks are more likely with larger companies and more likely in certain lines of business. Finance companies, contrary to their central role in interlocks through much of the twentieth century, stand out for their disproportionate number of single-seat directors at the end of the century (Davis and Mizruchi, 1999). At the other extreme, companies in the manufacture and distribution of durable goods have disproportionate numbers of interlocking directors.

Interlocks vary with geography. When directors interlock company boards, they connect the geographic places in which company headquarters are located. (6) In keeping with past research, index-company interlocks are concentrated in central cities (Dooley, 1969; Allen, 1974).

(7) Holding constant regional differences in average volume of interlocks, there is a strong preference for directors from one's own region (Kono et al., 1998). Local elites play more prominent board roles, the odds of an interlock decrease with geographic distance between two companies, and interlocks are concentrated within regional categories.

(8) There is a connection between interlocks within and beyond locations. The strong average preference for directors from one's own region varies between regions. Index companies headquartered in Cleveland, for example, have a markedly strong preference for other Cleveland companies. In comparison, New York index companies are more focused on companies outside New York. The extent to which companies headquartered in a location primarily interlock with one another is a measure of the location's isolation from other locations. Such isolation is correlated with local elites. The more isolated a location, the more likely that board seats on index companies headquartered in the location are concentrated in a few individuals.

(9) Again holding constant regional differences in interlock volume, each region prefers directors from certain other regions such that there is a geographic interlock network (Table 11 and Figure 11). The network reflects historical boundaries in the United States, with a cluster of connected areas in the former Confederate states, an array of connected areas in the former Union states, and a cluster of areas in the former Western territories. The Southern Cluster is largely segregated from the rest of the country except for a brokerage port through St. Louis. The Northern Cluster is anchored on a cohesive East Coast subcluster, itself anchored on New York City, surrounded by a balkanized Midwest. The Western Cluster is anchored on a cohesive West Coast subcluster, itself anchored on Los Angeles and the San Francisco Bay

Area, with satellites Houston, Dallas Fort Worth, and the Mountain States. The regional clusters are held together by four network bridges: St. Louis is a port out of the Southern Cluster, a port anchored on strong connection between SBC Communications and Anheuser-Busch. New York City is a broadly-connected port to locations in the Northern and Western Clusters. The East and West Coasts are connected by a bridge of links between technology companies in Boston and San Francisco. Fourth, there is a network bridge between Los Angeles and the twin cities of Minneapolis and St. Paul anchored in industrial and consumer-goods companies.

INDEX COMPANIES VERSUS THE FORTUNE ROSTER

Companies enter and leave the IRRC population of index companies depending on their quality as an indicator of broader market performance. Thus, the IRRC data are not panel data so much as they are a sequence of cross-sections. Companies are selected as market indicators by an Index Committee, composed of analysts and economists at Standard and Poor's. Among other factors, companies are selected for market size, liquidity, and industry representation. When a company faces unique issues, the performance of its stock is no longer a reliable indicator of broader market performance and the company is replaced. Many companies appear in all five years from 1999 through 2003. Some companies appear in only one of the years, though the company continues before and after the year it was included. There are companies added one year, deleted next year, then added again the year after. Switching costs create an incentive to select companies that could be indicators in multiple years. On average, an index company this year has a high probability of being included in the index next year.

——— Table 1 and Table 2 About Here ———

Table 2 shows how index companies overlap the familiar Fortune roster of large companies. To create Table 2, firms listed on the 2001 Fortune 1000 were matched to index companies, then traced back for two years and traced forward two years.

Mergers and acquisitions reduced the 2,477 index companies in Table 1 to 2,400 companies in Table 2. For example, Time Warner merged with American OnLine in 2001 to create AOL Time Warner. The merged firm is number 37 on the 2001 Fortune roster. Time Warner and AOL were both index companies in 1999, so they are two separate companies in Table 1. The two companies are combined in Table 2. American Telephone and Telegraph (AT&T) is number 15 on the 2001 Fortune roster. The company's wireless operation was spun off as a separate entity, and is an index company in 2002 and 2003. The two index companies in Table 1, AT&T and AT&T Wireless Services, are combined in Table 2.

Columns in Table 2 distinguish firms by the frequency with which they were index companies (excluding firms in which stock was not available so the firms were "not eligible" to be index companies, e.g., employee-owned Publix Super Markets). In the first row, or example, 162 of the Fortune 200 companies were index companies every year. Enron is one of the 11 Fortune 200 firms in the first row included for three years as an index company. Enron is number 5 on the 2001 Fortune roster and an index company in 1999, 2000, and 2001. Problems with Enron's bookkeeping became apparent in 2001. Enron is not an index company in 2002 or 2003. On average, there are four or five observations on each of the 200 largest companies (4.59 observations on average).

Rows in Table 2 distinguish companies by sales volume. Index companies not among the 2001 Fortune 1000 are combined in the bottom row as "smaller companies." The column of mean annual sales (taken from the IRRC data for each year in which a company was on one of the indices) shows relative size differences: $23 billion for index companies among the Fortune 200, down to $955 million for index companies not among the Fortune roster. Smaller companies are less likely to be continuing index companies, with an average 4.59 annual observations on the Fortune 200 companies down to 2.81 years on index companies below the Fortune 1000 roster. The same point

is illustrated in the column of eligible Fortune firms that are never index companies, from one of the 200 largest firms, down to 35 of the 200 smallest firms on the Fortune roster.

In sum, the index companies overlap extensively with the familiar Fortune 1000 roster, extending the Fortune roster to middle and smaller companies. Larger companies are more likely to appear in each year of IRRC data. Overlap, however, is a by-product of Fortune and S&P staff pursuing distinct goals. A company is selected for the Fortune roster because it had high sales in the preceding year. A company is selected for an S&P index because it is believed that the company's performance will be a good indicator of broader market performance in the future.

AN EXAMPLE BOARD

The director data are illustrated in Figure 1 with a depiction of Cisco Systems in 2001. Cisco is emblematic of the lucrative technology market at the turn of the century. The company was founded in 1984, made public in 1990 with sales of 69 million dollars, on the Fortune roster of America's largest companies as of 1997 with sales of 6.4 billion dollars, and number 92 on the 2001 Fortune roster with sales of 22 billion dollars. The company lost a billion dollars on its 2001 operations during the collapse of the dot-com bubble, but was back again at number 91 on the 2005 Fortune roster with 4.4 billion in profit on sales of 22 billion.[2]

Figure 1 shows Cisco's eleven directors in 2001 arranged in a circle with their board roles written inside the circle, primary affiliations under each person's name, and other affiliations around the periphery of the figure. The board is anchored on four people. Two industry legends play the roles of Chairman and Vice Chairman, respectively John Morgridge and Donald Valentine.[3] Valentine provided the venture

[2]Looking ahead, it is not surprising to see Cisco emerge as central in the network of interlocked index companies headquartered in San Francisco's Silicon Valley (see Figure 15).

[3]The IRRC data on director roles are to be used with caution (a caution provided on the WRDS website distributing the data). The data refer to roles an individual plays in any of the index companies,

capital for Cisco's growth, brought in Morgridge to lead the company, took the company public with Morgridge in 1990, and removed the two company founders to facilitate Cisco's growth. Valentine's Sequoia Capital also provided venture funding for Apple Computer, Atari, LSI Logic, Oracle, and Electronic Arts. When Morgridge retired from active management of the company in 1995, Valentine moved to Vice Chairman, Morgridge moved to Chairman, and John Chambers rose to President and CEO. The CEO is typically on the board to report company activity and strategy to the directors.[4] There is one other employee director on Cisco's board in 2001: Larry Carter, the company CFO, who serves as Secretary for the Board. Carter is a recent addition, joining Cisco's board in 2000 (versus 1993 for Chambers, 1988 for Morgridge, and 1987 for Valentine). There are numerous CFOs among the 16,180 employee directors in the index companies (711, or 4%), but it is more common to see company presidents (12%) and other line officers (27%) on the board.

——— Figure 1 About Here ———

The IRRC data distinguish three committees on the Cisco board.[5] Chambers is on the Nominations Committee with two outside directors who have been on the board for several years, James Gibbons and Carol Bartz. The Nominations Committee proposes new people to be on the board. Gibbons is a chaired professor and former Dean of

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not the individual's role on a particular company. For example, the 2001 IRRC data list three Chairman on the Cisco board: Bartz (Chairman of the Autodesk board), Fiorina (Chairman of the Hewlett-Packard board), and Morgan (Chairman of the Applied Materials board). John Morgridge, Cisco Chairman since 1995 and listed as Chairman in Cisco's 2001 and 2004 proxy statements, is not listed in the IRRC data as a chairman in 2001.

[4]Of the employee directors in the index companies from 1999 through 2003, half are the company CEO (55%). It is also usual to combine the role of CEO with other roles. Of the 8,361 CEO directors in the index companies during the five years, the modal combination is CEO and Chairman (35%), with slightly fewer playing the combine roles of President, CEO, and Chairman (30%), and about the same number being in John Chamber's position of President and CEO under someone else as Chairman (29%). It is unusual to see an index-company CEO who is neither Chairman nor company President (6%).

[5]The IRRC data also distinguish Corporate Governance committees, but do not identify members of such a committee for Cisco in 2001. Cisco has an Executive Committee in 2001 composed of the three central people Chambers, Morgridge, and Valentine, but the company's proxy statement says that the Executive Committee did not meet during 2001, which could explain the lack of IRRC data on the Committee. Descriptions in the text of Cisco directors are based on IRRC data augmented by the 2001 and 2002 proxy statements in Cisco's annual reports and SEC files on the companies in which outside directors served.

engineering at Stanford University, where he has been a professor since 1957. Bartz rose in 1992 to the position of CEO and Chairman of Autodesk, a company providing design automation software. Second, Gibbons and Bartz serve on the Compensation Committee with another outside director, James Morgan. The Compensation Committee reviews executive compensation and company benefit plans, including the "Stock Incentive Plan" integral to Cisco's acquisition and development strategy. Morgan is CEO and Chairman of Applied Materials, a company providing systems used in semiconductor manufacturing. In 2001, Morgan had led Applied Materials for more than a decade, taking the company to the top of its industry with prescient market and technology intuitions (e.g., getting into Japan early and one-at-a-time versus batch production). Third, the IRRC data distinguish Cisco's Audit Committee, which reviews company accounting principles, policies, and practices, and selects and meets with the company's independent accountants. Two outside directors form the Audit Committee in 2001, Arun Sarin and Steven West, both relatively young (mid 40s) but experienced from varied leadership roles in the industry. Sarin has been CEO of Accel-KKR Telecom since July of 2001, before which he was for ten months CEO of InfoSpace, before which he was for ten months a regional CEO for Vodafone. He will become CEO of Vodafone in 2003 and leave Cisco's board. West just finished a two-year job as President and CEO of Entera, before Entera was sold in January, 2001. He begins in December, 2001 a two-year job as COO of nCUBE, which provides on-demand media systems.

The two remaining Cisco directors are industry phenomena in their own ways. Carleton Fiorina joined Cisco's board in 2001. Celebrated for her rise to CEO of Silicon Valley icon Hewlett-Packard, Fiorina will be gone from Cisco's board in 2003. Jerry Wang joined the board last year. As a 32 year old student on leave from Stanford's electrical engineering Ph.D. program — a student who co-founded Yahoo! six years earlier — Wang in 2001 is in his unique way a Silicon Valley dot-com notable.

INTERLOCKS

Boards of directors are a window on the social organization of business. From patterns in which kinds of people are found often serving together on the boards of kinds of companies, one can make inferences about business preferences and leadership. Two directors are connected when they are colleagues on the same board. Time spent working together enriches whatever relationship they would otherwise have had. Two companies are connected when a director in the first company is also a director in the second. In Figure 1, for example, Carol Bartz sits on Cisco's board at the same time that she sits on the board of the company, Autodesk, where she is CEO and Chairman. Bartz is a link between Cisco and Autodesk in 2001. The two companies have interlocked directorates. For simplicity, I refer to interlocking directorates as "interlocks" or "interlock ties," and the individuals responsible as "interlock directors." There are numerous interlocks in Figure 1: Donald Valentine links Cisco to the board of Network Appliance, where Valentine is Chairman along with two other Cisco directors (Bartz and Carter). Cisco CEO John Chambers brings to Cisco deliberations information on operations in the retail giant, Wal-Mart. Cisco CFO Larry Carter sits on the boards of four companies outside Cisco. James Gibbons links Cisco to energy company El Paso Natural Gas and the leading aerospace firm, Lockheed Martin. Carol Bartz links Cisco to another aerospace leader, BEA Systems, and the innovative software of VA Linux Systems.

It is clear when an interlock exists, but what it means is less clear. An interlock is unambiguously present when a person sits on two boards of directors. Ambiguity results from the multiple reasons why people sit on more than one board and the multiple duties people perform as directors. At such a senior level, work is defined in broad parameters. What people do as a director varies across companies, industries, and the idiosyncratic mix of people on the board at a particular moment. The broader environment is a consideration. Public and legislative reaction to recent management

abuses created pressure on directors to be more alert to signals of management error. Ultimately, individuals have to figure out for themselves how to best play their role as a guardian of shareholder interests.

The lack of a definitive interpretation notwithstanding, interlocks have long been argued to warrant attention as channels through which companies can coordinate with one another or gain access to information on the external environment (e.g., Mizruchi, 1996). Without claiming how or whether interlocking directorates affect market processes (an empirical question on which there is no authoritative evidence), the board in Figure 1 illustrates the diversity of external information available to Cisco deliberations through interlock ties to other companies. Moreover, in deciding between candidates and companies above a threshold of social standing, information and learning are primary among the reasons given for appointing certain people as directors and for people agreeing to be directors. Mace (1971) remains the primary insider account of what it means to serve on the board of a large American company. Useem (1984) provides a sociological view richly annotated with quotes from insiders (e.g., with respect to information and learning, see Useem, 1984:45-48, 53-55, on interlocks providing “business scan" and a “communications network”). The officers and directors with whom Mace spoke agreed on three expectations of directors (pp. 178-184): directors are a source of advice and counsel to management, a source of management discipline as management strives to avoid being embarrassed by proposing poor ideas to the board, and a source of emergency management if the CEO becomes incapacitated. The preceding sentence is easily misinterpreted if read from the perspective of contemporary business. The advice, counsel, and discipline provided by Mace’s directors is passive (1971:186): “Board meetings are not regarded as proper forums for discussions arising out of questions asked by board members. It is felt that board meetings are not intended as debating societies. Many board members cited their lack of understanding of the problems and the implications of topics that are presented to the board by the president, and to avoid ‘looking like idiots,’ they refrain

from questions or comments." Further, Mace (1971:195-196) reports that people selected and invited to the board, typically by the CEO, have two qualities beyond substantive experience: title and prestige commensurate with other people on the board, and a reputation for being "noncontroversial, friendly, sympathetic, congenial, and understanders of the system," as opposed to "boat-rockers and wave-makers generally." Explaining why busy people agree to be directors, Mace (1971:197) summarizes with two broad considerations: "the opportunity to learn through exposure to other companies' operations something of value that might be useful in their own situation, and the intangible prestige value of identification with well-known and prestigious companies, executives, and other directors."

In sum, interlocks are about social standing and information. Directors brought in from other companies are status-enhancing to the board and looking to learn things that might be useful in their own situation. The CEO who invited them to the board is looking for quotable advice and counsel from prestigious experts, expressed in a civil, sympathetic way.

COMPANY SIZE AND BUSINESS

Two kinds of companies are often reported to be more involved in interlocks: big companies in general and banks in particular. Figure 2 shows interlocks associated with large index companies. The horizontal axis distinguishes directors by the number of boards on which a director sits during a year. The majority of directors sit on a single index-company board per year (49,314 of 60,896 or 81%). At the other extreme is Vernon E. Jordan — an African-American lawyer, civil rights leader, and Washington power broker — who sits on the boards of ten index companies in 1999 and again in 2000. I combine people in Figure 2 who sit on more than five boards because there are few observations more frequent interlocking. The size of the company on which a director sits is given on the vertical axes in Figure 2. One line shows the increasing

median annual sales of companies on which interlocking directors sit. The other line shows the tendency for interlocking directors to sit on the boards of Fortune 1000 companies. Both lines show multi-seat directors sitting on the boards of larger firms.

——— Figure 2 About Here ———

Banks have been especially prone to interlock. As Davis and Mizruchi (1999:215) put it, "Virtually all research has found banks to be the most central firms in the network. . . . By providing a stable core to the intercorporate network, researchers have argued, banks have anchored the social organization of business." However, as banking profits shifted from corporate lending to a broader range of activities, financial interlocks became less attractive. Davis and Mizruchi (1999) document the decreasing tendency for executives from large American companies to sit on the boards of banks in the 1980s and early 1990s.

Table 3 shows a corroborating lack of financial interlocks among index companies at the turn of the century. Columns in Table 3 distinguish directors by the number of boards on which they sit, as in Figure 2. Rows distinguish broad economic sectors in which the companies operate. The ten sectors (termed GICS sectors for "Global Industry Classification Standard") are the top of a business classification framework that Standard and Poor's developed in 1999 with Morgan Stanley to guide the creation of market indices. Index companies are selected to represent business in the sectors. Current definitions of the sectors can be found on the Standard & Poor's and the Morgan Stanley websites. Table 4 contains the sector definitions used in 2002 and 2003. Table 5 shows how sectors changed from their definitions in 1999 through 2001 by showing the percentage of continuing index companies that continue in the same sector from the previous year. For example, 93% of the Materials companies in 2001 that continue to be index companies in 2002 are again assigned to the Materials sector. Putting aside the sector re-definitions between 2001 and 2002, index companies by and large continue in one sector over time.

——— Table 3, Table 4, and Table 5 About Here ———

Sectors are listed in Table 3 in order of interlocking. At the top, companies in five sectors are prone to interlocks: Materials (9.3 logit z-score test statistic in the final column, $P < .001$), Industrials (6.2 z-score), Telecommunication Services (5.5 z-score), and Consumer Staples (4.5 z-score, $P < .001$), with Energy companies a borderline fifth place (2.6 z-score, $P \sim .01$).

In the middle of Table 3, companies in three sectors are neither prone, nor averse, to interlocks: Health Care (the reference category), Utilities (-1.4 z-score), and Consumer Discretionary goods (-1.0 z-score).

At the bottom of Table 3, Financial companies show a lack of interlocking directors (-3.8 z-score, $P < .001$). One other economic sector shows almost as strong an aversion to interlocks: Information Technology, and then only as the sector is defined after 2001. There are two rows of percentages in Table 3 for the Information Technology sector. As the sector is defined in 1999 through 2001, the percentage of single-seat directors in Information Technology (8.6%) is not significantly different from the percentage of directors who sit on two boards (9.0%), or the percentage of directors who sit on five or more boards (7.4%). Information Technology companies have no tendency toward or away from interlocks (0.9 logit z-score, $P \sim .35$). The sector was redefined in 2002 to exclude some large companies previously assigned to the Technology sector (e.g., Raytheon, a defense electronics firm with $20 billion in 2001 sales, is moved to Industrials) and to include some companies previously assigned elsewhere (e.g., Thermo Electron, a scientific instruments firm with $2.2 billion in 2001 sales, is moved from Capital Goods to Information Technology). For the last two of the five years studied, the sector shows an aversion to interlocks (-2.5 z-score, $P \sim .01$). Across all five years, there is no Technology association with interlocking (-0.4 z-score, $P \sim .40$).[6]

[6]Information Technology is the only sector for which two lines of percentages are presented in Table 3. The three other sectors substantially redefined in 2002 show similar associations with interlocks before and after redefinitions, so they are presented with a single association in Table 3. For example, Table 5 shows the Industrials sector involved extensive redefinition in creating the new Industrials sector. The new sector includes the majority of the continuing companies previously assigned to Capital Goods

In sum, interlocks are more likely with larger companies and in certain lines of business. Finance companies, contrary to their central role in interlocks through much of the twentieth century, have a disproportionate number of single-seat directors at the end of the century. At the other extreme, companies in the manufacture and distribution of durable goods have disproportionate numbers of interlocking directors.

DIRECTOR ROLES

Knowing the kinds of people prone to interlocks is a route into understanding the social organization of directors. For example, interlocks are most likely to involve directors who are independent of a company's senior executives. The IRRC staff assigns each director, each year, to one of three roles on the board, distinguished by the rows in Table 6. Directors are determined to be an employee of the company, somehow affiliated with the company, or independent of the company. Employees are reliably identified from reports filed with the SEC. Affiliated and independent directors are less easily identified. As explained on the IRRC website (www.irrc.org), an affiliated director is someone who is a former employee or owner of a majority-owned subsidiary, a provider of professional services (e.g., legal, consulting, or financial), a material customer of or supplier to the company, an employee of an affiliate of which the company owns less than 50 percent, a designee under a documented agreement with a group (such as a union) or a significant shareholder, a family member of an executive officer, a material interlock (an executive and director of this company sits on the board of another company from which an executive and director are drawn to sit on the board

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(78%), double-digit percentages of the companies previously in Consumer Staples and Consumer Cyclicals, eight percent of companies previous assigned to Technology, and all of the companies previously distinguished as a Transportation sector. Despite the extensive change, the association with interlocks is similarly strong before and after the change (5.7 z-score for Capital Goods before 2002 versus 5.0 z-score for Industrials after 2001) so there is only one row of percentages presented for Industrials in Table 3. Using the same tests, the redefined Consumer Staples and Consumer Discretionary sectors have similar associations with interlocks before and after the changes in 2002. The interlock association with Consumer Staples is a 2.9 and 6.9 z-score before and after the changes. There is a –0.5 z-score for Consumer Cyclicals before 2002 versus –0.8 for Consumer Discretionary after 2001.

of this company), a recipient of the company's charitable giving (disclosed in the company proxy statement), or any other "affiliation that may compromise the ability or incentive of a director to perform oversight duties in the best interests of shareholders." Free of these affiliations, a director is deemed an independent.[7]

——— Table 6, Table 7, and Table 8 About Here ———

The first row of Table 6 shows the connection between interlocks and independent directors. About one in three single-seat directors are independent. The probability doubles to .707 if the director sits on two boards, creating an interlock. The probability of independence increases with each additional board on which the director sits.

In contrast, the bottom row of Table 6 shows that employees are most likely to sit on one board: 25.3% of the single-seat directors are employees versus 15.3% of the directors who sit on two boards, and 3.9% of the directors who sit on five or more boards. Table 7 offers more detail on the kinds of employees involved. Directorships are the unit of observation in Table 6: one director adds an observation for each year on each board. A person who sits on two boards for five years adds 10 observations to the data. In Table 7, individuals are the unit of observation: one director adds an observation for each year in the data. Cells in Table 7 show the percent of directors who have the row attribute. The three bottom rows of Table 7 show the decreasing probability of operations executives to provide interlocks between companies. Vice-

[7]The Cisco board in Figure 1 illustrates a caution here. Reflecting the company proxy statement, the 2001 IRRC data report Chambers and Carter as company employees and Morgridge as an affiliated director. The other eight directors are reported as independent. In the wake of media attention to Enron and other examples of corporate misconduct, Cisco's 2004 proxy statement highlights the independence of its outside directors (page 5): "Cisco's policies and practices reflect corporate governance initiatives that are compliant with the listing requirements of Nasdaq and the corporate governance requirements of the Sarbanes-Oxley Act of 2002. . . The Board of Directors has affirmatively determined that each member of the Board of Directors other than Mr. Carter, Mr. Chambers and Mr. Morgridge is independent under the criteria established by Nasdaq for independent board members. In addition, the Board of Directors has determined that the members of the Audit Committee meet the additional independence criteria required for audit committee membership." Whatever the criteria are, they leave Donald Valentine an independent director. Without raising any questions about quality of judgment, it is difficult to believe that Valentine is independent of Morgridge and Chambers, the people with whom he so successfully grew the company through the 1990s. At minimum, Valentine is affiliated with the company from his lengthy leadership role as Chairman. The point is that the meaning of "independent" in the IRRC data is not the common-sense meaning that an independent director has no personal attachments that might affect the director's evaluations of company operations or executives.

Presidents, Chief Operations Officers, and Chief Financial Officers are most likely to sit on a single board, when they sit on any board. Presidents are more likely to sit on the board, but they are as likely among the directors who sit on a single board (23.7%) as they are among the directors who sit on five or more boards (22.1%). When interlocks involve an employee, they are most likely to involve the Chief Executive Officer.

Table 8 shows which directors play key roles on the board. The upper number of each cell in Table 8 is the percentage of affiliated directors who play the board role in a row (affiliated by being a current employee or one of the other above-mentioned affiliations). The bottom number is the percentage of independent directors who play the role. For example, 12.4% of the single-seat affiliated directors are members of the board audit committee versus 55.1% of the single-seat independent directors. Individuals are the unit of observation in Table 8 so directors who sit on multiple boards have to be coded as affiliated or independent across the multiple boards on which they sit. A director is coded as independent in Table 8 during a year in which he or she is nowhere an employee or affiliated director in an index company.

There is a preference for affiliated directors to be Chairman of the board. One in five independent directors are chairman in an index company. The odds are higher for affiliated directors. One in three single-seat affiliated directors are chairman. More than half of the multi-seat affiliated directors are chairman of an index company.

The pattern is more complex for board committees. For directors who sit on four or more boards, both independents and affiliated directors are likely to serve on committees. For directors who sit on fewer boards, especially those who sit on a single board, independent directors are more likely to staff committees, especially the sensitive compensation and audit committees. Single-seat independent directors outnumber affiliated directors five to one on compensation and audit committees. Independents are half again more numerous among directors who sit on the boards of two companies (two-seat independents are 138% the number of affiliated directors on the

compensation committee, and 156% the number of affiliated directors on the audit committee).

In sum, the average board has an affiliated Chairman corroborating the CEO, single-seat independents (i.e., "our" independent) serving on board committees, and interlocking directors, both affiliated and independent, used on committees as channels to external information.

DIRECTOR GENDER, ETHNICITY, AND AGE

Table 9 shows the prevalence of interlocks involving women, minorities, and older people. The odds of a director being a woman or minority increase with the number of boards on which the director sits. A minority here is a person coded in the IRRC data as Asian, Hispanic, or African-American.[8]

——— Table 9 About Here ———

The interlock association with age changes as a director approaches age 60. Among directors, young is under age 55. About a third of single-seat directors are under age 55. The odds of being that young decrease as the director sits on additional boards. One in five directors are in their late 50s. The odds are about the same for single-seat directors (20.7%) and directors who sit on four or more boards (21.4%). After age 60, the interlock association with age becomes positive. The association is slight for directors in their early 60s, pronounced after age 65: One in four single-seat directors are age 65 or higher, versus 43.2% of directors who sit on five or more boards. Judging from the IRRC data, the interlock association with age is not a retirement effect.

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[8]Ethnicity is not always consistent across years of the IRRC data. For example, Joyce M. Roche is coded as African-American for her 1999 and 2000 seats on Tupperware and Anheuser-Busch, but Caucasian for her 1999 and 2000 seats on SBC Communications. She is coded as African-American in the 2001, 2002, and 2003 record describing her seat on SBC Communications. In an obvious case like this, where one or two codes are inconsistent with the majority on the person, I changed the inconsistent codes to match the majority. In less obvious cases, I used company and community archives on the internet to determine ethnicity. All together, the corrections only affected 42 people who collectively held 316 directorships across the five years.

The bottom row of Table 9 shows that about one in ten directors are coded as "retired" in the IRRC data. Consistent with common sense, the odds of being "retired" increase with age.[9] Although retirement is associated with age and multi-seat directors tend to be older, the directors are not more likely to be "retired." The bottom row of Table 9 shows that single-seat directors are three times more likely to be "retired" than directors who sit on four or more boards (15.4% versus 3.6%; see footnote 12 for qualification).

REGIONAL CLUSTERS

As interlocking directors link companies, they link the cities in which those companies are headquartered. Consider Figure 3. Carol Bartz and Donald Valentine are two of the directors in Figure 1. Bartz is CEO and Chairman of Autodesk. She also sits on the boards of BEA Systems, Cisco Systems, and Network Appliance. Valentine is the Chairman of Network Appliance and sits on the board of Cisco. The headquarters offices for Cisco are located in San Jose, California; more specifically, in the three-digit zip code 951. When Bartz sits on Cisco's board, she brings what she knows about another large company in San Jose (BEA Systems), a company up the road, in Sunnyvale (Network Appliance), and a company across the San Francisco Bay, in San Rafael (Autodesk). Counting the interlocks depicted in Figure 3 yields the symmetric table at the bottom of the figure. There are three interlocks between zip codes 940 and 951, one interlock between companies headquartered in zip code 951, and so on.

——— Figure 3 About Here ———

The index companies link a total of 365 three-digit zip codes in one or more of the years 1999 through 2003. Of the 78,055 directorships observed in the five years, 49,313 are directors sitting on a single board and the other 28,742 are directors sitting on two or more boards (Table 3). As the interlocks displayed in Figure 3 define the (3,3)

[9]Here are the percentages of directors coded as "retired" in each of the four age categories in Table 9 (percentages not presented in Table 9): 3.2% of directors under age 55, 8.7% of directors in their late 50s, 17.9% of directors in their early 60s, and 32.4% of directors age 65 or older.

frequency table in the figure, the 28,742 interlock directors define a (365,265) frequency table, or network, of interlocks within and between the 365 zip codes in which the index companies were headquartered. Cell A,B in the network is the number of interlocks, calculated for each year then summed across the five years 1999 through 2003, linking index companies headquartered in zip code A with index companies headquartered in zip code B.

Concentration in Central Locations

The most obvious feature of the data is the concentration in central locations. The point is familiar in research on interlocking directorates (e.g., Dooley, 1969; Allen, 1974) and illustrated in Figure 4. Each dot in Figure 4 is a three-digit zip code. Lines connect zip codes connected by five or more interlocks (over the five years). Dots are close together to the extent that there are numerous interlocks between them.[10] Dot size indicates zip-code centrality in the interlock network. A location is central to the extent that it is strongly connected to other central locations. The larger the dot in Figure 4, the more that index companies are linked by interlocks through the zip code.[11]

There is a center-periphery structure to the geographic distribution of interlocks. Scattered around the periphery are zip codes rarely connected through interlocks.

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[10]The spatial representations in Figures 4 and 7 are heuristics in which proximity is a function of interlock frequency. The spatial algorithm used (variously named "spring-embedding" in NetDraw, or "energy" in Pajek, or "force-directed" in some texts) represents connections by a spring connecting network nodes (e.g., zip codes in Figure 4). Stronger connections are represented by less-elastic springs. The goal is to find a two-dimensional display that minimizes stretch on the springs using models such as Hooke's law for the force of a stretched or compressed spring. The spatial representation is heuristic in that a network can have multiple representations depending on start values for the spatial algorithm. The sociograms in this paper were obtained using Stephen Borgatti's NetDraw software. The center-periphery pattern in Figure 4 is stable across alternative start values, as are the four regional clusters in Figure 11.

[11]A location is central to the extent that it is strongly connected to other central locations. Let C1j be the relative number of interlocks that involve location j. Let Zij be the relative frequency of interlocks from location i to j (frequency of interlocks between locations i and j divided by the maximum frequency between i and any one location). Let C2i be the weighted combination of strong connections with central others: Σj ZijC1j. Centrality is measured relative to the most central location: 100 * C2i / maxC2, where maxC2 is the maximum C2 score for any location. Centrality scores vary from 100, for the most central location, down to a theoretical minimum of zero. The calculation is slightly different when zip codes are aggregated within regions (see footnote 19).

There are few lines with or among the periphery zip codes, and small dots represent them, indicating isolated interlocks. The center of the space is occupied by large, connected dots. The large gray dot is central Houston, zip code 770. There are four large red dots representing Chicago zip codes (600, 601, 605, and 606). Numerous large yellow dots represent zip codes in the New York City area (beginning with zip code 100).

——— Figure 4 and Table 10 About Here ———

Table 10 lists the fifteen most central of the 365 zip codes in Figure 4. Where a three-digit zip code contains multiple cities, the city name refers to the city containing the largest number of interlocks. For example, zip code 079 contains numerous interlocks to Morristown, Peapack, and Basking Ridge, but the largest number were to Murray Hill which is the city name given to the zip code.

Note the concentration of interlocks and index companies in the most central zip codes. The three most central zip codes — respectively zip code 100 in New York City, zip code 770 in Houston, and zip code 606 in Chicago — together contain 38% of all interlocks in Table 10. Interlock frequency continues to drop quickly beyond the table. The fifteen zip codes in Table 10 are only 4% of all 365 zip codes containing an index company, but the 4% contains 31% of all observed interlocks.

Preference for Directors in One's Own Region

Holding constant the interlock concentration in central locations reveals further regional patterns. For one, I infer a strong preference for directors within the same region.

Prominent Local Elites

I have three bits of evidence to support the inference. First, local elites seem to play more prominent director roles. My evidence on this point is not systematic. I only know the identities of local elites in one city, Chicago. Whatever the proportion of index-company directors in Chicago, Figure 5 shows an increasing prominence of Chicago

elites among multi-seat directors, and by inference, the multi-seat prominence of local elites elsewhere.

I identified Chicago elites by membership in the Commercial Club, which is the city's exclusive, uniquely prominent business association. The following description comes from the Club website in 2003 (commercialclubchicago.org, see Johnson, 1977, for a history of the Commercial Club): "The Commercial Club of Chicago is a non-profit membership organization of the leading men and women of Chicago's business, professional, cultural and educational communities. To be considered for membership, candidates must be nominated in writing by a Commercial Club member and seconded by at least six other members. Election to membership is 'limited to residents of the Chicago metropolitan area who shall be deemed qualified by reason of their personality, general reputation, position in their business or profession, and service in the public welfare.'" Membership in the Club is limited to 325 active members. To make room for new active members, older members move into retirement memberships.[12] There are

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[12]"Retired" is an ambiguous status. It can have different meanings for an individual director, his or her colleagues, and outside observers. "Retired" members of the Commercial Club provide quick illustration. Here is a tabulation of 1999-2003 IRRC retirement (active versus retired in the columns) compared to retirement measured by Commercial Club status in 2003 (rows):

Active	553	35
Retired	112	56
NonResident	66	14

Quite a few of the Commercial Club members listed as "retired" in the 1999-2003 IRRC data are still active members in 2003 (35 of 105, 33%). Two thirds of retired members of the Commercial Club are listed as not retired in the IRRC data (112 of 168; and there is no difference between the columns in the years during which directors were observed, 2.87 chi-square, 4 d.f., P ~ .6, so the 112 undetected retirements are not people who retired in 2003 and would be detected in 2004 IRRC data). These results do not treat the nonresident Commercial Club members as retired, which is often the case. Beyond the ambiguity of what "retired" means is the more substantively interesting point of how "retired" is associated with interlocks. Commercial Club retirees do not show the negative association with interlocks evident in the bottom row of Table 9. Here are the five columns of board seats in Table 9 held by active versus retired members of the Commercial Club:

Active	82%	70%	84%	76%	61%
Retired	18%	30%	16%	24%	39%

The first row is higher than the second, showing that active members are more often directors of the index companies, but the second row does not decrease across the columns as it does in the bottom row of Table 9, showing no concentration of "retired" Club members in the single-seat category. The difference could be due to "retired" being coded differently by the Commercial Club and IRRC, or it could be due to local elites being more attractive into their later years as directors. Either way, the results are a caution against simple interpretations of retirement.

nonresident memberships for members who move away from Chicago and would like to stay involved. Honorary memberships are reserved for the Mayor of Chicago and the Governor of Illinois. Adding the retired, nonresident, and honorary members to active members brings total Club membership to about 480 during the five years under study. Between 1999 and 2003, less than half of the Club members sit on the board of an index company. The 204 members who do are more likely to be found in companies headquartered in Chicago, but members can be found on boards across the country.[13]

The point in Figure 5 is that Club members are disproportionately on the boards of multiple index companies. Commercial Club members increase tenfold across the graph, from .8% of single-seat directors to 8.5% of directors who sit on five or more boards. The table below the graph in Figure 6 shows the association within each year.

——— Figure 5 About Here ———

The link between interlocks and local elites raises questions about how local elites differ from other directors. For the most part, directors affiliated with Chicago's Commercial Club are no different from other directors, other than the more prominent roles that the Chicago elites play on the boards.[14] Club-affiliated directors are more likely to be a chairman (3.5 test statistic, P < .001) and are more likely to be on the

[13]Here is a tabulation of the 78,055 index-company directorships, between 1999 through 2003, by geographic region and affiliation with the Commercial Club: Of directors in index-companies headquartered in Chicago (606XX zip codes), 26.8% are Club members. In companies headquartered in the Chicago suburbs (60XXX zip codes, excluding 606XX), 19.2% are Club members. In companies headquartered in downstate Illinois or the surrounding states of Indiana, Iowa, Ohio, Michigan, or Wisconsin, 1.8% are Club members. In index companies headquartered elsewhere, 0.8% are Club members.

[14]I went back through the variables in Table 5 to Table 9 predicting affiliation with Chicago's Commercial Club from each row variable, holding constant the number of boards on which a director sits (given the association with number of seats established in Figure 5 and the tables). In Table 5, directors affiliated with the Club are no more likely to be employees of the company in which they are a director (-.13 test statistic adjusted for autocorrelation within repeated observations of a person over time, across companies, P ~ .9). They are no more likely to be affiliated by other than employment with the company in which they are a director (-.75 test statistic, P ~ .5) and no more likely to be independent directors (.73 test statistic, P ~.5). Directors affiliated with the Club are not significantly more likely to be a CEO (1.9 test statistic, P ~ .06) — neither as a CEO sitting on the board where he or she is employed nor as a CEO sitting on someone else's board (1.8 and 0.1 test statistics). Beyond the chief executive position, Club directors are no more likely to play any other officer role in Table 7 (.97 test statistic, P ~ .33). With respect to Table 9, Club-affiliated directors are no more or less likely than other directors to be women (.15 test statistic, P ~ .9) or ethnic minorities (-.07 test statistic, P ~ .9). They are no more likely to be retired (-.35 test statistic, P ~ .7) and no older or younger than other directors (.90 t-test, P ~ .4).

corporate governance or nominating committees (4.8 test statistic, P < .001). Their presence on compensation committees and audit committees is about what would be expected by random chance (respective test statistics of 1.5 and 1.2, P ~ .2).

In sum, local elites, indicated by directors associated with Chicago's Commercial Club, do not differ from other directors in gender, ethnicity, age, or officer roles in the index companies. They are, however, more likely to sit on the boards of multiple index companies and are more likely to hold controlling positions on the boards (either as Chairman or a member of the governance or nomination committees).

Concentration in Adjacent Zip Codes

My second bit of evidence is more systematic. Interlocks are especially likely between companies headquartered close together (Kono et al., 1998). For example, the four interlocked companies displayed in Figure 3 are all headquartered in the San Francisco Bay Area.

——— Figure 6 About Here ———

Figure 6 documents the negative association between interlocks and distance more broadly. The 365 three-digit zip codes define 66,795 pairs of zip codes that could be connected by index-company interlocks (365 diagonal cells containing interlocks within each zip code and 66,430 unordered pairs of zip codes). Interlocks occur between 4,967 pairs, a small fraction of the pairs possible. Of the 4,967 pairs where interlocks occur, the 150 in which interlocks are most frequent contain 27% of the interlocks and are graphed in Figure 6. The horizontal axis is miles between pairs of zip codes.[15] The vertical axis is the ratio of observed interlocks over the number expected if interlocks were independent of zip code.[16] The graph shows interlocks especially

[15]Distances between zip codes were provided by Olav Sorensen from his research on the spatial distribution of inter-organizational networks (e.g., Sorenson and Audia, 2000; Sorenson and Stuart, 2001). Distances are measured between zip codes using the latitude and longitude of their central points as defined by the U. S. Post Office (see Sorenson and Audia, 2000:435).

[16]Where Fij is the observed frequency of interlocks between locations i and j, the number expected if interlocks were independent of location is the probability of an interlock in location i times the probability

likely between zip codes within a few miles of one another, then quickly disappearing with increasing distance. The negative correlation between log distance and log frequency is strong (-.56). The correlation is weaker when peripheral zip codes, with their infrequent interlocks, are included.

Regional Concentration

My third bit of evidence on the preference for local directors comes from the distribution of interlocks within and across regions. Twenty-one geographic locations are distinguished in Table 11. The distinctions are meant to be informative, but they are not proposed as authoritative.[17] The row at the bottom of the table lists the number of

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of an interlock in location j times the total number of interlocks available (i.e., E(Fij) = (Fi.)(F.j)/N). The vertical axis in Figure 6 is the ratio of observed to expected, Fij/E(Fij).

[17]I came to the categories as follows: Begin with the most central three-digit zip codes, listed in Table 10, then combine adjacent zip codes in the table (e.g., New York and Murray Hill, Chicago and Lake Forest, Minneapolis and St. Paul), then add adjacent zip codes not in the table where there are substantial interlocks. I then looked through the remaining zip codes in broad regional categories for geographic concentrations of interlocks. Here are the details on the geographic categories (some zip codes are not mentioned if they do not contain any index companies): (1) Chicago contains index companies with headquarters in the 606 zip code or the surrounding zip codes 600 through 609. (2) Cleveland is the 441 zip code in Table 11 combined with the surrounding zip codes 440, 442 and 443. (3) Minneapolis and St. Paul are the 554 and 551 zip codes in Table 11 combined with zip code 553. (4) St. Louis is zip code 631 in Table 11 combined with zip codes 630 and 633. (5) Ohio contained a large concentration of interlocks in the remaining Midwest states, so it is broken out as a separate category. "Other Ohio Areas" is all of Ohio, excluding the four Cleveland zip codes. (6) "Other Midwest Areas" are all areas in the following states excluding zip codes assigned to the preceding five categories: Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, North Dakota, Nebraska, Oklahoma, South Dakota, and Wisconsin. (7) To define the New York City category, I began with the index companies in Manhattan, Long Island and Westchester County, then looked at their interlocks into adjacent zip codes. I expanded the category south to Princeton (zip codes 070, 085, 088 and 089) and east through Fairfield County (zip codes 068 and 069). (8) Boston is zip code 021 in Table 11 plus the adjacent zip codes 017 through 024 around Route 128. (9) Philadelphia is zip code 191 in Table 11 plus the adjacent zip codes 190, 193 and 194. (10) "Other East Coast Areas" are all areas in former Union states to the east of Ohio, excluding the zip codes assigned to New York City, Boston, or Philadelphia. The included states are Connecticut, District of Columbia, Delaware, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. (11) Houston is zip code 770 in Table 11 plus the adjacent zip codes 772 to 774. (12) Atlanta is zip code 303 in Table 11 plus zip codes 300, 301, and 305. (13) Dallas and Fort Worth are the 752 and 750 zip codes plus zip codes 760 and 761. (14) Richmond is zip code 232 in Table 11 plus zip codes 230 and 231. (15 and 16) North Carolina and Florida contain numerous interlocks scattered across locations in the two states so I left them as state categories. (17) "Other Southern Areas" are all areas in the former Confederate states excluding zip codes assigned in the preceding categories. (18) Index companies headquartered in the "Mountain States" have an interlock pattern distinct from the pattern for companies headquartered in the states further west, so I broke them out as their own category. The category contains seven states: Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, and Utah. (19) The largest concentration of index-company directors is in Silicon Valley and the surrounding San Francisco Bay area. The category includes zip codes 940 through 951. (20) Los Angeles contains zip codes 900 through 917. (21) "Other

index-company interlocks that involve each location. Cells in the lower-diagonal of Table 11 contain the number of interlocks between regions. For example, there are 615 interlocks between index companies in Chicago, 409 between companies headquartered in Chicago and companies headquartered in New York City, and so on.

Some amount of interlocking is to be expected by random chance. There are more interlocks with New York companies than there are with Chicago companies, so interlock frequencies should be higher on average with New York than with Chicago.

The upper diagonal cells of Table 11 are useful because they measure the level of interlocking between regions holding constant regional differences in interlock volume. The upper-diagonal cells contain multiplicative coefficients from a loglinear model of the frequencies in the lower-diagonal cells. A coefficient of 1.0 between two locations says that the number of interlocks between the locations equals the number expected if companies in the two locations were drawing directors independent of location. A coefficient of 1.50 means that the observed number is 150% of the number expected if interlocks were independent of location.

——— Table 11 and Figure 7 About Here ———

The coefficients in the diagonal cells of the table put a metric on the concentration of interlocks within locations. The coefficients are large. For example, the frequency of interlocks between Chicago companies is 8.62 times the number expected if interlocks were independent of location. The concentration of interlocks within locations is less in some locations than others, but the diagonal coefficients all show intra-location interlock frequencies more than twice the number expected under independence, and the diagonal effects are the strongest effects in the table. The substantial margin by which they are the strongest is illustrated in Figure 7. Effects are measured on the vertical axis. The box-and-whisker plots show the distribution of effects within versus between locations. The 210 between-location effects are packed in a narrow range near zero,

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West Coast Areas" are all areas in Alaska, California, Hawaii, Oregon, and Washington excluding zip codes assigned to Los Angeles or the San Francisco Bay Area.

around a .86 median (.64 is the 25th percentile, 1.23 the 75th). The strongest effect is 3.99 for the high frequency of interlocks between Los Angeles and the rest of the West Coast, excluding the San Francisco Bay Area (with which Los Angeles also has a strong connection, 3.10). In contrast, the 21 within-location effects are visibly higher in the graph (6.75 is the 25th percentile, 10.29 median, and 14.51 the 75th percentile), extending up to extremes of 36.78 and 38.73 for the dense interlock networks within St. Louis and Cleveland.

Concentration within location continues to a deeper level. Interlocks concentrated in a location are concentrated in a small number of local elites.

Figure 8 distinguishes the 21 locations by the extent to which interlocks are concentrated in local elites. I created a 21 by 5 table of directorships. A directorship is assigned to a row based on the location in which the index company is headquartered. It is assigned to a column based on the number of other seats held by the same person that year (zero, one, two, three, four or more; as in Figure 5). I fit a loglinear association model to the table to get scores distinguishing locations by their distribution of directorships, some locations in which directors primarily sit on a single board versus other locations in which an exception percentage of directors sit on many boards. Atlanta is at the top of the scale in Figure 8. It is the location (of the 21 distinguished in Table 11) where seats on the boards of index companies are most concentrated in a small number of individuals. I set the Atlanta score in the association model to 100 and scaled scores for the other locations using Atlanta as a reference point. Dallas and Fort Worth are about average in their tendency for a few people to sit on many boards (-3 score is closest to zero on the scale). Figure 9 offers a more substantive sense of the scores. Chicago has a “concentration in local elite” score of 49. It is fourth from the top of the scale in Figure 8. The dark bars in Figure 9 show the directorship distribution that defines a concentration score of 49. The modal Chicago directorship is held by a director who also sits on four or more other Chicago boards (71%). In contrast, the white bars in Figure 9 show the directorship distribution in Boston, where concentration

is low (score of -22 in Figure 8). The modal San Francisco directorship is held by a director who sits only on that one board (59%).

——— Figure 8, Figure 9, and Figure 10 About Here ———

Figure 10 displays the association between concentration in a local elite and concentration in a location. Locations are positioned on the vertical axis in Figure 10 by their "concentration in local elite" score in Figure 8. Locations are positioned on the horizontal axis in Figure 10 by their diagonal element in Table 11. For example, Cleveland is far to the right in the graph showing that the directors of Cleveland index companies were especially likely to sit on boards with other Cleveland directors (at a frequency 38.7 times what would be expected if interlocks were independent of location). The two axes in Figure 10 are correlated (2.8 t-test). In other words, as a location becomes more isolated in the sense that directors are drawn from local firms, there is an increasing tendency for local index companies to draw on the same local people to be directors. The more isolated the location, the more likely that board seats on index companies headquartered in the location are concentrated in a few individuals.

Residuals from the association in Figure 10 can be useful for comparing locations because the residuals measure level of concentration in a local elite, holding constant location size (volume of directorships is held constant in the Figure 8 association model) and location isolation (the horizontal axis in Figure 10). Cleveland and St. Louis board seats are concentrated in a local elite (high on vertical axis), but theirs is a level of concentration to be expected from their size and isolation (far out on the horizontal axis). Atlanta and Chicago stand out as highly concentrated (residual scores of 98.5 and 54.0 respectively). San Francisco stands out for its low concentration (-52.0 residual).

Director Preferences between Specific Regions

The third regional pattern to the interlocks is a network of preferences between specific regions. There is pattern to the off-diagonal loglinear associations in Table 11. To see

associations from the perspective of leaders in each region, I normalized each row of associations by the maximum off-diagonal in the row. For example, the first row of Table 11 shows that Chicago's largest loglinear association with another region is with Philadelphia. The Chicago-Philadelphia association is highlighted because it is the maximum for Chicago. Divide Chicago's associations with each other region by its association with Philadelphia to measure Chicago's relative preference for directors from the twenty other regions – holding constant the relative availability of directors from other regions. The interlock frequencies at the bottom of Table 11, and the loglinear marginal effects at the top of the table, show that a director selected at random from the index companies is most likely to sit on the board of a New York City company simply because so many directors sit on the boards of index companies headquartered in New York City. I want to hold availability constant to see more clearly the relative tendencies for companies in each region to draw directors from the other regions. Chicago companies do not draw their largest number of directors from Philadelphia. They draw 89 directors from Philadelphia. However, those 89 are twice the number expected if Chicago companies were selecting Philadelphia directors without regard to location.

Figure 11 is a spatial representation of the loglinear coefficients in Table 11. In other words, the figure is a representation of interlock frequencies between regions holding constant average regional differences in interlocking. Two locations are close together in Figure 11 when companies in either location have a strong preference for directors in the other location.[18] Lines indicate connections that are three-quarters or more of the strongest connection for either location. The strongest connection for a region (highlighted in Table 11) is indicated by an arrow leading from the source of preference to the target. Each location has one arrow leading from it.

The size of the circle marking each location in Figure 11 measures the location's centrality in the interlock network. Independent of other locations, each location has

[18]See footnote 10 on the spatial display. Spatial distance in Figure 11 is based on the loglinear coefficients in Table 11, with coefficients in each row divided by the largest off-diagonal coefficient in the row.

some number of interlocks spread across some number of zip codes in the location. A location's relative volume of interlocks per zip code measures the density of interlocks through the location. Centrality measures the extent to which the index companies in a location are extensively involved in interlocks with index companies elsewhere that are extensively involved in interlocks.[19] Larger circles in Figure 11 indicate a location more connected to other central locations.

——— Figure 11 About Here ———

Companies in some locations prefer directors from a narrow set of other locations. For example, Florida is connected to only one other location in Figure 11. The one line, from Florida to North Carolina, shows the concentrated interest Florida companies have in directors on the boards of North Carolina companies. The strongest Florida association with another location in Table 11 is the 2.76 link with North Carolina. The next strongest is the 1.83 link with Richmond, which is 66% of 2.76 and so below the 75% threshold for a line in Figure 11. The three-quarters cut-off for a line in the map is arbitrary. The cut-off is merely a level at which network structure is not obscured by too many lines.

Companies in some regions draw directors from across the country. New York City is the most obvious example, with eight lines in Figure 11 to other regions. Table 11 shows no one or two particularly strong associations for New York. Instead, there are numerous associations of similar strength, so there are numerous associations within three-quarters of the strongest New York connection. The strongest connection, from New York City to Philadelphia, is not much stronger than the next connection, from New York to Los Angeles (loglinear effects of 1.39 and 1.33 respectively).

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[19]Centrality is computed as described in footnote 11 for individual zip codes, but here modified for the aggregation of zip codes into broader categories. Let C1j be the relative density of interlocks that involve location j (interlocks with the location divided by zip codes in the location, quantity divided by the maximum score on C1). The twin cities of Minneapolis and St. Paul have the maximum C1 score (1439 interlocks in three three-digit zip codes). Let Zij be the relative frequency of interlocks from location i to j (frequency of interlocks between locations i and j divided by the maximum frequency between i and any one location). Let C2i be the weighted combination of strong connections with central others: Σ_j ZijC1j. Centrality is measured relative to the most central location: 100 * C2i / maxC2, where maxC2 is the maximum C2 score for any location. New York City has the maximum C2 score.

There are several directions in which research could explore the network structure summarized in Table 11 and Figure 11. My purpose here is sketch a quick overview of the structure. In broad strokes, the network can be divided into three broad regions that have long characterized the United States. Using labels crystallized in the Civil War, locations in the former Confederate states cluster to the southeast in Figure 11. Locations in the former Union states are arrayed across the north in Figure 11. Locations in the western territories cluster to the southwest in Figure 11.

Southern Cluster

Index companies in the Southern states are the most distinct cluster. There are strong connections among companies in the region and weak connections outside the region. Note also in Table 11 the high diagonal effects for the Southern locations, indicating a strong preference for directors within each location. The frequency of interlocks among Atlanta companies, for example, is 14.39 times the number expected if interlocks were independent of region. North Carolina is about the same (14.51) and Richmond is higher (25.22). The South's strongly interconnected locations, segregated from the rest of the country, mean that prominent director reputations should form quickly, be familiar across the Southern Cluster, and be slow to change (Burt, 2005: Chap. 5).

The Southern Cluster ends in Texas. The two Texas concentrations of interlocks, in Houston and the twin cities Dallas and Fort Worth, stand apart; more connected to the West than they are to the South. Houston is densely connected internally, one Houston company interlocked with another, followed by interlocks to Dallas and companies on the West Coast outside the concentrations in Los Angeles and San Francisco. Dallas and Fort Worth are strongly connected with Houston, but join with St. Louis as ports into the Mountain States. Dallas and Fort Worth are also the strongest connection for index companies in the Mountain States.

——— Figure 12 and Figure 13 About Here ———

The primary port out of the region is through St. Louis companies linked to Southern companies outside the four areas in which Southern companies are

concentrated (Atlanta, Florida, North Carolina, Richmond). In fact, St. Louis emerges as a linchpin across the regions. The link between St. Louis and the Southern Cluster is the most identifiable network bridge in Figure 11,[20] but in addition, St. Louis is linked to the East through New York City, to the Midwest through companies outside the areas in which Midwest companies are concentrated, and the strongest St. Louis connection is to the West though index companies in the Mountain States.

The St. Louis bridge is concentrated in a single company. Figure 12 describes the network structure of the bridge. The figure is a sociogram of interlocks between index companies in the two bridged locations — blue circles are St. Louis companies and the red are index companies in the "Other Southern Areas." A line between two circles indicates one or more interlocks during any years 1999 through 2003. Larger circles indicate companies more central in the network. The point illustrated is that the St. Louis companies are tightly clustered together with few connections into the Southern companies. The exception is the Texas company, SBC Communications. Figure 13 highlights the concentration of bridge interlocks in SBC. Each bar is one of the twenty companies most interlocked within each of the two locations and across to the other location. Each bar has two components, grey for interlocks with other index companies in the same location, white for interlocks into the other location. The four most-interlocked St. Louis companies, to the left in Figure 13, each has several interlocks into the South. On the other side of the bridge, the right half of Figure 13 shows that most companies in "Other Southern Areas" have no interlocks with the St. Louis companies. The exception is SBC Communications, which accounts for almost half of the interlocks

[20] I computed Freeman's (1977) betweenness scores for each location in Figure 11. From zero to 100, these scores measure the extent to which all direct and indirect communication in a network goes through a location. Three locations have high scores indicating general brokerage roles in the network. The two highest are the two ends to the network bridge between St. Louis and the Other Southern Areas (48 points and 34 points, respectively). The third highest score is New York City, with 29 points. The other locations have much lower scores. I do not discuss betweenness in the text because the lines in Figure 11 are a binary treatment of connections that vary on a continuous scale. In fact, the interlock frequencies in Table 11 show that each of the 21 locations is connected by some number of interlocks to every other location. Some are just more connected than others. I mention the betweenness scores in this note because the scores are widely-used and reinforce my point in the text about the prominence of the network bridge between St. Louis and the Southern cluster.

with the St. Louis companies (the white area of SBC's bar in Figure 13 is 41 interlocks, of all 95 in Table 11 connecting St. Louis with "Other Southern Areas").

The concentration of interlocks in a single company invites a closer look at the company. Table 12 lists the 21 people on SBC's board of directors in 2001.[21] SBC has extensive interlocks to index companies across the country. Three directors sit on the boards of five index companies (Whitacre, Knight, and Tyson). Four sit on the boards of four index companies (Henderson, Inman, Martin, and Metz). Five sit on the boards of three index companies (Barnes, Busch, Hay, McCoy, and Roché). Although SBC directors bring a diversity of knowledge to the board, four items in Table 12 make the SBC connection with St. Louis stand out. First, SBC's dramatically successful CEO, Edward Whitacre, sits on the boards of four other index companies, three of which are in St. Louis: Anheuser-Busch, Emerson Electric, and May Department Stores. Second, two leaders in those companies sit on the SBC board: Charles Knight, who is Chairman and former CEO of Emerson Electric, and August Busch, who is CEO and Chairman of Anheuser-Busch, and the fourth generation of the Busch family to run the company. Third, the St. Louis directors have been on the SBC board for the twenty years that Whitacre has been on the board. Fourth, the two St. Louis companies are closely connected in that the CEOs sit on one another's board. In short, this is the rare event of three CEOs sitting on another's boards for twenty years: Busch sits on all three, Knight sits on all three, and Whitacre sits on all three.

There are other connections to St. Louis. One of the long-standing SBC directors, Clarence Barksdale, is the retired CEO of the St. Louis bank Centerre Bancorporation. A new SBC director, Joyce Roche, also sits on the board of Anheuser-Busch. Still, the anchor to the St. Louis bridge is the long-standing connection among the prominent business leaders Busch, Knight, and Whitacre.

——— Table 12 About Here ———

[21]The 21 directors are listed with their primary affiliation plus the names of index companies for which they were directors in 2001. No doubt there are numerous other boards on which these active people sat.

SBC has no interlock connection as strong to another location in Figure 11. Most of the other SBC directors in Table 12 entered well after the St. Louis people (1983.8 on average for Whitacre and the three St. Louis directors, versus 1995.3 for the other directors) and none of them brings a coordinated external power base to equal the St. Louis directors. The strongest SBC interlock after the St. Louis connection is the two SBC directors who sit on the board of the financial company, Morgan Stanley Dean Witter. Closer inspection shows that the interlock is a far-distant second to the St. Louis connection. One of the two Morgan Stanley directors is an academic new to the SBC board who sits on several boards. Laura Tyson joined SBC in 1999. She is the Dean of the London Business School, and former Dean of the Haas School of Business at the University of California, Berkeley. The other Morgan Stanley director is part of the St. Louis connection: Charles Knight, Chairman and former CEO of Emerson Electric.

In short, the Figure 11 St. Louis bridge into the Southern Cluster is concentrated first in the connections between three companies (Anheuser-Busch, Emerson Electric, and SBC Communications) and second in the connections between three business leaders (August Busch, Charles Knight, and Edward Whitacre). Absent the connections among these men and their companies, the bridge through St. Louis would disappear from Figure 11, leaving the Southern Cluster quite segregated from the rest of the country. Such an event warrants consideration given the age of the three men (Knight retired from CEO in 2000 and Busch retired from CEO in 2002). There are connections between index companies in the Southern Cluster and the rest of the country, but nothing that rises above the general pattern of drawing directors from central places and preferring directors from one's own region.

Northern Cluster

Relative to the Southern Cluster, the Northern Cluster arrayed across the top of Figure 11 is less cohesive and more connected to other regions. The cluster is most tightly integrated along the East Coast, with connections drawn among Boston, New York,

Philadelphia, and other East Coast Areas. The cluster is less connected in the Midwest, with Chicago a port between East and Midwest, Cleveland and Ohio their own social world at the top of Figure 11, the twin cities of Minneapolis and St. Paul more strongly connected to the West Coast than the Midwest, and St. Louis well away from the Midwest locations focused as it is on index companies in the Mountain States and the South. Directors can expect gossip across the interconnected East Coast to build and secure one's reputation on the East Coast, but the balkanized Midwest is more likely to foster local reputations specific to each location.

The Northern Cluster has three ports out to other regions. New York City is the primary port out, as already described. Interlocks out of New York involve numerous directors in many index companies. The loglinear coefficients In Table 11, and the yellow dots at the center of the center-periphery structure in Figure 4, show New York index companies connecting with companies across the country.

——— Figure 14 and Figure 15 About Here ———

Relative to New York, Boston is a more specialized port out of the Northern Cluster. Boston is connected to other East Coast locations, but its strongest connection is to companies in the San Francisco Bay Area. Boston, with its Route 128 technology district, is the East Coast connection to the West Coast's Silicon Valley. Of the 107 interlocks in Table 11 between Boston and San Francisco, 86 (or 80%) involve index companies in the technology sector (versus the other sectors in Table 5). However, interlocks in both locations often involve companies in the technology sector (75%). It is not accurate to say that technology companies in particular are more likely to bridge Boston and San Francisco. Bridge interlocks between Boston and San Francisco are no more likely between technology companies than between other kinds of companies (1.94 chi-square, 1 d.f., P = .16). It is accurate to say that interlocks in both locations often involve technology companies so bridge interlocks between the two locations are often between technology companies.

The sociogram in Figure 14 describes the network structure of the Boston bridge to San Francisco. The sociogram summarizes interlocks between index companies in Boston and the San Francisco Bay Area. The red San Francisco circles larger than the blue Boston circles in Figure 14 show that the San Francisco companies are more broadly interlocked, but interlocks between the two locations in Figure 14 are much more distributed across companies than was true for the Figure 12 interlocks into the Southern Cluster. It is equally true that certain companies contribute disproportionately to connecting Boston with San Francisco. Figure 15 shows that the companies most interlocked within each location (e.g., technology companies Ionics in Boston and Cisco Systems in San Francisco) are not the companies most interlocked across the two locations. From San Francisco, the companies most interlocked to Boston are Lam Research, Knight-Ridder, and Xilinx. From Boston, the companies most interlocked to San Francisco are Novell, Analog Devices, and Teradine. The interlock network around Novell, taken from Figure 14, is displayed in a box in Figure 15 to highlight the large number of San Francisco firms connected to Novell. Novell is more connected into San Francisco than it is with local Boston firms. Beyond the most-connected companies in Figure 15, are many other Boston companies with a director or two who sits on the board of a San Francisco company.

The twin cities of Minneapolis and St. Paul are the third port out of the Northern Cluster, in this case to Los Angeles. Index companies in the two Minnesota cities are more connected to companies in Los Angeles than they are to other companies in the Midwest. The line in Figure 11 linking Minneapolis and St. Paul to “Other Midwest Areas” is only above cut-off for the “Other Midwest Areas” (the 1.51 loglinear coefficient is 84% of the largest for “Other Midwest Areas” but 66% of the largest for Minneapolis St. Paul). In fact, the loglinear coefficients for Minneapolis and St. Paul in Table 11 are stronger with Los Angeles, San Francisco, and “Other West Coast Areas” than with any other locations.

Relative to the Boston technology bridge with San Francisco, the Minnesota bridge with Los Angeles is less specialized and more fragile. It does have its own flavor in that the bridge interlocks often involve industrials (GICS sector 60 in Table 5) and consumer discretionary goods (GICS sector 20 in Table 5). Of the 59 bridging ties in Table 11 that constitute the Minnesota bridge to Los Angeles, 53 (or 90%) involve an index company in industrials or consumer discretionary goods. Unlike the Boston bridge with San Francisco, the Minnesota bridge with Los Angeles is not a reflection of typical business in the two locations. Companies in industrials and consumer discretionary goods are more likely than neighboring companies in other businesses to have interlocks between the two locations (8.04 chi-square, 1 d.f., $P < .01$ for the lack of bridge interlocks from companies not involved in industrials or consumer discretionary goods).

——— Figure 16 and Figure 17 About Here ———

The network structure of the Minnesota bridge to Los Angeles is illustrated in the Figure 16 sociogram of interlocks between and within the two locations (corresponding to Figures 9 and 11), and the Figure 17 bars showing individual company contributions to linking the two locations (corresponding to Figures 10 and 12). The Minnesota companies (in blue) form a dense network of interlocks (see Galaskiewiz, 1985, for detailed description of the inter-organizational network in the two cities). In comparison, the Los Angeles companies are scattered with fewer connecting interlocks. The higher Minnesota bars in Figure 17 make the same point.

Two components in the bridge can be distinguished in the figures, one central, the other peripheral. The central component is three companies on which the bridge is anchored: (1) The Los Angeles company KB Homes is well-connected within Los Angeles and interlocked with two strong Minnesota companies, UnitedHealth Group and Target. These are large companies (respectively ranks 355, 84, and 34 on the 2001 Fortune roster of large companies), but the bridge interlocks consist of an outside director, James A. Johnson, who sits for all five years on the three boards. (2) With respect to number of people, Los Angeles company Teledyne Technologies is more

strongly connected to Minnesota in that it is well-connected within Los Angeles and has two directors who sit on the boards of Minnesota companies Alliant Techsystems and Donaldson Company, Donaldson in particular being central in the Minnesota interlock network. (3) The large Minnesota company 3M is well-connected within Minneapolis and St. Paul and has two directors who sit on the boards of three large, interconnected Los Angeles companies (Amgen, Northrop Grumman, and Unocal, respectively ranks 403, 151, and 278 on the 2001 Fortune roster).

The peripheral component to the Minnesota bridge is four Los Angeles companies that each have a handful of interlocks to Minnesota — Ryland Group, Syncor International, Hilton Hotels, and the Cheesecake Factory. These connections have three qualities that make them weak bridge connections. First, the bridge interlocks are a single outsider director sitting on the board of each company for each year in the five-year interval under study.[22] Second, with the exception of one director in Ryland Group during one year, the four companies have no interlocks with other Los Angeles companies, so they do not provide much of a bridge into Los Angeles (no lines to other red circles in Figure 16 and primarily, or entirely, white bars in Figure 17). Third, the Minnesota connection to these boards is not exceptional. These are boards containing representatives from many locations. In addition to the six interlocks in Figure 17 linking Ryland Group with other index companies in Minnesota and Los Angeles, Ryland has another 24 with index companies in other locations. The five Minnesota interlocks in Figure 17 are 17% of Ryland's total. Similarly, the Minnesota interlocks in Figure 17 for Syncor International and the Hilton Hotels are respectively 21% and 11% of each company's total with index companies. The Cheesecake Factory interlocks with Minnesota are 100% of its interlocks, but the connection is a peripheral component in the Minnesota bridge to Los Angeles. The five interlocks with Minnesota on Figure 17

[22]William L. Jews is outside director of LA company Ryland Group and Minnesota company Ecolab. Gail R. Wilensky is outside director of LA company Syncor International and Minnesota company UnitedHealth Group. Robert L. Johnson is outside director of LA company Hilton Hotels and Minnesota company General Mills. Thomas L. Gregory is outside director of the Cheesecake Factory headquartered in LA and Minnesota company Regis.

are from Thomas L. Gregory sitting on the boards of Cheesecake Factory and Regis, a company headquartered in a suburb of Minneapolis St. Paul that operates chains of hair salons. None of the other directors in Regis or the Cheesecake Factory sit on other boards, so the two companies are a disconnected dyad at the top of the sociogram in Figure 16. Whatever coordination occurs between Regis and the Cheesecake Factory has no interlocks with other index companies.

In sum, the Minnesota bridge to Los Angeles does not have the concentrated strength of the St. Louis bridge with the Southern Cluster via SBC Communications, nor the multi-company strength of the bridge between Boston and San Francisco, but it is the case that Minnesota directors appear more often on boards in Los Angeles than would be expected by random chance.

Western Cluster

With ports out of the other clusters already described, the final cluster can be described quickly. There is a cluster of Western locations in the southwest of Figure 11. The cluster is anchored on the West Coast, with concentrations in Los Angeles and especially the San Francisco Bay Area. San Francisco and Los Angeles are distinguishable communities of interlocked companies (intra-location loglinear coefficients in Table 11 of 17.10 and 10.72 respectively). Both are strongly connected to one another and have their strongest extramural connections with index companies in the adjacent West Coast areas. The Mountain States and the two Texas concentrations, in Houston and the twin cities of Dallas and Fort Worth, are more connected to the West Coast than elsewhere, but are clearly separate from the West Coast (similar to the Midwest's attachment to, but distinction from, a more cohesive East Coast). Table 11 shows the Mountain States most connected to the twin cities of Dallas and Fort Worth, but not that much less connected to San Francisco and St. Louis, quickly followed by the Mountain State connection to Los Angeles and Other West Coast Areas. Director reputations in the Western Cluster can be expected to

operate as in the Northern Cluster, with prominent director reputations shared across the West Coast locations while the adjacent Mountain States, Dallas Fort Worth, and Houston foster more local reputations specific to each location.

In sum, the interlock network in Figure 11 shows a cohesive Southern Cluster segregated from the rest of the country except for an SBC Communications brokerage port through St. Louis. There is a Northern Cluster anchored on a cohesive East Coast subcluster, itself anchored on New York City, surrounded by a balkanized Midwest. There is a Western Cluster anchored on a cohesive West Coast subcluster, itself anchored on Los Angeles and the San Francisco Bay Area, with satellites Houston, Dallas Fort Worth, and the Mountain States. The regional clusters are held together by four network bridges: St. Louis is a port out of the Southern Cluster, a port anchored on strong connection between SBC Communications and Anheuser-Busch. New York City is a broadly-connected port to locations in the Northern and Western Clusters. The East and West Coasts are connected by a bridge of links between technology companies in Boston and San Francisco. Fourth, there is a network bridge between Los Angeles and the twin cities of Minneapolis and St. Paul anchored in industrial and consumer-goods companies.

CONCLUSIONS

Conclusions were given at the front of the report.

REFERENCES

Allen, Michael Patrick. 1974. “The structure of interorganizational elite cooptation: corporate interlocking directorates.” American Sociological Review 39: 393-406.

Burt, Ronald S. 2005. Brokerage and Closure. New York: Oxford University Press.

Davis, Gerald F. and Mark S. Mizruchi. 1999. “The money center cannot hold: commercial banks in the U.S. system of corporate governance.” Administrative Science Quarterly 44: 215-239.

Dooley, Peter C. 1969. “The interlocking directorate.” American Economic Review 59: 314-323.

Freeman, Linton C. 1977. “A set of measures of centrality based on betweenness.” Sociometry 40: 35-41.

Galaskiewicz, Joseph. 1985. Social Organization of an Urban Grants Economy. New York: Academic Press.

Johnson, Vilas. 1977. A History of the Commercial Club of Chicago. Chicago, IL: Commercial Club of Chicago.

Kono, Clifford, Donald Palmer, Roger Friedland, and Matthew Zafonte. 1998. “Lost in space: the geography of corporate interlocking directorates.” American Journal of Sociology 103: 863-911.

Mace, Myles L. 1971. Directors: Myth and Reality. Boston, MA: Harvard Business School Press.

Mizruchi, Mark S. 1996. “What do interlocks do? An analysis, critique, and assessment of research on interlocking directorates.” Annual Review of Sociology 22: 271-298.

Sorenson, Olav and Pino G. Audia. 2000. “The social structure of entrepreneurial activity: geographic concentration of footwear production in the United States, 1940-1989.” American Journal of Sociology 106: 424-462.

Sorenson, Olav and Toby E. Stuart. 2001. “Syndication networks and the spatial distribution of venture capital investments.” American Journal of Sociology 106: 1546-1588.

Useem, Michael. 1984. The Inner Circle: Large Corporations and the Rise of Business Political Activity in the U.S. and U.K. New York: Oxford University Press.

Table 1. Companies and Directors

	Companies	Directors	Mean Directors per Company	Unique People among Directors
1999	1,807	17,420	9.64	13,310
2000	1,759	16,675	9.48	12,934
2001	1,800	16,669	9.26	13,014
2002	1,439	13,499	9.38	10,680
2003	1,472	13,792	9.37	10,958
Total	8,277	78,055	9.43	60,896
Mean per Year	1,655.4	15,611.0	9.43	12,179.0

Table 2. Fortune Rank of Index Companies

Fortune Rank in 2001	Years in S&P Indices, 1999 - 2003						Mean Years Included	Never Included	Mean Annual Sales (millions)	Not Eligible
	One Year	Two Years	Three Years	Four Years	Five Years	Total				
1 to 100	2	2	11	13	162	190	4.59	1	23,360	9
101 - 300	1	6	17	14	147	185	4.48	5	5,383	10
301 - 500	2	10	26	13	124	175	4.29	14	2,635	11
501 - 700	2	9	24	14	119	168	4.33	20	1,782	12
701 - 1000	3	5	26	9	108	151	4.13	35	1,242	14
Smaller Companies	466	281	275	103	406	1,531	2.81	—	955	—

NOTE — Rows distinguish firms in the Fortune 2001 ranking of the 1000 largest American companies. Columns distinguish firms by the number of years from 1999 to 2003 in which they were included in the S&P 500, the S&P MidCap 400, or the S&P SmallCap 60. “Not Eligible” firms are Fortune 1000 firms that did not sell stock to the public and so were not eligible to be index companies.

Table 3. Director Seats and GICS Economic Sector

	One (49,313)	**Two** (15,666)	**Three** (7,527)	**Four** (3,408)	**Five +** (2,141)	**Total** (78,055)	Association with Interlocks
Materials	5.9	9.0	8.7	10.6	10.2	7.1	9.3
Industrials (and transportation)	13.8	16.3	17.0	16.0	18.3	14.8	6.2
Telecommunication Services	1.6	2.1	2.5	3.1	3.5	1.9	5.5
Consumer Staples	8.4	8.9	10.0	10.5	12.2	8.8	4.5
Energy	4.2	4.6	5.0	5.0	4.0	4.4	2.6
Health Care	8.1	7.3	6.8	7.2	6.9	7.7	—
Consumer Discretionary	19.1	18.2	16.5	17.8	17.9	18.6	-1.0
Utilities	7.1	6.6	6.1	5.1	4.8	6.8	-1.4
Information Technology 1999-01	8.6	9.0	9.5	6.8	7.4	8.6	.9
Information Technology 2002-03	5.5	4.8	4.0	2.9	2.1	5.0	-2.5
Financials	17.8	13.3	14.0	15.1	12.7	16.3	-3.8

NOTE — Cells are the percent of the column directors who sit on the board of a company in the row sector. Percents are computed from all director observations between 1999 through 2003 (number given in parentheses). Test statistics in final column are from an ordinal logit model predicting the five levels of interlocking from economic sector using Health Care as a reference category and holding year constant (Health Care is in the center of associations when other sectors are the reference; statistics are adjusted down for within-director autocorrelation).

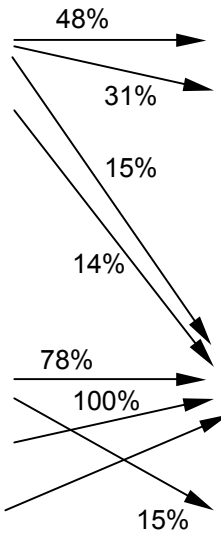
Table 4. 2002 GICS Economic Sectors

Sector	Companies Contained in Sector
Materials	Companies involved in commodity-related manufacturing, including chemicals, construction materials, glass, paper, forest products, metals, minerals and mining companies, including producers of steel.
Industrials (and transportation)	Companies that manufacture or distribute capital goods, including aerospace, construction, engineering and building products, electrical equipment and industrial machinery, commercial and office services, or transportation services (including airlines, couriers, marine, road and rail).
Telecommunication Services	Companies that provide communications services primarily through a fixed-line, cellular, wireless, high bandwidth and/or fiber optic cable network.
Consumer Staples	Companies that manufacture or distribute consumer goods less subject to business cycles including food, beverages, tobacco, or non-durable household goods and personal products. Food and drug retailing is here.
Energy	Companies engaged in the exploration,production, marketing, refining, or transportation of oil and gas products.
Health Care	Companies in either of two industries: (1) manufacturing health care equipment, services, or supplies, or (2) the research, production, and marketing of pharmaceuticals or biotechnology products.
Utilities	Electric, gas, or water utilities, or companies that operate as independent producers or distributors of power.
Consumer Discretionary	Companies that manufacture or distribute consumer sensitive to business cycles including automotive, household durable goods, textiles, apparel, and leisure equipment. Also here are hotels, restaurants and other leisure facilities, media production and services and consumer retailing.
Information Technology	Companies that manufacture or distribute software (internet, application systems, database management), technology consulting and services, or hardware (communications equipment, computers and peripherals, electronic equipment, and semiconductor equipment and products).
Financials	Companies in banking, consumer finance, investment banking and brokerage, asset management, insurance and investment, and real estate.

NOTE — These are sector definitions as of 2002. Detailed definitions can be found on the Morgan Stanley or Standard and Poor's websites.

Table 5. Percent of Continuing Index Companies that Continue in the same GICS Economic Sector

1999-2001 Categories	2000	2001	2002	2003	2002-2003 Categories
Basic Materials	97	97	93	100	Materials
Consumer Staples	99	99	48	100	Consumer Staples
Consumer Cyclicals	98	98	82	100	Consumer Discretionary
Health Care	97	99	100	100	Health Care
Energy	99	99	100	100	Energy
Financials	99	99	99	100	Financials
Capital Goods	97	95	78	100	Industrials
Transportation	100	95			
Technology	99	99	90	100	Information Technology
Communication Services	100	100	92	100	Telecom. Services
Utilities	99	98	98	100	Utilities



NOTE — Cells are the percent of continuing companies that continue in the same economic sector (e.g., 97% of index companies in 1999 Basic Materials that continue to be an index company in 2000, are again in Basic Materials). Principle elements of the sector re-definitions in 2002 are indicated by arrows showing the percent of 2001 firms in a sector that move to a 2002 sector.

Table 6.
Director Seats and IRRC Role in Company

	One (49,313)	**Two** (15,663)	**Three** (7,524)	**Four** (3,407)	**Five +** (2,136)	**Total** (78,043)
Director is Independent of Company	33.6	70.7	76.2	79.7	81.9	63.8
Director is Affiliated with Company.	16.8	14.0	11.2	12.4	14.2	15.4
Director is a Company Employee	25.3	15.3	12.6	7.9	3.9	20.7
Total	100%	100%	100%	100%	100%	100%

NOTE — Cells are the percent of the column directors who play the row role based on all director observations between 1999 through 2003 (number given in parentheses). Rows are the three director roles distinguished in the IRRC data. Each director is assigned to one of the three roles each year he or she sits on a board. Columns distinguish directors by the number of boards on which they sit during a year. Cells are percent of directors in column who have row attribute.

Table 7.
Director Seats and Officer Role Somewhere

	One (49,313)	**Two** (7,833)	**Three** (2,509)	**Four** (852)	**Five +** (389)	**Total** (60,896)
CEO	22.2	35.4	41.9	40.0	31.9	25.1
President	23.7	29.1	28.9	28.6	22.1	24.7
Vice-President	9.7	5.4	4.0	1.4	.5	8.7
COO	3.7	3.5	2.5	1.8	1.8	3.6
CFO	2.5	1.8	1.2	.6	.3	2.3

NOTE — Tabulation of annual director observations between 1999 through 2003. Number of observations is given in parentheses (not a multiple of observations in Table 3 because each director is not observed every year). Columns distinguish directors by the number of boards on which they sit during a year. Cells are percent of directors in column who play the row role (not necessarily in the company in which the individual is a director). An individual can be in more than one row.

Table 8.
Director Seats and Role on Board Somewhere

	One (49,313)	**Two** (7,833)	**Three** (2,509)	**Four** (852)	**Five +** (389)	**Total** (60,896)
Chairman or Vice-Chairman	30.3	52.8	65.1	66.1	58.1	36.1
	15.1	22.0	22.3	23.3	23.6	16.3
Member Governance Committee	5.6	27.7	48.2	62.0	76.8	12.4
	18.0	43.0	61.0	72.0	82.7	23.4
Member Compensation Committee	11.6	53.7	74.5	85.4	90.4	22.6
	49.6	74.1	84.4	87.6	96.3	54.4
Member Audit Committee	12.4	48.3	70.6	78.9	80.3	22.2
	55.1	75.7	83.0	93.3	96.9	59.2
Member Nominating Committee	15.0	42.5	65.4	79.4	88.9	23.1
	30.6	59.1	77.5	84.2	90.6	36.5

NOTE — Tabulation of annual director observations between 1999 through 2003. Number of observations is given in parentheses (not a multiple of observations in Table 3 because each director is not observed every year). Columns distinguish directors by the number of boards on which they sit during a year. Cells are percent of directors in column who play the row role on one of their boards. Top number is percent of employee and affiliated directors. Bottom number if percent of independent directors. A director is independent during a year in which he or she is nowhere an employee or affiliated director in an index company. An individual can be in more than one row.

Table 9.
Director Seats, Gender, Ethnicity, and Age

	One (49,313)	**Two** (7,833)	**Three** (2,509)	**Four** (852)	**Five +** (389)	**Total** (60,896)
Woman	8.4	9.3	10.5	15.5	14.7	8.7
Minority	3.1	6.0	9.5	10.3	16.7	3.9
Under Age 55	34.6	28.2	20.7	17.7	10.8	32.8
55 to 59	20.7	22.3	25.4	23.6	16.5	21.1
60 to 64	18.1	23.2	26.2	27.1	29.6	19.3
Age 65 +	26.6	26.4	27.7	31.6	43.2	26.8
Retired	15.4	16.9	6.4	3.2	4.6	12.6

NOTE — Tabulation of annual director observations between 1999 through 2003. Number of observations is given in parentheses (not a multiple of observations in Table 3 because each director is not observed every year). Columns distinguish directors by the number of boards on which they sit during a year. Cells are percent of directors in column who play the row role (not necessarily in the company in which the individual is a director). An individual can have multiple row attributes.

Table 10.
Fifteen Most-Central Zip Codes in Figure 4

Rank	Network Centrality	Zip Code	City, State	Interlocks	Companies
1	100.0	100	New York, NY	2780	92
2	88.5	770	Houston, TX	1555	82
3	85.9	606	Chicago, IL	1354	44
4	80.6	303	Atlanta, GA	1310	37
5	80.1	079	Murray Hill, NJ	810	21
6	77.0	600	Lake Forest, IL	1100	35
7	67.5	752	Dallas, TX	642	38
8	67.5	021	Boston, MA	534	25
9	66.5	750	Irving, TX	606	22
10	66.0	441	Cleveland, OH	996	30
11	66.0	554	Minneapolis, MN	734	29
12	65.4	631	St. Louis, MO	713	25
13	63.9	551	St. Paul, MN	485	11
14	62.8	232	Richmond, VA	616	20
15	61.8	191	Philadelphia, PA	527	14

Note — These are the most central 15 of all 365 three-digit zip codes in which an index firm headquartered for any year between 1999 through 2003. Network centrality varies from zero to 100 with the number of interlocks between the row zip-code and other high-volume zip codes (see footnote 10). City name is the city or town within the row zip-code that contained the highest number of interlock directors (people who sit on more than one board). Interlocks is a count of directed interlocks that involved a company headquartered in the row three-digit zip code. Companies is the total number of index companies headquartered in the row zip code.

Table 11. Geographic Interlock Network

(interlock directed frequencies in lower diagonal, multiplicative loglinear effects in upper diagonal; network highlights indicate diagonal cells and largest off-diagonal loglinear effect for each location)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
LOGLINEAR MARGINALS	1.59	.89	.83	.39	1.18	2.69	4.13	.83	.49	2.58	.93	.93	.95	.35	.66	.63	2.68	.99	1.20	.56	1.15
1 Chicago	8.62 615	.85	1.34	1.30	.99	**1.78**	1.11	.73	**2.02**	.80	1.15	.52	1.37	1.07	.51	.57	.75	.88	1.00	.32	.64
2 Cleveland	45	38.73 378	.48	.24	**3.75**	1.58	1.28	.94	.61	1.08	1.08	.49	.51	1.79	1.20	.72	.54	1.06	.45	1.02	.53
3 Minneapolis - St. Paul	99	13	16.65 319	1.06	.86	1.51	.78	.54	.88	.60	.54	.60	.93	.79	.56	.82	.62	.78	1.54	**2.26**	1.67
4 St. Louis	45	3	19	36.78 154	1.02	1.56	1.23	1.39	.38	.70	.65	.45	1.45	.26	.84	1.17	1.64	**1.85**	.27	.82	1.64
5 Other Ohio Areas	104	146	47	26	6.92 269	1.36	.76	.56	1.23	1.30	.85	.96	.73	.81	.85	1.03	.62	.37	.57	.92	.95
6 Other Midwest Areas	429	141	188	91	242	4.02 817	1.02	.59	.58	.78	1.20	.91	1.09	.78	.60	.74	.73	1.20	.61	.66	.70
7 New York City	409	175	150	110	207	636	2.87 1378	1.16	**1.39**	1.27	.82	.80	1.22	.92	.43	.90	.76	.86	.92	1.33	.71
8 Boston	54	26	21	25	31	74	225	11.02 214	1.66	1.66	.69	.78	1.21	.85	.81	1.36	.65	1.01	**1.90**	.38	.56
9 Philadelphia	89	10	20	4	40	43	159	38	12.52 85	**2.38**	.63	1.33	.76	.41	.66	.80	1.01	.76	1.08	.58	.76
10 Other East Coast Areas	186	92	72	39	222	304	760	200	170	2.52 472	1.24	.83	.73	1.42	1.01	.71	.61	.65	1.05	1.02	.67
11 Houston	96	33	23	13	52	168	176	30	16	167	10.29 248	.73	1.84	.87	.62	.52	1.34	1.15	.43	1.06	**1.92**
12 Atlanta	43	15	26	9	59	128	173	34	34	112	35	14.39 348	.63	**3.41**	2.72	1.43	1.75	.69	.81	.55	.52
13 Dallas - Fort Worth	117	16	41	30	46	157	269	54	20	101	91	31	6.75 172	.53	.51	1.04	.77	**2.03**	.96	.50	1.01
14 Richmond	34	21	13	2	19	42	76	14	4	73	16	63	10	25.22 89	**3.22**	1.83	2.22	.66	.17	.18	.87
15 North Carolina	30	26	17	12	37	59	66	25	12	96	21	93	18	42	14.51 175	**2.76**	**2.33**	.68	.79	.87	.24
16 Florida	32	15	24	16	43	70	131	40	14	65	17	47	35	23	64	9.24 103	1.61	.40	.59	.91	.39
17 Other Southern Areas	179	48	77	95	110	295	471	81	74	234	186	243	110	118	229	152	2.14 427	.69	.96	1.18	.70
18 Mountain States	78	35	36	40	24	181	198	47	21	94	60	36	108	13	25	14	14	5.14 143	1.83	1.43	1.46
19 San Francisco Bay Area	108	18	86	7	45	111	256	107	36	183	27	51	62	4	35	25	173	123	17.10 697	3.10	**3.27**
20 Los Angeles	16	19	59	10	34	56	174	10	9	83	31	16	15	2	18	18	99	45	118	10.72 95	**3.99**
21 Other West Coast Areas	66	20	89	41	72	122	189	30	24	111	115	31	62	20	10	16	120	94	255	145	7.76 289
TOTAL INTERLOCKS	2874	1295	1439	791	1875	4354	6388	1380	922	3836	1621	1627	1565	698	1110	964	3623	1517	2527	1072	1921
NETWORK CENTRALITY	51.5	23.0	31.3	16.8	30.7	72.1	100	22.8	15.0	63.4	29.8	32.0	29.3	14.4	18.3	15.9	67.2	26.3	25.6	15.3	33.4

Table 12. SBC Communications 2001 Board and Interlocks

Director Name Year Entered SBC Board, Role on Board; Committees	Also Director in Companies	Role in Company if Primary Employment	City and State	Interlock in Figure 12?
Edward E. Whitacre Jr.	Anheuser-Busch		St. Louis, MO	Yes
1983, CEO and Chairman	Burlington Northern Santa Fe		Fort Worth, TX	—
	Emerson Electric		St. Louis, MO	Yes
	May Department Stores		St. Louis, MO	Yes
Gilbert F. Amelio	Beneventure Capital	CEO and Chairman	Irvine, CA	—
2001, Independent				
Clarence C. Barksdale	Centerre Bancorporation	Retired CEO, Chairman	St. Louis, MO	—
1983, Independent; Audit				
James E. Barnes	MAPCO	Retired CEO, Chairman	Tulsa, OK	—
1990, Independent; Audit	Parker Drilling		Houston, TX	—
	Stilwell Financial		Kansas City, MO	—
August A. Busch III	Anheuser-Busch	President and Chairman	St. Louis	Yes
1983, Affiliated; Compensation, Nominations	Emerson Electric			Yes
William P. Clark	Clark, Celi and Negranti	Senior Counsel	Paso Robles, CA	—
1997, Independent				
Martin K. Elby Jr.	Elby Corporation	CEO and Chairman	Witchita, KS	—
1992, Independent; Nominations				
Herman E. Gallegos	Self-Employed	Management Consultant	Brisbane, CA	—
1997, Affiliated; Audit				

Table 12, continued

Director Name Year Entered SBC Board, Role on Board; Committees	Also Director in Companies	Role in Company if Primary Employment	City and State	Interlock in Figure 12?
Jess T. Hay 1986, Independent; Audit, Compensation, Nominations	HCB Enterprises	Chairman	Dallas, TX	—
	Trinity Industries		Dallas, TX	—
	Viad		Phoenix, AZ	—
James A. Henderson 1999, Independent, Audit	Cummins	Retired CEO, Chairman	Columbus, IN	—
	International Paper		Stamford, CT	—
	Rohm & Haas		Philadelphia, PA	—
	Ryerson Tull		Chicago, IL	—
Bobby R. Inman 1985, Independent; Compensation, Nominations	University of Texas, Austin	Professor and Retired Admiral	Austin, TX	—
	Fluor		Aliso Viejo, CA	—
	Massey Energy		Richmond, VA	—
	Temple-Inland		Austin, TX	Yes
Charles F. Knight 1983, Affiliated	Emerson Electric	Chairman, former CEO	St. Louis, MO	Yes
	Anheuser-Busch		St. Louis, MO	Yes
	IBM		Armonk, NY	—
	Morgan Stanley Dean Witter		New York, NY	—
Lynn M. Martin 1999, Independent	Northwestern University	Professor	Evanston, IL	—
	Procter & Gamble		Cincinnati, OH	—
	Ryder System		Miami, FL	—
	TRW		Cleveland, OH	—
John B. McCoy 1999, Independent; Compensation, Nominations	Bank One Corporation	Retired CEO, Chairman	Columbus, OH	—
	Cardinal Health		Dublin, OH	—
	Federal HomeLoan Mortgage		McLean, VA	Yes

Table 12, continued

Director Name Year Entered SBC Board, Role on Board; Committees	Also Director in Companies	Role in Company if Primary Employment	City and State	Interlock in Figure 12?
Mary S. Metz	S. H. Cowell Foundation	President	San Francisco, CA	—
1997, Independent; Audit	Longs Drug Store		Walnut Creek, CA	—
	PG & E		San Francisco, CA	—
	UnionBanCal		San Francisco, CA	—
Toni Rembe	Pillsbury Winthrop LLP	Partner	San Francisco, CA	—
1998, Affiliated	Potlatch		Spokane, WA	—
S. Donley Ritchey	Lucky Stores	Retired CEO, Chairman	Daville, CA	—
1997, Independent; Compensation, Nominations	McClatchy Company		Sacramento, CA	—
Joyce M. Roché	Girls Incorporated	CEO and President	New York, NY	—
1998, Independent; Audit	Anheuser-Busch		St. Louis, MO	Yes
	Tupperware		Orlando, FL	—
Carlos Slim Helú	Telefonos de Mexico	Chairman	Mexico City	—
1993, Independent	Philip Morris		New York, NY	—
Laura D'Andrea Tyson	London Business School	Dean	London, England	—
1999, Independent; Audit	Eastman Kodak		Rochester, NY	—
	Fox Entertainment Group		New York, NY	—
	Human Genome Sciences		Rockville, MD	—
	Morgan Stanley Dean Witter		New York, NY	—
Patricia P. Upton	Aromatique	CEO and President	Heber Springs, AK	—
1993, Independent				

Figure 1. Cisco Systems Board of Directors in 2001

Data are from the IRRC director file and the proxy statement in Cisco's 2001 Annual Report.

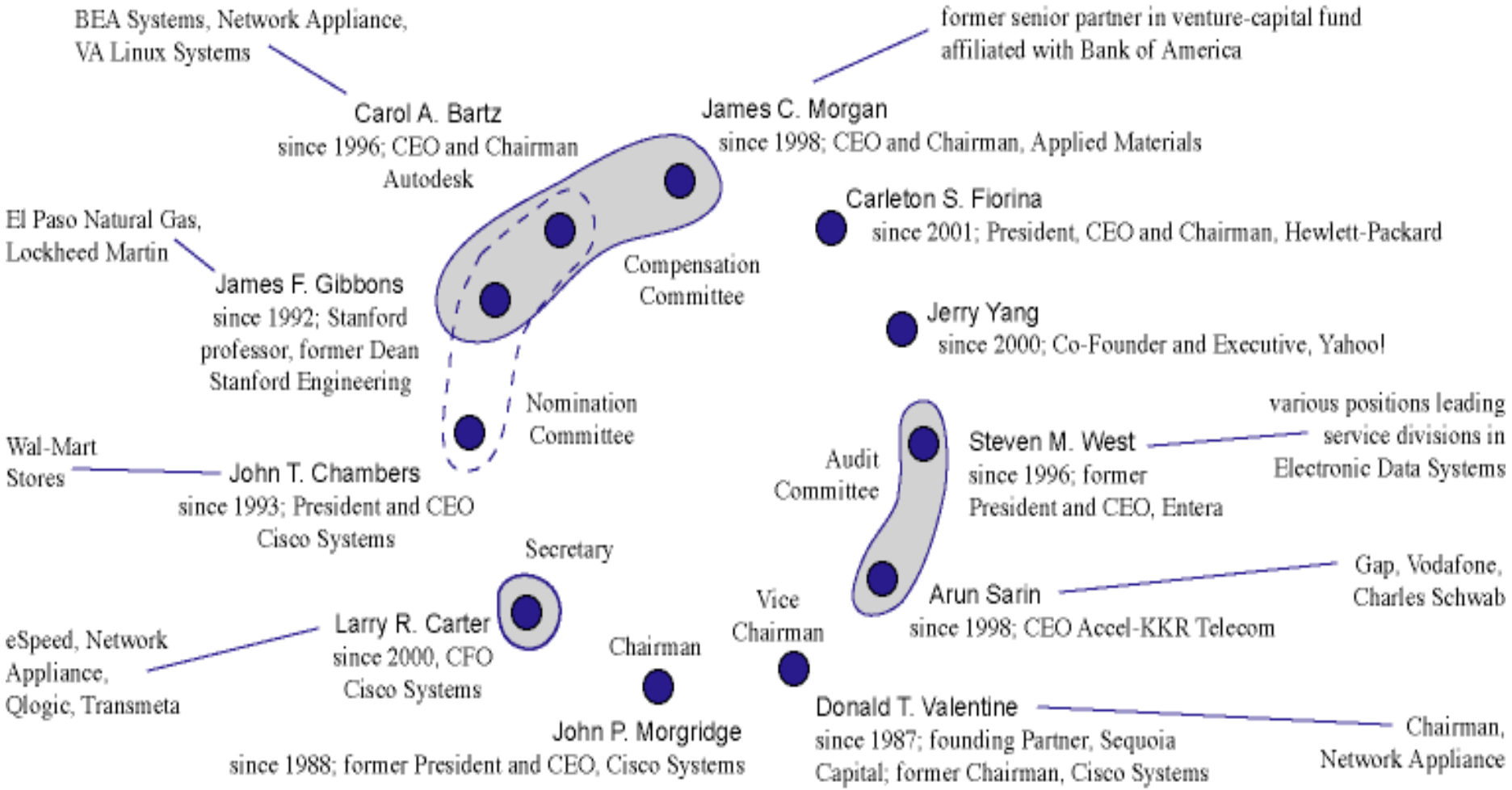
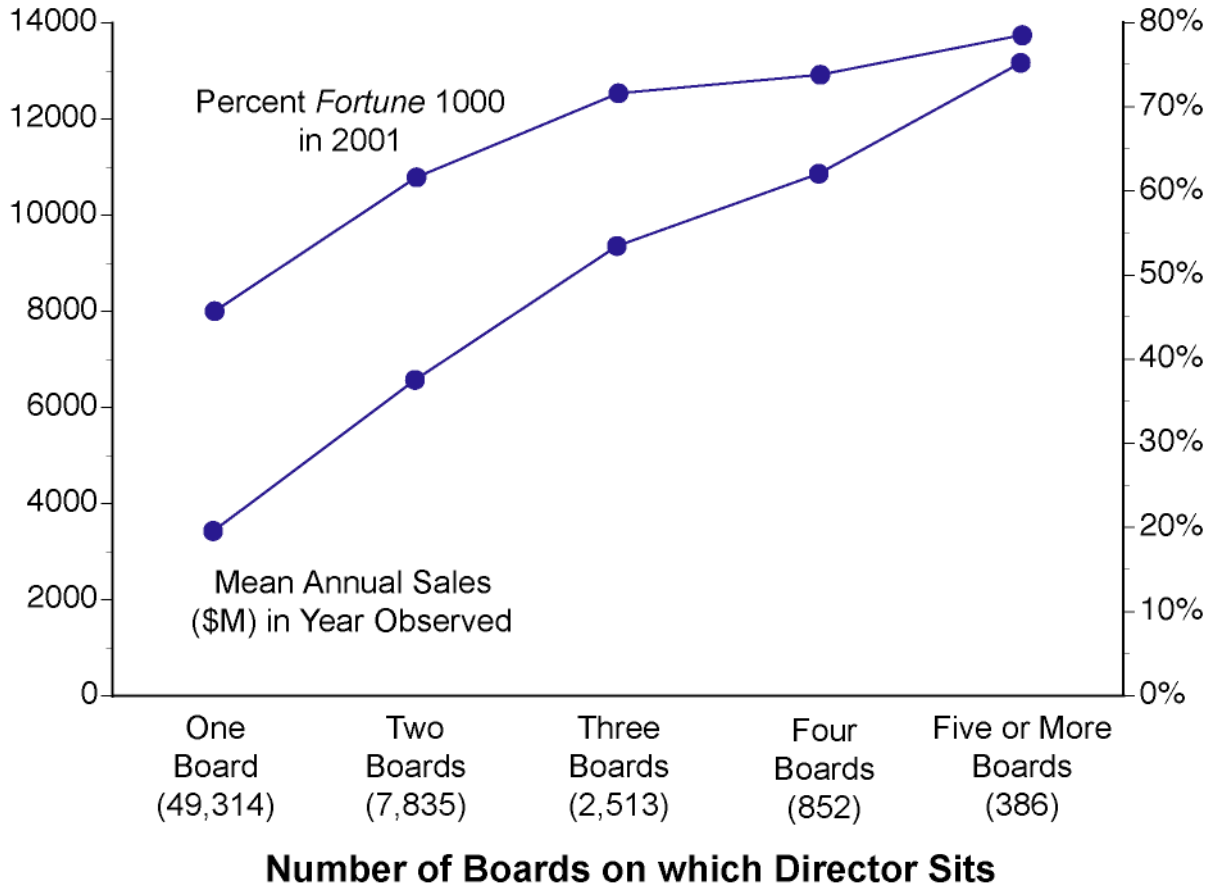


Figure 2.
Size of Companies in which Interlocking Directors Sit



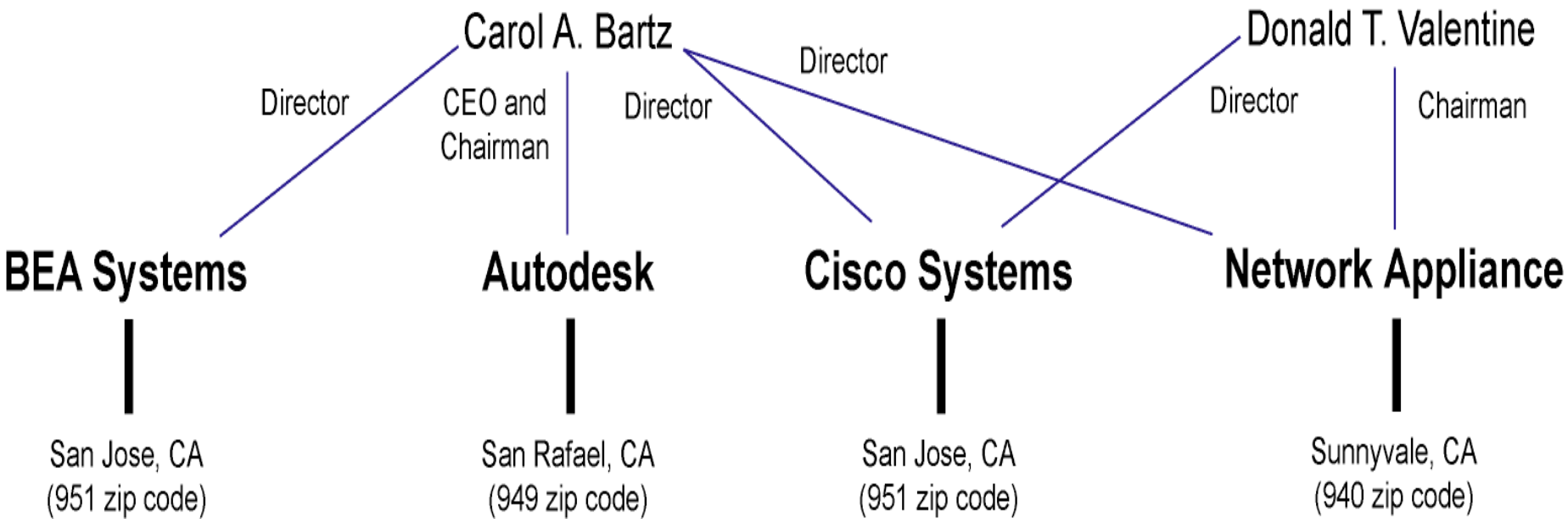


Figure 3.
Example Spatial Interlocks

Interlock ties are from the Figure 1 depiction of Cisco's network in 2001.

Frequency of depicted interlocks within and between zip codes

	940	949	951
940	0		
949	1	0	
951	3	2	1

Figure 4. Geographic Distribution of Interlocks

(circles are three-digit zip codes; lines link zip codes connected by five or more interlocks; circle size indicates network status; red circles are Chicago area, grey are Houston, yellow are New York City)

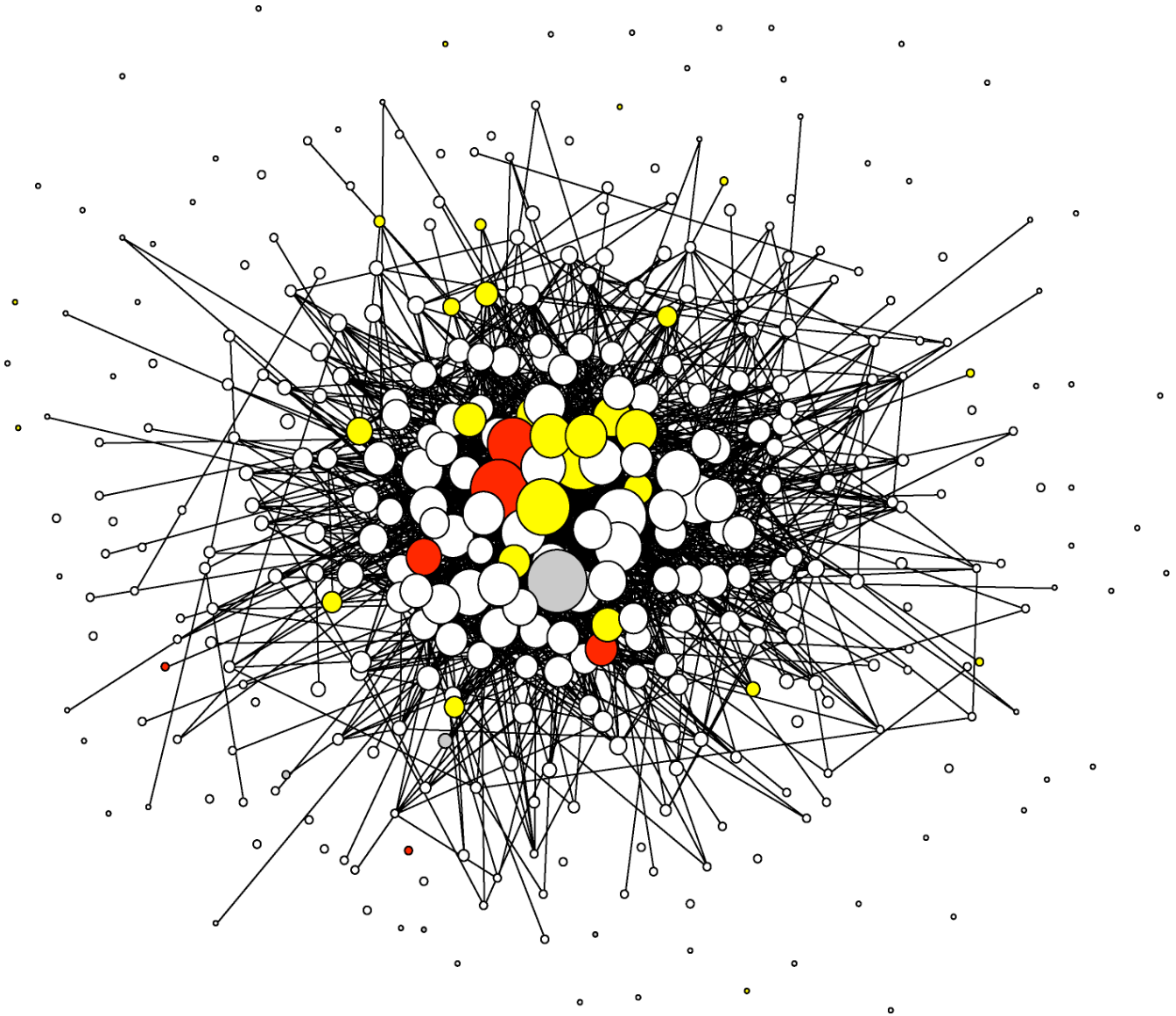
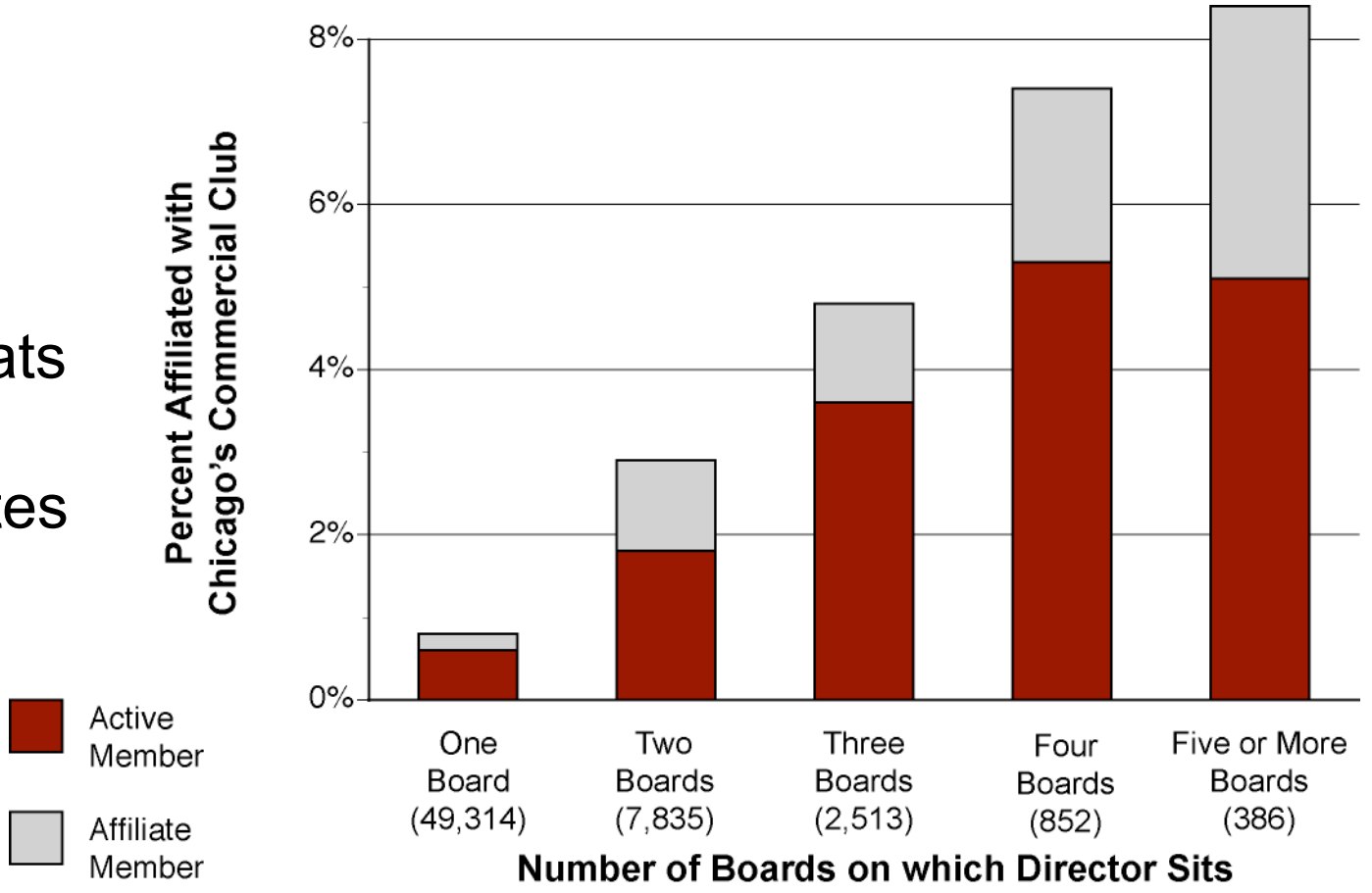


Figure 5.

Director Seats and Chicago Elites



Percentages by Year

1999	.7	3.0	4.4	5.8	8.9
2000	.8	2.7	3.9	9.0	8.2
2001	.8	2.5	4.5	9.7	6.5
2002	.9	2.9	6.3	6.8	9.4
2003	.9	3.1	5.4	5.6	1.7

Figure 6. Interlock Frequency by Geographic Distance

Correlations between Log Distance and Interlock Frequency

	150 Pairs of Zip Codes Most Often Interlocked (n = 150)	All Pairs of Zip Codes Linked by 5+ Interlocks (n = 1106)	All Pairs of Zip Codes Linked by Interlock (n = 4967)
Log Observed Interlock Frequency	-.46	-.32	-.27
Log Ratio of Observed to Expected	-.56	-.39	-.27

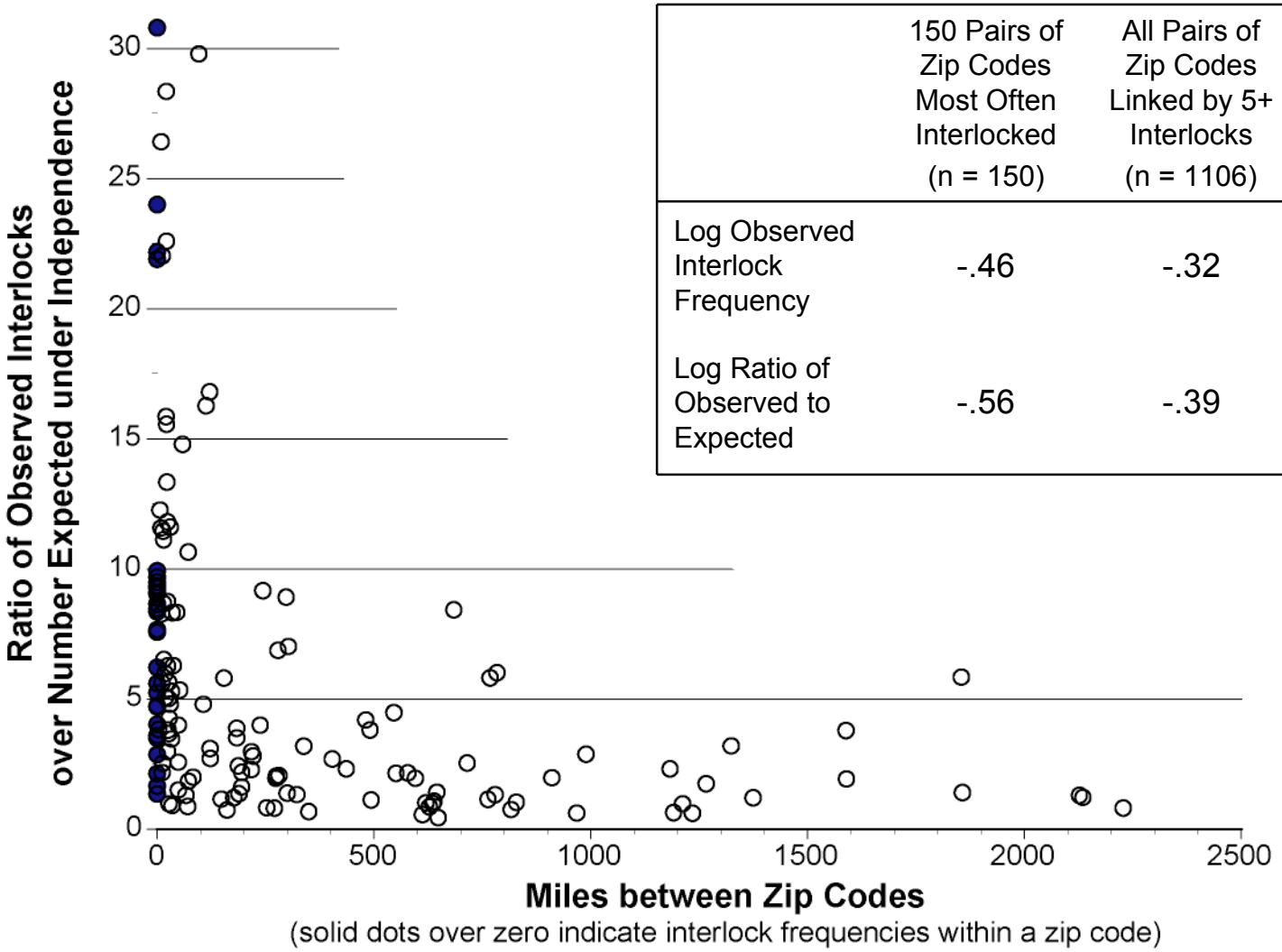
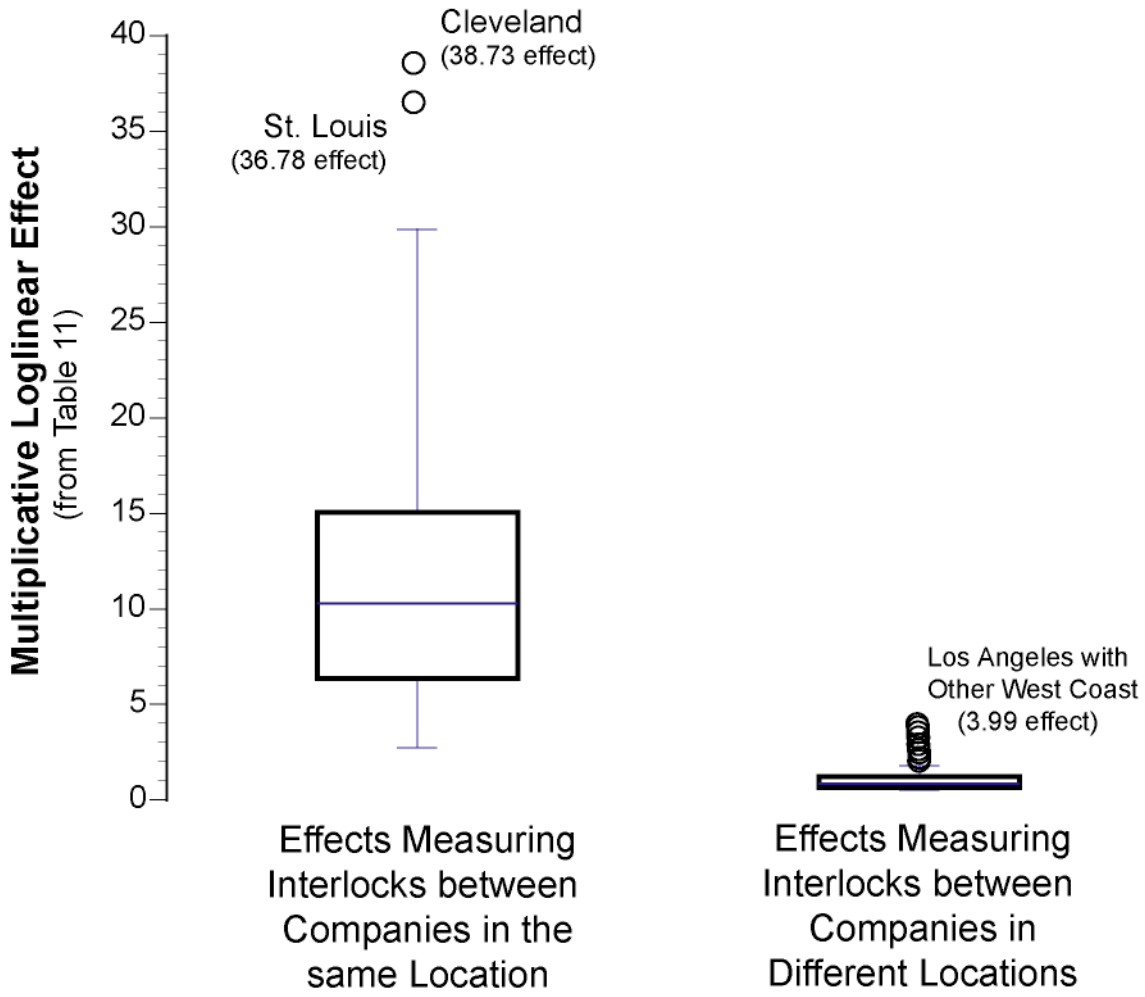


Figure 7.
Loglinear Measures of Interlocks within and between Locations

(box indicates 25%, 50%, 75%; whiskers extend to 10% and 90%; circles are outliers above 90%)



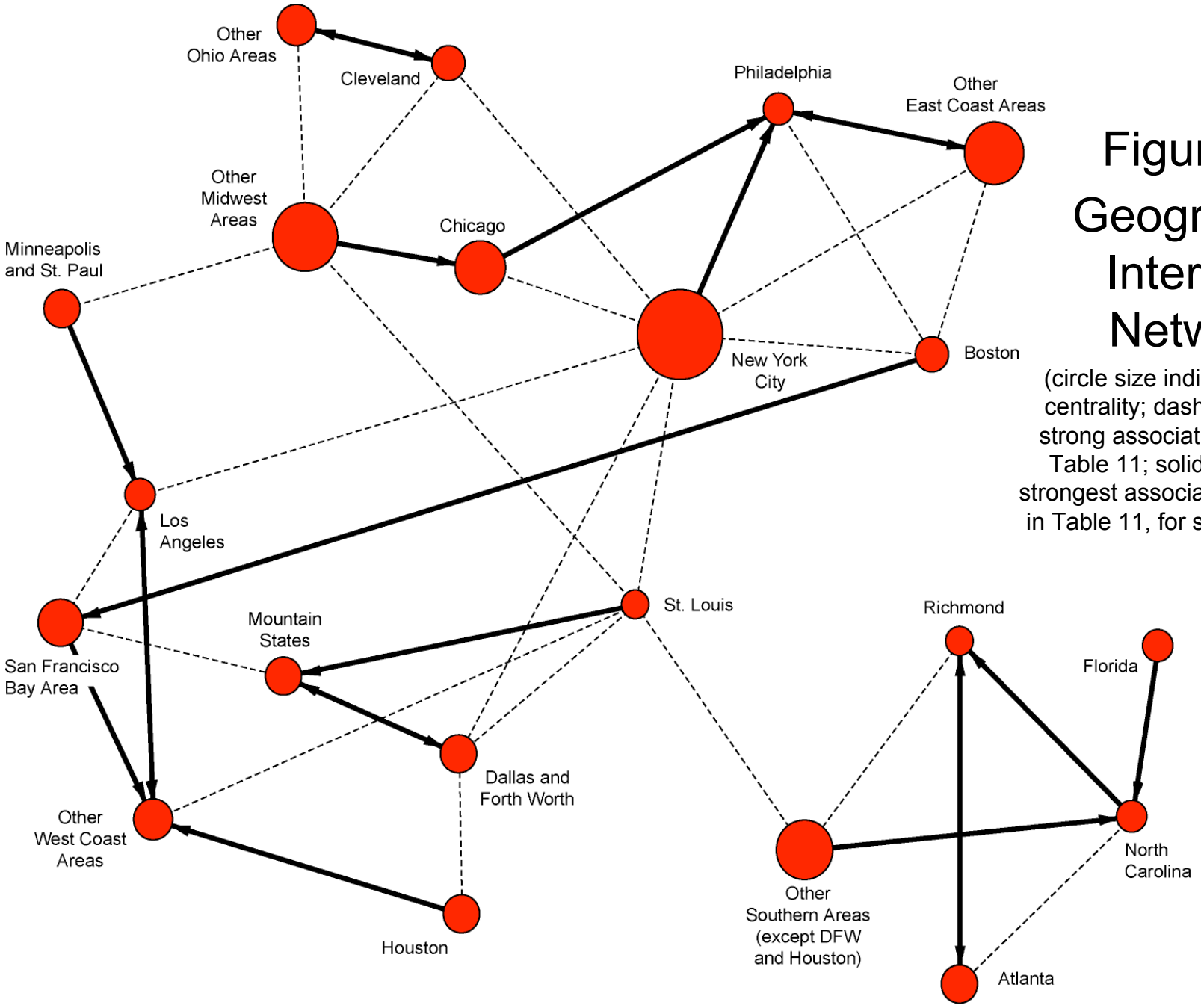


Figure 8. Geographic Interlock Network

(circle size indicates network centrality; dashed lines mark strong associations in rows of Table 11; solid arrows mark strongest association, highlighted in Table 11, for source of arrow)

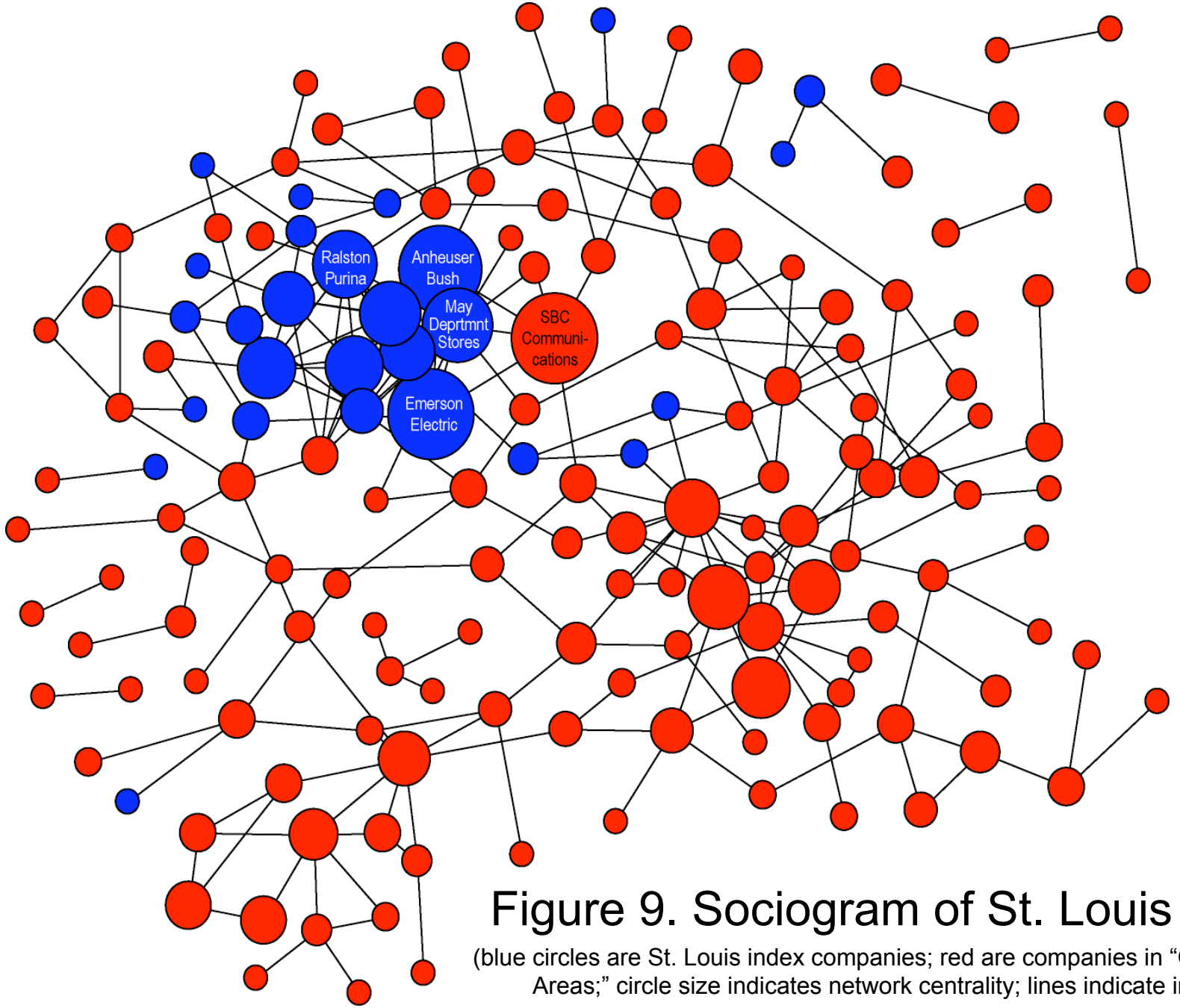


Figure 9. Sociogram of St. Louis Bridge

(blue circles are St. Louis index companies; red are companies in "Other Southern Areas;" circle size indicates network centrality; lines indicate interlocks)

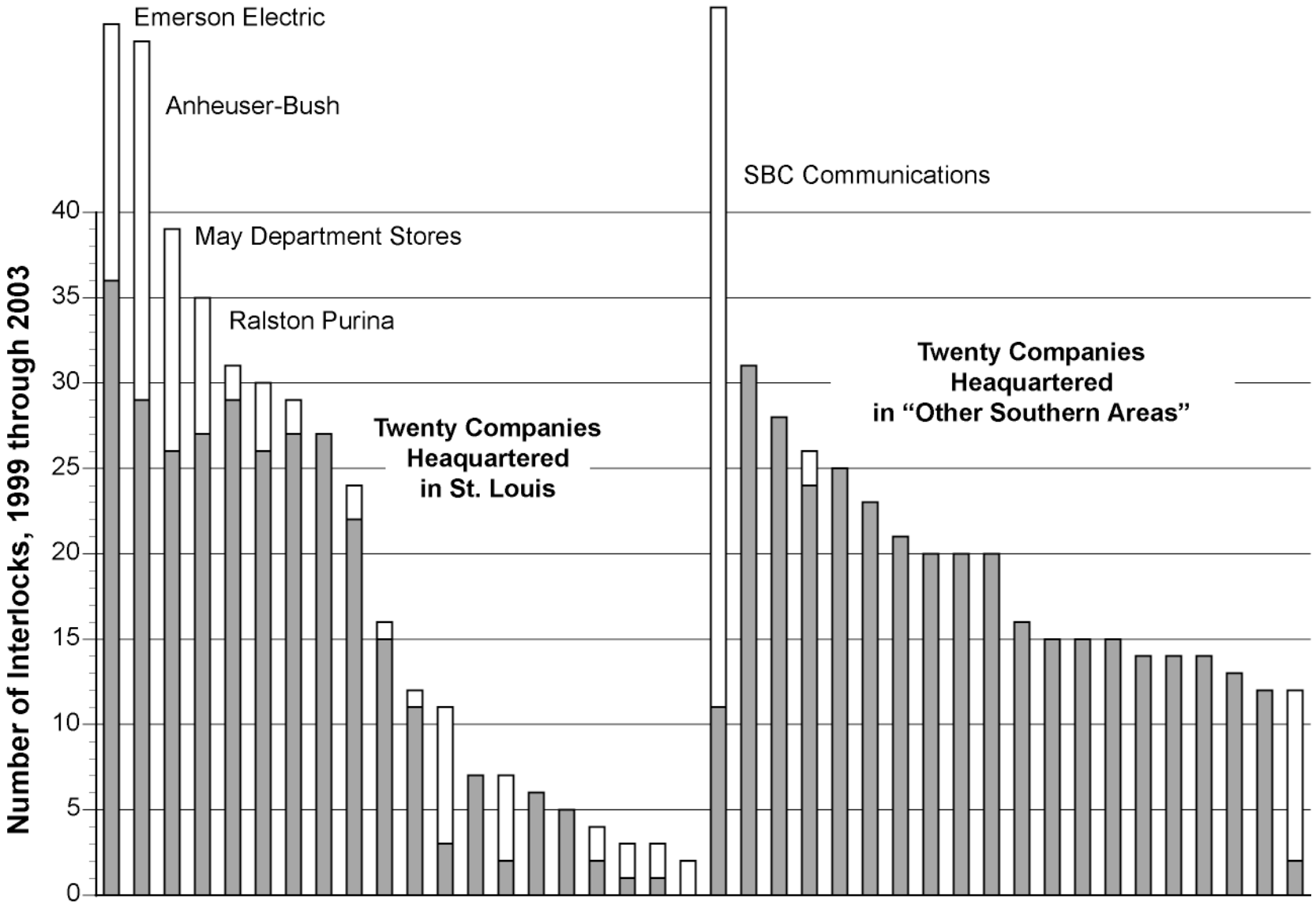


Figure 10. Companies in St. Louis Bridge

(each bar is an index company; grey area represents interlocks between companies headquartered in the same location, white area represents interlocks with companies in the other location; twenty companies with largest combined bars are presented)

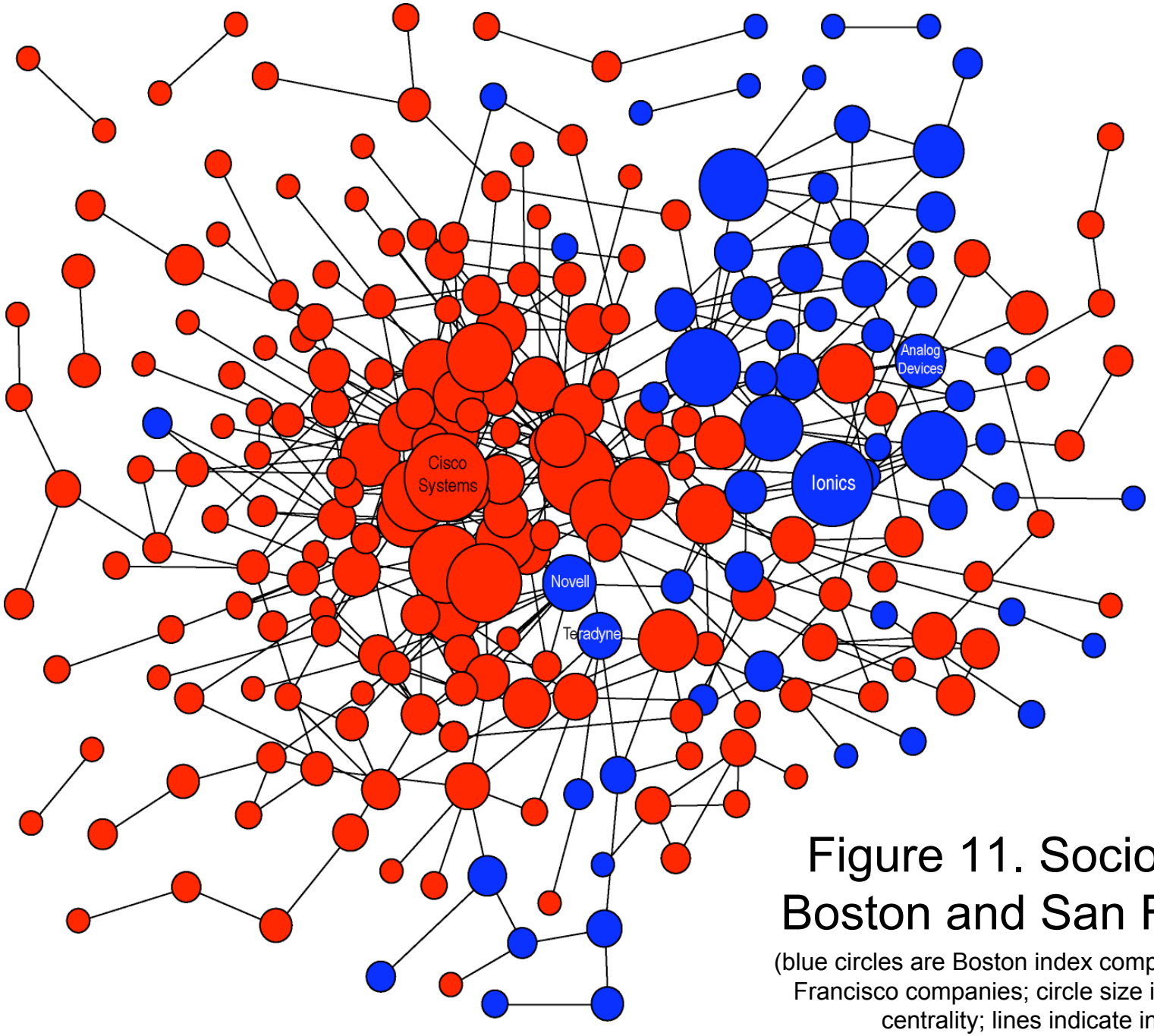


Figure 11. Sociogram of Boston and San Francisco

(blue circles are Boston index companies; red are San Francisco companies; circle size indicates network centrality; lines indicate interlocks)

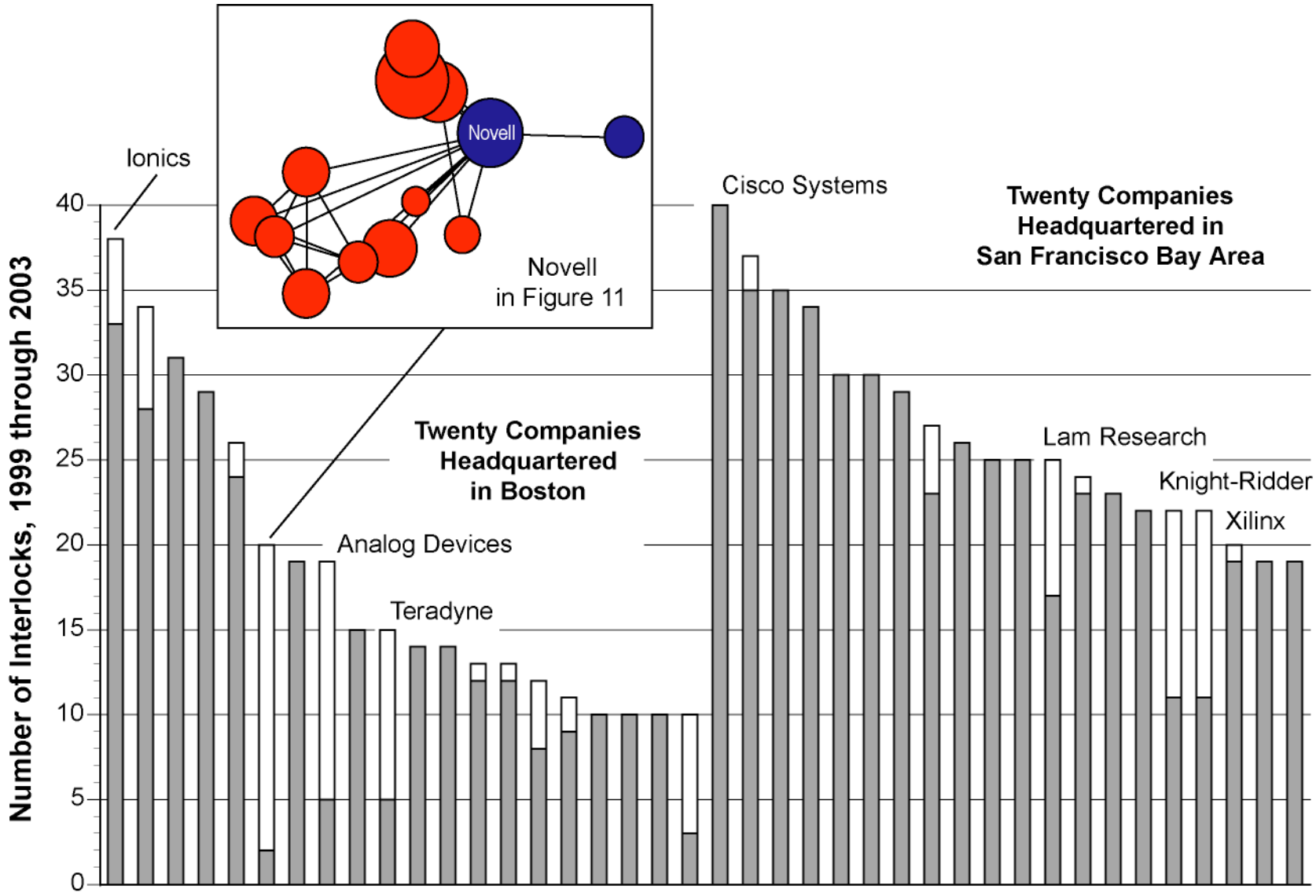


Figure 12. Companies in Boston Bridge to San Francisco

(each bar is an index company; grey area represents interlocks between companies headquartered in the same location, white area represents interlocks with companies in the other location; twenty companies with largest combined bars are presented)

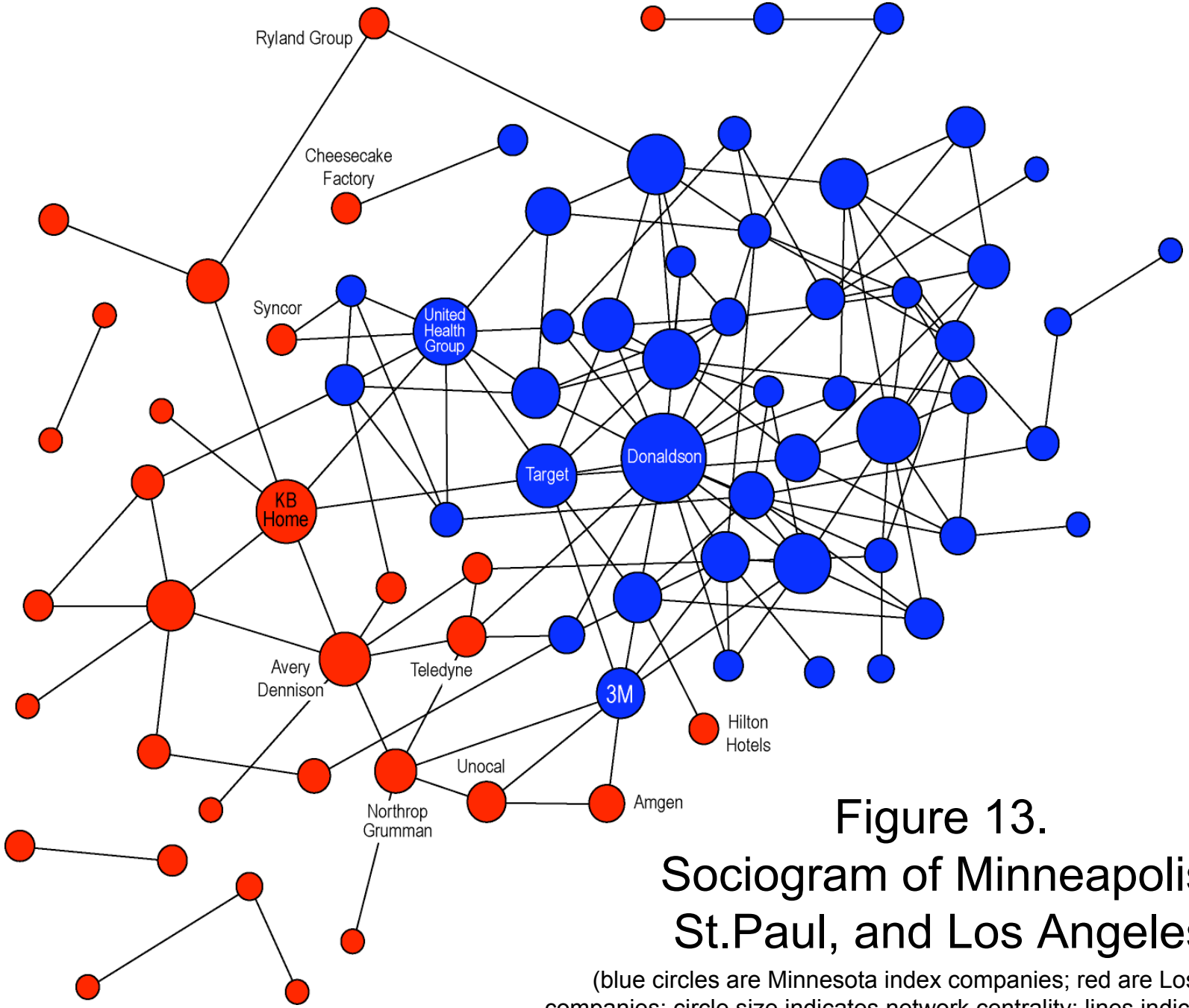


Figure 13. Sociogram of Minneapolis, St.Paul, and Los Angeles

(blue circles are Minnesota index companies; red are Los Angeles companies; circle size indicates network centrality; lines indicate interlocks)

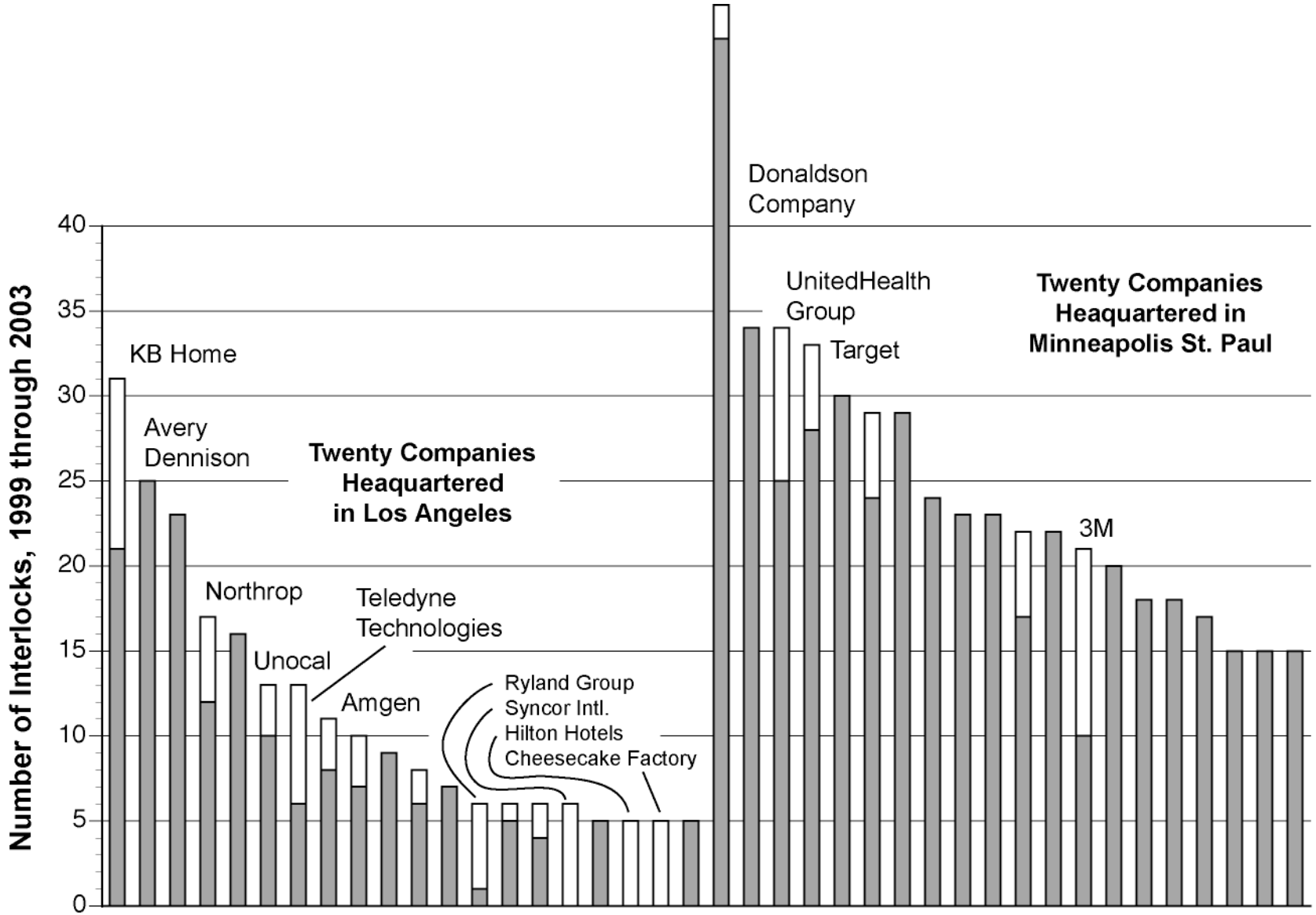


Figure 14. Companies in Minnesota Bridge to Los Angeles

(each bar is an index company; grey area represents interlocks between companies headquartered in the same location, white area represents interlocks with companies in the other location; twenty companies with largest combined bars are presented)

Figure 15. Sociogram of Directors in Chicago Index Companies

(1,380 Chicago directors; 818 isolates sit on one Chicago board or one Chicago board plus outside boards containing no other Chicago elites; gold indicates Commercial Club concentration in center, 13.2 t-test)

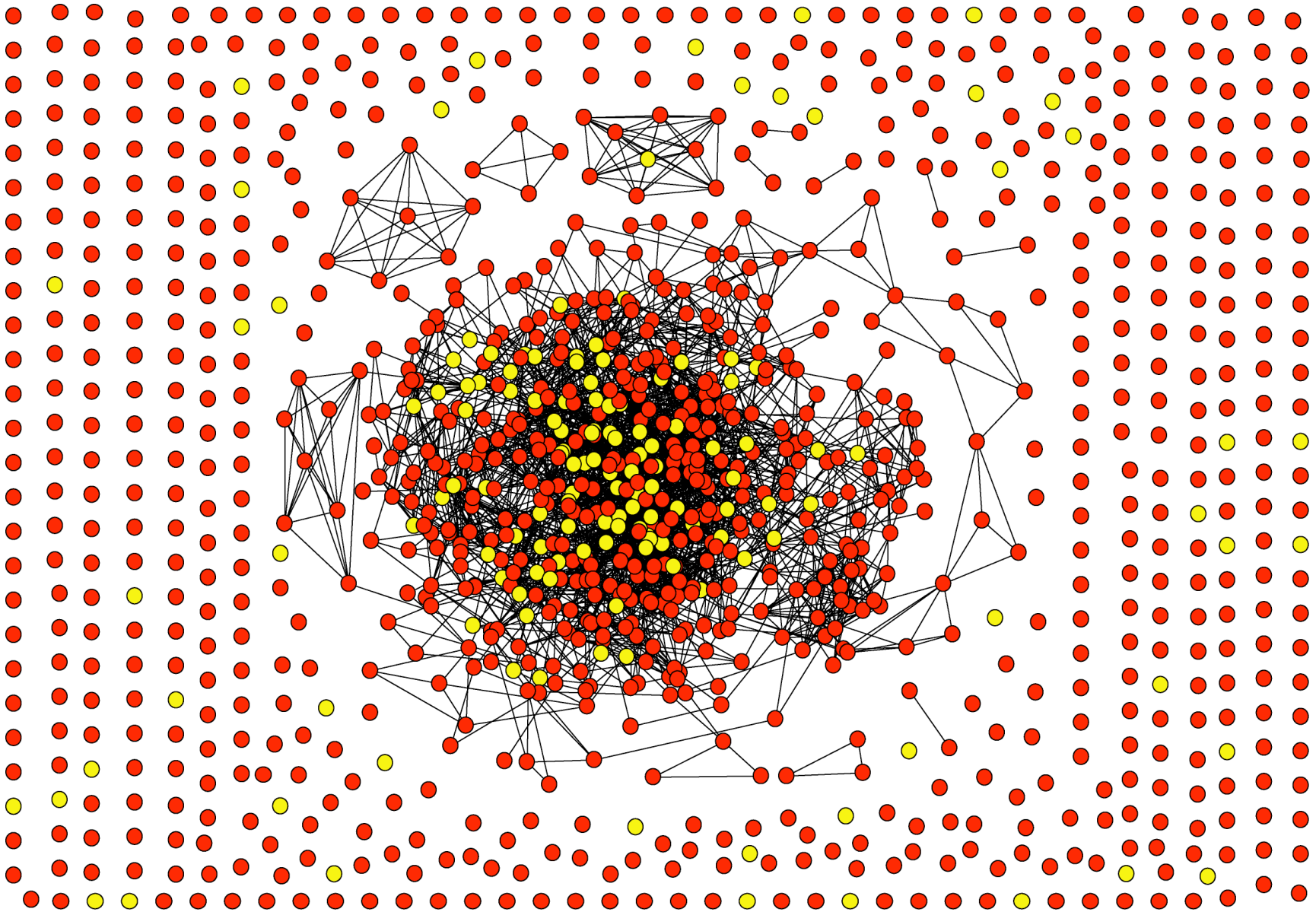
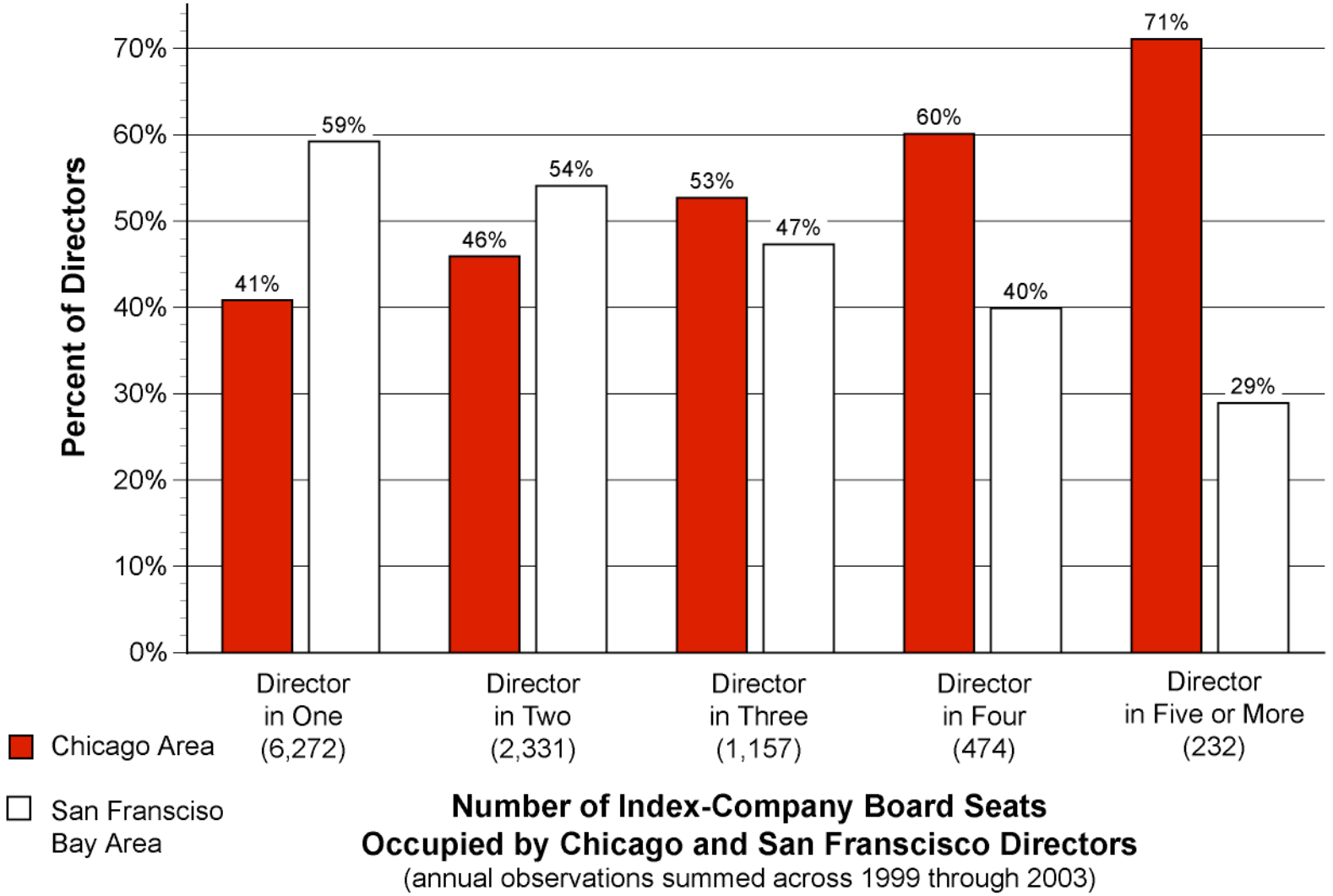


Figure 16. Relative to San Francisco, Board Seats in Chicago Are more Concentrated in a Few Individuals



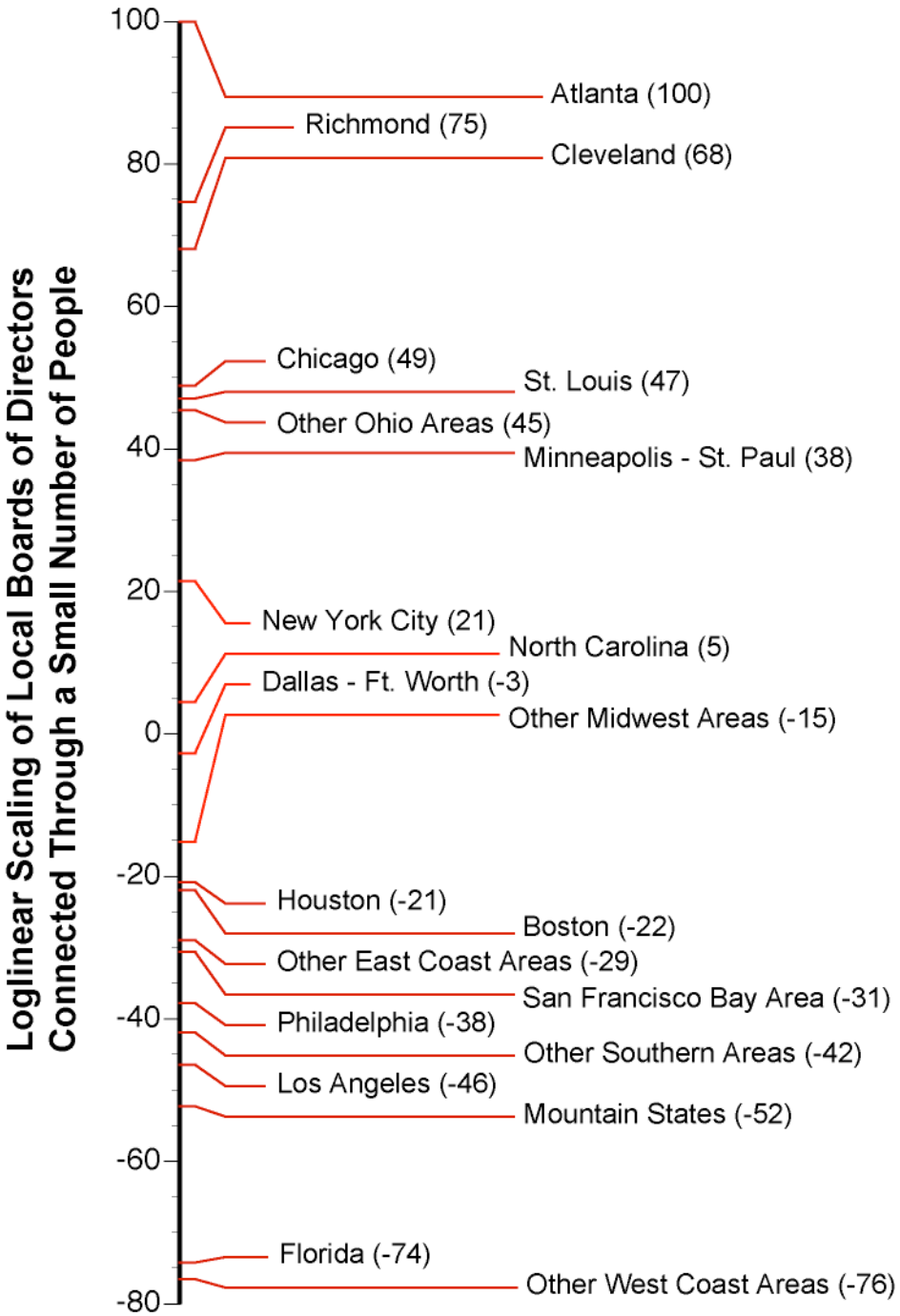
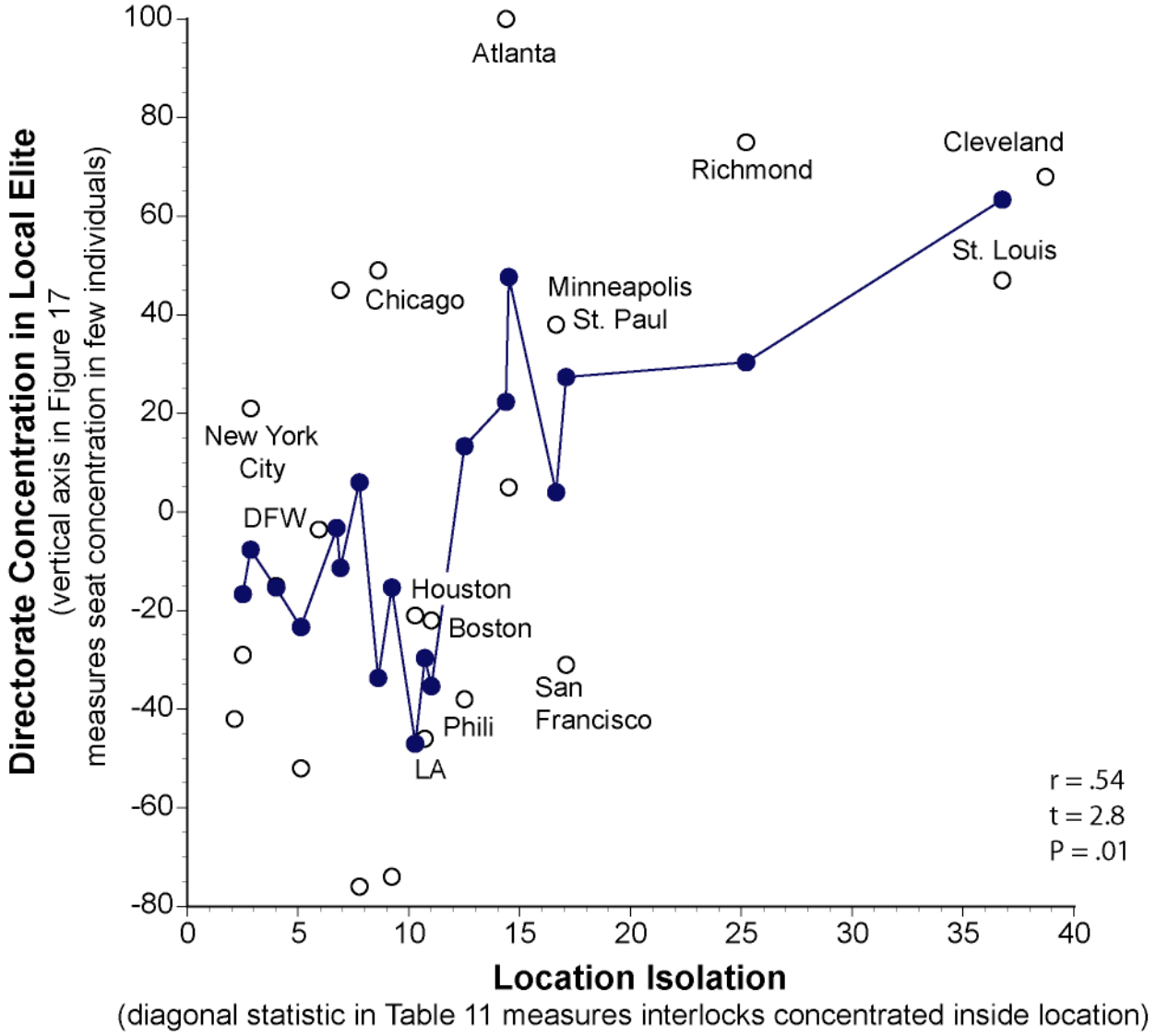


Figure 17. Twenty-One Locations Scored for the Extent to which Board Seats Are Concentrated in a Few Individuals

Scores are based on a loglinear model of the distribution of board seats among directors of index companies headquartered in each location.

Figure 18. Isolation Covaries with Concentration



(diagonal statistic in Table 11 measures interlocks concentrated inside location)