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## **Who killed the inner circle?**

### **The breakdown of the American corporate elite network, 1999-2009**

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# Who killed the inner circle?

## ABSTRACT

This paper analyzes the properties of the board interlock network connecting the largest American corporations between 1999 and 2009. We find that the former stability of the network—in which a handful of banks and multinationals held positions at the center, a few dozen directors served on a large number of boards, and thus the distance between any two companies or directors was short—has largely collapsed during the past decade. There is no longer a stable core of companies that reliably occupies a center, and the mean geodesic has gone up continuously since 2002. The proximal cause is that no cohort of super-connector directors has arisen to take the place of those who have retired. This contrasts with prior generations, in which ambitious individuals sought out multiple board seats for the benefits they provided in status, business connections, and monetary compensation. We speculate that the Sarbanes-Oxley Act, along with other corporate governance reforms, has made serving on several boards costly, resulting in the decline in one of sociology's most-studied networks.

## Who killed the inner circle?

Since the merger wave at the turn of the 20<sup>th</sup> century that gave birth to the modern American corporation, corporate boards have shared directors. The result is a large and inclusive interlock network that connects nearly every major corporation and nearly every director into a single more-or-less cohesive social structure. Interlock ties among corporations are largely fortuitous—boards recruit directors, not interlocks—but consequential. Directors bring insights gained on one board to bear on the decisions made on other boards. This has two implications: First, directors who serve on multiple boards may be particularly valuable because they provide a mechanism for vicarious learning and a conduit to best practices. Like phones and fax machines, directors are subject to network externalities: the more boards they serve on, the greater the benefit they bring. Second, widespread sharing of directors among boards creates a substrate for the rapid diffusion of information and practices, such as devices to defend against unwanted takeover or views about which Senate candidates to support (Mizruchi, 1996). Through monthly board meetings, a flu virus that infected a JP Morgan Chase board meeting in January 2001 could have spread via shared directors to 90% of the Fortune 1000 by May (Davis, Yoo and Baker, 2003). The small diameter of the interlock network, created by directors who serve on multiple boards, has been one of its most durable features.

The existence of an elite “inner circle” of directors who serve on many corporate boards has intrigued sociologists for decades (e.g., Useem, 1984). Who were these people, and how did they get there? For ambitious people, the attraction of serving on corporate boards was straightforward: the pay was good, the workload modest, and there were benefits in status and connections to serving on as many reputable boards as possible. Moreover, this inner circle played a particularly critical role in knitting together the broader business elite into a more-or-less coherent class, creating the network shortcuts that made the corporate elite into a small world (Davis et al., 2003).

In recent years, however, the attraction of serving on corporate boards has been diminished by a series of scandals and crises that have made board service less of a sinecure and more of a burden. The enhanced scrutiny of directors by analysts, the press, and institutional investors, and the increased legal liability imposed by corporate governance reforms over the past decade, may have turned the inner sanctum into an empty room.

In this paper, we briefly review findings on the American interlock network and its dynamics, highlighting some of its enduring regularities. We also describe some of the challenges, from corporate scandals and new regulation to financial crises, to this network's cohesiveness that have arisen since the turn of the 21<sup>st</sup> century. Next, we compile and analyze data on the boards of every firm in the S&P 500 from 1999 to 2009. We report three broad sets of findings. First, there was nearly complete turnover among the 25 most central corporations during this time. In contrast to what was true for almost the entire 20<sup>th</sup> century, neither banks nor any other type of firm occupied a stable center. Second, the inner circle of well-connected directors has largely disappeared. Whereas in prior years dozens of directors routinely served on five or more corporate boards, we find that by 2009 three directors served on five boards each, and only one served on six. Third, as a result of the disappearance of the inner circle, the mean geodesic has increased notably. Time series data suggest that the Sarbanes-Oxley Act of 2002 may have been the most significant factor in killing off the inner circle.

### **The American interlock network in the 20<sup>th</sup> century**

For over a century, scholars and policymakers have been intrigued by the interlock network created through directors who serve on multiple corporate boards. In 1905 Otto Jeidels, scion of a Frankfurt banking family, documented how German banks placed their directors on the boards of industrial companies while also offering directorships “to persons of title, also to ex-civil servants, who are able to do a great deal to facilitate relations with the authorities.” In the US, Louis Brandeis published a series of articles in *Harper's* showing the workings of a “Money Trust” that dominated American industry through

control of lending and through bankers placed on the boards of their subject companies. In his memorable phrasing, “The practice of interlocking directorates is the root of many evils. It offends laws human and divine...It is the most potent instrument of the Money Trust” (Brandeis, 1914: 51). At roughly the same time, Lenin (1916) claimed that bank control of the largest corporations was a common feature of advanced industrial economies, including Germany, France, and the US, and he pointed to the pervasive bank-centered interlock networks as one of its signal elements. Oligopoly in industry was accompanied by oligopoly in banking, and the two were connected via shared directors. For decades afterwards, overlapping memberships on corporate boards was taken as evidence of a more-or-less cohesive power elite (e.g., Mills, 1956; Useem, 1984), with particular kinds of people (corporate diplomats) and particular kinds of organizations (banks) playing central roles in holding the network together. From Mills (1956) onward, the interlock network was a seedbed for network thinking in sociology.

Researchers have discovered three kinds of regularities in the interlock network in the US. First, since the turn of the 20th century when the interlock network first arose, commercial banks have been the most central nodes (Mizruchi, 1982). Early on, banks were central because they placed their officers on the boards of other companies—for instance, President George Baker of New York’s First National Bank (predecessor of Citigroup) personally served on 22 corporate boards (Brandeis, 1914). As corporations grew larger and came to rely largely on their own earnings for financing, however, the flow of directors was reversed, and banks began to recruit well-connected CEOs and other elites to serve as outside directors on their own boards to provide wide-ranging economic intelligence to guide lending (Mintz and Schwartz, 1985). Money center bank boards, in short, formed a reliable core at the center of the interlock network.

Second, there was an identifiable “Inner Circle” of directors who were particularly important to the dynamics of the network. The vast majority of directors served on only one corporate board, but a small

number served on many boards and spanned the corporate, non-profit, and policy worlds. According to Mike Useem (1984), these “corporate diplomats” had a distinctively cosmopolitan outlook that encompassed the broad interests of business rather than just the interests of a particular sector, and they were more likely than other directors to participate in policy organizations and to serve stints in public service (before or after their director careers).

Third, the interlock network had an uncanny “small world” property in which everybody seemed to know everybody else, or to have friends in common. “As an elite, it is not organized, although its members often seem to know one another, seem quite naturally to work together, and share many organizations in common. There is nothing conspiratorial about it, although its decisions are often publicly unknown and its mode of operation manipulative rather than explicit” (Mills, 1956: 294). With the advent of advanced network methods and computing power, it became possible to quantify Mills’s observation: on average, the 6000 directors on major corporate boards in 1982 could reach each other in about four steps through shared board memberships (Davis, Yoo and Baker 2003: Table 2), and for those on the board of JP Morgan Chase the distance was substantially shorter. Among elites, it was a small world after all.

These empirical regularities varied in how stable they were over time. The chronic centrality of commercial banks began to decline in the 1980s, and by the late 1990s banks no longer dominated the ranks of the most central firms. There were two reasons for this: First, as corporations increasingly turned to financial markets rather than banks for their debt, commercial banks began to look to other markets, shrank their boards, and reduced their recruiting of well-connected executives (Davis and Mizruchi, 1999). Second, as the banking industry began to consolidate across geographic and industrial lines, there were simply fewer commercial banks to go around (Neuman et al., 2008).

The path to the inner circle had also changed. When Mills wrote *The Power Elite* in 1956, the inner circle was almost exclusively white, male, and “well-bred.” The old boys’ club was exactly that. Even as late as

the 1980s, the corporate elite was tilted heavily toward the graduates of fancy prep schools and Ivy League colleges (Useem, 1984). But societal pressures for diverse representation on corporate boards—coupled with the tendency of boards to recruit from among candidates that they already knew—ended up promoting a handful of “demographically attractive” directors into the inner circle. By 1999, many corporate diplomats were women, and four of the ten best-connected directors were African-American, including the director that served on the largest number of boards by far, Vernon Jordan. (Jordan was perhaps best known as Bill Clinton’s best friend and regular golf partner.) It appeared that the quickest path to the inner circle was to be female and/or minority and to serve in a Presidential administration—preferably a Republican one. A subsequent appointment to one corporate board often led to invitations to join several more (Davis et al., 2003). Thus, the demography of the inner circle had changed fairly dramatically after the 1980s.

In contrast, the “small worldness” of the interlock network appeared to be an ironclad law that operated independent of these other features. Davis et al. (2003) reported that the average geodesic among the largest 600 or so US corporations was 3.38 in 1982, 3.46 in 1990, and 3.46 in 1999, while the geodesic among directors was 4.27, 4.30, and 4.33 respectively—in spite of the high turnover among the constituent companies and the nearly complete turnover in individual directors during this 18-year period. It appeared that the short geodesics that characterized the interlock network were impervious to turnover among the constituent nodes.

Since the turn of the 21st century, there have arisen several potential challenges to the structure of the interlock network in the US. From the perspective of directors, three events have reduced the attractiveness of serving on corporate boards. The Nasdaq crash of March 2000 was followed by a series of scandals that revealed rampant conflicts of interest in the system of corporate financing in the United States and subjected dozens of corporate boards to embarrassing shareholder lawsuits. In response, Congress passed the Sarbanes-Oxley Act (SOX) in 2002 with near-unanimous votes in the House and

Senate. SOX was perceived to have greatly increased the accountability of corporate boards, particularly for directors serving on the audit committee, and to have further decreased the attraction of board service. Finally, the Great Recession that began in 2007 and the accompanying market decline brought increased pressures on directors. In combination, these events considerably dimmed the attraction of being a director, particularly on multiple boards.

The first decade of the 21st century also saw the movement toward bank consolidation become nearly complete, as the surviving big four commercial banks (JP Morgan Chase, Bank of America, Citigroup, and Wells Fargo) acquired many of their remaining rivals. The financial crisis of 2008 created additional pressures for consolidation, as distressed banks (Wachovia, Washington Mutual, National City, and others) were pushed into mergers with their larger rivals.

Finally, there has been a more diffuse decline of the corporate system. By 2009, the US had half as many public corporations as it had in 1997, as the number of initial public offerings failed to keep up with acquisitions, delistings, and acquisitions (Davis, 2011). The so-called “twilight of the public corporation” and the rise of alternative forms of financing such as private equity suggested that perhaps the interlock network was a peculiar feature of 20th century corporate economy rather than a permanent fixture of capitalism.

This paper examines each of the three network dimensions during the 2000s, describing changes in which corporations are most central, who are the members of the inner circle, and how small is the small world of the corporate elite. In each case, we uncover notable changes in the composition and structure of the corporate network.

## **Sample and data**

We examined company and director interlocks between S&P 500 companies annually from 1999 to 2009.

This period encompasses events such as the dot-com crash, Enron and other accounting scandals, introduction of Sarbanes-Oxley regulation, 9/11 and the ensuing War on Terror, the subprime mortgage

crisis and the collapse of the automakers.

For each calendar year, we created the list of companies that were on the S&P 500 at any point during the year. Standard and Poors occasionally changes the constituents of the S&P 500 index, typically due to mergers and bankruptcies. During the period under study, there were 329 such changes, for an average of just under 30 changes (6% turnover) per year. The year 2000 saw the most changes in the index with 53 and 2003 the fewest with 9. Our sample includes 829 distinct companies and 5,300 company-years.

For each year, we created the list of board interlocks—companies sharing a director—that existed between companies in the sample for that year. This list included all interlocks that existed at any point during that calendar year. Our sample consisted of 43,614 corporate interlock-years, for an average of just under 4,000 interlocks per year.

We also created a list of director interlocks—directors serving together on the same S&P 500 board. There were 9,615 unique directors and 49,435 director-years in our sample. The list includes 803,597 director interlock-years, for an average of slightly over 73,000 interlocks per year. We are in the process of gathering demographic data on the age, gender and ethnicity of the directors in our sample.

We created these lists with interlock data from Boardex, selecting the companies in our sample by matching to Compustat S&P 500 historical constituent lists using Committee on Uniform Security Identification Procedures (CUSIP) numbers. Companies' CUSIP numbers can change, so we used CRSP name event data to create a lookup between the CUSIP numbers listed by Compustat in its S&P 500 data and Boardex internal unique identifiers for each company. The Boardex data have two major drawbacks. First, data coverage is incomplete for firms and individuals that were not active into the late 2000s. Accordingly, while we expect our main conclusions below to hold, some of the specific statistics

reported may change as we track down missing data. Second, Boardex does not contain CUSIP data for all companies in its dataset. We manually inserted lookup values where this was the case for a company in our S&P 500 sample. We also manually corrected for inconsistencies between how Boardex and CRSP handled identifiers before and after mergers. Notwithstanding the incomplete coverage and need for manual linking to CRSP data, Boardex provides a singularly useful dataset for exploring board interlocks. Companies and directors are each assigned unique identifiers within the database, and these identifiers are used consistently. This obviates the need to manually check for different people with the same name or the same person listed under different names.

## Findings

There has been significant turnover in the ranks of the most-connected companies. Of the top 13 companies with the most direct board links within the S&P 500 in 2001 (top 10 including ties), only Procter & Gamble remained in the top 10 in 2009. Indeed, among the top 10 in 2001, only P&G, Pfizer and SBC Communications (renamed to AT&T Inc.) remained in the top 15 in 2009. When ranked by eigenvector centrality instead of degree, Procter & Gamble is again the only top 10 company from 2001 to remain in the top 10 in 2009. Only Pfizer, Verizon Communications, and Dell join P&G as top 10 eigenvector central companies remaining in the top 25 in 2009.

We could not discern an obvious pattern in the types of companies that were most central in the 2009 interlock network. Banks and financial institutions certainly were not the linchpins in either 2001 or 2009. One trend may be the rising prevalence within the most-connected ranks of companies with a global rather than U.S. domestic focus.

The connectedness of the most-connected companies has also declined. Whereas the highest-degree company in 2001 had 30 direct ties, the most-connected company in 2009 had only 23. (The comparable figure in 1982 was 48—see Davis and Mizruchi, 1999). To break into the top 25 in 2001 required 20

direct ties to other S&P 500 companies; in 2009, 14 ties was enough.

**[Table 1 about here]**

There has also been significant turnover in the most-connected directors. Of the top 11 highest-degree directors in 2001, only James Cash, Jr. remains in the top 10 in 2009, and only William Gray III from the 2001 top 10 joins Cash in the 2009 top 25. Measured by eigenvector centrality, the turnover is even more severe. None of the 2001 top 10 directors remains in the top 25 in 2009. Indeed, there is no overlap between the top 25 in 2001 and 2009.

In 2001, the most-connected directors were more likely ethnicity than the director population at large to be female or from a minority. This trend seems unchanged in 2009. In 2001, there was one woman (Helene Kaplan) in the top 10 for degree and eigenvector centrality. The top 10 degree centrality list also contained three African-American males and one Hispanic male. The top 10 eigenvector centrality list contained three black males. In 2009, there were three black males, one black female, one Hispanic male and one white female in the top-10 degree centrality list, and two black males, one Hispanic male and one Hispanic female in the top-10 eigenvector centrality list. Similarly, there seems to be no significant change in average ages of the most-connected directors between 2001 and 2009. In 2001, the average ages of the top 10 (including ties) most-connected directors by degree centrality and eigenvector centrality were 65.1 and 64.7 respectively. In 2009, these figures changed slightly to 63.4 and 64.4.

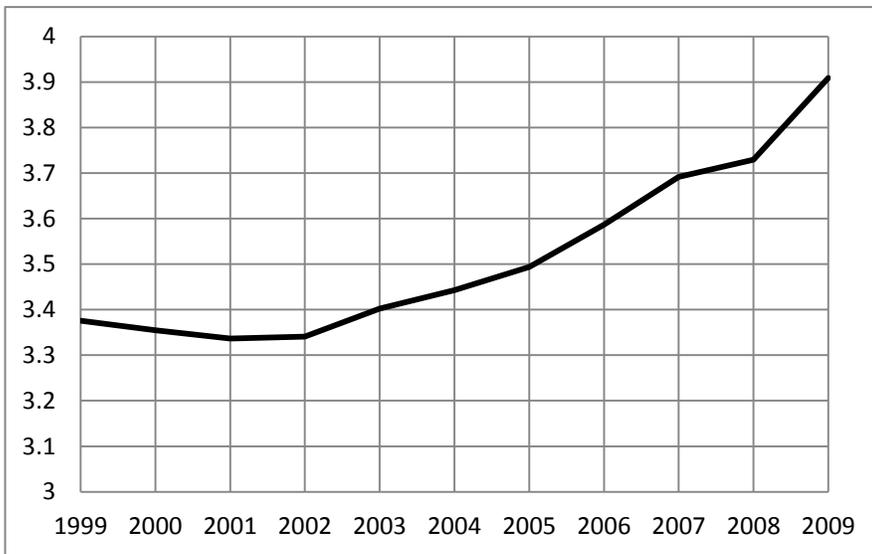
Mirroring the declining centrality among the most-connected companies, the centrality of the most-connected directors has also declined dramatically. In 2001, Senator George Mitchell III had the highest degree, sitting on the same boards with 101 other S&P 500 directors. In 2009, the highest-degree director was Dr. Shirley Jackson with 73 ties. The number of direct ties needed to break

into the top 25 decreased from 60 to 45.

[Table 2 about here]

Our most striking finding is the decline in the S&P 500 interlock network's overall connectedness, as measured by the mean geodesic (shortest path). Such large fluctuations have not been observed in the many studies of U.S. corporate elite networks to date. The mean geodesic in the corporate interlock network's main component increased from 3.38 in 1999 to 3.91 in 2009. This upward trend began in 2002 (i.e., around the time of the Sarbanes-Oxley Act) and continued into 2009.

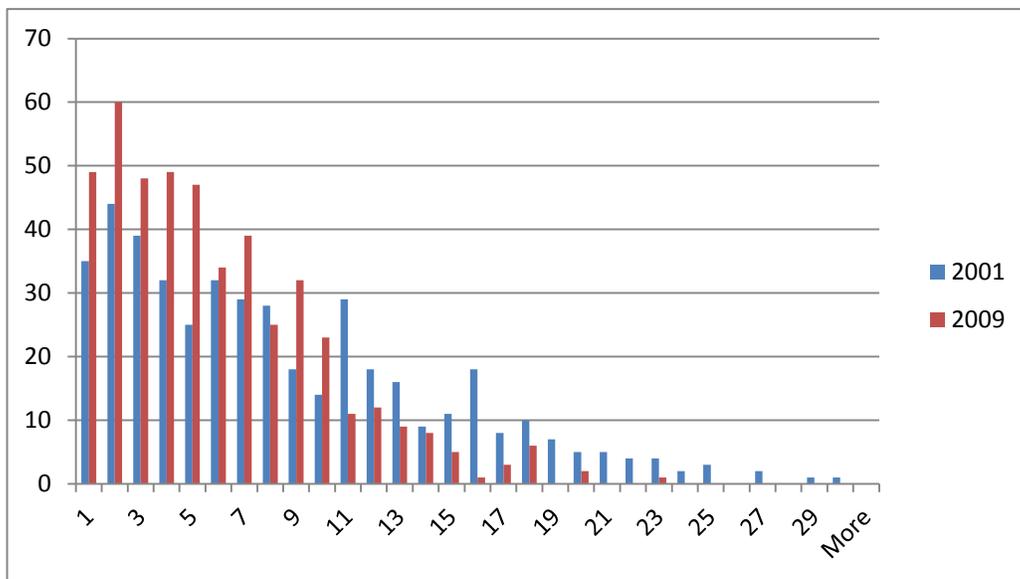
**Figure 1. S&P 500 company interlock average geodesic in main component 1999-2009**



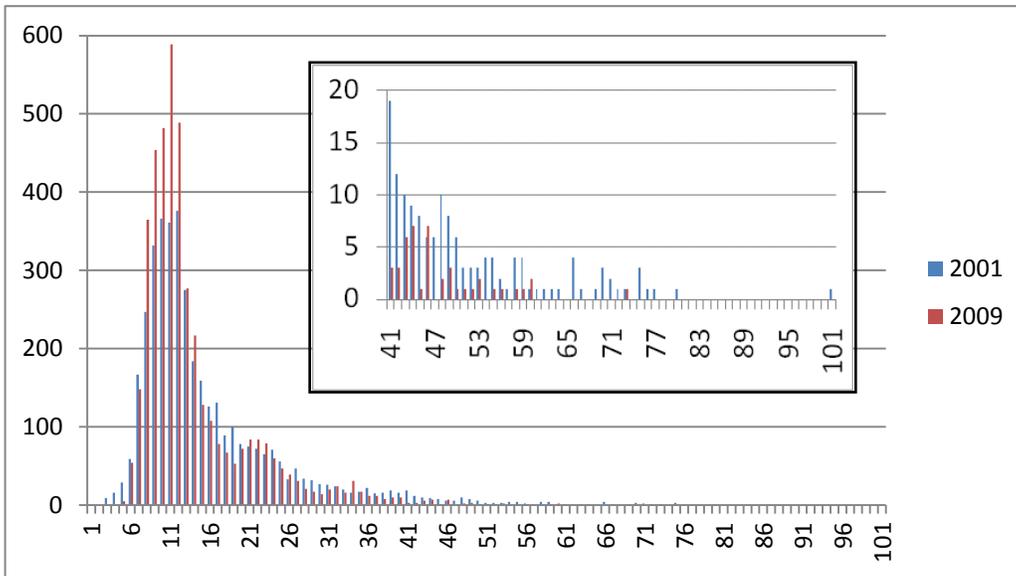
Contributing to this increase in path lengths was a marked downward shift in the number of direct interlock ties between companies and directors. Figures 2 and 3 show the degree distributions for companies and directors for 2001 and 2009. During this period, the average degree for companies fell from 3.30 to 2.64. There were 22 companies with more than 20 interlock ties in 2001, and AT&T

Corporation and J.P. Morgan Chase and Co. had the most ties to other S&P 500 companies with 30 and 29 respectively. By 2009, there was only one company with more than 20 interlock ties—Procter & Gamble with 23. For the director network, the average degree changed from 16.1 to 14.0. While there were 24 directors with more than 60 direct ties in 2001, there was only one in 2009. The most-connected director in 2001 had 101 ties, while the most-connected in 2009 had 73.

**Figure 2. Degree distributions for companies, 2001 and 2009**

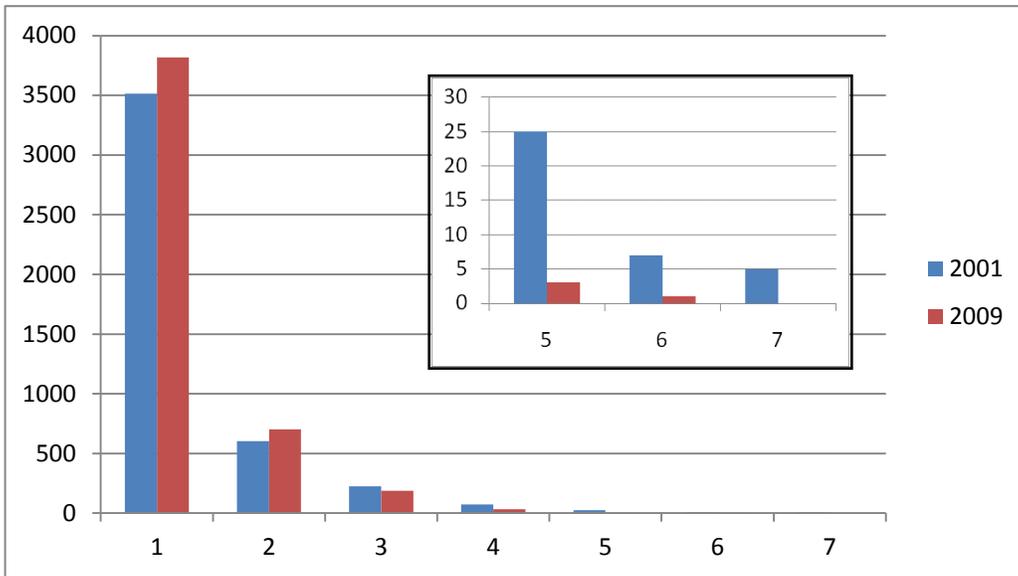


**Figure 3. Degree distributions for directors, 2001 and 2009**



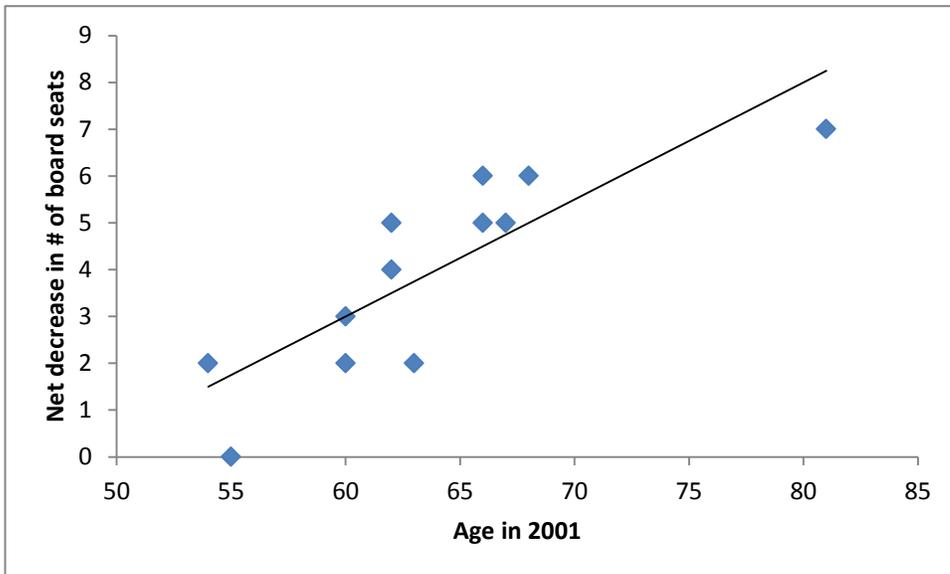
The increased distance between companies in the interlock network was not caused by a change in board sizes. Board sizes increased from an average of 8.9 directors per board in 2001 to 9.3 in 2009. Instead, the decline in connectedness was due to the fact that the top directors served on fewer boards in 2009 compared to 2001. The average number of directorships per S&P 500 director fell slightly from 1.32 to 1.25 from 2001 to 2009. More dramatic was the disappearance of “super-connectors” during this period. While in 2001, several individuals sat on seven S&P 500 boards, by 2009 there were no individuals sitting on seven boards. The number of directors who sat on six or more S&P 500 boards decreased from 12 to one, and the number on five or more boards from 37 to four. (By comparison, in 1982, there were six directors who served on seven boards, 15 that served on six, and 41 that served on five.)

**Figure 4. Number of directorships distribution, 2001 and 2009**



Age and retirement played a role in the diminishing connectedness of the 2001 super-connector director cohort. For the 12 directors with six or more S&P board seats in 2001, the median age in 2001 was 63—close to the standard retirement age. It is telling that the three youngest directors among these dozen—William Gray III, James Cash Jr. and Shirley Jackson—all continued to have four or more S&P 500 directorships in 2009.

**Figure 5. Net decrease in number of board seats by 2001 versus age (among directors with 6 or more directorships in 2001)**



Director turnover is nothing new, of course, and in the past the retiring super-connectors were replaced by new cohorts of super-connectors, who helped maintain the stability of the overall network. Why did no new super-connectors arise in the 2000s to replace those who retired? This is an intriguing question for future empirical study.

### Discussion and Conclusion

We discovered several changes in the S&P 500 interlock network during the period between 2001 and 2009. Some changes were expected, such as the extensive turnover in the identities of the most-connected companies and individuals. Retirement due to old age seems to be a key driver of turnover in the ranks of most-connected directors.

Other changes were surprising. For the first time since the early twentieth century, the network has started to lose its characteristic connectivity. Average geodesics—distances between companies and directors—increased by a magnitude that had not been observed before. Indeed, previous studies had found that the interlock network displayed a remarkably constant level of closeness, suggestive of a homeostatic equilibrium enforced by the underlying dynamics of network formation (Davis et al., 2003).

Our findings suggest a shift in the underlying dynamics of the network. All previous studies of interlock networks that we are aware of have found super-connectors—individuals who served on a large number of boards, and boards that served as meeting places for well-connected directors. From the 1900s to the 1980s, bank boards served as the meeting places of CEOs and bank directors served as linchpins in the interlock network. More recently, a handful of sought-after directors—often women and under-represented minorities holding high positions in government and civil society—have served as the super-connectors. The disappearance of super-connectors may indicate that preferential attachment (Barabasi, 2002) is no longer a meaningful predictor of interlock network tie formation. That is, companies may no longer prefer well-connected directors and potential directors may not prefer well-connected boards. To the extent that serving on multiple boards is no longer attractive, the career dynamics that previously underlaid the structure of the interlock network are undermined. Ambitious individuals may no longer accept invitations to join the boards of banks or other portals to the inner circle, because the rewards for being a super-connector are outweighed by the costs. Thus, the network loses its cohesion.

Several events in the early 2000s made being a super-connector director less attractive for individuals, and super-connector directors less attractive to companies. Serving on multiple boards became less attractive after the advent of Sarbanes-Oxley regulation in 2002 and the attendant increase in workload and legal liability for directors. Heightened airport security in response to terrorist attacks made even first-class travel less palatable. Companies faced increased scrutiny from the press, analysts and shareholders on director appointments. Some of this scrutiny explicitly criticized the hiring of super-connector directors. For example, Forbes began to issue an annual “Overworked Directors” list, containing information on the directors with the most S&P 500 board memberships and the boards that hired them.

Was the influence of these (and other) factors strong enough to permanently change the tie formation dynamics of the interlock network? Have super-connectors truly gone the way of the dodo? What does this tell us about the cohesiveness of the American elite?

There are at least three possibilities, which are not mutually exclusive. First, we may merely be observing a temporary blip as the interlock network transitions from centering around a particular set of individuals to centering around the next set of super-connectors. In a few years, the next generation of super-connectors may emerge from among the younger directors who are currently accumulating directorships.

Second, super-connectors may have disappeared because the corporate elite has fragmented.

Corporate CEOs and board members may no longer desire to be strongly-linked to each other. Mizruchi (2010) asserts that a moderate, highly-connected and influential core of business leaders—the corporate elite—continually existed from the early 20th century, but disappeared in the 1990s. In his view, an “active state, powerful labor, and a financial community whose interests transcended those of particular firms or sectors” forced the corporate elite to unite and defend the corporate system. In the 1980s, the moderating influences of the state, labor and commercial banks were weakened, and instead “shareholder value” became the dominant logic (Zajac and Westphal, 2004). Institutional investors (Useem, 1996), financial analysts (Dobbin and Zorn, 2005) and the capital market itself (Davis, 2009) came to exert control on CEOs. On one hand, the corporate elite had won the war, and the American corporate system had become a taken-for-granted institution, an ideological tautology. Attempts by lenders, labor or government to place restrictions on corporations were now deemed ill-advised, even unpatriotic. On the other hand, CEOs’ new shareholder value master proved to be a tyrant. Public company CEOs lost power, prestige and job security, and found themselves scrambling to survive individually by capturing more market value for their individual firms. CEOs no longer had the need nor

the motivation to band together to defend their interests as a class.

A final possibility is that the breakdown of the interlock network may signal a shift in form but not the function of elite ties—the connections may still be happening, just not in the form of public company interlocks. Corporate interlocks may have served a functional purpose for elite cohesion, but the appeal of this particular mechanism may have faded and other mechanisms may now connect the American elite. We should then look for burgeoning elite networks in other fora, such as private equity, non-profits, clubs, events or the equivalents of Facebook for the rich and famous.

If elites are shifting participation from corporate boards to other milieux, this may be a signal—cause and symptom—of a broader shift away from a corporate-centered society (Davis, 2009). Organization theorists have (perhaps self-servedly) argued that we live in a “society of organizations”. For example, Perrow (1991) claimed that large bureaucracies had absorbed society, and that understanding the corporation was equivalent to understanding American society. Others have argued that this is no longer true. We now live in a world of transient organizational identification (Wal-Mart, America’s largest employer, has 40% annual turnover) and smaller, less permanent and less clearly-demarcated companies. American society is no longer defined by its large organizations.

Perhaps, then, the disappearance of super-connectors in the interlock network is more akin to the extinction of ammonites (which died out with the dinosaurs) than dodos. The breakdown of the interlock network may be an indicator of an ecological shift in the makeup of society. As the age of corporations fades away, the new network center may show us where our society is heading.

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**Table 1. Most-connected companies, 2001 and 2009**

**2001**

Top-25 (including ties) degree centrality companies		Top-25 eigenvector centrality companies	
Degree	Company	Rank	Company
30	AT&T CORP	1	AT&T CORP
29	JPMORGAN CHASE & CO	2	JPMORGAN CHASE & CO
27	PFIZER INC	3	XEROX CORP
	XEROX CORP	4	PFIZER INC
25	EXXON MOBIL CORP	5	VERIZON COMMUNICATIONS INC
	PROCTER & GAMBLE CO	6	EXXON MOBIL CORP
	VERIZON COMMUNICATIONS INC	7	PROCTER & GAMBLE CO
24	SARA LEE CORP	8	JOHNSON & JOHNSON
	SBC COMMUNICATIONS	9	MAY DEPARTMENT STORES CO
23	AMR CORP	10	DELL COMPUTER CORP
	CUMMINS INC	11	SARA LEE CORP
	MAY DEPARTMENT STORES CO	12	PEPSICO INC
	PEPSICO INC	13	AMR CORP
22	CATERPILLAR INC	14	SBC COMMUNICATIONS
	CITIGROUP INC	15	CITIGROUP INC
	GENERAL ELECTRIC CO	16	DELTA AIR LINES INC
	GOODYEAR TIRE & RUBBER CO	17	AOL TIME WARNER INC
21	DELL COMPUTER CORP	18	GEORGIA PACIFIC GROUP
	HONEYWELL INTERNATIONAL INC	19	CUMMINS INC
	JOHNSON & JOHNSON	20	GENERAL ELECTRIC CO
	KROGER CO	21	MORGAN STANLEY DEAN WITTER & CO
	SUNOCO INC	22	UNITED STATES STEEL CORP
20	MINNESOTA MINING & MANUFACTURING CO	23	FANNIE MAE
	BELLSOUTH CORP	24	ROCKWELL INTERNATIONAL
	DELTA AIR LINES INC	25	SEARS ROEBUCK & CO
	GEORGIA PACIFIC GROUP		
	VULCAN MATERIALS		

**2009**

Top-25 (including ties) degree centrality companies		Top-25 eigenvector centrality companies	
Degree	Company	Rank	Company
23	PROCTER & GAMBLE CO	1	PROCTER & GAMBLE CO
20	MARATHON OIL CORP	2	INTERNATIONAL BUSINESS MACHINES CORP
	ELI LILLY & CO	3	3M CO (Minnesota Mining & Manufacturing Co)
18	3M CO (Minnesota Mining & Manufacturing Co)	4	MARATHON OIL CORP
	NORTHERN TRUST CORP	5	UNITED TECHNOLOGIES CORP
	BANK OF AMERICA CORP	6	DEERE & CO
	CITIGROUP INC	7	ELI LILLY & CO
	DEERE & CO	8	GENERAL ELECTRIC CO
	UNITED TECHNOLOGIES CORP	9	MCDONALD'S CORP
17	INTERNATIONAL BUSINESS MACHINES CORP	10	NORTHERN TRUST CORP
	AMERICAN INTERNATIONAL GROUP INC	11	CITIGROUP INC
	MCDONALD'S CORP	12	AON CORP
16	GENERAL ELECTRIC CO	13	AMERICAN INTERNATIONAL GROUP INC
15	SCHERING-PLOUGH CORP	14	CATERPILLAR INC
	PFIZER INC	15	VERIZON COMMUNICATIONS INC
	QWEST COMMUNICATIONS INTERNATIONAL INC	16	FEDEX CORP
	AT&T INC (SBC Communications)	17	PFIZER INC
	WELLS FARGO & CO	18	DELL INC (Dell Computer Corp)
14	GENERAL MILLS INC	19	NORTHROP GRUMMAN CORP
	CATERPILLAR INC	20	ILLINOIS TOOL WORKS INC
	FEDEX CORP	21	CHEVRON CORP
	TIME WARNER INC (AOL Time Warner Inc)	22	BANK OF AMERICA CORP
	AON CORP	23	ABBOTT LABORATORIES
	INTUIT INC	24	WELLS FARGO & CO
	YAHOO INC	25	INTUIT INC
	KROGER CO		

**Table 2. Most-connected directors, 2001 and 2009**

**2001**

**Top-25 degree centrality directors**

Degree	Company
101	George Mitchell Jr
80	Vernon Jordan Jr
77	William Gray III
76	Edward Whitacre Jr
75	James Cash Jr
	William Howell
	Helene Kaplan
73	Carl Reichardt
72	Claudio Gonzalez Laporte
71	John Clendenin
	Charles Knight
70	Sam Nunn Jr
	Jack Breen
	Frank Raines
69	Ann Korologos
67	The Hon. John Snow
66	Michael Miles
	Franklin Thomas
	Martin Walker
	Donald McHenry
64	Russell Palmer
63	William Johnson
62	James Zimmerman
61	Kenneth Derr
60	Joe Neubauer

**Top-25 eigenvector centrality directors**

Rank	Company
1	Helene Kaplan
2	Edward Whitacre Jr
3	Russell Palmer
4	Charles Knight
5	John Stafford
6	William Gray III
7	Donald McHenry
8	Robert Storey
9	Douglas Warner III
10	William Howell
11	Mitchel Burns
12	Lynn Martin
13	Frank Raines
14	Jess Hay
15	Bobby Inman
16	Joe Neubauer
17	Walter Shipley
18	Charles Lee
19	August Busch III
20	John Snow
21	Ivan Seidenberg
22	Don Fites
23	Hugh Price
24	Laura Tyson
25	Vernon Jordan Jr

**2009**

Degree	Company
73	Shirley Jackson
60	Charles Lee
	Suzanne Nora Johnson
59	Virgis Colbert
58	Sam Nunn Jr
56	Enrique Hernandez Jr
55	Robert Ryan
53	Richard Myers
	Robert Lane
52	James Cash Jr
51	William Gray III
50	Carol Bartz
49	Anne Mulcahy
	William Osborn
	Lynn Martin
48	Joseph Prueher
	Tony Earley Jr
46	Donald Rice
	Thomas Ryan
	Jackie Ward
	Dick Parsons
	Thomas Usher
	Charlene Barshefsky
	Basil Anderson
45	Hansel Tookes II

Rank	Company
1	Enrique Hernandez Jr
2	Walter Massey
3	Donald Rice
4	Virgis Colbert
5	Monica Lozano
6	Thomas Ryan
7	Chad Gifford
8	Joseph Prueher
9	Bob Joss
10	Charles Rossotti
11	Gary Countryman
12	Stephen Sanger
13	Kenneth Lewis
14	Thomas May
15	Frank Bramble Sr
16	Richard McCormick
17	John Chen
18	Don James
19	Jackie Ward
20	John Baker II
21	Chad Holliday Jr
22	William Barnet III
23	John Collins
24	Tommy Franks
25	Susan Engel