

REGIONAL INFORMATION AND INFLUENCE NETWORKS: THE GEOGRAPHY OF CORPORATE BOARD MEMBERSHIP IN TEXAS

Murray D. Rice and Michael Seman

Department of Geography
University of North Texas
Denton, TX 76203
USA

Milford B. Green

Department of Geography
University of Western Ontario
London, ON N6A 5C2
Canada

ABSTRACT

Texas plays a key role in the United States economy. Its status as an economic driver in the national energy and agriculture sectors is unquestioned. However, the state has always found itself confronted by its geographic separation from the economic core regions of the northeastern United States. The question arises as to how well Texas has been able to connect its business community with these core regions, both to influence external business decisions and to gather important business information. The research presented here analyzes the inter-urban business network established by corporations as they invite executives from other firms and places to serve on their corporate boards. Study results show that Texas-based firms are extensively connected with selected businesses and cities in this national network, but that firms in Texas' two dominant business centers, Dallas and Houston, appear to be following contrasting strategies in using this network. The analysis groups most major U.S. corporate centers, including New York, Chicago, Los Angeles, Detroit, and Atlanta, together in a common incoming versus outgoing director linkage behavior relative to Texas-based firms. San Francisco is among the few major centers that do not follow the behavior of the others. The paper concludes with a discussion of the meaning of these results and calls for further research into the evolving form of corporate networks in America.

Key words: Corporate geography, corporate links, boards of directors, Texas.

Texas occupies an important place in the economic history and geography of the United States. Although the state's high technology and service industries have risen to national prominence in recent years, Texas' oil and gas sector has been the cornerstone of its economy and international reputation from the late years of the 19th century. Even before its energy boom, Texas earned a reputation as a key production center within the agricultural sector. Texas is clearly important to the national economy in multiple dimensions. However, cutting across all of its key industries, the state has been faced from its earliest days with the ongoing challenge of the great distances separating it from major national and world markets. Texas businesses have long been active in developing solutions to this fundamentally geographic problem, as evidenced in the organization of long-distance cattle drives to remote markets, which were gradually replaced by more extensive rail connections between the state and outside regions (Richardson *et al.* 2005). However, despite such efforts the basic issue of the state's separation from New York, Chicago, and other major markets and corridors of economic power has remained an impediment to even more rapid economic development. As the state's economy has grown and evolved, transportation and communication have continued to be a major preoccupation for the region, giving rise to important Texas-based firms such as *American Airlines*, *Southwest Airlines*, *Continental Airlines*, *AT&T* (formerly *SBC*), and *BNSF*, that have all grown to national stature by connecting the state internally, as well as externally with cities across the country.

Such challenges are familiar ground for geographic study. Geographers and regional scientists have developed a long tradition of examining the development of city-systems, economies, and transport and communication systems (Isard 1956; Berry

1973, 1981; Leinbach and Brunn 1991; Black 2003). Particularly in the modern age, the inter-urban networks that continue to evolve in conjunction with advancements in space-shrinking technologies have proved to be fertile territory for geographic research. Business location studies continue to depict the importance of geographic space within the global economy even as web and video conferencing capabilities allow for rich information exchanges between widely separated locations. The prime evidence for the centrality of geographic space in the operation of the economy is the persistence of clusters of economic activity and opportunity (Porter 1998, 2002). Such clusters continue to exist because they offer meaningful benefits to their member firms. Pinch *et al.* (2002) argued that clusters form a basis for competitive advantage that have the potential to propel the growth of the group as a whole. Firms and cities located outside of dynamic business clusters remain at a disadvantage even as technological advances appear to be reducing the barriers created by distance.

Although Texas' separation from national and global business centers and markets remains a challenge, firms in the state and in other similar circumstances nationwide have continued to innovate and find ways of reducing the competitive disadvantages they face due to their peripheral location within the country. One strategy for establishing better links between a firm and the businesses it wishes to influence and communicate with is the *interlocking directorate*, involving the sharing of members among multiple corporate boards. An interlock occurs when a single director sits simultaneously on the boards of two or more firms, creating a linkage between the firms sharing the director. The importance of this kind of firm linkage follows from the elite level at which this interlocking occurs: corporate boards involve the most senior and influential of persons with knowledge and

experience of relevance to business (O'Hagan and Green 2004). The research presented here examines the interlocking directorate as a geographic phenomenon, both as a general concept and as a tool for overcoming great geographic distances used specifically by businesses in Texas. The study begins with a brief review of previous research relating to the interlocking directorate concept, followed by a case study of interlocking directorates associated with Texas-based firms.

THE INTERLOCKING DIRECTORATE

Interlocking directorates have a long history in business practice, regulation, and investigation. As a business practice, interlocking directorates date to the 19th century, when firms used the sharing of board members within industries to coordinate their activities and suppress competition. The Sherman Antitrust Act of 1890 and the Clayton Antitrust Act of 1914 were enacted as a result of such activity, prohibiting interlocking directorates between direct competitors while allowing the sharing of board members in other cases. The uses and impacts of interlocking directorates have stimulated business research since the early 20th century (Hilferding 1910), although the most intensive investigation of corporate boards has occurred more recently (Dooley 1969; Fennema 1982; Mintz and Schwartz 1985; Carroll and Carson 2003; O'Hagan and Green 2004).

Interlocking directorate research indicates that the sharing of board members is a means of both influencing business decisions external to the firm and gathering strategic business information (Pfeffer and Salancik 1978; Carroll and Carson 2003). Geographers have studied both of these aspects. However, the use of interlocking directorates as an information network has been the most intensively investigated of the two perspectives within geography. Directors are particularly important in transmitting

high-level information among firms, especially as related to corporate strategy and finance. Green (1980), Green and Semple (1981), and Green (1983) pioneered the geographic study of interlocking directorates and information transfer with a regional analysis of directors in the U.S. manufacturing belt. They showed extensive interlocking among the industrial firms of the region, which allowed the firms to share information as the region grew and prospered. However, when the region eventually declined and other regions expanded, extensive manufacturing belt interlocking accompanied by relatively weak extra-regional links turned into a negative, with the manufacturing belt being denied critical business information that was created and shared elsewhere. More recently, O'Hagan and Green (2002a, 2002b, 2004) have further extended the spatial analysis of information and interlocking directorates through examination of the evolving North American director network. Their analysis highlighted the importance of interlocking directors in the transferal of "tacit information", or information that is best communicated through face-to-face discussion. Some forms of information ("explicit information") might be transferred through a fax or an e-mail, but communication of tacit information requires a complex interaction between receiver and sender. High-level business insights communicated in a board setting might best be classified as tacit information.

The use of interlocking directorates as an influence mechanism is a well-documented and long-standing research emphasis in business sociology (Pfeffer and Salancik 1978; Mintz and Schwartz 1985; Carroll and Carson 2003), but has been little pursued within economic geography. It was the sociologists Pfeffer and Salancik, in their classic volume *The External Control of Organizations* (1978), who advanced the argument that interlocking directorate relationships form a primary mechanism

allowing corporations to co-opt and coordinate the operations of other firms in an extensive, national power network. From this perspective, corporations both influence and are influenced by their interlocking directorate links with other corporations. Pfeffer and Salancik's work showed interlocks to be an attempt to reduce the uncertainty inherent in the market system, such as, for example, industrial firms sharing directors with key suppliers. Complementary research in the years since Pfeffer and Salancik's publication has demonstrated that interlocking directorates influence a broad spectrum of corporate behaviors, including mergers, acquisitions, and other changes in corporate form (Palmer *et al.* 1993; Mizruchi 1992, 1996). While interpretations of the meaning and importance of these influence findings vary (Mintz and Schwartz 1985; Carroll and Fennema 2002), one consistent and related view, coming from both sociologists and geographers, is that one of the most important venues for the observation of director network influence is geographic space (Kono *et al.* 1996; Carroll and Fennema 2002; O'Hagan *et al.* 2008). From this perspective, the interurban interlocking directorate system plays an important role in establishing the status of cities as centers of influence in the modern, global economy. Such a geographic interpretation of directors and their influence connects interlocking directorate studies with headquarters location research as related means of investigating the geography of corporate command and control, the focus of the emerging *quaternary location* literature (Semple 1985, 1996; Wheeler and Mitchelson 1989; Rice 1996, 2004, 2006; Rice and Lyons 2007). Rice and Semple's (1993) analysis of Canadian directors investigates this influence-centered interpretation of the interlocking directorate network. While the traditional definition of an interlocking directorate focuses on the sharing of common board members by multiple firms, their work introduces the purely geographical concept of

a *spatial interlocking directorate*, where an interlocking link is defined purely on an inter-urban basis – cities sharing board members. Even if an executive sits on the board of only one firm, if that director lives in one city and serves on a corporate board in another city, a spatial interlocking link exists. Even under such a single-firm situation, a board member passes information between their city of work, including their own workplace and their local social network, and the city hosting their corporate board. The inter-urban network created by board members traveling between work and board cities is the focus of the spatial interlocking directorate analysis. By analyzing the Canadian directorate network from this perspective, Rice and Semple (1993) were able to demonstrate a shift in corporate influence through the 1970s and 1980s, with Toronto and western Canadian cities gaining influence within the directorate network, while Montreal declined from near-parity with Toronto in the early 1970s to a clear secondary status by the end of the 1980s. This Canadian study demonstrates the utility of spatial interlocking directorates in tracking the changing corporate influence of cities within a larger national urban network.

CASE STUDY

This work uses the spatial interlocking directorate concept to investigate a combined perspective on interlocking directorates involving spatial relationships of both influence and information. By engaging in spatial interlocking directorates via the invitation of executives in other cities to serve on their boards, firms headquartered in a given city transfer some fraction of their corporate influence from their city to the other cities represented on their corporate boards (Rice and Semple 1993). In return, these firms gain important, high-level information from their nonlocal board members that would be difficult to acquire in other ways (O'Hagan and Green 2004).

Viewed as a transaction of *influence* for *information*, the spatial interlocking directorate provides the basis for a variety of interesting urban-geographic analyses. Two basic investigations arising from such a conceptual framework include:

- *Which cities are senders of directors to boards in other cities*, or, stated differently, which cities are centers of business information generation? The business communities in these cities gain economic influence beyond their own, local head offices through their interurban connections via the spatial interlocking director network. Indeed, a city might have few corporate headquarters but, by virtue of a dynamic director community, be an important but little-recognized nexus of corporate power.
- *Which cities are receivers of directors from other cities*, or, stated differently, which cities are centers of business information collection? Firms in these cities exchange a portion of their economic influence with outside centers for business information and insights that can be provided by non-local directors. A city might be a very visible location of corporate power through its collection of key corporate offices, but some portion of that decision-making ability may actually be located in other places if many of the city's firms have key, influential directors who live and work elsewhere.

In the interlocking directorate network, few large cities are likely to be pure centers of *information generation* (no headquarters, but some outgoing directors to other cities) or *collection* (some headquarters, but no outgoing directors to other cities), but in practice most are a mixture of both. Acknowledging this mixed composition of

flows, we might classify cities based on the ratio of incoming directors to outgoing directors to determine whether a city tends to one extreme or the other, or whether its director activity exhibits a balance of incoming and outgoing information and influence. In addition, given the previous work that has demonstrated the considerable geographic complexity of director networks, it is also important to account for the specific cities linked to a given city through the director network, as *which* cities a given city links to can be as much an issue as *how many* external director links the city has.

DATA

The study investigates the interlocking directorate network involving firms in Texas and board members across the United States by analyzing directors associated with *Fortune 500* firms in 2004. Data for the directors of these firms were collected from the Standard and Poor's 2005 register of corporations, directors and executives in the United States. From this national database, we extracted two, non-mutually-exclusive groups of directors:

- Board members of *Fortune 500* firms with head offices in Texas
- *Fortune 500* firm directors whose primary work address is in Texas

Some directors belong to both groups: they work in Texas and serve on the board of a *Fortune 500* company based in Texas. However, some directors fall only in one category or another, such as an executive who works in Texas but serves on the board of a company headquartered in Ohio. The analysis captures all directors falling in either or both of the two groups defined here.

An important element providing context for the director database defined above is the corporate community of Texas itself. It is these Texas-based firms that request the service of directors from both inside and outside the state, and it is the executives of these firms that form the group of individuals most heavily involved in the interlocking directorate network. Tables 1 and 2 provide some background for understanding this corporate community, in terms of the largest firms based in Texas, and the sectoral orientation of these large firms by city. Table 1 demonstrates the

dominance of Houston and Dallas–Irving over business in Texas in sheer numbers of large firms. However, table 2 shows that the two top Texas business centers fundamentally differ in their sectoral orientation, with Houston’s headquarters being overwhelmingly oriented towards energy and resources, while Dallas–Irving has a much more diverse group of companies.

Table 1: Fortune 500 Corporations in Texas, by City, for 2004

City or Metropolitan Region	Number of Firms
Houston, TX	21
Dallas—Irving, TX	13
San Antonio, TX	5
Fort Worth—Arlington, TX	4
Austin—San Marcos, TX	3
Pittsburg, TX	1

Source: Authors’ tabulation of Fortune 500 data for 2004

Table 2: Top Texas Firms, by City or Metropolitan Region, for 2004

City or Metropolitan Region	Company	Industry	Revenues, 2004 (\$ Millions)
Houston, TX	ConocoPhillips	Energy & Resources	\$121,663
	Marathon Oil	Energy & Resources	\$45,444
	Sysco	Energy & Resources	\$29,335
	Plains All American Pipeline	Energy & Resources	\$20,975
	Halliburton	Energy & Resources	\$20,466
	Waste Management	Waste Management	\$12,516
	CenterPoint Energy	Energy & Resources	\$10,610
	Continental Airlines	Transportation	\$9,744
	Reliant Energy	Energy & Resources	\$8,916
	Enterprise Products	Energy & Resources	\$8,321
Dallas—Irving, TX	Exxon Mobil	Energy & Resources	\$270,772
	J.C. Penney	Retail	\$25,678
	Electronic Data Systems	Business Services	\$21,033
	Kimberly-Clark	Household Products	\$15,401
	Texas Instruments	Electronics	\$12,580
	TXU	Energy & Resources	\$11,161
	Centex	Construction	\$10,825
	Dean Foods	Food	\$10,822
	Southwest Airlines	Transportation	\$6,530
Commercial Metals	Metals	\$4,768	
San Antonio, TX	Valero Energy	Energy & Resources	\$53,918
	SBC (Now AT&T)	Communication	\$41,098
	Tesoro	Energy & Resources	\$12,139
	USAA	Insurance	\$11,273
	Clear Channel Communications	Communication	\$9,418
Fort Worth—Arlington, TX	AMR	Transportation	\$18,645
	Burlington Northern Santa Fe	Transportation	\$10,946
	D.R. Horton	Construction	\$10,841
	Radio Shack	Retail	\$4,841
Austin—San Marcos, TX	Dell	Electronics	\$49,205
	Temple-Inland	Packaging	\$4,767
	Whole Foods Market	Retail	\$3,865
Pittsburg, TX	Pilgrim's Pride	Food	\$5,364

Source: Dun & Bradstreet, Corporate Affiliations

METHODOLOGY

Based on the influence and director concepts developed in the preceding paragraphs, the analysis here defines the *influence ratio* as the simple ratio of director links directed out from a city (all directors whose primary workplace is in the city, who serve on a corporate board anywhere, including in the

same city) to the number of director links directed into the same city (all directors who serve on a corporate board based in the city, including board members who work in the same city). For example, the influence ratio of a city sending 6 director links, while receiving 3 director links, would be 2. The

study also implements the related concept of a *Texas influence ratio* that measures the influence of Texas on individual cities outside of Texas. Texas influence ratio is simply the ratio of the number of people from Texas who serve on a board based in a given, out-of-state city to the number of people working in the out-of-state city who serve on a Texas-based board. Texas influence ratios are calculated on a city-state pair basis (one ratio for each city involved in a director relationship with Texas). For example, if 12 Texans serve on Chicago-based boards while 6 Chicago residents serve on a Texas-based board, the Texas influence ratio for Chicago would be 2.

RESEARCH QUESTIONS

Given the geographic separation of the state from major markets and power centers, and the established analysis of interlocking directorates as information and influence networks, the Texas case study focuses on three key questions for analysis of the 2004 director database already defined. First, the *influence question*: which cities are influenced by Texas-based directors? This question investigates whether directors working in Texas serve primarily on Texas-based boards, or if they also have an important role in serving on, and influencing, the boards of firms in the country's other major power centers, such as New York and Chicago. Related to this primary analysis, the study also investigates the sub-question of how this outward linkage distribution (from Texas to cities in other states) compares to other, standard measures of the location of corporate power, such as *Fortune 500* headquarters cities. Are Texas' corporate centers interlocked with elite corporate centers across the country, or only a subset of such cities?

Second, the study addresses an *information question*: which out-of-state cities contribute members to Texas-based firms? As with the above influence question, do Texas

businesses draw primarily from a local or regional pool of directors, or do they include substantial representation from outside the state and southwest region? The geography of the director pool for Texas-based firms is one indicator of the cities and locations that hold strategic value for the operations of these firms.

Third, the study examines the *influence ratio question*, an exploratory look at the first two questions in combination: what characterizes the *net* interlocking behavior of cities, taking into account both director sending and reception? This analysis allows us to determine whether Texas' corporate centers are net receivers of director linkages, bringing in more directors than they send out to other places, or net contributors, sending out more directors than they receive. As a subanalysis to this question, the study examines which out-of-state centers are net receivers of director flows from Texas, and which ones are net contributors to Texas. Answers to these questions aim to provide a better understanding of the role and position of Texas within the U.S. spatial interlocking directorate network, and provide a model for further regional analysis of U.S. and global director networks.

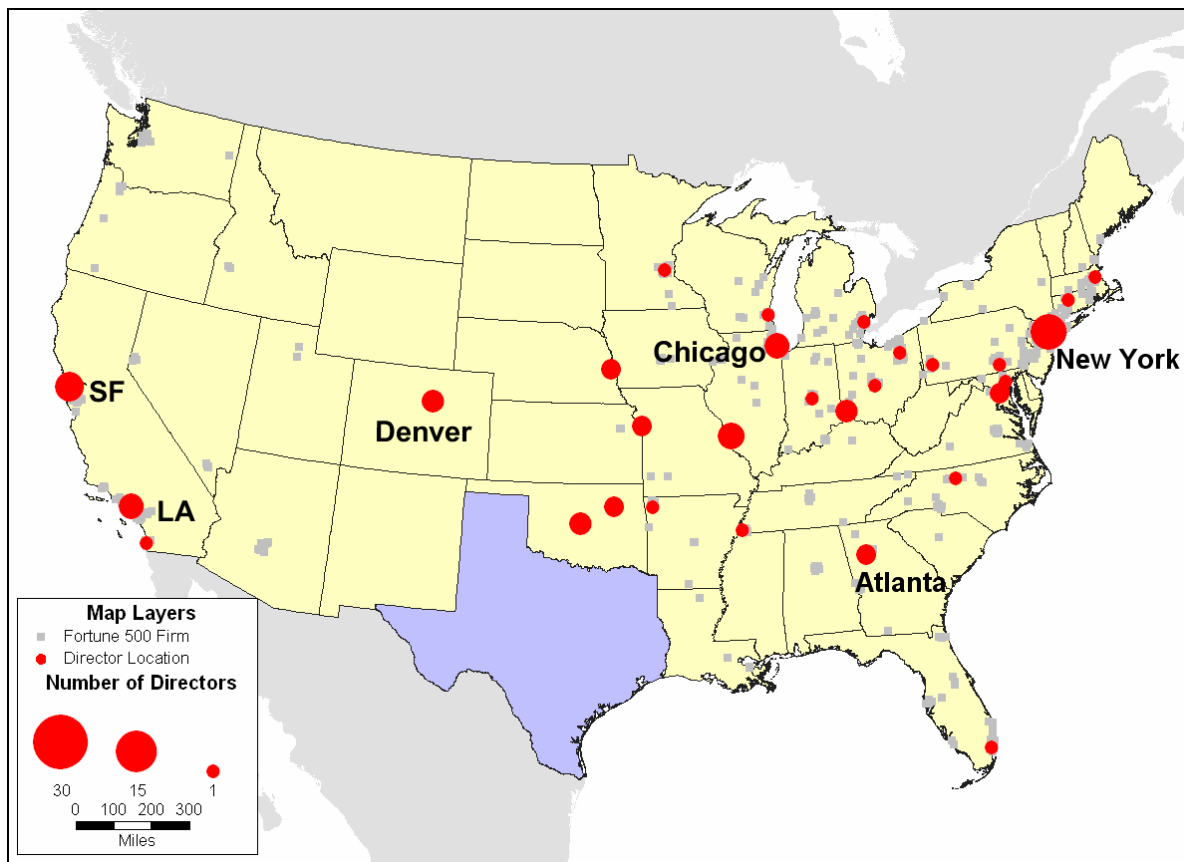
RESULTS

Figure 1 and Tables 3 and 4 summarize the results of the influence question analysis. The map in Figure 1 depicts the headquarters cities hosting *Fortune 500* firms that have invited Texas-based members onto their boards of directors. This director map shows that Texas-based board members serve with firms based in selected cities in the central U.S., Great Lakes region, eastern seaboard, and California. However, the map also shows that Texas' director community does not have a comprehensive reach across the nation. Texas directors serve on only a small subset of all *Fortune 500* boards of directors: of the 118 consolidated statistical areas (CSAs)

nationwide that host *Fortune 500* firms, only 35 have Texas director links. Table 3 further illustrates the difference that exists between Texas directorate linkage status and *Fortune 500* hosting status. This table shows that, while some large Fortune 500 hosts also receive large numbers of director links from Texas (for example, New York and Chicago),

other less important *Fortune 500* centers also rank high on the Texas director list (such as St. Louis and Kansas City). In terms of Texas-based directors influencing Texas-based firms, Table 4 illustrates that among all board locations nationwide, of the top 10, the top three urban destinations of Texas-based directors are also in Texas.

Figure 1: Texas Influence – Fortune 500 Headquarters with Texas-Based Directors, 2004



Source: Authors' tabulations of Standard & Poor's director data

Table 3: Non-Texas Metropolitan Regions, Texas-Based Director Links, and Number of Fortune 500 Firms for 2004

Rank	Consolidated Statistical Area	Director Links from Texas, 2004	Fortune 500 Firms, 2004
1	New York, NY—NJ—CT	12	83
2	San Jose—San Francisco—Oakland, CA	7	26
3	St. Louis, MO—IL	5	9
4	Chicago, IL—IN	4	29
4	Los Angeles—Long Beach, CA PMSA	4	24
6	Cincinnati, OH—KY—IN	3	11
6	Denver, CO	3	10
6	Kansas City, MO—KS	3	3
6	Oklahoma City, OK	3	3
6	Washington—Baltimore, DC—MD—VA—WV	3	17
11	Omaha, NE—IA	2	4
11	Richmond—Petersburg, VA	2	7
11	San Diego, CA	2	4
11	Tulsa, OK	2	2
15	Cleveland—Lorain—Elyria, OH	1	10
15	Atlanta, GA	1	14
15	Boston, MA—NH	1	12
15	Columbus, OH	1	6
15	Detroit, MI	1	17
15	Fayetteville—Springdale—Rogers, AR	1	2
15	Greensboro—Winston-Salem—High Point, NC	1	4
15	Hartford, CT	1	4
15	Indianapolis, IN	1	4
15	Lexington, KY	1	1
15	Memphis, TN—AR—MS	1	2
15	Miami, FL	1	4
15	Milwaukee—Waukesha, WI	1	8
15	Minneapolis—St. Paul, MN—WI	1	16
15	Pittsburgh, PA	1	7
15	Springfield, MA	1	1
15	York, PA	1	1

Source: Authors' tabulations of Standard & Poor's director data and Fortune 500 data

Table 4: Metropolitan Regions and Texas-Based Director Links, 2004

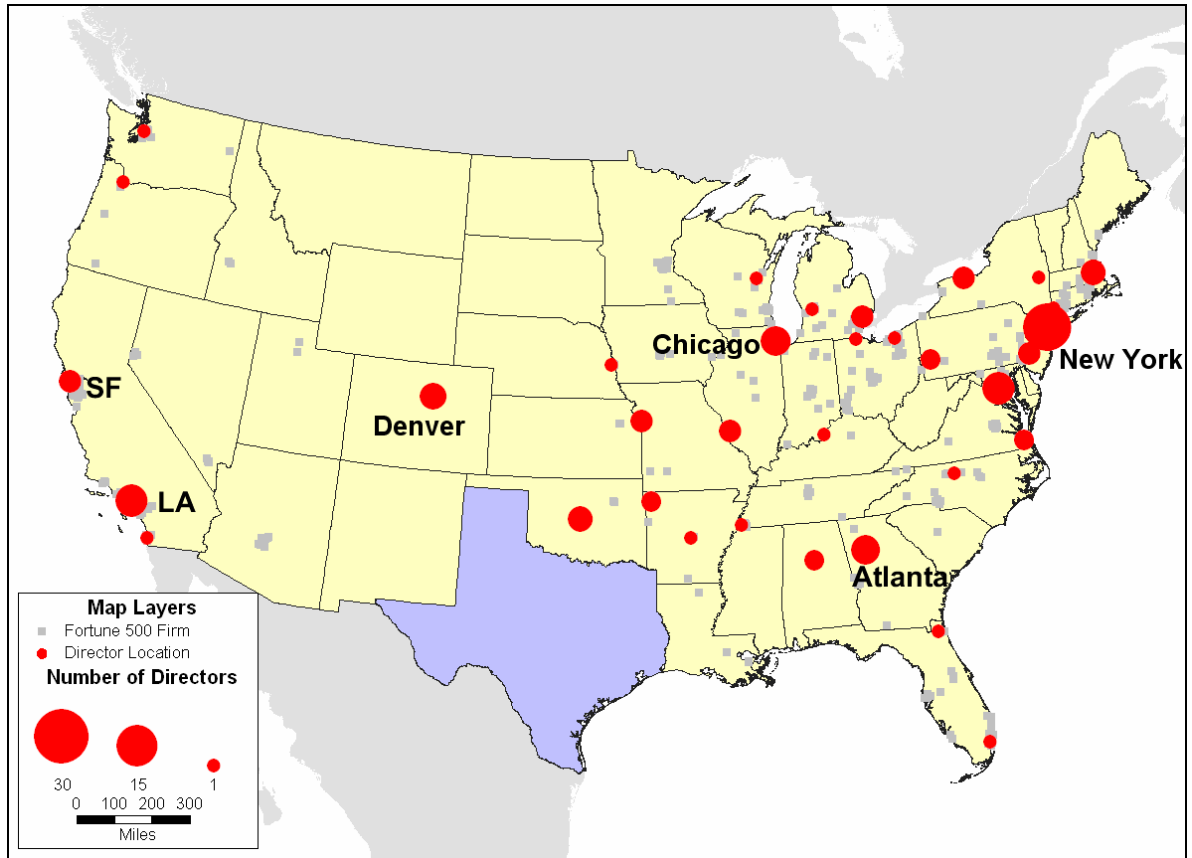
Consolidated Statistical Area	Directors Living in Texas
Dallas-Irving, TX	48
Houston, TX	44
Fort Worth-Arlington, TX	12
New York, NY PMSA	12
San Antonio, TX MSA	8
San Francisco, CA PMSA	7
St. Louis, MO-IL MSA	5
Austin-San Marcos, TX MSA	4
Chicago, IL PMSA	4
Los Angeles-Long Beach, CA PMSA	4

Source: Authors' tabulations of Standard & Poor's director data

Figure 2 maps the national results for the information question analysis. The map shows the locations of non-Texas-based directors associated with Texas-based *Fortune 500* firms. By comparison with Figure 1, this map shows a greater dispersion of links outside of the state. Several urban regions, including Seattle, Albany, and Birmingham, have representation in this map but not in Figure 1. In total, of the 118 *Fortune 500* CSAs, non-Texas-based directors of Texas-based Fortune firms live in 31. Table 5 details the wide dispersion of non-Texas-based directors.

Table 6 focuses more deeply on the considerably integrated director network inside Texas. The table summarizes the number of Texas-based directors connected with each headquarters city in Texas, as well as the percentage of all directors accounted for by these in-state director links. Austin-San Marcos, Fort Worth-Arlington, Houston, and San Antonio all fall on the low end of the scale, with less than 50% of their directors coming from in-state. Dallas-Irving and Pittsburg, TX each have more than 60% of their directors coming from Texas, although Pittsburg's situation (with one *Fortune 500* firm, the chicken processor *Pilgrim's Pride*, and two directors in total) is much different from Dallas-Irving (15 *Fortune 500* firms, and 79 directors).

Figure 2: Influence on Texas – Out-of-State Director Locations for Texas-Based Fortune 500 Firms, 2004



Source: Authors' tabulations of Standard & Poor's director data

Table 5: Out-of-State Director Locations for Texas Fortune 500 Firms, 2004

Rank	Consolidated Statistical Area	Number of Director Links from Texas
1	New York, NY—NJ—CT	12
2	San Jose--San Francisco--Oakland, CA	7
3	St. Louis, MO—IL	5
4.5	Chicago, IL—IN	4
4.5	Los Angeles--Long Beach, CA	4
8	Cincinnati, OH—KY—IN	3
8	Denver, CO	3
8	Kansas City, MO—KS	3
8	Oklahoma City, OK	3
8	Washington--Baltimore, DC—MD—VA—WV	3
12.5	Omaha, NE—IA	2
12.5	Richmond--Petersburg, VA	2
12.5	San Diego, CA	2
12.5	Tulsa, OK	2
23	Akron, OH	1
23	Atlanta, GA	1
23	Boston, MA—NH	1
23	Columbus, OH	1
23	Detroit, MI	1
23	Fayetteville--Springdale--Rogers, AR	1
23	Greensboro--Winston-Salem--High Point, NC	1
23	Hartford, CT	1
23	Indianapolis, IN	1
23	Lexington, KY	1
23	Memphis, TN—AR—MS	1
23	Miami, FL	1
23	Milwaukee--Waukesha, WI	1
23	Minneapolis--St. Paul, MN—WI	1
23	Pittsburgh, PA	1
23	Springfield, MA	1
23	York, PA	1

Source: Authors' tabulations of Standard & Poor's director data

Table 6: Texas-Based Directors Received by Texas Headquarters Cities, 2004

City or Metropolitan Statistical Area Name	Total Director Links Received	Texas Director Links Received	Texas Director Links (%)
Austin—San Marcos, TX	13	4	30.7%
Dallas—Irving, TX	79	48	60.8%
Fort Worth—Arlington, TX	27	12	44.4%
Houston, TX	94	44	46.8%
Pittsburg, TX	2	2	100.0%
San Antonio, TX	20	8	40.0%
State Total	235	114	48.5%

Source: Authors' tabulations of Standard & Poor's director data

Table 7 and Figure 3 conclude the analysis by addressing the influence ratio question. Table 7 classifies Texas' cities into net senders (influence ratio greater than 1.0) and net receivers (influence ratio less than 1.0) of director links. The table highlights an important difference between Texas' two dominant business centers: while Houston receives many more directors from outside centers than it sends out, Dallas-Irving actually originates marginally more director links than it receives. In this dimension, Dallas-Irving is similar to only San Antonio within the state, as all other Texas headquarters cities receive more director links than they originate. In total, the state

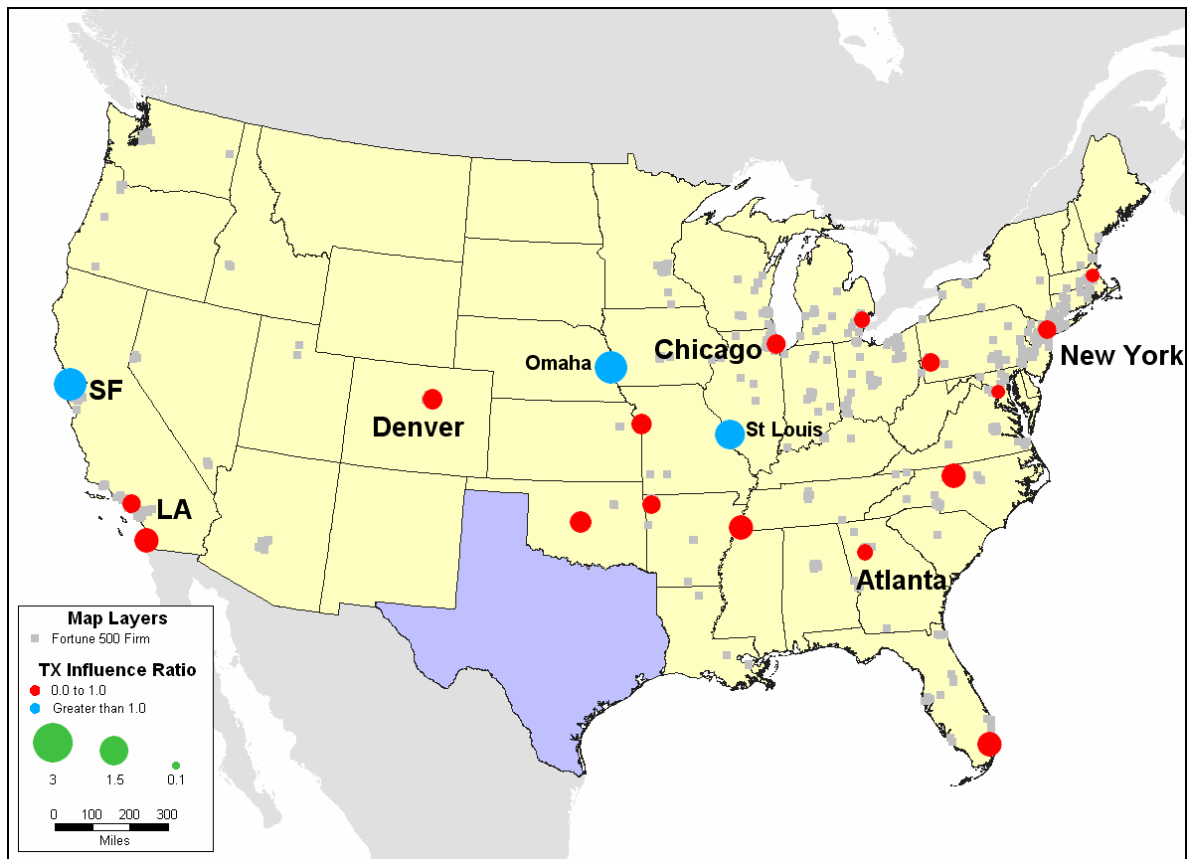
is a net receiver of director links. Figure 3 extends on the Texas-only numbers provided in Table 7 by classifying headquarters cities nationwide, based on their net director connection status with Texas. The map shows that several major corporate regions, including New York, Boston, Chicago, Atlanta, Detroit, Denver, and Los Angeles, are net senders of directors to Texas. Net urban receivers of directors from Texas include San Francisco, St. Louis, and Omaha. Table 8 compares the two city lists directly, showing that in general the net sender cities have a much greater importance as corporate headquarters cities, as compared to the net receiver set of cities.

Table 7: Fortune 500 Director Links Associated with Texas Headquarters Cities, 2004

City or Consolidated Statistical Area Name	Director Links Sent Out	Director Links Received	Internal Director Links (Within City)	Influence Ratio (Sent from City: Received by City)
Austin—San Marcos, TX	8	13	3	0.615
Bryan—College Station, TX	1	0	0	-
Dallas—Irving, TX	82	79	43	1.038
Fort Worth—Arlington, TX	12	27	7	0.444
Houston, TX	65	94	40	0.691
Pittsburg, TX	1	2	1	0.500
San Antonio, TX	21	20	8	1.050
Waco, TX	2	0	0	-
State Total	192	238	102	0.807

Source: Authors' tabulations of Standard & Poor's director data

Figure 3: Texas Influence Ratio by Metropolitan Region for Fortune 500 firms, for 2004



The map only shows cities with at least one director sent to Texas and one director received from Texas. Red dots signify cities that send more directors to Texas than they receive from Texas (net influencers of Texas). Blue dots signify cities that receive more directors from Texas than they send to Texas (net influenced by Texas). Dot size represents Texas' influence on the corporations of each city, as reflected by the Texas Influence Ratio.

Source: Authors' tabulations of Standard & Poor's director data

DISCUSSION AND CONCLUSION

The director research completed here provides insight into Texas' connection with the U.S. national spatial interlocking directorate network. The regional emphasis of the investigation yields insights from a new and distinctive perspective, in comparison with previous director studies accomplished at a national level. Within the present work, the *influence question* analysis demonstrates the selective reach of Texas firms and cities in influencing business activity outside of the state. While Texas' external, outgoing director links

feature strong connections with some of the largest corporate centers in the U.S. (New York, San Francisco Bay area, Chicago), some of the state's strongest outgoing links are to centers that are less important in a national context:

- **St Louis:** 3rd-ranked Texas link, 14th-ranked U.S. headquarters city
- **Kansas City and Oklahoma City:** cities tied for both 6th-ranked Texas link and 27th-ranked U.S. city (these

two cities actually appear so far down the national ranking that they fall below the top U.S. headquarters cities included in Table 8)

- **Richmond-Petersburg, VA:** 11th-ranked Texas link (tied with others), 18th-ranked U.S. city

While not addressed by the datasets used in this study, a reasonable explanation for such director activity might include the existence of a “strategic match” between the firms and industries present in Texas and the resources and capabilities of firms based in centers such as St Louis and Kansas City. A strategic match might come, for example, if a Texas-based business were to face a challenge that management in a company based elsewhere had successfully met. Such a situation, where strategic advice is being sought, could warrant the appointment of high-level management from one firm to the board of another firm.¹ Alternate explanations outside of the matching of corporate interests, such as director links motivated by personal connections including director home town, professional, or educational affiliations, are also viable paths for ongoing investigation (O’Hagan *et al.* 2008). Gender has been demonstrated to play an important role in interlock membership (Green and O’Hagan 2006), and needs to be included in further research. However, regardless of the multitude of factors that ought to be considered, it is clear from the influence question analysis that Texas-based directors exert their greatest influence on corporate boards that are themselves based in Texas, and that of all of the state’s external director connections to the rest of the nation, Texas-based directors serve on boards based in a very select subset of U.S. urban regions.

The *information question* analysis provides a picture of Texas firms’ incoming director connections that is similar to that provided

above, except that these incoming links are more geographically diverse than their outgoing counterparts. For example, the Pacific Northwest region is represented with two centers (Seattle, WA and Portland, OR) among the origins of these incoming linkages, but has no representation on the list of outgoing destinations for Texas directors. The analysis also shows that Texas-based directors are important for all of Texas’ headquarters cities, but particularly so for firms headquartered in Dallas-Irving and Pittsburg, TX. Geographic variation in Texas firms’ use of directors by urban area highlights the question, also raised above, as to why certain intercity and interstate links exist, while others do not. Do individual director links, studied in aggregate here, signify something fundamental about Texas’s firms and cities? For example, does the link between Ventura, California-based biotech giant *Amgen* and a San Antonio-based director represent a positive sign for the Texas city’s emergence as a biotech center? Another example involves the Austin region. While the Texas capital has developed a reputation as an emerging technology center in recent years, the city’s sole director link to the high-technology capital of Northern California falls, not within technology circles, but in the service sector with the clothing retailer *Gap*. Does this lack of director linkages signify a problem for the Texas capital’s status as an emerging technology center? Further investigation of the specific industrial affiliations of the firms involved in the Texas director network, and of the personal affiliations of directors and other executives involved in the selection of board members, would contribute to a greater understanding of firm decisions and inter-city economic relationships.

The *influence ratio* analysis provides an important contribution by comparing the results generated in the first two analyses. This final analysis shows that Texas, as a whole, receives more director links from

other states than it contributes to the rest of the country. Inside the state, Houston leads in this respect, receiving 94 directors while sending out 65, while Dallas-Irving is actually a marginal net contributor of directors to the national network (79 directors received, 82 directors sent out). Outside the state, analysis of urban areas by "Texas Influence Ratio", or the number of directors sent to Texas by a city divided by the number of directors received from Texas by the city, delimits two distinct groups of urban areas nationwide: those that receive more directors from Texas than they send to Texas, and those where the reverse is true. In general, it appears that most of the top corporate centers in the U.S. have Texas influence ratios less than 1.0, indicating that they send more directors to Texas than they receive from the state. Table 8 substantiates this observation, listing the top 25 consolidated statistical areas in the country by number of Fortune 500 firms, along with their numbers of Fortune 500 firms and their Texas influence ratios. Among the top ten cities nationwide, only the San Francisco Bay Area and Minneapolis-St Paul have Texas influence ratios above 1.0.

As the foregoing summary indicates, the results of this study provide a number of important answers relating to the Texas director network, but they also highlight several promising directions for further research. On the answer side, the most basic result of this investigation is the assembly of empirical evidence defining the geographic structure of the spatial interlocking directorate network linking Texas to the rest of the nation. Delineation of the most important interurban director connections involving Texas firms gives a valuable indication of the centers nationwide, led by New York, the San Francisco Bay Area, and St. Louis, that have extensive relationships with Texas businesses at the highest corporate levels. However, on the further research side, it is apparent that investigation following up on this overall

result ought to probe the full extent of the interurban and interstate business relationships uncovered here. Do interfirm and intercity links outside of the realm of directors occur that reflect or coincide with these director connections? What do New York and San Francisco offer that catapults these two cities to prominence in the Texas director landscape, and that is not present in other important corporate centers such as Boston and Atlanta? An examination of the volume and type of complementary business activities, such as forward and backward supplier links, that may accompany the director connections investigated in this research would contribute to a greater understanding of firm location, behavior, and strategy specifically, and regional economic development more broadly. Such an extension of the present research would help to establish more definitively the role and value of the interurban director connections that form the current study focus.

The second basic result of the research presented here is the finding that most key corporate centers in the U.S. are in a net sending position to Texas within the national director network. This "net sending" relationship suggests that Texas possesses a set of firms that occupy a specific role within the national corporate power structure, one that is largely characterized in part by a collection of information from other centers. The fact that such a large and complex region, perennially near the top of state rankings in terms of number of *Fortune 500* firms, can be characterized as having a dominant corporate interlocking behavior is an important finding in itself. What economic, social, or political conditions might account for such a state characteristic? This basic finding establishes the opportunity for research involving the mix of firms and industries in Texas as they relate to the national economy. More investigation is needed to probe the factors that contribute to Texas being a net receiver of director connections, and what implications this

director status might have outside of the director network.

In conclusion, a great deal of research is needed to better comprehend the importance and role of the interurban director network in regional economic development. As this paper highlights, a regional perspective is of value in bringing issues to the forefront that would not be obvious in a national analysis. However, gaps continue to exist that relate to the basic conceptualization of the director network as a geographic phenomenon. Indeed, the most fundamental need for research in this field encompasses, but goes beyond, the regional focus of this paper. Two questions encapsulate the need for overarching research of corporate directors and their geography:

1. What is the meaning of the geographic link between a *director's work city* and the *firm's headquarters city*, for the cities involved, as well as for the businesses linked by the director?
2. Are cities and firms that are well-connected in the *spatial interlocking directorate network* also better positioned for *economic growth*?

Such questions can and should be answered from a variety of viewpoints to provide new perspectives on these issues. The regional approach is only one example of such an alternate perspective on directors and director networks. Further extension of this research in the opposite direction from that pursued here, to *expand* the spatial scope of the research to better incorporate businesses from Canada, Western Europe, Latin America, and beyond, would also be of value. In the end, this study is only one step in the continuing efforts of geographers to understand the connections that exist between corporations, corporate power

structures, and the shifting fortunes of regional and national economies.

END NOTE:

¹ One interesting example of such board behavior is the selection of Steve Jobs, the innovative computer guru and founder of *Apple Computer*, to sit on the board of *Google*. Emphasizing the importance of this inter-firm connection, *Google's* chief executive officer, Eric Schmidt, was also appointed to sit on *Apple Computer's* board in a reciprocal arrangement (Wingfield and Delaney 2006).

ACKNOWLEDGEMENTS

The authors acknowledge the assistance of a University of North Texas Research Initiation Grant in providing the funding that enabled the collection of the director database analyzed here. We also thank the three anonymous reviewers and Bill Graves and Ron Kalafsky for their helpful and thought-provoking comments. We are responsible for any remaining shortcomings.

REFERENCES

- Berry, B.J.L. 1973. *Growth Centers in the American Urban System*. Cambridge, MA: Ballinger.
- _____. 1981 *Comparative Urbanisation*. London: Macmillan.
- Black, W.R. 2003. *Transportation: A Geographic Analysis*. New York: Guilford.
- Carroll, W.K. and C. Carson. 2003. The network of global corporations and elite policy groups: a structure for transnational capitalist class formation? *Global Networks* 3: 29-57.
- Carroll, W.K. and M. Fennema. 2002. Is there a transnational business community? *International Sociology* 17: 393-419.
- Dooley, P. 1969. The interlocking directorate. *American Economic Review* 59: 314-323.
- Fennema, M. 1982. *International Networks of Banks and Industry*. The Hague: Martinus Nijhoff.
- Green, M.B. 1980. *A Geographical Examination of Interlocking Directorates for Large American Corporations*. Unpublished Ph.D. dissertation. Columbus, OH: Department of Geography, The Ohio State University.
- _____. 1983. The interurban corporate interlocking directorate network of Canada and the United States: a spatial perspective. *Urban Geography* 4: 338-354.
- Green, M.B. and R.K. Semple. 1981. The corporate interlocking directorate as an urban spatial information network. *Urban Geography* 2: 148-160.
- Green, M.B. and S. O'Hagan. 2006. Canadian interlocking directorates: gender, industry and city differences, *Geography Online* 6: www.siu.edu/GEOGRAPHY/ONLINE/gov6n1a1.html (last accessed January 28, 2008).
- Hilferding, R. 1910. *Finance Capital*. London: Routledge, Keagan and Paul.
- Isard, W. 1956. *Location and Space-Economy*. New York: Wiley.
- Kono, C., D. Palmer, R. Friedland, and M. Zafonte. 1998. Lost in space: the geography of corporate interlocking directorates. *American Journal of Sociology* 103: 863-911.
- Leinbach, T.R. and S.D. Brunn. 1991. *Collapsing Space and Time: Geographic Aspects of Communication and Information*. London: HarperCollins.
- Mintz, B. and M. Schwartz. 1985. *The Power Structure of American Business*. Chicago: University of Chicago Press.
- Mizruchi, M. 1992. *The Structure of Corporate Political Action*. Cambridge, MA: Harvard University Press.
- _____. 1996. What do interlocks do? An analysis, critique, and assessment of research on interlocking directorates. *Annual Review of Sociology* 22, 271-298.
- O'Hagan, S. and M.B. Green. 2002a. Interlocking directorates: an example of tacit knowledge transfer. *Urban Geography* 23: 154-179.
- _____. 2002b. Tacit knowledge transfer via interlocking directorates: a comparison of Canada and the United States. *Geografiska Annaler* 84 B: 49-63.

- _____. 2004. Corporate knowledge transfer via interlocking directorates: a network analysis approach. *Geoforum* 35: 127-139.
- O'Hagan, S., M.D. Rice, and M.B. Green. 2008. North American corporate directors and educational affiliations: a geographical analysis. Forthcoming in *Geography Research Forum*.
- Palmer, D., P.D. Jennings, and X. Zhou. 1993. Late adoption of the multidivisional form by large U.S. corporations: institutional, political, and economic accounts. *Administrative Science Quarterly* 38: 100-131.
- Pfeffer, J. and G. Salancik. 1978. *The External Control of Organizations*. New York: Harper & Row.
- Pinch, S., N. Henry, M. Jenkins, and S. Tallman. 2002. From "industrial districts" to "knowledge clusters": a model of knowledge dissemination and competitive advantage in industrial agglomerations. *Journal of Economic Geography* 3: 373-388.
- Porter, M.E. 1998. Clusters and the new economics of competition. *Harvard Business Review* 76: 77-90.
- _____. 2002. Location, competition, and economic development: local clusters in a global economy. *Economic Development Quarterly* 14: 15-34.
- Rice, M.D. 1996. Functional dynamics and a peripheral quaternary place: the case of Calgary. *Canadian Journal of Regional Science* 19(1): 65-82.
- _____. 2004. Regional and sectoral growth in Canada's emerging economy". *Canadian Journal of Regional Science* 27(2): 237-254.
- _____. 2006. Dominant national centers: a comparative analysis of the headquarters communities of New York and Toronto. *Industrial Geographer* 4(1): 28-50.
- Rice, M.D. and R.K. Semple. 1993. Spatial interlocking directorates in the Canadian urban system, 1971-1989. *Urban Geography* 14: 375-396.
- Rice, M.D. and D. Lyons. 2007. Consistent business generators: urban leaders in Canada's next wave. *Canadian Journal of Regional Science* 30: 91-113.
- Richardson, R.N., A. Anderson, C.D. Wintz, and E. Wallace. 2005. *Texas: The Lone Star State*, Ninth Edition. Upper Saddle River, NJ: Pearson Prentice Hall.
- Semple, R.K. 1985. Toward a quaternary place theory. *Urban Geography* 6(4): 285-296.
- _____. 1996. Quaternary places in Canada, In *Canada and the Global Economy: The Geography of Global and Structural Change*, ed. J.N.H. Britton, pp. 352-373.
- Wingfield, N. and K.J. Delaney. 2006. Google CEO Schmidt joins Apple Computer board. *Wall Street Journal*, August 30: A3.
- Wheeler, J.O., and Mitchelson, R.L. 1989. Information flows among major metropolitan areas in the United States. *Annals of the Association of American Geographers* 79(4): 423-543.