North American Corporate Directors and Educational Affiliations: A Geographical Analysis

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The importance of the modern corporation, as an employer, customer, charitable donor, developer, investment venue, and simply as a community member, means that the processes by which it is governed are of importance to society as a whole. One key element of this governance system is the corporation's board of directors. Boards have come under increased scrutiny in recent years because of a variety of scandals and bankruptcies where boards have played, or should have played, key roles. A vast literature has developed around corporate boards, but one area in which research has been lacking relates to the geography of boards and board membership. This paper attempts to close this gap by exploring the boards of directors of Canadian and American companies and analyzing the geography of a key component of their social networks, their educational affiliations. The study examines the universities and university cities that are most central to the North American interlocking network, investigates the differences in university alumni network behavior that exist between the two countries, and focuses particularly on the very few cities that host the most elite of universities. The results of this research demonstrate that very few universities and university cities have influential positions within the North American directorate network, that by comparison with the US the Canadian director network is more diverse and international in outlook in terms of its selection of directors, and that Boston is alone among the top university cities in having a wide-spread influence in terms of local alumni placed with top boards across North America. The study interprets these results and calls for further research into corporate governance and networking.

Keywords: *Corporate governance, corporate geography, boards of directors, educational affiliations, North America.*

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The corporation plays a central role in modern society, an importance that can be viewed in multiple dimensions. As employers, customers, charitable donors, developers, investment venues, and simply members of the communities in which they work, corporations are active in shaping the world today. The operation of corporations, public and private, is of interest to stakeholders that extend far beyond the strict boundaries of corporate ownership. For every corporation, a network of employees, suppliers, charitable causes, and communities is impacted by the firm's ongoing decisions and actions, for good and for bad. Spectacular successes, such as the emergence of *Microsoft* into a global force over the past 30 years, and organizational failures, such as the long-term decline of *Ford* and *General Motors*, impact these socio-economic networks in their entirety. Such broad-based networks have a vital interest in the competent management of corporations for long-term prosperity. Although the structures that administer our corporations are rarely the subject of conversation outside of elite corporate circles and academia, corporate governance is important and relevant to a broad cross-section of society in the developed world today.

Corporate governance is the set of processes and policies affecting the way a corporation is guided and controlled. The principal players within the corporate governance structure are the shareholders, who own the company, and the board of directors, who are elected to oversee its management. An important theme within this realm that has been given considerable interest recently deals with structure and actions of corporate boards, particularly since the ignominies of *Enron* and *WorldCom* (Useem, 2003). For example, the options backdating scandal of 2005-2006 led to much attention in the popular business media. Analysis by The Corporate Library indicated that board composition may have played a role in the spread of options backdating, as firms central to the scandal shared board members to a greater extent than might be otherwise expected, but had no other identifiable links (Colvin, 2006). An improved understanding of the function and composition of boards, and the sharing of information at elite corporate levels, is an important subject for business research today.

While a vast literature has developed around the subject of boards of directors and corporate governance, much work still needs to be accomplished. Particularly in the realm of geography and the study of director locations and inter-firm and intercity board linkages, little has been completed. This paper attempts to fill a gap in the geographic literature of boards by exploring the boards of directors of Canadian and American companies and analyzing the geography of a key component of their social networks, their educational affiliations. Our primary goal is to examine the spatial relationship between the university attended by directors and the headquarters location of the corporate boards on which they sit.

THE DIRECTOR LITERATURE

As a matter of law, a board of directors must be maintained by corporations based in the United States and Canada. Directors are elected by the shareholders of the corporation, and have the responsibility as the shareholders' representatives to oversee corporate operations. Boards are generally made up of a mixture of inside directors (persons employed by the corporation, such as the president or other executives who also sit on the board) and outside directors (persons employed outside the corporation, such as executives of other firms or outside consultants). Inside directors are involved in the daily activities of a corporation, while outside directors monitor the actions of inside directors. Each director is selected for any of a host of reasons, but the general role of the board as a whole is to promote the betterment of the corporation.

The broad, social science literature relating to boards is categorized into three main themes. The first theme seeks to determine how board characteristics, such as composition or size, affect performance (Daily and Dalton, 1993; Yermack, 1996). The second asks how board characteristics influence the actions of the board (Baysinger and Hoskisson, 1990). The third and final theme explores those factors that affect the makeup of boards and how they evolve over time (Pfeffer, 1972; Hermalin and Weisbach, 1988). This paper follows the third theme to examine the geographical characteristics of the boards of directors of the largest American and Canadian corporations. Specifically we use descriptive statistics to determine if a spatial relationship exists between the universities attended by a director and the headquarters locations associated with their boards.

Despite the volume of social science research on the broad topic of corporate boards, surprisingly little work has specifically examined the influence of geography on their structures. It is, however, true that geographers have made progress in the more general study of the location of elite corporate activities (of which directors are a prominent example). Additionally, the regional, national, and global head office locations of major corporations have been extensively examined. Research in this general field of corporate location studies, termed 'quaternary location theory' (Semple, 1985; Holloway and Wheeler, 1991), has focused on a number of different themes. Some of the earliest quaternary location work focused on the headquarters community of an individual city (Quante, 1976), or on the corporate offices located in a small set of selected cities (Pred, 1977). However, more recently, the emphasis of current research into quaternary location has shifted to a systems perspective, examining the relationships existing among all of the major corporate centers in national and international city systems (Semple and Rice, 1994; Meyer and Green, 2003). It is within this systems perspective that geographical investigation into corporate directors most directly fits.

The small amount of geographical research that has been completed relating to corporate directors has focused on interlocking directorates, or the sharing of individual directors by multiple corporate boards. In fact, only four geographers (Green,

1980, 1983; Rice and Semple, 1993; O'Hagan and Green, 2004) have explored this issue in the published literature, principally from two perspectives: interlocking directorates as an inter-firm *influence network* (where businesses can influence the activities of other businesses through strategic interlocking linkages), and as an inter-firm *information network* (where insights are shared among businesses through interlocking board memberships). Green (1980) and Green and Semple (1981) pioneered the geographic study of interlocking directorates and information transfer with a regional analysis of directors in the US manufacturing belt. More recently, O'Hagan and Green (2002a, 2002b, 2004) extended the spatial analysis of information and interlocking directorates further through an examination of the evolving North American director network as a whole. Although corporate influence has developed into an important theme in interlocking directorate research by sociologists (Pfeffer and Salancik, 1978; Mintz and Schwartz, 1985; Carroll and Carson, 2003), Rice and Semple's (1993) examination of the Canadian director network provides the lone major example of geographical research relating to this 'corporate control' theme.

Despite this emphasis on interlocking directorates in the small geographical literature of boards, other possible research directions relate to the spatial distribution and change of corporate directors as a group. Rice and Semple's (1993) work provides some insight into other potential aspects for director research to address. Although their database included the interlocking of corporate boards, the focus of Rice and Semple's investigation was on spatial interlocking behavior, or the sharing of directors by multiple cities: in other words, the true focus of the interlock in their context is the city, not the board or the corporation. For example, a spatial interlock could be created by a board member working in one city and serving on a board in another city. Such an analysis highlights the idea that director locations, as opposed to business locations or links alone, might form an appropriate focal point for geographical analysis. It is from this broader context that the present study examines educational attributes, in combination with the locations of the American and Canadian boards on which the directors serve.

CASE STUDY

Up to this point, the discussion has explained the general context for the paper, both in terms of recent developments in business and in the literature of corporate boards. It is evident from this review that several opportunities exist for a contribution to the geographic study of corporate boards and directors. The following defines a case study to expand the investigation of directors in geography, including an overview of the datasets used in the analysis and a definition of the key research questions addressed in this paper.

Data

The study examines director datasets for firms based in both the United States and Canada. To examine American boards of directors, the top 500 US firms by revenues, as identified by *Fortune* for 2004 (Fortune, 2005), were selected for analysis. The directors of these firms were compiled using *Standard and Poor's Register of Corporations, Directors and Executives*. For Canada, a parallel database of the top 250 Canadian firms from the *Financial Post 500* for 2004 (National Post Business, 2005) was also selected for analysis. The directors of these Canadian firms were obtained from the *Financial Post Directory of Directors* (2005). Directors were cross-referenced across all firms to provide a database including the headquarters location and education of the directors.

The result was a database including 4,845 total directors with location and education data, of which 2,956 were American. The headquarters city (i.e. location of the board meeting) and work city for all 2,956 American directors were obtained, with 2,354 of these directors also having university education data. There were 1,889 Canadian directors, and again, the headquarters city and work city for all 1,889 directors was documented, along with education data for 1,384 of these directors.

It is important to note that the US and Canadian databases individually provide a detailed profile of the boards and directors active in overseeing the corporate entities of each country. However, the composition of the two databases is such that between-country comparisons are not appropriate. The study uses a total of 250 firms in Canada in order to provide sufficient depth to adequately represent the complexity and geographic distribution of the Canadian economy, versus a total of 500 firms for the US. On a joint, country-to-country comparison, Canada would be over-represented by such a firm selection. However, the goal of this analysis is to provide separate profiles of the director networks of each country. As the research outlined on the following pages focuses on distinct profiling of each country, rather than a combined analysis of the North American director network, the selection employed for each of the US and Canada is appropriate.

Research Questions

Based on the literature and databases defined in the preceding sections, this study extracts three key research questions to guide this exploratory analysis of directors, their locations, and their educational affiliations.

'The University Question': What universities and university cities have the largest presence on the North American corporate director network?

Since Taussig and Joslyn's (1932) introductory effort, an extensive literature on the characteristics of American corporate directors has been cultivated. From this research, class hegemony theory (Sonquist and Koenig, 1975) has emerged to contend that directorships emphasize upper-class participation in business. Directorships are

integrative ties whose main purpose is to support class cohesion. This view presumes that corporate managers seek protection from threats to their tenure leading in the pursuit of trusted business allies, which in turn leads to appointing trusted directors.

Of these characteristics, belonging to the same social clubs and attending the same private schools are two characteristics that support this perspective. For the purpose of this paper we are interested in university affiliation, a variable that has been explored at length outside of geography. Finkelstein (1992) established a list of primarily upper class institutions and argued that directors who graduated from these select set of schools possess 'power' in the corporate network. Finkelstein's list is dominated by old, established universities, especially Ivy League schools. Whit (1981) employed a similar list to find that directors from 'elite schools' were more likely to sit on the boards of oil companies than were directors from non-elite schools. Following this premise, we expect those old established universities, above all Harvard University, to be particularly prominent because of their acknowledged centrality in business networks. As geographers, we are also interested in the cities that host these universities, as well as the universities themselves.

'The Canada/US Question': How do Canadian universities and university cities compare in their director network behavior relative to US universities and university cities?

This question builds on the international comparison approach exemplified in the interlocking directorate studies of O'Hagan and Green (2002a, 2002b, 2004) and the headquarters location analysis of Rice (2006). Each of these studies centered on a direct comparison of the geography of elite corporate activities in the US and Canada, and each highlighted important differences in the operation and evolution of the two respective national corporate communities. The present analysis aims to find whether universities and university cities in the two countries place their graduates into their respective national and international director networks in similar ways.

O'Hagan and Green (2004) identified a key director network comparison that relates directly to this analysis. Their examination of the interlocking director networks of Canada and the US indicated that the Canadian network included more long-distance links, involving boards bringing members from across the country, while the US network had more of a regional orientation toward director links. Applying this finding to the present research question, our expectation is that Canadian boards would be more willing to include directors who are graduates of universities across the country, while US corporate board might be expected to have more of a regional university affiliation. Thus, boards in New York would be expected to rely heavily on directors educated in New York and the northeastern states, while boards in Toronto should be found to include a wider representation of universities from across Canada.

'The Key Cities Question': How do Boston, Chicago, and SF compare in their presence in the corporate director network?

As mentioned earlier in this paper, existing research on the corporate geography of America has overwhelmingly concentrated on headquarters locations (Holloway and Wheeler, 1991; Meyer and Green, 2003; Rice, 2006). Even the limited interlocking directorate literature in geography has utilized headquarters locations as a basis for data collection (O'Hagan and Green, 2002a, 2002b, 2004). Headquarters are obviously central to corporate decision-making, but do other venues exist that ought to be considered as meeting grounds in the study of elite corporate activities? This is what makes this component of the study, focusing on locations other than corporate headquarters, so important. Are there other means, outside of the hosting of headquarters, in which a city can gain and wield corporate influence? The spatial distribution of directors, and the social networks that connect these elite corporate players, lends itself well to the investigation of such alternate mechanisms of corporate influence and information transmission.

The existence of a small set of elite institutions, and the connection of these institutions to the cities in which they are hosted, provides a foundation for this question to be answered. This inquiry focuses on three metropolitan areas, widely spaced across the US, that host some of the most elite universities and business programs in the country: metropolitan *Boston*, host of Harvard University, metropolitan *Chicago*, host of the University of Chicago, and metropolitan *San Francisco*, host of Stanford University (Alsop, 2006; Medoff, 2006). What is the spatial distribution of corporate boards associated with graduates of the elite universities located in these three key cities? Are all of these top cities alike in their ability to place their graduates on important corporate boards across the country, and even internationally? Our expectation is that each of these top cities, and their elite schools, will have a broad influence in the corporate director network of the US.

RESULTS

The University and Canada/US Questions

We begin with a combined investigation of the university and Canada/US questions. As the two questions are highly linked, much of the following discussion relates to both questions. Table 1 displays the universities associated with directors of US and Canadian firms. In the US, 53 percent of directors received their educations from the top 25 schools, ranked by number of alumni sitting on the boards of corporations in the United States. In Canada, the corresponding figure is 83 percent. These results are expected given the amalgam of choice for post secondary education in the US, in comparison with Canada.

Beyond these 'top 25' figures, a number of points regarding Table 1 are notewor-

thy. On the US side, Harvard University, with 15.7 percent of American directors, dominates the table. Following Harvard distantly, the school with the second most directors, Columbia, has 3.7 percent of directors. This ascendancy is more remarkable when combined with the earlier argument that there are a large number of options for post secondary education in United States. The second tier of schools closely follows Columbia University in the make-up of American boards.[1]

Table 1: Top universities, ranked by number of alumni sitting on the boards of corporations in the US and Canada.

US Universities and Directors			Canadian Universities and Directors		
University	Number of Directors	Percent of Total	University	Number of Directors	Percent of Total
Harvard Univ.	370	15.7	Univ. of Toronto	160	11.6
Columbia Univ.	87	3.7	Harvard Univ.	104	7.5
Univ. of Chicago	82	3.5	Univ. of Western Ontario	89	6.4
Stanford Univ.	73	3.1	Univ. of Alberta	83	6.0
Univ. of Pennsylvania	62	2.6	McGill Univ.	78	5.6
MIT	59	2.5	Université Laval	61	4.4
Northwestern Univ.	59	2.5	Univ. of Calgary	56	4.1
Yale Univ.	59	2.5	Univ. of Saskatchewan	50	3.6
New York Univ.	57	2.4	Univ. of British Columbia	46	3.3
Univ. of Michigan	40	1.7	Queens Univ.	45	3.2
Princeton Univ.	37	1.6	York Univ.	45	3.2
Univ. of Wisconsin	28	1.2	Univ. of Manitoba	43	3.1
Univ. of Southern California	24	1.0	Univ. de Montreal	41	3.0
Indiana Univ.	23	1.0	Ecole Des Hautes Etudes Commercial	33	2.4
Univ. of California (Berkeley)	22	0.9	Univ. of Ottawa	30	2.1
Univ. of Virginia	21	0.9	Dalhousie Univ.	28	2.0
Michigan State Univ.	19	0.8	Univ. of Waterloo	28	2.0
Cornell Univ.	18	0.8	Univ. of Winnipeg	21	1.5
George Washington Univ.	18	0.8	McMaster Univ.	20	1.4
Univ. of North Carolina	18	0.8	Univ. of New Brunswick	18	1.3
Case Western Reserve Univ.	17	0.7	Univ. de Sherbrooke	17	1.2
Ohio State Univ.	17	0.7	Concordia Univ.	15	1.1
Univ. of California	17	0.7	Univ. of Chicago	14	1.0
Univ. of Pittsburgh	17	0.7	Bishops Univ.	13	1.0
Dartmouth Coll.	15	0.6	Carleton Univ.	12	0.8
Top 25 Total		53.4	Top 25 Total		82.8

The education of Canadian directors, on the other hand, is not dominated to the same extent by a top university. The University of Toronto does graduate 11.6 percent of directors but the drop to the second tier of universities is not as great. Harvard University, at 7.5 percent, and the University of Western Ontario, at 6.4 percent, head this Canadian 'second tier' of universities. As a foreign university, the importance of Harvard to the Canadian corporate landscape is remarkable as it graduates the second most Canadian directors. Harvard is joined by the University of Chicago (ranked 23rd) as foreign schools of importance in the education and socialization of the directors of Canadian firms.

Just as significant as the schools themselves, and their total numbers of director alumni, is the geographical placement of their alumni as directors. For example, among Canadian firms Harvard places directors across Canada, with graduates sitting on the boards of 9 British Columbia firms, 18 Prairie firms, 43 Ontario firms, 22 Quebec firms, and 10 Maritime firms. On the other hand, 10 of the 14 University of Chicago graduates sit on the boards of Ontario firms, suggesting a regional focus for that institution.

The City-Based Perspective

Table 2 displays the cities of the universities where directors obtained their education. With 21 percent of all directors sitting on American corporate boards, the importance of Boston is apparent. Of course, this result is influenced by Harvard University, but it is important to note that 124 directors obtained their education from other universities in Boston (out of a city total of 494). This number would still make Boston the third most important graduating city, even without Harvard University. Although Boston's business community has been impacted in recent years by a relocation out of the city of previous local giants such as *John Hancock Financial Services, FleetBoston Financial*, and *Gillette* (Stein, 2005), this result suggests that Boston and its institutions still wield considerable influence in corporate America. Results for New York and Chicago were a little more expected, although they followed as a distant second and third.

Table 2 reveals that findings from Canadian corporations are somewhat dissimilar. Again, Boston appears as an important destination for the education of Canadian corporate directors. Unlike the results for American corporations, though, this Canadian number is almost entirely due to Harvard University. Of the 106 Canadian directors that received their educations in Boston, 104 attended Harvard University. International institutions were an important source of education for directors. Seven of the top 25 cities that graduated the current directors of Canadian corporations are outside of Canada.

Table 3 divulges the spatial connection between the American region where directors attended university and the headquarters of the company where they now work. Given that intra-regional connections dominate six of the eight regions, it is apparent that geography plays a role in the relationship. Most directors in the remaining two regions, Plains and Rocky Mountain received their educations in the

Mid-Atlantic region. This can be rationalized by the fact that Mid-Atlantic schools account for one-quarter of all universities and that the Rocky Mountain and Plains regions account for the least number of universities in the dataset.

Table 2: Top university cities, ranked by number of alumni sitting on the boards of corporations in the US and Canada.

University City	Number of Directors	Percent of Total	University City	Number of Directors	Percent of Total
Boston	494	21.0	Toronto	219	16.1
New York	202	8.6	Montreal	181	13.3
Chicago	181	7.7	Boston	106	7.7
San Francisco	103	4.4	London	97	7.1
Philadelphia	91	3.9	Edmonton	82	6.0
Los Angeles	70	3.0	Winnipeg	64	4.7
New Haven	61	2.6	Quebec City	61	4.5
Washington	52	2.2	Calgary	56	4.1
Ann Arbor	41	1.7	Saskatoon	49	3.6
Princeton	37	1.6	Vancouver	48	3.5
Atlanta	28	1.2	Kingston	45	3.3
Pittsburgh	25	1.1	Ottawa	43	3.1
Bloomington	23	1.0	Halifax	35	2.5
Richmond	23	1.0	Waterloo	33	2.4
Milwaukee	22	0.9	Chicago	25	1.8
Columbus	21	0.9	Hamilton	20	1.4
Madison	20	0.8	Fredericton	18	1.3
Austin	19	0.8	Sherbrooke	16	1.2
East Lansing	19	0.8	Lennoxville	13	1.0
Ithaca	19	0.8	Wolfville	12	0.8
Baltimore	18	0.8	New Haven	10	0.7
Hartford	18	0.8	New York	10	0.7
Chapel Hill	17	0.7	San Francisco	8	0.6
Cleveland	17	0.7	Cambridge	8	0.6
Detroit	17	0.7	Oxford	8	0.6
Top 25 Total		69.7	Top 25 Total		90.6

As all regions are heavily reliant on a domestic education, Table 3 also reveals the lack of international connections. The Mid-Atlantic region has the greatest international links with an insignificant 4.8 percent of all directors receiving their educations outside of the United States. Interestingly, when examining the spatial relationship of where American directors receive their educations in Canada, geography also plays a role. Directors who sit on the boards of companies in the Mid-Atlantic, New England, Great Lakes, and Southeast regions mostly received their educations

from Ontario while directors who sit on the boards of companies in the Southwest and Far West regions mostly received their educations from British Columbia. As noted earlier, Harvard is atypical of American universities in that it places graduates across Canada.

Geography plays a role in the relationship between where a director receives his/her education and where he/she works, as revealed in Table 4. This assertion is supported by the fact that intra-regional connections dominate four of the five regions, and they were important in the fifth region as well.

Table 3: Regional relationship between director university attended and headquarters location of board: US-based firms.

	Headquarters Region							
University Region	New England	Mid-Atlantic	Great Lakes	Plains	Southeast	Southwest	Rocky Mountain	Far West
US Domestic								
New England	69	193	134	32	73	42	3	64
Mid-Atlantic	49	210	79	37	76	33	11	46
Great Lakes	25	84	180	28	50	31	10	41
Plains	1	20	14	19	11	15	4	5
Southeast	11	39	35	8	100	25	3	14
Southwest	3	9	16	11	9	45	4	5
Rocky Mountain	0	6	6	2	6	2	7	4
Far West	7	37	26	15	20	16	6	86
Total Domestic	165	598	490	152	345	209	48	265
Foreign								
Canada	2	11	6	1	4	3	0	3
Ontario	2	9	5	1	3	1		
Quebec		2	1					
BC					1	2		3
UK	1	8	6	2	4	1	0	6
Other	1	11	7	0	0	1	0	3
Total Foreign	4	30	19	3	8	5	0	12
Foreign (% of Total)	2.4	4.8	3.7	1.9	2.3	2.3	0.0	4.3

Unlike American corporations, Canadian companies rely heavily on foreign graduates. The Prairies region possessed the least with 21 percent of all directors obtaining their educations from a foreign university while British Columbia possessed the most with 45 percent. When examining the spatial relationship of where Canadian directors receive their educations in the United States, geography is again signifi-

cant. Directors who sit on the boards of companies in British Columbia mostly received their educations from the Far West region. Ontario, Quebec, and Maritimes directors mostly received their educations from the New England. The only region where this geographical pattern is not prominent was the Prairies.

Table 4: Regional relationship between director university attended and headquarters location of board: Canadian-based firms.

	Headquarters Region				
University Region	British Columbia	Prairies	Ontario	Quebec	Maritimes
Canadian Domestic					
British Columbia	25	10	12	5	0
Prairies	15	175	37	25	3
Ontario	32	73	252	89	3
Quebec	8	15	70	165	3
Maritimes	3	18	38	15	22
Total Domestic	84	292	409	299	32
Foreign					
USA	29	35	94	43	10
Far West	12	0	2	3	0
Rocky Mountain	3	3	7	0	0
Great Lake	3	7	17	7	0
Mid-Atlantic	2	7	15	7	0
New England	9	18	53	27	10
UK	3	7	18	8	3
Other	2	2	12	5	0
Total Foreign	34	43	124	57	13
Foreign (% of Total)	45.4	21.3	38.3	26.3	39.6

Table 5 furthers the argument that while the university-headquarters relationship has a remarkable spatial orientation, Harvard University is an exception. Of the top 500 American corporations in 2004 measured in terms of revenue, 38 companies possessed three or more directors that graduated from the same university. From this list, 11 graduated from a university now sit on the board of a company in the same city. The remaining 27 examples, listed in Table 5, are those corporations with three or more board members who graduated from the same university, where university and corporate headquarters are located in separate cities. The dominance of Harvard University is striking. Of the 27 examples only three were not from Harvard University.

Table 5: US firms with 3 or more directors from the same university, where the university and corporate headquarters are not in the same city.

Company	Company City	University	director count
Cummins	Columbus, IN	Harvard Univ.	5
Timken	Canton-Massillon	Harvard Univ.	5
General Mills	Minneapolis-St. Paul	Harvard Univ.	4
Levi Strauss	San Jose-San Francisco-Oakland	Harvard Univ.	4
MetLife	New York-Newark-Bridgeport	Harvard Univ.	4
Procter & Gamble	Cincinnati-Middletown-Wilmington	Harvard Univ.	4
Telephone & Data Sys.	Chicago-Naperville-Michigan City	Harvard Univ.	4
TIAA-CREF	New York-Newark-Bridgeport	Harvard Univ.	4
Air Products & Chem.	Allentown-Bethlehem-Easton	Harvard Univ.	3
Bank of New York Co.	New York-Newark-Bridgeport	Harvard Univ.	3
Brink's	Richmond-Petersburg	Harvard Univ.	3
Capital One Financial	Washington-Baltimore-Northern Virginia	Stanford Univ.	3
Corning	Corning, NY	Harvard Univ.	3
Danaher	Washington-Baltimore-Northern Virginia	Harvard Univ.	3
Eastman Kodak	Rochester	Harvard Univ.	3
Ford Motor	Detroit-Warren-Flint	Yale Univ.	3
General Motors	Detroit-Warren-Flint	Harvard Univ.	3
Georgia-Pacific	Atlanta-Sandy Springs-Gainesville	Harvard Univ.	3
Goldman Sachs Group	New York-Newark-Bridgeport	Harvard Univ.	3
International Paper	New York-Newark-Bridgeport	Harvard Univ.	3
Motorola	Chicago-Naperville-Michigan City	Yale Univ.	3
Pfizer	New York-Newark-Bridgeport	Harvard Univ.	3
R.R. Donnelley & Sons	Chicago-Naperville-Michigan City	Harvard Univ.	3
Rohm & Haas	Philadelphia	Harvard Univ.	3
Time Warner	New York-Newark-Bridgeport	Harvard Univ.	3
Verizon Communications	New York-Newark-Bridgeport	Harvard Univ.	3
W.W. Grainger	Chicago-Naperville-Michigan City	Harvard Univ.	3

Interlocking Directorates and University Affiliation

One key measure of the influence of universities and university cities is in their presence and positioning within the corporate interlocking network. As introduced earlier, an interlocking directorate occurs when a person sitting on the board of

directors of one firm also sits on the board of directors of another firm. Research on interlocking directorates has developed extensively over the last ninety years, mostly by sociologists.

Drawing on previous findings, we use the concept of centrality to explore interlocks. This allows for the determination of the importance of universities and cities as participants in the interlocking network. Within a network, certain cities maintain primary positions while others are relegated to have less impact. Calculating centrality allows for the determination of the most significant and least significant cities in the network.

The simplest way to measure centrality is degree. This measure simply counts the number of nodes (universities or cities) that each node is connected to. By inserting a denominator into the equation, the number of links for each individual university can be compared against total links in the network. This allows for the comparison of each university and city.

$$Centrality_{Degree}(Pk) = \frac{\sum x_r}{\sum x_{ij}}$$

Table 6 summarizes the centrality results for the top US universities. The maximum centrality value that an individual city can obtain is 1. This indicates that the city under investigation accounts for all links in the corporate network. At the other extreme, a centrality value of 0 implies that the city retains no links in the network. The higher the value, the more central the city. As anticipated, established universities are particularly prominent in the interlocking network. The top is dominated by Ivy League and other established schools. Once again, Harvard is by far the most significant node in the American interlocking network. On the other hand, when comparing the results to Table 1, the University of Chicago slips from third most prominent to seventh.

Table 7 summarizes the centrality results for the top US university cities. As with directors, Boston dominates interlocking at the city level, once again cementing the idea that the city plays pivotal role in the American corporate network. Chicago and Philadelphia move up in the ranking, but this second tier of cities ranks far behind Boston. The ranking of New York in the fifth position might be considered as surprising, given the continuing status of the city as the dominant American headquarters center (Rice, 2006).

The Key Cities Question

To this point, our study of the university and Canada/US questions has led to a macro-level investigation of the relationship between the university attended by directors and the headquarters location of the corporation for which they now work. From this, two important findings have emerged. First, it appears that a regional

relationship exists between the headquarters location for directors and the university that he/she attended. The evidence suggests that graduates of a university generally sit on the board of a corporation either in the same city or in close proximity to the university. Second, Boston, and in particular Harvard University, is by far the principal player in the American corporate network. In fact, Harvard appears to be the only university that possesses a national presence, or at least something more than a regional presence, in the national corporate network.

The following section attempts to answer the third main question of the study by examining specific cities within the network. Boston, Chicago, and San Francisco are selected because of the importance of their universities and their importance in the corporate network. Selecting an Eastern, Central, and Western city also provides a geographic basis for comparison. Mapping the location of directors from Boston, Chicago, and San Francisco universities provides a graphical means of confirming the premises behind our key cities question.

Table 6: Centrality in interlocks by US university.

University	centrality
Harvard Univ.	0.178
Univ. of Pennsylvania	0.043
Yale Univ.	0.042
Brown Univ.	0.039
Univ. of California (Berkeley)	0.026
Washington Univ.	0.026
Univ. of Chicago	0.025
New York Univ.	0.023
Stanford Univ.	0.020
Univ. of Michigan	0.020
Mass. Inst. of Tech.	0.017
Northwestern Univ.	0.016
Rutgers University	0.016
Arizona State Univ.	0.014
Loyola Univ. (Chicago)	0.014
Univ. of California	0.014
Univ. of Louisville	0.014
Univ. of North Carolina	0.014
Cornell Univ.	0.013
Kent State Univ.	0.013
Univ. of Massachusetts	0.013
Univ. of Wisconsin	0.013
Univ. of Southern California	0.012

Table 7: Centrality in interlocks by US university city.

University City	centrality
Boston	0.227
Chicago	0.067
Philadelphia	0.049
San Francisco	0.046
New York	0.042
New Haven	0.042
Providence	0.039
Los Angeles	0.038
Chapel Hill	0.030
St. Louis	0.026
Ann Arbor	0.020
Washington	0.017
Newark	0.016
Tempe	0.014
Louisville	0.014
Kent	0.013
Ithaca, NY	0.013
Baltimore	0.012
Tallahassee	0.010
Richmond	0.010
Austin	0.010
Salt Lake City	0.009
Princeton	0.009
Milwaukee	0.009
Madison	0.009

Figures 1-3 present findings for Boston, Chicago, and San Francisco. Each choropleth map provides the percentage of directors in each state that attended a university in each of the three cities. Results confirm what we have learned thus far, in that Boston universities impact the corporate director network nationwide. Figure 1 reveals that Boston graduates make up a large percentage of the directors in a large number of states. This occurrence is extremely prevalent in the eastern half of the country, but they even comprise a large percentage of directors in Washington, Arizona, Texas, Nevada, and California. Other than Washington, Figure 1 indicates that Boston graduates have little incidence in Northwest. But it is important to recognize that all university graduates have little presence in this region. For example, of the top 500 companies, one is located in Oregon and Utah, two firms are located in Idaho, and there are no top corporations in North Dakota, South Dakota, and Wyoming.



Figure 1: Boston universities--% of total directors for each state.

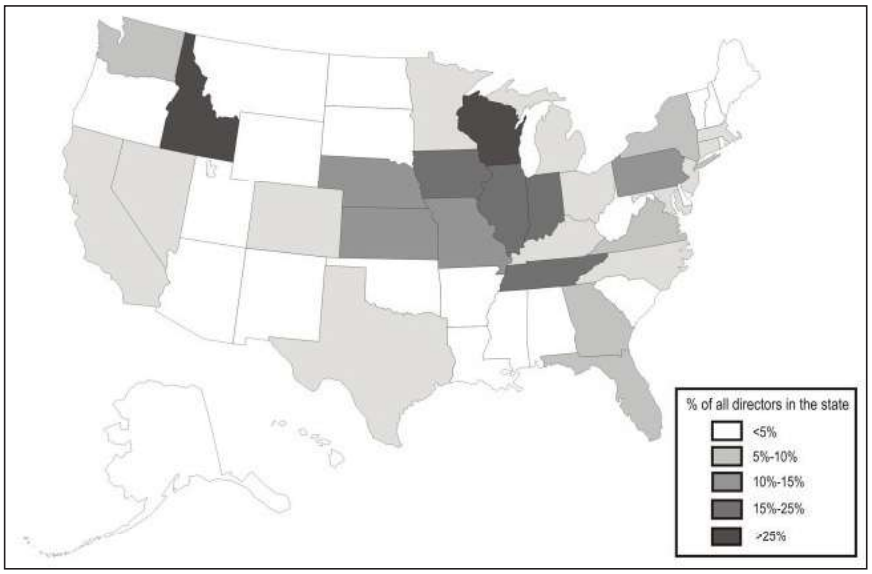


Figure 2: Chicago universities--% of total directors for each state.



Figure 3: San Francisco universities--% of total directors for each state.

Results from Figure 2 reveal that for the most part directors that attended a university in Chicago sit on the board of a company in that region. The Midwest stands out as Chicago graduates maintain a strong presence in Wisconsin, Iowa, Illinois, and Indiana. Chicago graduates also appear to be well represented in Idaho. One must be careful though as it was already suggested that only two of the top 500 companies are headquartered in Idaho. The result is only seven directors, two of whom attended a Chicago university.

Figure 3 show that directors who attended San Francisco universities are even more regional in their orientation. Graduates from schools in this metropolitan area, including Stanford University and the University of California – Berkeley, have a strong locational bias toward the western United States. These directors have a strong presence in Idaho and Oregon (again small samples), as well as Washington and California.

CONCLUSION

The purpose of this paper is to fill a gap in the geographic literature of Canada and United States' corporate director network. The study was exploratory in nature, with the goal of answering three main questions surrounding the spatial relationship between the university attended by directors and the headquarters location of the corporate boards on which they sit.

First, we wanted to ascertain which universities and university cities have the largest presence on the North American corporate director network. The results of our analysis show that Boston dominated director and interlocking results so profoundly that we argue the city exerts a significant influence over the American corporate network, even without housing a significant number of the largest companies. Boston results are, of course, heavily influenced by Harvard University; but even without Harvard the city would be a key player in the director and interlocking networks of the US. Similar to Boston at the city level, Harvard dominates the American corporate network at the university level. Harvard University graduates constitute 16 percent of all American directors, a noteworthy amount considering the large number of competing universities and elite business school alternatives present in virtually all regions of the United States.

Results also indicate that the university-headquarters relationship has a remarkable spatial orientation. Findings suggest that graduates of a university for the most part sit on the board of a company either in the same city or the same region. Once again the exception is Harvard University, which places graduates en masse nationwide. There were 27 instances where corporations held three or more board members who graduated from the same university, where university and corporate headquarters were located in separate cities. Of the 27 examples only three were not from Harvard University.

The results show that the Canadian network displayed a strong geographical prominence as well. Graduates of a university for the most part sit on the board of a company in the same region. However, an important distinction was found when a number of international cities were represented in the Canadian corporate network. Of the top 25 cities, seven were foreign. This is different to the domestic education obtained by American directors. At the top of the Canadian list was Boston, with 7.7 percent of all graduates sitting on Canadian firms. This was dictated by Harvard University graduates who make up 7.5 percent of all Canadian directors. Not only does Boston, and especially Harvard University significantly influence the American corporate network, they significantly impact the Canadian corporate network as well.

Finally we wanted to visually compare three key cities to the American director network. Specifically our third question asks how do Boston, Chicago, and San Francisco compare in the corporate director network? These results were domestic only, but once again reveal the far reaching influence of Boston's education establishments. Even compared to significant university and headquarters cities, Boston stands out.

Since the paper was exploratory in nature, a number of future research directions arise from our findings here. Perhaps most important would be to assess results of this paper temporally. Have Harvard University and the city of Boston increased the number of directors they place on the top corporations of America, and for that matter Canada, over time? Have old established institutions, like America's Ivy League

schools, become more or less central to the corporate network? Geographically, which universities and cities have become more regional, national, or international over time?

A second research direction following from the present results is a concurrent analysis of geography and gender among the corporate director network of North America. One minor result from our analysis, explored as an aside, came from our separation of the education affiliation of American directors by gender. Disparate results were expected between females and males at established institutions, such as the Ivy League schools, but not to the extent revealed by our preliminary analysis. The large difference presents an interesting vein not only for future research on gender and the director network, but on the spatiality of gender differences. For example are female graduates more (or less) likely to sit on the board of directors in close proximity to the university they attended? Are female directors more likely to sit on the boards of companies in certain cities or regions?

A third avenue for future research is related to the large percentage of directors sitting on Canadian boards who graduated from a foreign university. The surprising results suggest that this concept could have perhaps been a fourth question. From Table 4, the Prairies region possessed the least with 21 percent of all directors obtaining their education from a foreign university while British Columbia possessed the most with 45 percent. Of course this total is dominated by American schools.

Previous research on the internationalization of boards has focused on authentic foreign directors. Athanassiou and Nigh (1999) approach this premise from a resource dependence perspective to suggest that foreign board members allow the firm and its management to gain better access to international networks. Here we took a different angle to examine corporations that maintain international graduates. In this case we identified American university and university cities influence on the Canadian director network. These directors are in many cases Canadian, who traveled to the United States for their educations. But the premise is the same. These directors have international connections and international knowledge, which theoretically should make these companies more competitive in a global economy. Future research on this topic can explore the benefits of possessing international graduates on boards. For example, are companies with foreign graduates more competitive? At an international scale, what is the influence of Harvard University and the city of Boston on the global corporate network?

There is much need for further research into the geography of elite corporate activities, of which the investigation of director networks forms one part. Director network research is an important development within this field because the traditional focus on corporate headquarters facilities within quaternary location studies is, while useful to a degree, also too simplistic. Broader examinations of the location of high-level business activities and linkages need to transcend the customary view of corporate decision-making as being exclusively associated with the towers and office campuses that host the global headquarters of the largest firms worldwide.

An acknowledgement of the complex social and economic networks associated with firms and their key decision-makers promises a better understanding of the geography of corporate decision-making and its impact on regional and national economies. The geography of university alumni ties (as introduced here), regional and subsidiary headquarters (in addition to the ultimate, global headquarters traditionally studied), and processes of firm evolution (from small and fast-growing to large and mature) are all examples of areas in which further investigation can contribute to the theory of business location and development in geography. Geographers have a unique opportunity to contribute to regional and national economic development efforts through such targeted research.

NOTE

1. As an aside, an analysis of the education affiliation of American directors by gender also produced interesting results. Perhaps the most interesting of these findings are gender differences related to Ivy League schools. While female and male alumni of these elite schools both have a strong corporate presence, there is a discrepancy between genders. The eight schools make up 48 of 243 American female directors, or 19.7 percent of all females in the director network. On the other hand, these elite schools account for 634 of 2,110 American male directors, or 30 percent of all males in the network. The difference means that less prominent institutions, such as the Catholic University of America, take more important positions in the female corporate network.

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