

A Comparison of 1912 and 2012 Interlocking Directorate Networks of Ontario, Quebec, and Atlantic Canadian firms

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Abstract

This study contributes to the field of regional analysis by investigating the spatial relationship among the boards of directors of companies in Eastern Canada for the years 1912 and 2012. This study uses interlocking directorates as a proxy for knowledge transfer to argue these links are valuable sources of knowledge for firms and their regions. Results show that Quebec firms interlocked intra-provincially more than any other province and their propensity to transform these interlocks to external links was the least over the 100 year study period. This inward-looking perspective inhibits Quebec firms from being exposed to institutions outside the province.

Keywords: boards of directors, institutionalism, interlocking directorates

Introduction

There is strong agreement in the literature that knowledge accumulation is critical to the competitiveness of companies and the regions where they are located. This condition raises the question as to how firms grow their knowledge base in order to remain competitive. It has become commonplace for economic geographers to employ firm level data in their assessments of this issue. However, less attention has been paid to individual economic agents, the actual acquirers of knowledge, who then convey their expertise to the firm (Gertler, 2010). This article addresses this limitation by analyzing a specific set of individuals who play a crucial role at the top of the business hierarchy: members of the boards of directors of the largest corporations in Eastern Canada.

One generally accepted avenue whereby boards of directors acquire knowledge is through interlocking directorates, which occur when the board member of one firm also sits on the board of another firm. Recent research on the subject suggests that these connections yield knowledge transfer between companies (Shropshire, 2010; Abdollahian *et al.*, 2017; Howard *et al.*, 2017; Withers *et al.*, 2018). One way economic geographers can add to this area in the literature is by highlighting the influence of space and place in acquiring knowledge via these inter-organizational networks.

This study compares the system of interlocking directorates linking centers in Eastern Canada for the years 1912 and 2012. The purpose is to analyze the changing geography of interlocking directorates for firms located in Ontario, Quebec, and Atlantic Canada (New Brunswick, Newfoundland, Nova Scotia, and Prince Edward Island). It then compares how firms in each of these three regions have transformed the spatial distribution of their interlocking directorate network, and as a result where they acquire this form of knowledge.

KNOWLEDGE, INTERLOCKING DIRECTORATES, AND ECONOMIC GEOGRAPHY

This study utilizes boards of directors because as the ultimate caretakers of firms, these individuals are part of the highest level of decision-making for companies. The responsibilities of the board of directors are to ultimately manage and supervise the activities and affairs of the corporation. The primary obligation of the boards of directors can differ across countries. Pertinent to this study is that boards of Canadian firms are required to protect the shareholders' assets and ensure they receive an appropriate return on their investments.

We reason that it is beneficial for Canadian firms and the cities where they are located to house boards of directors, especially if these individuals are linked to other companies and cities because of their ability to amass inter-organizational business knowledge. Termed an interlocking directorate, this practice consists of members of directors serving on the boards of multiple corporations. If a firm is connected to boards of several other firms, it is in the center of a network and has access to valuable resources, one of which is knowledge. As argued by Connelly and Van Slyke (2012), with the external knowledge obtained, directors that serve on the boards of other firms are in a position to help management make better decisions.

A substantial amount of literature exists on the study of interlocking directorates and it has developed extensively over the last 100 years. As the business environment has changed, so too have the paradigms used to describe the environment of the interlocking directorate. From this literature, resource dependency has emerged as the dominant theory to explain why interlocking directorates occur. Based on their model, Pfeffer and Salancik (2003) reveal how structural characteristics of environments are associated with relationships among social actors. The combination of these two dimensions results in uncertainty. In other words, this theory states that firms are unable to generate all the necessary inputs for production. Firms respond with relationships to external elements of the environment, in this case through interlocking directorates, to ensure a supply of the required resources.

Recent research suggests that the external knowledge acquired in the form of interlocking directorates is a key source of competitive advantage and it highlights the limited research that assesses knowledge acquisition in the resource dependency literature (Pye *et al.*, 2014; Zdziarski and Czerniawska, 2016; Abdollahian *et al.*, 2017; Howard *et al.*, 2017; Withers *et al.*, 2018;). For example, research reveals how corporate governance practices quickly spread from one board to the next through common directors, denoting that experiences of directors on one board shaped what they did on other boards (Connelly *et al.*, 2011; Mazzola *et al.*, 2016). Shropshire (2010) terms this the diffusion model of interlocking whereby knowledge is circulated from one firm to another.

To be clear, this paper does not postulate that the corporate interlock is the only information gathering mechanism used by firms, or even that it is the most important. However, it is well documented that the interlock does provide firms with knowledge acquiring advantages not obtainable through other mechanisms. When mixed with internal knowledge created by the firm and knowledge acquisition from other external sources, interlocking directorates are a valuable source of the knowledge creation process.

Geographical research on interlocking directorates was first examined by Green and Semple (1981) and Green (1983). They revealed a network dominated by the cities in which major financial institutions have their headquarters. These cities in turn were part of networks that were regionalized in nature. Rice and Semple (1994), used interlocks to reveal increasing concentration of corporate power in Toronto over time. Kono *et al.* (1998) found that cities maintaining exclusive upper class social clubs resulted in local interlocks. Alternatively, cities not retaining exclusive upper class social clubs were less likely to maintain local interlocks.

O'Hagan and Green (2002a, 2002b, 2004) added a spatial dimension to the resource dependency paradigm as it pertains to interlocking directorates. They argued that geography plays more of a role in American interlocking than in Canada. They also found that intra-regional information flows can lead to less prosperity and that it is important for American companies to build relationships with firms internationally through interlocks (O'Hagan 2015; O'Hagan and Rice 2012, 2015).

We argue that when examining interlocking directorates geographically, it is important to have a mix of both inter- and intra-regional knowledge flows. The result will be accessing different forms of knowledge that provide for firm and regional success. Hence, we postulate that inter- and intra-provincial interlocking directorates are important. Due to the presence of the culturally dissimilar Quebec, Canada offers a useful setting to examine the influence of geography and culture on interlocking directorates and the knowledge gained from this phenomenon. This article takes advantage of this uncommon situation to compare the geography of interlocking by directors of Quebec firms to that of Ontario, and Atlantic Canadian firms.

This research study fits within the concept of institutionalism in economic geography, which argues that regional economic differences are primarily related to institutional disparities (Amin, 2004; Storper and Manville, 2006; Hodgson, 2007; Gertler, 2010, 2018). Institutions may be identified as compartments of socioeconomic organization and socioeconomic practices.

They can include formal structures such as legal rules, property laws, and government policies, as well as informal habits, codes of conduct, and organizational cultures. Perhaps North (1990) disentangles these characterizations best when he suggests that institutions are simply a set of rules that guide the economic behavior of agents.

A large and diverse country such as Canada has varied cultural practices and, therefore, different institutional practices across provincial boundaries. Since Quebec has such a distinct culture compared to other provinces in Canada, we argue that Canada offers a unique subnational example to explore institutions. In this case, we will examine what impact does cultural distinctiveness have on the business practice of interlocking by directors sitting on Quebec firms compared to other directors in the Eastern Canadian provinces of Ontario, New Brunswick, Newfoundland, Nova Scotia and Prince Edward Island?

When Gertler (2018) suggests that institutions make particular actions easier to perform, the obvious example is Quebec's distinct language. But many other examples exist as well. Although Quebec has never gained total control over immigration policies, it has made some major progress with the Canada-Quebec Accord, signed in 1991, which designed to preserve Quebec's cultural distinctiveness. The federal government remains responsible for admitting immigrants, but grants special consideration to the Government of Quebec for things such as duration of stay and authorization to work and study. Another example is employment and labor law in Canada is governed by the common law, but in the case of Quebec, this is a civil law jurisdiction (Civil Code of Quebec). Institutions, whether they be informal or formal, shape the economic decisions made by individuals, and related to this study, the preponderance for directors to interlock intra-provincially rather than inter-provincially.

We contend that it is important for Canadian companies to build relationships with firms outside their region to facilitate exposure to different institutions. Using interlocking directorates, whereby individuals link to external institutions and bring that knowledge back to the firm, addresses Gertler's (2010) main assertion for the future of institutional economic geography. He emphasizes that the economic agents that researchers use should not simply be firms, but should be individuals, such as managers.

DATA

This study utilizes a thorough dataset of directors for Eastern Canadian based firms as identified by Financial Post's *Directory of Directors* in the year 1912 and 2012. In 1912, each incorporated company in Canada was requested to supply a list of their directors and officers. Out of nearly 10,000 requests, approximately 5,000 were returned with most information completed. The 2012 register of companies includes a list of executive officers and directors for both publicly traded and privately owned companies. Criteria for inclusion in the 2012 sample includes: incorporation in Canada; substantial revenue or assets; and Canadian residency for the majority of the directors. Once a company qualifies for inclusion, its officers and directors automatically meet the criteria for a personal listing. As a result, while amalgamating the 1912 and 2012 datasets is not perfect, it offers a rare examination into a comparison of directorships across Canada.

Table 1 Summary of data, 1912 and 2012

Variable	Canada		Ontario		Quebec		Atlantic Canada	
	1912	2012	1912	2012	1912	2012	1912	2012
Total number of directors in dataset	6,997	24,163	4,541	9,474	1,781	3,812	633	866
Total number of interlocks in dataset	10,122	30,632	6,199	9,618	2,913	3,261	398	767
Total number of companies in dataset	1,741	5,699	470	2,076	178	747	58	200
Number of Directors per Company	4.02	4.24	9.66	4.56	10.01	5.10	4.02	4.33
Number of Interlocks per Director	1.45	1.27	1.37	1.02	1.64	0.86	0.63	0.89
Number of Interlocks per Company	5.81	5.37	13.19	4.63	16.37	4.37	6.86	3.84
% of directors in country			64.90	39.21	25.45	15.78	9.05	3.58
% of interlocks in country			61.24	31.40	28.78	10.65	3.93	2.50

Table 1 encapsulates the disparities of the data in the two collection years. The 1912 dataset includes 6,997 businessmen showing the directorships and offices they held for 1,741 companies across Canada. The 2012 dataset includes 24,163 businesswomen and businessmen for 5,669 companies in the country. The large discrepancy in raw data lies in how each publication collected data, and, as a result, data availability. Undoubtedly, more interlocking directorates occurred in 2012 when compared to that of 1912. However, the large difference found there can also be attributed to data availability. Importantly, this compels our study to be analyzed by comparing percentages and not actual numbers. The disparity holds true for our three areas of analysis as Ontario's total directors is much larger than Quebec's and dwarf's that of Atlantic Canada's total number of directors. This is also the reasoning for amalgamating the four Maritime provinces in this study.

The vast majority of directors across Canada served on only one board (87% of all directors in 1912 and 68% in 2012). A large number of directors also sat on two boards, although 100 years later these numbers are reversed: 8% in 1912 and 20% in 2012. At the other end of the spectrum are the directors that sat on a large number of boards. In 1912, those directors that sat on more than 10 boards made up 2.5% of all interlocks. In 2012 this was less than 1%. Chu and Davis (2016) term this elite group the Inner Circle. This decrease can be attributed, as Chu and Davis (2016) point out, to the fact that board recruiting practices changed over time, especially in the early 2000s. Researchers have given considerable interest to the structure and actions of corporate boards, particularly since the controversies surrounding Enron Corporation and WorldCom (now known as MCI Inc.). At that time well-connected directors became less preferred. As a result, the inner circle disappeared and companies became less connected to each other.

RESULTS

Since results suggest that the importance of the inner circle has faded, it would be appropriate to surmise that companies have become less connected over time as well. It is possible to test the connectivity of the corporate network via interlocking directors through the use of network theoretical concepts and methods (Borgatti *et al.*, 2002). At the center of network theory is the economic conduct of business organizations embedded in institutions (Granovetter, 1985). Using the concept of geodesic distance, or shortest network distance, it is possible to determine the density of a network (in this case comparing the interlocking networks of 1912 to those of 2012). It was found that the network between any pair of directors or any pair of companies decreased from an average of 5.2 to 4.2 over the 100 years. In other words, the opposite had occurred to what was expected. An increase in the number of directors sitting on two boards and a decrease in the inner circle, ensured the network of companies were more connected over time, through less well-connected directors. These figures display all nodes and links in each network with the 2012 clearly displaying a much greater density.

Table 2 highlights those companies that were at the “center” of the corporate network. To measure what constitutes a “center,” the concept of betweenness is used. Betweenness is considered a powerful measure of centrality because it takes into account where actors lie in the entire interlocking network. The ability to tap into knowledge embedded in relationships and to control flows of knowledge within the context of board networks should affect the extent to which directors can influence strategic decision-making processes for their firms and the cities where these firms are headquartered. Accordingly, knowledge transfers between the headquarters of firms (and their cities and provinces) should be a function of a director’s control of knowledge flow channels between firms. Betweenness measures control of knowledge flow by calculating how many times an actor sits on the geodesic (the shortest path) linking two other actors together. Connelly and Van Slyke (2012) suggest it is not what you know, it is who you know. Further, they argue it is not even who you know, it is who they know. This form of centrality views an actor as being in a favoured position to the extent that the actor falls on the geodesic paths between other pairs of actors in the network.

It is calculated as:

$$C_B(k) = \sum \partial_{ikj} / \partial_{ij}, i \neq j \neq k$$

Where,

∂_{ikj} = the number of geodesics linking firms i and j that pass through firm k

∂_{ij} = the number of geodesics linking firms i and j

Results suggest that the centrality of the most prominent firms lessened over time. In other words, the top firms held less power in the network. This occurred for a variety of reasons, most notably the increased number of firms in the 2012 dataset. Consequently, links did not necessarily need to travel through those central firms.

Table 2 Interlocks by company (as measured by centrality)

1912 company name	Industry	Centrality	2012 company name	Industry	Centrality
Dominion Coal Company Ltd.	Montreal, QC	0.091	London Life Insurance Company	Toronto, ON	0.076
Canadian General Electric Company Ltd.	Toronto, ON	0.091	The Canada Life Assurance Company	Toronto, ON	0.076
Western Assurance Company	Toronto, ON	0.090	The Great-West Life Assurance Company	Winnipeg, MB	0.075
Toronto Electric Light Company Ltd.	Toronto, ON	0.090	Canada Life Financial Corporation	Toronto, ON	0.075
Toronto and York Radial Railway Company	Toronto, ON	0.090	Great-West Lifeco Inc.	Winnipeg, MB	0.074
British America Assurance Company	Toronto, ON	0.090	Power Financial Corporation	Montreal, QC	0.074
National Trust Company Ltd.	Toronto, ON	0.089	Canada Life Financial Corporation	Toronto, ON	0.073
Canadian Pacific Railway Company	Montreal, QC	0.089	Burnet, Duckworth & Palmer LLP	Calgary, AB	0.073
Toronto Railway Company	Toronto, ON	0.089	IGM Financial Inc.	Winnipeg, MB	0.073
Royal Trust Company	Montreal, QC	0.089	Power Corporation of Canada	Montreal, QC	0.073
Dominion Iron and Steel Company Ltd.	Toronto, QC	0.088	Alexis Minerals Corporation	Toronto, ON	0.073
Canadian Bank of Commerce	Toronto, ON	0.088	Sulliden Gold Corporation Ltd.	Toronto, ON	0.072
Bank of Montreal	Montreal, QC	0.088	Continental Minerals Corporation	Vancouver, BC	0.072
Toronto General Trusts Corporation	Toronto, ON	0.087	Northern Dynasty Minerals Ltd.	Vancouver, BC	0.072
Central Canada Loan and Savings Company	Toronto, ON	0.860	Crowflight Minerals Inc.	Toronto, ON	0.071
Dominion Securities Corporation Limited	Toronto, ON	0.860	Nyah Resources Corp.	Toronto, ON	0.071
Sao Paulo Tramway, Light and Power Company Ltd.	Toronto, ON	0.860	Lundin Mining Corporation	Vancouver, BC	0.071
Montreal Trust Company	Montreal, QC	0.860	Kria Resources Ltd.	Toronto, ON	0.071
Montreal Light, Heat and Power Company	Montreal, QC	0.085	Penn West Energy Trust	Calgary, BC	0.071
Rio de Janeiro Tramway, Light and Power Company Ltd.	Toronto, ON	0.085	Valencia Ventures Inc.	Toronto, ON	0.071
Canada Foundry Company Ltd.	Toronto, ON	0.084	McCarthy Tétrault LLP	Vancouver, BC	0.070
London Electric Company Ltd.	London, ON	0.083	Avion Gold Corporation	Toronto, ON	0.070
Canada Paper Company Ltd.	Windsor Mills, QC	0.083	Brookfield Asset Management Inc.	Toronto, ON	0.069
Ogilvie Flour Mills Company Ltd.	Montreal, QC	0.083			

With specific reference to Eastern Canada the results obtained by the study are somewhat as expected. Table 1 reveals that Eastern Canada accounted for 99% of directors and 93% of all interlocks. With the increased development of Western Canada over the 100 years study period, these numbers were expected to decrease significantly and did to 59% of all directors in 2012 and 45% of all interlocks. When comparing the regions of Eastern Canada, Ontario’s proportion of all directors decreased 26% of all directors while interlocks decreased almost 30%. Quebec’s proportion of all directors decreased 10% while interlocks decreased almost 18%. Atlantic Canada’s proportion of all directors decreased 5% while interlocks decreased almost 1.5%.

Table 3 summarizes Intra- and Inter-Provincial Interlocks for the years 1912 and 2012. Comparing results with those in Table 1, it is expected that the percentage of interlocking with Eastern Canada for Ontario, Quebec, and Atlantic Canada should decrease considering the increasing importance of Western Canada in terms of corporate power for 2012 compared to 1912. This is was found to be the case as all three regions increased their linkages to Western Canadian firms via interlocks. Examining the final three columns in Table 3 it is possible to see that Ontario and Atlantic Canada increased much more substantially than Quebec for linking to Western Canada. This is especially true for British Columbia and Alberta as Ontario increased linkages by 12% and 10.5% of their total interlocks to firms in these provinces respectively. Atlantic Canadian firms increased the amount of interlocking to British Columbia by 11.5% and to Alberta by 9% of their total connections. Conversely, Quebec firms lagged in their linkages to British Columbia, increasing the proportion of all of their interlocks by 4% to British Columbia and 5% to Alberta.

Table 3 Geographical distribution of Intra- and Inter-provincial interlocks, 1912 and 2012

Province	% of Interlocks, 1912			% of Interlocks, 2012			= change over 100 years		
	Ontario	Quebec	Atlantic Canada	Ontario	Quebec	Atlantic Canada	Ontario	Quebec	Atlantic Canada
Ontario	82.48	27.52	10.67	60.02	24.26	30.12	-22.46	-3.25	19.44
Quebec	12.98	67.69	15.45	8.67	61.15	5.41	-4.30	-6.54	-10.04
Atlantic Canada	0.64	1.96	73.03	2.38	1.35	35.06	1.74	-0.60	-37.97
New Brunswick	0.12	0.32	11.80	0.87	0.62	5.88	0.76	0.30	-5.92
Newfoundland	0	0	2.25	0.06	0.12	4.94	0.06	0.12	2.69
Nova Scotia	0.52	1.64	58.71	1.44	0.62	22.82	0.92	-1.02	-35.88
PEI	0	0	0.28	0	0	1.41	0	0	1.13
BC	1.56	1.46	0.28	13.59	5.48	11.76	12.03	4.02	11.48
Alberta	0.35	0.39	0	10.91	5.23	9.18	10.56	4.84	9.18
Saskatchewan	0.08	0	0	0.73	0	7.53	0.65	0	7.53
Manitoba	1.42	0.89	0.56	3.51	2.52	0.94	2.09	1.64	0.38

Table 3 also reveals the importance of geography for firms interlocking from all of the three regions being investigated. This is especially true for 1912 when intra-provincial interlocking dominates, undoubtedly due to the lack of infrastructure for transport and communication at the time as well as Canadian commerce being focused in the Eastern portion of the country (although significant developments took place for transport and communications, especially between 1867 and 1912). It was found that 83% of all Ontario firms were linked to other firms within the province in 1912. Additionally, it was observed that 68% of all Quebec firms were interlocked intra-provincially and that 73% of all Atlantic Canadian firms linked within that region. Akin to Table 1, these figures dropped dramatically with 60% of Ontario’s interlocks, 61% of Quebec’s interlocks, and 35% of Atlantic Canada’s interlocks occurring intra-provincially in 2012. As stated earlier, the opening of Western Canada is unquestionably an important explanation for these findings.

Examining the right hand columns in Table 3 allows for closer consideration of the three intra-provincial changes. While all decreased significantly, once again, Quebec stands out. Ontario and Quebec firms both maintain approximately 60% of their interlocks within their province, but Quebec firm’s propensity for intra-provincial interlocks only decreased 6.5%. To make clear, Quebec firms interlocked intra-provincially more than any other province in 2012 and their propensity to alter the geographical make-up of their interlocking network to incorporate links to firms external to their province was the least of our three study regions over the 100 year study period.

Table 4 summarizes selected cities in Eastern Canada that have the highest number of headquarters, directors, and interlocks as well as changes to these variables over the 100 year study period. The 11 cities account for a little over half of the headquarters and directors in 1912. For the importance of this study the third column, the % Change, is of particular interest. In 1912 directors of Toronto firms also sat on the board of other Ontario companies in 83% of all cases. In 2012, this dropped to 65%. The decline is expected as firms attempt to expand their interlocking networks to a wider geographical territory. This is still a fairly high percentage of their overall interlocks. However, the amount of directors and opportunities that exist in Ontario justify this. As evidence, results in Table 4 reveal that after interlocking to firms in their home province every city’s second greatest linkages were to Ontario firms (St. John firms equally linked to New Brunswick and Ontario firms).

Table 4 Summary of Inter- and Intra-Provincial interlocks by select Eastern Canadian cities, 1912 and 2012

City	Ontario			Quebec			Atlantic Canada			West			North		
	1912	2012	Change	1912	2012	Change	1912	2012	Change	1912	2012	Change	1912	2012	Change
Toronto	83.06	64.98	-18.09	12.47	8.45	-4.02	0.69	1.83	1.14	3.77	24.70	20.93	0	0.04	0.04
Montreal	27.66	28.50	0.84	67.83	55.92	-11.90	1.94	1.48	-0.46	2.57	14.10	11.52	0	0	0
Hamilton	86.50	75.00	-11.50	10.95	4.17	-6.78	0.73	8.33	7.60	1.82	12.50	10.68	0	0	0
London	89.37	55.45	-33.92	8.66	5.45	-3.21	0	0.91	0.91	1.97	37.27	35.30	0	0.91	0.91
Ottawa	89.89	57.96	-31.93	8.24	14.33	6.09	0	4.14	4.14	1.87	22.29	20.42	0	1.27	1.27
Quebec City	25.69	16.81	-8.88	69.44	72.84	3.40	0	0.86	0.86	4.86	9.48	4.62	0	0	0
Halifax	9.87	28.09	18.22	13.45	5.11	-8.35	76.23	36.60	-39.64	0.45	30.21	29.76	0	0	0
St. John	13.21	50.00	36.79	16.98	0.00	-16.98	67.92	50.00	-17.92	1.89	0.00	-1.89	0	0	0
Sydney	17.86	42.86	25.00	14.29	14.29	0	67.86	0	-67.86	0.00	42.86	42.86	0	0	0

Firms of the other large city in Table 4, Montreal, were part of an interlocking directorate to other firms in Quebec 56% of the time in 2012. This is a smaller proportion as the opportunities to other firms in Quebec are much less than Toronto’s opportunity to link to other Ontario firms. Montreal and Toronto are similar in that they are at the top of Canada’s business and urban hierarchy, and international business centers. Therefore, perhaps more important is the fact that Montreal’s change in intra-provincial interlocking decreased only 12%. It was anticipated that Montreal firms would expand their pattern of interlocking to include more distant firms.

Results for third tiered cities were expected, as all cities decreased the intra-provincial portion of their interlocking network substantially. The two exceptions were Hamilton and Quebec City. For example, Ottawa is connected far more to companies outside Ontario (42% inter-provincial) and Halifax to cities outside of Atlantic Canada (42% inter-provincial 63% outside the region) than is Quebec City. Quebec City companies rely less on an interlocking network outside their home province (27%). Of the intra-provincial links from Quebec City firms, Ontario firms dominate these connections (17%), whereas Ottawa and Halifax based firms’ interlocks are more evenly distributed across the country. Thus, the theme remains for Quebec City firms that Montreal firms and the province of Quebec’s firms as a whole.

DISCUSSION

This paper has noted that institutions can be recognized as divisions of socioeconomic practices. Additionally, that sociologists and economists investigate this concept through the social networks of individual actors or firms. But geographers differ in that they highlight place and space as a vital component to this study area.

This study on interlocking directorates provides intriguing results, especially when considering that a vein of this research emphasizes how proximity may actually hinder innovation due to lock-in especially when cultural differences arise (Boschma 2005).

Results show that Ontario's proportion of all interlocks across Canada decreased more than the other two regions in this study. However, we argue that Quebec's decrease was actually more substantial. The French province's proportion decreased from 29% of all interlocks in 1912 to only 10% in 2012. In fact, not shown here, but British Columbia and Alberta's directorships and interlocks actually rose from almost nothing in 1912 to make-up more than Quebec's proportion in 2012. Atlantic Canada's proportion of interlocks decreased as well, albeit a small proportion of all interlocks.

Perhaps the most important finding of this study is the fact that Quebec firms interlocked intra-provincially more than any other province and their propensity to transform these interlocks to external links was the least over the 100 year study period. In Quebec's case, this can be explained by the cultural dissimilarities with the rest of the country. Ontario's intra-provincial interlocks maintained a healthy proportion of intra-provincial interlocking as well. Ontario's results can be explained by the sheer volume of companies, and thus the interlocking opportunities within the province. Directors sitting on Ontario boards make-up 40% of all directors in the 2012 dataset and Quebec directors only constitute 16% of all directors (Table 1), this difference is even more noteworthy.

Over the 100 year study period it is important to note that intra-provincial interlocks by Toronto firms decreased 18% of their total connections. This decline meant that geographically, Toronto firms increased their network to firms in other provinces. The difference was generally picked up with connections to Western Canadian firms, although links slightly increased to Atlantic Canadian and Northern Canadian firms as well. As transport and communications improved, Toronto firms moved from an insular perspective to a set of connections with distant firms experiencing dissimilar institutions.

Perhaps more important, were results for Montreal, the other large city in the study. Montreal and Toronto are similar in that they are at the top of Canada's business and urban hierarchy, and international business centers. Therefore, it was anticipated that the proportion of Montreal's firms intra-provincial interlocking would decrease significantly. In fact, it only decreased 12%. The difference between Montreal and Toronto (18% to 12%) is more meaningful by the fact that the opportunities for Montreal firms to share an interlock with other firms in Quebec are much less than Toronto's opportunity to link to other Ontario firms. Only 12% of Hamilton firms, as noted previously, suffered tremendous losses to their interlocking network, and Quebec City, which actually increased their intra-provincial connections, did not expand their interlocking network more than Montreal.

The cities of Ottawa and Halifax are comparable to Quebec City in that each plays important administrative roles in addition to being business centers. The cities differ in that Quebec City is dominated by a French speaking population (95%) and by the fact that it is Quebec's capital. Halifax is the provincial capital but also widely regarded as Atlantic Canada's top tier city. As Canada's capital, Ottawa's administrative responsibilities dwarf its role in business. Results reveal that Ottawa and Halifax extended their interlocking network countrywide while Quebec City companies rely less on an interlocking network outside of their home province. Thus, the theme remains for Quebec City firms what Montreal firms have experienced.

Results of the two cities from Quebec in our sample, Montreal and Quebec City, suggest that their inward-looking perspective is alarming as it inhibits Quebec firms from being exposed to institutions outside the province. With advancements in transport and communications, and opportunities that arose for Western Canadian firms over this study's 100 year research period, it would be reasonable to assume that every city in Table 5 would substantially increase their interlocking network across all provinces. This is not the case for firms in the two Quebec cities. As an international urban area, one would expect Montreal firms to decrease their intra-provincial interlocking more than all cities in the sample, especially when considering the intra-provincial interlocking opportunities by Toronto firms. Additionally, Quebec City was the only city to actually increase their interlocking network within their home province. Even interlocks to Atlantic Canada were to firms in New Brunswick, geographically close but also the only other province in Canada that maintains French as an official language.

CONCLUSION

This article set out to examine inter-organizational networks underpinning the flow of knowledge within and across firms via interlocking directorates. Previous literature reveals that regional competitiveness benefits from both internal and external knowledge bases. On one hand, a regional culture of social inclusion is likely to increase knowledge sharing and thus competitiveness for all. At the same time, a lack of external links can deprive firms of access to information in other growth areas.

Results revealed that all three regions diffused their interlocking to more distant networks over the 100 year study period. All three regions increased their linkages to Western Canadian firms via interlocks, however Ontario and Atlantic Canada increased much more substantially than Quebec for linking to Western Canada. The geographically based results show that Quebec firms continued to interlock intra-provincially more than Ontario and the Atlantic Provinces.

At the city level, Montreal and Toronto are comparable international urban centers and exert considerable influence as business focal points. Of the two, Montreal's fall from the top of the interlocking hierarchy is troubling. In 1912 a quarter of all interlocking directorates encompassed a Montreal firm. This decreased to 6% in 2012. Perhaps more important is the fact that Montreal's change in intra-provincial interlocking decreased only 12%.

Quebec City, the other notable Quebec City in this study followed a similar pattern. Firms from Quebec City actually increased intra-provincial interlocking over the 100 year study period. This inward bias in the long run can leave a region, in this case Quebec, at a distinct disadvantage and contribute to its decline. Disregarding ideas from external individuals, especially employment pivotal to the success of the corporation, can leave firms vulnerable.

This study invites further questions on the subject, especially when considering Quebec City and Montreal. The following question is raised: Do cultural differences outside the province prevent directors of Quebec City firms from accessing important sources of external knowledge? A qualitative study that asks specific questions will allow this to occur.

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