CFGR | FCRG

Canadian Foundation for Governance Research
Fondation canadienne de recherche sur la gouvernance

The Robert Bertram Doctoral Research Awards

2014 RESEARCH REPORT

Corporate Governance, Board Interlocks and Environmental Performance: Evidence of Large Canadian Firms

Jing Lu
Haskayne School of Business, University of Calgary

cfgr.ca

ABSTRACT

Research Question/Issue: This paper studies corporate governance, board interlocks and firms' environmental performance in Canada.

Research Findings/Insights: Using a sample of firms listed on S&P/TSX Composite Index in 2012, I first find a non-linear relationship between directors' busyness (measured by average number of boards per director) and firms' environmental performance. Using curve estimation regression statistics, I find the optimal number of boards per director is about two. Second, I find a negative relationship between a firm and its interlocking firms' environmental performance both in aggregate form and in pairs. These evidences indicate that firms with high and low environmental performance are mingled together through board interlocks in Canada. Third, this paper also confirms the findings in previous researches that firms with large board size, good corporate governance, low demand for external funding, high risks and high takeover defenses have high environmental performance.

Theoretical/Academic Implications: This paper provides empirical evidence of a midrange, contingency-based, inverted U-shaped relationship between board interlocks and firms' environmental performance. It contributes to the debate whether there is a positive or negative relationship between board interlocks and environmental performance suggested by resource dependency theory and agency theory.

Practitioner/Policy Implications: For boards and individual directors, this paper improves their understanding of board composition, which may lead to strategic decisions

to improve corporate governance structure and practice, especially through succession plans. For investors, this research demonstrates the values and impacts of board interlocks. For policy makers, this paper provides empirical evidence that might suggest the necessity to consider interlock regulations.

BACKGROUND

Nominating an interlocking directorate is a dilemma. On the one hand, an interlocking director provides valuable human, relational, and informational resources, which could benefit the firm. On the other hand, having an overextended director who is unable to devote sufficient time and commitment might reduce the effectiveness of corporate governance.

Overboarded directors also concern the shareholders. Institutional Shareholder Services (ISS) and Glass Lewis are two major proxy advisory firms whose voting policies are widely accepted by institutional investors. ISS defined overboarded directors as "sit on a number of boards which could result in excessive time commitments and an inability to carry out their oversight duties"(ISS, 2013). ISS recommends investors to vote against CEO directors that sit on more than two public companies outside their own companies or an individual director that sits on more than six public company boards. Similarly, Glass Lewis suggested investors to vote against certain director if, "a director serves on an excessive number of boards" or "a director who has interlocking directorships with one of the company's executives." (Glass Lewis & Co., 2013).

Numerous prior researches have studied the link between board characteristics and firms' environmental performance and/or quality of disclosure such as the board

structure (e.g. the presence of an environmental committee and/or a chief sustainability office) and theboard composition (e.g. independence, diversity, and expertise) (Peters & Romi, 2013; Rupley, Brown, & Marshall, 2012; Zhang, Zhu, & Ding, 2013). However, firms are not isolated in the business world and multiple board appointments are common. In addition to the expertise of individual board members, their relational resources are also important. This paper fills a gap in the research by investigating the relational dimension of corporate governance (i.e. social network created by board interlocks) and firms' environmental performance. It hopes to shed some light on the study of corporate governance, board interlocks, and environmental performance in Canada.

I investigate the following questions: (1) Is there a relationship between directors' busyness and firms' environmental performance? Are the policies regarding overboarded directors from ISS and Glass Lewis appropriate? (2) Do the firms benefit from board interlocks? Is there a link between a firm and its interlocking firms' environmental performance?

LITERATURE REVIEW

An interlocking directorate refers to the situation in which a person affiliated with one organization sits on the board of directors of another organization (Mizruchi, 1996). When two organizations share a common director, it creates a board interlock (Richardson, 1987). Boards of directors have two important functions: monitoring management on behalf of shareholders to reduce agency cost (agency theory) (Jensen & Meckling, 1976) and providing resources (resource dependence theory) (Hillman & Dalziel, 2003).

Board Interlocks and Financial Performance

Agency theory (Jensen & Meckling, 1976) deals with the separation of ownership structure between shareholders and management. To control the firm effectively and reduce agency costs, board of directors perform monitoring role on behalf of the shareholders (Boyd, 1990; Johnson, Daily, & Ellstrand, 1996; Pearce & Zahra, 1992). There is a long lasting debate on how multiple appointments affect firm's financial performance and the results are contradicting (Kaczmarek, Kimino, & Pye, 2012; Zahra & Pearce, 1989). Ferris, Jagannathan, and Pritchard (2003) found that good firm performance helped directors seeking multiple appointments using a sample of large firms in 1995. Their evidences showed that sitting on multiple boards did not increase the likelihood of shirking and fraud. However, things might be changed after the Sarbanes-Oxley Act (SOX) took effect. Although there is no explicit rule about multiple board appointments in SOX, the independence requirements in SOX and other corporate governance reforms has made multiple appointments costly and there is a declining trend of serving on multiple boards (Chu & Davis, 2011). Using a more recent sample between 1999 and 2008 in US, Cashman, Gillan, and Jun (2012) found a negative association between busyness and firms' performance. The result is consistent with Andres, van den Bongard, and Lehmann (2013)'s finding using 133 German firms from 2003 to 2006 and Kaczmarek et al. (2012)'s finding using financial and utility firms between 1999 and 2008. Busy boards (with a majority of outside directors hold three or more directorships) are associated with weak corporate governance, low market-to-book ratios, and weak profitability (Fich & Shivdasani, 2006). And market acts negatively when the CEO is appointed as a director in an outside firm (Fich, 2005). When the CEO interlocks are

reciprocal, it benefits the CEOs personally rather than the shareholders (Fich & White, 2005). However, it is unclear how multiple appointments affect firms' environmental performance.

Resource Dependency View

Resource dependency theory (Pfeffer & Salancik, 1978) uses social context and power to explain strategies and organization behaviors (Davis & Cobb, 2010). It was originally developed to provide alternative explanation for merger and board interlocks (Pfeffer, 2003).

Hillman and Dalziel (2003) provided an explanation of a board's role from the resource dependency perspective. Resource dependence theory views the board as a provider of resources, called board capital. Board capital has two elements: human capital (experience, expertise, reputation) and relational capital (network of ties to other firms and external contingency). Some authors offer a third element, structural, which provides for development of communication lines and sharing of information (Nahapiet & Ghoshal, 1998). Hillman, Withers, and Collins (2009) summarized Pfeffer and Salancik (1978) thoughts and suggested that "directors bring four benefits to organization: a) information in the form of advice and counsel, (b) access to channels of information between the firm and environmental contingencies, (c) preferential access to resources, and (d) legitimacy." Board composition help "match the resources provided by the board with the needs of the firm" (Hillman et al., 2009). Social capital is "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (Nahapiet & Ghoshal, 1998, p. 243). Social capital results in the creation of knowledge, knowing and

professional practices that brings advantage to firms (Nahapiet & Ghoshal, 1998). Board interlocks is a type of social capital created by sharing common board members. Firm's economic outcome are affected by its network structure (Granovetter, 1985) and among them, board interlocks are considered to be most influential (Mizruchi, 1996).

Directors' human and social capitals are found to be linked with the effectiveness of acquisition (McDonald, Westphal, & Graebner, 2008) and strategic decision making (Mason & Westphal, 2001). Firms with interlocked boards are more likely to form joint ventures (Gulati & Westphal, 1999). Stevenson and Radin (2009) conducted a survey of all board members of 14 companies and found social capital (ties to others) made a director more influential than his/her human capital.

Board interlocks provide information (Haunschild & Beckman, 1998) and facilitate social learning and imitation of policies (Beckman & Haunschild, 2002; Haunschild, 1993; Mizruchi, 1996; Westphal, Seidel, & Stewart, 2001). Social ties between CEO and board members improve the level of collaboration trust and information, and thus enhance the effectiveness of governing (Westphal, 1999). And empirical evidence was found that the existence of social ties improved the quality of financial reporting (Hoitash, 2011). Thus, there is a positive link between directors' social ties and firms' future performance (Horton, Millo, & Serafeim, 2012).

Embeddedness View

Granovetter (1985) studied how behavior and institutions are affected by social relations, what he called as "structural embeddedness." He argued that, similar to human behavior, economic behavior is also socially embedded. The relations that exist between different economic actors significantly influence their economic behavior.

"Embeddedness refers to the fact that economic action and outcomes ... are affected by actors' dyadic (pairwise) relations and by the structure of the overall network of relations" (Granovetter, 1992, p. 33). From the firm level, economic sociologist Granovetter's network embeddedness paradigm indicates that a firm's behavior could be affected by its relation with other firms and interlocking directorates provide a logical site to test the embeddedness model (Mizruchi, 1996).

Granovetter (2005) found three main reasons that a social network affects economic outcomes (1) a social network affects the flow and the quality of information (2) a social network is an important source of reward and punishment and (3) trust emerges in the context of a social network. He explained that information is difficult to verify, so actors rely on people they know to get information. And the impact of reward and punishment are often magnified if they are coming from the people the actors personally know.

Spillover Effect

Evidences show that investors believe in the contagion effects through board interlocks. If one firm restates accounting earnings that reduce shareholder wealth, investors are more likely to reduce the share price among non-restating firms in the same industries due to the accounting quality concerns (Gleason, Jenkins, & Johnson, 2008). When a firm is accused of financial reporting fraud, its interlocking firms immediately suffer from reputational penalties in terms of decline in cumulative abnormal returns over a two-day event window (Kang, 2008). If one firm is sued for financial fraud, the

valuations of its interlocking firms also decline significantly since the possibility of fraud increases (Fich & Shivdasani, 2007).

Board Interlocks and Diffusion of Practices

Board interlocks serves as a channel of diffusing practices (Shropshire, 2010). Numerous researches have found evidences that corporate governance practices diffuse through board interlocks, such as antitakeover tactics poison pills (shareholder rights plan) and golden parachutes (change-in-control benefits) (Davis & Greve, 1997), and board independence policies (Westphal & Zajac, 1997). And corporate governance practices tend to converge because of the network effects (Bouwman, 2011). In terms of accounting practices, Firms are more likely to expense stock option grants voluntarily if they have insider director interlocks with other firms with similar practice (Kang & Tan, 2008). Firms are more likely to engage in earnings management if they are linked with a manipulator through board interlocks (Chiu, Teoh, & Tian, 2012).

RESEARCH DESIGN AND DATA

Sample

This paper examines the relationship between board interlocks and environmental performance using a sample of Canadian S&P/TSX composite index firms in 2012. Following the work of Chiu et al. (2012) in the accounting literature, I define the presence of a board interlock between firm M and N when director A sits on the boards of M and N simultaneously. This paper does not distinguish the interlocks created by inside and outside directors (directional and non-directional interlocks) but perhaps this method might be fruitful for future research.

Board and financial information are collected from the S&P Capital IQ database

for year 2012. Firms' environmental and governance performance are collected from the Sustainalytics database, which is a global leading company in environmental, social and governance (ESG) performance ratings. Sustainalytics has 20 years experience in ESG research. Its research teams are located in twelve major cities in North America, South America, Europe and Asia. Sustainalytics uses Likert-type scales of 160 indicators and groups them into four themes: governance (34 indicators), social (58 indicators), environment (56 indicators) and product (12 indicators). Sustainalytics database has been used in previous studies of academic research. For example, Surroca, Tribó, and Waddock (2010) used Sustainalytics to study the relationship between a firm's corporate responsibility and financial performance.

To ensure Sustainalytics ratings are valid, I compared its ratings with another commonly used environmental, social and governance performance database: MSCI (formerly known as Kinder Lydenberg Domini (KLD)) and find similar dimensions. According to a survey conducted by GlobalScan and SustainAbility among 850 sustainability professionals in June 2012, Sustainalytics was found to be more credible than MSCI ESG indices by the experts from business, government, NGOs and academia (GlobalScan & SustainAbility, 2012). Sustainalytics updates firm ratings on a monthly basis and I use the year-end ratings of 2012 in this research.

I first start with all the firms that are listed in Canadian Stock Exchanges and find 3,721 firms. Table 1 shows that there are 14,432 directors that siting on the boards of Canadian firms in 2012. The majority (75 percent or 10,887 directors) sits on the board of one firm. Those sitting on only one board do not create board interlocks. About 14 percent of the directors (2,043 directors) sit on the boards of two firms, five percent (796

directors) sit on the boards of three firms, two percent (342 directors) sit on the boards of four firms and two percent (364 directors) sit on the boards of five firms or above.

Most of the firms are not rated by Sustainalytics database. Therefore, their environmental performance is not observed. This reduces the sample size to 237 firms and all are large firms listed on S&P/TSX composite index (largest firms listed on Toronto Stock Exchange). Table 2 shows the descriptive statistics in the sample. Similar to the statistics above, there are 2,028 directors in the sample and the majority (83.6 percent, 1,695 directors) sits on one board. Two hundred fifty-two directors (12.4 percent) sit on two boards, sixty-six directors (3.3 percent) sit on three boards, twelve directors (0.6 percent) sit on four boards and three directors (0.1 percent) sit on five boards.

Control Variables

Governance. To control for the possibility that environmental performance can be driven by overall good corporate governance (Jamali, Safieddine, & Rabbath, 2008), I use the governance score from Sustainalytics database as a control variable.

Leverage: Total debt to total assets is used as the measure of leverage. It is often included in assessing overall financial performance of a firm or the relationship between financial and environmental/social disclosures (e.g., Boulouta, 2012; Gul et al., 2011).

Growth: High growth companies are likely to enhance competitive advantage through better environmental and financial performance generating prevention efforts (Russo & Fouts, 1997). High growth companies often have organic, flexible and lean organizational structures that can adapt to a dynamic context more quickly (Pfeffer, Hatano, &

Santalainen, 1995). I measure growth as Market to Book (MTB) ratio and anticipate a positive association between environmental performance and MTB ratio.

Demand for external financing. I defined the demand for external financing as free cash flow (FCF) scaled by current assets following Dechow, Sloan, and Sweeney (1995) and Bowen, Rajgopal, and Venkatachalam (2008). I measure FCF as the difference between cash free from operations in year t-1 and the average of capital expenditures of year t-1, t-2, t-3. If FCF is minus 0.5 then it indicates the current assets can fund a firm's operating and investing activities for about two year. If the demand for external financial is less than minus 0.5, then the dummy variable CAP equals one, which indicates the firm needs external financial and zero otherwise. Firms with external financing demand are less likely to pursue high environment performance. Therefore, I anticipate a negative association between environmental performance and CAP.

Risk. I use standard deviation of quarterly cash flow from operation from 2009 to 2011 as the proxy for risk following Minton and Schrand (1999) and Bowen et al. (2008).

Financial Performance: Many corporate governance studies use Tobin's Q as the proxy for firm performance (e.g. Surroca et al. (2010)). I do not use Tobin's Q because it is also a proxy for growth opportunities (Wintoki, Linck, & Netter, 2012), which duplicates the sales growth control variable. I use return on assets (ROA) following Chiu et al. (2012). ROA is calculated as income before extraordinary items divided by total assets.

Firm Size, Institutional Holdings, Independent Directors and Board Size: I control for firm size, institutional holdings, independent directors and board size following Chiu et al. (2012). I measure board independence using number of the independent directors divided by board size. More independent board structures improve the effectiveness of monitoring (Klein, 2002). And firms with large boards have greater opportunities for interlocks. I measure the firm size using natural log of total assets. Percentage of institutional holdings and board size are collected from Capital IQ database.

Takeover Defense. I use takeover defense scores from Capital IQ. High scores indicate strong anti-takeover defense, such as the existence of poison pills, classified boards, super-majority provisions, and golden parachutes. Previous researches find that takeover pressures are associated with managerial myopia (Stein, 1988). Takeover defense mechanisms reduce the external pressures, provide some quiet life to managers (Zhao & Chen, 2008) and reduce the incentive to pursue high environmental performance. I anticipate a negative association between environmental performance and takeover defense.

Environmental Sensitive Industries. Firms in environmental sensitive industries are more committed to environmental disclosures (Kuo, Yeh, & Yu, 2012), so I anticipate firms in environmental sensitive industries have higher environmental performance. US small business administration (SBA) categorized Mining, Constructions, Manufactory, Transportation, Communications, Electric, Gas & Sanitary Service as environmental sensitive industries (SBA, 2012). I follow SBA's classification and set variable EnvSen to one if the firm is in environmental sensitive industry, and zero otherwise. Table 3

shows the descriptive statistics of firms by industry. Table 4 and 5 provide descriptive statistics of all variables in model 1, 2 and 3.

[Insert Table 3, 4 & 5 Here]

Environmental Performance and Board Interlocks

I use the following regression model (model 1) to test the link between directors' busyness and firms' environmental performance. The dependent variable is environmental performance from Sustainalytics database. The independent variable is average number of boards per director, which is calculated as following. The numerator is the sum of all Canadian boards one firm's directors sit on and the denominator is the board size. If all directors in one firm only sit on the board of that firm, then the average number of boards per director is one. The reason I use all Canadian boards (3,721 firms) instead of the S&P/TSX sample (237 firms) to calculate the busyness is because sitting on the boards of other Canadian firms occupies directors' time regardless whether that firm's environmental performance is observable or not. As shown in Table 4, the average busyness is 2.1 boards per director, the minimum is one board per director (no interlocks) and the maximum is 5.8 boards per director.

$$AVG_{BOARDS} = \frac{\sum Number\ of\ Boards\ in\ Canada}{Board\ Size}$$

Model 1:

$$ENVIRONMENT_t = \beta_0 + \beta_1 AVG\_BOARDS_t + \beta_2 GOVERNANCE_t + \beta_3 LEVERAGE_t + \beta_4 GROWTH_t + \beta_5 CAP_t + \beta_6 RISK_t + \beta_7 ROA_t + \beta_8 SIZE_t + \beta_9 INT\_OWN_t + \beta_{10} IND_t + \beta_{11} BOARD\_SIZE_t + \beta_{12} TAKEOVER_t + \beta_{13} ENVSEN_t + \varepsilon_t$$

where:

$ENVIRONMENT_t$=environmental performance at t

AVG_BOARDS_t=average number of boards per director at t

$GOVERNANCE_t$=governance performance at t

$LEVERAGE_t$=leverage ratio, total debt to total assets at t

$GROWTH_t$=market to book ratio at t

CAP_t=demanding for external financing at t

$RISK_t$= standard deviation of quarterly cash flow from operation from previous three years

ROA_t=net income divided by total assets at t

$SIZE_t$=natural log of total assets at t

INT_OWN_t=institutional ownership at t

IND_t=proportion of independent directors at t

$TAKEOVER_t$= takeover defense score at t

$ENVSEN_t$= 1 if in environmental sensitive industry, 0 otherwise

Environmental Performance and Interlocking Firms' (Neighbors') Average Environmental Performance

To test whether a firm's environmental performance is linked with the average performance of its interlocking firms (neighbors), I run the regression in model 2. Twenty-seven firms in the sample are not linked to other firms (isolated), therefore their interlocking firms' environmental performance are not available. This reduces the sample size from 237 firms to 210 firms.

Model 2:

$$ENVIRONMENT_t = \beta_0 + \beta_1 AVG\_NEIGHBOUR\_ENV_t + \beta_2 GOVERNANCE_t + \beta_3 LEVERAGE_t + \beta_4 GROWTH_t + \beta_5 CAP_t + \beta_6 RISK_t + \beta_7 ROA_t + \beta_8 SIZE_t + \beta_9 INT\_OWN_t + \beta_{10} IND_t + \beta_{11} TAKEOVER_t + \beta_{12} ENVSEN_t + \varepsilon_t$$

where:

$ENVIRONMENT_t$=environmental performance at t

$AVG\_NEIGHBOUR\_ENV_t$=average environmental performance of interlocking firms

$GOVERNANCE_t$=governance performance at t

$LEVERAGE_t$=leverage ratio, total debt to total assets at t

$GROWTH_t$=market to book ratio at t

CAP_t=demanding for external financing at t

$RISK_t$= standard deviation of quarterly cash flow from operation from previous three years

ROA_t=net income divided by total assets at t

$SIZE_t$=natural log of total assets at t

INT_OWN_t=institutional ownership at t

IND_t=proportion of independent directors at t

$TAKEOVER_t$= takeover defense score at t

$ENVSEN_t$= 1 if in environmental sensitive industry, 0 otherwise

Environmental Performance and Interlocking Firms' Environmental Performance (Paired Sample)

In addition to study the link between a firm and its neighbor's environmental performance on average, I look at the firm pairs. For each pair of the firms sharing one director, I randomly assign one firm as information receiving and the other firm as information sending firm following Shi (2011). I use the information receiving firm's environmental performance as dependent variable and sending firm's environmental performance as independent variable. All the control variables are related with information receiving firms. There are 521 firm pairs in the sample. I use model 3 to test whether a firm's environmental performance is linked with its interlocking firm's performance.

Model 3:

$$ENVIRONMENT_t = \beta_0 + \beta_1 NEIGHBOUR\_ENV_t + \beta_2 GOVERNANCE_t + \beta_3 LEVERAGE_t + \beta_4 GROWTH_t + \beta_5 CAP_t + \beta_6 RISK_t + \beta_7 ROA_t + \beta_8 SIZE_t + \beta_9 INT\_OWN_t + \beta_{10} IND_t + \beta_{11} TAKEOVER_t + \beta_{12} ENVSEN_t + \beta_{13} S\_INDUSTRY_t + \varepsilon_t$$

where:

$ENVIRONMENT_t$=environmental performance at t

$NEIGHBOUR\_ENV_t$= environmental performance of interlocking firms

$GOVERNANCE_t$=governance performance at t

$LEVERAGE_t$=leverage ratio, total debt to total assets at t

$GROWTH_t$=market to book ratio at t

CAP_t=demanding for external financing at t

$RISK_t$= standard deviation of quarterly cash flow from operation from previous three years

ROA_t=net income divided by total assets at t

$SIZE_t$=natural log of total assets at t

INT_OWN_t=institutional ownership at t

IND_t=proportion of independent directors at t

$TAKEOVER_t$= takeover defense score at t

$ENVSEN_t$= 1 if in environmental sensitive industry, 0 otherwise

$S\_INDUSTRY$= 1 if the firm and its interlocking firm are in the same industry, 0 otherwise

RESULTS AND DISCUSSIONS

Environmental Performance and Board Interlocks

Table 6 reports the regression result of environmental performance and average number of boards per director (model 1). The coefficient of average number of boards per director is not significant. It suggests that relationship between board interlocks and environmental performance might be non-linear.

To further reveal the non-linear relationship, I conduct curve estimation regression between environmental performance and the average number of boards per director for 35 different statistics models and find two curves (vapor pressure and rational) that best fit the data. Figure 1 plots two best-fitting curves (red dots and black line) together with the original data (blue pluses). Both best-fitting curves are inverted U-shaped. There is a positive relationship between average number of boards per director and the environmental performance until the average number of boards per director reaches two then it switches to a negative relationship. This indicates that before reaching the optimal point (two boards per director), more board interlocks help directors build experience and result in higher environmental performance. But after the optimal point, more board interlocks make the directors too busy to stay focused and result in lower environmental performance. This finding indicates that the optimal number is about two boards per director on average.

This test also confirms a few previous findings. Environmental performance is positively related with corporate governance ($p<0.01$), positively related with risk ($p<0.01$), negatively related with demand for external funding ($p<0.05$), negatively related with takeover defense ($p<0.05$), and positively related with board size ($p<0.05$). Firms with high risks, low takeover defenses and low demand of external funding have high environmental performance. This indicates that firms face external pressure to pursue high environmental performance. And they use internally generated funds to support such activities. However, I do not find the link between environmental performance and leverage, growth, ROA, firm size, institutional holdings, independent directors and whether firms are in environmental sensitive industries.

[Insert Table 6 & Figure 1Here]

Environmental Performance and Interlocking Firms' (Neighbors') Average Environmental Performance

Table 7 reports the regression result of environmental performance and interlocking firms' average environmental performance. I find a negative relationship between the firm and its interlocking firms' environmental performance on average ($p<0.05$). The higher one firm's environmental performance is, the lower its neighbors' average environmental performance is. This implies that high performing firms are surrounded by low performing firms and vice versa. In addition, similar to the result in table 6, I also find that environmental performance is positively related with corporate governance ($p<0.01$), positively related with risk ($p<0.05$), negatively related with demand for external funding ($p<0.05$), positively related with board size ($p<0.05$) and negatively related with takeover defense ($p<0.1$).

[Insert Table 7 Here]

Environmental Performance and Interlocking Firms' Environmental Performance (Paired Sample)

Consistent with the result of model 2 in Table 7, I find a negative relationship ($p<0.1$) between a firm and its interlocking firm's environment performance in paired sample (Table 8). This again indicates that high performing firms and low performing firms are mingled with each other through board interlocks. There are two possible explanations depending on the direction of causality. The first possibility could be high performance leads to board interlocks. A firm with low environmental performance wants

to improve its performance, so it deliberately creates board interlocks with the high performing firms (such as appointing someone from a high performing firm's board). The second possibility could be boards interlocks lead to high performance. Getting different lessons from its low performing neighbors makes one firm better. Unfortunately, limited by one year of data, the direction of causality could not be answered in this study.

In addition, I find same industry interlocks are negatively related with environmental performance in the paired sample ($p<0.01$). This shows that interlocking with firms in different industries brings in new information and improves a firm's environmental performance.

[Insert Table 8 Here]

CONCLUSIONS AND CONTRIBUTIONS

From agency point of view (Jensen & Meckling, 1976), busy boards reduce the effectiveness of monitoring and thus result in low environmental performance. From resource dependency point of view (Hillman & Dalziel, 2003), board interlocks bring in new resources, improve diversity and improve environmental performance. Similar to Geletkanycz and Boyd (2011) who studied the link between CEO outside directorships and financial performance, this paper finds a midrange, contingency-based result that there is a inverted U-shaped relationship between board interlocks and environmental performance. It contributes to the debate whether there is a positive or negative relationship between board interlocks and environmental performance. In addition, this paper finds a negative relationship between a firm and its neighbors' environmental performance both in aggregate form and in pairs. It shows that in Canada firms with high

and low environmental performance are mingled together through board interlocks. This is an interesting phenomenon that requires further investigation.

For boards, individual directors and policy makers, this paper provides empirical evidence that the optimal number is two public boards per director on average. It improves the understanding of the link between busyness and environmental performance, which may lead to strategic decisions to improve corporate governance structure and practice, especially through succession plans. For investors, this research demonstrates the values and impacts of board interlocks and find that firms with good corporate governance, high risks, low demand of external funding, low takeover defenses and large board size have high environmental performance.

LIMITATIONS AND FUTURE RESEARCH

First, this paper does not distinguish board interlocks created by CEO/top executive ties and outside directors. Future research could be expanded to study the difference of directional and non-directional ties (Richardson, 1987).

Second, the overlapping of CEO's and board of directors' human and social capital results in positive and negative synergies (Sundaramurthy, Pukthuanthong, & Kor, 2013). Expanding the interactions of CEO's and board of directors' human and social capital to earnings management could be another future direction.

Third, this research does not test the direction of causality between environmental performance and board interlocks. Limited by the one year data, it is unknown whether a high performing firm attracts the interlocks of low performing firms or lessons from poorly performing neighbors help improve one firm's environmental performance.

Fourth, this research only uses Canadian public firms to calculate directors' busyness. It does not consider the interlocks with private, non-profit organizations, and firms in the US.

Table 1 Descriptive statistics of board of directors (all Canadian firms)

Number of Boards	Number of Directors	Percentage
1	10887	75.44%
2	2043	14.16%
3	796	5.52%
4	342	2.37%
5	166	1.15%
6	78	0.54%
7	44	0.30%
8	24	0.17%
9	9	0.06%
10	7	0.05%
11	9	0.06%
12	13	0.09%
13	2	0.01%
14	2	0.01%
15	2	0.01%
16	2	0.01%
18	1	0.01%
19	3	0.02%
28	2	0.01%
Total	14432	100.00%

Table 2 Descriptive statistics of board of directors (S&P/TSX Composite Index)

Number of Boards	Number of Directors	Percentage
1	1695	83.6%
2	252	12.4%
3	66	3.3%
4	12	0.6%
5	3	0.1%
Total	2028	100%

Table 3 Descriptive statistics of sample firms by industry (S&P/TSX Composite Index)

Industry	Number of firms	Average Total Assets (CAD	Average Board	Environmental Sensitive

		Million)	Size	Industry
Agriculture, Forestry & Fishing	0	N/A	N/A	N/A
Mining	91	5021	8.9	Yes
Construction	2	2321	8.0	Yes
Manufactory	39	8567	10.1	Yes
Transportation, Communications, Electric, Gas & Sanitary Service	29	12593	11.1	Yes
Wholesale trade	8	2141	9.8	No
Retail trade	13	6663	12.4	No
Finance, insurance, real estate	46	116520	12.7	No
Services	8	4291	10.1	No
Public administration	1	8847	11.0	No
Total	237		10.4	

Table 4 Descriptive statistics of variables (aggregate form, model 1 & 2)

Variable	Obs.	Mean	Std. Dev.	Min	Max
ENVIRONMENT	237	41.43	13.06	17.71	81.94
AVG_BOARDS	237	2.10	0.76	1.00	5.80
AVG_NEIGHBOUR_ENV	210	43.85	8.93	22.65	77.78
GOVERNANCE	237	59.22	11.94	26.79	87.00
LEVERAGE	237	0.22	0.16	0.00	0.75
GROWTH	237	2.12	1.57	-2.64	12.03
CAP	237	0.29	0.46	0.00	1.00
RISK	237	272.55	1139.74	0.62	9872.30
ROA	237	3.84	5.99	-43.50	30.10
SIZE (NATURAL LOG)	237	8.29	1.67	4.84	13.62
INT_OWN	237	42.91	19.77	8.00	99.28
IND	237	0.83	0.09	0.50	1.00
BOARD_SIZE	237	10.38	4.37	4.00	49.00
TAKEOVER	237	0.18	0.04	0.10	0.31
ENVSEN	237	0.68	0.47	0.00	1.00

Table 5 Descriptive statistics of variables (paired sample, model 3)

Variable	Obs.	Mean	Std. Dev.	Min	Max
ENVIRONMENT	551	44.08	14.42	17.71	81.94
NEIGHBOUR_ENV	551	43.83	14.32	17.71	81.94
GOVERNANCE	551	60.52	12.52	26.79	87.00
LEVERAGE	551	0.22	0.16	0.00	0.75
GROWTH	551	2.09	1.46	-2.64	8.97
CAP	551	0.26	0.44	0.00	1.00

RISK	551	758.11	2105.77	0.67	9872.30
ROA	551	3.42	5.72	-43.50	20.10
SIZE	551	9.24	2.06	4.84	13.62
INT_OWN	551	42.05	20.59	8.00	93.69
IND	551	0.85	0.09	0.56	1.00
BOARD_SIZE	551	12.96	7.24	5.00	49.00
TAKEOVER	551	0.18	0.04	0.10	0.31
ENVSEN	551	0.58	0.49	0.00	1.00
S_INDUSTRY	551	0.23	0.42	0.00	1.00

Table 6 Environmental Performance and Board Interlocks (Ordinary Least Square)

$$ENVIRONMENT_t = \beta_0 + \beta_1 AVG\_BOARDS_t + \beta_2 GOVERNANCE_t + \beta_3 LEVERAGE_t + \beta_4 GROWTH_t + \beta_5 CAP_t + \beta_6 RISK_t + \beta_7 ROA_t + \beta_8 SIZE_t + \beta_9 INT\_OWN_t + \beta_{10} IND_t + \beta_{11} BOARD\_SIZE_t + \beta_{12} TAKEOVER_t + \beta_{13} ENVSEN_t + \varepsilon_t$$

Environment	Coef.	t
AVG_BOARDS	0.87	0.85
GOVERNANCE	0.41	5.61***
LEVERAGE	4.09	0.77
GROWTH	-0.88	-1.74*
CAP	-3.95	-2.08**
RISK	0.00	2.87***
ROA	0.02	0.18
SIZE	0.20	0.31
INT_OWN	0.01	0.31
IND	9.72	1.19
BOARD_SIZE	0.47	2.07**
TAKEOVER	-47.07	-2.47**
ENVSEN	0.51	0.26
Adj. R-square	32.40%	
F	9.08	
No. of OBS	237	

***p<0.01, **p<0.05, *p<0.1

Table 7 Environmental Performance and Interlocking Firms' (Neighbors') Average Environmental Performance (Ordinary Least Square)

$$ENVIRONMENT_t = \beta_0 + \beta_1 AVG\_NEIGHBOUR\_ENV_t + \beta_2 GOVERNANCE_t + \beta_3 LEVERAGE_t + \beta_4 GROWTH_t + \beta_5 CAP_t + \beta_6 RISK_t + \beta_7 ROA_t + \beta_8 SIZE_t + \beta_9 INT\_OWN_t + \beta_{10} IND_t + \beta_{11} TAKEOVER_t + \beta_{12} ENVSEN_t + \varepsilon_t$$

Environment	Coef.	t
AVG_NEIGHBOUR_ENV	-0.19	-1.98**
GOVERNANCE	0.43	5.51***
LEVERAGE	-0.16	-0.03
GROWTH	-0.71	-1.32
CAP	-5.11	-2.49**
RISK	0.00	2.47**
ROA	0.05	0.34
SIZE	0.31	0.45
INT_OWN	0.01	0.29
IND	12.35	1.38
BOARD_SIZE	0.51	2.12**
TAKEOVER	-38.20	-1.83*
ENVSEN	0.75	0.36
Adj. R-square	32.61%	
F	8.41	
No. of Observations	210	

***p<0.01, **p<0.05, *p<0.1

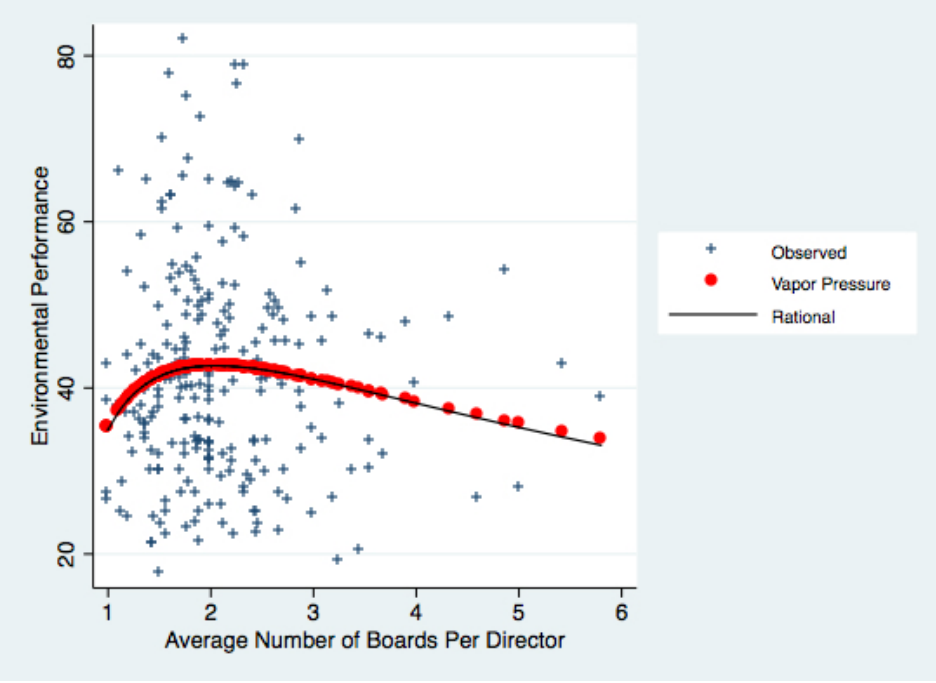
Table 8 Environmental Performance and Average Interlocking Firms' Environmental Performance (Paired Sample, Ordinary Least Square)

$$ENVIRONMENT_t = \beta_0 + \beta_1 NEIGHBOUR\_ENV_t + \beta_2 GOVERNANCE_t + \beta_3 LEVERAGE_t + \beta_4 GROWTH_t + \beta_5 CAP_t + \beta_6 RISK_t + \beta_7 ROA_t + \beta_8 SIZE_t + \beta_9 INT\_OWN_t + \beta_{10} IND_t + \beta_{11} TAKEOVER_t + \beta_{12} ENVSEN_t + \beta_{13} S\_INDUSTRY_t + \varepsilon_t$$

Environment	Coef.	t
NEIGHBOUR_ENV	-0.05	-1.77*
GOVERNANCE	0.56	6.37***
LEVERAGE	0.49	11.3***
GROWTH	-7.23	-2.31**
CAP	-0.65	-1.92*
RISK	-3.39	-2.86***
ROA	0.32	1.04
SIZE	0.00	5.83***
INT_OWN	0.00	0.01
IND	0.00	0.14
BOARD_SIZE	3.88	0.72
TAKEOVER	-19.18	-1.67*
ENVSEN	2.50	1.94*
S_INDUSTRY	-3.28	-2.89***
Adj. R-square	54%	
F	45	
No. of OBS	521	

***p<0.01, **p<0.05, *p<0.1

Figure 1 Best-Fitting Curves between environmental performance and average number of boards per director



Vapor Pressure: Y = e^(b0 + b1/X + b2 * ln(X))
Rational: Y = (b0 + b1 * X)/(1 + b2 * X + b3 * X^2)

References

Andres, C., van den Bongard, I., & Lehmann, M. (2013). Is Busy Really Busy? Board Governance Revisited. *Journal of Business Finance & Accounting, 40*(9-10), 1221-1246. doi: 10.1111/jbfa.12051

Beckman, C. M., & Haunschild, P. R. (2002). Network Learning: The Effects of Partners' Heterogeneity of Experience on Corporate Acquisitions. *Administrative Science Quarterly, 47*(1), 92-124. doi: 10.2307/3094892

Boulouta, I. (2012). Hidden Connections: The Link Between Board Gender Diversity and Corporate Social Performance. *Journal of Business Ethics*, 1-13.

Bouwman, C. H. S. (2011). Corporate Governance Propagation through Overlapping Directors. *Review of Financial Studies, 24*(7), 2358-2394. doi: 10.1093/rfs/hhr034

Bowen, R. M., Rajgopal, S., & Venkatachalam, M. (2008). Accounting Discretion, Corporate Governance, and Firm Performance*. *Contemporary Accounting Research, 25*(2), 351-405. doi: 10.1506/car.25.2.3

Boyd, B. (1990). Corporate linkages and organizational environment: A test of the resource dependence model. *Strategic Management Journal, 11*(6), 419-430. doi: 10.1002/smj.4250110602

Cashman, G. D., Gillan, S. L., & Jun, C. (2012). Going overboard? On busy directors and firm value. *Journal of Banking & Finance, 36*(12), 3248-3259. doi: http://dx.doi.org/10.1016/j.jbankfin.2012.07.003

Chiu, P.-C., Teoh, S. H., & Tian, F. (2012). Board Interlocks and Earnings Management Contagion. *The Accounting Review, 88*(3), 915-944.

Chu, J., & Davis, G. (2011). Who Killed the Inner Circle? The Breakdown of the American Corporate Elite Network, 1999-2009.

Davis, G. F., & Cobb, J. A. (2010). Resource Dependence Theory: Past and Future. In C. B. Schoonhoven & F. Dobbin (Eds.), *Stanford's Organization Theory Renaissance, 1970–2000*: Emerald Group Publishing Limited.

Davis, G. F., & Greve, H. R. (1997). Corporate Elite Networks and Governance Changes in the 1980s. *American Journal of Sociology, 103*(1), 1-37.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting Earnings Management. *The Accounting Review, 70*(2), 193-225. doi: 10.2307/248303

Ferris, S. P., Jagannathan, M., & Pritchard, A. C. (2003). Too Busy to Mind the Business? Monitoring by Directors with Multiple Board Appointments. *The Journal of Finance, 58*(3), 1087-1111. doi: 10.2307/3094573

Fich, E. M. (2005). Are Some Outside Directors Better than Others? Evidence from Director Appointments by Fortune 1000 Firms. *The Journal of Business, 78*(5), 1943-1972. doi: 10.1086/431448

Fich, E. M., & Shivdasani, A. (2006). Are Busy Boards Effective Monitors? *The Journal of Finance, 61*(2), 689-724. doi: 10.1111/j.1540-6261.2006.00852.x

Fich, E. M., & Shivdasani, A. (2007). Financial fraud, director reputation, and shareholder wealth. *Journal of Financial Economics, 86*(2), 306-336. doi: http://dx.doi.org/10.1016/j.jfineco.2006.05.012

Fich, E. M., & White, L. J. (2005). Why do CEOs reciprocally sit on each other's boards? *Journal of Corporate Finance, 11*(1–2), 175-195. doi: http://dx.doi.org/10.1016/j.jcorpfin.2003.06.002

Geletkanycz, M. A., & Boyd, B. K. (2011). CEO OUTSIDE DIRECTORSHIPS AND FIRM PERFORMANCE: A RECONCILIATION OF AGENCY AND EMBEDDEDNESS VIEWS. *Academy of Management Journal, 54*(2), 335-352. doi: 10.5465/AMJ.2011.60263094

Glass Lewis & Co. (2013). Proxy Paper Guidelines.

Gleason, C. A., Jenkins, N. T., & Johnson, W. B. (2008). The Contagion Effects of Accounting Restatements. *The Accounting Review, 83*(1), 83-110. doi: 10.2308/accr.2008.83.1.83

GlobalScan, & SustainAbility. (2012). Rate the Raters 2012: Polling the Experts: GlobalScan and SustainAbility.

Granovetter, M. (1985). Economic Action and Social Structure: The Problem of Embeddedness. *American Journal of Sociology, 91*(3), 481-510.

Granovetter, M. (1992). *Problems of explanation in economic sociology*. Cambridge, MA: Harvard Business School Press.

Granovetter, M. (2005). The Impact of Social Structure on Economic Outcomes. *The Journal of Economic Perspectives, 19*(1), 33-50. doi: 10.2307/4134991

Gul, F. A., Srinidhi, B., & Ng, A. C. (2011). Does board gender diversity improve the informativeness of stock prices? *Journal of Accounting and Economics, 51*(3), 314-338.

Gulati, R., & Westphal, J. D. (1999). Cooperative or Controlling? The Effects of CEO-Board Relations and the Content of Interlocks on the Formation of Joint Ventures. *Administrative Science Quarterly, 44*(3), 473-506.

Haunschild, P. R. (1993). Interorganizational Imitation: The Impact of Interlocks on Corporate Acquisition Activity. *Administrative Science Quarterly, 38*(4), 564-592.

Haunschild, P. R., & Beckman, C. M. (1998). When Do Interlocks Matter?: Alternate Sources of Information and Interlock Influence. *Administrative Science Quarterly, 43*(4), 815-844. doi: 10.2307/2393617

Hillman, A. J., & Dalziel, T. (2003). Boards of Directors and Firm Performance: Integrating Agency and Resource Dependence Perspectives. *The Academy of Management Review, 28*(3), 383-396.

Hillman, A. J., Withers, M. C., & Collins, B. J. (2009). Resource Dependence Theory: A Review. *Journal of Management, 35*(6), 1404-1427. doi: 10.1177/0149206309343469

Hoitash, U. (2011). Should Independent Board Members with Social Ties to Management Disqualify Themselves from Serving on the Board? *Journal of Business Ethics, 99*(3), 399-423. doi: 10.1007/s10551-010-0660-5

Horton, J., Millo, Y., & Serafeim, G. (2012). Resources or Power? Implications of Social Networks on Compensation and Firm Performance. *Journal of Business Finance & Accounting, 39*(3-4), 399-426. doi: 10.1111/j.1468-5957.2011.02276.x

ISS. (2013). 2013 Canadian Proxy Voting Guidelines TSX-Listed Companies.

Jamali, D., Safieddine, A. M., & Rabbath, M. (2008). Corporate Governance and Corporate Social Responsibility Synergies and Interrelationships. *Corporate Governance: An International Review, 16*(5), 443-459.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305-360. doi: 10.1016/0304-405x(76)90026-x

Johnson, J. L., Daily, C. M., & Ellstrand, A. E. (1996). Boards of Directors: A Review and Research Agenda. *Journal of Management, 22*(3), 409-438. doi: 10.1177/014920639602200303

Kaczmarek, S., Kimino, S., & Pye, A. (2012). Interlocking directorships and firm performance in highly regulated sectors: the moderating impact of board diversity. *Journal of Management & Governance*, 1-26. doi: 10.1007/s10997-012-9228-3

Kang, E. (2008). Director Interlocks and Spillover Effects of Reputational Penalties From Financial Reporting Fraud. *Academy of Management Journal, 51*(3), 537-555. doi: 10.5465/amj.2008.32626007

Kang, E., & Tan, B. R. (2008). Accounting Choices and Director Interlocks: A Social Network Approach to the Voluntary Expensing of Stock Option Grants. *Journal of Business Finance & Accounting, 35*(9-10), 1079-1102. doi: 10.1111/j.1468-5957.2008.02114.x

Klein, A. (2002). Audit committee, board of director characteristics, and earnings management. *Journal of Accounting and Economics, 33*(3), 375-400. doi: http://dx.doi.org/10.1016/S0165-4101(02)00059-9

Kuo, L., Yeh, C.-C., & Yu, H.-C. (2012). Disclosure of Corporate Social Responsibility and Environmental Management: Evidence from China. *Corporate Social Responsibility and Environmental Management, 19*(5), 273-287. doi: 10.1002/csr.274

Mason, A. C., & Westphal, J. D. (2001). The Strategic Context of External Network Ties: Examining the Impact of Director Appointments on Board Involvement in Strategic Decision Making. *The Academy of Management Journal, 44*(4), 639-660.

McDonald, M. L., Westphal, J. D., & Graebner, M. E. (2008). What do they know? The effects of outside director acquisition experience on firm acquisition performance. *Strategic Management Journal, 29*(11), 1155-1177. doi: 10.1002/smj.704

Minton, B. A., & Schrand, C. (1999). The impact of cash flow volatility on discretionary investment and the costs of debt and equity financing. *Journal of Financial Economics, 54*(3), 423-460. doi: http://dx.doi.org/10.1016/S0304-405X(99)00042-2

Mizruchi, M. S. (1996). What Do Interlocks Do? An Analysis, Critique, and Assessment of Research on Interlocking Directorates. *Annual Review of Sociology, 22*, 271-298.

Nahapiet, J., & Ghoshal, S. (1998). Social Capital, Intellectual Capital, and the Organizational Advantage. *The Academy of Management Review, 23*(2), 242-266.

Pearce, J. A., & Zahra, S. A. (1992). BOARD COMPOSITION FROM A STRATEGIC CONTINGENCY PERSPECTIVE. *Journal of Management Studies, 29*(4), 411-438. doi: 10.1111/j.1467-6486.1992.tb00672.x

Peters, G., & Romi, A. (2013). Does the Voluntary Adoption of Corporate Governance Mechanisms Improve Environmental Risk Disclosures? Evidence from Greenhouse Gas Emission Accounting. *Journal of Business Ethics*, 1-30.

Pfeffer, J. (2003). *The External Control of Organizations: A Resource Dependence Perspective*. Stanford, CA: Stanford University Press.
Pfeffer, J., Hatano, T., & Santalainen, T. (1995). Producing Sustainable Competitive Advantage through the Effective Management of People [and Executive Commentary]. *The Academy of Management Executive (1993-2005), 9*(1), 55-72.
Pfeffer, J., & Salancik, G. (1978). *The External Control of Organizations: A Resource-Dependence Perspective*. New York: Harper and Row.
Richardson, R. J. (1987). Directorship Interlocks and Corporate Profitability. *Administrative Science Quarterly, 32*(3), 367-386.
Rupley, K. H., Brown, D., & Marshall, R. S. (2012). Governance, media and the quality of environmental disclosure. *Journal of Accounting and Public Policy, 31*(6), 610-640.
Russo, M. V., & Fouts, P. A. (1997). A Resource-Based Perspective on Corporate Environmental Performance and Profitability. *The Academy of Management Journal, 40*(3), 534-559.
SBA. (2012). *Lender and Development Company Loan Programs*.
Shi, L. (2011). *The Role of Board/Audit Committee Interlocks in Diffusion of Earnings Equality*. (3466795 Ph.D.), Syracuse University, Ann Arbor. ProQuest Dissertations & Theses Full Text database.
Shropshire, C. (2010). The Role of the Interlocking Director and Board Receptivity in the Diffusion of Practices. *Academy of Management Review, 35*(2), 246-264.
Stein, J. C. (1988). Takeover Threats and Managerial Myopia. *Journal of Political Economy, 96*(1), 61-80. doi: 10.2307/1830710
Stevenson, W. B., & Radin, R. F. (2009). Social Capital and Social Influence on the Board of Directors. *Journal of Management Studies, 46*(1), 16-44. doi: 10.1111/j.1467-6486.2008.00800.x
Sundaramurthy, C., Pukthuanthong, K., & Kor, Y. (2013). Positive and negative synergies between the CEO's and the corporate board's human and social capital: A study of biotechnology firms. *Strategic Management Journal*, n/a-n/a. doi: 10.1002/smj.2137
Surroca, J., Tribó, J. A., & Waddock, S. (2010). Corporate responsibility and financial performance: the role of intangible resources. *Strategic Management Journal, 31*(5), 463-490.
Westphal, J. D. (1999). Collaboration in the Boardroom: Behavioral and Performance Consequences of CEO-Board Social Ties. *The Academy of Management Journal, 42*(1), 7-24. doi: 10.2307/256871
Westphal, J. D., Seidel, M.-D. L., & Stewart, K. J. (2001). Second-Order Imitation: Uncovering Latent Effects of Board Network Ties. *Administrative Science Quarterly, 46*(4), 717-747.
Westphal, J. D., & Zajac, E. J. (1997). Defections from the Inner Circle: Social Exchange, Reciprocity, and the Diffusion of Board Independence in U.S. Corporations. *Administrative Science Quarterly, 42*(1), 161-183. doi: 10.2307/2393812
Wintoki, B., Linck, J. S., & Netter, J. M. (2012). Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics, 105*(3), 581-606.

Zahra, S. A., & Pearce, J. A. (1989). Boards of Directors and Corporate Financial Performance: A Review and Integrative Model. *Journal of Management, 15*(2), 291-334. doi: 10.1177/014920638901500208

Zhang, J., Zhu, H., & Ding, H.-b. (2013). Board Composition and Corporate Social Responsibility: An Empirical Investigation in the Post Sarbanes-Oxley Era. *Journal of Business Ethics, 114*(3), 381-392.

Zhao, Y., & Chen, K. H. (2008). The Influence of Takeover Protection on Earnings Management. *Journal of Business Finance & Accounting, 35*(3-4), 347-375. doi: 10.1111/j.1468-5957.2008.02081.x