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Board internationalization and green innovation

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\textbf{A B S T R A C T}

Amid the rapid transition towards a low-carbon world, this study resolves how a nationally-diverse board affects a firm's inclination towards green innovation. Using eleven years (2005–2015) data of all A-share manufacturing companies listed on the Shanghai and Shenzhen stock exchange, we find reliable evidence that board internationalization strengthens the tendency of firms towards green business practices. Further, we document that state-owned firms have a stronger aptitude to capitalize on the presence of foreign directors on the board when compared with non-state-owned firms.

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1. Introduction

"Humankind has declared war on nature and nature is striking back in a very violent way. Climate change will not kill the planet, but it could kill humankind". (UN Secretary-General Antonio Guterres message at Davos, 2020).

In the aftermath of the \textit{Rio declaration and Paris agreement}, World Economic Forum (WEF) has continued to work for a carbon-free planet. The unswerving resolve for addressing the environmental challenges trampling our ecology and economy was top of the Davos agenda, 2020. In the post-COVID-pandemic scenario, green innovation (GI) is seen as a panacea for sundry economic ills, including much-needed economic recovery. WEF suggests ‘going green’ as an opportunity to deliver a sustainable and inclusive COVID-19 recovery. The forum asserts that we have a unique opportunity to build a greener and more resilient world through GI. Specifically, the forum’s newly constituted CEO Action Group believes that “we can emerge from the crisis stronger if we manage to sustain momentum on low-carbon transition”.

The current multi-faceted phenomenon of globalization has amazingly promoted people’s free movement, which has prompted highly talented, trained, and skilled people to move across the nations. In this contemporary business world, brain gain surfaces as an opportunity for foreign-born professionals to work across the borders that corporations can grab and capitalize on. Brain amassed at the upper echelons has a more substantial multiplier and trickle-down effect on organizational outcomes. Conflating the board of directors with a rich blend of nationally-diverse brains will muster positive outcomes for the firms. The board of directors carves out the strategic intent that succinctly reflects its inclination towards going green. At a firm level, the board is a supreme policymaking institution where strategic decisions emanate from. The board sets the tone and tenor of the C-suite, which execute corporate-level strategies. The board holds C-level executives accountable if they are found negligent in their performance. Thus, the board has got an instrumental role in influencing the strategic direction of a firm. For smooth sailing in a complex and uncertain business environment, a board needs to be diverse. Therefore, regulatory bodies legislate for the greater diversity of boards in different terms, e.g., gender, culture, education experience, nationality, etc.

A nationally-diverse board symbolizes a better blend of unique strategic resources, which helps the firms go greener. Different backgrounds (education, experience, and cultural) emanating from diverse nationalities (heterogeneity in the board) significantly promote holistic decision-making, and boards become sensitive to disparate stakeholders’ interests, which paves the way for GI.

A whole host of theories suggests that an international board (board with foreign directors) helps a firm go greener. Human
capital theory suggests that foreign directors carry traits that positively affect environmental performance (David and Lopez, 2001). Human capital refers to one’s traits of intelligence, positive attitude, creativity, and business savvy (Fitz-enz, 2000). Resource dependence theory also supports foreign directors’ role in GI as foreign directors help firms access essential and necessary resources from outside, assisting firms to go greener (Pfeffer and Salancik, 2003). Amid globalization, boards with knowledge and experience of foreign markets, diverse cultures, and multinational values can better compete in the business world. Thus, foreign directors bring the required know-how and technology necessary for GI. Resource dependence theory considers foreign directors as boundary-spanners who replicate their experience with green business practices in new firms. Upper echelons theory also substantiates the afore-mentioned role of foreign directors, which states that upper echelons (board of directors) characteristics at least partly affect firm-level outcomes (Hambrick and Mason, 1984). Directors having an appropriate set of traits will positively affect the firm’s inclination towards GI. In a similar vein, the resource-based view (Barney, 2001) considers foreign directors’ skill set as a strategic resource that provides a firm with a competitive advantage for pursuing GI.

Board diversity plays an instrumental role in achieving the organizational goals, mainly because of its likely influence on firm-level outcomes. A significant number of studies have investigated board diversity’s effect on firm-level outcomes (e.g., Nadeem et al., 2020; Beji et al., 2020). Extant research considers board diversity’s traditional attributes, such as gender, tenure, education, and functional background. Further, more focus has been on gender diversity in the past. With an increasing trend of diversity in a firm’s workforce, policies, and practices, researchers have identified and documented newer dimensions to diversity, such as nationality, which calls for new research. Today, in the current global business paradigm, national diversity is a widely touted diversity dimension. The extant research has analyzed the effect of board diversity, mainly on corporate reputation, corporate governance, and corporate performance. The relationship between board diversity and GI has been primarily investigated using gender (Nadeem et al., 2020). However, the nationality dimension, which seems more synchronized with GI, has been overlooked to date.

Additionally, the extant research on the effect of foreign directors’ presence on corporate outcomes such as firm performance and corporate social responsibility is minimal (e.g., Beji et al., 2020; Handa, 2020) but growing. Therefore, we intend to further this research by investigating the relationship between foreign directors’ presence on the board and a firm’s tendency towards GI. Thus, this study contributes to the existing literature by exploring the under-investigated research question of whether boardroom internationalization affects GI or not.

2. Methodology

2.1. Data and sample

Our sample includes the data of all A-share manufacturing companies listed on Shenzhen and Shanghai stock exchanges for 2005 to 2015. The data regarding the director’s nationality and other control variables are extracted from China’s Stock Market and Accounting Research database while data about GI is obtained from the National Intellectual Property Administration database. After merging both data sets and excluding the firm-year observations with missing data on study variables, our final sample consists of 11,250 firm-year observations.

The primary variable of interest is GI (Green_Innovation). Consistent with existing studies on GI in the context of China and the availability of data in China, we use green patents as the indicator of GI (Li et al., 2018). We use the logarithm of environmental patent count to condense the effect of heteroscedasticity and the magnitude of differences in green patents across firms. Consistent with prior literature (Beji et al., 2020; Handa, 2020) we also use Foreign_Proportion (defined as the proportion of foreign directors on the board) as a proxy for board internationalization.

We also controlled for variables that may influence the green innovation, as suggested by existing studies (e.g., Li et al., 2018). Control variable includes Board_Size (total number of directors on the board), Board_Independence (proportion of independent directors on the board), CEO_Duality (1 if the CEO also chairs the board and 0 otherwise), Intuition_Equity (proportion of shares owned by institutions), Board_Equity (proportion of shares owned by the board of directors), SOEs (1 if the ultimate owner is government and 0 otherwise), Firm_Performance (net profit divided by total assets), Firm_Size (log of total assets), Firm_Age (number of years firm is listed on the stock exchange), Firm_Opportunity (book value divided by the market value of the firm’s total assets), Financial_Leverage (total debt divided by total assets), and year dummies.

2.2. Empirical model

Our data set is a panel; therefore, we use a firm fixed-effects regression model (FE) to explore the effect of boardroom internationalization on GI. Moreover, the firm fixed-effects regression model mitigate the issue of omitted variables bias i.e., the relationship between board internationalization and GI may be driven by unobservable firm-level characteristics and it might be possible that these unobservable characteristics can be correlated with both firm GI and the probability of having foreign directors on the board.

Besides, our results might be biased because of endogeneity, i.e., self-selection bias and reverse causality. To mitigate the issue of endogeneity, we use two different models. First, we use the propensity score matching method (PSM) to alleviate the problem of self-selection bias, i.e., it might be possible that the level of GI is due to firm other characteristics (such as board other characteristics, ownership structure or firm economic condition) rather than boardroom internationalization. We match the firms on the probability of having foreign directors on the board based on all control variables used in this study. Second, we use two-stage least square regression (2SLS) to mitigate the issue of reverse causality. We use the industry average of foreign directors as an instrument variable because firms are more likely to appoint a foreign director if this is the industry’s norm.

3. Results

Table 1 (Columns 1 to 4) reports the descriptive statistics (mean) for the whole sample, firms with some foreign directors’ sample, and firms without foreign directors’ sample. Column 1 shows that only 11 percent of our sample firms have foreign directors. Column 2 to 4 indicates that firms with foreign directors are greener than their counterparts, and firms with and without foreign directors are significantly different.

Table 1 (Models 1 to 3) documents results on the association between board internationalization and GI using three statistical methodologies i.e., FE, PSM, and 2SLS. In all models, the Foreign_Proportion coefficient remains positive and significant, suggesting that firms with foreign directors are greener. One plausible explanation of these findings is the appropriate skill set of foreign directors that prompts them to go greener. This view
is primarily substantiated by human capital theory. The other

tenable justification is a resource dependence perspective that

posits that foreign directors as boundary spanners replicate their

green knowledge and experience in new firms that, according to

resource-based-view, confers a competitive advantage for green

practices.

Moreover, in unstipulated results, we find that foreign di-

rectors significantly promote GI in both SOEs and non-SOEs. How-

ever, our results suggest that SOEs are more likely to benefit

from foreign directors than non-SOEs. SOEs’ institutional context

is more enabling for green practices because SOEs face higher

institutional pressure for green practices, which precipitate

them to benefit more from foreign directors compared to non-SOEs.

4. Conclusion

Advancing research on going green practices, we investigate the

relationship between foreign directors’ presence on a firm’s

board and its tendency towards GI. We observe that the presen-

tce of foreign directors fosters green practices at a firm-level.

Findings substantiate a nationally-diverse board as an important

driver of GI and identify the modus operandi to grab the going

green opportunity. We documented that state-owned firms reap

higher dividends from foreign directors’ presence in terms of

going green drive due to the institutional paradigm they live in.

This research contributes to the WEF call for garnering academic

support for policy guidelines.

Declaration of competing interest

The authors declare that they have no known competing finan-

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to influence the work reported in this paper.

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Table 1

Descriptive statistics and regression results on the effect of board internationalization on green innovation.

| Variables          | Whole Sample (N = 11250) | Some Foreign directors sample (N = 1247) | No foreign director sample (N = 10003) | Compare mean analysis | FE (N = 11250) Model 1 | PSM (N = 2476) Model 2 | 2SLS (N = 11250) Model 3 |
|--------------------|--------------------------|-----------------------------------------|--------------------------------------|-----------------------|------------------------|------------------------|------------------------|
| Green_Innovation   | 0.663                    | 0.742                                    | 0.653                                 | (−3.42)***            | –                      | –                      | –                      |
| Percentage of firms with foreign directors | 11.10                       | –                                        | –                                    | –                     | –                      | –                      | –                      |
| Foreign_Proportion | 0.018                    | –                                        | –                                    | –                     | 0.723*** (3.00)        | 0.452 (1.75)           | 1.912*** (3.18)         |
| Board_Size         | 10.071                   | 10.289                                   | 10.044                                | (−3.33)***            | −0.001 (−0.42)         | 0.003 (0.39)           | −0.001 (−0.23)          |
| Board_Independence | 0.376                    | 0.378                                    | 0.376                                 | (−0.99)               | 0.120 (1.00)           | 0.525*** (2.36)        | 0.394*** (3.43)         |
| CEO_Duality        | 0.257                    | 0.322                                    | 0.249                                 | (−5.55)***            | −0.030 (−1.32)         | −0.025 (−0.61)         | −0.015 (−0.85)          |
| Institutional_Equity| 0.064                    | 0.054                                    | 0.065                                 | (3.61)***             | −0.002 (−1.45)         | 0.001 (0.43)           | −0.002 (−2.20)          |
| Board_Equity       | 0.113                    | 0.123                                    | 0.112                                 | (−1.83)*              | −0.050 (−0.37)         | 0.160 (0.73)           | 0.074 (1.36)            |
| SOEs               | 0.417                    | 0.278                                    | 0.434                                 | (10.50)***            | −0.037 (−1.16)         | 0.245*** (2.19)        | −0.010 (−0.46)          |
| Firm_Performance   | 0.044                    | 0.055                                    | 0.042                                 | (−1.89)*              | 0.033 (1.15)           | 0.187*** (0.64)        | −0.005 (−0.15)          |
| Firm_Size          | 21.894                   | 22.034                                   | 21.876                                | (−4.10)***            | 0.161*** (8.73)        | −0.547 (−6.06)         | 6.945*** (41.54)        |
| Firm_Age           | 9.08                     | 7.501                                    | 9.277                                 | (9.94)***             | 0.071*** (13.25)       | 0.100*** (9.34)        | 0.005*** (3.32)         |
| Firm_Oppportunity  | 0.525                    | 0.493                                    | 0.529                                 | (4.81)***             | 0.051 (0.92)           | 0.014 (0.63)           | −0.040 (−4.76)          |
| Financial_Leverage | 0.457                    | 0.388                                    | 0.466                                 | (2.48)**              | 0.024*** (3.43)        | 0.189 (1.41)           | 0.027*** (3.63)         |
| Year_Dummies       | –                       | –                                        | –                                    | –                     | yes                    | yes                    | yes                    |
| Constant           | –                       | –                                        | –                                    | –                     | −3.541*** (−9.60)      | 1.737*** (2.63)        | −20.848*** (−42.01)     |
| R-squared          | –                       | –                                        | –                                    | –                     | 15.8%                  | 29.2%                  | 15.8%                  |
| F-test/ Chi-square | –                       | –                                        | –                                    | –                     | 79.248                 | 27.820                 | 2433.577               |

Note: T-values are reported in parenthesis.

*Significance level at the 10%.

**Significance level at the 5%.

***Significance level at the 1%.