

The impact of board gender diversity and national culture on corporate innovation: a multi-country analysis of multinational corporations operating in emerging economies

Abstract

This paper contributes to burgeoning research concerning the relationship between boardroom gender diversity and corporate innovation. The paper deploys a multi-theoretical framework comprising insights from the upper echelons, resource-dependency, and institutional theories, and the Hofstede's cultural dimensions framework. We test a panel dataset for 472 multinationals in 21 emerging economies, covering nine years (2009-2018). Our findings reveal that gender diversity is positively associated with corporate innovation. We also find that local factors such as national norms, cultural values, and country-level institutional quality influence boardroom gender diversity, level of investment in research and development (R&D), and corporate innovation. The paper concludes by providing policy and managerial recommendations on how to promote firm R&D within emerging markets contexts.

Keywords

Gender diversity, national culture, institutional environment, multinational corporations (MNCs), emerging economies, and firm innovation.

1. Introduction

Multinational corporations (MNCs) operating in emerging markets are often reluctant to invest in corporate innovation because such subsidiaries are initially born out of their existing assets, a unique set of core competencies and resource orchestrations (Back et al. 2014; Nuruzzaman et al. 2019, Pitelis and Teece, 2018; Yip and McKern 2014). However, due to the resource and institutional constraints in emerging markets (Amankwah-Amoah et al., 2019), value-conscious middle-class consumers with relatively lower purchasing power (Zeschky et al., 2011) present top management teams with both opportunities and challenges. Developing and maintaining systems for co-production and consumption (pro-consumption) of goods and services that offer the greatest value to customers and businesses, thus

presents a great challenge to corporate boards (see Prahalad and Ramaswamy, 2004; Biraghi et al., 2018). Given that corporate profitability is a function of costs and revenues (Pettersson and Segerstedt, 2013), scores of studies seem to pay huge attention to the market efficiency hypothesis of the production process (Teece, 1980; Dunning and Lundan, 2008; Gaur et al., 2019), leaving behind several years of critical but under-researched ideas of how top management teams in the upper echelons shape firm investment decisions in emerging markets. Instructively, extant research highlights the importance of the human capital aspect of the production function (Kesti and Syvajarvi, 2015; Debrah et al., 2018) and how it determines investment in green and sustainable technology (Stucki, 2019) and commitment to research and development (Meyer, 2004; Wu et al., 2019; Liu et al., 2019) in enhancing firm innovation. Moreover, studies have established a relationship between gender diversity and corporate boards with improved commitments to R&D and CSR investments (Brammer et al. 2009; Diaz-Garcia et al., 2013; Brieger et al., 2019).

However, the literature on innovation has yielded inconclusive evidence concerning factors that influence corporate innovation capabilities. On one hand, studies suggest that corporate innovation is influenced by the prevailing culture within a country, which is also argued to constrain the desire, motivation, and ability of firm executives to execute innovative ideas (Lin, 2009; Turró, and Peris-Ortiz, 2014). Another strand of literature contends that firm innovation is influenced by firms' ability to access resources, including finance and human capital (i.e. competent personnel and directors with resources connections) (Torchia et al., 2011; Dai et al., 2019). Moreover, emerging evidence suggests that gender diversity in corporate boardrooms could have a significant impact on firm innovation capabilities (see, Griffin et al., 2019; Na and Shin, 2019). For example, Na and Shin (2019) investigate the effect of gender diversity on firm innovation in manufacturing firms across Eastern Europe and Central Asia, although research on the relationship between board gender diversity and firm innovation is still very nascent in the literature

and also reports mixed evidence (Quintana-García and Benavides-Velasco, 2016; Horbach and Jacob, 2018).

Whilst businesses and governments in developed countries have introduced corporate governance codes that compel listed MNCs to increase the presence of women on boards, this wind of change is yet to reach the shores of several countries classified as emerging or frontier markets. The OECD (2018) also describes institutions in these markets as weak in enforcing the rule of law, to protect the rights of investors and/or promote a thriving climate for R&D investments. More importantly, though Hofstede's (1980) cultural dimensions have been utilised in various studies to distinguish a country's dominant national character, fewer studies have critically examined how this correlates with boardroom gender diversity, level of investment in R&D, and corporate innovation in emerging markets as a whole.

Consequently, the present study sets out to contribute to the understanding of how the three factors above (i.e. board gender diversity, moderated by national culture and institutional environment) impact firm innovation using multi-country evidence. Our study develops a comprehensive understanding of how gender diversity impacts firm innovation in emerging economies, including how varying national cultures and country institutional settings moderate this effect. Specifically, our paper extends previous work (e.g., Na and Shin, 2019) by analysing a more representative dataset comprising all industrial sectors, besides manufacturing, and incorporating MNCs from across the world (i.e. Africa, Asia, Europe, and the Americas). Another study, by Griffin et al. (2019), examines the impact of gender diversity on corporate innovation focusing on the number of patents registered with the United States Patent and Trademark Office (USPTO) by global firms. We complement and expand on their work by seeking to unravel how boardroom gender diversity affects firm innovation activities in other countries, beyond the US context.

This paper, therefore, critically analyses the connection between boardroom gender diversity and national cultures on corporate innovation by integrating a multi-theoretical framework comprising the upper echelons, resource-dependency, and institutional theories, and Hofstede's cultural dimensions. In doing so, we seek to answer the following research questions: Does boardroom gender diversity influence organisational commitment to corporate innovation in emerging markets? And, to what extent do individual countries' institutional factors – i.e. national norms, cultural values, and country-level institutional quality – affect boardroom gender diversity and corporate innovation? Using a rich dataset of 472 MNCs operating in 21 emerging economies, we measure corporate innovation using the level of investment in research and development as well as how expenditures in cutting-edge technologies have been used to revolutionise the co-creation, co-production, and delivery of goods and services in emerging market settings (see Zhao et al. 2014; Adomako et al., 2019; Wu and Park, 2019).

The rest of this paper is organised as follows: section two reviews the existing literature. Section three describes the data and research design adopted in our study. Section four explains the results and findings, while section five concludes the paper.

2. Literature and hypotheses

2.1 Upper Echelons Theory (UET)

The Upper Echelons Theory (UET) suggests that the behavioural characteristics of the top management team (TMT) provide a unique explanation for corporate decision making and financial outcomes. This, in effect, means that executives in the upper echelons of firms act based on their personalised interpretation of the situations they face. These personalised constructions are a function of their experiences, values, and personalities. Consequently, how the boards are led to work together to execute their fiduciary responsibilities is reflected in the character of those at the helm of firms (Seijts et al.,

2019). Using the bounded rationality lens, the behavioural assumption within the context of MNC management decision making emphasises the importance of understanding the mental constructions of top management in explaining the choices they make when confronted with complex situations that demand their attention (Rost and Osterloh, 2010).

Additionally, the UET emphasises the importance of considering demographic characteristics (attitudes, beliefs, and lifestyle) of the top executives in understanding the strategic choices they make and accounting outcomes they deliver (Hambrick, 2007). Eagly (1987), for instance, proposes that men and women behave according to the stereotypes and beliefs associated with the social roles they occupy. Boulouta (2013) indicates that these beliefs act as social norms and personal dispositions which are embedded in individual gender identities, professional experiences, present circumstances, and future expectations. Such beliefs shape their mindsets and worldview which consequently become important determinants of how managers in the upper echelons run their firms (Galaskiewicz, 1991; Post and Byron, 2015). Slote (2007) asserts that empathy is found at the core of the feminist character. This line of reasoning has also been expanded to include the mechanism of empathic caring, as having compassion and benevolence towards investments in green technology and sustainable means of production. Also, Gaard and Gruen (1993) assert that female executives tend to consider the protracted view in addition to the net effect of their decisions on all stakeholders; whereas, male managers implement policies based on rules and appeal. For instance, the literature suggests that women have and continue to be at the heart of the green revolutions, biotechnological innovations and crop diversity across Africa, Asia and Latin America (Sachs et al., 1997), an observation that is attributed to their stronger emphatic and caring traits compared with men (Eagly, 2009; Eagly and Wood, 2011).

2.2 Board gender diversity and firm innovation

Boards of directors are viewed as ‘boundary-spanning’ mechanisms that link organisations with vital resources and opportunities necessary for achieving organisational objectives (Pfeffer and Salancik, 1978). Corporate board appointments are thus argued to involve strategic considerations of the value that individual directors bring to the appointing organisation (Pfeffer, 1972; Salancik and Pfeffer, 1977; Hillman et al., 2000). For instance, firms experiencing solvency challenges are reported in the literature to appoint directors associated with financial institutions to unlock access to capital (Mizruchi and Stearns, 1988), while firms faced with uncertainty or resource scarcity prefer to appoint highly interlocked directors who can provide links to crucial resources (Boyd, 1990; Dalton et al., 1999; Johnson et al., 1996). In addition, the resource dependency theory (RDT) literature suggests that firms also seek to appoint directors who can bring other benefits such as ‘advice and counsel’, as is the case with non-executive directors (Drees and Heugens, 2013; Areneke and Kimani, 2019; Ullah et al., 2019). Firms can also appoint eminent members of society (Drees and Heugens, 2013), or even individuals from marginalised groups such as women and/or ethnic minorities, to enhance firm legitimacy (see, Peng et al., 2001).

Hardly any research investigates the impact of gender diversity on firm innovation within an emerging markets context. Instead, existing studies focus on the impact of the boardroom diversity on firm financial outcomes, such as performance and/or market value. Thus, the evidence discussed below concerns studies conducted in developed countries contexts. In the first instance, Torchia et al. (2011) report a significant positive relationship between the appointment of women into the upper echelons and the level of firm innovation. Whilst their work used a sample of 317 Norwegian firms to underscore the growing importance of gender diversity in firm innovation, the contribution of women hinges on their number and positions in the boardroom. Whilst the work of Torchia et al. (2011) is important from an institutionally stable economy context, they called for cross-country analysis to investigate how the

promotion of women into the upper echelons enhances corporate innovation in different political and institutional contexts. In a related study, Dai et al. (2019) confirm that the greater presence of women on corporate boards improves the integration of knowledge and firm innovation performance in new venture teams. Diaz-Garcia et al. (2014) also used data from Spanish firms to examine gender diversity within R&D teams and revealed that promoting women to the upper echelons produces radical innovation. Given these arguments, we hypothesise that promoting women to the upper echelons of MNCs in emerging economies would result in empathy-based responses towards corporate R&D expenditure and investment in green technology in emerging markets (see Abdullah et al., 2015; Terjesen et al., 2009; Torchia et al., 2010; Diaz-Garcia et al., 2013).

Accordingly, Abdullah et al. (2016) report contradictory evidence concerning the impact of gender diversity on firm value in the Malaysian context. These authors report that many boards are dominated by men, with over half of surveyed firms lacking female directors, and that the market fails to recognise the contribution of female directors (Abdullah et al., 2016). The authors conclude by calling for further research to explore the institutional and cultural factors which inform this phenomenon, using cross-country evidence. This is especially important considering that prior evidence has shown that diversity “increases creativity and innovation” (Campbell and Mínguez-Vera, 2008, p. 440). Similarly, Singh and Delios (2017), surveying a sample of listed Indian firms, argue that firms in emerging markets place more significance on resource linkages and expertise/counsel role when making board nominations, instead of the monitoring role to be played by the appointed directors. This, they observe, assists firms in “pursuing growth strategies through new domestic ventures or new foreign investments” (Singh and Delios, 2017, p. 624).

In addition, Quintana-García and Benavides-Velasco (2016) investigated the impact of gender diversity on firm innovation, using data related to top-level executives for US biotechnology firms that underwent

initial public offerings (IPOs) between 1983-2009. Surprisingly, the authors report that “investors do not perceive that women managers of biotechnology firms can enhance the firm’s innovation capabilities” (Quintana-García and Benavides-Velasco, 2016, p. 515). This finding contradicts literature on diversity which views socio-cognitive heterogeneity, such as that which arises from gender diversity, as a valuable resource for firms (Østergaard et al., 2011; Zona et al., 2013; Quintana-García and Benavides-Velasco, 2016). Furthermore, a recent survey of German firms reveals that mixed-gender management boards – with a large proportion of women – were positively associated with environmental innovation (Horbach and Jacob, 2018). The authors explain this finding by arguing that innovation is a complex activity that requires “collaborative behaviour more than competitive behaviour” (Horbach and Jacob, 2018, p. 8). These authors, however, fail to explain whether gender diversity (or lack thereof) within supervisory boards also impacts firms’ eco-innovation. Considering this background, the present study sets out to test the following hypothesis:

Hypothesis 1: The presence of female directors on boards is positively associated with firm innovation.

2.3 Institutional quality

The institutional theory argues that the actions of individuals and organisations within a given social context are constrained by the demands of their institutional environment (Scott, 1987; Zucker, 1987). Such institutional demands (or simply *institutions*) comprise “informal constraints (i.e. sanctions, taboos, customs, traditions, and codes of conduct), and formal rules (i.e. constitutions, laws, property rights)” (North, 1991, p. 97). North (1991) also argues that institutions are created to maintain stability in societies. In this regard, social actors (i.e. individuals or organisations) that deviate from the socially expected behaviour may receive admonition or punishment depending on the seriousness of their actions (Oliver, 1991; Adams et al., 2019). Accordingly, the form and substance of institutions vary across socio-cultural settings, and thus institutions that are acceptable in one social context could be frowned upon in

another (Dacin, 1997; Miska et al., 2018). Considering this, MNCs with operations in various emerging markets must adapt their structures and practices to individual countries' institutional demands to secure legitimacy (Areneke and Kimani, 2019). Moreover, Dacin (1997) argues that institutions are not static and change over time, even within individual country contexts. This suggests that even firms operating in a single country must gradually reproduce their structures in order to keep up with evolving institutional demands (Greenwood and Hinings, 1996).

Notwithstanding, emerging market contexts are argued in the literature to exhibit considerable diversity both within and across countries (Areneke et al., 2019). Such diversity is manifested in various forms, including cultural diversity (Grzegorzcyk, 2019), ethnic diversity (Abdullah et al., 2016), education, and skill levels (Amankwah-Amoah, 2016), and level of economic development (Krammer, 2015). Literature suggests that institutional backgrounds of emerging markets are further complicated by the existence of institutional voids; that is, (formal) institutions to “support markets are absent, weak, or fail to accomplish the role expected of them” (Mair and Marti, 2009, p. 422). Factors that contribute to institutional voids include low formal education attainments (Khanna and Palepu, 1997), non-existent or weak property rights laws (Brouthers, 2002), and inadequate regulatory oversight (Alon and Hageman, 2017). For instance, in a study covering 5000 firms within 20 emerging markets, Alon and Hageman (2017) observe that firms operating in countries with weak legal environments paid bribes more frequently, compared with countries where legal climates are relatively stronger. Explaining this phenomenon, the authors argue that weak formal institutions, in this case, weak laws, have been supplanted by vigorous informal institutions, i.e. the practice of paying bribes to acquire legitimacy (Alon and Hageman, 2017). Also, Nakpodia and Adegbite (2018) reveal that board positions in Nigerian firms are dominated by locally prominent individuals who are appointed based on their influence, rather than the experience or skills that they bring into the board. The behaviour of these individuals often goes unchecked as they are more

powerful than regulators, thus intensifying the institutional voids – i.e. weak corporate governance framework (Nakpodia and Adegbite, 2018; Areneke et al., 2019). As suggested by Areneke and Kimani (2019), however, MNCs operating in emerging markets can minimise this problem by recruiting foreign directors into their boards. The foregoing discussion can thus be inferred to mean that institutional voids are not uncommon in emerging markets, and that absence of formal institutions can trigger emergence of unfavourable informal institutions. We further argue that many less developed countries, which primarily constitute the emerging markets, are likely to exhibit weak affirmative action policies and practices which might lead to exclusion of women in the corporate sector. Considering this background, the present study sets out to test the following hypothesis:

Hypothesis 2: Country institutional context has a significant impact on firm innovation within emerging markets.

2.4 Culture and innovation

The Hofstede’s cultural framework (Hofstede, 1980, 1983, 2001, 2005) has been widely applied in research to capture and explain how variations in national cultures contribute to varied individual behaviour and organisational practices across countries. Hofstede (1980, p. 43) equates national culture to the dominant national character of a country, which he defines further as being “the collective mental programming of people in an environment”. Accordingly, the Hofstede’s cultural framework proposes five features that can help to understand a nation’s culture: (i) Power Distance Index (PDI), (ii) Uncertainty Avoidance Index (UAI), (iii) Individualism Index (IDV), (iv) Masculinity Index (MAS), and (v) Long-Term Orientation Index (LTO) (see Hofstede, 2001). The *Power Distance Index (PDI)*, according to Hofstede, considers how social and organisational hierarchies constrain individual choices and decision-making processes within organisations (Hofstede, 1980, 1991, 2005). The *Uncertainty Avoidance Index (UAI)* assesses how cultural attitudes towards uncertainty influence the likelihood of

embracing change, where cultures with high UAI are found to be less open to new ideas/change, and vice versa (Hofstede, 1991). The *Individualism Index (IDV)* measures whether societies favour an individualistic versus collectivist approach in decision making (Hofstede, 1991), where societies with high IDV measures are noted to experience more innovations than those with low IDV (Everdingen and Waarts, 2003). The *Masculinity Index (MAS)* measures whether a society assumes a masculine or feminine outlook (Hofstede, 1980, 1991, 2005), where a high MAS shows a strong focus on outcomes and is also characterised by aggressiveness, assertiveness, and decisiveness in individual habits (Everdingen and Waarts, 2003). Cultures depicting a *Long-Term Orientation Index (LTO)* are associated with a stronger attachment to traditional values (Hofstede, 2001, 2005), and are less likely to adopt new ideas, and vice versa (Erumban and de Jong, 2006). Lastly, the sixth and most recent of Hofstede's cultural dimensions is the *Indulgence Versus Restraint Index (IVR)*. A high IVR index suggests that a country's culture approves the pursuit of individual ambitions/new imaginations, while the same is restrained in a society with a low IVR index (Hofstede, Hofstede, and Minkov, 2010).

Besides institutions and institutional voids, the national culture of a country is also argued to have a considerable impact on various organisational practices (Hofstede, 1983, 1980); more so, where formal institutions are weak or absent (see, for instance, Chakrabarty, 2009; Nakpodia and Adegbite, 2018; Areneke et al., 2019). Prior studies demonstrate that national culture has a moderating effect on the propensity of firms to embrace innovative practices (Everdingen and Waarts, 2003), corporate entrepreneurship (Turró et al., 2014), and firm financial and governance outcomes (Hooghiemstra et al., 2015). According to Na and Shin (2019, p. 6), "culture [is] a dominant factor in innovativeness", and thus research seeking to understand variations in firm innovation across countries needs to consider this factor. For this reason, emerging market MNCs should also pay due regard to the complexities of individual countries' cultural conditions and respond appropriately to their demands (Dimitratos et al.,

2011; Wang et al., 2012). Considering the complexity of different national culture dimensions that can affect firm innovation or moderate the effect of gender diversity on firm innovation, we set out to test hypothesis 3 below. Notwithstanding, the study will also test each of the six Hofstede's cultural dimensions in the discussion section. This is important as it will allow us to deepen our understanding concerning the linkage between firm innovation and the different cultural dimensions.

Hypothesis 3: The national culture of a country has a significant impact on corporate innovation.

3. Methodology

We collected corporate governance, gender diversity, and financial data from Thomson Eikon. Thomson Eikon has recently introduced ESG (environmental, social, and governance) data for many companies from around the world. The internal corporate governance and firm-specific variables used in this study are also available in the Bloomberg database. Our research and development expenditures data are also collected from Thomson Eikon. Country-level data on institutional quality (such as rule of law, regulation quality, government effectiveness, and control for corruption) are extracted from The World Bank database. Data on cultural dimensions of each country, on the other hand, are collected from Hofstede's website using various aspects of cultural dimensions such as power distance, individualism vs collectivism, masculinity vs femininity, long- vs short-term orientation, and indulgence vs restraint. Our final sample comprises 472 companies from 21 countries for a sample period 2009-2018. Table 1 below presents definitions for a list of firm-level measures of corporate governance, country-level governance structures, and Hofstede's indices capturing different dimensions of national culture.

Insert table 1 here

We looked for a suitable estimation approach that can handle endogeneity issues effectively. Fixed effects estimation can partially control for several sources of endogeneity, including unobserved heterogeneity (Ullah et al., 2018; Ullah et al., 2020). Other superior estimations, such as system GMM, can better control simultaneity bias, while the use of lagged values can overcome the dynamic nature of endogeneity. However, owing to the nature of our longitudinal dataset, our diagnostic tests suggested that fixed effects was an appropriate estimation approach. Endogeneity in the estimation process is a cause of concern for studies of this nature, and inappropriate estimation can potentially lead to a spurious correlation between the chosen variables. Strict exogeneity is a fundamental assumption of fixed estimation. According to this assumption, the current governance arrangement, institutional factors, and cultural dimensions are not affected by any changes in the firm's R&D investment activities in the current and previous years. To test the impact of gender diversity on corporate innovation, we employ the following generic panel data fixed effects model:

$$\begin{aligned} \text{Corporate innovation}_{it} = & \text{Gender}\beta_{it} + \text{Corporate Governance}\beta_{it} + \text{National culture}_{it} + \\ & \text{Institutional Quality}_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

We further expanded the category of variables into the following model, which we tested in our main results.

$$\begin{aligned} \text{Corporate innovation}_{it} = & \text{Gender}\beta_{it} + \text{BSIZE}\beta_{it} + \text{NED}_{it} + \text{SBO}_{it} + \text{LEV}_{it} + \text{ROA}_{it} + \text{ROE}_{it} + \\ & \text{MTBV}_{it} + \text{PDI}_{it} + \text{IDV}_{it} + \text{MAS}_{it} + \text{UAI}_{it} + \text{LTO}_{it} + \text{IVR}_{it} + \text{REGQUA}_{it} + \text{SIPI}_{it} + \text{RULEOFLAW}_{it} + \\ & + \text{GOVEFFECT}_{it} + \text{CTRFORCORR}_{it}\varepsilon_{it} \end{aligned} \quad (2)$$

The dependent variable is corporate innovation and explanatory variables include gender diversity, corporate governance, national culture, and institutional quality. Our study uses two different proxies for firm innovation, i.e. number of patents registered by the company or the intensity of R&D expenditure.

Patents data are conveniently available for firms listed in the United States and other developed markets. Obtaining patents registration data for emerging economies is, on the other hand, a challenging task. To overcome this, we used investment in R&D expenditure as an alternative proxy for corporate innovation, and this data can conveniently be extracted from corporate annual reports and major financial databases. We define investment in R&D expenditure as firm-level research and development expenditure divided by sales. We use other measures of governance quality such as board size, non-executive directors, leverage, and single largest shareholder. The firm-level financial characteristics comprise return on assets, return on equity, and market-to-book value. Moreover, world bank governance indicators cover the rule of law, regulation quality, government effectiveness, control for corruption, and, more importantly, the Hofstede's cultural dimensions.

4. Results and findings

The results of our study contribute to the literature on boardroom gender diversity and firm innovation from three main perspectives. First, we used a novel panel dataset that combines firm-level and cross-country data in examining the effects of boardroom gender diversity from weak institutional settings. Second, our paper is the first study, to the best of our knowledge, to combine country-level institutional quality variables with meso-level Hofstede's national culture variables and firm-level variables all in one study to explore the association between boardroom gender diversity and firm innovation. Third, we extend the empirical findings of Torchia et. al (2011) and Dai et. al (2019), whose findings on the effects of gender diversity and board innovation only concentrated on a single developed and developing country (Norway and China, respectively). Our empirical findings are based on a new and original panel dataset that combines firm-level and cross-country data from 21 emerging economies.

To provide clarity, rigour, and coherence to the unique contributions of our study as enumerated above, we structure our results section into four parts: first, we examine the narrative from the descriptive statistics. Second, we set out to establish the link between boardroom gender diversity and corporate innovation. Third, we explicate how firm-level and country-level factors influence corporate innovation. We also uncover how values, national norms, and different cultural dimensions influence boardroom gender diversity, the level of investment in research and development (R&D) activities, and corporate innovation.

4.1 Descriptive statistics

In Table 2, we provide the sample decomposition of our novel cross-country data by juxtaposing the number of companies from each country in our dataset together with the associated industries. To avoid sample biases, the number of companies included in our data mostly reflects the size and population of the respective countries. For example, we included more firms from large emerging market economies such as Brazil, China, India, Mexico, and Indonesia (see Table 2 Panel A).

Insert table 2

Table 2 Panel B shows a further breakdown of the industrial composition of our sample with companies from basic materials and consumer goods as well as the services industry representing approximately 45% of the total industry-set in our dataset. In this regard, our curiosity was heightened to note that firms from technology industries are not very significant in comparison to industries that concentrate on consumables. First of all, this demonstrates the type, nature, and structure of industries that are emerging and growing up in emerging markets. To some extent, it also shows the type of goods and services

purchased by the ‘emerging’ middle-class consumers in these growing markets. Consequently, we further explore this antecedent by focusing on the cross-country-level data and Hofstede’s meso-level cultural variables from the 21 countries, to understand why some technology firms might be reluctant to invest in emerging economies. Table 3, therefore, presents the descriptive statistics for firm-level data.

Insert table 3 here

Looking at Table 3, the average board size is 10 for the sample companies. Board size generally tends to be larger in emerging economies as a result of family ownership and concentrated ownership structure. Board independence, which is measured by the percentage of non-executive directors on corporate boards, is 52% and this higher board independence is quite encouraging for companies located in emerging markets contexts. Gender diversity in the boardroom is around 4%, which is relatively low for large listed companies in emerging economies. Large companies in emerging economies are gradually introducing self-enforcing measures to enhance diversity targets in their boardrooms. Ownership by the largest shareholders is 31%, which is consistent with the notion that companies in emerging economies have a highly concentrated ownership structure (Areneke and Kimani, 2019; Areneke et al., 2019).

4.2 Link between board gender diversity and board innovation

We used regression results in Table 4 to test our first hypothesis, which posits that the appointment of female directors into the upper echelons of firms is positively associated with firm innovation in emerging markets. We noted from the regression results in Table 4 that the proportion of female board members (gender diversity) in all our seven models (i.e. models 1-7) is positively and significantly associated with corporate innovation. This result implies strong empirical support for our first hypothesis.

As such, our results are consistent with previous studies that argue that the appointment of more female board members has a significant positive association with corporate innovation (see Abdullah et al., 2015; Terjesen et al., 2009; Torchia et al., 2010; Diaz-Garcia et al., 2013; Chen et al., 2018).

Similarly, our results are consistent with previous studies such as Dai et al. (2019) which argue that promoting more women into the upper echelons will enhance firm innovation. The upper echelon theoretical prediction posits that appointing more women to the board enhances board effectiveness. Thus, bringing more women into the upper echelons implies that strategic decisions will be evaluated from different pragmatic perspectives which influence higher R&D expenditure (Post and Byron, 2015; Galaskiewicz, 1991). Our findings extend the literature by validating the empirical findings of Torchia et al. (2011) and Diaz-Garcia et al. (2014), who find a significant association between board gender diversity and corporate innovation from a stable and strong institutional setting. For example, whilst the empirical findings of Terjesen et al. (2015) are based on 317 Norwegian firms and those of Diaz-Garcia et al. (2014) on data from 4277 Spanish companies, our study extends their findings by using cross-country data from 21 emerging countries to test the association between board gender diversity and firm innovation. Further, our findings provide empirical validation for the upper echelons theory which argues that promoting more women to the upper echelons of firms will influence board strategic cognition and innovativeness (Garcia-Granero et al., 2019).

Having more women on corporate boards provides a more feminine flavour (such as empathy, compassion, and benevolence towards investment in green technology and sustainable means of production) that influences the dominant strategic logic of the board (Eagly, 2009; Eagly and Wood, 2011). More women on corporate boards can influence the corporate boards' dominant logic (Certo et al., 2006) by promoting the dominance of feminine empathy-oriented R&D investment ideologies. The

next section explores how corporate innovation at the firm level is shaped by individual countries' contextual realities.

Insert table 4 here

4.3 Firm and country-level determinants of board innovation

To the best of our knowledge, our study is the first of its kind to use combinations of cross-country level institutional data with Hofstede's meso-level cultural framework data to examine firm-level and country-level determinants of corporate innovation. The results in Table 4 show firm-level factors that support board innovativeness. First, we noted a consistent positive association between the number of non-executive directors (NEDs) on the board and the level of board innovativeness. This result provides empirical support for the predictions of the resource dependency theory and the upper echelons theory which suggest that appointing more non-executive directors to the board will enable firms to rent idiosyncratic knowledge sets (Hambrick, 2007), and relevant experience and expertise that can sharpen the strategic lens of the board (Balsmeier et al., 2017). Thus, the unique knowledge-sets and experiences that can be shared by the NEDs can influence board innovation (Rost and Osterloh, 2010). Our results extend the empirical findings of Balsmeier et al. (2017), whose empirical results are based solely on US firm-level data.

Second, our results from Table 4 from models 1-7 consistently show a significant association between the strength of investor protection index and board innovation. These results confirm previous studies such as Kayalvizhi and Thenmozhi (2018) which postulate that countries with a strong institutional environment, including robust investor protection laws, experience more innovation at the firm level. Despite the insightful empirical work of Kayalvizhi and Thenmozhi (2018), their evidence was based on data that excluded key firm-level variables, such as boardroom diversity, and the role and contribution

of non-executive directors in enhancing corporate innovation. As such, our study extends their empirical findings by broadening the narrative to include firm-level data on innovative determinants, and variables such as boardroom gender diversity, and the role of non-executive directors in the analysis.

Third, we noted a significant positive association between the single largest shareholders and board innovation from our regression results in Table 4. These results complement previous empirical studies that argue that the large ownership has a significant positive influence on firm innovation (Chen et al., 2014; Choi et al., 2011). Using institutional theory as a backdrop, Chen et al. (2014) argue that large owners are powerful and highly influential in many emerging economies (Chen et al., 2014; Choi et al., 2011). In comparison, our results imply that large owners (blockholders) can use their influence to champion increased research and development budgets in corporations. It is also worthwhile to mention that the findings of Chen et al. (2014) and Choi et al. (2011) were based on a dataset of only Chinese companies. We extend their empirical findings by using a dataset from 21 emerging economies.

Fourth, we test our second hypothesis by incorporating country-level institutional variables into our regression analysis in Table 4. The findings reported by models 2-9 in Table 5 show that there is a positive (albeit insignificant) association between country-level institutional quality and board R&D activities and corporate innovation. This result is supported by a previous empirical study conducted by Honoré et al. (2015). In addition, corporate governance quality of MNCs in emerging markets is conditioned by the level of institutional quality prevailing in a country, as confirmed by Scott (1987) and Zucker (1987). For example, the empirical findings from Honoré et al. (2015) show that poor regulatory institutional environments can stifle board R&D intensity. Whilst their empirical findings were based on data from 177 European countries, we extend the work of Honoré et al. (2015) by examining board R&D intensity using cross-country data from emerging economies contexts.

4.4 Hofstede's country-level variables and board innovation (hypothesis 3)

To further enhance our understanding of the relationship between boardroom gender diversity and corporate innovation, particularly from the perspective of country-level institutional and cultural differences, we included and tested hypothesis 3 using Hofstede's six cultural dimensions framework in our model. Hofstede's country-level meso-variables consist of six dimensions consisting of power distance index (PDI), individualism versus collectivism index (IDV), masculinity versus femininity index (MAS), uncertainty avoidance index (UAI), long- versus short-term orientation index (LTO), and indulgence versus restraint index (IVR). In testing these hypotheses, our result is consistent with the work of Everdingen and Waarts (2003), who examined the effect of national culture on mid-size companies within stable institutional contexts in Europe. As far as we know, except for Png et al. (2001), who focused on only two out of the six dimensions, and Everdingen and Waarts (2003), who focused on only four out of the six dimensions, our study is the first to combine firm-level and country-level data with Hofstede's six cultural dimensions to examine board gender diversity and firm innovation within emerging market settings.

We noted from our results in Table 4 that strong variations exist in the values of these dimensions across the 21 countries. To test the effects of these six cultural values on board gender diversity and innovation, we performed regression analysis (see Table 4). Our results show a significant negative association between power distance index (PDI) and board innovation (R&D intensity). Further, we noted a significant negative association between the uncertainty avoidance index (UAI) and corporate innovation. These results are consistent with previous empirical studies such as Everdingen and Waarts (2003). Apart from this, our results add to this narrative by suggesting that board innovation may be limited and dysfunctional in environments characterised by non-appointment of women into the upper echelons of firms. The sense of hopelessness and suppression of the voices of the few who are in higher

positions have a long-term impact on corporate innovation. These antecedents usually result in centralised decision structures, use of formal rules, autocracy, and poor information sharing at the subsidiary level, irrespective of the human resource systems and practices of an MNC's country of origin (see Adams et al., 2017).

Thus, a power-centred environment can stifle freedom of expression, knowledge sharing, and board innovativeness. Further, companies that reside in countries with a high uncertainty avoidance culture are likely to resist innovations due to their proclivity to high-risk avoidance. Regarding the other remaining cultural dimensions, our results from Table 4 show the following: first, we noted a significant positive association between long-term orientation (LTO) and corporate innovation. Second, we recorded a significant positive association between indulgence versus restraint index (IVR) and boardroom expenditure on R&D and firm innovation. Third, we noted a positive association between individualism (IDV) versus collectivism index and corporate innovation. Apart from the latter, the other two indices above are supported by a previous empirical study that posits that cultures with long-term orientation are more adaptive, persistent, proactive, and innovative. Further, our findings show a positive but insignificant association between masculinity index and board innovation, implying that countries with a high masculine score are more likely to be innovative because of dominant cultural values such as high competition, equality, and emphasis on achievements and reward, among others (see Everdingen and Waarts, 2003).

To strengthen our narrative regarding the significant linkages between gender diversity and firm innovation, we included additional analysis in Table 5 to model the effect of gender diversity on innovation and moderate that relationship with each of the six national culture dimensions

Insert table 5 here

Our findings from Table 5 are consistent with hypothesis 3 and institutional theory that implies that the extent to which boardroom gender diversity influences firm innovation is moderated by national culture. This finding is consistent with resource dependency and institutional theory. The institutional theory posits that the prevailing social structures (national cultures) in a given country can influence organisational norms, policies, procedures, and long-term vision (Hofstede 1980). Also, Hofstede (1980) suggests that national culture has a significant influence on competition, risk avoidance, long-term goals, and achievements of people in a country. Lastly, our findings from Table 5 imply that the effect of gender diversity on innovation is moderated by national culture. This finding is supported by the recent regulatory and governance reforms around the world which call for greater female representation in the boardrooms of listed companies (see, Areneke and Kimani, 2019).

5. Summary and conclusion

This cross-country research explores the role of boardroom gender representation, corporate governance, national culture, and country-level institutional factors and their impact on corporate innovation. Using a unique sample of 472 multinational companies operating in 21 emerging economies, we find a strong impact of boardroom gender diversity on corporate innovation as measured by the R&D intensity. Gender representation in corporate boardrooms is considerably low for companies operating in emerging economies as compared to their counterparts in the advanced countries. The positive impact of gender on corporate innovation supports the notion of higher gender representation in the upper echelons of firms (whether for local or multinational companies). We also find that other firm-level governance mechanisms such as non-executive directors (NEDs) and large shareholders (blockholders) play an important role in enhancing firm-level innovation. Interestingly, and contrary to our expectations, the results for the country-level institutional factors (i.e. rule of law, regulatory quality, control for

corruption, government effectiveness) and corporate innovations are largely insignificant. Additionally, we could not uncover the impact of such institutional complexities on corporate innovations in emerging economies. We found a significantly negative relationship between the power distance measure of national culture and the degree of R&D investment in emerging economies. However, we did find a positive association between long-term orientation and corporate innovation.

Previous empirical studies concerning boardroom gender diversity and R&D commitments have focused mainly on firm proprietary capabilities from a developed countries perspective. As far as we know, our study is the first empirical study that combines firm-level variables, institutional factors, and national culture dimensions in one study. This, in turn, has helped us to reach robust findings concerning the effect of gender diversity on corporate innovation, and moderate that relationship with Hofstede's six national culture dimensions. The results from our empirical study extend the literature by providing further evidence that strengthens previous research and corporate governance initiatives that argue for the need to increase female representation in the boardroom, especially in emerging economies where gender issues are usually overlooked. We increase the robustness of our findings by simultaneously using a multi-theoretical framework that combines firm-level data, institutional level data, and Hofstede's cultural dimensions to examine how boardroom gender diversity influences corporate innovativeness in emerging economies.

Our results contribute to the extant corporate governance literature in several ways. First, we use a larger sample size of 472 multinational corporations drawn from 21 emerging economies. Second, contrary to previous studies that show significant linkages between institutional factors and firm innovation, our results show that country-level institutional factors play an insignificant role in promoting firm innovativeness in emerging economies. Rather, a change in culture, attitude, and mindset of stakeholders (such as employees, managers, competitors, etc.) is necessary to drive corporate innovation. For example,

our results show significant linkages between firm innovation in emerging economies that are more future-oriented with a highly competitive culture, rigid codes of belief, and strong risk mitigation culture. These findings strengthen the previous empirical studies that either use a smaller sample size or focus on advanced countries rather than emerging economies.

Our study has important policy implications. First, policymakers in emerging economies need to initiate legislation that enhances competition among firms. Second, the corporate board needs to shift their attention from accounting-based reward systems that are based on historical performance. Rather, more forward-looking and long-term based reward systems such as employee bonus issues, stock options, reward systems based on innovation, etc., are required. Third, our results imply that uncertainty avoidance culture has a significant influence on corporate innovation. Directors, entrepreneurs, leaders of institutions, etc., need to clarify their firms' long-term and short-term goals to employees at all levels to ensure a better understanding of their short-term targets and long-term goals. Providing clear long-term goals and short-term objectives will re-focus employees' attention and avoid uncertain behaviours that ultimately stifle individuals and group initiatives. Fourth, the results from our study imply that adopting a high-risk management awareness and risk mitigation culture has the potential to enhance business continuity and innovation across various sectors of an economy. Our findings from Table 6 imply that the effect of gender diversity on innovation is moderated by national culture. This finding is supported by the recent regulatory and governance reforms around the world which call for greater female representation in the boardrooms of listed companies.

Finally, our study has limitations. Owing to the unavailability of patents registration data for several companies in emerging economies, we could not use this proxy for innovation. Instead, we used R&D investment as an alternative – which is also widely used as a proxy for innovation in the literature. To

conclude, we wish to invite further research to investigate how the appointment of women into the upper echelons of emerging market MNCs shapes investor perceptions of the appointing organisation.

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Table 1: Variables and their definitions

Variable name	Definition	Source
<i>Firm-specific variables</i>		
R&D Spending (RDSALES)	Firm-level research and development expenditures divided by sales	Thomson Eikon
Gender Diversity (GD)	Percentage of women on a company board	Thomson Eikon
Board size (BSIZE)	The total number of board members	Thomson Eikon
Non-executive directors (NED)	The percentage of non-executive directors (this is a measure of board independence)	Thomson Eikon
Single largest shareholder (SBO)	The percentage of share ownership of a single largest shareholder	Thomson Eikon
Leverage (LEV)	Total debt divided by total assets	Thomson Eikon
Return on equity (ROE)	Operating income divided by stockholder equity	Thomson Eikon
Return on assets (ROA)	Operating income divided by total assets	Thomson Eikon
Market-to-book value (MTBV)	Market value of common equity divided by the balance sheet value of the common equity	Thomson Eikon
<i>Hofstede's National Culture aspects</i>		
Power distance index (PDI)	The degree of inequality that exists – and is accepted – between people with and without power	Hofstede Insights
Individualism Versus Collectivism (IDV)	The strength of the ties that people have to others within their community	Hofstede Insights
Masculinity Versus Femininity (MAS)	Measures the distribution of roles between men and women	Hofstede Insights
Uncertainty Avoidance Index (UAI)	Measures how well people can cope with anxiety	Hofstede Insights
Long- Versus Short-Term Orientation (LTO)	The time horizon that people in a society display	Hofstede Insights
Indulgence Versus Restraint (IVR)	Society that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun	Hofstede Insights
<i>Country-level Institutional factors</i>		
Regulation quality (REGQUA)	The index measures how governments develop and implement regulations that allow and promote private-sector development	World bank indicators
Strength of investor protection index (SIPI)	This index is an average of three other indices: the extent of disclosure index, the extent of director liability index and the ease of shareholder suit index. The index ranges from 0 (having some or no investor protection) to 10 (higher investor protection)	World bank indicators
Rule of law (RULEOFLAW)	The index values vary from 0 (non-existent) to 100 (excellent) and it measures the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence	World bank indicators
Government effectiveness (GOVEFFECT)	The index varies from 0 to 100 and measures the quality of the civil service, public services, and the degree of independence of these from political pressures	World bank indicators
Control for corruption (CTRFORCORR)	World Bank indicator which measures extent to which public power is exercised for private gain (percentile rank among all countries, which ranges from (lowest) zero to (highest)100 rank)	World bank indicators

Table 2 Panel A: Sample characteristics			Panel B: Industrial composition of the sample	
Country	No. of companies	No. of industries		
Argentina	4	4	Basic Materials	102
Brazil	62	5	Consumer goods	52
Chile	17	7	Consumer services	24
China	54	9	Financial	51
Colombia	11	7	Healthcare	12
Czech Republic	1	1	Industrials	91
Hungary	2	2	Oil and Gas	37
India	57	10	Technology	38
Indonesia	72	9	Telecommunications	21
Malaysia	7	4	Utilities	44
Mexico	32	7	Total	472
Peru	6	3		
Philippines	29	6		
Poland	12	4		
Russia	43	9		
South Africa	17	5		
South Korea	6	3		
Sri Lanka	1	1		
Taiwan	15	5		
Thailand	10	5		
Turkey	14	6		
Total	472	112		

Table 3 Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
BFSIZE	4295	10.209	3.778	1	37
NED	4725	52.349	34.41	0	96.43
GD	4723	4.355	7.528	0	50
SBO	3681	31.186	26.984	0	99.99
LEV	4725	.029	.06	0	.864
ROE	4725	.156	.554	-7.893	23.187
ROA	4725	.01	.027	-.054	.572
MTBV	4685	2.39	4.283	0	51.97
LEVERAGE	4725	.272	.192	0	3.651
RDSALES	4724	.03	.079	0	.813

Table 4 Boardroom gender diversity, national cultures and corporate innovations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GD	0.00219*** (0.000228)	0.00179*** (0.000219)	0.00173*** (0.000199)	0.00174*** (0.000199)	0.00181*** (0.000218)	0.00179*** (0.000219)	0.00173*** (0.000199)	0.00174*** (0.000199)	0.00181*** (0.000218)
BSIZE	-0.000612 (0.000473)	-0.000419 (0.000509)	-0.000445 (0.000449)	-0.000455 (0.000448)	-0.000351 (0.000508)	-0.000419 (0.000509)	-0.000445 (0.000449)	-0.000455 (0.000448)	-0.000351 (0.000508)
NED	0.000145** (6.50e-05)	0.000160** (7.85e-05)	0.000145** (6.05e-05)	0.000143** (6.05e-05)	0.000157** (7.84e-05)	0.000160** (7.85e-05)	0.000145** (6.05e-05)	0.000143** (6.05e-05)	0.000157** (7.84e-05)
SBO	0.000271*** (8.26e-05)	0.000152* (8.97e-05)	0.000169** (7.57e-05)	0.000168** (7.56e-05)	0.000160* (8.97e-05)	0.000152* (8.97e-05)	0.000169** (7.57e-05)	0.000168** (7.56e-05)	0.000160* (8.97e-05)
LEV	0.000807 (0.0303)	0.0837** (0.0382)	0.00311 (0.0262)	0.00427 (0.0262)	0.0563* (0.0327)	0.0837** (0.0382)	0.00311 (0.0262)	0.00427 (0.0262)	0.0563* (0.0327)
ROE	-0.000875 (0.00233)		-0.000902 (0.00192)	-0.000856 (0.00192)	-0.00100 (0.00193)		-0.000902 (0.00192)	-0.000856 (0.00192)	-0.00100 (0.00193)
MTBV	-0.000478 (0.000599)	-0.000466 (0.000826)	-0.000450 (0.000597)	-0.000414 (0.000596)	-0.000589 (0.000818)	-0.000466 (0.000826)	-0.000450 (0.000597)	-0.000414 (0.000596)	-0.000589 (0.000818)
SIPI	0.00629 (0.00470)	0.00919* (0.00486)	0.00858** (0.00420)	0.00872** (0.00419)	0.00990** (0.00485)	0.00919* (0.00486)	0.00858** (0.00420)	0.00872** (0.00419)	0.00990** (0.00485)
PDI	-0.000795*** (0.000271)								
IDV	0.000549* (0.000307)								
MAS	0.000473 (0.000310)								
UAI	-0.000658*** (0.000178)								
LTO	0.000630*** (0.000175)								
IVR	0.000582** (0.000256)								
ROA		-0.119 (0.0737)				-0.119 (0.0737)			
REGQUA		0.000209 (0.000176)				0.000209 (0.000176)			
GOVEFFEC			5.92e-05 (0.000136)				5.92e-05 (0.000136)		
CTRFORCORR				0.000176 (0.000139)				0.000176 (0.000139)	
RULEOFLAW					0.000404** (0.000189)				0.000404** (0.000189)
Constant	-0.0297 (0.0492)	-0.0618* (0.0338)	-0.0432 (0.0285)	-0.0541* (0.0286)	-0.0840** (0.0344)	-0.0618* (0.0338)	-0.0432 (0.0285)	-0.0541* (0.0286)	-0.0840** (0.0344)
R-squared	.0615	.0454	.0531	.0529	.0452	.0454	.0531	.0529	.045
Observations	3,018	2,871	3,332	3,332	2,871	2,871	3,332	3,332	2,871
Number of firms	435	356	469	469	356	356	469	469	356

Please refer to Table 1 for variables and their definitions. The dependent variable is firm-level R&D spending in all models. The key explanatory variable is gender diversity. Model 1 includes country-level strength of investor protection (SIPI) and Hofstede's national culture dimensions: Power Distance Index (PDI), Individualism Versus Collectivism (IDV), Masculinity Versus Femininity (MAS), Uncertainty Avoidance Index (UAI), Long- Versus Short-Term Orientation (LTO), and Indulgence Versus Restraint (IVR). Models 2–9 include additional country-level controls such as: Regulation quality (REGQUA), Rule of law (RULEOFLAW), Government effectiveness (GOVEFFECT), and Control for corruption (CTRFORCORR).

Table 5 Interactions of gender and Hofstede cultural dimensions with firm innovation

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GD	0.00219*** (0.00023)							
BFSIZE	-0.00061 (0.00047)	-0.00057 (0.00048)	-0.00037 (0.00047)	-0.00058 (0.00047)	-0.00047 (0.00048)	-0.00012 (0.00048)	-0.00041 (0.00048)	-0.00072 (0.00047)
NED	0.00014** (0.00006)	0.00018*** (0.00006)	0.00017*** (0.00006)	0.00014** (0.00006)	0.00016** (0.00007)	0.00029*** (0.00006)	0.00018*** (0.00007)	0.00015** (0.00006)
SBO	0.00027*** (0.00008)	0.00022*** (0.00008)	0.00027*** (0.00008)	0.00027*** (0.00008)	0.00026*** (0.00008)	0.00024*** (0.00008)	0.00026*** (0.00008)	0.00025*** (0.00008)
LEV	0.00081 (0.03028)	-0.00092 (0.03046)	0.00654 (0.02989)	0.00324 (0.03029)	0.00615 (0.03054)	0.00537 (0.03061)	0.00350 (0.03048)	0.01055 (0.02981)
ROE	-0.00088 (0.00233)	-0.00108 (0.00233)	-0.00113 (0.00233)	-0.00092 (0.00233)	-0.00111 (0.00233)	-0.00139 (0.00237)	-0.00093 (0.00235)	-0.00097 (0.00231)
MTBV	-0.00048 (0.00060)	-0.00076 (0.00060)	-0.00027 (0.00059)	-0.00052 (0.00059)	-0.00002 (0.00060)	-0.00015 (0.00060)	-0.00034 (0.00060)	-0.00038 (0.00059)
SIPI	0.00629 (0.00470)	0.00683 (0.00473)	0.00643 (0.00471)	0.00634 (0.00470)	0.00762 (0.00473)	0.00298 (0.00474)	0.00411 (0.00472)	0.00666 (0.00469)
PDI	-0.00080*** (0.00027)		-0.00075*** (0.00027)	-0.00077*** (0.00027)	-0.00067** (0.00027)	-0.00103*** (0.00026)	-0.00105*** (0.00026)	-0.00097*** (0.00026)
IDV	0.00055* (0.00031)	0.00061* (0.00031)		0.00066** (0.00027)	-0.00014 (0.00027)	-0.00006 (0.00023)	-0.00009 (0.00023)	0.00040* (0.00023)
MAS	0.00047 (0.00031)	0.00039 (0.00031)	0.00057** (0.00028)		0.00131*** (0.00024)	0.00072** (0.00031)	0.00074** (0.00031)	0.00047 (0.00029)
UAI	-0.00066*** (0.00018)	-0.00060*** (0.00018)	-0.00061*** (0.00015)	-0.00079*** (0.00013)		-0.00049*** (0.00017)	-0.00046*** (0.00017)	-0.00060*** (0.00016)
LTO	0.00063*** (0.00018)	0.00079*** (0.00017)	0.00049*** (0.00013)	0.00065*** (0.00017)	0.00038** (0.00017)			0.00043*** (0.00011)
IVR	0.00058** (0.00026)	0.00087*** (0.00024)	0.00049** (0.00019)	0.00064*** (0.00024)	0.00007 (0.00023)	-0.00000 (0.00015)	-0.00001 (0.00015)	
PDI X GD		0.00003*** (0.00000)						
IDV X GD			0.00005*** (0.00001)					
MAS X GD				0.00004*** (0.00000)				
UAI X GD					0.00003*** (0.00000)			
LTO X GD							0.00003*** (0.00000)	
IVR X GD								0.00005*** (0.00000)
Constant	-0.02971 (0.04925)	-0.11179*** (0.04153)	-0.01557 (0.04803)	-0.00636 (0.04752)	-0.07615 (0.04801)	0.06330 (0.04146)	0.05741 (0.04140)	0.01830 (0.04406)
R-Square	0.0615	0.0496	0.0601	0.0791	0.0796	0.0653	0.0738	0.0798
Observations	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018
Number of id	435	435	435	435	435	435	435	435

Please refer to Table 1 for variables and their definitions. The dependent variable is firm-level R&D spending in all models. The key explanatory variable is gender diversity. Model 1 includes country-level strength of investor protection (SIPI) and Hofstede's national culture dimensions: Power Distance Index (PDI), Individualism Versus Collectivism (IDV), Masculinity Versus Femininity (MAS), Uncertainty Avoidance Index (UAI), Long- Versus Short-Term Orientation (LTO), and Indulgence Versus Restraint (IVR). Models 2–9 We model the effect of gender diversity on innovation and moderate that relationship with the six Hofstede national culture dimensions including: Power Distance Index x gender diversity (PDI x GD), Individualism Versus Collectivism x gender diversity (IDV x GD), Masculinity Versus Femininity x gender diversity (MAS X GD), Long- Versus Short-Term Orientation x gender diversity (LTO X GD), Indulgence Versus Restraint x gender diversity (IVR X GD)