The Impact of TMT Gender Diversity on the Adoption of Environmental Management Standards in Emerging Economies

Abstract

Drawing on upper echelon theory, we examine how top management team (TMT) gender diversity impacts the adoption of environmental standards in emerging countries. We further examine how this impact is affected by women executives' personal attributes as well as organizational and institutional conditions. Using panel data from 490 firms in three highly polluted emerging countries (China, India and Pakistan) and employing Probit instrumental variable regressions, we find that the proportion of women in TMTs is positively related to the likelihood of ISO 14001 certification and renewal. Additionally, we find that high institutional gender parity, women executives' power and CSR committees strengthen this relationship. Our findings, which demonstrate a systematic translation of women's values into environmental strategy, make important contributions to literature and practice.

Keywords: Environmental management, ISO 14001, board gender diversity, upper echelon theory, top management team

1. Introduction

In recent years, firms are increasingly being scrutinized for wrongdoing, particularly in relation to the natural environment. Stakeholders take various actions to discourage environmentally destructive practices. For example, investors discount the share prices of firms that cause environmental damage; governments introduce regulations that impose pollution levies; and consumers use organizational environmental behavior as a criterion for making purchase decisions (Berrone, Fosfuri, Gelabert and Gomez-Mejia, 2013). A common response to these mounting pressures is the adoption of voluntary environmental management systems (EMSs), which are defined as standards to provide practical tools for firms to manage their environmental responsibilities (ISO, 2018). EMS guides firms, regardless of their size and sector, to procedurally improve the management of their environmental impacts (Boiral, Guillaumie, Heras-Saizarbitoria, & Tayo Tene 2018; Jiang and Bansal, 2003; Morrow and Rondinelli, 2002). Precisely, it helps organizations to plan and operationalize environmental plans (McGuire, 2014; Johnson and Schaltegger, 2016) by advocating processes to lower the consumption of resources, improve energy efficiency and reduce waste management among others (McGuire, 2014; Boiral *et al*., 2018).

Previous research on EMSs, has evolved into three main streams. The first stream investigates the economic and environmental consequences of EMS, mainly with respect to environmental performance (e.g., De Jong, Paulraj and Blome, 2014; Darnall and Edwards, 2006; Delmas, 2001). The second stream takes a strategic perspective and examines how firms respond to external pressures to manage the environment (He, Yang and Choi, 2018; Delmas and Toffel, 2008). The third stream, still gathering momentum, investigates the role of firm-level factors in the development of corporate environmental strategy. Studies within this stream examine the

impact of profitability and market concentration (Delmas and Burbano, 2011), corporate governance (Walls *et al*., 2012), institutional shareholding (Wahba, 2010), state-ownership (He *et al*., 2018) and others on EMS adoption.

An important issue ignored in the third research stream is the role of top management teams (TMTs) in EMS. The composition of TMTs is a meaningful predictor of a firm's strategy (Quintana-García and Benavides-Velasco, 2016). TMT diversity, in terms of gender, impacts strategic decision-making (Adams, 2016; Nielsen and Huse, 2010) and strategic orientation (Escriba-Esteve, Sanchez-Peinado and Sanchez-Peinado, 2009). Despite this, we know little about how women executives' presence in TMTs affect firms' decisions to adopt EMS and what conditions enhance or impair these decisions. This gap causes us to ask the following research question: what is the impact of TMT gender diversity on the adoption of environmental standards?

Understanding the impact of TMT gender diversity on EMS adoption is important for three reasons. First, strategic decisions that relate to the environment are often made by TMTs. Adopting EMS is a strategic initiative whose implementation requires TMTs to develop and integrate their firms' environmental policies within broader corporate functions and operations. As such, the composition of TMTs impacts whether, and how a firm implements environmental standards (Talke, Salomo and Rost, 2010). Second, EMS is a basis for differentiation and can thus help firms to gain competitive advantage (Delmas, 2001). The standard covers a range of issues, including those that have strategic and competitive implications. Third, the representation of women in top management positions increased from 22% in 2015 to 24% in 2018. In the same time period, the percentage of businesses with at least one woman in top management increased from 68% to 75% (GT, 2018). In recent years, several female appointments to TMTs have made

headlines. This trend calls for more research on female executives' impact not only on firm performance, but also on sustainability and environmental initiatives.

Our study makes three contributions to the TMT literature. First, leveraging upper echelon theory, we show how women leaders' values and character become embedded in their companies' strategy, and present empirical evidence that having women in TMTs increases the likelihood of adopting EMS. We provide novel insights into how gender diversity impacts EMS and expand the literature on TMT diversity from a predominant focus on economic outcomes to environmental outcomes. Our work, by linking the values of women executives to EMS, serves as a bridge between strategic management, sustainability and diversity literatures.

Second and more importantly, we identify women executives' power, CSR committees and institutional-level gender parity as new boundary conditions that moderate the relationship between TMT gender diversity and EMS adoption. This is insightful because the outcomes of women executives in upper echelons have been theorized as being dependent on the characteristics of the business environments in which a firm operates (Saeed, Belghitar and Yousaf, 2016: Bennouri, Chtioui, Nagati and Nekhili, 2018; Talke *et al*., 2010). Empirically, we report that this is true, and identify the conditions under which women executives are more effective in influencing ISO 14001. By doing so, we answer recent calls seeking more contingent analysis (Byron and Post, 2016; Liao, Luo and Tang, 2015) of how diversity in upper echelons may influence the development of an organization's strategy (Quintana-García and Benavides-Velasco, 2016), thereby shedding more light on the contingent nature of women's impact on environmental standards.

Finally, we provide a methodological contribution to help future scholars explore gender diversity in TMTs. We construct an aggregate index for measuring women executives' power. Our index accounts for six widely used top executives' characteristics, namely education level, experience, foreign education in environmental-friendly countries, longevity in TMT position, CSR committee membership and firm ownership. By accounting for these characteristics, our index provides a comprehensive measure that overcomes the weaknesses of prior studies that used single measures (e.g., Adams Adams, Almeida and Ferreira, 2005; Bennouri *et al.*, 2018; Triana, Miller and Trzebiatowski, 2013).

2. Theoretical framework and Hypotheses

2.1. Upper Echelon Theory, Female Executives and EMS

Upper echelon theory views senior management as a decision-making group and argues that executives' characteristics influence corporate decisions. It suggests that demographic characteristics are linked with the cognitive bases, values and perceptions that shape executives' decision making (Hambrick and Mason, 1984; Hambrick, 2007; Carpenter, Geletkanycz and Sanders, 2004). The theory advances that higher diversity along psychological attributes of team members represent variety of perspectives and knowledge that affect organizational choices. As psychological attributes are rooted in human socialization and cognition (Miklikowska, 2016; Polavieja & Platt, 2014), upper echelons theory may sometimes appear to overlap with other management theories such as traits, ethics, and diversity theories. This, however, does not diminish its relevance for explaining TMT behavior. To test the theory, a large number of studies have examined the relationship between executives' characteristics (e.g., age, education, gender, and tenure length) and important corporate outcomes such as strategic development, investment

decisions, corporate social responsibility, innovation, and performance (Adams *et al*., 2005; Bennouri *et al.,* 2018; Chen, Zhou and Zhu, 2018; Francoeur, Labelle, Balti & Bouzaidi, 2019; McGuinness, Vieito, Wang, 2017).

Gender constitutes an important dimension of TMT diversity (Triana *et al*., 2013). In this regard, studies have also examined the impact of female executives on diverse organizational phenomena, and have identified several mechanisms through which they influence corporate decisions. Drawing on Cumming, Leung and Rui (2015), we advance the following two mechanisms that may cause women executives to display a stronger commitment to environment-related decisions: ethicality and altruistic behavior; and risk aversion. Each of these mechanisms is rooted in natural gender differences.

First, diversity scholarship relates women with traits such as ethicality, empathy, and compassion (e.g. Dadanlar & Abebe, 2020; Boulouta, 2013; Apesteguia, Azmat and Iriberri, 2012). Perusing this line of research, developmental psychologists observe gender differences in ethical stances and report that women, as compared to men, care more about morality and ethics and feel more responsible for others' wellbeing (Byron and Post, 2016). Importantly, women consider ethical issues in terms of care and compassion, whereas men consider similar issues based on rules and rights (Gilligan, 1982). In a survey, Weeks, Moore, McKinney and Longenecker (1999) found that women adopt a stricter ethical stance than their male counterparts. Similarly, Jaffee and Hyde (2000) found support for these contentions of gender differences in moral orientation and ethical attitudes. Consequently, women are more likely than men to speak out against unethical behavior (Vermeir and Van Kenhove, 2008), and tend to become whistle-blowers (Rothschild and Miethe, 1999). Extending this diversity stream of research, several other studies provide evidence that women are more altruistic than men (e.g. Lilley and Slonim, 2016; Capraro and

Cococcioni, 2015). In fact, women are more likely than men to exhibit empathic concerns for others (Apesteguia *et al*., 2012), including volunteering behavior (Francoeur *et al*., 2019) and charitable giving (Jia and Zhang, 2013). Meta-analyses (e.g. Rand, D. G., V. L. Brescoll, Everett, Capraro and Barcelo, 2016) further show that women internalize altruism more often as their spontaneous reaction than men.

The upper echelons literature supports the above inferences and suggest that ethical considerations and altruism are central to the conceptualization of leadership among women (Eagly and Carli, 2003; Ho, Li, Tam and Zhang, 2015). Women leaders are more likely than men to exhibit a commitment to fairness, harmony, equity, collaboration and ethics (Apesteguia *et al*., 2012; Eagly, Eaton, Rose, Riger and McHugh, 2012; Kearney, 2000). A stronger ethical disposition among women leaders is observed in reporting quality (Bear, Rahman and Post, 2010), dividend payment (Saeed and Sameer, 2017), earning management practices and fraud deterrence (Cumming *et al*., 2015). The presence of women leaders also relates positively with organizations' socially responsible behavior (Francoeur *et al*., 2019; McGuinness *et al*., 2017).

Based on the foregoing, we argue that the stronger ethical disposition of women executives results in stronger ethical leadership, and hence a stronger ethical stance towards environmental practices. Following altruistic behavior, women executives care more about the greater good of their employees, organizations, and society (Brown, Treviño and Harrison, 2005; Nielsen and Huse, 2010). In doing so, they also believe that they have a moral imperative to pursue activities like environmental protection, social welfare, and other community-based investments (Apesteguia *et al*., 2012). They understand the needs of multi-stakeholders better than men, and are also better at addressing them (e.g. Bear *et al*., 2010; Apesteguia *et al*., 2012). We argue that women executives will accommodate the concerns and welfare of their constituents in their

decision-making, which may entail taking environmental management initiatives such as EMS adoption.

There is also burgeoning evidence that gender-role expectations lead women executives to a greater demonstration of their inner values of ethicality and altruism in decision-making (e.g. Eagly *et al.,* 2012). Gender stereotype suggests that women possess value sets that emphasize ethics, altruism, empathy, and community-orientation (Boulouta, 2013), and they are expected to comply with these values, even in leadership roles (Eagly *et al.,* 2012). This may cause them to adopt EMS. Moreover, the career path of women executives also strengthens their innate values. Various organizational mobility constraints guide women executives to follow career trajectories different from men (Cook and Glass, 2014; Bear *et al*., 2010). For example, women initially serve on the boards of smaller firms (Terjesen and Singh, 2008). Considering small firms have fewer stakeholders, female executives develop habits. This becomes a lasting value than can trigger sustainability concerns and EMS adoption.

Second, differences in risk-taking behavior between males and females account for why the latter would care more about the environment. Previous studies examining the impact of gender in risk preferences is equivocal (Liu, 2018; Adams and Funk, 2012). On the one hand, some studies have shown that women do not follow stereotypical behaviors. For instance, Gallus & Bhatia (2020) show that Wikipedia female editors who advance to leadership positions have same risk preferences as male editors. Similarly, Adams and Funk (2012) reported that female directors are more risk tolerant than their male counterparts. On the other hand, however, a large body of literature suggests women as still risk averse than men (e.g., Liu, 2018; Cumming et al., 2015), a characteristic that it is rooted in genetics and hormones like testosterone (Jost, 1970). Testosterone accounts for higher levels of aggression, dominance and sensation seeking (Archer,

2006). Due to lower levels of this hormone in women than men, the former usually have a comparatively lower risk appetite (e.g. Croson & Gneezy, 2009; Wilson and Altanlar, 2016) and are less likely to be involved in risky experiments and gambling (Byrnes, Miller, & Schafer, 1999). Risk-aversion among women also affects decision-making. For example, Levi, Li and Zhang (2014) found that women executives are less likely to favor M&A investments. Similarly, Wilson and Altanlar (2016) found insolvency risk to be inversely associated with the presence of women on boards. Several other studies have reported women executives' risk-aversion behavior in tax strategies (Chen *et al*., 2018), dividend policy (Saeed *et al*., 2016), R&D investment (Bennouri *et al.*, 2018), securities' fraud (Cumming *et al*., 2015), financial disclosures (Liao *et al*., 2015; Conyon and He, 2017) and environmental litigation (Liu, 2018; Wagner, 2015). Overall, despite a small number of studies showing females in top management positions not following stereotypical behaviors, we still find many studies showing that the behavior of women leaders follows gender related patterns (Zalata et al. 2019; Yang et al., 2019; Bennouri et al., 2018). We adopt this position in the conceptual framing of our study.

Environmental irresponsibility poses economic and survival risks for firms. Indeed, it causes direct economic losses due to sanctions (Karpoff, Lott J, & Wehrly, 2005), monetary penalties (Barrett, Lynch, Long, & Stretesky, 2018), expensive cost of capital (Sharfman and Fernando, 2008) and higher audit fees (Li, Zhao, Chen, Jiang, Liu, & Shi, 2014). It also brings reputation loss due to poor environmental performance, investors' negative evaluation (Wang, Zhang, Lub, Wang, & Song, 2019; Cormier and Magnan, 1997), and customers' dissent (Russo and Fouts, 1997). Considering the risks of irresponsibility towards the environment and women's' risk-aversion tendencies, we argue that women executives are more likely to avoid activities that

cause environmental pollution and ecological damage, and in doing so they may advocate or persuade TMTs to adopt EMS.

In line with previous TMT research, we advance that women can influence board decision making (Nielsen and Huse, 2010; Campbell and Minguez-Vera, 2008), mainly as they have different (non-traditional) professional experiences (Apesteguia *et al*., 2012; Nielsen and Huse, 2010) and adopt a more participative and democratic leadership style (Eagly *et al*. 2012). According to Fondas and Sassalos (2000), women are more able to influence executive decisions due to the gender-based functional differences that confer on them broader experiences and different 'voice'. Similarly, Bilimoreia (2000) claims that women executives exert a strong impact on executive decisions with their well-informed views on female-related issues (note that our arguments, so far, draw linkages between feminity and environmentalism), thus making it less likely that they are ignored in the decision-making process. For example, it was a female executive that urged Nike to launch women's sports shoes, which resulted in creation of a whole new market of women fashionable sportswear (Bilimoreia, 2000; Singh, Vinnicombe, and Johnson, 2001).

Essentially, women executives provide diverse perspectives and encourage participative communication, which may enable a TMT to effectively address the needs of diverse stakeholders (Bear *et al*., 2010). We contend that higher levels of TMT gender diversity is a catalyst for environmental strategies. Our argument, which is predicated on the assumption that women executives can influence EMS, holds in the light of empirical evidence that shows that women attend more board meetings than men (Adams and Ferreira, 2009) and are more active at these meetings (Schwartz-Ziv, 2017). Not only does this give them legitimacy to wield more influence in strategic decisions, but it also allows them to share and live their values of care and

compassion in the boardroom. Importantly, Cumming *et al*., (2015) suggest that women presence in TMTs can improve existing trust relationships among top executive team, thus reducing complacency related to environmental policies and environmental protection.

Based on the foregoing, we argue that women executives are more likely to transfer their innate values and character into corporate decisions and are likely to push their organizations to show concern and care for the natural environment through the EMS. We believe that women executives are likely to push for this standard because it is globally accepted, well recognized, externally audited and credible, and is thus consistent with feminine traits of care, altruism, and risk-aversion. Thus, we hypothesize that:

> H1: The higher the level of TMT gender diversity, the more likely that the firm adopts EMS.

Next, we present hypotheses about how CSR committees, women executives' power and institutional gender parity moderate the positive relationship between TMT gender diversity and EMS adoption. These three moderators do not only shape TMT structures and dynamics in ways that help women leaders to live their innate values of care and compassion, but they also empower them to play a more effective role in shaping TMT decisions. These moderators also represent individual (i.e. executive power), firm (board structure), and institutional (gender parity) level influences on TMT dynamics, thus allowing for the delineation of multi-level boundary conditions of women leaders' impact on firms' environmental management. As such, they spell contingencies for the tenets and thesis of upper echelons theory used in this study.

2.2. Moderating role of CSR committee

Recent studies reveal that TMTs are increasingly functioning through committees (Homroy and Slechten, 2017). These committees are focused on tasks such as nominations, audits, and risks. To address environmental concerns from the perspective of risks, strategic opportunities and stakeholder engagement, an increasing number of firms are establishing CSR committees (Liao *et al*., 2015). CSR committees play an important role in ensuring that the environmental perspective is integrated into organizational strategy and translated into tangible action. These committees are generally responsible for reviewing policies and firm conduct with respect to environmental commitments (Mallin and Michelon, 2011). Hence, they effectively manage stakeholders' social and environmental expectations. In a way, their role, with respect to the environment, is analogous to the role of an audit committee in ensuring proper financial reporting. CSR committees are viewed as an indication of TMT orientation towards environmentally friendly activities. Moreover, these committees provide structure and systems for the successful implementation of EMS (Liao *et al*., 2015).

The existence of CSR committees may indicate that a firm has better ability and resources to evaluate and interpret the executives' innate values and character related to the environment. The successful implementation of EMS often requires firms to establish structure and management systems. In this regard, the existence of CSR committee indicates that TMT has a formal structure and routines to gather and implement environment-friendly ideas and may provide a channel or conduit for women executives to demonstrate their inner values of care for the environment and orchestrate sustainability strategies. Their presence may also signal that an organization is concerned about its impact and relationships with external stakeholders, thus aligning the organization with the innate feminine value of care. Consequently, CSR committees may encourage female executives to express their values and provide a channel or conduit for

women executives to demonstrate their care for the environment through sustainability strategies. Taken together, we anticipate that the existence of CSR committees may encourage and facilitate the initiatives that women executives take, including EMS. Therefore, we hypothesize that:

> H2: The presence of CSR committees strengthens the positive relationship between the TMT gender diversity and EMS adoption.

2.3. Moderating role of women executives' power

It is generally acknowledged that executives vary in their power (e.g. Chin *et al*., 2013). Upper echelon theory views managerial power as managers' ability to exert influence on organizational strategies and decisions (Hambrick and Mason, 1984). TMTs may comprise individuals with different qualities and characteristics. Some individuals tend to have a stronger influence over team decisions (Barker and Mueller, 2002). The typical gender stereotypical belief depicting women as incompetent allow women little opportunity to influence group decisions (Finkelstein and Mooney, 2003). Therefore, it is important to consider the power of women executives when examining their impact on environmental management decisions.

We posit that when women executives are influential, their impact on the adoption of EMS will be stronger. The reason behind this is twofold. First, women generally possess less power as group members due to their lower level of social status (particularly in less developed countries), which is rooted in stereotypical beliefs suggesting women are inferior to men in experience, social networks, and other resources (Triana et al., 2014). However, as the influencing power of women executives increases in the TMT, their ability to shape strategic decisions also increases. This gives them confidence to live their feminine values and shape their ability to transfer inner values into their organizations' strategies. Second, powerful people are generally more

influential in groups (Kroll, Walters, & Le, 2007). They feel more confident, bolstering their ability to follow their personal values. Accordingly, powerful women in TMT speak out, and provide different perspectives and diverse ideas, which can be beneficial for top management to make better decisions (Triana et al., 2014; Finkelstein & Mooney, 2003). Moreover, powerful individuals also gain the support of their team members, which confers on them the confidence to embed their values in group decisions (Dou et al., 2015). Thus, increased support of TMT enables women's executives to embed their inner values in strategic decisions.

Taken together, when women executives hold greater sway over decision making, their personal values and ethical disposition for environmental issues will be more vividly reflected in organizations' EMS. Thus, we argue that the power of women executives strengthens values and convictions of environmental protection.

H3: Women executives' power strengthens the positive relationship between TMT gender diversity and EMS adoption.

2.4. Moderating role of institutional gender parity

Organizational decisions and outcomes are the reflections of the regulations and structures of the national institutional environment in which firms operate (North, 1990). Research has acknowledged that national cultural norms and values define women's role in society at a broader level, which in turn influences the acceptability of women executives (e.g. Brieger, Francoeur, Welzel and Ben-Amar, 2017; Hofstede, 1983). Acceptability of women in leading roles creates an encouraging environment that values and supports the values that women bring to top management. In support of this view, Brieger *et al.* (2017) show that emancipative values and institutional empowerment foster women's participation in the business world.

Considering the significance of the institutional environment, we argue that women empowerment in a country increases the positive impact exerted by women leaders on environmental management. We offer two supporting arguments for this assertion. First, when women politicians are empowered to wield their voice and influence, they will easily express their values and may promote regulations to protect the environment due to their natural inclination towards care (Ben-Amar, Chang and McIlkenny, 2017). This provides precedence and inspiration for women executives to embark on similar environmental initiatives at the organizational level. Second, women empowerment challenges traditional gender stereotypes (Arvate, Galilea and Todescat, 2018) and creates a supportive environment for women leaders to make and effectively implement decisions. It can be seen as a virtuous circle - as more women reach decisive positions, their role in society becomes more accepted and a women-friendly atmosphere evolves, such that more females will develop career ambitions and more women will be available for such positions. Moreover, women reaching these positions are likely to represent 'women interests' and may recommend policies that target social acceptance, culminating in a higher propensity for women to express their innate values of care and compassion for sustainability in executive decisions. Therefore, we hypothesize that:

H4: Institutional gender parity strengthens the positive relationship between TMT gender diversity and EMS adoption.

3. Data and Methodology

3.1. Sample and Data

We used three emerging economies, namely, China, India and Pakistan as our research setting. These countries have witnessed a rapid increase in ISO 14001certifications from 59,333 in 2009

to 173,902 in 2017. During this period, China's certifications increased from 55,316 to 165,665, representing a 199% growth. India and Pakistan also recorded 107% and 60% increases respectively (ISO, 2017). These statistics demonstrate a growing awareness and concern for environmental issues in the focal countries. Despite the popularity of ISO 14001, India, Pakistan and China are highly ranked among the world's polluted countries. In fact, China (11.1%) and India (10.6%) record the highest levels of pollution-attributable deaths in the world (GBD, 2017).

In India, the proportion of female executives rose from 12% in 2011 to 19% in 2018 (Business Standard, 2018) while Pakistan's female workforce increased from 16% in 2000 to 28% in 2018[1]. In 2018, women in China held almost 9.4% of TMT positions (World Economic Forum, 2018). In the same year, women constituted 24.9%, 20.6% and 11.8% of the parliaments in China, Pakistan and India respectively (World Bank, 2018). The foregoing shows the poor state of environmental management and the increasing trend of women executives in these countries, which provides an ideal setting to test our predictions.

We used data from domestic firms operating in the three countries between 2010 and 2017. During this period, ISO 14001 certifications in emerging countries increased by 150%. We targeted the largest stock exchange of each country - Mumbai Stock Exchange in India, Shanghai Stock Exchange in China and Pakistan Stock Exchange in Pakistan. We selected only domestic firms because the environmental pressures they encounter are different from those faced by multinational firms (Husted, Montiel and Christmann, 2016). Financial and TMT data of the firms were collected from OSIRIS database. Due to limited data availability, we hand-collected

[1] India's law (Companies Act, 2013) mandates quota for women on corporate board, mandating at least one woman in the boardroom. In May 2017, Pakistan also enacted a law 'The Companies Act 2017' which mandates listed companies to have at least one woman on their boards within next three years.

ISO 14001 certification information from firms' websites, CSR and quarterly reports. Owing to this difficult manual search, we selected only 1,000 firms from each from China and India and 958 from Pakistan (the entire market). As ISO certification is valid for 3 years and our sample period is 8 years, the data include ISO 14001 renewals. After removing foreign firms as well as firms with missing information, the sample reduced to 618 firms. Next, we searched the firms on OSIRIS database to gather TMT and financial data (e.g. total assets, return on assets, debt to equity ratio, price to book ratio). We complemented the TMT data by checking firms' annual and quarterly reports. After removing firms with incomplete TMT and financial information, the final sample consisted of 490 firms (190 from China, 197 from India and 103 from Pakistan), yielding several firm-year observations.

3.2. Research Context: ISO 14001

While there are various environmental standards that firms could adopt, previous research focuses on the two dominant ones, namely ISO 14001 and EU's Eco-Management and Audit Scheme (EMAS) (Treacy, Humphreys, McIvor, & Lo, 2019). We advance that ISO 14001 has more recognition than the other standards, and is thus the most likely EMS that firms would adopt to gain legitimacy in emerging markets (Testa, Boiral, & Iraldo, 2018; UNEP, 2005; Jiang and Bansal, 2003; Morrow and Rondinelli, 2002). First, a third-party audit is required to verify a firm's adherence to the requirements of ISO 14001. This helps to overcome credibility problems intrinsic to self-reported environmental efforts. Second, ISO 14001 is privately regulated, and therefore sets stricter requirements compared with other standards such as EMAS (a publicly issued standard). Third, ISO 14001 is globally accepted (agreed upon by 163 member nations) and is thus recognized in emerging countries, unlike other standards that tend to be limited to specific geographic regions and economic blocs (e.g. EMAS is EU specific) (Testa *et al*., 2018).

Organizations undergo rigorous phases and procedures to gain ISO 14001 certification. In the pre-certification phase, firms develop and implement their own EMS, often through the help of an external consultant. Subsequently, the progress that firms make towards obtaining ISO 14001 certification is assessed in a two-part external audit process. Part 1 is a documentation review that assesses whether a firm's processes and policies are in line with the requirements of ISO 14001. Part 2 involves a thorough on-site audit, which verifies that the firm's internal EMS has been fully implemented and conforms to the requirements of ISO 14001. If deemed satisfactory, the auditor recommends ISO 14001 certification for a three-year period. After certification, surveillance audits are undertaken annually to confirm conformance. The involvement of an independent external auditor in the certification process provides legitimacy to the standard and the certified firm (Boiral *et al*., 2018).

It is worth noting that ISO 14001 certification does not measure environmental performance. Rather it is a proxy for environmental responsibility and a means to improve environmental performance. Reviews by Molina-Azorín, Tarí, Claver-Cortés & López-Gamero (2009) and Boiral *et al*. (2018) show that most of the studies that investigated the relationship between ISO 14001 and environmental performance found a positive association underpinned by reduced atmospheric emissions (Peters and Romi, 2014), technological innovation that decreases the risk of environmental mishap (Hanna, Newman, & Johnson, 2000), material efficiency (Chattopadhyay, 2001;), efficient waste management (Franchetti, 2011), and reduced energy consumption (Johnstone & Hallberg, 2020). Following the prevalent notion in the literature, we believe that ISO 14001, though not a measure of environmental performance, enables firms to be environmentally responsible and subsequently improve their environmental performance.

3.3. Variables & Measurement

3.3.1. Dependent Variable

The dependent variable is ISO 14001 certification. We use a dummy variable, which takes the value of one, otherwise zero, operationalize ISO 14001 certification. It is the most widely used environmental certification (De Jong *et al*., 2014), largely because it has broad applicability across firms, industries and countries.

3.3.2. Independent Variables

We used two proxies for TMT gender diversity. First, we used the percentage of females on TMTs. Second, we used Blau index (1977) of heterogeneity to check the robustness of the results. According to Miller and Triana (2009), Blau index is the most appropriate tool to measure diversity because it is bounded and does not assume negative values.

3.3.3 Moderators

This study investigates the effects of three moderator variables, namely CSR committee, women executives' power, and institutional gender parity. We measured CSR committee as a binary variable, whereby firms having a CSR committee are coded 1 and 0 if otherwise. We defined women executives' power as the ability of women in TMTs to influence decision making processes. To capture women executives' power, we consider six factors, all of which affect their confidence to live their feminine values and shape their ability to transfer those values into their organizations' strategies. First, education can enhance executives' capability to collect, handle and evaluate information (Escriba-Esteve et al., 2009), thereby boosting decision-making confidence. In this respect, we argue that women with higher education are likely to be more confident to express their values. Second, foreign education (in environment-friendly countries) provides an opportunity to experience the values and norms of other countries, which may cause

individuals to re-evaluate and thereby reaffirm their own values and norms (Shirodkar, Konara and McGuire, 2017). In the context of environmental practices, exposure to environment friendly countries where environmentalism has become both business culture and social norm could strengthen feminine convictions and values towards the environment. These stronger convictions towards environment afford women the confidence to see through their care for the environment. Third, some studies have shown that TMT members' power hinges on their experience (Kroll, Walters and Le, 2007). TMT members accumulate specific and general knowledge with increasing experience (Dou, Sahgal and Zhang, 2015). More experience leads to a better understanding, helps in the collection of efficient and extensively organized information, and enhances TMT members' confidence in strategic decision making. The increased confidence bolsters executives' ability to act according to their personal values. Following this, experienced female executives are likely to be more comfortable in making decisions based on their values and beliefs. Fourth, the longevity/tenure of TMT members affects their influence on strategic decisions (Bonini, Deng, Ferrari and John, 2017). Long tenure TMT members gain legitimacy and support for their perspectives, which confers on them the power to embed their values in strategic decisions (Dou et al., 2015). Thus, when female executives have more longevity in TMTs, their views and values are less likely to be ignored by others. Fifth, there is vast literature showing that the existence of CSR committees increases corporate environmental performance (e.g., Liao et al., 2015; Peters and Romi, 2014). Therefore, membership in CSR committees provides women executives the opportunity to influence environmental decisions according to their innate values. Lastly, female executives with high shareholding have voting power to influence strategic decisions (Florackis, Kostakis and Ozkan, 2009).

We constructed an index based on the six characteristics, namely education level, foreign education, experience, TMT longevity, CSR committee membership and firm ownership. We first coded education into six ordinal levels (1= no formal education; 2 = high school; 3 = certificate/diploma; 4 = Bachelor's degree; 5 = Master's degree; 6 = Doctorate). Second, we coded foreign education into two categories (1 for "educated locally" and 2 for "educated in an environment-friendly country). We used the Environmental Performance Index (EPI) maintained by Yale University USA to identify environment-friendly countries. EPI assigns scores from 0 to 100 to each country (i.e. from least environmental-friendly country to most environmental-friendly). We classified countries having scores to be greater than 80 as environment-friendly. Third, we measured experience as the natural logarithm of the number of years of professional work. We operationalized longevity as the natural logarithm of the number of years an executive has served in TMT. Membership in CSR committee is a variable that takes the value 1 if a women executive is a member of CSR committee and 0 if otherwise. Finally, firm ownership is measured as the percentage of women executives' shareholdings. We assigned equal weights to all six criteria and calculated power using the formula:

Women Executives' Power = *(0.167×Education) + (0.167×Foreign education) + (0.167×Experience) + (0.167×Longevity on TMT) + (0.167 × membership in CSR Committee) + (0.167 × percentage of firm ownership).*

We measured institutional gender parity (i.e. extent of gender egalitarianism in society) by the percentage of women representatives in national parliaments and the proportion of women in a country's labor force. This data was collected from the World Bank. Institutional gender parity can arise from more participation of females in politics and the labour force and can provide more voice power and influence to females in general (Arvate *et al*., 2018). For instance, more

women in parliament empowers female employees, mainly as female politicians tend to advocate for regulations that protect women rights and gender equality (Clots-Figueras, 2011).

3.3.4. Control Variables

We controlled for the effects that have been identified in previous research. Firm size is positively associated with environmental disclosure (Chang and McIlkenny, 2017; Ben-Amar *et al*., 2017). We controlled for firm *size*, measured as the logarithm of total assets. Like prior studies, we included firms' investment opportunities, which is measured by market-to-book value. Firms with higher market-to-book values (more investment opportunities) are more likely to adopt ISO 14001 to reduce information asymmetry with stakeholders. Following Brammer and Pavelin, (2006) and Ben-Amar *et al* (2017), we controlled for the effect of *financial profitability* using ROA and the effect of financial leverage (measured using debt-to-equity ratio). Highly leveraged firms find it difficult to invest funds in environmental strategies. We also controlled for *environmentally sensitive industries* because firms operating in these industries are subject to higher environmental-related issues and therefore stakeholders may expect these firms to get ISO 14001 certification. In line with Ben-Amar, Chang and McIlkenny (2017) and Brammer and Pavelin, (2006), we consider chemicals, automobile, forest products, oil and gas, mining, pipe lines, electrical and gas utilities, steel, precious metals, and transportation as environmentally sensitive industries and dummy-coded them as 1. Lastly, we used China and India country dummies to control for country-level effects.

3.4. Analysis

The presence of women in TMTs is prone to the effects of firm attributes (e.g. profitability, size, leverage, growth opportunities). Therefore, our analysis may encounter an endogeneity issue

leading to inconsistent and biased findings (Greene, 2003). We addressed endogeneity through two methods. First, all independent variables are lagged by one year. Second, following Ben-Amar *et al*. (2017), we used a probit model with continuous endogenous regressors to estimate the results. Previous literature (e.g. Gul *et al*., 2011; Ben-Amar *et al*., 2017) recommended instrumental variable approach to handle the endogeneity problem of self-selection bias related to the decision of firms to appoint females. We addressed this problem using two instruments. First, we used TMT size (i.e., Group size) as an exogenous instrument. This instrument should be correlated with the proportion of females on TMTs and uncorrelated with ISO 14001 adoptions. Prior studies (Campbell and Minguez-Vera, 2008; Ben-Amar *et al*., 2017) used a similar approach, arguing that the higher the board size (Group Size), the higher the chances of appointing a women director.

Second, we used the industry-level TMT gender diversity of firms located in the same region as an IV. Following previous studies (Nie et al., 2019; Jiaming et al., 2018; Hussain et al., 2018) we divided China into three regions namely Northern, middle, and Southern region; and India into four regions namely Himalayan region, the great Northern plains, Deccan Plateau and Coastal plains and islands. Pakistan is treated as a single region because industries are mainly concentrated in the Southern part. Firms operating within the same industry in each of the regions are clustered together and their average TMT gender diversity scores are calculated and used as instruments. These instruments are suitable because a firm's TMT gender diversity is expected to be related to its regional industry average TMT gender diversity, but this average will be uncorrelated with the firm's decision to adopt ISO 14001.

4. Results

4.1. Descriptive Statistics

Table 1 provides the variable definitions. Table 2 presents the descriptive statistics of our sample firms. It can be seen from the descriptive statistics of whole sample that women hold on average 11% of TMT positions and the average Blau index score is 0.062. 49% of the sample firms are ISO 14001 certified, 51% have a CSR committee, and 54% operate in an environmentally sensitive industry. Table 2 also presents the descriptive statistics across different sub-samples such as for ISO 14001 certified and non-certified firms and also for the certified firms that renew the certification. ISO 14001 certified firms are larger in size, and have higher TMT gender diversity and profitability than their non-certified counterparts. Table 3 reports ISO 14001 certification distribution across industries. In the sample, 52% of the certified firms belong to environmentally sensitive industries; the remaining 48% operate in non-sensitive industries. The slight difference in the adoption rate of ISO 14001 among environmentally sensitive and non-sensitive industries indicates the significance of environmental concerns and possible legitimacy benefits associated with ISO 14001 across industries. Table 4 presents the correlation matrix. As expected, there is a significant correlation between gender diversity and ISO 14001. ISO 14001 is also significantly correlated with the CSR committee and women executive' power. The relatively low correlation coefficients among the variables suggest that multicollinearity does not affect our multivariate analysis.

4.2. Multivariate Results

Table 5 (panels A and B) contains the main results. Model 1 shows that TMT gender diversity is positively associated with ISO 14001 adoption, thus providing support for hypothesis 1. To aid

economic interpretation, we estimated the average marginal effect, which revealed that a unit change in TMT gender diversity increases the probability of ISO 14001 certification by 3.65[2]. These findings show that increasing the number of women on TMT increases corporate awareness of environmental problems and increases the adoption of ISO 14001. As our study uses panel data collected over 8 years, the result captures certifications, re-certifications, renewals and otherwise. It indicates that TMT gender diversity not only impacts the initial decision to adopt ISO 14001, but it also impacts firms' decision to renew or readopt the standard after it expires. Hence, female executives' influence on environmental management is not ad hoc but rather systematic. They ensure that their values are enduringly reflected in their organizations' strategies. Our finding is somewhat consistent with prior studies that report a positive relationship between gender diversity and corporate environmental responsibility (e.g., Zhang, Kong and Wu, 2018; Ben-Amar *et al*., 2017).

In hypothesis 2, we proposed that CSR committees strengthen the impact TMT gender diversity on ISO 14001 certification. The results shown in Model 3 shows that the interaction effect of CSR committee and TMT gender diversity positively affect the likelihood of adopting ISO certification. This is further supported in the full model (Model 6) where CSR committees significantly and positively moderate the effect of TMT gender diversity on ISO 14001. Estimating the marginal effects, we found greater effects for gender diverse TMTs in firms with CSR committees than those without these committees. Our pairwise estimates reveals a significant expected difference in probability of ISO 14001 certification for gender diverse

[2] The marginal effect of an independent variable is the derivative (that is, the slope) of the prediction function, which, by default, is the probability of success following probit. By default, margins evaluate this derivative for each observation and reports the average of the marginal effects. The important thing to note is that the slope of a function can be greater than one, even if the values of the function are all between 0 and 1. See https://www.stata.com/support/faqs/statistics/marginal-effect-greater-than-1/

TMTs in firms with CSR committees and those without the committees. These results support hypothesis 2.

Next, in hypothesis 3, we hypothesized the moderating influence of women executives' power. Results obtained in Model 4 shows that the interaction variable *women power× TMT gender diversity* is positively and significantly related to ISO 14001 certification. Similar results are reported in the full model (Model 6). Together, these results indicate that women executives' power further strengthens the positive relationship between TMT gender diversity and ISO 14001 certification. To further unpack the interaction effect, we estimated the average marginal effects of TMT gender diversity at different levels of women executives' power, which revealed an increasing probability of ISO 14001 certification as women power increased. In this sense, the ability of TMT gender diversity to increase ISO 14001 certification is accentuated by the amount of power wielded by the women serving in TMTs. The more powerful the women executives, the more likelihood that gender diversity translates into ISO certification.

In our last hypothesis, we proposed that in countries where gender parity is well established, the impact of TMT gender diversity on ISO 14001 increases. To test this hypothesis, we added an interaction term (TMT gender diversity and institutional level gender parity) in Model 5. The results show a positive and statistically significant moderating effect of institutional gender parity on the relationship between TMT gender diversity and ISO 14001 certification. Similar results are achieved in the full model (Model 6), confirming hypothesis 4. Again, our test of average marginal effects reveals that the probability of ISO 14001 certification increases with higher levels of institutional gender parity.

To test whether ISO 14001 certification differs across the countries, we included dummies for China and India while treating Pakistan as the reference group to avoid a dummy variable trap. The results generally show that China lags behind Pakistan in the likelihood of ISO 14001 certifications. The findings for India are not significant, but the coefficients are negative. This provides some evidence (albeit weak) of Pakistan's superiority vis-à-vis India in terms of ISO 14001 certifications. Summarily, the likelihood of ISO certification is higher in Pakistan compared with China and India. This is perhaps due to institutional differences with respect to environmental management across regimes. International bodies have taken some steps in Pakistan to reduce corporate environmental impact. For instance, a project named "Building Capacity for Environmental Prosecution, Adjudication, Dispute Resolution, Compliance, and Enforcement in Asia" was launched by Asian Development Bank in 2011 in collaboration with the Committee for Enhancing Environmental Justice (CEEJ)[3]. The outcomes of this initiative include the introduction of quasi-judicial mechanism to curb the harmful effects of pollution (Ahsan and Khawaja, 2013). Such regulatory initiatives have caused firms to adopt ISO 14001.

Taken together, the findings support our hypotheses. They provide evidence that the presence of women in TMTs increase ISO 14001 certification. In addition, our results unfold the positive moderating effects of CSR committees, women executive's power and institutional gender parity. Women, compared to men, have a different value set in terms of empathy and ethical standards. When they find themselves in C-Suites and boardrooms, these values are reflected in organizations' strategies. Overall, the findings are consistent with upper echelon theory.

[3] Held an environmental conference in 2012, which was attended by judges from SAARC countries and Pakistan. At the conference, Green Benches at all the High Courts and Supreme courts in Pakistan were tasked by the Chief Justice of Pakistan to protect and preserve the environment under the ambit of public interest litigation.

4.3. Alternative measure of TMT gender diversity

To ensure the robustness of our results, we use an alternative measure of TMT gender diversity. Following prior studies (Campbell and Minguez-Vera, 2008; Ben-Amar *et al*, 2017), we employ Blau index using the formula: $H=1 - \sum_i^k = Ip_i^2$, where *I* denotes the number of categories, which is 2 in our case (i.e. male and female). P_i denotes the fraction of female and male executives in TMT. The index takes 0 for one gender on the TMTand 0.5 when there is equal proportion of male and female executives on the TMT. We repeated the empirical tests using Blau index. Generally, the results of these tests did not alter our main findings (see Table 6), confirming that our main findings are robust to alternative measures of TMT gender diversity.

4.4. Subsample analyses across different industries

Prior research shows that firms belonging to heavy polluting industries are more likely to employ ISO 14001 because it helps them to achieve environmental reduction goals (Hart and Ahuja, 1996). To further strengthen this inference, we conducted a subsample analysis to examine the heterogeneous effects of TMT gender diversity on ISO 14001 across environmental polluting and non-polluting firms. In so doing, we split our sample firms into environmentally-sensitive and non-sensitive firms. The results are reported in tables 7. The impact of TMT gender diversity on ISO 14001 is positive in both samples. Moreover, similar results (as in Table 4) are obtained for moderating variables in both samples. Thus, we can conclude that our results are not influenced by industry. Due to space limit, we report only results for the main variables in Table 7.

4.5. Alternative measure of corporate environmental responsibility

To further check the robustness of our baseline findings, we used environmental penalty as an alternative measure of firms' environmental responsibility. Generally, environmental penalty is considered as an indication of environmental irresponsibility. We collected data on these penalties from Reuters News, Financial Times, leading newspapers and magazines, firms' quarterly statements and official websites. Our dataset comprises 67 firms and 73 cases of environmental penalties for the period 2010 to 2017. Following Koster and Pelster (2017), environmental penalty is measured by the penalty amount in a given year divided by total assets. We employed dynamic system GMM model to examine the impact of TMT gender diversity on these penalties. The results, in Table 8, show that TMT gender diversity has a significant negative relationship with environmental penalty, with CSR Committee and Women Executives' Power strengthening this negative relationship. These results provide support for our baseline findings that female executives are associated with better environmental management and higher environmental responsibility. They also further confirm that our baseline results are not affected by proxy choice.

4.6 Additional tests

To further ensure the reliability of our main findings, we conducted several robustness tests. Firstly, we split our sample into two sub-samples i.e., initial ISO 14001 adoption and renewals by firms and run further tests[4]. The results of initial adoption, presented in Table 9, provide support for our baseline findings. Women presence in top management team continues to

[4] For the initial certification sub-sample, we treated an observation as the year the firm received its first certification, which could be any year between 2010 and 2017 (i.e. the sample period). In the certification year and the subsequent two years (i.e. during the three-year certification period), we assigned a value of 1 to the ISO 14001 variable. We assigned 0 in the prior years between 2010 and 2017 if the firm was not certified in 2010 and dropped all observations beyond the three-year initial certification period. For the renewal sub-sample, we considered only certified firms, checked whether they applied for recertification three years after initial certification, and assigned a value of 1 if recertified and 0 if otherwise. The subsequent two years after recertification also took the value of 1. We again checked recertified firms' status after every three years and followed the same procedure.

positively affect initial ISO 14001 certification. Similarly, women executive power, institutional gender parity and presence of CSR committee positively moderate the relationship between TMT gender diversity and initial certification. Result for TMT gender diversity and ISO 14001 renewals are also positive and significant (Table 10), though the coefficients are lower than the baseline findings (Table 5). Nevertheless, it support our hypothesis. Additionally, results for the interaction terms are positive and significant for ISO 14001 renewals.

Secondly, following prior studies (Fernández- Méndez et al., 2019; Nadolska & Barkema, 2007; Song, 2014), we employed a hazard rate model to deal repeated nature of our outcome variable (initial adoption and renewals). The hazard rate model allows us to compute the probability that a firm certify with ISO 14001 during the sample period, by considering both probabilities (ISO 14001 adoption or not) and time interval concurrently. In our case, the hazard model calculates the impact of TMT gender diversity on ISO 14001 certification without imposing a parametric form to the distribution of the hazard rates. The results of the hazard rate model are reported in table 11. It is evident from the table that applying a different estimation technique (hazard rate model) also provides support to the hypothesized roles of our variables.

Thirdly, we used a control sample selected by using a one-to-one matching criteria based on two-digit SIC industry codes and firm size. All the selected control non-certified firms must have ROA that lies in the 90% to 110% interval of the certified firms' ROA. The results are presented in Table 12. The results are consistent with the earlier findings. In particular, the effect of TMT gender diversity on ISO 14001 is positive and significant, lending support to our first hypothesis. Further, the interaction terms continue to relate positively with the gender diversity-ISO 14001 adoption relationship. Thus, we can suggest that our results are not influenced by the unobservable firm-fixed effects.

5. Discussion

This study examined the impact of top management gender diversity on EMS. It further analyzed the effect of CSR committee, women executives' power and institutional gender parity on the relationship between TMT gender diversity and ISO 14001. The empirical evidence shows a positive effect of TMT gender diversity on ISO 14001 adoption. Further, CSR committee, power of women executives and institutional level gender parity positively moderate the relationship between TMT gender diversity and ISO 14001 certification.

We make several important contributions to the TMT literature. First, this study is among the first to link gender diversity with EMS and examine the impact of TMT gender diversity on ISO 14001. Our findings are consistent with upper echelon theory and studies such as Adams (2016), Quintana-García and Benavides-Velasco (2016) and Carpenter *et al* (2004) which suggest that the unique characteristics that diversity brings to TMT influence corporate strategies. In particular, our results are generally in line with studies offering evidence that women directors exert a positive influence on corporate socially responsible activities (Francoeur *et al*., 2019; McGuinness *et al*., 2017; Byron and Post, 2016; Jia *et al*., 2013; Boulouta, 2013). Our findings also contribute to the scholarly work that explicitly examines the impact of women directors on corporate environmental policies (Post, Rahman, Rubow, 2011; Li *et al.*, 2016). We advance that the adoption of ISO 14001 in companies with women in the TMT reflects how women leaders' characters, values and virtues become embedded in their companies' strategy, and posit that women's distinctive value sets are reflected more in corporate strategy development when organizational and institutional conditions and structures are supportive (Wu, Kwan, Yim, Chiu and He 2015).

Second and more importantly, we highlight the importance of context in upper echelon literature and show the contingent effects of firm-level (CSR structure) and nation-level (gender parity) dynamics on the relationship between TMT characteristics and EMS. We found that the effect of TMT gender diversity on EMS is stronger when women executives have personal power, are members of CSR committees, and work in gender-egalitarian countries. In this respect women are motivated to express their unique perspective in organizational and institutional contexts that accept and support the distinctiveness associated with their diversity. Overall, our paper delineates insightful boundary conditions of women executives' impact on corporate environmental responsibility in general and ISO 14001 in particular.

Third, we provide evidence on TMT gender diversity from an emerging market context. To date, evidence on the impact of women executives on environmental responsibility is largely based on the US context (e.g. Post et al.,2015; Li *et al.*, 2016; Francoeur *et al.*, 2019; Post *et al*., 2011; Jian and Zaman, 2020; Li et al., 2017). Our study adds to this literature by confirming the trans-context value of gender diversity.

Besides theoretical contributions, this study also generates useful insights for practitioners and policymakers. The findings show how the presence of women executives in TMT exerts a positive effect on strategies related to the environment as well as the conditions under which this effect becomes even stronger. Hence, firms committed to optimizing their environmental policies and practices should include women in TMTs and create conditions that are supportive (e.g. CSR committees) for them to effectively express their innate inclinations.

6. Conclusion

In conclusion, we contend that improving women presence in senior positions and promoting environmentally responsible practices are mutually reinforcing objectives. Indeed, improving gender diversity in TMT and adopting environmental management strategies both satisfy societal expectations and meets the demands of multiple stakeholders.

Despite this study's strengths, it has limitations that provide avenues for future research. First, statistics from ISO shows that there are over 300,000 certificates in use in over 170 countries. Our sample of 490 firms from three countries is clearly small. Hence, future studies could adopt a broader scope to ascertain the generalizability of our findings. Second, our sample excludes foreign firms, thus limiting generalizability of the findings. Foreign firms are subject to more regulatory pressures regarding environmental practices and women representation in TMT. Future studies could therefore use a diverse sample to examine how the effect of TMT gender diversity on ISO 14001 varies across domestic and multinational firms. Third, we only articulated impact mechanisms without testing them. Various dimensions of cognitive frames (e.g., ethical disposition, and moral judgment) have been quantitatively measured through surveys (e.g., Todaro *et al* 2019; Paillé et al., 2014). These measures could be used in future research to investigate and shed more light on the mediating mechanisms of the TMT gender diversity-ISO 14001 relationship.

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Table 1: Variable description

Variable	Description/Measurement
ISO	Dummy variable that equals 1 if the company is ISO 14001 certified 0 otherwise
TMT Gender diversity	Percentage of women on TMT
Blau Index	Blau (1977) index of heterogeneity. $I p_i^2$ where I number of categories (2 for gender diversity) and p_i the proportion of group members (fraction of female and male members on TMT) in each category
CSR Committee	Dummy variable that equals 1 if there is CSR committee in the firm 0 otherwise
Institutional Gender Parity	0.5*Percentage of women in parliament+ 0.5*percentage of women in labour force.
Women Executives' Power	0.167*education+ 0.167*education in environmentally friendly country + 0.167*experience + 0.167*longevity on TMT + 0.167*CSR Committee membership + 0.167*firm ownership
Size (logta)	Firm size (logarithm of total assets)
Profitability (ROA)	Return on assets
Leverage	Debt-to-equity ratio
PRICE-TO-BOOK	Price-to-book value of equity
Industry Sensitivity	Dummy variable that equals 1 if the firm belongs to a high-carbon impact industrial sector. High-carbon impact industries include automobiles and components, chemicals, forest products, gas and electrical utilities, oil and gas, mining, pipelines, precious metals, steel, and transportation
Size of TMT	Total number of members on TMT

Table 2: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Panel A: All firms					
ISO 14001	3920	.491	.499	0	1
TMT gender diversity	3920	.113	.134	0	.615
Blau index	3920	.062	.129	0	0.74
CSR Committee	3920	.512	.5	0	1
Women Executives' Power	3920	1.031	.747	0	3.594
Institutional gender parity	3920	24.695	9.804	14.187	41.036
Sensitivity	3920	.546	.498	0	1
Firm size	3920	3.297	.844	-.328	5.595
Profitability	3920	7.397	8.878	-34.04	77.96
Price to book ratio	3920	2.42	3.199	-16.997	29.102
Leverage	3920	2.311	7.16	-120.738	210.26
Panel B: ISO 14001 certified firms					
TMT gender diversity	1923	.186	.153	0	.711
Blau index	1923	.116	.17	0	1.01
CSR Committee	1923	.681	.466	0	1

Women Executives' Power	1923	1.519	.825	0	4.099
Institutional gender parity	1923	23.132	9.29	14.187	41.036
Sensitivity	1923	.587	.493	0	1
Firm size	1923	3.411	.764	-.328	5.377
Profitability	1923	8.58	9.38	-33.58	77.96
Price to book ratio	1923	2.744	3.462	-16.997	26.754
Leverage	1923	2.268	8.96	-120.738	210.26
Panel C: ISO 14001 non-certified firms					
TMT gender diversity	1997	.043	.057	0	.44
Blau index	1997	.01	.03	0	.387
CSR Committee	1997	.349	.477	0	1
Women Executives' Power	1997	.905	.774	0	2.467
Institutional gender parity	1997	26.2	10.051	14.187	41.036
Sensitivity	1997	.506	.5	0	1
Firm size	1997	3.187	.901	.194	5.595
Profitability	1997	6.258	8.208	-34.04	48.35
Price to book ratio	1997	2.108	2.89	-9.952	29.102
Leverage	1997	2.352	4.832	-114.137	68.063
Panel D: ISO 14001 certification renewals firms					
TMT gender diversity	1175	.184	.155	0	.676
Blau index	1175	.116	.17	0	.913
CSR Committee	1175	.699	.459	0	1
Women Executives' Power	1175	1.57	.843	0	4.099
Institutional gender parity	1175	24.282	9.889	14.187	41.036
Sensitivity	1175	.577	.494	0	1
Firm size	1175	3.458	.742	-.328	5.377
Profitability	1175	8.486	9.375	-33.58	77.96
Price to book ratio	1175	2.708	3.39	-13.847	22.49
Leverage		2.515	10.478	-120.738	210.26

Table 3: Sample distribution across industries

Industry	**Environmentally sensitive/ Non-sensitive**	**Firm-year observations**	**Certified**	**Non-Certified**
Automobiles & transportation	Sensitive	520	51%	49%
Chemicals	Sensitive	392	54%	46%
Consumer durables	Non-sensitive	552	55%	45%
Food	Non-sensitive	472	41%	59%
Information technology	Non-sensitive	344	39%	61%
Mining	Sensitive	264	50%	50%
Oil and gas	Sensitive	440	61%	39%
Service	Non-sensitive	552	42%	59%
Steel & metal	Sensitive	384	39%	61%

Table 4: Correlation Matrix

	Variables	1	2	3	4	5	6	7	8	9	10	11
1	ISO 14001	1										
2	TMT gender diversity	0.52***	1									
3	Blau index	0.40***	0.94***	1								
4	CSR Committee	0.33***	0.21***	0.21***	1							
5	Women Executives' power	0.37***	0.26***	0.19**	0.19***	1						
6	Institutional gender parity	-0.15***	-0.18***	-0.11**	0.00	-0.16**	1					
7	Sensitivity	0.08***	0.06***	0.04*	0.04***	-0.01	-0.39***	1				
8	Firm size	0.13***	0.13***	0.11**	0.18***	0.12***	0.45***	-0.24**	1			
9	Profitability	0.13***	0.16***	0.11**	0.10***	0.06***	-0.18***	0.10**	-0.13***	1		
10	Price to book ratio	0.09***	0.09***	0.04**	0.06***	0.08***	-0.21***	0.02	-0.12***	0.46***	1	
11	Leverage	-0.00	-0.00	-0.01	0.00	0.01	0.00	-0.00	0.04***	-0.12***	0.01	1

*** shows significance at the .01 level, ** at .05 level and * at 0.1 level respectively

Table 5. TMT Gender Diversity and ISO 14001

Panel A: TMT Gender Diversity and ISO 14001 (Firm TMT size as instrumental variable)						
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)
TMT gender diversity	9.3833***(6.04)	7.4851***(3.72)	3.5391 (0.96)	3.3162(0.90)	-6.1018(-1.05)	-8.5452(-1.14)
CSR committee		0.7573***(5.98)	0.0910(0.26)	0.7677***(6.56)	0.8640***(7.11)	0.4857**(1.94)
Women Executive's power		0.5738***(6.23)	0.5781***(6.38)	0.1594(0.84)	0.5651***(6.00)	0.3238**(2.05)
Institutional gender parity		0.0479***(3.54)	0.0475***(3.59)	0.0503***(3.74)	0.0062(0.27)	0.0206(0.94)
TMT gender diversity × CSR committee			7.2718**(1.68)			5.2595**(1.73)
TMT gender diversity × Women Executive's power				4.0929***(2.46)		3.0445**(2.17)
TMT gender diversity × Institutional level gender parity					0.5873***(2.73)	0.5073***(2.47)
TMT size						
Sensitivity	0.0982(0.85)	0.0890(0.44)	0.1783(1.41)	0.0693(0.58)	0.1329(1.09)	0.1276(0.93)
Firm size	0.2183**(2.21)	0.1967**(2.06)	0.2023***(2.11)	0.2084**(2.07)	0.1984**(2.14)	0.2011**(1.90)
Profitability	0.0044(0.85)	0.0034(0.59)	0.0028(0.50)	0.0036(0.64)	0.0033(0.57)	0.0014(0.25)
Price-to-book	0.0007(0.18)	-0.0006(-0.04)	0.0047(0.28)	-0.0076(-0.42)	0.0145(0.88)	0.0108(0.61)
Leverage	0.0013(0.08)	-0.0013(-1.31)	-0.0027(-0.61)	-0.0003(-0.20)	-0.0016(-0.42)	-0.0021(-0.61)
Industries Dummies	YES	YES	YES	YES	YES	YES
China Dummy	-0.2604(-1.22)	-1.413***(-4.3)	-1.222***(-3.8)	-1.527***(-4.6)	-1.418***(-4.1)	-1.435***(-3.9)
India Dummy	0.0726(0.66)	-0.2167(-1.21)	-0.1425(-0.429)	-0.3807**(-1.9)	-0.1683(-0.92)	-0.2692(-1.43)
NB observation	3920	3920	3920	3920	3920	3920
Wald $\chi 2$	123.48***	206.07***	158.05***	159.41***	235.97***	263.28***
Wald test of exogeneity	x^2 (1):0.02 ; Prob> x^2 0.9094	x^2 (1):2.07; Prob> x^2 0.1503	x^2 (1):1.63; Prob> x^2 0.2020	x^2 (1):1.52; Prob> x^2 0.2182	x^2 (1):1.13; Prob> x^2 0.2877	x^2 (1):0.24; Prob> x^2 0.6214

Panel B: TMT Gender Diversity and ISO 14001 (Industry TMT size as instrumental variable)

	Model 1b	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)
TMT gender diversity	7.912***(4.11)	7.4152***(3.27)	-3.8293(-0.51)	1.7342(0.33)	-3.247(-0.27)	-2.5283(-0.95)
CSR committee		0.7682***(6.36)	-0.3928(-0.87)	0.6832***(5.82)	0.8093***(5.36)	-0.1471(-0.47)
Women Executive's power		0.4943***(6.64)	0.4613***(5.89)	0.0402(0.22)	0.4193***(3.89)	0.1482*(1.84)
Institutional gender parity		0.0459***(3.57)	0.0427***(2.64)	0.0517***(3.34)	-0.0198(-0.73)	0.03569*(1.73)
TMT gender diversity × CSR committee			10.2912***(3.74)			6.7923***(4.69)
TMT gender diversity × Women Executive's power				4.1923***(2.94)		4.4892***(5.14)
TMT gender diversity × Institutional level gender parity					0.7293***(4.16)	0.7037***(8.42)
TMT size						
Sensitivity	0.0745(0.43)	0.0658(0.38)	0.1387(1.30)	0.0538(0.50)	0.1394(1.16)	0.1483(0.79)
Firm size	0.1932**(2.73)	0.2032**(2.27)	0.2291***(2.38)	0.2092**(2.04)	0.1843**(2.04)	0.2029**(1.98)
Profitability	0.0041(0.81)	0.0039(0.54)	0.0028(0.57)	0.0036(0.54)	0.0031(0.52)	0.0016(0.23)
Price-to-book	0.0007(0.11)	-0.0003(-0.06)	0.006(0.16)	-0.0079(-0.49)	0.0145(0.83)	0.0143(0.68)
Leverage	0.0010(0.08)	-0.0011(-1.28)	-0.0022(-0.45)	-0.0003(-0.24)	-0.0013(-0.49)	-0.0018(-0.56)
Industries Dummies	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES
NB observation	3920	3920	3920	3920	3920	3920
Wald $\chi 2$	95.73***	193.38***	155.62***	139.23***	228.32***	397.67***
Wald test of exogeneity	x^2 (1):0.85 ; Prob> x^2 0.3613	x^2 (1):2.44; Prob> x^2 0.1174	x^2 (1):1.61; Prob> x^2 0.1773	x^2 (1):2.24; Prob> x^2 0.1573	x^2 (1):2.32; Prob> x^2 0. 1194	x^2 (1):2.18; Prob> x^2 0.1505

This table reports the findings of Instrumental Variable Probit regression of ISO 14001 adoption on TMT gender diversity and control variables. *, **, and *** denotes significance at the 10, 5 and 1 percent levels, respectively.

Table 6. Blau Index and ISO 14001[1, 2]

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)
Blau gender index	12.5284***(3.44)	10.5442***(2.65)	7.9033*(1.69)	7.1482*(1.74)	-7.0976(-1.2)	-9.8743(-0.8)
CSR committee		0.6020***(4.61)	0.4601***(2.37)	0.6396***(5.08)	0.8602***(8.57)	0.6283***(5.12)
Women Executive's power		0.5888***(6.47)	0.5794***(6.42)	0.4001***(2.6)	0.4301***(3.61)	0.4712***(4.01)
Institutional gender parity		0.0425***(3.54)	0.0441***(3.71)	0.0461***(3.70)	0.0109(0.41)	0.0312***(2.81)
Blau gender index × CSR committee			5.5066*(1.63)			9.201**(1.85)
Blau gender index × Women Executive's power				7.93*(1.49)		8.1801***(2.17)
Blau gender index × Institutional level gender parity					0.8971***(4.81)	0.8903**(1.72)
TMT size						
Sensitivity	0.1338(1.21)	0.1278(1.09)	0.1541(1.28)	0.0943(0.84)	0.1032(0.92)	0.1045(0.98)
Firm size	0.2529***(2.80)	0.2407***(2.74)	0.2677***(2.94)	0.2176***(2.27)	0.1356*(1.63)	0.2230**(2.01)
Profitability	0.0057(1.06)	0.0049(0.90)	0.0040(0.71)	0.0076(0.97)	0.0067(0.40)	0.0000(0.20)
Price-to-book	0.0067(0.41)	0.0083(0.52)	0.0145(1.02)	0.0000(0.18)	0.0000(0.49)	0.0101(1.15)
Leverage	-0.0006(-0.19)	-0.0016(-0.45)	-0.0021(-0.55)	-0.0002(-0.49)	-0.0009(-0.48)	-0.0123(-0.62)
Industries Dummies	YES	YES	YES	YES	YES	YES
China Dummy	0.3046*(-1.62)	-1.3717***(-4.6)	-1.3582**(-4.5)	-1.372**(-4.1)	-1.4120**(-4.4)	-1.3981**(-3.2)
India Dummy	-0.1668(1.00)	-0.1833(-1.06)	-0.1573(-0.91)	-0.1943(-0.97)	-0.1613(-0.81)	-0.2490(-1.62)
NB observation	3920	3920	3920	3920	3920	3920
Wald $\chi 2$	74.86***	156.77***	173.36***	157.96***	285.84***	182.39***
Wald test of exogeneity	χ^2 (1):1.51; Prob> χ^2 0.2189	χ^2 (1):0.16; Prob> χ^2 0.6892	χ^2 (1):0.08; Prob> χ^2 0.7823	χ^2 (1):0.05; Prob> χ^2 0.8971	χ^2 (1):1.04; Prob> χ^2 0.3457	χ^2 (1):0.33; Prob> χ^2 0.6582

[1] This table reports the findings of Instrumental Variable Probit regression of ISO 14001 adoption on Blau gender diversity index and control variables. *, **, and *** denotes significance at the 10, 5 and 1 percent levels, respectively.

Table 7. TMT Gender Diversity and ISO 14001[1, 2]

Panel A: Environmentally sensitive industries

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)
TMT gender diversity	9.656***(4.17)	7.5340***(2.58)	4.8835 (1.07)	4.4529(0.87)	-10.5351(-0.89)	-6.3030(-0.47)
CSR committee		0.4048***(2.42)	0.1674(0.35)	0.4117***(2.72)	0.7264***(2.45)	0.1879*(1.64)
Women Executive's power		0.6602***(5.30)	0.6857***(5.51)	0.2951(1.11)	0.6587***(4.67)	0.5856***(2.61)
Institutional gender parity		0.1002***(4.23)	0.0995***(4.14)	0.1032***(4.20)	0.0372(0.57)	0.0829*(1.58)
TMT gender diversity × CSR committee			6.1808**(1.78)			4.8510**(1.79)
TMT gender diversity × Women Executive's power				3.6480**(2.02)		2.7676*(1.66)
TMT gender diversity × Institutional level gender parity					0.9562***(1.71)	0.5489**(1.97)
TMT size						
Industries Dummies	YES	YES	YES	YES	YES	YES
China Dummy	0.2594(0.84)	-2.009***(-3.9)	-1.757***(-3.4)	-2.956***(-3.9)	-1.819***(-2.4)	-2.003***(-3.0)
India Dummy	0.3854*(1.77)	0.0291(0.13)	0.0290(0.13)	-0.1236(-0.48)	).0759(0.33)	-0.2665(-0.11)
NB observation	2144	2144	2144	2144	2144	2144
Wald $\chi 2$	75.60***	139.82***	124.66***	109.27***	156.77***	146.07***
Wald test of exogeneity	x^2 (1):0.11 ; Prob> x^2 0.7376	x^2 (1):0.63; Prob> x^2 0.4276	x^2 (1):0.29; Prob> x^2 0.5927	x^2 (1):0.36; Prob> x^2 0.5480	x^2 (1):0.29; Prob> x^2 05897	x^2 (1):0.03; Prob> x^2 0.8650

Panel B: Non-Environmentally sensitive industries

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**

	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)
TMT gender diversity	9.5989***(4.36)	7.3529***(2.64)	-1.7455(-0.31)	0.1375(0.03)	-10.6212(-0.71)	-23.8785(-1.48)
CSR committee		1.4302***(7.69)	0.1902(0.41)	1.4454***(7.32)	1.2157***(4.65)	0.7195**(1.83)
Women Executive's power		0.4616***(3.47)	0.4695***(3.70)	0.1734(0.71)	0.4077***(3.33)	0.0938(0.45)
Institutional gender parity		0.0337**(1.89)	0.0328**(1.97)	0.0368**(2.07)	-0.0305(-1.07)	0.0162(0.59)
TMT gender diversity × CSR committee			13.720**(3.41)			8.5064***(2.94)
TMT gender diversity × Women Executive's power				6.5358***(2.97)		6.0147***(3.64)
TMT gender diversity × Institutional level gender parity					0.6952***(3.45)	06548***(3.93)
TMT size						
Industries Dummies	YES	YES	YES	YES	YES	YES
China Dummy	-0.8378**(-2.4)	-1.875***(-3.6)	-1.537***(-2.9)	-2.030***(-3.8)	-1.651***(-3.0)	-1.902***(-3.1)
India Dummy	0.4997(-1.48)	-0.8352(-1.32)	-0.5574(-1.43)	-1.0222**(-2.6)	-0.5661(-1.4)	-0.7661(-1.7)
NB observation	1776	1776	1776	1776	1776	1776
Wald $\chi 2$	84.20***	154.21***	128.90***	144.78***	195.45***	237.49***
Wald test of exogeneity	χ^2 (1):0.44 ; Prob> χ^2 0.5052	χ^2 (1):2.13; Prob> χ^2 0.1598	χ^2 (1):1.96; Prob> χ^2 0.1448	χ^2 (1):2.32; Prob> χ^2 0.1818	χ^2 (1):1.93; Prob> χ^2 0.2052	χ^2 (1):2.01; Prob> χ^2 0.1510

[1] This table reports the findings of Instrumental Variable Probit regression of ISO 14001 adoption on TMT gender diversity and control variables. *, **, and *** denotes significance at the 10, 5 and 1 percent levels, respectively.

Table: 8. Alternative measure of environmental responsibility

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Environmental penalty	Environmental penalty	Environmental penalty	Environmental penalty	Environmental penalty	Environmental penalty
Lag. Penalty	-0.2155*(0.1178)	-0.3028***(0.1226(	-0.3571***(0.1257)	-0.3064***(0.1236)	-0.3024***(0.1249)	-0.3706***(0.1191)
TMT gender diversity	-0.0180**(0.0093)	-0.0234**(0.0134)	-0.0177***(0.0008)	-0.0284*(0.0175)	0.0646**(0.032)	-0.0629*(0.0413)
CSR committee		-0.0004***(0.0001)	-0.010(0.014)	-0.0006*(0.0002)	-0.0004*(0.0001)	-0.0109*(0.006)
Women Executive's power		-0.0198**(0.0099)	-0.020**(0.0102)	-0.0244(0.0577)	-0.0167**(0.0095)	-0.006**(0.004)
Institutional gender parity		0.0001**(0.0002)	0.0001*(0.0003)	0.0001**(0.0002)	0.0002**(0.0003)	-0.0002(0.0024)
TMT gender diversity × CSR committee			-0.0496**(0.0205)			-0.0568**(0.0350)
TMT gender diversity × Women Executive's power				-0.1473***(0.0598)		-0.1575***(0.0653)
TMT gender diversity × Institutional level gender parity					-0.0221**(0.0090)	-0.0263*(0.0170)
Industries Dummies	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES
NB observation	3919	3919	3919	3919	3919	3919
Hansen test	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
AB test AR (1)	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
AB test AR (2)	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant

[1] This table reports the findings of Dynamic GMM model. Arellanoe Bond test of the null hypothesis of no serial correlation (autocorrelation) in the first-differenced residuals was employed, Hansen test of over-identification for the validity of the full instruments set was conducted. *, **, and *** denotes significance at the 10, 5 and 1 percent levels, respectively. robust standard errors are reported in parentheses.

Table 9. TMT Gender Diversity and first time ISO 14001 [1, 2]

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)
TMT gender diversity	5.1669***(3.20)	2.5475*(1.98)	-0.1108(-0.03)	-0.3452(-0.11)	-0.6787(0.24)	-0.2156(0.92)
CSR committee		0.4417***(5.08)	0.1190(0.55)	0.4131***(4.70)	0.7677***(7.33)	0.5066***(3.19)
Women Executive's power		0.3434***(5.27)	0.3378***(5.28)	0.1517*(1.56)	0.3681***(5.43)	0.1472*(1.73)
Institutional gender parity		0.1256***(6.28)	0.1174***(6.15)	0.1130***(5.95)	0.1220***(5.17)	0.1176***(4.79)
TMT gender diversity × CSR committee			4.9368*(1.69)			3.3160**(2.16)
TMT gender diversity × Women Executive's power				3.1656**(1.99)		3.5356***(2.39)
TMT gender diversity × Institutional level gender parity					1.1097***(4.26)	0.9754***(3.97)
TMT size						
Industries Dummies	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES
NB observation	2268	2268	2268	2268	2268	2268
Wald χ^2 84.27*** 159.83***	202.19***	181.00***	226.29***	239.80***		
Wald test of exogeneity	x^2 (1):0.49 ; Prob> x^2 0.4852	x^2 (1):2.92; Prob> x^2 0.1138	x^2 (1):1.99; Prob> x^2 0.1382	x^2 (1):2.43; Prob> x^2 0.1109	x^2 (1):1.75; Prob> x^2 0.1658	x^2 (1):2.13; Prob> x^2 0.1448

[1] This table reports the findings of Instrumental Variable Probit regression of ISO 14001 initial adoption on TMT gender diversity and control variables. *, **, and *** denotes significance at the 10, 5 and 1 percent levels, respectively.

Table 10. TMT Gender Diversity and ISO 14001 renewals

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)
TMT gender diversity	2.5134*(1.96)	3.1420*(2.01)	-0.3472(-0.05)	-3.2751(-0.38)	-3.3609(-0.28)	-2.6667(-0.49)
CSR committee		0.2043**(2.18)	-0.9956(-0.97)	0.3125(1.47)	0.1675(0.88)	-0.6841(-0.94)
Women Executive's power		0.2849**(2.84)	0.3339***(3.20)	-0.5948(-0.99)	0.1974(1.41)	-0.0976(-1.35)
Institutional gender parity		0.0689*(1.98)	0.0527(0.71)	0.0730(-1.07)	0.1211(-1.57)	0.4324(-0.83)
TMT gender diversity × CSR committee			10.2702*(1.69)			7.3683**(2.09)
TMT gender diversity × Women Executive's power				7.5531***(2.98)		6.0953***(4.02)
TMT gender diversity × Institutional level gender parity					0.2821*(1.74)	0.1825*(1.88)
TMT size						
Industries Dummies	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES
NB observation	1175	1175	1175	1175	1175	1175
Wald $\chi 2$	17.93***	33.65***	35.19***	41.01***	77.57***	94.02***
Wald test of exogeneity	x^2 (1):0.88 ; Prob> x^2 0.3473	x^2 (1):0.81; Prob> x^2 0.3685	x^2 (1):0.25; Prob> x^2 0.6171	x^2 (1):0.47; Prob> x^2 0.4928	x^2 (1):0.97; Prob> x^2 0.3252	x^2 (1):0.30; Prob> x^2 0.5808

[1] This table reports the findings of Instrumental Variable Probit regression of ISO 14001 renewals on TMT gender diversity and control variables. *, **, and *** denotes significance at the 10, 5 and 1 percent levels, respectively.

Table 11. TMT Gender Diversity and ISO 14001 (Hazard rate model)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	ISO 14001	ISO 14001	ISO 14001	ISO 14001	ISO 14001	ISO 14001
TMT gender diversity	0.9605***(18.17)	0.67708***(10.59)	0.6529***(9.232)	0.5818***(9.51)	0.5860***(2.16)	0.5583***(4.33)
CSR committee		1.8712***(4.98)	2.439071***(5.53)	1.8321***(4.80)	1.9010***(5.07)	2.5272***(5.62)
Women Executive's power		1.6172***(4.97)	1.6187***(4.97)	2.0251***(5.83)	1.6215***(5.03)	1.9721***(5.57)
Institutional gender parity		0.5959***(-11.66)	0.5929***(-11.80)	0.5891***(-11.85)	0.6010***(-11.30)	0.5903***(-11.68)
TMT gender diversity × CSR committee			0.1618***(-2.70)			0.1151***(-3.04)
TMT gender diversity × Women Executive's power				0.2475***(-3.48)		0.2907***(-2.88)
TMT gender diversity × Institutional level gender parity					1.3893***(2.40)	0.0781***(1.83)
Industries Dummies	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES
NB observation	3920	3920	3920	3920	3920	3920
Chi-square	330.59	594.85	601.57***	606.18***	600.27***	616.66***

Robust z-statistics in parentheses, ***p < 0.01.; **p < 0.05.; *p < 0.1

Table 12. TMT Gender Diversity and ISO 14001(Based on one-to-one matching criterion)

	Model 1b	Model 2a	Model 3b	Model 4b	Model 5b	Model 6b
	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)	ISO 14001 Coefficient (z statistics)
TMT gender diversity	6.7823***(2.78)	6.5832*(2.14)	-1.3672(-1.13)	2.09223(1.02)	2.2932(0.53)	4.8731(-1.37)
CSR committee		1.3823***(2.56)	2.9562***(2.71)	1.9723***(3.32)	1.6823**(2.49)	-0.6192(-0.71)
Women Executive's power		7.7921***(3.53)	5.4572*(1.61)	6.2938***(3.62)	4.8232(0.69)	5.1293(1.26)
Institutional gender parity		0.0582*(1.49)	0.0372(0.57)	0.0659*(1.55)	0.0820(1.46)	-0.0762(-0.80)
TMT gender diversity × CSR committee			9.6821***(5.21)			10.7827***(2.79)
TMT gender diversity × Women Executive's power				3.9238**(2.43)		3.8923**((2.10)
TMT gender diversity × Institutional level gender parity					2.7843***(2.78)	2.5672**(2.52)
TMT size						
Firm Dummies	YES	YES	YES	YES	YES	YES
Industries Dummies	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES
NB observation	3920	3920	3920	3920	3920	3920
Wald χ^2 256.87*** 270.21*** 302.12*** 427.32*** 163.43*** 121.28***						
Wald test of exogeneity	x^2 (1):1.02 ; Prob> x^2 0.3283	x^2 (1):1.40; Prob> x^2 0.3392	x^2 (1):1.81; Prob> x^2 0.1923	x^2 (1):1.23; Prob> x^2 0.2892	x^2 (1):1.11; Prob> x^2 0.3925	x^2 (1):0.78; Prob> x^2 0.4102

Robust z-statistics in parentheses, ***p < 0.01.; **p < 0.05.; *p < 0.1