When do Investors See Value in International Environmental Management Certification of Multinational Corporations? A Study of ISO 14001 Certification after the Paris Agreement

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RESEARCH SUMMARY

Despite the prominence of International Organization for Standardization (ISO) 14001 certification as a global strategy instrument, there is persistent doubt about its effectiveness as a value-generating tool, especially for multinational corporations (MNCs). This study draws on institutional theory to explain the varying market valuations of international environmental management certification following a strongly binding multilateral environmental agreement. We submit that ISO 14001 certification increases the market value of MNCs more strongly following the institutional pressures exerted by the strongly binding Paris Agreement. This effect varies due to institutional country-of-origin effects and exposure to host countries with stringent environmental regulations. We provide empirical support using a difference-in-differences analysis of 3,193 MNCs from 60 countries with pledged commitments to emission reductions in the Paris Agreement.

MANAGERIAL SUMMARY

ISO 14001 has been recognized as pivotal for achieving sustainable development goals. Nevertheless, managers continue to seek financial justifications for adopting this prominent global standard. Our study shows that ISO 14001 increases the market value of multinational corporations (MNCs) more strongly following the binding Paris Agreement, as the global standard reassures investors about corporate alignment with global climate goals. Although the financial impact of ISO 14001 appears to be greater for MNCs from emerging economies, owing to the lower expectations associated with institutional quality in emerging economies, investors correct the (economic) evaluation of ISO-certified MNCs according to their exposure to host countries with stringent environmental regulations. These findings inform managers of the importance of aligning corporate sustainability with geographical diversification strategies.

Keywords institutional theory, institutional country-of-origin, host country environmental stringency, ISO 14001, Paris Agreemen

1. INTRODUCTION

Multinational corporations (MNCs) are essential for sustainable development (Van Zanten & Van Tulder, 2018), especially regarding climate change (Dunning, 2009; Kolk & Pinkse, 2008). This is because resource-rich MNCs can afford innovative green initiatives (Van der Waal, Thijssens, & Maas, 2021) and their global connectedness facilitates the global diffusion of such initiatives (Maksimov, Wang, & Yan, 2019). Despite MNCs' superior green capabilities, they face greater legitimacy challenges than domestic and exporting firms. MNCs' prevalence in pollution-intensive industries (Williamson, Symeou, & Zyglidopoulos, 2022), coupled with the opportunity to shift polluting activities across the global value chain (Berry, Kaul, & Lee, 2021; Gonenc & Poleska, 2022), raises doubts about their environmental credentials. An attractive instrument to convey MNCs' environmental capabilities is the International Organization for Standardization (ISO) 14001 (King, Lenox, & Terlaak, 2005; Rugman & Verbeke, 1998), a prominent international certification for environmental management systems (EMS).

While national and regional environmental management certifications[1] are tightly confined to domestic regulations and certification processes, ISO 14001 was developed by expert members from 88 countries, and its certification process is facilitated by a global network of more than 160 national standard bodies (ISO, 2015). This is appealing to MNCs because they want to exhibit commitment to climate action at the global level. IBM, for instance, leveraged the worldwide ISO 14001 registration to establish environmental leadership (ISO Focus, 2015). Likewise, Samsung Electronics mandates ISO 14001 certification at its manufacturing facilities globally to foster a global reputation in environmental sustainability (ISO Focus+, 2012).

[1]Examples of national environmental management certification are China's Energy Conservation Program and Indonesia's program for pollution control, evaluation, and rating (PROPER). An example of regional environmental management certification is the Eco-Management and Audit Scheme (EMAS) of the European Union.

As ISO 14001 certification is associated with higher environmental performance (Erauskin, Zubeltzu, Heras, & Boiral, 2020), it is highly valued by investors of MNCs (Dowell, Hart, & Yeung, 2000). However, there is evidence of lower market values of ISO 14001-certified firms and negative market reactions to adopting ISO 14001 (e.g., Cañón & Garcés, 2009; Paulraj & De Jong, 2011; Riaz & Saeed, 2020). This negative market valuation has been observed for both domestic firms (Riaz & Saeed, 2020) and MNCs (Cañón & Garcés, 2009), casting doubt on the value-generating effect of this prominent global standard. Such doubts could hamper the attainment of sustainable development goals given the pivotal role of global standards for the worldwide adoption of EMS (United Nations, 2016, 2021).

We draw on institutional theory (DiMaggio & Powell, 1983; Martin, 2014; Peng, 2002, 2003; Scott, 2001; Selznick, 1996) to explain the value-generating role of ISO 14001 certification for MNCs. Inspired by prior research on the market valuation of global corporate social responsibility (CSR) practices (e.g., Doh, Howton, Howton, & Siegel, 2010; El Ghoul, Guedhami, & Kim, 2017), our study demonstrates that institutional theory provides a more elaborate explanation of the varying market valuation of ISO 14001 by explicating the institutional complexity of MNCs (Kostova, Roth, & Dacin, 2008; Marano & Kostova, 2016).

Our study begins by examining the normative role of multinational environmental agreements using the sociology-based approach to institutional theory (Aguilera & Grøgaard, 2019; Cuervo-Cazurra, Mudambi, & Pedersen, 2019). Given their multi-country presence, MNCs are strongly constrained by global norms at the multilateral level (Pinkse & Kolk, 2012) especially those established through the multinational environmental agreements (Schüssler, Rüling, & Wittneben, 2013). Surprisingly, this aspect has been rarely explored in the ISO 14001 literature (see Boiral, Guillaumie, Heras, & Tayo Tene, 2018; Sartor, Orzes, Touboulic, Culot, &

Nassimbeni, 2019 for recent reviews). We expect that strongly binding multilateral environmental agreements will positively influence the market valuation of ISO 14001-certified MNCs because such agreements increase the value attached to ISO 14001 as a reliable standardized reference of MNCs environmental credentials. This effect, however, will vary across MNCs because of the institutional effects of the country-of-origin and exposure to host countries' stringent environmental regulations. Although the influence of home (e.g., Kölbel & Busch, 2019; Su, Peng, Tan, & Cheung, 2016) and host country institutions (e.g., El Ghoul et al., 2017) on the market valuation of global CSR practices has been examined, the possible interdependence between them has not been clearly explicated (Sun, Doh, Rajwani, & Siegel, 2021). This theoretical gap is mirrored in the empirical setting of certification research. Despite the need for multi-country studies to capture the cross-border institutional complexity of MNCs (Sun et al., 2021), certification research has been conducted more frequently in single-country settings, either in developed (e.g., Cañón & Garcés, 2009; Nishitani & Kokubu, 2012) or emerging economies (e.g., Riaz & Saeed, 2020; Zhang, Jiang, & Noorderhaven, 2019).

As the first multilateral environmental agreement with bottom-up commitments from advanced and emerging economies, the strongly binding Paris Agreement elevated the institutional pressures for environmental sustainability compared to preceding global conventions (Keohane & Oppenheimer, 2016). Accordingly, we examine whether ISO 14001 certification has affected the market value of MNCs more strongly after the Paris Agreement. Subsequently, we explore the value attached to the ISO 14001 certification of MNCs from emerging economies (EM-MNCs) and advanced economies (AE-MNCs) to assess the influence of the institutional country-of-origin effects and exposure to host countries with stringent environmental regulations. Therefore, this is the first study to present a comprehensive, multi-

layered institutional analysis of the market valuation of ISO 14001 certification for MNCs. We address the dearth of multi-country analyses in the certification literature by including 3,193 MNCs in our sample. We focus on MNCs because comparative institutional analysis is better established when the focus is on intra-group variation (i.e., within MNCs) rather than inter-group variation (i.e., MNCs versus domestic or exporting firms). To address the lack of discrete events associated with ISO 14001 certification and to capture market valuation, we conduct a difference-in-differences analysis with the Paris Agreement as an exogenous global event. The Paris Agreement serves as the theoretical point of departure and a suitable empirical instrument because the bottom-up country commitments to the global climate targets set in the Paris Agreement are less likely to be predicted by the market or formulated by MNCs (Kruse, Mohnen, & Sato, 2020).

This study makes three contributions. *First*, our examination of institutional pressures at the multilateral level expands the discussion on the relationship between global strategy and the quality of institutions (Cuervo-Cazurra et al., 2019). Building on neo-institutionalism (DiMaggio & Powell, 1983; Scott, 2001; Selznick, 1996), we submit that conformity to the institutional constraints set by the Paris Agreement yields economic advantages for ISO-14001-certified MNCs. Our empirical analysis shows that the economic advantages constitute approximately US$315 million additional increase in market value. *Second*, the comparative institutional analysis exploring institutions in multiple countries provides a comprehensive explanation of why the market valuation of ISO 14001 certification varies. While contradictory findings are a frequent generic motivation for management research (Grant & Pollock, 2011) and for certification studies (Boiral et al., 2018), this study submits (and empirically shows) that seemingly inconclusive findings might reflect the limitations of single-country studies in

capturing the cross-border institutional complexity of MNCs. *Third*, our study serves as a caution for managers seeking financial justification for adopting ISO 14001. Recent research suggests that ISO 14001 certification can be employed by businesses in different contexts to prove their environmental credentials (Camilleri, 2022). Our study reveals that for MNCs, such a strategy might be counterproductive when they have limited exposure to stringent environmental regulations across their global operations. This condition applies to both EM- and AE-MNCs. In the following section, we provide the conceptual development that leads to the hypotheses and subsequently present the empirical analysis.

2. CONCEPTUAL DEVELOPMENT

2.1. ISO 14001 certification and MNCs

Here, we provide a brief background of ISO 14001, its relevance to MNCs, and the relationship between ISO 14001 and the market value of MNCs. Originally published in 1996, ISO 14001 is the core of the ISO 14000 series on environmental management developed by ISO/TC 207/SC 1,[2] the technical committee of the ISO, with expert members representing multiple stakeholder groups from 88 countries. This global representation limits the regulatory influence of national and regional institutions and confirms the international validity of ISO 14001 (Darnall, 2006; Morrow & Rondinelli, 2002; Testa et al., 2014). Another aspect that boosts the global prominence of ISO 14001 is the global network of national standard bodies, which facilitates the auditing and certification process of ISO 14001 (Heras & Boiral, 2013). Although doubts exist regarding the reliability of private auditors in the cross-country certification of ISO 14001 (Dogui, Boiral, & Heras, 2014), the third-party certifiers are verified by competent national standard bodies connected through the ISO network (Testa et al., 2014).

[2] https://committee.iso.org/home/tc207sc1

As an internationally accepted blueprint for sustainable development, pollution prevention, and compliance assurance (Delmas, 2002), ISO 14001 is particularly attractive to MNCs facing challenges in consistently exhibiting superior green capabilities across different locations (Maksimov et al., 2019). As ISO 14001 provides harmonized guidelines for the entire organization (Morrow & Rondinelli, 2002), corporate headquarters (HQs) mandate ISO 14001 certification for all corporate facilities (Boiral, 2007; Darnall, 2006). Therefore, although ISO 14001 is primarily adopted by individual facilities, HQ-level commitments are translated into its adoption at every MNC facility. Evidently, Ford, General Motors, and Toyota required their manufacturing plants worldwide to certify their EMS using ISO 14001 (Wilson, 2001). Likewise, the Korean industrial conglomerate POSCO acquired ISO 14001 certification for its steel plants and natural gas production sites, both at home and overseas (Posco International, 2019). IBM also applied ISO 14001 to its global operations (ISO Focus, 2015).

Essentially, ISO 14001 is a "management process standard" that specifies requirements for EMS that can be audited and certified without any explicit targets for environmental performance such as the level of air pollutants or eco-efficiency ratios (Baek, 2017; Delmas, 2002; King et al., 2005). As a strategic instrument, ISO 14001 certification indirectly creates value by influencing the perceptions of market actors, particularly investors (Dowell et al., 2000; Nishitani & Kokubu, 2012). This value-creating mechanism is different from environmental product certifications, such as China's Environmental Labelling Program or the US Energy Star label, from which firms create value directly through the environmental technology attached to the certified products (Houde, 2022; Shuai, Ding, Zhang, Guo, & Shuai, 2014). ISO 14001 certification is associated with eco-efficiency (Sinkin, Wright, & Burnett, 2008), reduced emissions (Nishitani & Kokubu, 2012), and improved environmental performance (Erauskin et

al., 2020). This positive association is valued by value-seeking investors of MNCs as the global standards signal that operational improvements in one location can be readily transferred to worldwide subsidiaries (Dowell et al., 2000). Nonetheless, investors may still question the environmental credentials of ISO-certified firms due to the limited availability of reliable data on corporate-level emissions (Gomez & Rodriguez, 2011; Zobel, 2013) and green process innovations (Van der Waal et al., 2021). This skepticism is greater for MNCs than for exporting firms due to MNCs' direct involvement in international production (Dunning, 2009).

2.2. Increasing institutional pressures following the Paris Agreement and the market valuation of ISO 14001

In the certification literature, scholars frequently use institutional theory to explain adoption motives (e.g., Baek, 2017; Heras, Landín, & Molina, 2011; Wang, Li, & Zhao, 2018) but use other theories to explain the benefits of adopting ISO 14001. For example, the positive relationship between ISO 14001 and firm value is often described as the market premium of signaling (Sinkin et al., 2008)—although the ubiquity of the global standard (Baek, 2017; Delmas, 2002; Qi et al., 2011) raises the question of how investors assign value to a widely adopted signal (Bergh, Connelly, Ketchen Jr, & Shannon, 2014).

The main assertion of neo-institutionalism (DiMaggio & Powell, 1983; Scott, 2001; Selznick, 1996) is that organizations imitate widely accepted behaviors in response to social pressures to be accepted in society. As adapting to demands of a society serves as an effective strategy (Cuervo-Cazurra et al., 2019), there is a market incentive to employ globally recognized sustainability practices like ISO 14001 certification as a tool of legitimacy. Typically, norms of environmental sustainability are established at the national level through a country's environmental regulations (Aragon, Marcus, & Vogel, 2020; Porter & Van der Linde, 1995;

Rugman & Verbeke, 1998). However, domestic environmental regulations are insufficient for controlling MNCs' behavior, especially when strong enforcement mechanisms are absent (Rugman & Verbeke, 1998). One way to increase institutional pressure at the global level is through multilateral environmental agreements (Schüssler et al., 2013).

Environmental sociologists suggest that multilateral environmental agreements, from the 1987 Montreal Protocol to the 2021 Glasgow Climate Pact, draw public attention to climate change thanks to the intense media coverage surrounding such events (Hase, Mahl, Schäfer, & Keller, 2021; Schmidt, Ivanova, & Schäfer, 2013). However, media coverage converts into institutional pressures to engage in climate action only when every advanced and emerging economy commits to the obligations sealed in the multilateral agreements (Schmidt et al., 2013). When multilateral environmental agreements are strongly binding, MNCs face the institutional pressures to meet societal expectations of environmental sustainability (Pinkse & Kolk, 2012).

Compared to the 1997 Kyoto Protocol under which binding emission reduction targets were limited to 37 advanced industrialized economies (United Nations, 1998), the Paris Agreement was the first international treaty on climate change with binding targets[3] for both advanced and emerging economies (Keohane & Oppenheimer, 2016). Following the strongly binding Paris Agreement, ISO 14001 certification increased the market value of MNCs more strongly for two reasons. First, after the Kyoto Protocol dissipated (Schüssler et al., 2013), the shock introduced by the Paris Agreement redirected the attention of market actors toward global environmental sustainability (Kruse et al., 2020). This renewed interest elevates corporate environmental risks as investors look for cues of corporate environmental capability

[3] Each signatory party sets these binding targets voluntarily through the Nationally Determined Contributions (NDC). The political attention triggered by the global scope of the Paris Agreement is also evident from the voluntary commitment of non-negotiating parties. Taiwan, for instance, has voluntarily set its NDC through the Greenhouse Gas Reduction and Management Act despite being excluded from Paris negotiations.

(Monasterolo & De Angelis, 2020; Seltzer, Starks, & Zhu, 2020). Such risks are greater for MNCs because their international production activities lead to greater scrutiny. Therefore, ISO 14001 has become a valuable reputational shield and a signal of MNCs' capabilities to meet the Paris Agreement climate goals. Given the cross-border operations of MNCs, it is possible that investors evaluate the ISO 14001 certification of a parent company separately from its subsidiaries. However, this is less likely because of the HQs mandate on ISO 14001 adoption throughout MNCs' facilities (Baek, 2017; Delmas, 2002). Second, the international validity of ISO 14001 fulfills the need for a reliable, standardized reference for MNCs' alignment with the Paris Agreement in advanced and emerging economies. This requirement cannot be fulfilled by adopting local or regional environmental management standards. Accordingly, we hypothesize:

Hypothesis (H1). *ISO 14001 certification increases the market value of MNCs more strongly after the Paris Agreement.*

2.3. Influence of institutional country-of-origin

Although the Paris Agreement generally increases the market value of ISO 14001-certified MNCs, this effect is likely to differ between EM- and AE-MNCs. There are several possible explanations for this variation. First, it may be attributed to varying requirements of environmental standards in advanced and emerging economies. Nonetheless, this explanation is less likely for ISO 14001 because the requirements and ISO certification process are the same everywhere (Testa et al., 2014). Second, it could be due to the non-signing effect. Specifically, the influence of ISO 14001 on market value is stronger for MNCs based in countries that have signed the Paris Agreement. Although plausible, this explanation is less convincing given the global coverage of the Paris Agreement. After considering these possibilities, we submit that the varying market valuations likely reflect institutional country-of-origin effects (Bilkey & Nes,

1982; Cuervo-Cazurra, Luo, Ramamurti, & Ang, 2018). Investors tend to have general expectations and perceptions of MNCs associated with home country institutions (Bilkey & Nes, 1982). For example, EM-MNCs are generally associated with lower corporate sustainability because of the low institutional quality and weak stakeholder positioning in emerging economies (Marano, Tashman, & Kostova, 2017). However, institutional country-of-origin effects can change the relative strategic position of EM-MNCs versus AE-MNCs, leading to comparative institutional advantage (Martin, 2014). This comparative institutional advantage is more pronounced in the presence of strongly binding multilateral environmental agreements.

As the binding commitments of advanced and emerging economies in the Paris Agreement create a common expectation of global environmental sustainability for both AE- and EM-MNCs, it is relatively easier for EM-MNCs to build a global reputation through ISO 14001. This advantage is derived from the lower expectation of corporate behavior in emerging economies (Deephouse, Newburry, & Soleimani, 2016). Although ISO 14001 is valuable for AE-MNCs investors, the increase in market value is less for ISO-certified AE-MNCs than ISO-certified EM-MNCs. This is because AE-MNCs are already subject to higher standards of corporate behavior, especially regarding their sustainability practices (Jiang & Bansal, 2003; Knight, Holdsworth, & Mather, 2007). Our prediction is consistent with the conjecture that institutional country-of-origin effects lead to different expectations and different returns to (voluntary) CSR practices (Rodriguez, Siegel, Hillman, & Eden, 2006).

Another reason for the greater value-generating effect of ISO 14001 for EM-MNCs is attributed to information asymmetry. As alternative reliable information about corporate sustainability is limited and does not travel freely in emerging economies (Su et al., 2016), investors often rely on international standards as primary heuristic tools for evaluating EM-

MNCs' green capabilities (Qi et al., 2011). By contrast, ISO 14001 likely adds little valuable information about AE-MNCs' environmental capabilities because of robust evaluation metrics for corporate environmental practices in advanced economies. Research on Western European MNCs found that ISO 14001 certification only weakly affects firm value because investors can consult the strictly enforced EMAS to make reliable inferences about AE-MNCs' green capabilities (Wiengarten, Pagell, & Fynes, 2013). A similar result is reported for US MNCs owing to the intense monitoring and evaluation of the Environmental Protection Agency (Bansal, 2002). Based on the above discussions of institutional country-of-origin effects, we hypothesize:

Hypothesis (H2). *After the Paris Agreement, ISO 14001 certification increases the market value of EM-MNCs more strongly than that of AE-MNCs.*

2.4. Influence of exposure to host countries with stringent environmental regulations

Besides the institutional country-of-origin effects, the value attached to ISO 14001 certification depends on MNCs' exposure to host countries with stringent environmental regulations because it reflects MNCs' substantive environmental actions. Instead of relying on perceptions built on predetermined factors like institutional country-of-origin, investors include factual information when evaluating an organization (Zuckerman, 1999). When the "evidence" contradicts the general perception, investors apply the illegitimacy discount to the market valuation of the firm (Zuckerman, 1999). In the context of global environmental standards, MNCs' exposure to host countries with stringent environmental regulations is the commonly available factual information (Dowell et al., 2000).

Taking the management approach to institutional theory, the institutional view posits that MNCs can react differently to increasing institutional pressures (Peng, 2002, 2003). Accordingly, MNCs may react differently to the increasing institutional pressures exerted by the

Paris Agreement. MNCs can react by using ISO 14001 certification as symbolic conformity or as guidance to engage in substantive actions (Durand, Hawn, & Ioannou, 2017). While symbolic conformity is ceremonial, substantive conformity indicates that the voluntary adoption of ISO 14001 is accompanied by significant changes that involve material costs and are not easily reversible (Durand et al., 2017), such as green process innovations (Erauskin et al., 2020).

Prior research suggests that symbolic or substantive conformity is mirrored by MNCs exposure to host countries with stringent environmental regulations (e.g., Berry et al., 2021; Bu & Wagner, 2016; Kim, Pantzalis, & Zhang, 2021; Marquis, Toffel, & Zhou, 2016). When MNCs are exposed to host countries with stringent environmental regulations, they are more likely to invest in green innovations (Bu & Wagner, 2016; Kim et al., 2021) and are less likely to be involved in greenwashing (Marquis et al., 2016). By contrast, MNCs may exploit lax environmental regulations of host countries to spread polluting activities in the global value chain (Berry et al., 2021). Because voluntary environmental initiatives, like adopting ISO 14001, come with substantive actions under strict regulatory surveillance and enforcement mechanisms (Christmann & Taylor, 2006; Short & Toffel, 2010), investors are more convinced by the environmental credentials of ISO-certified MNCs when they are exposed to host countries with stringent environmental regulations. We expect that this condition applies to both AE- and EM-MNCs despite the modifying influence of institutional country-of-origin.

As AE-MNCs are already exposed to the strict requirements in advanced economies (Bansal, 2002; Jiang & Bansal, 2003), they should be able to build a global reputation even without host-country environmental stringency (Zhang et al., 2019). However, exposure to host countries with stringent environmental regulations increases the opportunities to benefit from environmental innovations (Bu & Wagner, 2016) while reducing the opportunities to avoid

environmental regulations by moving to pollution havens (Berry et al., 2021). Both factors are likely to increase the value of environmental management capabilities, thus, strengthen the value attached to the ISO 14001 certification of AE-MNCs.

The conditioning influence of exposure to host countries with stringent environmental regulations also applies to EM-MNCs. As the pollution haven phenomenon is more prevalent among emerging economies (Hoffmann, Lee, Ramasamy, & Yeung, 2005), investors likely perceive ISO 14001 as substantive conformity when EM-MNCs are exposed to host countries with stringent environmental regulations. Otherwise, investors apply illegitimacy discount to correct their valuation of EM-MNCs. Another reason ISO 14001 increases the market value of EM-MNCs more strongly when they are exposed to host countries with stringent environmental regulations is that the benefit of building reputational credibility is higher when the liability of origin is greater. When expanding to advanced markets, EM-MNCs face an institutional disadvantage because stakeholders impose stricter requirements in assessing their credentials due to the negative stereotyping of emerging markets (Pant & Ramachandran, 2012). Consequently, it is more difficult for EM-MNCs to benefit from global standards like ISO 14001 when they are exposed to host countries with stringent environmental regulations. Although greater scrutiny appears to be a disadvantage, compliance with the host country's intense examination allows EM-MNCs to establish good reputational credibility (Stevens, Makarius, & Mukherjee, 2015). Specifically, EM-MNCs' track-record in dealing with stricter sustainability requirements in some host countries is often used to assess the overall credibility of their environmental capabilities, even in host countries with low institutional quality. For instance, exposure to Western European markets is often used as a reference to assess the credibility of sustainability practices of Chinese MNCs in Africa (Miska, Witt, & Stahl, 2016). In summary, despite different mechanisms

applicable to AE- and EM-MNCs, we expect that exposure to host countries with stringent environmental regulations increases the value attached to ISO 14001 certification for both AE- and EM-MNCs. We propose the following hypothesis:

> **Hypothesis (H3)**. *The ISO 14001 certification increases the market value of AE- and EM-MNCs more strongly after the Paris Agreement when they are exposed to stringent environmental regulations across their host-country operations.*

3. METHODS

3.1. Data and sample

We began building our sample by checking the availability of ISO 14001 certification data in the Refinitiv EIKON database (EIKON) between fiscal years 2009/2010 and 2019/2020. This period includes the three years before and three years after the adoption of the Paris Agreement. In EIKON, firms without ISO 14001 certification were labeled *No*. Therefore, it was possible to distinguish between firms without ISO 14001 certification and those with missing values. We excluded firms for which certification information was missing. We also excluded firms in the financial services industry. To ensure that our sample contained MNCs exclusively, we only included corporations with at least one subsidiary located outside the home country that was directly owned with a minimum 25 percent stake at the first level of ownership. This cut-off value has been used in prior studies to identify the control rights of a parent company (Horobet, Belascu, Curea, & Pentescu, 2019). We consulted the financial statement consolidation code in Bureau van Dijk's Orbis to further verify the parent status of MNCs. The final sample comprised 3,193 MNCs with headquarters spread across 60 countries.[4] All accounting information was retrieved from EIKON, while information on MNCs' global operations was from Orbis historical

[4] We provide the sample summary in Section A of the online appendix.

database. We consulted different publicly available sources, namely the International Monetary Fund (IMF), the Organization for Economic Cooperation and Development (OECD), the United Nations Conference on Trade and Development (UNCTAD), the World Economic Forum (WEF), and the World Bank's World Governance Indicator (WGI) for country-level information.

3.2. Variable measurement

3.2.1. Dependent variable: market value

As ISO 14001 certification helps MNCs conduct effective stakeholder management (Hillman & Keim, 2001) and overcome market information asymmetries (King et al., 2005), both of which constitute valuable and intangible resources (Hillman & Keim, 2001; Jiao, 2010; Nishitani & Kokubu, 2012), we observed changes in the valuation of MNCs' intangibles through *market value* using Tobin's q as a proxy:

$$q = \frac{Market\ value}{Tangible\ asset\ value} = 1 + \frac{Intangible\ value}{Tangible\ asset\ value}$$

As in prior research (Dowell et al., 2000; Konar & Cohen, 2001), we calculated the market value of a firm by adding its total market capitalization to its total debt. Market capitalization was calculated by multiplying the common stock and preferred shares by the latest closing price. Total debt was the sum of the book value of long-term debt and short-term bank borrowings and notes payable. The replacement value of tangible assets was the sum of the book value of property, plant and equipment, and current assets.

3.2.2. Treatment group variable: ISO 14001

The *ISO 14001* variable was binary, taking a value of one for MNCs with ISO 14001 certification, and zero otherwise. We included MNCs with ISO 14001 certification in the treatment group only if they had obtained the certification before the fiscal year 2013/2014 to mitigate concerns that MNCs change their position toward ISO 14001 certification in

anticipation of or in response to the Paris Agreement. Furthermore, the observed effect for the treatment group more likely reflects investors' valuation of MNCs' green capabilities because abnormal market reaction has been observed within the first 18 months of initial adoption of ISO 14001 (Curkovic & Sroufe, 2011). Although it is unlikely that an ISO-certified firm would lose its certification within the three-year validity period, we manually checked and ensured that all MNCs in the treatment group maintained their ISO certification after the Paris Agreement.

3.2.3. Exposure to host countries with stringent environmental regulations (stringent exposure)

We combined the approaches of Rathert (2016) and Zyglidopoulos, Williamson, & Symeou (2016) to measure *stringent exposure* as a proportion of an MNC's foreign subsidiaries located in countries with the most stringent environmental regulations to its total foreign subsidiaries. We identified 15 countries with the most stringent environmental regulations[5] based on the Environmental Policy Stringency Index (OECD, 2016). The OECD index is less prone to subjective assessment because it is calculated based on actual policy instruments associated with explicit and implicit costs of environmentally harmful behavior and not based on managers' perceptions (Brunel & Levinson, 2016). When environmental regulations are stringent, MNCs incur higher compliance costs. We distinguished between *low* and *high stringent exposure* groups based on the median value of the stringent exposure variable.

3.2.4. Financial performance control variables

As a firm's financial performance could influence its market value, we included a list of control variables that potentially affect a firm's future profitability. We employed return on assets as a proxy for *short-term profit* and calculated the variable as the ratio of operating income

[5] These countries are Australia, Austria, Canada, Denmark, Finland, France, Germany, Japan, South Korea, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom, and the United States.

to total assets. Similar to El Ghoul et al. (2017), we controlled for firm *size* and expected a negative relationship with market value because larger firms are likely to suffer from the diversification discount. Following common practice in the literature, we calculated firm size as the logarithmic form of total assets. We also included *sales growth* and calculated it as the change in annual revenue. We included research and development (R&D) because highly innovative firms are likely to be profitable and valued by the market. Furthermore, any estimation of financial performance is mis-specified if the R&D variable is omitted (McWilliams & Siegel, 2000). We calculated the *R&D* variable as the ratio of R&D expenses to total assets, with missing R&D expenses set to zero (Buchanan, Cao, & Chen, 2018; El Ghoul et al., 2017; Konar & Cohen, 2001). We included *leverage* and calculated the variable as the total debt-to-total equity ratio. As higher debt obligations prevent firms from exploring high-growth opportunities (Myers, 1977), a higher leverage is less likely to be valued by the market. We winsorized variables such as size, short-term profit, sales growth, and leverage to control for the possible influence of outliers in the regression analysis (Tukey, 1977).

3.2.5. Nonfinancial-performance control variables

In addition to profitability-related control variables, we also included a proxy for *the analyst* effect. There is mixed evidence in the literature on the role of analysts in assigning value to firms' sustainability initiatives, with some scholars observing significant effects on firms' market valuation (Robinson, Kleffner, & Bertels, 2011) while others found no effect (Durand, Paugam, & Stolowy, 2019). As a proxy for the analyst effect, we created a time-variant dummy variable that took the value of one when an environmental, social, and governance (ESG) score was observed in a particular year. As geographically diversified firms are valued by the market due to their superior ability to exploit the benefits of internationalization (Ioulianou, Trigeorgis,

& Driouchi, 2017), we included the variable *geo-diversification*. We followed Tong and Reuer (2007) to measure the breadth of MNCs' geographical diversification as the logged difference between the highest GDP/capita and lowest GDP/capita of countries in which an MNC operates, and then multiplied this logged GDP/capita range by the proportion of an MNC's foreign subsidiaries to its total subsidiaries. MNCs with heterogeneous geographical locations have a higher value of geo-diversification when they have a greater presence outside the domestic market. We also included two control variables as proxies for domestic and foreign environmental policies to observe the dynamics of country environmental policy within the split samples. *Domestic policy* is the value of the environmental regulations index at MNCs' HQs. *Foreign policy* is the simple average of the WEF environmental regulations index across MNCs' subsidiaries. We provide descriptions and measurements of the variables in Table 1, and the summary statistics, correlation matrix, and variance inflation factors based on the overall sample in Table 2.

[INSERT TABLE 1 HERE]

[INSERT TABLE 2 HERE]

3.3. Estimation strategy: Difference-in-differences (DID)

Prior studies (e.g., Dowell et al., 2000; Konar & Cohen, 2001; Su et al., 2016) identified two typical empirical challenges relevant to our study. First, simultaneous causality leads to an endogeneity problem because high-capability firms are likely to be valued as such by the market and have a better capacity to comply with ISO 14001 standards. Second, it is challenging to empirically capture the market valuation of ISO 14001 certification because many factors can potentially influence firm value. We opted for a DID analysis with the Paris Agreement as the exogenous event and ISO 14001 certification as the treatment variable to address these empirical

challenges. While the Conferences of Parties (COP) are recurring events (Schüssler et al., 2013), the Paris Agreement fits as an exogenous shock because of the last-minute signing of large emerging economies (e.g., India and Brazil). Illustratively, Kruse et al. (2020, pp. 6–7) noted that "the coverage in public liveblogs and newsfeeds during the two-week negotiation period reveals there was a high degree of uncertainty around whether an agreement would actually be reached. The positions of large emerging economies also remained unclear." To verify the validity of the Paris Agreement as an exogenous event, we tested the pre-treatment parallel assumption in a dynamic DID model.[6]

Given the lack of discrete events associated with ISO 14001 certification in multiple countries, it was empirically challenging to observe market value through abnormal market reactions during the brief period around the initial adoption of ISO 14001. Instead, we assessed the difference in market value for MNCs with ISO 14001 certification (the treatment group) before and after the Paris Agreement and compared this difference with the corresponding difference for MNCs without ISO 14001 certification (the control group). A positive DID indicates that ISO 14001 certification increases the market value of MNCs more strongly after the Paris Agreement, regardless of the level of firm value or performance derived from the EMS already in place. Our baseline DID model is as follows:

$$MV_{i,t} = \beta_0 + \beta_1 ISO14001_i + \beta_2 Paris_t + \beta_3 ISO14001_i * Paris_{2015} + \beta_k K'Control_{i,t-1} + \alpha_i + \mu_t + e_{i,t}$$

The dependent variable, market value (MV), is Tobin's q of firm *i* in year *t*, *Paris* indicates the fiscal years after the Paris Agreement (i.e., fiscal year 2016/2017 to fiscal year 2018/2019), and ISO 14001 is the treatment group variable. The coefficient of interest in the baseline model is β_3, which captures the average treatment effect of the ISO 14001 certification. A positive and

[6] The estimation results of the dynamic DID are provided in Section B of the online appendix.

significant β_3 supports Hypothesis (H1) that ISO 14001 certification increases the market value of MNCs more strongly after the Paris Agreement. Due to the relatively large sample size, we opted for within transformation rather than firm fixed effects to control for firm observable and unobservable characteristics α_i. Within-transformation controls for MNCs' sector activity and primary listing location, among other things, as long as they remain constant over time. This procedure addresses the endogeneity concern stemming from time-invariant omitted variable bias (Hsiao, 2014). As a result of within-transformation, β_1 was omitted from the output. We included year fixed effects μ_t to capture time trends in firm value. To help establish directionality, we measured each *k* control variable in year *t-1*. We reported heteroskedasticity-robust standard errors clustered at the firm level to address cross-sectional dependence and time-series correlations in our panel dataset. To test Hypothesis (H2), we observed β_3 for AE- and EM-MNCs. We consulted IMF country classification to identify MNCs based in advanced economies as AE-MNCs and MNCs based in emerging and developing economies as EM-MNCs.[7] Instead of creating a dummy and estimating a difference-in-difference-in-differences model, we examined Hypothesis (H3) using the range of exposure to environmental regulations across the global operations of AE- and EM-MNCs. Prior studies have used this approach to examine two subgroups from the same sample but with different characteristics (e.g., Bruno, Crescenzi, Estrin, & Petralia, 2022; Buchanan et al., 2018).

4. RESULTS

4.1. Descriptive statistics and univariate analysis

Summary statistics in Table 3 indicate that almost 50 percent of the MNCs in our sample had ISO 14001 certification, reflecting the worldwide diffusion of ISO 14001. Approximately 45

[7] https://www.imf.org/external/pubs/ft/weo/2021/02/weodata/groups.htm

percent of the foreign subsidiaries of these MNCs were in countries with the most stringent environmental regulations. However, the average level of stringent exposure was substantially lower among EM-MNCs (mean = 25%, P75 = 42%) than AE-MNCs (mean = 48%, P25 = 28%). These statistics supported the decision to examine the influence of stringent exposure separately for AE- and EM-MNCs because exposure is relative. Highly stringent exposure for an EM-MNC might be considered low stringent exposure for an AE-MNC.

[INSERT TABLE 3 HERE]

The two-sample t-tests based on the overall sample in Panel A of Table 4 indicate that only MNCs in the treatment group showed a positive and significant change in market value after the Paris Agreement (Δ Tobin's q = 0.08, p = .021) despite their lower average market value compared to that of MNCs in the control group. These initial observations indicate that regardless of the level of firm value, only ISO-certified MNCs gained value following the Paris Agreement. Based on subsamples of MNCs in Panel B, we observed a positive change in market value after the Paris Agreement for AE-MNCs. However, this change was only significant for AE-MNCs in the treatment group (Δ Tobin's q = 0.12, p = .002). Although all EM-MNCs experienced a decline in market value, the decline was significantly larger for EM-MNCs without ISO 14001 certification (Δ Tobin's q = – 0.31, p = .005) than those with ISO 14001 certification (Δ Tobin's q = – 0.09, p = .282).

[INSERT TABLE 4 HERE]

4.2. Multivariate analysis

Table 5 reports the estimation results of the DID model using the fixed-effect estimation. The positive and significant DID coefficient *ISO 14001*Paris* for the "All MNCs" column (β = 0.09, p = .019, 95% confidence interval [CI] 0.02–0.17) was the overall average treatment effect

of ISO 14001 certification after the Paris Agreement. The 0.09 DID coefficient suggests a +0.21 (+0.12) change in market value following the Paris Agreement for MNCs with (without) ISO 14001 certification. To gauge the economic significance of these results, we calculated the difference in market capitalization before and after the Paris Agreement between the control and treatment groups at the (sample) mean value of physical assets. At US$3.5 billion of physical assets, the 0.09 DID coefficient constitutes a difference of approximately US$315 million in market capitalization after the Paris Agreement between ISO-certified and non-ISO-certified MNCs. This result supports Hypothesis (H1) that following the institutional pressures created by the strongly binding Paris Agreement, MNCs experience more of an increase in market value when having the ISO 14001 certification compared to not having it. To illustrate the pre- and post-effects of the Paris Agreement, we plotted the predicted mean market value of the treatment and control groups during the observation period. As shown in Figure 1, the predicted mean of market value moves in parallel before diverging two years after the Paris Agreement. This lagged effect is likely attributable to the period between adoption and ratification of the Paris Agreement.[8]

[INSERT TABLE 5 HERE]

[INSERT FIGURE 1 HERE]

The estimation results for EM- and AE-MNCs subsamples show that the *ISO 14001*Paris* interaction term was positive and significant for AE-MNCs (β = 0.09, p = .039, 95% CI 0.00–0.18) and EM-MNCs (β = 0.20, p = .031, 95% CI 0.02–0.37). In an unreported table, we compared the effect size using standardized coefficients of β_3 for AE-MNCs (β = .06, p = .003, 95% CI 0.02–0.09) and EM-MNCs (β = .09, p = .023, 95% CI 0.01–0.17). The relatively

[8] The Paris Agreement was adopted on 12th December, 2015 and entered into force on 4th of November, 2016. https://cop23.unfccc.int/most-requested/key-aspects-of-the-paris-agreement

larger size of β_3 for EM-MNCs supports Hypothesis (H2), indicating that investors valued ISO-14001-certified EM-MNCs more than ISO-14001-certified AE-MNCs. The DID coefficient of 0.20 constitutes a +0.21 (-0.02) change in market value for EM-MNCs with (without) ISO 14001 following the Paris Agreement. We plot the predicted mean of the control and treatment groups for EM- and AE-MNC subsamples in Figure 2.

[INSERT FIGURE 2 HERE]

From the last four columns of Table 5, the DID coefficient, β_3, is positive and significant only for EM-MNCs in the *high stringent exposure* group (β = 0.25, p = .047, 95% CI 0.00–0.50), suggesting that investors valued ISO 14001 certification more when the certified EM-MNCs were disproportionately exposed to host countries with the most stringent environmental regulations. In contrast, the DID coefficient was not significant for EM-MNCs in the *low stringent exposure* group (β = 0.12, p = .381, 95% CI -0.15–0.40). A similar pattern was observed for the AE-MNC subsamples. To elaborate on our analysis, we further split AE- and EM-MNCs at the extreme value of stringency exposure (i.e., 25th and 75th percentiles). We conclude that Hypothesis (H3) is supported by the results.

4.3. Robustness checks[9]

Given the lack of consensus on classifying EM- and AE-MNCs, we checked whether our results were robust to different country classifications. First, consistent with prior research (e.g., Marano et al., 2017; Mathews, 2006), we classified MNCs based on the UNCTAD's classification of developed and developing regions. Second, rather than using economic development to distinguish between the two types of MNCs, we adapted Goedhuys and Sleuwaegen's (2016) approach to detect home institutional quality based on high and low values

[9] Tables for robustness checks are available in Section C to G of the online appendix. Please contact the authors should you require more details.

of various indicators. As in Aouadi and Marsat (2018), we used the press freedom index from Reporters Without Borders as a proxy for the quality of infrastructure that supports the production of news and information and reversed the index so that a higher value reflected a better quality of *media infrastructure*. We also took two of the widely used WGI (see, e.g., Cuervo-Cazurra & Genc, 2008; Tashman, Marano, & Kostova, 2019), namely, *control of corruption* and *regulatory quality*, as proxies for home institutional quality. We observed that the DID coefficient was consistently higher for MNCs based in countries with lower-quality media infrastructure, weaker control of corruption, and lower-quality regulations, and identified by UNCTAD as developing economies.

The lower average firm value (i.e., Tobin's q) for ISO 14001-certified MNCs than non-certified MNCs may raise concerns about the comparability of treatment and control groups. Specifically, heavily polluting MNCs were more likely to have ISO 14001 certification (Heras, Arana, & Boiral, 2015); thus, dominated the treatment group. Another potential source of bias was investors' preferences for highly innovative corporations. As such, the observed market value may be influenced by the level of R&D intensity. There is also a possibility that the market value effect confounds the short-term profitability effect (Heras, Molina, & Dick, 2011). To address these concerns, we estimated a matched sample. The matched 1,143 MNCs were in the same industry and based in countries with similar levels of economic development. Summary statistics based on matching characteristics indicate that, prior to the Paris Agreement, the difference in means was not statistically significant for either short-term profitability or R&D intensity. Furthermore, neither MNC type (i.e., AE-MNCs or EM-MNCs) dominated the treatment or control groups. The estimation results based on the matched sample were consistent with those obtained using the overall sample.

To rule out the influence of pollution-intensive manufacturing activities, we estimated the models after controlling for the level of carbon productivity—measured as operating profit per unit emissions (Nishitani & Kokubu, 2012). Based on our sample, MNCs with low carbon productivity generated on average US$132 per unit carbon emissions, and this value was not statistically different between EM- and AE-MNCs (t = -0.76, p = .445). However, MNCs with high carbon productivity generated an average of US$16,922 per unit of carbon emissions, and this value was not statistically different between EM- and AE-MNCs (t = 1.78, p = .075). We observed that the DID effect of having ISO 14001 after the Paris Agreement was greater for EM-MNCs than for AE-MNCs after controlling for carbon productivity. These results further support Hypothesis (H2) that the varying market valuation is likely attributed to the institutional country-of-origin effects rather than the difference in pollution-intensive manufacturing activities between emerging and advanced economies. We also observed that the DID coefficient was statistically significant only for MNCs in the high carbon productivity group, suggesting that investors are more likely to value ISO-certified MNCs when they combine high operational productivity with low pollution/waste.

To ensure that the non-signatory factor did not influence the results of Hypothesis (H2), we estimated all models using a subsample of MNCs excluding Taiwan. As a non-UN member, Taiwan was excluded from the Paris negotiations—yet Taiwanese MNCs face institutional pressures exerted through Taiwan's Greenhouse Gas Reduction and Management Act.[10] Although confounding events triggered by withdrawal from the Paris Agreement[11] more likely occurred beyond the timeframe of this study, we also tested whether our results were influenced

[10] The Act serves as Taiwan's voluntary commitment to the Paris Agreement https://adapt.epa.gov.tw/eng/TCCIP-1-D/TCCIP-1-D-5_en.html

[11] Article 28 states that a signatory country can withdraw from the Paris Agreement three years after it came into force.

by subsequent exogenous political shocks, such as the US withdrawal under the Trump administration—which was announced on the 4th of November, 2019 and took effect on the 4th of November, 2020. The results appeared to be consistent after excluding US MNCs from the sample (β = 0.10, p = .032, 95% CI 0.01–0.19).

As an alternative way to examine the interaction of institutional pressures at home and host levels, we calculated the difference (i.e., distance) between the domestic and foreign policy variables. A positive (negative) distance indicates that the environmental policy at home was less (more) stringent than the average environmental policy in host countries. As we focus on the distance direction (Bruno et al., 2022), we split AE- and EM-MNCs into two groups: positive (i.e., exposure to more environmentally stringent host countries) and negative. We observed that DID coefficients were positive and statistically significant only when the distance direction was positive. This indicates that investors valued ISO 14001 certification more positively when MNCs were exposed to host countries with more stringent environmental regulations than those in the home country.

Finally, as time-invariant variables are omitted in fixed-effect estimation (Cameron & Trivedi, 2005), our specification might undermine the influence of the country fixed effects in a multi-country setting. To reintroduce country fixed effects into the model, we created country-year fixed effects and estimated random effects models. Alternatively, we re-estimated our models after controlling for corruption and GDP per capita as the additional country-level, time-varying variables. The results were consistent with our main analysis.

5. DISCUSSION AND CONCLUSION

Although many certification studies have been conducted, doubts about the benefits of adopting ISO 14001 certification persist because scholars have observed negative market reactions and

lower market valuations of ISO-certified MNCs. These observations could be attributed to the limited attention paid to the institutional influence at the multilateral level and the absence of a comparative institutional analysis. Drawing on the sociology (i.e., neo-institutionalism) and management approach to institutional theory (i.e., institutional view), we theorize that a strongly binding multilateral environmental agreement makes investors value MNCs with ISO 14001 certification more positively and that this market valuation is modified by institutional country-of-origin effects and exposure to host countries with stringent environmental regulations. Using the Paris Agreement as an exogenous global event that raises investor awareness and elevates institutional pressures on corporate climate actions, we conducted a large-scale, multi-layer, comparative institutional analysis. In contrast to prior multilateral environmental agreements, which have been criticized for their failure to exert institutional pressures globally (Pinkse & Kolk, 2012), our results suggest that the bottom-up NDCs of advanced and emerging economies sealed in the Paris Agreement effectively elevate institutional pressures by increasing the global environmental awareness of market actors. As the call for radical changes to address climate change intensifies, it will be interesting to extent our research using the Glasgow Climate Pact[12] or the recent COP27 in Egypt.

In line with the global CSR literature (e.g., Doh et al., 2010; El Ghoul et al., 2017), we find that the effect of having ISO 14001 certification is stronger for EM-MNCs because of the comparative institutional advantage derived from institutional country-of-origin effects contingent on their exposure to host countries with stringent environmental regulations. This finding is critical for the certification literature, in which concerns about using ISO 14001 certification as symbolic conformity are predominant (e.g., Delmas & Burbano, 2011; Heras,

[12] https://unfccc.int/process-and-meetings/the-paris-agreement/the-glasgow-climate-pact-key-outcomes-from-cop26

Boiral, & Díaz, 2020). As emissions data are often poorly documented (Gomez & Rodriguez, 2011; Zobel, 2013), it is challenging to directly assess whether conformity comes with substantive actions or is merely symbolic. We empirically established that exposure to host countries with stringent environmental regulations could serve as a channel through which market discipline can be imposed because MNCs' responses to institutional pressures are likely to be substantive under such exposure. Our finding is consistent with that of Zeng and Eastin (2011) who observed that the increasing exposure to the US, Europe, and Japan markets had modified the notorious environmental practices of Asia Pulp and Paper, a large paper manufacturer whose activities are concentrated in China and Indonesia.

Although our findings may be applicable to environmental product certification, future examinations are required because different market actors and different value-creation mechanisms are involved. As ISO 14001 certification focuses on process improvements, technical novelty may not be visible to market actors. In contrast, market actors can directly assess the technical novelty of the environmental product certification as the certification links to a set of defined green technologies (Houde, 2022; Shuai et al., 2014).

As the influence of host country exposure on corporate sustainability is greater for foreign-direct-investment-based than trade-based economic ties (Marano & Kostova, 2016), there might be a different mechanism of host institutional effects for the market valuation of ISO 14001 certification for exporting firms. Furthermore, ISO 14001 is adopted and audited mainly at an organization's facilities. Thus, it is more relevant when the subject of analysis is involved in international production. We therefore invite future research to examine different types of business organizations because our findings may not be generalizable to large (domestic) exporting firms.

5.1 Theoretical contributions

Our study contributes to the ongoing discussion on differences between AE- and EM-MNCs (Narula, 2006; Ramamurti, 2012), particularly regarding their sustainability strategies. Using a widely recognized strategy instrument, we show that, despite the diverging influence of institutional country-of-origin effects, investors' valuations become homogenous when there is a high degree of exposure to stringent regulations across MNCs' global operations. This suggests that, although AE- and EM-MNCs are different due to systematic home institutional differences, they become increasingly similar once they enter the global arena. One possible implication is that, although a different strategy might be required in the domestic market, AE- and EM-MNCs may resort to similar strategies in the global market.

Our study also contributes to the discussion on internationalization and corporate sustainability. A higher degree of internationalization is often associated with superior corporate sustainability performance (e.g., Attig, Boubakri, El Ghoul, & Guedhami, 2016; Cheung, Kong, Tan, & Wang, 2015). Nevertheless, we find that such a relationship is conditioned on the institutional arrangements across MNCs' global operations. We accordingly echo Pangarkar's (2008) appeal to pay more attention to the breadth of internationalization (i.e., multinational exposure) rather than solely focusing on the depth of internationalization (i.e., the proportion of foreign sales or assets) when assessing MNCs' geographical diversification.

Empirically, our study provides a multilayer institutional analysis, examining the multilateral, home, and host levels in a single study. As Sartor et al. (2019) pointed out, such an empirical design allows a comparative assessment of the financial outcome of ISO 14001 and identifies the source of differences. Hence, we encourage future research on certification to be conducted in a cross-country setting when the focal unit of analysis is MNCs.

Our study also has implications for business cases in the certification and global CSR literature. Despite sufficient research, there is no consensus on the financial benefits of ISO 14001 certification (Boiral et al., 2018; De Jong, Paulraj, & Blome, 2014), which likely stems from the lack of theoretical references (Sartor et al., 2019). Our study reconciles the seemingly puzzling evidence on the financial benefits of ISO 14001 by systematically identifying conditions that modify the influence of ISO 14001 certification on a firm's market value. Our conceptual development can be immediately extended not only to other international management standard certifications but also to other standardized corporate sustainability practices, such as the Global Reporting Initiatives, of which the market valuation also varies (see, e.g., Landau, Rochell, Klein, & Zwergel, 2020).

5.2 Policy and managerial implications

ISO 14001 has continuously gained traction among academics and policymakers following the instrumental role of global standards in delivering sustainable development goals (World Bank, 2016). Despite this public acknowledgment, policymakers should not rely on ISO 14001 certification to achieve these goals without ensuring environmental stringency. As indicated by our empirical analysis, ISO 14001 certification is valuable for MNCs that are exposed to stringent environmental regulations. This result suggests that efforts to encourage CSR practices through formal law, which has been of interest to lawmakers in emerging economies (Kapoor & Dhamija, 2017; Waagstein, 2011), may not be effective unless corporations are monitored by third-party agencies and exposed to strictly enforced regulations across their global operations. As increasing exposure to stringent environmental regulations might require MNCs to expand to distant locations, this strategy may not be viable for EM-MNCs with relatively limited ownership advantages (Awate, Larsen, & Mudambi, 2012; Julian

& Ofori-Dankwa, 2013). A better policy recommendation is to strengthen regulatory enforcement throughout emerging economies.

Contrary to research suggesting that exposure to host countries with low institutional quality benefits EM-MNCs (Cuervo-Cazurra & Genc, 2008), our study reveals that such exposure negatively influences the market evaluation of ISO 14001. Consequently, managers who consider ISO 14001 certification to "show-off their company's EMS" (Boiral, 2007) or to "catch-up with the global trend" (Zeng & Eastin, 2011) should be aware that the global strategy may not be effective when their geographical diversification strategy leads to lower exposure to stringent regulations. Our findings also highlight the consequences of exploiting institutional learning. EM-MNCs benefit from institutional learning (Cuervo-Cazurra et al., 2018) derived from their knowledge of doing business under low-quality institutions when expanding to developing countries (Cuervo-Cazurra & Genc, 2008). However, this institutional learning can also be detrimental. The pollution haven phenomenon is more prevalent among lower-income economies than high-income economies (Hoffmann et al., 2005), suggesting that EM-MNCs might exploit their institutional learning to distribute pollution within emerging markets. Nonetheless, our study shows that the market incentive for ISO 14001 is greater for MNCs in "pollution halos" than those exploiting institutional learning in "pollution havens."

5.3 Limitations

Despite advanced empirical techniques that control various sources of endogeneity, there are limitations that provide scope for future studies. First, we assumed that countries with stringent environmental regulations always have high-quality institutional characteristics. While we consistently observe that countries with the most stringent environmental regulations also have strong control of corruption, high regulatory quality, and a robust media infrastructure,

future studies may consider other institutional factors to validate our findings. We nonetheless maintain the decision not to combine multiple institutional factors as a compound index to minimize the issue of multi-collinearity (Beugelsdijk, Ambos, & Nell, 2018) and to focus on the most relevant institutional aspects (Xu, Hitt, Brock, Pisano, & Huang, 2021). Second, we did not consider the economic importance of foreign subsidiaries primarily due to data availability. For example, foreign sales data of US MNCs in the database were aggregated as "international sales." We encourage future studies to assess the importance of different foreign subsidiaries when data are available. Finally, we observed the influence of ISO 14001 certification on market value over a period of seven years. Albeit a relatively short period, this time-frame is sufficient to capture the influence of ISO 14001 certification on market value because abnormal performance was already captured within 18 months of the first adoption of the standard (Curkovic & Sroufe, 2011).

REFERENCES

Aguilera, R. V., & Grøgaard, B. (2019). The dubious role of institutions in international business: A road forward. *Journal of International Business Studies, 50*(1), 20–35.
Aouadi, A., & Marsat, S. (2018). Do ESG controversies matter for firm value? Evidence from international data. *Journal of Business Ethics, 151*(4), 1027–1047.
Aragon, J. A., Marcus, A. A., & Vogel, D. (2020). The effects of mandatory and voluntary regulatory pressures on firms' environmental strategies: A review and recommendations for future research. *Academy of Management Annals, 14*(1), 339–365.
Attig, N., Boubakri, N., El Ghoul, S., & Guedhami, O. (2016). Firm internationalization and corporate social responsibility. *Journal of Business Ethics, 134*(2), 171–197.
Awate, S., Larsen, M. M., & Mudambi, R. (2012). EMNE catch-up strategies in the wind turbine industry: Is there a trade-off between output and innovation capabilities? *Global Strategy Journal, 2*(3), 205–223.
Baek, K. (2017). The diffusion of voluntary environmental programs: The case of ISO 14001 in Korea, 1996–2011. *Journal of Business Ethics, 145*(2), 325–336.
Bansal, P. (2002). The corporate challenges of sustainable development. *Academy of Management Perspectives, 16*(2), 122–131.
Bergh, D. D., Connelly, B. L., Ketchen Jr, D. J., & Shannon, L. M. (2014). Signalling theory and equilibrium in strategic management research: An assessment and a research agenda. *Journal of Management Studies, 51*(8), 1334–1360.
Berry, H., Kaul, A., & Lee, N. (2021). Follow the smoke: The pollution haven effect on global sourcing. *Strategic Management Journal, 42*(13), 2420–2450.
Beugelsdijk, S., Ambos, B., & Nell, P. C. (2018). Conceptualizing and measuring distance in international business research: Recurring questions and best practice guidelines. *Journal of International Business Studies, 49*(9), 1113–1137.
Bilkey, W. J., & Nes, E. (1982). Country-of-origin effects on product evaluations. *Journal of International Business Studies, 13*(1), 89–100.
Boiral, O. (2007). Corporate greening through ISO 14001: a rational myth? *Organization Science, 18*(1), 127–146.
Boiral, O., Guillaumie, L., Heras, I., & Tayo Tene, C. V. (2018). Adoption and outcomes of ISO 14001: A systematic review. *International Journal of Management Reviews, 20*(2), 411–432.
Brunel, C., & Levinson, A. (2016). Measuring the stringency of environmental regulations. *Review of Environmental Economics and Policy, 10*(1), 47–67.
Bruno, R. L., Crescenzi, R., Estrin, S., & Petralia, S. (2022). Multinationals, innovation and institutional context: IPR protection and distance effects. *Journal of International Business Studies*. *53*(9), 1945–1970.
Bu, M., & Wagner, M. (2016). Racing to the bottom and racing to the top: The crucial role of firm characteristics in foreign direct investment choices. *Journal of International Business Studies, 47*(9), 1032–1057.
Buchanan, B., Cao, C. X., & Chen, C. (2018). Corporate social responsibility, firm value, and influential institutional ownership. *Journal of Corporate Finance, 52*, 73–95.
Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: Methods and applications*. New York: Cambridge University Press.

Camilleri, M. A. (2022). The rationale for ISO 14001 certification: A systematic review and a cost–benefit analysis. *Corporate Social Responsibility and Environmental Management*. *29*(4), 1067–1083.
Cañón, J., & Garcés, C. (2009). ISO 14001 environmental certification: a sign valued by the market? *Environmental and Resource Economics, 44*(2), 245–262.
Cheung, Y.-L., Kong, D., Tan, W., & Wang, W. (2015). Being good when being international in an emerging economy: The case of China. *Journal of Business Ethics, 130*(4), 805–817.
Christmann, P., & Taylor, G. (2006). Firm self-regulation through international certifiable standards: Determinants of symbolic versus substantive implementation. *Journal of International Business Studies, 37*(6), 863–878.
Cuervo-Cazurra, A., & Genc, M. (2008). Transforming disadvantages into advantages: developing-country MNEs in the least developed countries. *Journal of International Business Studies, 39*(6), 957–979.
Cuervo-Cazurra, A., Luo, Y., Ramamurti, R., & Ang, S. H. (2018). The Impact of the home country on internationalization. *Journal of World Business, 53*(5), 593–604.
Cuervo-Cazurra, A., Mudambi, R., & Pedersen, T. (2019). Clarifying the relationships between institutions and global strategy. *Global Strategy Journal, 9*, 151–175.
Curkovic, S., & Sroufe, R. (2011). Using ISO 14001 to promote a sustainable supply chain strategy. *Business Strategy and the Environment, 20*(2), 71–93.
Darnall, N. (2006). Why firms mandate ISO 14001 certification. *Business & Society, 45*(3), 354–381.
De Jong, P., Paulraj, A., & Blome, C. (2014). The financial impact of ISO 14001 certification: top-line, bottom-line, or both? *Journal of Business Ethics, 119*(1), 131–149.
Deephouse, D. L., Newburry, W., & Soleimani, A. (2016). The effects of institutional development and national culture on cross-national differences in corporate reputation. *Journal of World Business, 51*(3), 463–473.
Delmas, M. A. (2002). The diffusion of environmental management standards in Europe and in the United States: An institutional perspective. *Policy Sciences, 35*(1), 91–119.
Delmas, M. A., & Burbano, V. C. (2011). The drivers of greenwashing. *California Management Review, 54*(1), 64–87.
DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review,* 147–160.
Dogui, K., Boiral, O., & Heras, I. (2014). Audit fees and auditor independence: The case of ISO 14001 certification. *International Journal of Auditing, 18*(1), 14–26.
Doh, J. P., Howton, S. D., Howton, S. W., & Siegel, D. S. (2010). Does the market respond to an endorsement of social responsibility? The role of institutions, information, and legitimacy. *Journal of Management, 36*(6), 1461–1485.
Dowell, G., Hart, S., & Yeung, B. (2000). Do corporate global environmental standards create or destroy market value? *Management Science, 46*(8), 1059–1074.
Dunning, J. H. (2009). Location and the multinational enterprise: John Dunning's thoughts on receiving the Journal of International Business Studies 2008 Decade Award. *Journal of International Business Studies, 40*(1), 20–34.
Durand, R., Hawn, O., & Ioannou, I. (2017). Willing and able: A general model of organizational responses to normative pressures. *Academy of Management Review, 44*(2), 299–320.

Durand, R., Paugam, L., & Stolowy, H. (2019). Do investors actually value sustainability indices? Replication, development, and new evidence on CSR visibility. *Strategic Management Journal*, *40*(9), 1471–1490.
El Ghoul, S., Guedhami, O., & Kim, Y. (2017). Country-level institutions, firm value, and the role of corporate social responsibility initiatives. *Journal of International Business Studies, 48*(3), 360–385.
Erauskin, A., Zubeltzu, E., Heras, I., & Boiral, O. (2020). ISO 14001, EMAS and environmental performance: A meta-analysis. *Business Strategy and the Environment, 29*(3), 1145–1159.
Goedhuys, M., & Sleuwaegen, L. (2016). International standards certification, institutional voids and exports from developing country firms. *International Business Review*, *25*(6), 1344–1355.
Gomez, A., & Rodriguez, M. A. (2011). The effect of ISO 14001 certification on toxic emissions: an analysis of industrial facilities in the north of Spain. *Journal of Cleaner Production*, *19*(9), 1091–1095.
Gonenc, H., & Poleska, A. (2022). Multinationals, research and development, and carbon emissions: international evidence. *Climate Policy*, 1–16.
Grant, A. M., & Pollock, T. G. (2011). Publishing in AMJ—Part 3: Setting the hook. Academy of Management Journal, 54(5), 873-879.
Hase, V., Mahl, D., Schäfer, M. S., & Keller, T. R. (2021). Climate change in news media across the globe: An automated analysis of issue attention and themes in climate change coverage in 10 countries (2006–2018). *Global Environmental Change*, *70*, 102353.
Heras, I., Arana, G., & Boiral, O. (2015). Exploring the dissemination of environmental certifications in high and low polluting industries. *Journal of Cleaner Production, 89*, 50–58.
Heras, I., & Boiral, O. (2013). ISO 9001 and ISO 14001: Towards a research agenda on management system standards. *International Journal of Management Reviews, 15*(1), 47–65.
Heras, I., Boiral, O., & Díaz, A. (2020). Environmental management certification and environmental performance: Greening or greenwashing? *Business Strategy and the Environment, 29*(6), 2829–2841.
Heras, I., Landín, G. A., & Molina, J. F. (2011). Do drivers matter for the benefits of ISO 14001? *International Journal of Operations & Production Management, 31*(2), 192–216.
Heras, I., Molina, J. F., & Dick, G. P. M. (2011). ISO 14001 certification and financial performance: selection-effect versus treatment-effect. *Journal of Cleaner Production, 19*(1),
Hillman, A. J., & Keim, G. D. (2001). Shareholder value, stakeholder management, and social issues: what's the bottom line? *Strategic Management Journal*, *22*(2), 125–139.
Hoffmann, R., Lee, C. G., Ramasamy, B., & Yeung, M. (2005). FDI and pollution: a granger causality test using panel data. *Journal of International Development*, *17*(3), 311–317.
Horobet, A., Belascu, L., Curea, Ș. C., & Pentescu, A. (2019). Ownership concentration and performance recovery patterns in the European Union. *Sustainability*, *11*(4), 953.
Houde, S. (2022). Bunching with the stars: How firms respond to environmental certification. *Management Science*. *68*(8), 5569–5590.
Hsiao, C. (2014). *Analysis of Panel Data (3rd ed.)* Cambridge: Cambridge University Press.
Ioulianou, S., Trigeorgis, L., & Driouchi, T. (2017). Multinationality and firm value: The role of real options awareness. *Journal of Corporate Finance, 46*, 77–96.
ISO. (2015). The newly revised ISO 14001 is here. Retrieved from https://www.iso.org/
ISO Focus. (2015). IBM leverages ISO 14001 for sustainable business. Retrieved from https://www.iso.org/

ISO Focus+. (2012). Samsung CEO: Samsung gets great value and benefit from ISO standards. https://www.iso.org/
Jiang, R. J., & Bansal, P. (2003). Seeing the need for ISO 14001. *Journal of Management Studies, 40*(4), 1047–1067.
Jiao, Y. (2010). Stakeholder welfare and firm value. *Journal of Banking & Finance, 34*(10), 2549–2561.
Julian, S. D., & Ofori-Dankwa, J. C. (2013). Financial resource availability and corporate social responsibility expenditures in a sub-Saharan economy: The institutional difference hypothesis. *Strategic Management Journal, 34*(11), 1314–1330.
Kapoor, G. K., & Dhamija, S. (2017). Mandatory CSR spending—Indian experience. *Emerging Economy Studies, 3*(1), 98–112.
Keohane, R. O., & Oppenheimer, M. (2016). Paris: Beyond the climate dead end through pledge and review? *Politics and Governance, 4*(3), 142–151.
Kim, I., Pantzalis, C., & Zhang, Z. (2021). Multinationality and the value of green innovation. *Journal of Corporate Finance, 69*, 101996.
King, A. A., Lenox, M. J., & Terlaak, A. (2005). The strategic use of decentralized institutions: Exploring certification with the ISO 14001 management standard. *Academy of Management Journal, 48*(6), 1091–1106.
Knight, J. G., Holdsworth, D. K., & Mather, D. W. (2007). Country-of-origin and choice of food imports: an in-depth study of European distribution channel gatekeepers. *Journal of International Business Studies, 38*(1), 107–125.
Kölbel, J. F., & Busch, T. (2019). Signaling legitimacy across institutional contexts—The intermediary role of corporate social responsibility rating agencies. *Global Strategy Journal*. *11*(2), 304–328.
Kolk, A., & Pinkse, J. (2008). A perspective on multinational enterprises and climate change: Learning from "an inconvenient truth"? *Journal of International Business Studies, 39*(8), 1359–1378.
Konar, S., & Cohen, M. A. (2001). Does the market value environmental performance? *Review of Economics and Statistics, 83*(2), 281–289.
Kostova, T., Roth, K., & Dacin, M. T. (2008). Institutional theory in the study of multinational corporations: A critique and new directions. *Academy of Management Review, 33*(4), 994–1006.
Kruse, T., Mohnen, M., & Sato, M. (2020). Are financial markets aligned with climate action? New evidence from the Paris Agreement. *Grantham Research Institute on Climate Change and the Environment Working Paper*(333). Retrieved from https://www.lse.ac.uk/
Landau, A., Rochell, J., Klein, C., & Zwergel, B. (2020). Integrated reporting of environmental, social, and governance and financial data: Does the market value integrated reports? *Business Strategy and the Environment, 29*(4), 1750–1763.
Maksimov, V., Wang, S. L., & Yan, S. (2019). Global connectedness and dynamic green capabilities in MNEs. *Journal of International Business Studies*, 1–18.
Marano, V., & Kostova, T. (2016). Unpacking the institutional complexity in adoption of CSR practices in multinational enterprises. *Journal of Management Studies, 53*(1), 28–54.
Marano, V., Tashman, P., & Kostova, T. (2017). Escaping the iron cage: Liabilities of origin and CSR reporting of emerging market multinational enterprises. *Journal of International Business Studies, 48*(3), 386–408.
Marquis, C., Toffel, M. W., & Zhou, Y. (2016). Scrutiny, norms, and selective disclosure: A global study of greenwashing. *Organization Science, 27*(2), 483–504.

Martin, X. (2014). Institutional advantage. *Global Strategy Journal, 4*(1), 55–69.
Mathews, J. A. (2006). Dragon multinationals: New players in 21st century globalization. *Asia Pacific Journal of Management, 23*(1), 5–27.
McWilliams, A., & Siegel, D. (2000). Corporate social responsibility and financial performance: correlation or misspecification? *Strategic Management Journal, 21*(5), 603–609.
Miska, C., Witt, M. A., & Stahl, G. K. (2016). Drivers of global CSR integration and local CSR responsiveness: Evidence from Chinese MNEs. *Business Ethics Quarterly, 26*(3), 317–345.
Monasterolo, I., & De Angelis, L. (2020). Blind to carbon risk? An analysis of stock market reaction to the Paris Agreement. *Ecological Economics, 170*, 106571.
Morrow, D., & Rondinelli, D. (2002). Adopting corporate environmental management systems: Motivations and results of ISO 14001 and EMAS certification. *European Management Journal, 20*(2), 159–171.
Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics, 5*(2), 147–175.
Narula, R. (2006). Globalization, new ecologies, new zoologies, and the purported death of the eclectic paradigm. *Asia Pacific Journal of Management, 23*(2), 143–151.
Nishitani, K., & Kokubu, K. (2012). Why does the reduction of greenhouse gas emissions enhance firm value? The case of Japanese manufacturing firms. *Business Strategy and the Environment, 21*(8), 517–529.
OECD. (2016, 27 January 2022). How stringent are environmental policies? Retrieved from https://www.oecd.org/
Pangarkar, N. (2008). Internationalization and performance of small-and medium-sized enterprises. *Journal of World Business, 43*(4), 475–485.
Pant, A., & Ramachandran, J. (2012). Legitimacy beyond borders: Indian software services firms in the United States, 1984 to 2004. *Global Strategy Journal, 2*(3), 224–243.
Paulraj, A., & De Jong, P. (2011). The effect of ISO 14001 certification announcements on stock performance. *International Journal of Operations & Production Management*. *31*(7), 765–788.
Peng, M. W. (2002). Towards an institution-based view of business strategy. *Asia Pacific Journal of Management, 19*(2), 251–267.
Peng, M. W. (2003). Institutional transitions and strategic choices. *Academy of Management Review, 28*(2), 275–296.
Pinkse, J., & Kolk, A. (2012). Multinational enterprises and climate change: Exploring institutional failures and embeddedness. *Journal of International Business Studies, 43*(3), 332–341.
Porter, M. E., & Van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives, 9*(4), 97–118.
Posco International. (2019). *Posco international corporation sustainability report 2019*. Retrieved from https://ungc-production.s3.us-west-2.amazonaws.com/
Qi, G. Y., Zeng, S. X., Tam, C. M., Yin, H. T., Wu, J. F., & Dai, Z. H. (2011). Diffusion of ISO 14001 environmental management systems in China: rethinking on stakeholders' roles. *Journal of Cleaner Production, 19*(11), 1250–1256.
Ramamurti, R. (2012). What is really different about emerging market multinationals? *Global Strategy Journal, 2*(1), 41–47.
Rathert, N. (2016). Strategies of legitimation: MNEs and the adoption of CSR in response to host-country institutions. *Journal of International Business Studies, 47*(7), 858–879.

Riaz, H., & Saeed, A. (2020). Impact of environmental policy on firm's market performance: The case of ISO 14001. *Corporate Social Responsibility and Environmental Management, 27*(2), 681–693.
Robinson, M., Kleffner, A., & Bertels, S. (2011). Signaling sustainability leadership: Empirical evidence of the value of DJSI membership. *Journal of Business Ethics, 101*(3), 493–505.
Rodriguez, P., Siegel, D. S., Hillman, A., & Eden, L. (2006). Three Lenses on the Multinational Enterprise: Politics, corruption, and corporate social responsibility. *Journal of International Business Studies, 37*(6), 733–746.
Rugman, A. M., & Verbeke, A. (1998). Corporate strategy and international environmental policy. *Journal of International Business Studies, 29*(4), 819–833.
Sartor, M., Orzes, G., Touboulic, A., Culot, G., & Nassimbeni, G. (2019). ISO 14001 standard: Literature review and theory-based research agenda. *Quality Management Journal, 26*(1), 32–64.
Schmidt, A., Ivanova, A., & Schäfer, M. S. (2013). Media attention for climate change around the world: A comparative analysis of newspaper coverage in 27 countries. *Global Environmental Change, 23*(5), 1233–1248.
Schüssler, E., Rüling, C.-C., & Wittneben, B. B. F. (2013). On melting summits: The limitations of field-configuring events as catalysts of change in transnational climate policy. *Academy of Management Journal, 57*(1), 140–171.
Scott, W. R. (2001). *Institutions and organizations* (2nd ed.). London: Sage.
Seltzer, L., Starks, L. T., & Zhu, Q. (2020). Climate regulatory risks and corporate bonds. *Nanyang Business School Research Paper*(20–05). https://papers.ssrn.com/
Selznick, P. (1996). Institutionalism "old" and "new". *Administrative Science Quarterly, 41*(2), 270–277.
Short, J. L., & Toffel, M. W. (2010). Making self-regulation more than merely symbolic: The critical role of the legal environment. *Administrative Science Quarterly, 55*(3), 361–396.
Shuai, C.-M., Ding, L.-P., Zhang, Y.-K., Guo, Q., & Shuai, J. (2014). How consumers are willing to pay for low-carbon products?–Results from a carbon-labeling scenario experiment in China. *Journal of Cleaner Production, 83*, 366–373.
Sinkin, C., Wright, C. J., & Burnett, R. D. (2008). Eco-efficiency and firm value. *Journal of Accounting and Public Policy, 27*(2), 167–176.
Stevens, C. E., Makarius, E. E., & Mukherjee, D. (2015). It takes two to tango: Signaling behavioral intent in service multinationals' foreign entry strategies. *Journal of International Management, 21*(3), 235–248.
Su, W., Peng, M. W., Tan, W., & Cheung, Y.-L. (2016). The signaling effect of corporate social responsibility in emerging economies. *Journal of Business Ethics, 134*(3), 479–491.
Sun, P., Doh, J. P., Rajwani, T., & Siegel, D. (2021). Navigating cross-border institutional complexity: A review and assessment of multinational nonmarket strategy research. *Journal of International Business Studies*, 1–36.
Tashman, P., Marano, V., & Kostova, T. (2019). Walking the walk or talking the talk? Corporate social responsibility decoupling in emerging market multinationals. *Journal of International Business Studies, 50*(2), 153–171.
Testa, F., Rizzi, F., Daddi, T., Gusmerotti, N. M., Frey, M., & Iraldo, F. (2014). EMAS and ISO 14001: The differences in effectively improving environmental performance. *Journal of Cleaner Production, 68*, 165–173.
Tong, T. W., & Reuer, J. J. (2007). Real options in multinational corporations: Organizational challenges and risk implications. *Journal of International Business Studies, 38*(2), 215–230.

Tukey, J. W. (1977). *Exploratory data analysis*. Reading: Addison-Wesley.
United Nations. (1998). Kyoto Protocol to the United Nations Framework Convention on Climate Change. Retrieved from https://unfccc.int/
United Nations. (2016). The role of international standards in the 2030 development agenda. Retrieved from https://www.unido.org/
United Nations. (2021). Why standards matter for sustainable development. Retrieved from https://standards4sdgs.unece.org/
Van der Waal, J. W. H., Thijssens, T., & Maas, K. (2021). The innovative contribution of multinational enterprises to the Sustainable Development Goals. *Journal of Cleaner Production, 285*, 125319.
Van Zanten, J. A., & Van Tulder, R. (2018). Multinational enterprises and the Sustainable Development Goals: An institutional approach to corporate engagement. *Journal of International Business Policy, 1*(3-4), 208–233.
Waagstein, P. R. (2011). The mandatory corporate social responsibility in Indonesia: Problems and implications. *Journal of Business Ethics, 98*(3), 455–466.
Wang, S., Li, J., & Zhao, D. (2018). Institutional pressures and environmental management practices: The moderating effects of environmental commitment and resource availability. *Business Strategy and the Environment, 27*(1), 52–69.
Wiengarten, F., Pagell, M., & Fynes, B. (2013). ISO 14000 certification and investments in environmental supply chain management practices: Identifying differences in motivation and adoption levels between Western European and North American companies. *Journal of Cleaner Production, 56*, 18–28.
Williamson, P. J., Symeou, P. C., & Zyglidopoulos, S. (2022). International diversification, legitimacy, and corporate social performance of extractive industry multinationals. *Global Strategy Journal, 12*(2), 359–393.
Wilson, R. C. (2001). Ford spreads the word about its EMS success. *Pollution Engineering, 33*(6), 32–32.
World Bank. (2016). Keynote Speech by Cecile Fruman at ISO 50th DEVCO Meeting: Achieving the SDGs and the role of Standards, A World Bank Group Perspective. Retrieved from https://www.worldbank.org/
Xu, K., Hitt, M. A., Brock, D., Pisano, V., & Huang, L. S. R. (2021). Country institutional environments and international strategy: A review and analysis of the research. *Journal of International Management, 27*(1), 100811.
Zeng, K. A., & Eastin, J. (2011). Asia Pulp & Paper: Local standards, world markets, and environmental protection. In *Greening China: The benefits of trade and foreign direct investment* (pp. 143–169): University of Michigan Press.
Zhang, J., Jiang, J., & Noorderhaven, N. (2019). Is certification an effective legitimacy strategy for foreign firms in emerging markets? *International Business Review, 28*(2), 252–267.
Zobel, T. (2013). ISO 14001 certification in manufacturing firms: a tool for those in need or an indication of greenness? *Journal of Cleaner Production, 43*, 37–44.
Zuckerman, E. W. (1999). The categorical imperative: Securities analysts and the illegitimacy discount. *American Journal of Sociology, 104*(5), 1398–1438.
Zyglidopoulos, S., Williamson, P., & Symeou, P. (2016). The corporate social performance of developing country multinationals. *Business Ethics Quarterly, 26*(3), 379–406.

TABLES

TABLE 1 Description and measurement of variables

Variable	Measure	Measurement	Source
Tobin's q $\frac{Market\ value\ (equity\ +\ preferred\ stock + debt)}{Replacement\ value\ (plant\ +\ equipment\ +\ inventory\ +\ short\ term\ assets)}$	Market capitalization	Common stock & preferred stock at year end *t* closing price	EIKON
	Long term debt	Long term debt at year *t*	
	Short term debt	Short-term bank borrowings andnotes payable at year *t*	
	Tangible assets	Sum of the book value of property, plant and equipment, and current assets at year *t*	
Stringent exposure	Presence in host countries with the most stringent environmental regulations	Proportion of subsidiaries in countries with the most stringent environmental regulations to total foreign subsidiaries	Orbis Historical 2017 and OECD
Short-term profit	Return on assets	Operating income at year *t-1* divided by total assets at year *t-1*	EIKON
Size	Total assets	Log of total assets at year *t-1* (measured each year)	
Leverage	Leverage	Total debt at year *t-1* divided by total equity at year *t-1*	
Sales growth	Sales growth	Revenue at year *t-1*/revenue at year *t-2*	
R&D	R&D expenses	R&D expenses at year *t-1* divided by total assets at year *t-1*	
Analyst	Social rating inclusion or exclusion	A dummy that takes a value ofone if ESG score is observed at year *t-1*, and zero otherwise	
Geo-diversification = Foreign subsidiaries * log per capita GDP range	Foreign subsidiaries	Proportion of subsidiaries outside an MNC's home country to total subsidiaries	Orbis Historical 2017
	Per capita GDP range	Log of the difference between maximum and minimum GDP per capita of host countries in which the MNC presents	IMF
Domestic policy	Environmental policy at the MNCs' home country	Environmental stringency index at MNCs' headquarter	WEF Executive opinion survey
Foreign policy	Environmental policy at the MNCs' host countries	Average environmental stringency index at MNCs' foreign subsidiaries' location	

TABLE 2 Descriptive statistics and correlation matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	VIF
	P25	1.02	0	0.24	0.03	20.94	0.14	-0.05	0.00	1.00	0.25	2.15	5.10	4.69	
	P50	1.82	0	0.44	0.07	22.00	0.49	0.03	0.00	1.00	0.50	5.35	5.40	5.01	
	P75	3.49	1	0.65	0.11	23.06	0.99	0.13	0.00	1.00	0.74	8.15	5.80	5.29	
	Mean	2.68	0.48	0.45	0.07	21.98	0.74	0.05	0.01	0.87	0.50	5.21	5.30	4.96	
	S.D.	2.31	0.50	0.30	0.08	1.67	0.82	0.17	0.03	0.33	0.29	3.48	0.63	0.49	
1	Market value														NA
2	ISO 14001	**-0.25**													1.24
3	Stringent exposure	**0.16**	**-0.16**												2.00
4	Short-term profit	**0.25**	0.03	-0.05											1.08
5	Size	**-0.22**	**0.34**	**-0.12**	0.08										1.49
6	Leverage	-0.06	0.06	-0.02	**-0.11**	**0.29**									1.15
7	Sales growth	**0.21**	**-0.14**	0.09	**0.10**	**-0.11**	-0.04								1.15
8	R&D	**0.26**	-0.04	**0.12**	**-0.13**	**-0.15**	**-0.14**	**0.13**							1.18
9	Analyst	**-0.10**	**0.22**	**-0.11**	0.04	**0.36**	0.07	**-0.12**	-0.05						1.38
10	Foreign subsidiaries	0.06	**0.17**	-0.06	-0.03	-0.00	-0.07	0.03	**0.20**	0.03					6.25
11	Geo-diversification	0.04	**0.23**	**-0.1**	0.03	**0.12**	-0.05	0.00	**0.16**	0.06	**0.91**				6.41
12	Domestic policy	**0.10**	-0.09	**0.25**	-0.04	-0.07	-0.07	-0.00	**0.15**	0.00	0.03	0.06			1.15
13	Foreign policy	**0.17**	**-0.15**	**0.69**	-0.03	**-0.12**	-0.00	**0.10**	**0.13**	**-0.10**	-0.06	-0.09	**0.26**		2.00

Notes. For p values < .05 and ρ > |.10|, statistics are displayed in bold. P25, P50, P75 denote the 25th, 50th (median), and 75th percentile; N = 22,242.

TABLE 3 Summary statistics for AE- and EM-MNCs

		All MNCs (n = 3,193; N = 22,242)			EM-MNCs (n =465; N = 3,249)			AE-MNCs (n = 2,728; N = 18,993)		
	Variable	P50	Mean	S.D.	P50	Mean	S.D.	P50	Mean	S.D.
1	Market value	1.82	2.68	2.31	1.41	2.12	1.96	1.90	2.77	2.35
2	ISO14001	0	0.48	0.50	1	0.59	0.49	0	0.47	0.50
3	Stringent exposure	0.44	0.45	0.30	0.18	0.25	0.28	0.46	0.48	0.29
	Financial controls									
4	Short-term profit	0.07	0.07	0.08	0.08	0.08	0.07	0.07	0.06	0.08
5	Size	22.00	21.98	1.67	22.25	22.21	1.38	21.96	21.94	1.71
6	Leverage	0.49	0.74	0.82	0.60	0.82	0.80	0.47	0.72	0.82
7	Sales growth	0.03	0.05	0.17	0.03	0.05	0.18	0.04	0.05	0.17
8	R&D	0	0.01	0.03	0.00	0.00	0.01	0.00	0.01	0.03
	Nonfinancial controls									
9	Analyst	1	0.87	0.33	1	0.92	0.27	1	0.86	0.34
10	Foreign subsidiaries	0.50	0.50	0.29	0.38	0.46	0.32	0.51	0.51	0.28
11	Geo-diversification	5.35	5.21	3.48	3.49	4.56	3.70	5.55	5.32	3.43
12	Domestic policy	5.40	5.30	0.63	4.10	4.30	0.56	5.40	5.47	0.46
13	Foreign policy	5.01	4.96	0.49	4.62	4.64	0.59	5.04	5.02	0.44

Notes. *n* is the number of MNCs, and *N* is the number of observations.

TABLE 4 Two-sample t-tests comparing the difference in market value for the overall sample of MNCs (Panel A) and the subsamples of AE- and EM-MNCs (Panel) B

Panel A	Control (n =1,651)		Treatment (n = 1,542)		*t-stat* (Control – Treatment)		
Market value	Mean	S.D.	Mean	S.D.	Mean diff.	*t-stat*	*p-value*
Pre-Paris	3.23	2.53	2.05	1.76	1.18	30.70***	<.001
Post-Paris	3.24	2.61	2.13	1.90	1.01	23.79***	<.001
Mean diff. (Post – Pre Paris)	0.00		0.08				
t-stat	0.10		2.31				
p value	.921		.021				

Panel B	AE-MNCs (n = 2,728)				EM-MNCs (n = 465)			
	Control (n = 1,462)		Treatment (n = 1,266)		Control (n = 189)		Treatment (n = 276)	
Market value	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Pre-Paris	3.33	2.57	2.05	1.73	2.45	2.11	2.02	1.87
Post-Paris	3.38	2.65	2.17	1.90	2.14	1.95	1.92	1.88
Mean diff. (Post – Pre Paris)	0.05		0.12		-0.31		-0.09	
t-stat	0.86		3.08***		-2.82***		-1.07	
p-value	.388		.002		.005		.282	

Notes. MNCs with ISO 14001 certification in the Treatment group, MNCs without ISO 14001 certification in the Control group. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 5 DID analysis of the market valuation of ISO 14001 certification

DV: Market value	Hypothesis 1	Hypothesis 2		Hypothesis 3			
	All MNCs	EM-MNCs	AE-MNCs	EM-MNCs		AE-MNCs	
				High stringent exposure	Low stringent exposure	High stringent exposure	Low stringent exposure
Paris	0.12***	-0.02	0.14***	-0.04	0.02	0.08*	0.18***
	(0.03)	(0.07)	(0.03)	(0.11)	(0.10)	(0.04)	(0.04)
ISO 14001*Paris	***0.09****	***0.20****	***0.09****	***0.25****	***0.12***	***0.13****	***0.07***
	(0.04)	***(0.09)***	***(0.04)***	***(0.13)***	***(0.14)***	***(0.06)***	***(0.07)***
Financial performance control variables							
Short-term profit	2.06***	2.12***	1.98***	2.49***	1.71***	1.98***	1.95***
	(0.26)	(0.44)	(0.28)	(0.66)	(0.57)	(0.39)	(0.40)
Firm size	-0.28***	-0.29**	-0.28***	-0.42***	-0.21	-0.32***	-0.25***
	(0.06)	(0.13)	(0.07)	(0.12)	(0.18)	(0.10)	(0.09)
Sales growth	0.42***	0.21*	0.46***	0.15	0.28	0.42***	0.49***
	(0.07)	(0.12)	(0.08)	(0.13)	(0.18)	(0.12)	(0.12)
R&D	3.30***	-4.81	3.27***	-9.52**	0.36	4.59***	2.18
	(1.00)	(4.98)	(1.02)	(4.67)	(7.73)	(1.56)	(1.34)
Leverage	0.06**	-0.09*	0.08***	-0.01	-0.13*	0.10**	0.05
	(0.03)	(0.05)	(0.03)	(0.07)	(0.07)	(0.04)	(0.04)
Nonfinancial-performance control variables							
Analyst	0.23***	0.24	0.21***	0.43***	0.07	0.20**	0.21***
	(0.05)	(0.15)	(0.05)	(0.16)	(0.24)	(0.08)	(0.07)
Geo-diversification	0.37	-0.49	0.42	-0.75	-0.46	-0.03	0.77*
	(0.31)	(0.50)	(0.33)	(1.05)	(0.52)	(0.50)	(0.43)
Domestic policy	0.11***	0.12	0.11**	0.22**	0.05	0.16**	0.08
	(0.04)	(0.08)	(0.05)	(0.11)	(0.11)	(0.06)	(0.08)
Foreign policy	-0.12	-0.06	-0.10	-0.02	-0.03	-0.13	-0.06
	(0.08)	(0.14)	(0.09)	(0.24)	(0.17)	(0.13)	(0.12)
Constant	6.55***	10.15***	6.16***	13.65**	8.76**	8.96**	4.33
	(2.11)	(3.58)	(2.34)	(5.90)	(4.27)	(3.69)	(2.95)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,242	3,249	18,993	1,622	1,627	9,486	9,507
Adjusted R-squared	.84	.85	.83	.88	.83	.85	.81
Number of MNCs	3,193	465	2,728	232	233	1,360	1,368

Notes. Robust standard errors clustered at the firm level are presented in parenthesis. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Actual *p-values* are reported in the Results section.

FIGURES

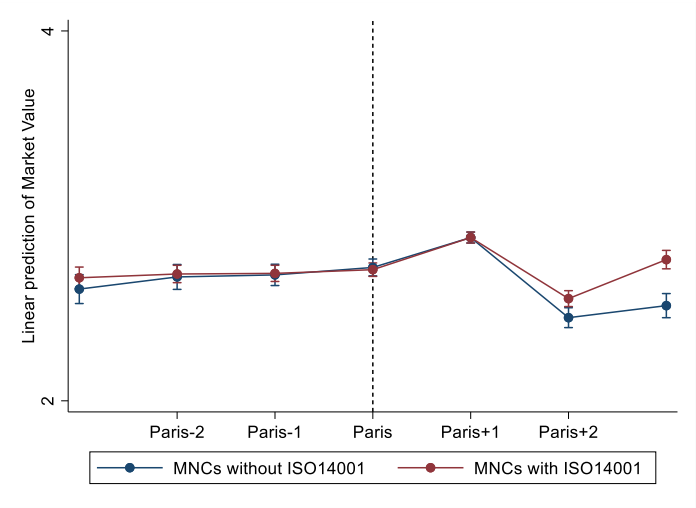

FIGURE 1 Plot of the predicted mean market value of MNCs with ISO 14001 certification (treatment group) and without ISO 14001 certification (control group) pre- and post-Paris Agreement

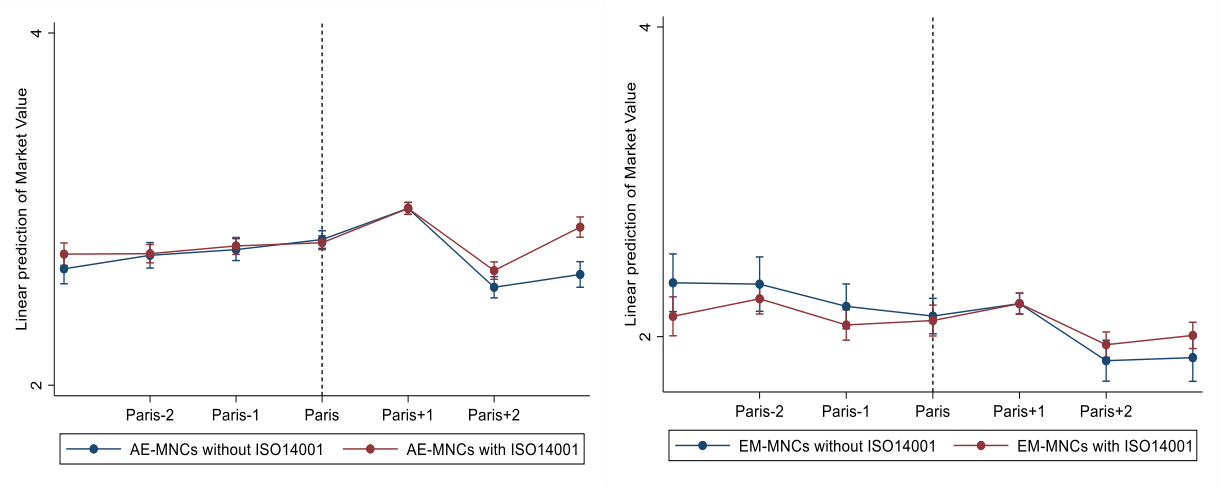

FIGURE 2 Plot of the predicted mean market value of control and treatment groups pre- and post-Paris Agreement based on subsamples of AE-MNCs (left panel) and EM-MNCs (right panel)

Supplementary data and analysis (online appendix)

A. Sample summary
B. Dynamic DID: testing the pretreatment parallel assumption
C. Robustness check: alternative measures of home institutional quality
D. Robustness check: matched sample
E. Robustness check: polluting intensive activities (carbon productivity)
F. Robustness check: political effect
G. Robustness check: country-year fixed effects and additional country time-variant variables

A. Sample summary

Home	AE-MNCs	ISO-Certified	Ratified or accepted
Australia	179	42	9-Nov-16
Austria	14	10	5-Oct-16
Belgium	18	12	6-Apr-17
Canada	150	38	5-Oct-16
Cyprus	5	5	4-Jan-17
Czech Republic	1	1	5-Oct-17
Denmark	20	15	1-Nov-16
Finland	23	21	14-Nov-16
France	80	66	5-Oct-16
Germany	70	52	5-Oct-16
Greece	10	7	14-Oct-16
Hong Kong	51	29	3-Sep-16
Ireland	31	18	4-Nov-16
Israel	10	5	22-Nov-16
Italy	25	22	11-Nov-16
Japan	328	249	8-Nov-16
Korea	83	58	3-Nov-16
Luxembourg	13	7	4-Nov-16
Malta	1	0	5-Oct-16
Netherlands	35	23	28-Jul-17
New Zealand	27	3	4-Oct-16
Norway	14	9	20-Jun-16
Portugal	9	9	5-Oct-16
Puerto Rico	1	0	3-Sep-16
Singapore	23	12	21-Sep-16
Spain	30	25	12-Jan-17
Sweden	41	31	13-Oct-16
Switzerland	56	39	6-Oct-16
Taiwan	104	76	1-Jul-15
United Kingdom	205	117	18-Nov-16
United States	1,071	265	3-Sep-16
Total AE-MNCs	2,728	1,266	

Home	EM-MNCs	ISO-Certified	Ratified or accepted
Argentina	8	1	21-Sep-16
Brazil	33	19	21-Sep-16
Chile	15	10	10-Feb-17
China	89	34	3-Sep-16
Colombia	4	2	12-Jul-18
Egypt	4	3	29-Jun-17
Hungary	2	2	5-Oct-16
India	58	48	2-Oct-16
Indonesia	9	6	31-Oct-16
Kuwait	3	3	23-Apr-18
Malaysia	35	21	16-Nov-16
Mauritius	1	1	22-Apr-16
Mexico	22	16	21-Sep-16
Oman	2	0	22-May-19
Panama	2	1	21-Sep-16
Papua New Guinea	1	1	21-Sep-16
Peru	3	2	25-Jul-16
Philippines	15	8	23-Mar-17
Poland	14	10	7-Oct-16
Qatar	6	2	23-Jun-17
Russia	23	14	7-Oct-19
Saudi Arabia	4	1	3-Nov-16
South Africa	66	37	1-Nov-16
Sri Lanka	1	1	21-Sep-16
Thailand	25	19	21-Sep-16
Turkey	13	11	11-Oct-21
Ukraine	1	0	19-Sep-16
United Arab Emirates	5	3	21-Sep-16
Zimbabwe	1	0	7-Aug-17
Total EM-MNCs	465	276	

Notes. Hong Kong is not a separate country but part of the People's Republic of China as a specially administered region (SAR). The listed date for Taiwan was the announced date of the Greenhouse Gas Reduction and Management Act. The listed date for the United States was the date the US government deposited its instrument of acceptance for the first time.

B. Dynamic DID: testing the pretreatment parallel assumption

We ran falsification tests using the dynamic DID model to test the assumption that the market value of the treatment (i.e., MNCs with ISO 14001 certification) and the control group (i.e., MNCs without ISO 14001 certification) followed similar trends prior to the exogenous event Paris Agreement. Specifically, we created six time-indicator variables: two for the two years before the Paris Agreement, one for the year in which the Paris Agreement was adopted, and the rest for the three-year after the Paris Agreement. Our variables of interest were the interactions between the treatment variable ISO 14001 and the time variables. The estimation results using fixed- and random-effect estimators in Table B1 indicated that the coefficients of interactions were significant only after the Paris Agreement and were not significant prior to the Paris Agreement (i.e., *ISO 14001* Paris-2* and *ISO 14001* Paris-1*). These results were consistent across models, suggesting pre-treatment parallel trends in market value between the treatment and the control group.

Table B1 Estimation results of the dynamic DID model

DV: Market value	Fixed Effect		Random Effect	
ISO 14001 X Paris^{-2}	-0.03	-0.04	-0.03	-0.04
	(0.04)	(0.04)	(0.04)	(0.04)
ISO 14001 X Paris^{-1}	-0.03	-0.05	-0.03	-0.04
	(0.05)	(0.05)	(0.05)	(0.05)
ISO 14001 X Paris^{0}	-0.04	-0.07	-0.04	-0.06
	(0.05)	(0.05)	(0.05)	(0.05)
ISO 14001 X Paris^{+1}	-0.04	-0.05	-0.05	-0.05
	(0.06)	(0.06)	(0.06)	(0.06)
ISO 14001 X Paris^{+2}	0.06	0.01	0.05	0.02
	(0.06)	(0.06)	(0.06)	(0.06)
ISO 14001 X Paris^{+3}	0.20***	0.16**	0.19***	0.16***
	(0.07)	(0.06)	(0.07)	(0.06)
ISO14001			-1.17***	-0.41***
			(0.08)	(0.08)
Paris^{-2}	0.08**	0.06*	0.08**	0.06*
	(0.03)	(0.03)	(0.03)	(0.03)
Paris^{-1}	0.07	0.08*	0.07	0.07
	(0.04)	(0.04)	(0.04)	(0.04)
Paris^{0}	0.11**	0.11**	0.11**	0.10**
	(0.05)	(0.04)	(0.05)	(0.04)
Paris^{+1}	0.31***	0.27***	0.31***	0.26***
	(0.05)	(0.05)	(0.05)	(0.05)
Paris^{+2}	-0.09*	-0.13***	-0.09	-0.15***
	(0.05)	(0.05)	(0.05)	(0.05)
Paris^{+3}	-0.06	-0.06	-0.06	-0.08
	(0.06)	(0.05)	(0.06)	(0.05)
Control variables	No	Yes	No	Yes
Constant	Yes	Yes	Yes	Yes
Industry FE			Yes	Yes
Market FE			Yes	Yes
Observations	22,242	22,242	22,242	22,242
Number of MNCs	3,193	3,193	3,193	3,193

Notes. Robust standard errors clustered at the firm level in parentheses

C. Robustness check: alternative measures of home institutional quality

	Media infrastructure		Control of corruption		Regulatory Quality		UNCTAD	
DV: Market value	Low	High	Low	High	Low	High	Developing	Developed
Paris	-0.13**	-0.14*	-0.19***	-0.13*	-0.21***	-0.14*	-0.22***	-0.12***
	(0.06)	(0.08)	(0.07)	(0.07)	(0.08)	(0.07)	(0.07)	(0.04)
ISO 14001*Paris	***0.14****	***0.06***	***0.15****	***0.03***	***0.15****	***0.04***	***0.16*****	***0.11*****
	(0.07)	***(0.08)***	***(0.08)***	***(0.08)***	***(0.09)***	***(0.07)***	***(0.08)***	***(0.05)***
Financial performance control variables								
Short-term profit	1.90***	1.36***	2.36***	1.28***	2.40***	1.11***	1.89***	2.01***
	(0.61)	(0.40)	(0.43)	(0.39)	(0.46)	(0.41)	(0.53)	(0.29)
Size	-0.24**	-0.16	-0.36***	-0.14	-0.37***	-0.23*	-0.30***	-0.27***
	(0.12)	(0.12)	(0.13)	(0.13)	(0.13)	(0.12)	(0.12)	(0.07)
Sales growth	0.17*	0.50***	0.21**	0.44***	0.17*	0.49***	0.22**	0.47***
	(0.10)	(0.14)	(0.09)	(0.14)	(0.09)	(0.14)	(0.10)	(0.09)
R&D	1.18	0.52	0.76	0.85	2.30	-0.86	-1.81	3.53***
	(2.41)	(1.87)	(2.78)	(2.06)	(3.54)	(2.28)	(1.92)	(1.08)
Leverage	-0.05	-0.03	-0.02	-0.06	-0.02	-0.07	-0.12**	0.08***
	(0.06)	(0.06)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.03)
Nonfinancial-performance control variables								
Analyst	0.19	0.05	0.25*	0.11	0.30**	0.18	0.25*	0.19***
	(0.16)	(0.12)	(0.15)	(0.12)	(0.15)	(0.12)	(0.14)	(0.05)
Geo-diversification	0.43	-0.10	-0.37	0.11	-0.32	0.37	0.33	0.33
	(0.56)	(0.58)	(0.43)	(0.57)	(0.42)	(0.56)	(0.53)	(0.35)
Domestic policy	-0.05	0.02	0.10	-0.06	0.07	-0.06	0.11	0.15***
	(0.07)	(0.10)	(0.07)	(0.09)	(0.07)	(0.09)	(0.08)	(0.05)
Foreign policy	0.01	-0.20	-0.07	-0.06	-0.11	0.08	0.01	-0.04
	(0.14)	(0.16)	(0.13)	(0.15)	(0.15)	(0.15)	(0.15)	(0.09)
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,405	5,193	5,316	5,407	5,370	5,702	4,967	17,275
Adjusted R-squared	.85	.84	.85	.84	.84	.84	.83	.84
Number of MNCs	914	922	824	906	1,127	938	711	2,482

Notes. Robust standard errors clustered at the firm level in parentheses. The *High* group was at the higher percentile point (P75), suggesting higher quality media infrastructure, stronger control of corruption, and higher regulatory quality at the MNC's home base. The *Low* group was at the lower percentile point (P25).

D. Robustness check: matched sample

In addition to all financial control variables, we included EIKON economic sector as matching characteristics to ensure the matched MNCs were in the same industry. All time-varying matching variables were calculated as the three-year average preceding the Paris Agreement.

Table D1 Mean comparison between treatment and control group based on the matched sample

Variable	Group	N	P25	P50	P75	Mean	S.D.	t-stat	*p*-value
Δ Market value	Control	1,699	-0.21	0.05	0.41	0.13	0.76	1.05	0.294
	Treatment	1,714	-0.16	0.05	0.30	0.11	0.62		
Short-term profit	Control	1,699	0.03	0.07	0.11	0.07	0.08	-1.16	0.246
	Treatment	1,714	0.03	0.07	0.11	0.07	0.07		
Size	Control	1,699	20.76	21.77	22.81	21.76	1.61	-13.66	<0.01
	Treatment	1,714	21.47	22.45	23.55	22.49	1.53		
Leverage	Control	1,699	0.14	0.49	0.99	0.74	0.83	-1.32	0.188
	Treatment	1,714	0.19	0.52	1.02	0.78	0.83		
Sales growth	Control	1,699	-0.07	0.02	0.10	0.03	0.16	-0.20	0.843
	Treatment	1,714	-0.07	0.02	0.10	0.03	0.15		
R&D	Control	1,699	0	0	0	0.01	0.02	-1.41	0.158
	Treatment	1,714	0	0	0	0.01	0.02		
Stringent exposure	Control	1,699	0.17	0.44	0.70	0.45	0.33	4.68	<0.01
	Treatment	1,714	0.24	0.40	0.53	0.40	0.25		

Table D2 DID analysis based on the matched sample

				EM-MNCs		AE-MNCs	
DV: Market value	MNCs	EM-MNCs	AE-MNCs	High stringent exposure	Low stringent exposure	High stringent exposure	Low stringent exposure
Matched sample – IMF classification							
Paris	0.06	-0.18	0.09**	-0.36**	-0.06	0.00	0.13**
	(0.04)	(0.13)	(0.04)	(0.17)	(0.18)	(0.07)	(0.06)
ISO 14001*Paris	0.16***	0.37**	0.14**	0.58***	0.21	0.18**	0.14*
	(0.06)	(0.15)	(0.06)	(0.20)	(0.20)	(0.09)	(0.08)
Adjusted R-squared	0.82	0.82	0.82	0.86	0.77	0.84	0.81
Matched sample – UNCTAD classification							
Paris	0.13***	0.15***	0.00	-0.03	0.04	0.09**	0.19***
	(0.04)	(0.03)	(0.06)	(0.10)	(0.09)	(0.05)	(0.04)
ISO 14001*Paris	0.10*	0.11**	0.17**	0.25**	0.08	0.15**	0.09
	(0.06)	(0.05)	(0.08)	(0.12)	(0.11)	(0.06)	(0.07)
Adjusted R-squared	0.84	0.84	0.84	0.84	0.83	0.82	0.86
Number of MNCs	1,143	300	843	168	133	423	420
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes. Robust standard errors clustered at the firm level in parentheses. High(low) stringent exposure was at the above(below) median value of the stringent exposure variable.

E. Robustness check: polluting intensive activities (carbon productivity)

To rule out the influence of pollution-intensive manufacturing activities, we performed DID analysis after controlling for the level of their carbon productivity for 249 EM- and 1,239 AE-MNCs. Carbon productivity was measured as the operating profit per unit emission. Scope 1 covers direct emissions from sources owned and controlled by a company. Scope 2 covers indirect emissions generated from the purchase of utilities (electricity, steam, heating, cooling).

Table E1 Robustness check testing the country-of-origin effects after controlling for carbon productivity

DV: Market Value	High Carbon Productivity			Low Carbon Productivity		
	All MNCs	EM-MNCs	AE-MNCs	All MNCs	EM-MNCs	AE-MNCs
Paris	0.05	-0.39	0.10	0.08	-0.15	0.11*
	(0.11)	(0.28)	(0.11)	(0.06)	(0.13)	(0.07)
ISO 14001*Paris	0.44***	0.69*	0.41***	0.06	0.18	0.05
	(0.14)	(0.37)	(0.14)	(0.07)	(0.14)	(0.07)
Carbon productivity	0.11	0.25	0.09	0.01	0.04**	0.00
	(0.12)	(0.36)	(0.12)	(0.01)	(0.02)	(0.02)
Financial performance control variables						
Short-term profit	3.65***	3.61	3.49***	0.55**	0.92	0.44*
	(1.16)	(4.54)	(1.18)	(0.24)	(0.56)	(0.25)
Firm size	-0.27	-1.17**	-0.20	-0.27***	-0.38***	-0.22**
	(0.36)	(0.55)	(0.39)	(0.09)	(0.11)	(0.11)
Sales growth	0.55***	0.20	0.62***	-0.05	0.00	-0.06
	(0.21)	(0.56)	(0.23)	(0.08)	(0.10)	(0.11)
R&D	3.44	-2.28	3.61	1.82	1.81	1.66
	(2.19)	(3.84)	(2.26)	(2.00)	(1.66)	(2.16)
Leverage	0.11	0.09	0.10	0.03	0.02	0.03
	(0.09)	(0.53)	(0.09)	(0.03)	(0.05)	(0.03)
Nonfinancial-performance control variables						
Analyst	-0.72**	omitted	-0.74**	omitted	omitted	omitted
	(0.28)		(0.30)			
Geo-diversification	2.36**	0.82	2.33**	-0.29	-0.40	-0.27
	(0.93)	(4.81)	(0.93)	(0.34)	(1.08)	(0.36)
Domestic policy	0.77***	0.39	0.80***	0.10	-0.03	0.15*
	(0.15)	(0.52)	(0.16)	(0.07)	(0.09)	(0.08)
Foreign policy	0.35	-0.26	0.50	-0.08	0.12	-0.10
	(0.29)	(0.79)	(0.32)	(0.13)	(0.17)	(0.15)
Constant	-12.13	22.22	-14.70	8.90***	10.99*	7.46**
	(11.16)	(23.17)	(12.05)	(2.61)	(5.59)	(3.00)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,634	208	2,426	3,392	707	2,685
Adjusted R-squared	.88	.90	.88	.89	.90	.89
Number of MNCs	658	73	585	830	176	654

Notes. Robust standard errors clustered at the firm level in parentheses. The variable Analyst was omitted for several subsamples because the value did not change, indicating that the ESG score of MNCs in the respective subsample were always monitored during the observation period.

F. Robustness check: political effect

The political effect was examined in two ways: through the non-signing effect and the withdrawal effect. To test whether the main results are robust to the non-signing effect, we estimated all models after excluding Taiwan MNCs. To check the potential confounding effect of US withdrawal, we estimated a subsample of non-US MNCs.

Table F1 Robustness check testing the non-signing effects using a subsample of MNCs after excluding Taiwan and US MNCs

	After excluding Taiwan MNCs				After excluding US MNCs			
DV: Market Value	All MNCs	AE-MNCs	High stringent exposure	Low stringent exposure	All MNCs	AE-MNCs	High stringent exposure	Low stringent exposure
Paris	0.13***	0.15***	0.18***	0.10**	0.09***	0.13***	0.16***	0.08
	(0.03)	(0.03)	(0.04)	(0.05)	(0.03)	(0.04)	(0.06)	(0.06)
ISO 14001*Paris	0.09**	0.09**	0.12**	0.05	0.10**	0.07	0.08	0.08
	(0.04)	(0.05)	(0.06)	(0.07)	(0.05)	(0.05)	(0.08)	(0.07)
Financial performance control variables								
Short-term profit	2.08***	2.00***	1.98***	1.97***	1.57***	1.36***	1.46***	1.21***
	(0.26)	(0.29)	(0.36)	(0.47)	(0.28)	(0.32)	(0.46)	(0.44)
Firm size	-0.28***	-0.28***	-0.26***	-0.32***	-0.28***	-0.27***	-0.13	-0.42***
	(0.06)	(0.07)	(0.09)	(0.10)	(0.08)	(0.09)	(0.14)	(0.11)
Sales growth	0.42***	0.46***	0.52***	0.37***	0.39***	0.45***	0.52***	0.35***
	(0.07)	(0.08)	(0.11)	(0.13)	(0.07)	(0.09)	(0.13)	(0.12)
R&D	3.43***	3.39***	2.46**	5.49**	1.20	1.34	0.45	2.70
	(1.04)	(1.06)	(1.18)	(2.45)	(1.09)	(1.11)	(1.37)	(1.85)
Leverage	0.06**	0.08***	0.06	0.09*	-0.05	-0.03	-0.03	-0.06
	(0.03)	(0.03)	(0.04)	(0.05)	(0.03)	(0.04)	(0.05)	(0.06)
Nonfinancial-performance control variables								
Analyst	0.23***	0.21***	0.21***	0.24**	0.20**	0.20**	0.08	0.39***
	(0.05)	(0.05)	(0.07)	(0.10)	(0.08)	(0.10)	(0.13)	(0.15)
Geo-diversification	0.37	0.43	0.79**	-0.37	0.49	0.59	0.96*	-0.14
	(0.31)	(0.34)	(0.40)	(0.57)	(0.41)	(0.46)	(0.57)	(0.66)
Domestic policy	0.11***	0.11**	0.16**	0.03	0.01	-0.01	0.04	-0.05
	(0.04)	(0.05)	(0.07)	(0.07)	(0.05)	(0.07)	(0.09)	(0.09)
Foreign policy	-0.11	-0.07	-0.12	-0.02	-0.06	-0.04	-0.20	0.13
	(0.08)	(0.09)	(0.12)	(0.14)	(0.09)	(0.11)	(0.18)	(0.12)
Constant	6.53***	6.07**	4.01	10.82***	5.63**	4.82	0.24	11.26**
	(2.13)	(2.37)	(2.91)	(3.92)	(2.84)	(3.39)	(4.56)	(4.55)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,514	18,265	11,858	6,310	14,814	11,565	6,445	5,043
Adjusted R-squared	.84	.84	.82	.85	.85	.85	.85	.84
Number of MNCs	3,089	2,624	1,705	905	2,122	1,657	924	722

Notes. Robust standard errors clustered at the firm level in parentheses.

G. Robustness check: country-year fixed effects and country-level time-variant variables

We created the country-year fixed effects to reintroduce the country fixed effects in the model (results in Table G1). We also took a more conservative approach to preserve the country and industry fixed effects in the results by estimating random effect models (results in Table G2). Alternatively, we included two time-variant country-level variables: home and host country corruption and per capita GDP (results in Table G3). Due to the high correlations between country variables, the addition likely introduces multicollinearity. Indicatively, the domestic policy variable was highly correlated with control of corruption (ρ = 0.80, p <.001) and home per capita GDP (ρ = 0.64, p <.001).

Table G1 DID analysis based on fixed effects models with country-year fixed effects

	Hypothesis 1	Hypothesis 2		Hypothesis 3			
				EM-MNCs		AE-MNCs	
DV: Market value	All MNCs	EM-MNCs	AE-MNCs	High stringent exposure	Low stringent exposure	High stringent exposure	Low stringent exposure
Paris	6.62***	6.89***	0.02	-0.42	6.96***	0.09	-0.08
	(0.28)	(0.44)	(0.17)	(0.81)	(0.53)	(0.24)	(0.25)
ISO 14001*Paris	0.15***	0.18**	0.14***	0.26*	0.16	0.16**	0.12
	(0.04)	(0.09)	(0.05)	(0.14)	(0.14)	(0.07)	(0.08)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,242	3,249	18,993	1,622	1,627	9,486	9,507
Adjusted R-squared	.84	.86	.84	.87	.85	.85	.81
Number of MNCs	3,193	465	2,728	232	233	1,360	1,368

Notes. Robust standard errors clustered at the firm level in parentheses.

Table G2 DID analysis based on random effects models

	Hypothesis 1	Hypothesis 2		Hypothesis 3			
				EM-MNCs		AE-MNCs	
DV: Market value	All MNCs	EM-MNCs	AE-MNCs	High stringent exposure	Low stringent exposure	High stringent exposure	Low stringent exposure
Paris	0.12***	-0.01	0.13***	-0.04	0.03	0.08*	0.18***
	(0.03)	(0.07)	(0.03)	(0.11)	(0.10)	(0.04)	(0.04)
ISO 14001	-0.50***	-0.16	-0.59***	-0.25	0.04	-0.46***	-0.71***
	(0.08)	(0.17)	(0.09)	(0.24)	(0.25)	(0.12)	(0.13)
ISO 14001*Paris	0.10**	0.18**	0.10**	0.24*	0.12	0.13**	0.08
	(0.04)	(0.09)	(0.04)	(0.13)	(0.14)	(0.06)	(0.07)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,242	3,249	18,993	1,622	1,627	9,486	9,507
Between R-squared	.35	.32	.36	.38	.39	.37	.34
Number of MNCs	3,193	465	2,728	232	233	1,360	1,368

Notes. Robust standard errors clustered at the firm level in parentheses.

Table G3 DID analysis based on fixed effects models after adding more country-level variables

	Hypothesis 1	Hypothesis 2		Hypothesis 3			
				EM-MNCs		AE-MNCs	
DV: Market value	All MNCs	EM-MNCs	AE-MNCs	High stringent exposure	Low stringent exposure	High stringent exposure	Low stringent exposure
Paris	0.14***	-0.04	0.16***	-0.09	0.01	0.11**	0.15***
	(0.03)	(0.06)	(0.03)	(0.12)	(0.12)	(0.05)	(0.05)
ISO 14001*Paris	0.10**	0.19***	0.09**	0.27**	0.13	0.13**	0.06
	(0.04)	(0.06)	(0.04)	(0.13)	(0.15)	(0.06)	(0.07)
Financial performance control variables							
Short-term profit	2.05***	2.10***	1.96***	2.49***	1.70***	1.96***	1.94***
	(0.25)	(0.35)	(0.28)	(0.64)	(0.57)	(0.39)	(0.40)
Size	-0.28***	-0.31***	-0.28***	-0.51***	-0.22	-0.31***	-0.25***
	(0.06)	(0.05)	(0.07)	(0.13)	(0.18)	(0.10)	(0.09)
Sales growth	0.41***	0.24**	0.45***	0.19	0.28	0.41***	0.49***
	(0.07)	(0.09)	(0.08)	(0.13)	(0.18)	(0.11)	(0.12)
R&D	3.25***	-5.17**	3.25***	-10.16**	0.26	4.63***	2.05
	(1.00)	(2.31)	(1.02)	(4.73)	(7.78)	(1.57)	(1.33)
Leverage	0.05**	-0.08**	0.08***	0.02	-0.13*	0.10**	0.05
	(0.03)	(0.04)	(0.03)	(0.08)	(0.07)	(0.04)	(0.04)
Nonfinancial-performance control variables							
Analyst	0.22***	0.26***	0.21***	0.47***	0.08	0.20**	0.21***
	(0.05)	(0.07)	(0.05)	(0.16)	(0.25)	(0.08)	(0.07)
Geo-diversification	0.39	-0.50	0.45	-0.89	-0.45	0.03	0.66
	(0.31)	(0.43)	(0.33)	(1.04)	(0.55)	(0.49)	(0.44)
Domestic policy	0.13***	0.04	0.11**	0.01	0.05	0.17***	0.08
	(0.05)	(0.07)	(0.05)	(0.09)	(0.14)	(0.06)	(0.08)
Home corruption	-0.14	0.04	-0.19	0.31*	-0.19	-0.33**	0.02
	(0.10)	(0.13)	(0.12)	(0.19)	(0.36)	(0.14)	(0.22)
Home GDP	-1.17	1.35*	-1.21	2.64*	-0.07	-1.98	-0.82
	(0.81)	(0.75)	(1.62)	(1.46)	(1.65)	(1.80)	(2.24)
Foreign policy	-0.11	-0.07	-0.09	0.03	-0.09	-0.09	-0.04
	(0.08)	(0.11)	(0.09)	(0.24)	(0.17)	(0.14)	(0.12)
Host corruption	0.30	-0.13	0.31	0.03	-0.09	0.30	0.13
	(0.24)	(0.23)	(0.31)	(0.55)	(0.32)	(0.40)	(0.51)
Host GDP	-0.95	-0.15	-1.20	-0.67	1.53	-1.37	5.39
	(0.99)	(1.02)	(1.17)	(2.37)	(2.51)	(1.47)	(3.67)
Constant	15.70***	6.12	16.97*	8.88	2.73	23.76**	-16.51
	(5.45)	(4.88)	(8.72)	(14.92)	(10.66)	(9.61)	(19.93)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,242	3,249	18,993	1,622	1,627	9,486	9,507
Adjusted R-squared	.84	.85	.84	.88	.83	.85	.82
Number of MNCs	3,193	465	2,728	232	233	1,360	1,368

Notes. Robust standard errors clustered at the firm level in parentheses.