



What Makes MNEs Greener? The Interplay of Family Ownership and International External Pressures

Jongik Chang¹ · Junmin Park² · Nicola Misani³

Received: 16 December 2024 / Revised: 26 November 2025 / Accepted: 21 April 2026
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Abstract

This study examines how family ownership affects a firm's climate performance and how this effect is shaped by multinational enterprises' (MNEs') exposure to international institutional environments. Drawing on agency theory and the socioemotional wealth (SEW) perspective, we analyze Korean family-owned MNEs, which operate in a domestic context of institutional voids but interact with diverse global regulatory regimes. Using firm-level data on greenhouse gas emissions and foreign exchange-based measures of regional dependency, we find that concentrated family ownership is associated with weaker climate engagement. However, this relationship is context-dependent: internationalization mitigates the adverse effect of family ownership, especially when firms are exposed to environmentally stringent host countries. In contrast, exposure to institutionally lax environments reinforces or fails to offset this negative influence. No significant effects are found for intermediate levels of regulation. These findings show that family firms' climate behavior is shaped not only by ownership structure but also by transnational institutional pressures. International exposure thus emerges as a potential substitute for weak home-country governance in emerging markets.

Keywords Greenhouse gas emissions · Climate change · Family ownership · Internationalization · Regional exposure

✉ Nicola Misani
nicola.misani@unibocconi.it

Jongik Chang
jongikchang@korea.ac.kr

Junmin Park
pjm1425@gmail.com

¹ Korea University Business School, Seoul, Republic of Korea

² Department of Global Business, Halla University, Wonju-si, Gangwon-do, 28 Halladae-gil, Heungeop-myeon, 26404, Republic of Korea

³ Department of Management and Technology, and ICRIOS, Bocconi University, Milan, Italy

1 Introduction

Over the past five years, the frequency and severity of climate-related disasters have increased dramatically (World Meteorological Organization, 2024), heightening societal expectations for firms, particularly multinational enterprises (MNEs), to take meaningful action on decarbonization and climate resilience (Flammer, 2013; Ioannou & Hawn, 2019; Verbeke, 2021). However, not all firms respond equally to these challenges, raising the question of why some MNEs actively engage in climate strategies, while others remain disengaged, even under similar regulatory conditions. Emerging evidence suggests that differences in internal governance structures and the institutional contexts where firms operate may jointly shape their climate responses (Mellahi et al., 2016). Although prior work has investigated the antecedents of environmental and social engagement across multiple analytical levels, research on climate-specific corporate strategies remains fragmented (Bass & Grøgaard, 2021; Doh et al., 2021), particularly regarding the role of internal drivers alongside institutional and stakeholder pressures (Afsharipour & Gelter, 2020; Liang & Renneboog, 2017).

To address this research gap, we examine how family ownership influences climate change engagement in emerging markets. Prior studies in developed economies, especially in Europe, have identified family ownership as a key internal driver of firm-level sustainability engagement, especially in contexts of strong stakeholders and regulatory pressures. Family firms are generally considered more effective at mitigating classical agency problems in which managers pursue private goals misaligned with shareholders' interests, commonly referred to as 'Type I' conflicts (Fama & Jensen, 1983; Jensen & Meckling, 1976). Moreover, drawing on socioemotional wealth (SEW) theory, scholars have argued that family firms pursue legacy preservation and reputational concerns (Gómez-Mejía et al., 2007, 2011; König et al., 2013), which naturally align with stakeholder interests (Berrone et al., 2010; Cennamo et al., 2012). These motivations become particularly salient under stringent institutional environments characterized by clear regulatory mandates and robust stakeholder scrutiny (Matten & Moon, 2008), where reputational risks are amplified. Indeed, empirical studies have shown that European family firms are more proactive in environmental practices than non-family firms (Cruz et al., 2014; Garcés-Ayerbe et al., 2022; Gómez-Mejía et al., 2025). These findings emerge from institutional contexts where domestic pressures strongly reinforce sustainability norms.

However, evidence from emerging-market contexts remains puzzling. Some studies have suggested that family firms can act as substitutes for weak domestic formal institutions, thereby achieving positive environmental or corporate social responsibility (CSR) outcomes comparable to those observed in developed economies (Cordeiro et al., 2018, 2023). In contrast, other evidence has highlighted intensified 'Type II' agency problems, in which dominant family owners exploit corporate resources for private benefit at the expense of other stakeholders (Claessens et al., 1999; Easterbrook, 1984; Jensen & Meckling, 1976). In such settings, controlling families may engage in entrenchment behavior (Bae et al.,

2002, 2012; Baek et al., 2004; Kim et al., 2007) that undermines stakeholder-oriented performance (Afsharipour & Gelter, 2020). Therefore, in the presence of institutional voids, the weakness of both regulatory enforcement and monitoring mechanisms may result in diminished environmental commitment among family firms (Dow & McGuire, 2015; El Ghouli et al., 2016; Fan et al., 2021; Rees & Rodionova, 2014).

Moreover, while SEW preservation may encourage legacy-building in developed economies, it can have adverse implications in weak institutional environments by fostering excessive risk aversion, power entrenchment, or family control protection. Especially when ethical behavior is not externally enforced, the ‘dark side’ of SEW may lead to underinvestment in long-term and uncertain initiatives such as environmental sustainability (Gómez-Mejía et al., 2025; Kellermanns et al., 2012). These effects are problematic for climate change issues, which require proactive commitment despite uncertain payoffs. Thus, the same family ownership structures that promote ‘greener’ strategies in developed economies, such as those in Europe, may have the opposite influence in emerging markets.

Firm internationalization introduces additional complexities, as family firms expand into markets with diverse regulatory environments and stakeholder expectations (Ioannou & Serafeim, 2012, 2023; Sun et al., 2021). Previous research has shown that firms operating across borders face heightened scrutiny from stakeholders in host countries, particularly regarding sustainability issues (Ioannou & Hawn, 2019; Verbeke, 2021). MNEs often encounter institutional pressures that differ markedly from those in their home countries, prompting adjustments in their environmental strategies (Attig et al., 2016; Del Bosco & Misani, 2016; Kang, 2013; Rathert, 2016). These dynamics are particularly salient for family-owned MNEs from emerging markets, where weak home-country institutions coexist with exposure to international scrutiny (Lyons et al., 2025; Roh et al., 2025). Unlike in their domestic markets, family-owned MNEs often find it difficult to influence regulatory environments abroad through corporate political activities due to the liability of foreignness (Sun et al., 2021, 2024). Instead, they must comply with the institutional frameworks of the host countries in which they operate, particularly in regions with stringent environmental regulations.

Therefore, our study addresses the question of how family ownership affects sustainability commitment in weak institutional settings, taking into account both domestic factors and international exposure. We focus on Korean MNEs, which provide an appropriate empirical setting for two reasons. First, Korea exhibits the core features of emerging-market institutional environments with weak regulatory enforcement, concentrated ownership, and underdeveloped accountability mechanisms, which can heighten Type II agency problems and hinder stakeholder protection (Claessens et al., 1999; Kim et al., 2007). This is especially evident in the climate domain, where Korea’s per capita CO₂ emissions remain high (about 12–13 tons per person) and its performance in global environmental rankings is modest (Wolf et al., 2022). These characteristics stand in sharp contrast to Europe’s rule-based regulatory landscape (Matten & Moon, 2008), where much of the research on the positive effects of family ownership has been conducted. Therefore, Korea presents a relevant comparative setting to test the boundary conditions under which family ownership produces its effects. Second,

the Korean corporate sector is dominated by large, publicly listed firms that are both family-owned and highly internationalized (Choi et al., 2018). These factors allow us to examine how internal governance dynamics, such as agency costs and SEW, interact with the institutional demands of host countries. In particular, Korean family-owned MNEs offer strong analytical leverage to explore how the interplay of home- and host-country institutions shapes climate-related strategies.

We evaluate Korean MNEs' climate-related strategies by using MSCI GHG emission scores, which assess firms' performance in reducing greenhouse gas emissions compared to industry peers. To operationalize firms' exposure to the host-country institutional environments, we adopt a novel approach from the international finance literature. We introduce foreign exchange (FX) exposure to measure regional dependency, focusing on five major currencies: the Euro (EUR), United States Dollar (USD), British Pound (GBP), Japanese Yen (JPY), and Chinese Yuan (CNY) (Adler & Dumas, 1984; Allayannis & Ofek, 2001; Jorion, 1990). This method provides a more precise assessment of firms' institutional exposure than traditional metrics like regional sales or subsidiary counts, by capturing the extent to which firms are both financially and strategically tied to specific host regions (Shapiro & Hanouna, 2020).

Our empirical analysis shows that family ownership in Korean MNEs is negatively associated with climate change engagement, consistent with Type II agency concerns and the dark side of SEW. However, greater internationalization mitigates this negative effect, leading to higher GHG emission scores. Notably, exposure to institutionally strong regions (e.g., the Eurozone) enhances climate responsiveness, whereas exposure to weaker environments (e.g., China) does not.

Our research contributes to the international business literature in three ways. First, we advance a comparative understanding of family firms and corporate sustainability by showing that the dual effects of family ownership are contingent on domestic institutional contexts. In contrast to findings from developed markets, we show that under institutional voids family firms may underperform in climate engagement. Second, we extend research on internationalization by showing that multi-market exposure does not uniformly enhance sustainability engagement; rather, its effect depends on the institutional quality of host countries, with a firm's ownership structure serving as an important channel. Third, we introduce FX exposure, a metric from international finance, as a novel proxy for host-country institutional embeddedness. This methodological contribution provides a dynamic and strategy-relevant measure of the extent to which firms are financially tied to foreign institutional environments. As a whole, our study offers insights that potentially extend beyond Korea, highlighting how family-owned MNEs in emerging markets navigate institutional voids amid growing global climate pressures.

2 Theoretical Background and Hypotheses Development

A growing body of research emphasizes the importance of national institutional environments in shaping non-financial outcomes (Attig et al., 2016; Ioannou & Serafeim, 2012; Rathert, 2016), including climate-related strategies. MNEs have been

conceptualized as recipients of institutional and stakeholder pressures, responding to the regulatory expectations of both home and host countries (Campbell et al., 2012; Ioannou & Hawn, 2019; Verbeke, 2021). However, these perspectives do not fully account for the substantial heterogeneity observed among firms operating under similar institutional environments (Ioannou & Serafeim, 2023; Marquis et al., 2016). To address this limitation, recent studies have focused on internal organizational factors that mediate firms' responses to sustainability challenges. Among these, family ownership has emerged as a globally relevant governance mechanism, though findings remain mixed. While studies in developed contexts often portray family firms as sustainability leaders (Cruz et al., 2014; Garcés-Ayerbe et al., 2022), recent evidence reveals significant variation across institutional settings (Afsharipour & Gelter, 2020; Liang & Renneboog, 2017). Gómez-Mejía et al. (2025) show that the ethical implications of family influence depend on regulatory quality, legal protection, and societal norms. These findings underscore the importance of considering institutional contexts when theorizing about the climate-related behavior of family firms.

2.1 Family Ownership and Climate Change Engagement: Agency Costs and the Dark Side of Socioemotional Wealth

Family influence has long been viewed as a double-edged sword in corporate governance (Al-Tabbaa et al., 2023). While concentrated family ownership can mitigate classical agency problems by aligning managers with owners (Type I agency conflicts, Fama & Jensen, 1983; Jensen & Meckling, 1976), it can also exacerbate Type II agency conflicts, in which controlling shareholders pursue private benefits at the expense of minority shareholders and broader stakeholders (Choi et al., 2018; Claessens et al., 2000; La Porta et al., 1999). This tension is particularly salient in the context of climate change engagement, which demands long-term investment, accountability, and stakeholder alignment.

From an agency theory perspective, family firms may exhibit lower climate engagement when external monitoring mechanisms are underdeveloped. In many emerging markets, institutional voids manifest in weak legal enforcement and investor protection (Dow & McQuire, 2015; La Porta et al., 1998), with board of directors often dominated by family affiliates (Choi et al., 2018; Hwang & Kim, 2009). In such settings, the absence of credible disciplinary mechanisms allows controlling families to prioritize private interests over stakeholder concerns or long-term climate investments (Kim et al., 2007; Shleifer & Vishny, 1997). Moreover, complex ownership structures, such as pyramids and cross-shareholding arrangements common in business groups, further isolate family dominance from minority shareholders, increasing the risk of self-dealing, tunneling, and reduced transparency (Bae et al., 2002; Baek et al., 2004; Johnson et al., 2000; Wolfenzon, 1999). Similarly, the disciplining role of institutional investors may be weak, even though they are often viewed as critical monitors that pressure firms to improve environmental performance in Western contexts (Döring et al., 2023; Drobetz et al., 2024). In emerging markets, institutional investor activism remains constrained by opaque governance

structures, weak voting rights, and low board independence (Afsharipour & Gelter, 2020; Claessens et al., 1999; La Porta et al., 1998). Even long-horizon institutional investors such as pension or insurance funds face difficulties influencing family owners who maintain disproportionate control over board appointments and capital flows (McConnell & Servaes, 1990; Rees & Rodionova, 2014).

Beyond these economic concerns, family firm behavior is shaped by non-financial motivations linked to SEW, defined as the affective value that families attach to the firm (Gómez-Mejía et al., 2007). Grounded in the behavioral agency model (Cruz & Arredondo, 2016; Wiseman & Gómez-Mejía, 1998), SEW theory posits that family owners often prioritize identity, legacy, and reputation over financial returns. While these goals may align with environmental strategies under strong regulatory scrutiny (Berrone et al., 2010; Cennamo et al., 2012), recent studies show that SEW preservation may foster strategic conservatism and resistance to external pressures in weak institutional environments, thereby discouraging high-risk, long-term investments such as climate initiatives (Gómez-Mejía et al., 2025; Reina et al., 2023).

These darker implications of SEW are especially salient in emerging-market family MNEs, where ownership is often concentrated within tightly controlled business groups (Choi et al., 2018; Claessens et al., 1999; La Porta et al., 1999; Yoo & Lee, 1987). Such structures facilitate intra-group transactions and entrenchment, thereby reducing transparency and shielding controlling families from external accountability (Bae et al., 2012; Baek et al., 2004). As a result, climate-related strategies that require long-term capital commitment may be perceived as threats to families' control-preserving priorities.

Both economic (agency-based) and behavioral (SEW-based) logics point to a lower propensity for climate engagement among family firms in institutionally weak settings. When external monitoring is ineffective, family owners may prioritize the preservation of control and reputation over responding to uncertain stakeholder expectations or making irreversible climate-related commitments.

Hypothesis 1 (H1) *Family ownership is negatively associated with climate change engagement among emerging market MNEs.*

2.2 Internationalization as a Moderator: External Pressures and SEW Realignment

While family ownership may hinder climate engagement under institutional voids, this effect is unlikely to be uniform across firms. One critical contingency is the degree of internationalization. As MNEs expand globally, they become embedded in diverse institutional environments and face pressures from transnational stakeholders, regulatory authorities, and public scrutiny (Ioannou & Serafeim, 2012, 2023; Sun et al., 2021; Svystunova et al., 2024; Verbeke, 2021). This global exposure has important implications for how family firms respond to sustainability challenges.

From an agency theory perspective, international operations increase the salience of external monitoring mechanisms. Family-controlled firms, which often operate

with high discretion in domestic institutional voids, may find such discretion constrained by host-country institutions and global stakeholder expectations (Attig et al., 2016; Dow & McGuire, 2015; Li & Zhou, 2017). These external pressures raise the reputational and financial costs of opportunistic behavior (Cheng et al., 2014; Rathert, 2016), disciplining family firms and limiting control-preserving practices. In addition, while family firms may rely on political ties to influence domestic regulatory environments (Gul & Kealey, 1999; Yoo & Lee, 1987), corporate political activities are far less effective in international contexts due to the liability of foreignness and limited access to policymakers (Dorobantu et al., 2017; Sun et al., 2021, 2024). This constraint makes legitimacy-seeking through environmental and climate-related practices a more viable means to protect family interests and reputation abroad. As such, internationalization serves as an external governance mechanism that curbs Type II agency costs and steers family firms toward stakeholder-aligned outcomes (Attig et al., 2016; Del Bosco & Misani, 2016).

Internationalization may also reshape the behavioral logic underlying family firm decision-making. As discussed earlier, the SEW framework suggests that family firms often pursue non-financial goals such as legacy preservation and control, which, in the presence of institutional voids, can foster risk aversion and resistance to change. However, internationalization may shift the expression of SEW toward legitimacy-seeking. Family firms operating across borders must manage relationships with diverse and demanding stakeholders, such as host governments, NGOs, and global consumers, who evaluate firms' legitimacy based on international norms (Cennamo et al., 2012; Verbeke, 2021). In this context, preserving SEW may require family firms to move away from control-oriented conservatism. As Gómez-Mejía et al. (2025) and Reina et al. (2023) emphasize, SEW is context-dependent and evolves with societal expectations. Such adaptation can transform SEW from a constraint on sustainability into a driver of investment in climate initiatives that enhance legitimacy across markets.

Thus, we expect that internationalization attenuates the negative relationship between family ownership and climate engagement among firms based in countries with institutional voids. In contrast to domestically focused family firms, internationally embedded family MNEs are more likely to view climate engagement as a legitimacy-enhancing strategy aligned with the protection of SEW in a globalized context.

Hypothesis 2 (H2) *Internationalization positively moderates the negative relationship between family ownership and climate change engagement among emerging market MNEs.*

2.3 MNEs' Exposure to Regulatory Stringency as a Moderator

Internationalization exposes family-owned MNEs to stronger external scrutiny, but their responses to foreign contexts may vary considerably depending on two interrelated factors: (1) the stringency of climate regulations in host countries

and (2) the degree of MNEs' dependence on specific markets (Bass & Grøgaard, 2021; Svystunova et al., 2024; Verbeke, 2021). MNEs tend to prioritize institutional demands from host countries that are not only stringent but also strategically or financially salient (Gamache et al., 2020; Kim et al., 2024; Lee & Lounsbury, 2015; Mitchell et al., 1997, 2011). For family firms, the literature suggests that they are more reactive to selective pressures that threaten their interests (Cruz et al., 2014). Thus, heterogeneity in institutional exposure is a critical contingency shaping whether internationalization attenuates or amplifies the adverse effects of family ownership on climate engagement.

Stringent regulatory environments provide MNEs with institutional stability and clearer expectations, enabling them to adapt strategically and invest in long-term sustainability initiatives. Such conditions not only enable a reduction in GHG emissions from current processes but also promote greener innovation and investment in long-term transitions from fossil-fuel-based energy to environmentally friendly alternatives (Verbeke & Hutzschenreuter, 2021). We expect the impact of local institutions to be more significant for MNEs with greater exposure to these stringent pressures than for firms less exposed to external demands. When firms are exposed to stringent GHG regulatory pressures, such as those in European markets, they are more likely to engage in GHG reductions to avoid negative legitimacy costs (Cheng et al., 2014; Reid & Toffel, 2009). Conversely, exposure to countries with lax regulations is unlikely to affect the propensity to engage in climate initiatives.

Therefore, we suggest that the regulatory environment in host countries plays a crucial role in shaping the effects of internationalization on family firms' GHG reduction strategies. We classify host-country institutional stringency into three categories—stringent (EU), moderate (U.S., U.K., Japan), and lax (China)—and expect that the moderating effect proposed in Hypothesis 2 will differ across these contexts. Specifically, a positive moderating effect is expected in countries with stringent environmental regulations, no significant effect in moderately regulated contexts, and a negative effect in lax environments.

Hypothesis 3a (H3a) *MNEs' dependence on host countries with stringent climate change regulations positively moderates the relationship between family ownership and corporate climate change engagement among emerging market MNEs.*

Hypothesis 3b (H3b) *IMNEs' dependence on host countries with moderate climate change regulations does not significantly moderate the relationship between family ownership and corporate climate change engagement among emerging market MNEs.*

Hypothesis 3c (H3c) *MNEs' dependence on host countries with lax climate change regulations negatively moderates the relationship between family ownership and corporate climate change engagement among emerging market MNEs.*

A conceptual model with the three hypotheses is presented below. It illustrates how family ownership is expected to influence climate engagement from a

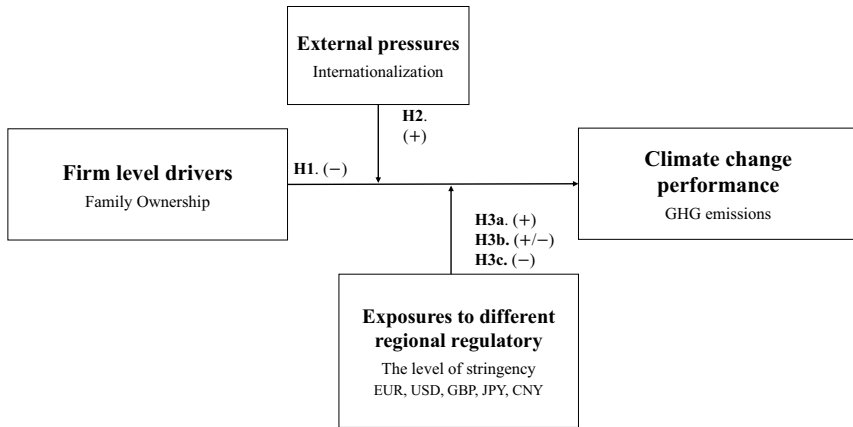


Fig. 1 Conceptual model with three hypotheses

comparative perspective, suggesting that this relationship is shaped by both institutional context and internationalization. In emerging-market environments characterized by weak institutions, family ownership tends to hinder climate engagement due to Type II agency problems and the dark side of SEW, which emphasize control and risk aversion over long-term sustainability. Internationalization, however, exposes firms to diverse host-country institutions and external scrutiny, serving as an external governance mechanism that can discipline family firms and redirect SEW toward legitimacy-seeking behavior. This moderating effect varies with the stringency of host-country regulations (Fig. 1).

3 Methods

3.1 Sample and Data

To test our hypotheses, we examined MNEs from Korea, an emerging-market context characterized by a large economy, strong trade integration, significant exposure to buyers from developed countries, and a long-standing dominance of family-owned firms. Our sampling process began with 138 listed firms that had a market capitalization exceeding KRW 1 trillion (approximately USD 0.7 billion) as of 2022. This threshold ensured the inclusion of globally active Korean firms with sufficient international presence, making them representative of emerging-market MNEs operating across diverse institutional environments. Listed firms are particularly suitable for investigating climate engagement, given their disclosure obligations, heightened public scrutiny, and greater potential for Type II agency costs when external investors hold minority stakes.

We merged the initial sample with the Orbis dataset (formerly Bureau van Dijk) to obtain information on firms' international subsidiaries and with the MSCI Net Zero Tracker for GHG emission performance. We focused on the period from 2013

to 2021, as coverage of Korean firms in both MSCI and Orbis was limited before 2013. This timeframe also coincides with the growing global salience of climate change issues and the improved quality and consistency of MSCI data for Korea. Financial and ownership information was retrieved from Compustat, Bloomberg, and the eGroup Portal of the Korea Fair Trade Commission. After excluding companies with missing or insufficient data, the final sample comprised 76 listed Korean MNEs (68 family-controlled and 8 non-family firms). Although relatively small, the sample is theoretically relevant and representative of the phenomenon under study, with future research encouraged to extend external validity to broader groups of companies and national contexts. Moreover, the panel structure of our data yielded 432 firm-year observations (an unbalanced panel), enabling the use of conservative analyses with year and firm fixed effects to test all hypotheses.

3.2 Variables

Our main dependent variable is firms' climate engagement, measured by the GHG Emissions Score provided by MSCI ESG Ratings. MSCI collects publicly available data and evaluates corporate ESG performance, assigning an annual ESG score. For GHG emission performance, MSCI assigns an 'Emission Score' on a scale from 0 to 10. This score indicates a firm's relative performance compared with its industry peers, based on its commitment and effectiveness in reducing environmental emissions from production and operational processes (MSCI, 2022). Consequently, we did not control for industry effects, as the dependent variable is already industry-adjusted. Figure 2 presents details on the relationship between emission grades and scores.

To measure family ownership, we calculated the total voting rights held by family members each year, following the methodology of La Porta et al. (1999). This continuous variable represents the percentage of aggregate voting rights held by the controlling family, including both direct and indirect ownership. It is essential to account for indirect ownership through control-enhancing mechanisms, such as pyramids, cross-holdings, and circular financing, which indicate both family influence and Type II agency problems (Claessens et al., 2000).

To measure MNEs' internationalization, we used the number of host countries in which a firm operates subsidiaries each year. This metric, consistent with Delios and Henisz (2003), reflects the scope of external stakeholder pressures, with a higher count indicating broader exposure to foreign environmental standards and norms.

Letter rating	Leader/Laggard	Final Industry-adjusted company score
AAA	Leader	8.571*-10.0
AA	Leader	7.143-8.571
A	Average	5.714-7.143
BBB	Average	4.286-5.714
BB	Average	2.857-4.286
B	Laggard	1.429-2.857
CCC	Laggard	0.0-1.429

Fig. 2 MSCI score mapped to a letter rating in the MSCI ESG rating methodology (2022)

However, this measure might introduce autocorrelation in our panel data, as the cumulative number of host countries naturally increases over time (firm exits are less common than entries). Family ownership might also induce autocorrelation, since ownership structures typically remain stable except during succession events, such as the unexpected death of a family member. These potential autocorrelations could lead to multicollinearity in the interaction terms. To address, this issue, we mean-centered both family ownership and internationalization, which effectively reduced the correlation between the two variables from 0.71 to 0.01.

To capture MNEs' dependency on specific regions, we used the FX exposure of a firm's stock price to representative currencies, which measures how much the firm's value is affected by changes in foreign exchange rates (Adler & Dumas, 1984). This approach offers a direct indicator of institutional dependence, reflecting how firms are influenced by host country environments beyond their physical presence or sales (Shapiro & Hanouna, 2020). For example, a Korean MNE with high exposure to the euro (EUR) is likely to experience material consequences from EU regulatory changes and, therefore, more directly internalizes European climate expectations. Compared with traditional dependency measures such as the ratio of subsidiaries or sales in a particular region, FX exposure is more closely linked to a firm's overall performance and aligns with both shareholder interests and strategic decision-making. Moreover, it responds to a range of factors, such as political risk and other uncertainties, that affect a firm's stock price depending on its regional exposure. This makes the measure suitable for our study, as we expect firms to adjust their sensitivity to costly climate-related pressures based on the economic significance of the regions from which these pressures originate.

To implement this measure, we started from the widely used two-factor model (Allayannis & Ofek, 2001; Hutson & Stevenson, 2010):

$$r_t = \alpha + \beta_m \times r_{mt} + \beta_e \times \Delta e_t + u_t$$

- r_t is the daily stock return over the period t .
- α is the intercept.
- β_m captures the MNE's sensitivity of stock returns to market index returns.
- r_{mt} is the market index return over the period t (KOSPI 200).
- β_e captures the MNE's sensitivity of stock returns to FX rate changes (i.e., exposure).
- Δe_t is the percentage change in the FX rate over the period t (USD, EUR, GBP, JPY, CNY) against KRW.
- u_t is the error term.

We collected foreign exchange rates for EUR, USD, GBP, JPY, and CNY against the KRW from Datastream (Chernov et al., 2023). Using daily exchange rate fluctuations, we estimated each firm's exposure to currency movements by examining how sensitive its equity returns were to changes in FX rates. This sensitivity coefficient (β_e) was calculated separately for each currency and each firm-year using the two-factor model. Then, to derive a firm's regional institutional dependency, we

used the statistical significance of β_e for each currency. If β_e for a given currency was significant at the 5% level ($p < 0.05$), the firm-year was coded as dependent on the region. For instance, if β_{EUR} was significant, the firm was considered exposed to European markets, suggesting that institutional and regulatory conditions in the EU could materially affect the firm's value. In contrast, insignificant β_e values implied low economic embeddedness in that region. Accordingly, for each currency (EUR, USD, GBP, JPY, and CNY), we generated a binary variable coded as 1 if the estimated β_e was not zero and significant at the 5% level, otherwise coded as 0. This approach produced a set of firm-year indicators, capturing differences in exposure to host-country regulatory environments, ranging from stringent (EU) and moderate (U.S., U.K., Japan) to lax (China).

Finally, we controlled for several governance and financial characteristics that could influence a firm's engagement with climate strategies. First, we included institutional ownership, considering only shareholdings exceeding the 3% threshold required for shareholder proposals under Korean corporate law, to account for the monitoring role that these investors may exercise over family owners. We captured intra-family managerial involvement through a dummy variable indicating whether a family member served as CEO. We also accounted for firm size (total assets) and profitability (return on equity), both winsorized at the 1% level to reduce the impact of outliers. To proxy financial constraints, we included the debt ratio and payout ratio, as financially constrained firms may be less likely to invest in ESG initiatives (Cheng et al., 2014). Moreover, to capture investment behavior and operational capacity, we controlled for R&D intensity, asset tangibility (the ratio of property, plant, and equipment to total assets), and cash flow intensity.

3.3 Estimation

Our models employed panel regression with firm fixed effects to control for unobservable, time-invariant firm characteristics. The dependent variable varied annually, as MSCI evaluates firms' GHG performance each year. All firm-level controls, as well as our internationalization and FX dependency variables, were also time-varying. Therefore, the analyses captured the effects of variation in family ownership, internationalization, and FX exposure on GHG emission performance. To address potential serial correlation and heteroskedasticity in the panel setting, we clustered standard errors at the firm level, following Li and Wibbens (2023). Moreover, we tested for potential multicollinearity by obtaining Variance Inflation Factors (VIFs). Multicollinearity was not a concern, as all VIFs remained below 3 in OLS estimations and below 5 in fixed-effects specifications, consistent with common diagnostic thresholds (O'Brien, 2007). We report descriptive statistics and pairwise correlations for all variables in Table 1.

Table 1 Descriptive statistics and correlation table

Variables	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Carbon emission score	7.52	2.20	0.00	10.00	1																			
2. Family ownership	29.91	17.04	0.00	73.92	0.11	1																		
3. Internationalization	2.14	3.98	0.00	33.00	0.25*	0.00	1																	
4. EUR dependency	0.54	0.54	0.00	1.00	0.15*	0.10	0.11	1																
5. USD dependency	0.65	0.48	0.00	1.00	0.07	0.03	0.08	0.50*	1															
6. GBP dependency	0.17	0.38	0.00	1.00	0.04	-0.02	0.02	0.26*	0.20*	1														
7. JPY dependency	0.69	0.46	0.00	1.00	0.09	0.07	0.03	0.60*	0.61*	0.19*	1													
8. CNY dependency	0.55	0.50	0.00	1.00	0.10	0.06	0.06	0.45*	0.74*	0.24*	0.54*	1												
9. Controlled CNY dependency	0.94	0.29	0.00	1.00	-0.06	0.11	0.03	0.00	0.01	0.04	0.00	-0.12	1											
10. Institutional ownership	2.99	5.17	0.00	24.43	-0.03	-0.32*	0.14*	-0.21*	-0.13*	-0.05	-0.17*	-0.1	0.04	1										
11. Size	25.10	35.47	0.37	194.51	0.22*	-0.05	0.37*	0.1	0.05	0.02	0.09	0.03	-0.07	-0.02	1									
12. Profitability	0.05	0.21	-3.57	0.77	0.00	0.06	0.05	-0.03	-0.01	0.04	-0.03	-0.03	0.02	0.07	-0.05	1								
13. Liability ratio	0.51	0.17	0.08	0.97	0.01	-0.02	-0.09	-0.03	0.06	-0.05	0.07	-0.04	-0.04	-0.14*	0.28*	-0.29*	1							
14. R&D intensity	0.02	0.03	0.01	0.24	0.26*	-0.05	0.21*	0.07	0.02	0.04	0.03	0.07	0.01	0.02	-0.09	0.09	-0.29*	1						
15. Tangibility	0.32	0.18	0.01	0.77	-0.22*	0.05	-0.09	0.00	-0.13*	0.02	-0.03	-0.07	-0.03	-0.17*	-0.12	-0.07	0.13*	-0.15*	1					
16. Cashflow intensity	0.07	0.06	-0.15	0.47	0.03	-0.01	0.02	-0.03	-0.12	0.06	-0.11	-0.09	0.05	0.05	-0.13*	0.49*	-0.39*	0.21*	0.15*	1				
17. Payout ratio	0.23	0.39	-1.20	2.58	0.02	-0.03	0.05	0.05	0.04	-0.04	0.03	0.04	-0.01	0.01	0.16	0.00	0.02	0.00	-0.01	0.00	1			
18. Family CEO	0.29	0.46	0.00	1.00	-0.19*	0.23*	0.08	0.02	0.01	0.02	-0.03	-0.01	-0.02	-0.19*	0.04	0.02	-0.06	-0.02	-0.04	-0.06	0.06	1		
19. Environmental Pillar Score	4.84	1.87	0.09	10.00	0.38*	-0.20*	0.21*	-0.03	-0.07	0.08	-0.06	-0.04	0.00	0.19*	0.12*	-0.01	0.00	0.25*	-0.11	0.06	-0.01	-0.19*	1	
20. Social Pillar Score	4.16	1.44	0.00	8.82	0.10	0.01	0.12	0.05	0.09	0.09	0.06	0.05	0.11	0.00	0.00	0.05	0.04	0.12	0.03	0.19*	0.08	-0.12	0.17*	1
21. Governance Pillar Score	4.02	1.53	0.10	9.88	-0.08	-0.12	-0.1	-0.08	-0.22*	-0.06	-0.16*	-0.13*	-0.07	0.10	-0.08	-0.03	-0.11	0.04	0.12	0.06	0.04	0.00	0.02	-0.01

* indicates significance at the 10% level

4 Results

4.1 Main Analysis

Table 2 presents the regression results for H1, which predicts a negative effect of family ownership on GHG emission reduction, and H2, which predicts that firm internationalization positively moderates this relationship. Model 1 includes only

Table 2 Hypotheses 1 and 2—Regression results

	Model 1	Model 2	Model 3	Model 4	Model 5
Dependent Variable: Carbon emissions score					
Family Ownership (%)		−0.057** (0.038)		−0.053** (0.038)	−0.067*** (0.005)
Internationalization			0.691** (0.016)	0.640** (0.014)	0.420** (0.044)
Family Ownership (%) x Internationalization					0.033*** (0.007)
Institutional Ownership (%)	−0.019 (0.316)	−0.026 (0.361)	−0.009 (0.742)	−0.016 (0.567)	−0.020 (0.464)
Size	0.029*** (0.000)	0.026*** (0.000)	0.024*** (0.001)	0.021*** (0.000)	0.021*** (0.000)
Profitability	0.903*** (0.009)	0.925*** (0.000)	0.862*** (0.003)	0.885*** (0.000)	0.954*** (0.000)
Liability ratio (%)	−2.079** (0.035)	−2.865** (0.023)	−1.896* (0.068)	−2.642** (0.027)	−2.519** (0.029)
R&D intensity (%)	0.089 (0.976)	−0.590 (0.489)	0.174 (0.878)	−0.465 (0.657)	−1.055 (0.192)
Tangibility (%)	−2.831*** (0.006)	−3.069* (0.071)	−2.472 (0.171)	−2.720 (0.118)	−2.969* (0.077)
Cashflow intensity (%)	−6.094*** (0.001)	−7.093*** (0.001)	−5.527*** (0.005)	−6.501*** (0.002)	−6.845*** (0.002)
Payout ratio (%)	−0.004 (0.876)	−0.009 (0.367)	−0.002 (0.807)	−0.007 (0.468)	−0.007 (0.522)
Family CEO	−0.283 (0.324)	−0.290 (0.400)	−0.190 (0.541)	−0.204 (0.519)	−0.109 (0.722)
Intercept	9.320*** (0.000)	10.211*** (0.000)	8.804*** (0.000)	9.673*** (0.000)	9.798*** (0.000)
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.128	0.162	0.159	0.188	0.211
F-Statistics	5.671	6.305	5.637	7.265	8.708
No. of observations	432	432	432	432	432

Standard errors appear in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively

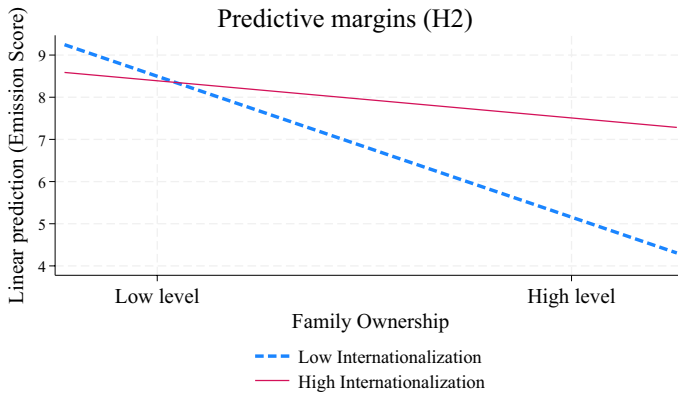


Fig. 3 Moderating effect of internationalization

control variables. Model 2 introduces family ownership, showing a negative and significant coefficient ($\beta = -0.057^{**}, p = 0.038$), supporting H1. This result suggests that Korean MNEs with higher levels of family ownership tend to perform worse on GHG emission outcomes, consistent with the expectation that Type II agency costs and the dark side of SEW outweigh legacy-preserving motivations under weaker institutions. Model 3 tests the main effect of internationalization and finds a positive and significant coefficient ($\beta = 0.691^{**}, p = 0.016$), indicating that international presence may compensate for institutional voids and lead to better GHG performance.

Models 4 and 5 test the interaction between family ownership and internationalization. The interaction term is positive and significant ($\beta = 0.033^{***}, p = 0.007$), lending support to H2. This result suggests that the effect of internationalization strengthens as family ownership increases, consistent with our argument that internationalization acts as an important constraint when family owners tend to err on the dark side of SEW. Figure 3 visualizes the interaction effect. The marginal effect of family ownership on GHG performance is negative at both low and high levels of internationalization. However, the slope is flatter for firms with broader international presence, indicating that the negative effect of family ownership becomes less pronounced as internationalization increases. This visual evidence reinforces the idea that international embeddedness can buffer against the downsides of family influence, although it does not fully eliminate these effects.

To test H3a–3c, we replaced the internationalization variable with our FX dependency indicators, which reflect the firm's exposure to specific geographic regions. Table 3 reports the results of our regression for exposure to EUR (Models 6–8) and CNY (Models 9–12). Model 6–8 test the effect of European dependency (H3a). The main effect of EUR dependency is consistently positive and significant across all model specifications (e.g., $\beta = 0.224^{**}, p = 0.025$ in Model 8), suggesting that Korean MNEs exposed to stringent regulatory environments exhibit superior carbon-emission performance. In Model 8, the interaction term between family ownership and EUR dependency is also positive and significant

Table 3 Hypotheses 3a and 3c—Regression results

	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Dependent Variable: Carbon emissions score						
Family Ownership (%)		−0.055** (0.049)	−0.062** (0.033)			−0.060*** (0.000)	−0.059*** (0.000)
EUR Dependency	0.287** (0.013)	0.272** (0.014)	0.224** (0.025)				
Family Ownership (%) x EUR Dependency			0.014** (0.029)				
CNY Dependency				−0.079 (0.590)			
Controlled CNY Dependency					−0.376** (0.048)	−0.390** (0.036)	−0.365* (0.088)
Family Ownership (%) x Controlled CNY Dependency							−0.003 (0.815)
Institutional Ownership	−0.015 (0.596)	−0.022 (0.446)	−0.022 (0.432)	−0.003 (0.873)	−0.003 (0.897)	−0.009 (0.649)	−0.009 (0.639)
Size	0.026*** (0.001)	0.023*** (0.000)	0.022*** (0.001)	0.023*** (0.000)	0.022*** (0.000)	0.019*** (0.003)	0.019*** (0.003)
Profitability	0.842*** (0.001)	0.866*** (0.000)	0.997*** (0.000)	0.641* (0.068)	0.615* (0.078)	0.636* (0.063)	0.636* (0.063)
Liability ratio (%)	−1.978* (0.072)	−2.750** (0.029)	−2.949** (0.020)	−1.828* (0.068)	−1.837* (0.065)	−2.742*** (0.006)	−2.754*** (0.006)
R&D intensity (%)	−0.092 (0.926)	−0.744 (0.421)	−1.250 (0.206)	−1.328 (0.663)	−1.703 (0.575)	−2.272 (0.446)	−2.304 (0.441)
Tangibility (%)	−2.432 (0.174)	−2.686 (0.120)	−2.614 (0.127)	−2.388** (0.027)	−2.371** (0.027)	−2.493** (0.018)	−2.497** (0.018)

Table 3 (continued)

	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Dependent Variable: Carbon emissions score						
Cashflow intensity (%)	-5.271*** (0.007)	-6.290*** (0.003)	-6.919*** (0.001)	-5.556*** (0.003)	-5.188*** (0.005)	-6.247*** (0.001)	-6.269*** (0.001)
Payout ratio (%)	-0.004 (0.684)	-0.009 (0.372)	-0.010 (0.323)	-0.006 (0.819)	-0.006 (0.834)	-0.012 (0.650)	-0.012 (0.648)
Family CEO	-0.266 (0.432)	-0.274 (0.395)	-0.238 (0.437)	-0.221 (0.443)	-0.205 (0.475)	-0.222 (0.429)	-0.224 (0.425)
Intercept	8.994*** (0.000)	9.880*** (0.000)	10.031*** (0.000)	9.345*** (0.000)	9.290*** (0.000)	10.253*** (0.000)	10.262*** (0.000)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.144	0.176	0.188	0.171	0.180	0.217	0.217
F-Statistics	5.514	6.961	7.712	3.893	4.138	4.917	4.661
Observations	432	432	432	432	432	432	432

Standard errors appear in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively

($\beta = 0.014^{**}$, $p = 0.029$), indicating that exposure to the European region is not only associated with superior GHG emission performance but also mitigates the negative effect of family ownership on this performance among Korean firms. These results support H3a. They are visualized in the top-left graph in Fig. 4, which shows the predictive margins of Model 8 under different levels of EUR dependency.

Models 9–12 in Table 3 examine dependency on China (H3c). The initial estimation (Model 9) shows no significant effect of CNY dependency. However, this result may be biased by the co-movement between the Chinese yuan (CNY) and the U.S. dollar (USD) due to China's informal currency peg. To address this bias, we re-estimated FX dependency using a two-currency market model that jointly includes CNY and USD returns, allowing for a cleaner identification of institutional exposure to China. This adjustment provides a more accurate assessment of the CNY exposure by separating it from fluctuations driven by the USD. The CNY dependency variable was then re-coded accordingly. In the adjusted models, CNY dependency becomes significantly negative (e.g., $\beta = -0.376^{**}$, $p = 0.048$ in Model 10 and $\beta = -0.365^{*}$, $p = 0.088$ in Model 12), suggesting that a lax institutional environment reduces incentives for emission reduction. Nevertheless, the moderating effect of family ownership remains insignificant (Model 12), offering limited support for H3c (see also the top-right graph in Fig. 4, which visualizes the interaction). These results may indicate that, in the case of China, institutional laxity uniformly weakens environmental engagement, leaving little room for ownership structure to moderate the effect.

Finally, Table 4 presents the results for dependency on USD, GBP, and JPY. Across all models, neither the main effects nor the interaction terms are statistically significant. These null results offer support for H3b, which predicted the absence of moderating effects from institutional environments with moderate climate stringency. The near-parallel lines in the predictive margin plots (Fig. 4, bottom panels) further illustrate that these regions do not meaningfully alter the

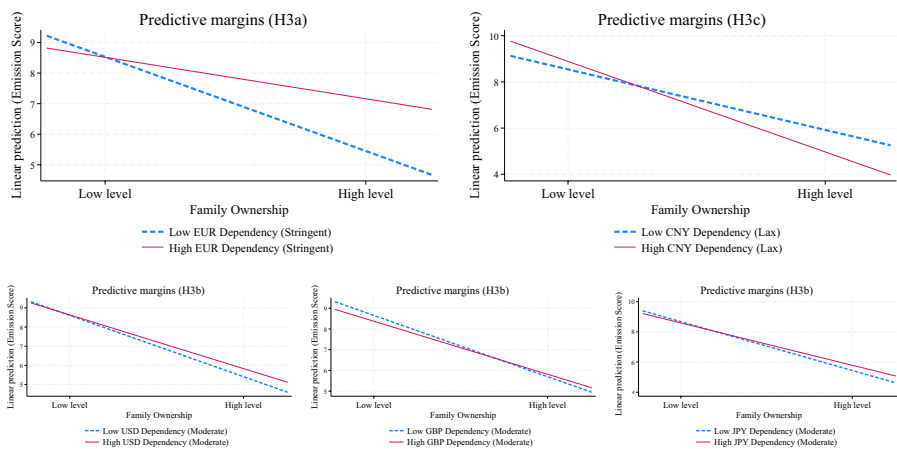


Fig. 4 Moderating effect of regional exposure: Stringent (EUR), Lax (CNY), and Moderate (USD, GBP, JPY)

Table 4 Hypothesis 3b—Regression results

	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18
Dependent variable	Dependent variable: Carbon emissions score					
Family Ownership (%)		−0.064*** (0.000)		−0.059*** (0.000)		−0.065*** (0.000)
USD Dependency	0.140 (0.223)	0.145 (0.203)				
Family Ownership (%) x USD Dependency		0.008 (0.207)				
GBP Dependency			−0.082 (0.572)	−0.162 (0.270)		
Family Ownership (%) x GBP Dependency				0.008 (0.373)		
JPY Dependency					0.028 (0.809)	0.046 (0.693)
Family Ownership (%) x JPY Dependency						0.009 (0.200)
Institutional Ownership	−0.016 (0.398)	−0.024 (0.210)	−0.020 (0.308)	−0.027 (0.161)	−0.019 (0.330)	−0.025 (0.199)
Size	0.028*** (0.000)	0.024*** (0.000)	0.030*** (0.000)	0.027*** (0.000)	0.029*** (0.000)	0.025*** (0.000)
Profitability	0.866** (0.013)	0.961*** (0.006)	0.926*** (0.008)	1.019*** (0.004)	0.896** (0.010)	0.987*** (0.005)
Liability ratio (%)	−2.114** (0.032)	−3.020*** (0.002)	−2.062** (0.037)	−2.826*** (0.005)	−2.092** (0.035)	−3.070*** (0.002)
R&D intensity (%)	0.180 (0.953)	−0.708 (0.812)	−0.057 (0.985)	−0.767 (0.797)	0.067 (0.982)	−0.917 (0.759)
Tangibility (%)	−2.614** (0.013)	−2.649** (0.011)	−2.897*** (0.006)	−3.191*** (0.002)	−2.803*** (0.007)	−2.781*** (0.008)
Cashflow intensity (%)	−5.926*** (0.001)	−7.176*** (0.000)	−6.185*** (0.001)	−7.523*** (0.000)	−6.044*** (0.001)	−7.325*** (0.000)
Payout ratio (%)	−0.005 (0.862)	−0.011 (0.698)	−0.005 (0.843)	−0.012 (0.659)	−0.004 (0.881)	−0.008 (0.755)
Family CEO	−0.284 (0.322)	−0.293 (0.297)	−0.266 (0.357)	−0.285 (0.316)	−0.279 (0.331)	−0.269 (0.340)
Intercept	9.194*** (0.000)	10.127*** (0.000)	9.337*** (0.000)	10.271*** (0.000)	9.298*** (0.000)	10.222*** (0.000)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.132	0.171	0.129	0.166	0.128	0.167
F-Statistics	5.260	5.923	5.126	5.717	5.096	5.745
Observations	432	432	432	432	432	432

Standard errors appear in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively

relationship between family ownership and climate performance. Such null findings, including the absence of significant main effects, are consistent with the view that these regions exert only limited institutional pressure.

4.2 Robustness Checks

We conducted two analyses to evaluate the robustness of our findings. First, we conducted a placebo test to examine whether the negative association between family ownership and GHG performance extended to other forms of non-financial performance by using alternative MSCI scores, specifically the Social and Governance pillar scores. Across all model specifications, family ownership showed no significant effect on either outcome, suggesting that the observed relationship is climate-specific rather than a general reflection of weak ESG performance. These results underscore the distinctiveness of climate-related pressures as a key constraint on family-owned MNEs in emerging markets.

Second, we addressed concerns about ESG rating inconsistencies across providers (Chatterji et al., 2016) by replacing the MSCI-based outcome with firms' actual CO₂-equivalent emissions data obtained from Refinitiv (ENERDP023). Following prior studies, we applied a natural log transformation to normalize the distribution. Under this alternative specification, higher emission values represent weaker environmental performance, and the hypothesis implies that family ownership is associated with greater emissions.

As shown in Table 5, Models 19 to 23 indicate that family ownership is significantly and positively associated with actual CO₂ emissions ($\beta = 0.065^{***}$, $p = 0.000$ in Model 19 and $\beta = 0.071^{**}$, $p = 0.000$ in Model 23), consistent with the main hypothesis that family control dampens climate engagement (H1). Furthermore, both internationalization ($\beta = -0.522^{***}$, $p = 0.000$ in Model 20 and $\beta = -0.279^{**}$, $p = 0.030$ in Model 21) and its interaction with family ownership ($\beta = -0.035^{***}$, $p = 0.000$) remain statistically significant, providing robust support for our argument that international pressures constrain the influence of family ownership (H2).

In Model 22, EUR dependency shows a significant negative effect ($\beta = -0.153^*$, $p = 0.077$), while in Model 23, its interaction with family ownership is again significant ($\beta = -0.011^{**}$, $p = 0.031$), indicating that dependency on more stringent regions continues to attenuate the adverse effect of family ownership on emissions (H3a). Figure 5 presents the predictive margins for the robustness models using actual CO₂ emissions as the dependent variable. The left panel corresponds to H2, illustrating the interaction between family ownership and internationalization. The right panel represents H3a, which tests the moderating role of EUR dependency, reflecting exposure to stringent institutional environments. Both panels show a steep positive relationship between family ownership and CO₂ emissions (indicating poor climate performance). By contrast, the slopes for high internationalization and high EUR dependency are notably flatter, suggesting that external exposure reduces the negative environmental impact of family ownership. Finally, we find no significant

Table 5 Robustness check—Replacing MSCI emission score with refinitiv CO2 emissions

	Model 19	Model 20	Model 21	Model 22	Model 23
Dependent Variable: Total CO2 equivalent emissions (Tons)					
Family Ownership (%)	0.065*** (0.000)	0.064*** (0.000)	0.067*** (0.000)	0.066*** (0.000)	0.071*** (0.000)
Internationalization		− 0.522*** (0.000)	− 0.279** (0.030)		
Family Ownership (%) x Internationalization			− 0.035*** (0.000)		
EUR Dependency				− 0.153* (0.077)	− 0.115 (0.190)
Family Ownership (%) x EUR Dependency					− 0.011** (0.031)
Institutional Ownership	0.010 (0.517)	0.007 (0.634)	0.009 (0.556)	0.007 (0.668)	0.007 (0.655)
Size	0.031*** (0.000)	0.037*** (0.000)	0.035*** (0.000)	0.032*** (0.000)	0.032*** (0.000)
Profitability	− 0.120 (0.509)	− 0.102 (0.567)	− 0.110 (0.520)	− 0.088 (0.631)	− 0.147 (0.423)
Liability ratio (%)	− 1.157 (0.121)	− 1.678** (0.023)	− 1.356* (0.058)	− 1.390* (0.066)	− 1.380* (0.066)
R&D intensity (%)	0.543 (0.870)	0.594 (0.855)	1.524 (0.627)	1.108 (0.740)	1.663 (0.617)
Tangibility (%)	− 0.757 (0.382)	− 1.084 (0.201)	− 0.703 (0.393)	− 0.888 (0.305)	− 0.795 (0.357)
Cashflow intensity (%)	1.607 (0.268)	0.699 (0.625)	0.924 (0.503)	1.127 (0.444)	1.423 (0.333)
Payout ratio (%)	0.071*** (0.000)	0.068*** (0.001)	0.065*** (0.001)	0.071*** (0.000)	0.072*** (0.000)
Family CEO	0.976*** (0.000)	0.781*** (0.000)	0.666*** (0.000)	0.966*** (0.000)	0.949*** (0.000)
Intercept	12.476*** (0.000)	13.101*** (0.000)	12.767*** (0.000)	12.710*** (0.000)	12.633*** (0.000)
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.290	0.329	0.375	0.297	0.307
F-Statistics	13.18	14.29	16.03	12.35	11.84
Observations	394	394	394	394	394

Standard errors appear in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively

effects for dependency on CNY or other currencies (USD, GBP, JPY), which aligns with our earlier results.

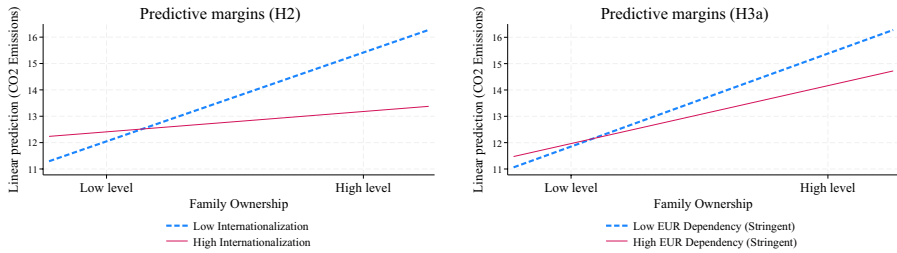


Fig. 5 Robustness check: Moderating effect of internationalization (H2) and EUR dependency (H3a) on GHG emissions

Taken together, these robustness checks reinforce the validity of our core findings and show that the relationship between family ownership and climate performance is distinctive and consistent across alternative data sources.

5 Discussion

This paper explored the relationship between family ownership and corporate GHG emission performance by examining Korean MNEs with varying levels of family control. We hypothesized that, in institutional voids, owners may prioritize family interests over those of minority shareholders and other stakeholders, reflecting Type II agency costs. Our findings supported the negative influence of family ownership on GHG emission performance among Korean firms. However, we also found that internationalization positively moderates this relationship, suggesting that family firms facing increased climate-related pressures as they internationalize are more likely to engage with stakeholder expectations. At the same time, family firms do not react uniformly to host-country institutions: Korean family MNEs respond heterogeneously to GHG-related regulatory pressures depending on their regional exposure. Euro-dependent MNEs are more likely to engage in GHG reduction, showing a positive moderation of the family ownership effect. Conversely, MNEs dependent on China exhibit weaker emission performance, consistent with the negative implications of lax regulatory environments. However, we find no significant moderating effect for USD, GBP, or JPY regional exposure.

Our results indicate that Korean MNEs controlled by families are less likely to reduce GHG emissions, consistent with previous findings that controlling families may use corporate assets and resources for private interests (Bae et al., 2012; Claessens et al., 1999; Johnson et al., 2000; Kim et al., 2007). From an SEW perspective, family owners seek to preserve non-financial wealth, including family control and influence. Strategies that address external pressures to combat climate change can help protect the family from reputational damage, but they may also diminish family authority and increase costs. Our study provides evidence that external contexts are crucial to understanding how the balance between these two sides of SEW is achieved. This insight supports recent SEW scholarship emphasizing the context-dependent expression of family firm motivations (Gómez-Mejía et al., 2025).

Domestic institutional voids and internationalization within lax institutional environments tend to reinforce their darker side, while exposure to stringent host-country regulations encourages family firms to express the bright, legacy-building side. These results not only contribute to ongoing debates about the dual nature of SEW but also illustrate the value of a comparative perspective, moving beyond research focused primarily on Western European contexts where family ownership is linked to enhanced sustainability (Cruz et al., 2014; Garcés-Ayerbe et al., 2022).

Our finding that more internationalized firms exhibit better emission performance is consistent with previous studies on external pressures (Attig et al., 2016) and institutional theory (Nippa et al., 2021). Among the various sources of external influence, our study highlights internationalization as a fundamental channel through which stakeholder pressures are transmitted. The issue of climate change is inherently global, yet regulatory and institutional responses vary widely across countries. Consequently, the international scope of a firm determines its sensitivity toward institutional expectations. Our approach is distinctive in measuring international exposure through FX dependency. This methodology allows us to assess the varying degrees of influence that different host-country institutions exert on family-owned MNEs, integrating both direct and indirect forms of institutional pressure.

Our findings do not support a moderation effect of dependency on the Chinese market. The most immediate interpretation is that the main effect (the negative association between CNY dependency and GHG emission performance) is dominant. Moreover, China and Korea are highly economically integrated through dense supply-chain and investment linkages. Both economies also feature concentrated ownership structures and relatively limited protection for minority shareholders, which together reduce external accountability. As a consequence, being financially dependent on China may not expose Korean family firms to governance logics that are sufficiently novel to drive the moderation effect that we expected in H3c.

The most plausible interpretation of the non-significant moderating effects for USD, GBP, and JPY exposure is that these regions exert only moderate institutional pressure, insufficient to influence MNEs' GHG emission performance, as proposed in H3b. Since meeting climate-related expectations may entail short-term costs, pressures below a certain threshold of stringency are unlikely to motivate meaningful change. While null results always leave open the possibility that larger or more detailed datasets could reveal subtle effects, it is noteworthy that both the main and interaction terms remain consistently insignificant across three distinct contexts (the United States, the United Kingdom, and Japan), which otherwise differ considerably in their economic and institutional characteristics.

6 Conclusion

This study advances international business research by showing that the effects of family ownership on climate strategy are positive in strong institutional environments but negative under institutional voids. It also identifies internationalization as a key channel through which institutional pressures shape sustainability behavior, contingent on host-country regulatory stringency. Methodologically, the use of

FX exposure offers a novel way to capture firms' institutional embeddedness across regions, highlighting how family-owned MNEs from emerging markets navigate sustainability challenges in a global context. These findings contribute to a comparative understanding of how international embeddedness interacts with domestic governance to shape firms' climate-related strategies.

This paper is not without limitations, which should be addressed in future research. First, the sample size is relatively modest. While we believe the sample is broadly representative of Korean firms operating across diverse institutional environments, greater external validity could be achieved through larger samples that capture a broader range of firm sizes and levels of internationalization.

Second, extending the analysis to family-owned MNEs from other emerging economies would further strengthen the comparative perspective. Korean family firms operate within a unique socio-economic context marked by strong founder influence, chaebol structures, and relatively weak domestic enforcement of climate policy. However, these characteristics are not exclusive to Korea. Emerging markets such as China, India, or Southeast Asian economies also feature institutional gaps, state-business entanglement, and concentrated family control. Comparative studies across these economies may further clarify the disciplining role of internationalization across governance ecosystems. Research has provided initial evidence that excessive family influence persists in East Asian countries with weak institutions (El Ghoul et al., 2016) and that Chinese family firms invest less in pollution prevention strategies than their counterparts (Fan et al., 2021).

Third, we rely on publicly available ESG data from MSCI, which may introduce measurement biases. Although these data are widely used, and we conducted robustness analyses using another database, Refinitiv, the quality of ESG ratings can vary across firms (Chatterji et al., 2016), potentially affecting the accuracy of the GHG performance metrics. Future research could extend this approach by incorporating additional data sources to strengthen the comparability of climate-related assessments.

Fourth, our use of FX exposure as a proxy for regional institutional embeddedness may not capture the full spectrum of institutional pressures. Future research could complement this approach with other host-country measures, such as CSR reporting requirements, NGO activity, or bilateral policy agreements, to offer a richer picture of the channels through which international influences affect family firms.

Our findings offer several actionable insights. For owners and top managers of family firms, the study highlights the governance-enhancing potential of internationalization. By engaging in institutionally demanding markets, family firms can not only expand commercially but also adopt more stakeholder-aligned practices. Institutional investors and ESG analysts should refrain from treating family ownership as a universal risk factor; instead, they should assess a firm's embeddedness in external institutional environments and recognize that family firms operating in more regulated regions tend to exhibit better climate performance than their counterparts focused on institutionally lax markets. Integrating this logic into ESG evaluation models may enable more nuanced screening and engagement strategies. Lastly, for policymakers in emerging economies, our results suggest that indirect institutional

pressure, through trade linkages, investment treaties, or participation in international environmental frameworks, may be an effective route for diffusing climate standards to family-owned MNEs.

In sum, this paper offers a foundation for developing a more comparative and institutionally grounded understanding of how family ownership interacts with global environmental expectations. As climate change becomes an increasingly salient issue for firms, understanding the boundary conditions governing firm engagement across ownership forms and institutional systems will remain an important avenue for research.

Acknowledgement We thank comments to previous versions of this paper by discussants and participants at the Euro-Asia Management Studies Association annual conferences (Tokyo, 2022; Stockholm, 2023); the Academy of International Business annual conference (Seoul, 2024); and the Strategic Management Society annual conference (Istanbul, 2024).

Funding Open access funding provided by Università Commerciale Luigi Bocconi within the CRUI-CARE Agreement.

Data availability The dataset analysed in this study was compiled by the authors from the sources described and cited in the paper.

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