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Female Directors, Family Firms, Climate Talk and Climate Walk: European Evidence

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ABSTRACT

Growing attention is attributed to symbolic and substantive climate efforts, labelled as climate talk and walk. Focusing on the European capital market, we study the relationship between board gender diversity, family ownership and different levels of corporate climate activities along the continuum from climate talk to climate walk. Using emission reduction target data from the Carbon Disclosure Project (CDP), we conduct various panel regression analyses and propose several additional robustness tests. Our results extend prior research on carbon performance and reporting by providing novel insights into how firms translate their climate ambitions into actionable targets and how they subsequently deliver on those targets. This study stresses that firms with gender-diverse boards engage more in symbolic climate talk but not in substantive climate walk. Empirical evidence on the family ownership impact is mixed. Overall, family ownership tends to exhibit a negative association with climate actions, although the effect depends on the ownership concentration threshold and varies with family management. Our results also indicate that female directors mitigate the negative direct consequences of family ownership for climate actions. Our study contributes to the ongoing discourse regarding symbolic and substantive climate efforts among European businesses and sheds light on the particular role of different corporate governance mechanisms for attaining international climate objectives. As climate-related regulatory initiatives unfold rapidly, the results are highly relevant to European firms, their stakeholders and regulators. In terms of their practical application, our results may inform the pending 'omnibus' proposals to revise European sustainability legislation while also helping firms to reflect on their governance structures in line with climate needs.

1 | Introduction

Global climate change mitigation efforts have become increasingly urgent, exerting substantial pressure on firms to account for and reduce their carbon emissions and strengthen their carbon reporting quality (Block et al. 2024; Qian and Schaltegger 2017). Meanwhile, the literature on carbon and environmental outcomes is facing significant challenges to differentiate between symbolic and substantive efforts, referred to as 'climate talk and walk' (Bingler et al. 2024; Coen et al. 2022; Herman et al. 2024; Morrison et al. 2024). In line with previous research, we define *climate talk* as merely symbolic climate efforts focusing on climate-related communications, whereas *climate walk* indicates substantive efforts based on fundamental improvements in climate-related performance. The notion of climate talk and walk thus implies that there is a continuum of climate efforts that can be divided into symbolic and substantive sets of actions. Among others, symbolic climate efforts include the (voluntary) disclosure of carbon information or signalling the intention to reduce emissions through carbon targets. These represent communicative acts not directly representative of any substantive underlying efforts to reduce emissions (Bingler et al. 2024; Dahlmann 2024), which is why we consider these as *climate talk* throughout our analysis. In contrast, beyond mere symbolism, firms may prioritize fundamental improvements in climate-related performance. This includes efforts to align their climate objectives with the wider implications of climate science as well as subsequently following up on their commitments to reduce emissions (Ben-Amar et al. 2024; Bendig et al. 2023; Ioannou et al. 2016). We refer to these substantive climate efforts as *climate walk* throughout our study.

The role of the board of directors in aligning corporate objectives with stakeholder demands to improve carbon outputs has attracted considerable attention (Dyck et al. 2023; Michelon and Parbonetti 2012; Velte 2024a). As an important aspect of board composition, the impact of board gender diversity (BGD) has been widely addressed in academic research. Previous studies document a positive relationship between BGD and corporate carbon performance and reporting (Konadu et al. 2022; Kordsachia et al. 2023; Nimer et al. 2024; Velte 2025). However, although gender-diverse boards are frequently associated with superior carbon outcomes, studies also raise questions as to what extent gender-diverse boards catalyse substantive climate action beyond merely symbolic improvements (Ghitti et al. 2024; Haque 2017; Taglialatela et al. 2024). Accordingly, Taglialatela et al. (2024) find that higher levels of BGD are linked to a more pronounced focus on green communications vis-á-vis implementation, that is, talk is being prioritized over walk. Similarly, although gender-diverse boards tend to favour more carbon reduction initiatives, this may not lead to actual emission reductions (Haque 2017).

Thus, although the BGD–carbon link is generally well established in the literature, several research gaps can be identified. For instance, it remains unclear to what extent female directors contribute to the formalization of decarbonization strategies by means of setting decarbonization targets and what role they subsequently play in meeting these commitments. To the best of our knowledge, no prior study has analysed the role of female board members in the process of setting, validating and finally achieving decarbonization targets as a new means to distinguish between climate talk and walk.

Besides the board of directors, differences in the ownership structure are found to affect firms' climate change strategies (Velte 2024a). In this regard, family ownership (FO) is of high significance, with 32% of all publicly listed firms in Europe being identified as family firms (Gregorič et al. 2022). Family owners, as presumably long-term-oriented, are expected to follow idiosyncratic sustainability motives, yet mixed results prevail within empirical research (Kavadis and Thomsen 2023; Lorenzen et al. 2024; Miroshnychenko et al. 2022). Emphasizing the need to differentiate between symbolic and substantive environmental efforts in the family business domain, Miroshnychenko et al. (2022, 80) call for more research to disentangle the '(mis) alignment between environmental operational practices and environmental communications'. In this regard, no prior study, as far as we are aware, has directly addressed the relationship between family involvement and climate talk and walk. Initial results tend to suggest that family firms may favour implementation over communication, because they engage less in public displays of their commitments despite better or at least equal carbon performance and may, therefore, be less inclined to greenwash (Borsuk et al. 2024; Dyck et al. 2024; Kim et al. 2017). However, these results do not seem to hold among European publicly listed firms (Dyck et al. 2024; Lorenzen et al. 2024), which is our research context.

The interaction between the board of directors and ownership structure may help to further explain the individual and joint effects of BGD and FO on corporate climate strategies. Early studies have started to assess the specific interactions of BGD and FO to explain environmental reporting as well as performance outcomes, but the results remain ambiguous (Borsuk et al. 2024; Cordeiro et al. 2020; Maggi et al. 2023). This perspective is particularly promising to derive novel insights because BGD and FO are being discussed as potentially competing corporate governance mechanisms concerning environmental outcomes (Campopiano et al. 2019; Dyck et al. 2023; Fan et al. 2023; Farooq et al. 2023).

Overall, the mixed findings in previous literature indicate that there is significant untapped potential to understand climate talk and walk strategies within the European capital market. Following previous calls for research, we therefore aim to answer the research question of how BGD and FO affect corporate climate action, and whether BGD and FO influence climate talk and walk differently.

The European capital market is a particularly apposite setting to explore this topic, given that the European regulatory landscape strongly emphasizes climate legislation as well as gender equality in corporate governance. The goal of the ambitious EU Green Deal project and its related sustainable finance, reporting and corporate governance regulations is to achieve a climate-neutral economy by 2050. The dominant role of climate change can also be attributed to precise carbon reporting duties in line with the Corporate Sustainability Reporting Directive (CSRD), the EU Taxonomy Regulation and the Corporate Sustainability Due Diligence Directive (CSDDD), as well as the directive on mandatory female quotas on the board of directors in listed firms. These regulations are currently being discussed controversially, as the EU Commission plans to implement an 'omnibus' law to strengthen their linkages. Moreover, the particular context of our sample provides fertile ground to investigate the role of family owners in climate-related business decisions among European firms. On the one hand, family businesses represent a large fraction of all firms in the region, both in terms of economic output and carbon emissions (Botero et al. 2015; Gregorič et al. 2022). On the other hand, family owners, as key decision makers in many European firms, are uniquely positioned to boost (or slow down) the green transformation of the European economy, which has been under-researched to date.

Our paper contributes to the sustainability (carbon), corporate governance and family business literature in several ways.

First, our results shed light on the complex interplay between symbolic and substantive climate efforts, widely regarded as a key challenge within extant research. Second, besides the high practical relevance of achieving global decarbonization targets, our results further contribute to the academic discourse on greenwashing by providing quantifiable evidence on the extent to which firms follow up on their decarbonization commitments. Third, our findings support prior evidence that indicates that BGD and FO may be regarded as competing corporate governance mechanisms in terms of their influence on corporate climate strategies.

The rest of this paper is structured as follows. In Section 2, we summarize the findings of previous research and derive our hypotheses from a legitimacy theory perspective. In Section 3, we introduce the underlying data and method, before presenting the empirical results in Section 4. In Section 5, we discuss the results, including their robustness and limitations. In Section 6, we present our conclusions.

2 | Theory, Literature Review and Hypotheses

2.1 | Legitimacy Theory as Our Main Framework

Legitimacy theory has been identified as the most prevalent theoretical lens to explain the BGD–carbon relationship and is widely established in the literature, also in the family firm context (Nuber and Velte 2021; Panwar et al. 2014; Richards et al. 2017). Legitimacy is defined as a 'generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions' (Suchman 1995, 574), implying that organizations exist as part of broader social systems in which they gain legitimacy by aligning organizational interests with the expectations of the superordinate social system as part of an ongoing social contract (Dowling and Pfeffer 1975; Shocker and Sethi 1973). With the increasing urgency of climate change, stakeholder expectations are evolving from a reporting perspective focused on measuring and disclosing carbon emissions (Deegan 2002) towards the underlying carbon performance as a means to gain legitimacy (Qian and Schaltegger 2017).

From a legitimacy theory perspective, enhancing sustainable board dynamics to improve carbon reporting and performance should align organizational activities with societal expectations and ultimately favour firm legitimacy (Khatri 2024; Nuber and Velte 2021; Suchman 1995). Sustainable board composition, such as gender diversity among directors, affects its monitoring ability and thereby impacts carbon efforts (de Villiers et al. 2011).

BGD plays an important role in the process of gaining and maintaining legitimacy concerning climate outcomes, as female directors are more sensitive to environmental harm due to gender-specific socialization, which emphasizes altruism, benevolence and universalism (Glass et al. 2016; Liu 2018; Nadeem et al. 2020). Given their greater sensitivity for environmental impact, gender-diverse boards are regarded as more likely to respond adequately to environmental stakeholder interests, thereby presumably favouring legitimacy-seeking strategies.

However, the consequences of BGD for different types of legitimacy-seeking strategies may vary, with important implications for climate talk and walk. Based on Suchman's distinction between moral and pragmatic legitimacy, Taglialatela et al. (2024, 2894) argue that 'a higher proportion of women on the board could spur moral legitimacy seeking strategies that consist of increasing participation in public discourse proxied by more communication efforts'. According to Suchman (1995), although moral legitimacy is contingent on a normative evaluation of the organization's activities based on the audience's socially constructed value system, pragmatic legitimacy rests on the self-interested calculations of an organization's audiences, rendering the latter more transactional in nature.

Based on this distinction, Taglialatela et al. (2024) suggest that gender-diverse boards are more likely to adopt environmental strategies that focus on green communications (moral legitimacy-seeking) compared with environmental strategies that focus on implementing green practices (pragmatic legitimacy-seeking). Following their reasoning, we consider firms with more gender-diverse boards as more likely to engage in symbolic climate efforts that focus on climate-related communications such as climate talk (e.g., voluntary disclosure of carbon emissions). However, we do not anticipate increased BGD to significantly affect substantive climate efforts based on fundamental improvements in climate-related performance such as climate walk (e.g., meeting emission reduction targets).

Although the existing literature provides a very solid theoretical basis to build upon, there are several ways in which a distinct focus on climate talk and walk is warranted, going beyond previous research with a focus on environmental aspects more broadly. First and foremost, this relates to the predominant role of climate issues within the EU Green Deal project and its related regulations, drawing significant public attention to corporate climate transformation. Consequently, this raises the stakes for firms to either emphasize (or conceal) their climate progress. Within the EU taxonomy's six environmental objectives, climate change mitigation represents the most quantifiable and arguably also the most regulated objective (Velte 2024b). In contrast, other taxonomy objectives address the protection of marine resources, the transition to a circular economy and the protection of biodiversity, all of which are less specifically operationalized within the taxonomy regulation. Moreover, the European Sustainability Reporting Standards (ESRS) include a detailed standard on climate change (ESRS E1). Therefore, the growing regulatory pressure on climate actions aggravates firms' incentives to engage in symbolic climate efforts to maintain a legitimate stance. In other words, as climate issues tend to imply the most pressing legitimacy threats, a detailed analysis of symbolic and substantive climate efforts is warranted.

This notion is further reinforced by the diverse range of environmental outcomes studied in prior research, which may prove as too inclusive to allow for differentiated inference (Miroshnychenko et al. 2022). In fact, environmental performance is generally regarded as a multidimensional construct that needs to be decomposed into its specific dimensions (Endrikat et al. 2014). For instance, Taglialatela et al. (2024) covered a wide range of environmental aspects across the domains of pollution prevention (incl. carbon emissions), supply chain management, product development, corporate governance aspects such as sustainability board committees, the firm's UN global compact signatory status or CSR assurance, among others. Yet, to distinguish between symbolic and substantive efforts, the ability to measure and quantify them more narrowly constitutes an important precondition. Our research setting concerning climate talk and walk provides a unique opportunity to differentiate between symbolic and substantive climate efforts. Namely, the inherent link between carbon reporting, the formalization of decarbonization objectives through targets and their subsequent achievement offer a unique setting to distinguish between symbolic/substantive climate efforts beyond previous studies.

2.2 | The Impact of BGD on Climate Talk and Walk

In the previous section, we have argued, from a legitimacy perspective, that gender-diverse boards are likely to respond adequately to environmental stakeholder interests. Yet, based on the distinction of moral and pragmatic legitimacy (Suchman 1995), we have further applied and extended the reasoning of Taglialatela et al. (2024) to theorize that more gender-diverse boards may emphasize specific legitimacy-seeking strategies to different extents. Accordingly, we consider BGD to be associated with a focus on climate talk (moral legitimacy-seeking) rather than climate walk (pragmatic legitimacy-seeking). Building upon these considerations, below, we further review recent empirical findings concerning the BGD–carbon link to substantiate our hypotheses.

Prior research on the impact of BGD on carbon reporting and performance has increased in recent years. In terms of *carbon reporting*, prior research finds that BGD is positively associated with the (voluntary) disclosure of carbon information, demonstrating the board's ability to effectively respond to stakeholder calls for climate reporting (Caby et al. 2024; Park et al. 2023; Taglialatela et al. 2024). Furthermore, not only the existence of carbon reporting but also the quality of the disclosed carbon information is affected positively, indicating that BGD is linked to higher carbon reporting quality (García-Sánchez et al. 2025; Houqe and Khan 2023; Nimer et al. 2024). Although most evidence is drawn from non-European settings, a positive link between BGD and carbon reporting is also supported for European firms (Jizi 2017; Taglialatela et al. 2024; Tingbani et al. 2020). The positive effect of BGD is particularly prevalent among corporate boards in which female directors represent a critical mass, stressing a substantive use of sustainable boards (Gavana et al. 2024; Nuber and Velte 2021).

Regarding *carbon performance*, similar findings concerning the positive effect of BGD can be observed. BGD is associated with higher carbon performance, both in terms of absolute emissions (García Martín and Herrero 2020; Issa and In'airat 2024; Konadu et al. 2022; Kordsachia et al. 2023; Kreuzer and Priberny 2022; Kyaw et al. 2022; Marchini et al. 2022; Muktadir-Al-Mukit and Bhaiyat 2024; Oyewo 2023; Valls Martínez et al. 2022) and emissions intensity (Altunbas et al. 2022; Benlemlih and Yavaş 2024; Elsayih et al. 2021; Kordsachia et al. 2023; Lu and Wang 2021; Nuber and Velte 2021; Rjiba and Thavaharan 2022; Toukabri and Jilani 2023).

As an important intermediate mechanism translating environmental ambition into quantifiable goals, recent studies have also started to assess the influence of BGD on *emission reduction targets*. Nimer et al. (2024) found that BGD is positively associated with the establishment of emission reduction targets. However, decarbonization targets and their potential to distinguish between symbolic and substantive climate efforts have thus far been underexplored. To the best of our knowledge, the relationship between BGD and the respective *achievement on a target-level* has not been studied before, similar to the approach of Ioannou et al. (2016). Moreover, the properties of these emissions targets, such as validation by the science-based targets initiative (SBTi) as an external quality signal regarding alignment with the Paris agreement, have not been explored in depth (Bendig et al. 2023).

Despite the abundant evidence of a positive BGD–carbon relationship, a growing number of studies raise questions as to what extent BGD actually catalyses substantive climate-related improvements compared with merely symbolic climate action (Ghitti et al. 2024; Haque 2017; Taglialatela et al. 2024). Although prior research documents that BGD is linked to more carbon reduction initiatives or better reporting, this may not materialize in the form of actual emission reductions (Cordova et al. 2021; Haque 2017; Narsa Goud 2022). As such, Haque (2017) stated that although gender-diverse boards are more likely to engage in carbon reduction initiatives (process-oriented carbon performance), they do not achieve actual improvements in carbon performance. In the same vein, Taglialatela et al. (2024) found that BGD is associated with a preponderance of green communication over implementation.

Based on legitimacy theory (moral vs. pragmatic legitimacy-seeking; see Section 2.1) and empirical research emphasizing that BGD may favour symbolic over substantive climate efforts, we assume that firms with more gender-diverse boards engage more in (symbolic) climate talk but do not engage more in (substantive) climate walk, as indicated in Hypothesis 1.

Hypothesis 1. *BGD increases climate talk but not climate walk.*

2.3 | The Impact of FO on Climate Talk and Walk

From a legitimacy perspective, prior research argues that family firms are expected to be more concerned about their reputation and therefore put a particular emphasis on maintaining their legitimacy (Brunelli et al. 2024; Ma 2023; Maughan 2023). Thus, for the owning families whose image and reputation are tied to the business, the pursuit of legitimacy in general tends to be an important issue (Bammens and Hünermund 2020; Sageder et al. 2018). However, to gain legitimacy, family firms may prioritize engaging in other areas of corporate social responsibility beyond environmental matters. Namely, family firms have been found to favour social over environmental aspects, for example, in terms of strong social ties with their local communities (Herrero et al. 2024; Kim et al. 2024; Miroshnychenko et al. 2024), while also focusing more strongly on closer (internal) stakeholder groups (Block et al. 2024; Rivera-Franco et al. 2024).

In this regard, applying the concept of moral versus pragmatic legitimacy (Suchman 1995; Taglialatela et al. 2024) to the relationship between FO and climate talk and walk adds new insights to the debate on the symbolic versus substantive climate strategies among family firms. Considering the case of voluntary sustainability certifications as a communicative act, Richards et al. (2017) theorize that family firms predominantly derive moral legitimacy from well-established close relationships with stakeholders in the 'domestic world', reducing the need to communicate their sustainable practices more widely (Baumann-Pauly et al. 2013). Thus, Richards et al. (2017) suggest that family firms that frequently enjoy considerable trust in their communities are likely to believe that their family legacy and reputation guarantee sufficient legitimacy, diminishing their desire to engage in sustainability-related communications.

Extending this notion, we propose that family firms are less likely to seek moral legitimacy through symbolic climate-related communications, for example, voluntary emissions disclosure. We anticipate that family firms, having more concentrated shareholdings and dominant family owners, answer to a smaller investor base compared with firms with dispersed ownership. Consequently, family firms should be less dependent on gaining external legitimacy by engaging in climate talk.

At the same time, the 'domestic world' metaphor as a source for legitimacy in family firms described by Richards et al. (2017) implies a stronger focus on more proximate stakeholder groups, based on nonanonymous personal relationships, being negotiated at a local level between directly involved parties. This strongly resembles the pragmatic legitimacy construct introduced by Suchman (1995), in which firms gain legitimacy by more directly addressing the needs of self-interested stakeholders, such as customers or suppliers (Taglialatela et al. 2024), thereby following a more transactional give-and-take logic of legitimacy compared with moral legitimacy. Thus, contrary to their supposed under-engagement in symbolic climate talk, we consider family firms to be as likely as nonfamily firms to engage in substantive climate-related efforts (climate walk). We therefore argue that to protect their reputation in the 'domestic world', family firms seek to satisfy measurable demands of their direct audiences, for example, in the form of realized carbon emission reductions.

Empirically, in terms of *carbon reporting*, Terlaak et al. (2018) documented a non-linear effect of FO on carbon reporting, with negative consequences for moderate levels of FO, turning positive for absolute majority ownership. Qosasi et al. (2022) found a positive relationship between FO and carbon reporting, especially when the controlling family is involved in management.

In terms of *carbon performance*, Borsuk et al. (2024) found a positive effect of family involvement on carbon performance. Dyck et al. (2024) stressed that family-controlled firms exhibit equal carbon performance and even outperform nonfamily firms in countries with weak climate regulation. According to Gómez-Mejía et al. (2025), family firms under the EU emission trading system, most of which are private firms, pollute less. Earlier studies have also addressed pollution and its toxicity, such as the seminal work of Berrone et al. (2010) showing that US family firms pollute less. Oussii and Jeriji (2024) further identified a negative moderating effect of FO for the BGD–carbon performance relationship. Apart from the studies of Borsuk et al. (2024), Gómez-Mejía et al. (2025) and Dyck et al. (2024), the prior evidence on the family firm–carbon relationship is largely drawn from single-country designs with relatively small samples, such as South Korea, Indonesia and Italy.

Addressing differences in symbolic and substantive decarbonization strategies, Block et al. (2024, 14) found that 'family-owned firms seem to be less attentive than nonfamily-owned firms toward external stakeholder pressures'. Previous research showed that family-owned firms tend to engage less strongly in climate talk—that is, different communicative efforts of a symbolic nature—while engaging at least equally in climate walk. More specifically, family firms are found to engage less in public displays of their commitments despite better or at least equal carbon performance (Borsuk et al. 2024; Dyck et al. 2024). As such, 'family firms tackle carbon emissions with actions and are simply not interested in producing formal policy statements or engaging in "box-checking"' (Dyck et al. 2024, 27), indicating that while polluting less, family firms also communicate less about it (Borsuk et al. 2024).

Similarly, family firms are found to connect environmental attention with subsequent action, thereby being less likely to greenwash (Kim et al. 2017). However, these results are subject to several contingencies, questioning their validity among European publicly listed firms. Namely, the results may not apply to European countries, publicly listed firms and ownership-based family firm definitions (Dyck et al. 2024; Lorenzen et al. 2024).

Because the FO–carbon link has attracted comparably little research to date, we further contextualize the findings with evidence on environmental reporting and performance more broadly, of which carbon issues represent only one subpillar. In terms of *environmental reporting*, Maggi et al. (2023) and Ma et al. (2022) stressed a negative effect of FO, which is mitigated by a critical mass of female board members or family board chairs. Arena and Michelon (2018) indicated that strong family control and influence is associated with less environmental disclosure, whereas a strong family identity is linked to higher environmental disclosure. Likewise, Cabeza-García et al. (2017) found negative consequences of family involvement for sustainability disclosure more widely. In terms of *environmental performance*, recent meta-analyses stressed mixed results (Lorenzen et al. 2024; Miroshnychenko et al. 2022). On the one hand, family businesses exhibit slightly worse environmental performance (Miroshnychenko et al. 2022). On the other hand, family firms are found to not differ from nonfamily firms, even performing better when it comes to their environmental footprint (Lorenzen et al. 2024).

Overall, considering the moral versus pragmatic legitimacy perspective as well as the recent empirical evidence in favour of family firms potentially prioritizing implementation over communication, we consider FO to be negatively related with climate talk, yet having no noticeable effect on climate walk.

Hypothesis 2. *FO decreases climate talk but not climate walk.*

2.4 | FO as a Moderator of the Relationship Between Female Board Directors and Climate Talk and Walk

Considering the different preferences of family-owned versus nonfamily-owned firms to gain and maintain legitimacy, we hypothesize that FO (pragmatic legitimacy seeking) may mitigate or even counteract the positive impact of higher BGD (moral legitimacy seeking), especially when it comes to climate-related communications. Although board oversight is an important mechanism to limit poor environmental conduct, family firm boards may be dominated by family members whose family or economic priorities exceed environmental concerns (Galbreath 2017; Miroshnychenko et al. 2024).

Several recent studies have addressed the specific interaction between BGD and FO, indicating that BGD enhances environmental reporting and performance, whereas FO tends to inhibit this relationship, suggesting a potential negative moderating effect. Maggi et al. (2023) and Dyck et al. (2023) found a positive effect of BGD towards environmental disclosure and performance, which is reduced (but not fully offset) by family control. The adverse consequences are particularly prevalent in firms with strong family control (Arena and Michelon 2018). Reinforcing the negative perspective, the broader sustainability reporting literature shows that although BGD promotes it, the positive influence is constrained by family involvement: Stronger involvement of the family in the business is associated with a dysfunctional view in which boards reinforce family interests at the expense of sustainability reporting (El Ghoul et al. 2016; Farooq et al. 2023; Oh et al. 2019).

A potential mechanism explaining the hypothesized negative moderating effect of FO on the BGD–carbon relationship lies in lower levels of independence among female family board members (Ali Gull et al. 2023; Biswas et al. 2022; Campopiano et al. 2019; Fan et al. 2023; Gavana et al. 2024; Ghaleb et al. 2024; Rodríguez-Ariza et al. 2017; Wang et al. 2023; Yu et al. 2021). Applying these rationales and findings to our climate talk and walk setting, we hypothesize that FO negatively moderates the relationship between BGD and climate talk and walk.

Hypothesis 3. *FO negatively moderates the relationship between BGD and climate talk and walk.*

Figure 1 summarizes our conceptual model.

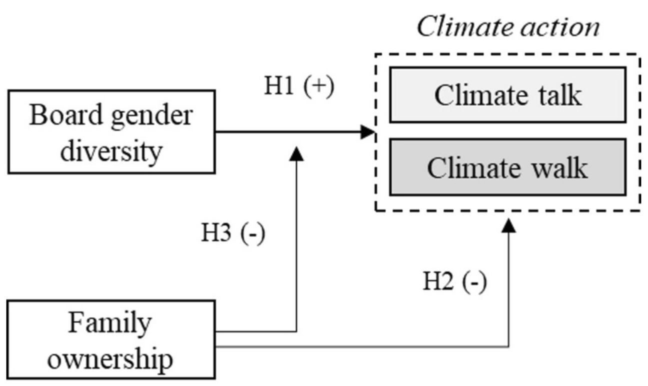

FIGURE 1 | Overview of hypotheses.

3 | Data and Method

3.1 | Sample

The dataset is compiled from three sources. First, our sample incorporates all European publicly listed firms invited to participate in the CDP (formerly known as the Carbon Disclosure Project) survey between 2010 and 2021, including nonrespondents. We focus on the European capital market since extant research has mostly addressed US samples (e.g., Berrone et al. 2010; Block and Wagner 2014; Cordeiro et al. 2020), whereas the scarce evidence concerning Europe remains ambiguous (Dyck et al. 2024). Our focus can be further justified by the EU Green Deal project and the major goal to reach a climate-neutral economy by 2050, leading to the necessity of successful corporate carbon transformation. Our specific sampling period and the European context allow us to capture a timeline of relevant decarbonization efforts among European firms after the financial crisis of 2008–2009, with a substantial uptake of voluntary emissions disclosure. With our observation period between 2010 and 2021, we specifically focus on the time prior to the introduction of the EU CSRD and the EU BGD Directive in 2022. Thus, our sampling period ensures a homogeneous regulatory environment, as these legislative changes entail significant consequences for our model variables, both the dependent and independent ones. Second, financial and ESG data from Refinitiv are matched to the CDP sample firms. Third, global ultimate ownership information is drawn from the Bureau van Dijk Orbis Europe database, which is widely used in similar studies (Block et al. 2024; Meier and Schier 2021; Requejo et al. 2018). The sample collection process is summarized in Table 1.

The total number of publicly listed CDP firms (respondents and nonrespondents) remains stable over time. Similar to other studies, we exclude financial service firms (Haque 2017; Nuber and Velte 2021). Furthermore, to clean the dataset, we drop observations from firms that are missing in any of the three databases (Orbis Europe, Refinitiv, CDP). The implied data loss decreases over time with improving carbon reporting quality. Overall, this results in an unbalanced panel of 1387 firms (9597 firm-year observations).

The composition of the sample across countries and industries is presented in Table 2. The country with the highest number of firms is the United Kingdom, followed by Germany, France and Switzerland. Regarding the sample's industry structure, manufacturing firms are predominant, followed by other energy-intensive industries including mining, utilities, transportation and real estate. Thus, apart from information technology, the sample is composed of many firms from heavy industries with high emission intensity.

3.2 | Variables

3.2.1 | Dependent Variables

To study the effect of BGD and FO on climate talk and walk, we consider different aspects of the firms' climate actions. We address increasingly selective measures of climate action across different levels, from the mere reporting of carbon emissions, to setting emission reduction targets, to achieving these targets,

TABLE 1 | Sample collection.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Publicly listed CDP firms from Europe	2938	2960	2994	2997	3000	2959	2924	2873	2825	2746	2660	2559
less												
Financial service firms	536	539	554	557	547	541	532	521	516	505	493	481
Firms with missing values in CDP, Refinitiv or Orbis database	1812	1808	1815	1809	1800	1714	1678	1573	1266	1127	971	1143
Final sample	590	613	625	631	653	704	714	779	1043	1114	1196	935

thus allowing us to differentiate between *climate talk* and *walk*. Specifically, we consider five items (see Appendix A for a full description). First, we consider *participation* in the CDP survey, which is widely used in similar studies as a dummy variable concerning the voluntary disclosure of carbon emissions (Ben-Amar et al. 2017; Caby et al. 2024). Second, we consider the subsequent *publication* of the CDP survey data, which represents a standalone decision irrespective of CDP participation (Ott et al. 2017). Third, we analyse whether a firm has set an *emission reduction target*, which has been used in prior studies of firms' decarbonization objectives (Nimer et al. 2024).

These three variables (*participation*, *publication* and *target*) relate to the disclosure of carbon information or the intention to reduce carbon emissions and, thus, represent communicative efforts that are not representative of any substantive underlying efforts to reduce emissions. Although target setting implies a public commitment to reduce emissions (Borsuk et al. 2024), prior research shows that targets may be used as a tool to gain superficial legitimacy without following up on these commitments (Dahlmann 2024). Therefore, we consider these three items as part of our *climate talk* variable, representing symbolic climate actions.

As increasingly substantive climate actions and, hence, part of our *climate walk* variable, we consider *science-based targets* (SBTs) and the *adherence to these targets*. SBTs are emission reduction targets that are validated externally by the SBTi and are regarded as significantly more challenging compared with prevailing emission reduction targets due to their alignment with climate science (Ben-Amar et al. 2024; Bendig et al. 2023; Dahlmann 2024; Mateo-Márquez et al. 2025).

Finally, as the fifth and most substantive climate action measure, we incorporate the *adherence to targets*. Aside from the application in Ioannou et al. (2016), the adherence to targets is not yet widely used in the literature but holds significant potential to differentiate between climate talk and walk. Decarbonization targets exhibit substantial complexity along several dimensions, including their extent, form and time horizon (Bendig et al. 2023; Dahlmann et al. 2019). To accommodate different emission reduction targets in our analysis, we introduce the variable *adherence*, which is computed for each firm-year based on the delta between time passed for a given target and the (partial or full) achievement of this target. We draw from a pool of 14,362 data points of firm-year targets to calculate the adherence variable. Our approach is in line with Ioannou et al. (2016), except that we also incorporate ongoing targets, allowing us to consider a larger number of targets, and also reflect the 'work-in-progress' nature of firms' climate transitions. The targets in our sample have an average duration of 9.68 years, measured from start to target year. Overall, 25.41% of all targets are fully elapsed, whereas 74.59% are ongoing targets. On average, 66.70% of all targets are being met successfully (or are on track to do so), a ratio that is relatively stable across industries. A full description of the respective variable definitions, as well as a breakdown of the target-level data, can be found in Appendices A and B.

Generally, there are several barriers to target comparability, for example, differences in emission scopes, partial exclusion of certain emission subcategories or varying target duration and baseline years (Dahlmann 2024). To overcome these challenges and account for the diversity in emission reduction targets, *adherence* is introduced as a relative measure of progress made against a given target. This variable captures in relative terms to what extent firms achieve their committed decarbonization targets, contingent on each target's inherent characteristics. Thereby, we can address a considerably larger sample of targets compared with previous analyses, increasing the robustness of our results significantly.

In turn, this approach raises the need to also address the level of target ambition in our analysis to not penalize more ambitious (harder-to-achieve) targets vis-á-vis less ambitious ones. We account for this by using science-based targets as a proxy for target ambition (Ben-Amar et al. 2024; Bendig et al. 2023).

Finally, by also including ongoing targets and evaluating their partial achievement, our analysis builds on the assumption of time-proportional emission reduction pathways. Generally, firms that are behind schedule to meet a given target could in theory be able to catch up in later years. Yet, absent a more comprehensive strategic rationale (e.g., anticipated non-linear technological advancements), planning for disproportionate reductions at the end of the target period may itself decelerate decarbonization efforts, especially if expectations of more extensive emission reductions do not materialize towards the target's final year (Dahlmann 2024; Malen 2022).

3.2.2 | Independent Variables

As the model's two main independent variables, we employ BGD (*BGD*) and FO (*famown*). To operationalize BGD, we use the percentage of female board members, which is widely used in similar studies (Caby et al. 2024; Houqe and Khan 2023; Lemma

TABLE 2 | Sample composition by country and industry.

Panel A: By country	Number	Percent
Austria	189	1.97
Belgium	258	2.69
Cyprus	1	0.01
Czech Republic	12	0.13
Denmark	271	2.82
Finland	339	3.53
France	1027	10.70
Germany	1047	10.91
Greece	87	0.91
Hungary	41	0.43
Iceland	4	0.04
Ireland	267	2.78
Italy	113	1.18
Luxembourg	84	0.88
Malta	7	0.07
Netherlands	300	3.13
Norway	269	2.80
Poland	251	2.62
Portugal	60	0.63
Romania	2	0.02
Russia	254	2.65
Slovenia	6	0.06
Spain	324	3.38
Sweden	592	6.17
Switzerland	781	8.14
Turkey	96	1.00
United Kingdom	2915	30.37
Total	9597	100.00

Panel B: By industry (NAICS sector)	Number	Percent
Accommodation and Food Services	179	1.87
Admin. Support, Waste Mgmt. and Remediation Services	284	2.96
Agriculture, Forestry, Fishing and Hunting	45	0.47
Arts, Entertainment and Recreation	108	1.13
Construction	433	4.51
Educational Services	6	0.06
Health Care and Social Assistance	73	0.76
Information	860	8.96
Management of Companies and Enterprises	4	0.04
Manufacturing	3812	39.72
Mining, Quarrying and Oil and Gas Extraction	564	5.88
Other Services (except Public Administration)	51	0.53
Professional, Scientific and Technical Services	653	6.80
Real Estate and Rental and Leasing	732	7.63
Retail Trade	642	6.69
Transportation and Warehousing	439	4.57
Utilities	474	4.94
Wholesale Trade	238	2.48
Total	9597	100.00

(Continues)

TABLE 2 | (Continued)

et al. 2023; Nimer et al. 2024). Considering the time needed to implement climate-related policies, we use lagged values of the independent variables ($t-1$); lagging the variables, along with our robustness tests, allows us to identify causal relationships (Zhang et al. 2022). Besides the ratio of female board members, we also use the Blau index (*blau_index*) as an alternative measure of BGD in our robustness tests (Maggi et al. 2023).

To operationalize FO, we use a dummy variable indicating whether the firm is owned by 'one or more named individuals or families' at the global ultimate ownership level. Similar to other family business studies, in our main analysis, we use the 25.01% threshold (Requejo et al. 2018). The global ultimate ownership data is only available for one time period, implying stability over time. This is common practice in other studies (Ali et al. 2007; Brune et al. 2019a) as FO is regarded as relatively persistent, with little variation over shorter time periods, partly due to the long transgenerational time horizon of family owners. However, we also test lower FO thresholds used in other studies, namely, more than 5% or 10% of FO, respectively. To complement our main FO variable and to address some data limitations, these are computed at the direct shareholders level rather than the global ultimate ownership level (*famown_direct*). In our robustness tests, we furthermore analyse family management (*fam_mgmt*), which enables us to capture whether the family owners are directly involved in the firm's management. A detailed overview of all variables can be found in Appendix A.

3.2.3 | Control Variables

Similar to previous related studies (Borsuk et al. 2024; Döring et al. 2023), we control for firm financial characteristics such as profitability (*roa*) and firm size (*size*) as measured by the logarithm of total assets. More profitable and larger firms are expected to devote more resources to climate-related initiatives, such as carbon reporting (Baumann-Pauly et al. 2013; Wickert et al. 2016). As corporate governance-related controls, we consider board independence (*independence*), board size (*B_size*), the number of board members' affiliations (*B_affiliation*) and board members with specific skills (*B_skills*), in line with prior research (Haque 2017; de Villiers et al. 2011). We also include complementary sustainable board governance variables beyond BGD that are found to positively affect carbon reporting and performance (Velte 2025), namely, sustainability-related management compensation (*incentive*) and the existence of a sustainability board committee (*CSR_comm*). As an inverse measure of blockholder effects (Fattoum-Guedri et al. 2018), we include the percentage of shares in free float (*float*). Furthermore, we control for total emission intensity (*emissions*) to account for differences in high- versus low-emitting firms, in line with recent discussions in the literature in favour of emission intensity (Aswani et al. 2024). Higher emissions expose firms to greater carbon risks, potentially leading to an increased focus in managing their emissions but also greater incentives to potentially conceal their environmental harm (Asafu-Adjaye and Mahadevan 2013; Littlewood et al. 2018). Finally, we include firm age (*ln_age*) as an additional control, which may serve as a proxy for generational effects among family firms (Richards et al. 2017). In line with common practice, we have treated outliers by winsorizing values at the 1st and 99th percentiles to avoid distortion in our estimates.

3.3 | Model

We run several random-effects panel data models, all of which include year- and industry-fixed effects. Methodologically, given that FO is time-constant in our sample, we need to rely on random-effects estimators, similar to Brune et al. (2019b); fixed-effects estimators cannot be used in our setting. More specifically, it is not possible to estimate the effects of time-invariant variables using fixed-effects models since they are eliminated because of perfect collinearity (Schunck 2013). As Wooldridge (2013) explains 'The transformation in [the random-effects estimator] allows for explanatory variables that are constant over time, and this is one advantage of random effects (RE) over either fixed effects or first differencing'; the econometrician also states that 'if the key explanatory variable is constant over time, we cannot use FE to estimate its effect'. Given that FO is regarded as relatively stable over time, random-effects estimators are commonly used to test the role of FO for environmental performance and CSR more widely (Cordeiro et al. 2020; Farooq et al. 2023).

$$\begin{aligned} Climate\ talk/walk_{it} = {} & \beta_0 + \beta_1{}^*BGD_{i,t-1} + \beta_2{}^*famown_{i,t-1} \\ & + \beta_3{}^*BGD_{i,t-1} \times famown_{i,t-1} \\ & + \beta_4{}^*independence_{i,t-1} + \beta_5{}^*incentive_{i,t-1} \\ & + \beta_6{}^*CSR\_comm_{i,t-1} \\ & + \beta_7{}^*B\_size_{i,t-1} \\ & + \beta_8{}^*B\_skills_{i,t-1} + \beta_9{}^*B\_affiliation_{i,t-1} \\ & + \beta_{10}{}^*emissions_{i,t-1} + \beta_{11}{}^*roa_{i,t-1} \\ & + \beta_{12}{}^*size_{i,t-1} + \beta_{13}{}^*ln\_age_{i,t-1} \\ & + \beta_{14}{}^*float_{i,t-1} + yearFE + industryFE + e_{it} \end{aligned}$$

We use lagged values for the independent and control variables to consider the time needed to implement climate-related policies and to be able to establish causal relationships. Acknowledging that endogeneity issues permeate both the family firm as well as the carbon literature, we additionally perform a number of robustness tests (Zhang et al. 2022). Besides the use of panel data and lagged explanatory variables, we further replicate our results using alternative variable definitions, which allows us to mitigate endogeneity from measurement error. Moreover, we use *coarsened exact matching* (CEM) to find comparable treatment and control groups in order to alleviate endogeneity problems related to selection bias or omitted variables (Blackwell et al. 2009). Finally, we conduct a two-stage least squares regression (2SLS) using instrumental variables to substantiate the results derived from our base model. In this way, we can mitigate endogeneity attributable to reverse causality (see Section 4.2 for a detailed discussion).

3.4 | Descriptive Statistics

Tables 3 and 4 present the descriptive statistics of the variables as well as their pairwise correlation. The descriptive statistics indicate that the sample mean ratio of BGD is 23.5%. Meanwhile, family firms represent 19.8% of all observations (6.2% being managed by family members). At lower FO thresholds (based on direct ownership), family firms represent between 21.5% and 31.5% of observations, albeit for a smaller sample due to reduced data availability of direct shareholder data.

The pairwise correlations suggest that there are no multicollinearity problems in our regression analyses. The highest correlations among independent variables are between size and board size (0.566). Computing variance inflation factors (VIFs) indicates that multicollinearity issues likely do not affect our analyses. The VIF values for all variables lie between 1 and 3—that is, they fall well below established thresholds (Fox and Monette 1992; O'brien 2007).

Similar to Miroshnychenko et al. (2022), we further conduct two-sample *t*-tests on the equality of means to explore univariate differences among family and nonfamily firms (see Table 5). Our preliminary findings indicate that family firms tend to engage less in climate talk and walk.

4 | Results

4.1 | Main Analysis

The base model results (see Table 6) indicate that BGD has a significant positive relationship with climate talk ($p<0.05$) but not with climate walk (n.s., see Models 1–3). Thus, Hypothesis 1 is fully supported. These results indicate that firms with more gender-diverse boards engage more in climate-related communications (talk), but not more in terms of substantive climate-related efforts (walk). Our results also suggest significant negative effects of FO on climate walk ($p<0.05$) but not on climate talk (n.s.), contrary to Hypothesis 2 (see Models 1–3). Beyond statistical significance, these findings are also economically meaningful. The negative consequences of FO for climate

TABLE 3 | Descriptive statistics.

	N	**Mean**	**Median**	**Std. dev.**	**Min**	**Max**
Dependent						
talk_and_walk	9597	1.802	1.000	1.823	0	5
talk	9597	1.396	1.000	1.372	0	3
walk	9597	0.406	0.000	0.77	0	2
Independent						
BGD	9597	23.524	23.077	14.451	0	80
blau index	9597	0.318	0.355	0.155	0	0.5
famown	9597	0.198	0.000	0.399	0	1
famown direct 10pct	4125	0.215	0.000	0.411	0	1
famown direct 5pct	4125	0.315	0.000	0.465	0	1
fam mgmt	9597	0.062	0.000	0.241	0	1
Controls						
independence	9597	54.612	55.556	25.424	0	100
incentive	9597	0.322	0.000	0.467	0	1
csr com	9597	0.687	1.000	0.464	0	1
B size	9597	10.022	9.000	3.648	4	21
B skills	9597	41.757	41.667	22.547	0	92.308
B affiliation	9597	0.882	0.769	0.648	0	3
emissions	9597	363.484	41.081	1035.788	0.124	6980.331
roa	9597	4.876	4.570	8.021	−40.401	34.485
size	9597	22.027	21.938	1.568	16.337	26.739
ln age	9597	3.145	3.135	1.006	0	4.898
freefloat	9597	70.9	77.934	27.093	0.53	100

walk ($\beta = -0.0998$) correspond to 18.17% (= [−0.0998/0.77]*100) of a standard deviation of the walk variable, indicating the practical relevance of this evidence.

In our hypotheses, we had anticipated that family-owned firms would be less inclined to seek moral legitimacy and thereby engage less in climate-related communications. Among others, we derived these hypotheses from the previous literature, indicating that family firms enjoyed considerable trust based on their well-established close relationships with their proximate stakeholders in the 'domestic world' (Richards et al. 2017), resulting in a lower necessity for climate communication. We interpret our results as evidence that these theoretical perspectives may be less applicable to the case of large publicly listed family firms. Generally, these firms have already transformed significantly by going public, opening themselves up to the capital markets and the corresponding disclosure requirements. Thus, the theoretical arguments that imply a lower propensity for climate-related communications may not be as applicable for the group of publicly listed family firms.

Despite the fact that the European sample is generally subject to common regulation in climate matters, in Models 4 and 5, we also control for country-level effects. The results from these models are in line with the base model results. Only the relationship between BGD and climate talk is now significant at the $p < 0.1$ level (before: $p < 0.05$).

Against this background, we have also tested the sensitivity of our results with regard to lower FO thresholds (see Models 6–11). We now observe a negative relationship between FO and climate talk ($p < 0.05$), but not with climate walk. We interpret this as evidence that a decrease in the levels of family control also coincides with less negative consequences of FO for substantive climate efforts; the detrimental effect of FO in this case tends to be more pronounced for higher levels of FO. Yet, at the lower FO thresholds, family firms seem to engage less in symbolic climate talk, while not differing from nonfamily firms in terms of climate walk.

Finally, concerning Hypothesis 3, we do not find a significant moderating role of FO in the relationship between BGD and

TABLE 4 | Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) *talk_and_walk*	1.00																			
(2) *talk*	0.922*	1.00																		
(3) *walk*	0.725*	0.402*	1.00																	
(4) *BGD*	0.196*	0.177*	0.149*	1.00																
(5) *blau_index*	0.219*	0.201*	0.160*	0.944*	1.00															
(6) *famown*	−0.131*	−0.125*	−0.087*	−0.01	−0.038*	1.00														
(7) *famown_direct_10pct*	−0.147*	−0.141*	−0.097*	−0.02	−0.04	0.177*	1.00													
(8) *famown_direct_5pct*	−0.174*	−0.167*	−0.115*	−0.01	−0.02	0.174*	0.771*	1.00												
(9) *fam_mgmt*	−0.073*	−0.077*	−0.034*	−0.058*	−0.076*	0.517*	0.143*	0.124*	1.00											
(10) *independence*	0.186*	0.187*	0.108*	0.216*	0.248*	−0.158*	−0.123*	−0.144*	−0.054*	1.00										
(11) *incentive*	0.214*	0.205*	0.141*	0.117*	0.111*	−0.078*	−0.110*	−0.110*	−0.053*	0.129*	1.00									
(12) *csr_com*	0.424*	0.422*	0.253*	0.163*	0.187*	−0.127*	−0.157*	−0.183*	−0.076*	0.165*	0.213*	1.00								
(13) *B_size*	0.315*	0.254*	0.292*	0.062*	0.094*	−0.01	−0.092*	−0.090*	−0.062*	−0.146*	0.111*	0.235*	1.00							
(14) *B_skills*	−0.050*	−0.01	−0.092*	−0.196*	−0.180*	−0.079*	−0.134*	−0.157*	−0.01	0.030*	0.077*	0.02	−0.220*	1.00						
(15) *B_affiliation*	0.216*	0.202*	0.152*	0.073*	0.079*	−0.069*	−0.210*	−0.231*	−0.00	0.203*	0.127*	0.169*	0.092*	0.142*	1.00					
(16) *roa*	0.02	0.01	0.02	−0.047*	−0.048*	0.041*	−0.02	−0.01	0.068*	0.00	−0.02	−0.01	−0.047*	0.051*	0.01	1.00				
(17) *size*	0.438*	0.368*	0.380*	0.101*	0.116*	−0.040*	−0.180*	−0.195*	−0.028*	0.114*	0.183*	0.324*	0.566*	−0.155*	0.343*	−0.055*	1.00			
(18) *ln_age*	0.180*	0.184*	0.099*	0.100*	0.104*	0.01	−0.02	0.00	−0.064*	0.00	0.042*	0.141*	0.104*	−0.071*	0.049*	0.01	0.080*	1.00		
(19) *freefloat*	0.156*	0.151*	0.099*	0.045*	0.079*	−0.353*	−0.168*	−0.173*	−0.164*	0.302*	0.087*	0.100*	−0.130*	0.227*	0.199*	0.031*	−0.00	−0.00	1.00	
(20) *emissions*	−0.053*	−0.054*	−0.028*	−0.116*	−0.119*	−0.02	−0.03	−0.066*	0.01	−0.046*	0.01	0.02	0.088*	−0.041*	0.02	−0.070*	0.140*	−0.067*	−0.149*	1.00

*$p < 0.01$.

TABLE 5 | Univariate tests.

	Nonfamily (1) *Mean*	Family (2) *Mean*	Difference in means (1)–(2)
Talk and walk	1.922	1.321	0.601***
Talk	1.482	1.049	0.433***
Walk	0.439	0.271	0.168***

Note: This panel presents the two-sample *t*-tests with unequal variances on the equality of means with respect to the total climate talk and walk, as well as the talk and walk variables individually, by family and nonfamily firms.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

climate talk and walk; thus, Hypothesis 3 is not supported (see Models 1–3).

Notably, the positive significant effect of BGD on climate talk and walk is observed only when firms have at least two ($p < 0.1$) or three ($p < 0.05$) female board members, thereby reinforcing the notion of the critical mass theory (see Table 7, Models 1–3). We interpret these results as evidence that boards with one female director, potentially being appointed just as a 'token' director (Torchia et al. 2011), are not sufficiently equipped to promote and implement corporate climate strategies. Only with more notable steps towards equal representation do significant positive effects arise in our analysis.

Considering the positive consequences of BGD and the negative consequences of FO in the main models, as well as the evidence in favour of more female directors to achieve the desired outcome, we conclude that a more detailed look into the interaction between female board members and FO is warranted. In Table 7, the interaction is therefore split by family and nonfamily firms and their respective number of female directors (none, more than one, more than two). Across all models (climate talk and walk), the results indicate that family-owned firms benefit from having relatively more female directors. Specifically, family firms without female board members perform worse in terms of climate talk and climate walk, whereas family firms with at least one female board member (see Models 4–6) perform better (i.e., less negative). Family firms with more than two female directors perform best compared with their counterparts with less female directors (see Models 7–9). These results indicate that female board members have a mitigating effect in family firms. In particular, the negative direct effect of FO on climate talk and walk decreases as family firms incorporate more females into their boards.

4.2 | Robustness Tests and Endogeneity Checks

To test the robustness of the results derived from the random-effects models, we conduct several additional analyses. First, we replicate the main results using alternative variable definitions for both explanatory and dependent variables. The positive direct effect of BGD ($p < 0.05$) and the negative direct effect of FO ($p < 0.1$) for climate talk and walk are confirmed using the *emission score* from LSEG (formerly known as Refinitiv) as an external measure approximating our climate-related dependent variables from the CDP data (see Table 8, Model 1). Furthermore, the results remain robust for different definitions of BGD, namely, the *Blau index* ($p < 0.05$), which has been widely used as an alternative BGD measure (Maggi et al. 2023; Nuber and Velte 2021) (see Table 8, Model 2).

Although our analysis focuses on FO, we also test differential effects of family involvement in management. Contrary to the findings concerning FO, the results do not show a significant relationship between *family management* and climate talk and walk (see Table 8, Model 3). This finding is in line with the meta-analytic results of Lorenzen et al. (2024), suggesting that FO, but not family management, has a significant negative relationship with environmental sustainability performance.

Second, to account for the underlying variable structure in our climate talk and walk measures, we further introduce *ordered logistic regression models* (Fullerton 2009) to further strengthen the validity of our base regressions. These are applicable to situations in which the dependent variable(s) represents two or more categories in sequential order, where larger values represent 'higher' outcomes. This resembles the structure of our climate talk and walk variables, where a higher value corresponds to increasingly substantive climate efforts. The results of the ordered logistic regressions (see Table 8, Models 4–6) further support the findings from our base regressions.

Third, to substantiate the estimation of causal effects, we use *coarsened exact matching* (CEM) to construct comparable treatment and control groups. CEM is a matching method used to improve the estimation of causal effects by reducing imbalance in covariates between treated and control groups and holds several practical advantages over other matching approaches (Blackwell et al. 2009). As a matching method, CEM addresses endogeneity problems based on selection bias or omitted variable bias (Zhang et al. 2022). We apply the CEM command in Stata, using firm size, industry, and country as matching criteria and FO as treatment (with nonfamily as the control group). Matching based on firm size, industry and country takes into account the limited total number of family firms to be matched. We use the 'k2k' specification, creating treatment and control groups of equal sizes, which implies losing some observations. This gives a CEM-matched subsample of 466 firms, equivalent to 2728 firm-year observations. We opt for the 'k2k' specification as this is a more restrictive approach compared with matching multiple nonfamily firm observations to one family firm observation using weights. Further, we implement the CEM matching at the firm level rather than by observation. More specifically, we match firms at the beginning of the sample period based on their first year of occurrence to compare the evolution of matched firms over time. This process effectively reduces the imbalance in covariates between treatment (family-owned) and control groups, as measured by the multivariate L1 distance (Blackwell et al. 2009). In our analysis, the L1 distance is reduced from 0.671 (prematch) to 0.016 (postmatch), indicating increased similarity between treatment and control groups. A further overview of how the matching reduces variation between treatment and control groups is presented in Appendix C.

TABLE 6 | Base regression results: Random-effects panel regressions.

	(1) Talk & walk	(2) Talk	(3) Walk	(4) Talk	(5) Walk	(6) Talk & walk	(7) Talk	(8) Walk	(9) Talk & walk	(10) Talk	(11) Walk
$BGD_{i,t-1}$	0.00448**	0.00411**	0.000382	0.00332*	0.000250	0.00625**	0.00567**	0.000505	0.00622**	0.00568**	0.000472
	(0.00193)	(0.00180)	(0.000427)	(0.00187)	(0.000425)	(0.00271)	(0.00244)	(0.000609)	(0.00271)	(0.00243)	(0.000606)
$famown_{i,t-1}$	−0.272**	−0.171	−0.0998**	−0.102	−0.0865**						
	(0.133)	(0.119)	(0.0430)	(0.116)	(0.0434)						
$famown\_BGD_{i,t-1}$	0.00124	0.000410	0.000620	0.000549	0.000501	−0.00555	−0.00603*	0.000327	−0.00543	−0.00599*	0.000362
	(0.00462)	(0.00433)	(0.000955)	(0.00431)	(0.000969)	(0.00365)	(0.00309)	(0.00125)	(0.00365)	(0.00308)	(0.00126)
$famown\_direct\_5percent_{i,t-1}$						−0.114**	−0.121**	0.00907			
						(0.0563)	(0.0534)	(0.0162)			
$famown\_direct\_10percent_{i,t-1}$									−0.112**	−0.104*	−0.0159
									(0.0571)	(0.0537)	(0.0136)
$independence_{i,t-1}$	0.00138	0.00166*	0.000110	0.000832	0.0000	0.00283**	0.00212*	0.00114***	0.00280**	0.00210*	0.00113***
	(0.000938)	(0.000852)	(0.000257)	(0.000876)	(0.000259)	(0.00125)	(0.00112)	(0.000434)	(0.00126)	(0.00113)	(0.000437)
$incentive_{i,t-1}$	0.103***	0.0924***	0.0166*	0.0849***	0.0165*	0.0621	0.0539	0.0127	0.0602	0.0523	0.0127
	(0.0331)	(0.0321)	(0.00916)	(0.0321)	(0.00919)	(0.0478)	(0.0455)	(0.0140)	(0.0478)	(0.0454)	(0.0141)
$csr\_com_{i,t-1}$	0.415***	0.441***	0.00314	0.424***	0.00177	0.428***	0.457***	0.000355	0.427***	0.457***	−0.000289
	(0.0535)	(0.0500)	(0.00703)	(0.0503)	(0.00699)	(0.0783)	(0.0722)	(0.0103)	(0.0785)	(0.0725)	(0.0103)
$B\_size_{i,t-1}$	0.0278***	0.0220***	0.00449*	0.0258***	0.00405	0.0351***	0.0284**	0.00640**	0.0351***	0.0284**	0.00637**
	(0.00939)	(0.00843)	(0.00268)	(0.00881)	(0.00271)	(0.0130)	(0.0116)	(0.00307)	(0.0130)	(0.0116)	(0.00307)
$B\_skills_{i,t-1}$	0.000224	0.000908	−0.000418**	0.000484	−0.000363*	0.00127	0.00209*	−0.000659**	0.00129	0.00210*	−0.000658**
	(0.000841)	(0.000794)	(0.000200)	(0.000831)	(0.000203)	(0.00130)	(0.00118)	(0.000309)	(0.00129)	(0.00118)	(0.000309)
$B\_affiliation_{i,t-1}$	0.132***	0.131***	−0.00374	0.137***	−0.00176	0.0323	0.0619	−0.0282*	0.0301	0.0609	−0.0295*
	(0.0507)	(0.0452)	(0.0112)	(0.0469)	(0.0113)	(0.0622)	(0.0541)	(0.0169)	(0.0624)	(0.0543)	(0.0169)
$emissions_{i,t-1}$	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

(Continues)

TABLE 6 | (Continued)

	(1) Talk & walk	(2) Talk	(3) Walk	(4) Talk	(5) Walk	(6) Talk & walk	(7) Talk	(8) Walk	(9) Talk & walk	(10) Talk	(11) Walk
$roa_{i,t-1}$	0.000664	0.00105	−0.000285	0.00140	−0.000219	0.00184	0.00142	0.000365	0.00204	0.00160	0.000344
	(0.00244)	(0.00233)	(0.000396)	(0.00235)	(0.000395)	(0.00380)	(0.00353)	(0.000544)	(0.00381)	(0.00354)	(0.000548)
$size_{i,t-1}$	0.305***	0.211***	0.0542***	0.233***	0.0514***	0.314***	0.209***	0.0682***	0.314***	0.208***	0.0670***
	(0.0314)	(0.0246)	(0.00819)	(0.0251)	(0.00826)	(0.0396)	(0.0317)	(0.0106)	(0.0395)	(0.0316)	(0.0106)
$ln\_age_{i,t-1}$	0.189***	0.143***	0.0205*	0.123***	0.0164	0.181***	0.142***	0.0177	0.182***	0.143***	0.0181
	(0.0333)	(0.0262)	(0.0114)	(0.0266)	(0.0117)	(0.0400)	(0.0327)	(0.0135)	(0.0399)	(0.0326)	(0.0135)
$freefloat_{i,t-1}$	0.00675***	0.00420***	0.00238***	0.00291**	0.00299***	0.00699***	0.00377**	0.00294***	0.00701***	0.00381**	0.00290***
	(0.00156)	(0.00123)	(0.000641)	(0.00127)	(0.000674)	(0.00190)	(0.00160)	(0.000708)	(0.00190)	(0.00160)	(0.000709)
Constant	−6.714***	−4.675***	−1.122***	−5.176***	−1.066***	−7.685***	−5.236***	−1.620***	−7.676***	−5.238***	−1.593***
	(0.743)	(0.576)	(0.207)	(0.631)	(0.253)	(0.807)	(0.648)	(0.221)	(0.806)	(0.647)	(0.220)
Observations	8180	8180	8180	8180	8180	3553	3553	3553	3553	3553	3553
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	No	No	No	No	No	No
R^2	0.324	0.276	0.174	0.315	0.195	0.345	0.291	0.220	0.347	0.293	0.220

Note: Robust standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

TABLE 7 | Variation in interaction terms: Random-effects panel regressions.

	(1) Talk & walk	(2) Talk & walk	(3) Talk & walk	(4) Talk & walk	(5) Talk	(6) Walk	(7) Talk & walk	(8) Talk	(9) Walk
$women\_atleast1_{i,t-1}$	0.0354								
	(0.0544)								
$women\_atleast2_{i,t-1}$		0.0809*							
		(0.0414)							
$women\_atleast3_{i,t-1}$			0.0901**						
			(0.0432)						
$famown_{i,t-1}$	−0.332**	−0.317**	−0.316**						
	(0.131)	(0.131)	(0.129)						
$famown\_BGD_{i,t-1}$	0.00398	0.00326	0.00310						
	(0.00436)	(0.00439)	(0.00429)						
At least one female director									
Nonfamily × At least one female $director_{i,t-1}$				0.0289	0.0438	−0.00451			
				(0.0571)	(0.0563)	(0.00922)			
Family × No female $director_{i,t-1}$				−0.313**	−0.216*	−0.114***			
				(0.142)	(0.123)	(0.0410)			
Family × At least one female $director_{i,t-1}$				−0.196*	−0.103	−0.0836**			
				(0.110)	(0.0901)	(0.0408)			
At least two female directors									
Nonfamily × More than two female $directors_{i,t-1}$							0.0808*	0.0937**	−0.00612
							(0.0439)	(0.0431)	(0.00898)
Family × Less than two female $directors_{i,t-1}$							−0.269***	−0.166**	−0.105***
							(0.102)	(0.0846)	(0.0383)
Family × More than two female $directors_{i,t-1}$							−0.144	−0.0635	−0.0781*
							(0.107)	(0.0848)	(0.0421)

(Continues)

TABLE 7 | (Continued)

	(1) Talk & walk	(2) Talk & walk	(3) Talk & walk	(4) Talk & walk	(5) Talk	(6) Walk	(7) Talk & walk	(8) Talk	(9) Walk
$independence_{i,t-1}$	0.00159*	0.00146	0.00147	0.00159*	0.00185**	0.000129	0.00146	0.00171**	0.000135
	(0.000940)	(0.000936)	(0.000940)	(0.000940)	(0.000854)	(0.000253)	(0.000936)	(0.000850)	(0.000256)
$incentive_{i,t-1}$	0.104***	0.103***	0.107***	0.104***	0.0939***	0.0166*	0.103***	0.0927***	0.0165*
	(0.0332)	(0.0331)	(0.0332)	(0.0332)	(0.0321)	(0.00917)	(0.0331)	(0.0320)	(0.00915)
$csr\_com_{i,t-1}$	0.416***	0.416***	0.417***	0.417***	0.444***	0.00361	0.417***	0.443***	0.00366
	(0.0533)	(0.0532)	(0.0534)	(0.0532)	(0.0498)	(0.00697)	(0.0531)	(0.0496)	(0.00697)
$B\_size_{i,t-1}$	0.0280***	0.0251***	0.0245**	0.0282***	0.0219**	0.00457*	0.0251***	0.0189**	0.00468*
	(0.00948)	(0.00970)	(0.00981)	(0.00944)	(0.00852)	(0.00273)	(0.00968)	(0.00874)	(0.00280)
$B\_skills_{i,t-1}$	0.000135	0.000150	0.000162	0.0000	0.000782	−0.000436**	0.000127	0.000820	−0.000427**
	(0.000846)	(0.000845)	(0.000845)	(0.000844)	(0.000797)	(0.000200)	(0.000846)	(0.000798)	(0.000200)
$B\_affiliation_{i,t-1}$	0.134***	0.133***	0.133***	0.133***	0.132***	−0.00384	0.134***	0.132***	−0.00316
	(0.0509)	(0.0509)	(0.0507)	(0.0509)	(0.0454)	(0.0112)	(0.0509)	(0.0453)	(0.0112)
$emissions_{i,t-1}$	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
$roa_{i,t-1}$	0.000736	0.000767	0.000754	0.000766	0.00111	−0.000270	0.000798	0.00117	−0.000276
	(0.00243)	(0.00244)	(0.00243)	(0.00243)	(0.00232)	(0.000399)	(0.00244)	(0.00232)	(0.000394)
$size_{i,t-1}$	0.310***	0.307***	0.306***	0.311***	0.215***	0.0547***	0.307***	0.212***	0.0545***
	(0.0314)	(0.0313)	(0.0313)	(0.0313)	(0.0246)	(0.00820)	(0.0313)	(0.0245)	(0.00817)
$ln\_age_{i,t-1}$	0.190***	0.189***	0.190***	0.189***	0.144***	0.0200*	0.189***	0.143***	0.0205*
	(0.0334)	(0.0333)	(0.0334)	(0.0335)	(0.0263)	(0.0114)	(0.0334)	(0.0262)	(0.0114)
$freefloat_{i,t-1}$	0.00682***	0.00675***	0.00684***	0.00681***	0.00424***	0.00239***	0.00673***	0.00417***	0.00239***
	(0.00157)	(0.00157)	(0.00157)	(0.00157)	(0.00123)	(0.000643)	(0.00157)	(0.00123)	(0.000643)
Constant	−6.797***	−6.695***	−6.652***	−6.804***	−4.757***	−1.123***	−6.694***	−4.643***	−1.125***
	(0.749)	(0.745)	(0.748)	(0.748)	(0.580)	(0.207)	(0.744)	(0.576)	(0.207)
Observations	8180	8180	8180	8180	8180	8180	8180	8180	8180

(Continues)

TABLE 7 | (Continued)

	(1) Talk & walk	(2) Talk & walk	(3) Talk & walk	(4) Talk & walk	(5) Talk	(6) Walk	(7) Talk & walk	(8) Talk	(9) Walk
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	No	No	No	No	No	No
R^2	0.319	0.321	0.322	0.319	0.273	0.172	0.321	0.275	0.171

Note: Robust standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Using the CEM-matched samples, we replicate the base model results. Specifically, after applying CEM, we also find positive significant effects of BGD for climate talk ($p<0.05$) but not for climate walk. Likewise, the results show negative significant effects of FO for climate walk ($p<0.05$). In line with the base model, the relationship between FO and climate talk is insignificant. Also, the interaction term of BGD and FO remains insignificant (see Table 8, Models 7–9).

Finally, as a fourth robustness test, we use *a 2SLS instrumental variables* method (see Table 9). Although it is generally challenging to find appropriate instruments (Voordeckers et al. 2023), Zhang et al. (2022) identify different classes of instruments to be used in family business research, including family- or time-related instruments (lagged variables) as well as 'higher level instruments'—that is, instruments derived from higher levels than individual observations (e.g., region- or industry-level) with no direct connection to the dependent variables and the error term.

Using the latter approach to find suitable instruments, in line with prior studies, we employ three instruments, namely, the *mean value of BGD and FO by country and industry*, as well as *the country-level legislation on board gender diversity*. It is common practice within the CSR and environmental management literature to employ mean values of explanatory variables on an industry-level as instruments (Cordeiro et al. 2020; Jiraporn and Chintrakarn 2013) because they frequently predict the endogenous independent variables well in first-stage regressions but are uncorrelated with the error term, thereby reducing endogeneity concerns. Similarly, prior research employs state- or country-level regulatory differences as an instrument (Flammer et al. 2019). We use the existence of BGD legislation within European countries prior to the recent EU board gender directive (no law, soft law and hard law) as an instrument to predict BGD, with data being derived from Arndt and Wrohlich (2019) and complemented by manual research for nonreported sample countries.

The first-stage regression results confirm that our instruments are significantly correlated with our explanatory variables BGD and FO ($p<0.01$). The second stage results of the 2SLS model are in line with our base regressions (see Table 9), indicating that the predicted value of BGD has a positive relationship with climate talk ($p<0.01$) and that the predicted value of FO has a negative relationship with climate walk ($p<0.1$). In the 2SLS specification, the relationships between the predicted value of BGD and climate walk and FO and climate talk, which were not significant in the base model specification, now become significant.

5 | Discussion

5.1 | Overall Findings

Our analysis has yielded several important findings concerning the relationship between BGD, FO and climate talk and walk. First, the findings show that BGD is associated with *more symbolic climate talk but not with more substantive*

TABLE 8 | Robustness tests: Alternative variable definitions, ordered logistic regressions and coarsened exact matching (CEM).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	EmissionScore	**Talk & walk**	**Talk & walk**	**Talk & walk**	**Talk**	**Walk**	**Talk & walk**	**Talk**	**Walk**
				ologit	ologit	ologit	CEM matched	CEM matched	CEM matched
$BGD_{i,t-1}$	0.0824**		0.00494***	0.0174***	0.0121***	0.0321***	0.0118***	0.00971**	0.00102
	(0.0361)		(0.00189)	(0.00221)	(0.00233)	(0.00340)	(0.00415)	(0.00392)	(0.00104)
$famown_{i,t-1}$	−3.876*	−0.292**		−0.228**	−0.121	−0.439**	−0.363*	−0.245	−0.137**
	(2.134)	(0.132)		(0.111)	(0.116)	(0.183)	(0.191)	(0.169)	(0.0674)
$famown \times BGD_{i,t-1}$	0.0887	0.00229	−0.00155	−0.000703	−0.00221	−0.000164	−0.00320	−0.00286	0.000125
	(0.0594)	(0.00451)	(0.00383)	(0.00403)	(0.00415)	(0.00573)	(0.00620)	(0.00593)	(0.00137)
$blau\_index_{i,t-1}$		0.330**							
		(0.162)							
$fam\_mgmt_{i,t-1}$			−0.147						
			(0.144)						
$independence_{i,t-1}$	0.0487***	0.00138	0.00140	0.00275**	0.00420***	−0.00137	0.000366	0.000708	0.000220
	(0.0164)	(0.000940)	(0.000940)	(0.00112)	(0.00120)	(0.00149)	(0.00155)	(0.00141)	(0.000410)
$incentive_{i,t-1}$	1.042**	0.104***	0.104***	0.358***	0.347***	0.313***	0.128**	0.0921	0.0333**
	(0.517)	(0.0332)	(0.0332)	(0.0501)	(0.0554)	(0.0676)	(0.0639)	(0.0626)	(0.0160)
$csr\_com_{i,t-1}$	9.408***	0.414***	0.417***	1.362***	1.325***	1.129***	0.482***	0.482***	0.00871
	(0.912)	(0.0534)	(0.0535)	(0.0582)	(0.0568)	(0.0990)	(0.0919)	(0.0864)	(0.0103)
$B\_size_{i,t-1}$	0.757***	0.0272***	0.0282***	0.0804***	0.0715***	0.0762***	0.0289*	0.0241*	0.00259
	(0.149)	(0.00946)	(0.00938)	(0.00906)	(0.0100)	(0.0129)	(0.0150)	(0.0138)	(0.00554)
$B\_skills_{i,t-1}$	0.0188	0.000192	0.000217	−0.000791	0.000769	−0.00548***	0.000583	0.00131	−0.000514
	(0.0135)	(0.000845)	(0.000842)	(0.00126)	(0.00135)	(0.00179)	(0.00147)	(0.00141)	(0.000316)
$B\_affiliation_{i,t-1}$	−0.262	0.132***	0.132***	0.156***	0.213***	0.118*	0.0844	0.116*	−0.0158
	(0.710)	(0.0508)	(0.0508)	(0.0431)	(0.0464)	(0.0625)	(0.0707)	(0.0644)	(0.0220)
$emissions_{i,t-1}$	−0.000242	0.0000	0.0000	−0.000158***	−0.000161***	−0.000121***	0.0000	0.0000	0.0000
	(0.000551)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

(Continues)

TABLE 8 | (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	EmissionScore	**Talk & walk**	**Talk & walk**	**Talk & walk**	**Talk**	**Walk**	**Talk & walk**	**Talk**	**Walk**
$roa_{i,t-1}$	0.0647	0.000641	0.000687	0.0151***	0.0108***	0.0237***	0.00418	0.00476	−0.000668
	(0.0406)	(0.00244)	(0.00244)	(0.00336)	(0.00359)	(0.00501)	(0.00375)	(0.00357)	(0.000875)
$size_{i,t-1}$	6.962***	0.307***	0.305***	0.414***	0.368***	0.461***	0.255***	0.173***	0.0406***
	(0.466)	(0.0313)	(0.0314)	(0.0226)	(0.0252)	(0.0308)	(0.0556)	(0.0452)	(0.0151)
$ln\_age_{i,t-1}$	3.029***	0.189***	0.187***	0.110***	0.143***	0.0297	0.165***	0.114**	0.0240
	(0.609)	(0.0333)	(0.0335)	(0.0235)	(0.0252)	(0.0331)	(0.0577)	(0.0448)	(0.0231)
$freefloat_{i,t-1}$	0.0249	0.00673***	0.00758***	0.00478***	0.00353***	0.00688***	0.00584**	0.00416*	0.00162
	(0.0231)	(0.00156)	(0.00153)	(0.00105)	(0.00116)	(0.00136)	(0.00270)	(0.00223)	(0.00107)
Observations	8180	8180	8180	8180	8180	8180	2728	2728	2728
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes	No	No	No
R^2	0.415	0.323	0.322				0.308	0.257	0.161

Note: Robust standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

TABLE 9 | Instrumental variable regressions (2SLS).

	(1)	(2)
Panel A: First stage	**BGD**	**famown**
Instruments		
BGD_mean	0.6140***	
	(0.017)	
BGD_legislation	1.0611***	
	(0.2994)	
famown_mean		0.3360***
		(0.0478)
Controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	8885	8885
R^2	0.437	0.187

	(3)	(4)	(5)
Panel B: Second stage	**Talk & walk**	**Talk**	**Walk**
BGD	0.0160***	0.0113***	0.00465***
	(0.00352)	(0.00278)	(0.00141)
famown	−2.281***	−1.914***	−0.367*
	(0.477)	(0.370)	(0.196)
independence	0.00178*	0.00143*	0.000351
	(0.000991)	(0.000789)	(0.000394)
incentive	0.240***	0.161***	0.0793***
	(0.0435)	(0.0345)	(0.0186)
csr_com	0.733***	0.599***	0.134***
	(0.0571)	(0.0460)	(0.0219)
B_size	0.0297***	0.0127**	0.0170***
	(0.00693)	(0.00538)	(0.00302)
B_skills	−0.000295	0.00148**	−0.00177***
	(0.000892)	(0.000724)	(0.000349)
B_affiliation	0.0776**	0.0628**	0.0148
	(0.0314)	(0.0249)	(0.0131)
emissions	−0.000128***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)
roa	0.0128***	0.00805***	0.00475***
	(0.00267)	(0.00216)	(0.000988)
size	0.356***	0.216***	0.140***
	(0.0176)	(0.0138)	(0.00730)

(Continues)

TABLE 9 | (Continued)

	(3)	(4)	(5)
Panel B: Second stage	**Talk & walk**	**Talk**	**Walk**
ln_age	0.163***	0.138***	0.0247***
	(0.0188)	(0.0149)	(0.00759)
freefloat	−0.00455*	−0.00519***	0.000639
	(0.00253)	(0.00197)	(0.00102)
Observations	8885	8885	8885
R^2	0.196	0.083	0.219
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Note: Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

climate walk. In this regard, our results align with prior studies showing that higher BGD has been associated with more (and better) carbon reporting and emission reduction initiatives but not with actual emission reductions (Córdova Román et al. 2021; Haque 2017). In a similar fashion, Taglialatela et al. (2024, 2890) find that 'more gender-diverse [...] boards are associated with a preponderance of green communication over implementation', which they attribute to firms participating in public discourse to gain moral legitimacy. From a theoretical point of view, our results point in a similar direction, suggesting that more gender-diverse boards tend to seek legitimacy through symbolic climate efforts, without corresponding fundamental improvements in climate-related performance. Thus, reinforcing previous findings from the literature, our research substantiates legitimacy theory perspectives that associate more gender-diverse boards with moral legitimacy-seeking strategies over pragmatic legitimacy-seeking strategies, materializing through distinct climate strategies in our analysis. These findings are highly relevant, as climate matters play a predominant role in the EU Green Deal project, drawing significant public attention to corporate climate transformation. In turn, this raises the stakes for firms to either emphasize (or conceal) their climate progress. Thus, our results provide important timely evidence that specifies the role of BGD for both symbolic and substantive climate efforts. Second, concerning the role of FO, our results allow for several nuanced interpretations. Across the different model specifications, we have observed negative effects of FO on both climate talk and climate walk; however, the negative impact of FO on climate walk has remained particularly robust throughout several tests. Notably, the negative significant results concerning the role of FO for substantive climate efforts (walk) contradict our hypothesis. Generally, our results align with prior studies emphasizing the potentially adverse consequences of FO for environmental outcomes, such as the meta-analysis by Miroshnychenko et al. (2022). Concerning the 'dual nature' discussion within the family business literature relating to the sustainability consequences of family involvement, our results thus add to the negative view of family firms' climate talk and walk strategies. Our hypothesis from a legitimacy theory perspective was not supported. We interpret our findings as evidence that some of the theoretical arguments that prevail in the family business literature, such as well-established stakeholder relationships, proximity or trust, tend to be less applicable to large publicly listed family firms. Generally, this group of firms has already transformed significantly by going public, opening themselves up to the capital markets and the corresponding disclosure requirements. Furthermore, our results suggest that family-owned firms are reluctant to engage in substantive climate efforts, contrary to our expectations. These effects tend to be more pronounced for higher levels of family control and are not evident for family-managed firms. This suggests that family owners with higher stakes, who are relatively more exposed to climate risks affecting their assets, are counterintuitively more hesitant to transform their business through substantive climate strategies.

Considering the partially mixed results within the literature, our analysis documents several contingencies that help explain some seemingly conflicting findings. For instance, both Borsuk et al. (2024) and Dyck et al. (2024) indicate that family firms engage less in reporting their commitments and have lower environmental ratings, yet they do not underperform when measured by carbon emissions (and in some settings even outperform nonfamily firms). Although the first observation is in line with our own results on family firms engaging less in climate talk, the latter results indicate that family firms would engage at least as strongly in climate walk, which contradicts our own findings. However, upon closer inspection, the different results can be explained by regional differences in the sample structure and the implied institutional and legislative environment. Accordingly, Dyck et al. (2024) show that family-controlled firms have lower carbon emissions only in countries where there is little climate regulation, posing the risk of policy tightening in the future. The opposite is the case for our European sample, already subject to restrictive climate regulation.

However, it is not only regional differences that help reconcile some of the seemingly conflicting evidence. Although the meta-analysis of Lorenzen et al. (2024) indicates that family firms overall tend to perform better in terms of their environmental footprint, they specify that the effect is in fact negative for large and publicly listed family firms, in line with our own findings. Supporting this potential divide between public and private family firms, the results of Gómez-Mejía et al. (2025) document that family involvement is associated with lower emissions among *private* European firms. Besides differences between public and private family firms, differences between family-owned and family-managed firms may explain diverging results. Accordingly, Lorenzen et al. (2024) find that negative consequences of family involvement are more pronounced for FO-based definitions, but not for family management. This notion has also been observed in our analysis, indicating a negative effect of FO, while yielding insignificant results for family management in our robustness test.

Finally, the expected *negative moderating role of family ownership* in the BGD–climate policy relationship has not been supported by the data. However, when disaggregating the interaction results, our findings indicate a mitigating effect of female board members in family firms, applicable to both climate talk and climate walk and across different thresholds of female directorships. Accordingly, family firms can benefit from appointing relatively more female board members in terms of their climate strategies.

Overall, our research yields several important contributions that extend across the sustainability (carbon), corporate governance and family business literature in various ways. First, our results shed light on the complex interplay between symbolic and substantive climate efforts, which still constitute a key challenge and continue to attract researchers' attention. Second, besides the high practical relevance of achieving global decarbonization targets, our results also contribute to the academic debate on greenwashing by providing empirical evidence on the extent to which firms meet their decarbonization commitments. Third, our findings support previous studies showing that BGD and FO are corporate governance mechanisms that shape corporate climate strategies.

5.2 | Limitations and Opportunities for Further Research

Our study is subject to limitations, which give opportunities for further research. First, our sample focuses on European publicly listed firms. Thus, future research on private firms and beyond Europe is still needed to complement our analyses (Gómez-Mejía et al. 2025). Second, the FO information used in our study is limited in terms of its granularity. Although we have employed different FO thresholds, tested for differential effects of family involvement in management as well as controlled for firm age as a proxy for the family firm generation, further considerations of family firm heterogeneity are not feasible with the available data. Thus, we see potential for further refinement by analysing the interaction of family involvement and BGD at the level of each individual board member. Likewise, other aspects of board diversity beyond its demographic composition, as well as the role of other board governance mechanisms related to sustainability, represent promising opportunities. Also, this includes further inquiry into non-linear (e.g., U-shaped) relationships between BGD and climate talk and walk. These may also benefit from prior studies analysing non-linear effects of family control (Qosasi et al. 2022; Terlaak et al. 2018).

Furthermore, extending the findings of this study, we see potential for additional research concerning the internal relationship between climate talk and walk among family firms. Within the literature, there is a lively discourse on the intention–action relationship among family firms specifically, considering different rationales for particularly action-oriented corporate behaviour, which makes them less susceptible to greenwashing (Kim et al. 2017). In this regard, researchers may also benefit from the rich literature addressing the link between willingness and ability in family firms, which has informed several prior studies beyond carbon outcomes (Chrisman et al. 2015; Debellis et al. 2021; Schepers et al. 2021).

The target-level data that feed into the climate walk variable (adherence to emission reduction targets) is subject to restrictions. The target data are drawn from a diverse set of emission reduction targets with different characteristics, such as target type and time period. Our metric of target adherence addresses these issues by looking at performance in relative terms—that is, comparing time passed and progress made on the level of each target and firm-year. In this regard, we see potential for future research to use other target-level information to ensure reliability, including data on target materiality or the share of emissions covered by a given target, as carbon targets are subject to increasing scrutiny (Callery and Kim 2024).

Finally, we see several opportunities for further research related to regulatory changes on a European level, namely, the introduction of the CSRD/ESRS as well as the EU BGD directive, which are not yet reflected in our sample period. Although future research should critically review the overall success of regulatory reform, studies may also benefit from additional or higher quality climate data.

6 | Conclusion

To avert the imminent climate crisis and meet internationally agreed climate targets, firms must account for and reduce their greenhouse gas emissions considerably (Christy et al. 2024; Hettler and Graf-Vlachy 2024). However, distinguishing between symbolic and substantive climate efforts remains a key challenge (Coen et al. 2022). We address this challenge by analysing different levels of climate action from climate talk to climate walk. By using CDP data on the process of setting, validating and finally achieving decarbonization targets as a new means to distinguish between climate talk and walk, we extend prior literature that has primarily focused on carbon performance (Busch et al. 2022; Nuber and Velte 2021). In this regard, BGD and FO have been identified as important determinants of firms' climate strategies.

Drawing from target-level data of 1387 publicly listed European firms between 2010 and 2021, our results show that firms with higher BGD engage *more strongly in climate talk but not in climate walk*. Thereby, we confirm prior findings indicating that BGD is more strongly associated with symbolic climate efforts, which do not always translate into substantive improvements (Cordova et al. 2021; Haque 2017; Taglialatela et al. 2024). Meanwhile, our results support *negative effects of FO*, mainly attributable to climate walk and to a lesser extent to climate talk, in line with the negative view of family involvement for carbon outcomes.

Considering the mixed results of prior studies, we identify several contingencies that help to reconcile our findings with the extant literature, including regional differences, public versus private firms and family-owned versus family-managed firms. Contrary to our hypothesis, we did *not* find a negative moderating role of FO in the relationship between BGD and climate talk or walk. Rather, the results indicate a mitigating effect of female board members in family firms, who reduce the negative effect of FO; this result suggests that family firms benefit from appointing relatively more female board members in terms of their climate strategies.

Our results contribute to the ongoing debate concerning the role of board mechanisms and their effectiveness in aligning firm objectives with climate-related stakeholder needs. Our findings substantiate prior evidence that indicates that BGD and FO may be regarded as competing corporate governance mechanisms in terms of their influence on corporate climate strategies (Maggi et al. 2023). In this regard, our study has several important *theoretical implications*. By separating symbolic from substantive efforts, our results shed light on the more nuanced dynamics that encompass corporate climate efforts that are facing persistent greenwashing allegations frequently not addressed in extant research. Namely, our results indicate that although BGD is associated with positive consequences, firms focusing merely on BGD as a measure of demographic board diversity may not be sufficiently equipped to catalyse substantive climate efforts. We associate our results with a particular emphasis on moral legitimacy-seeking strategies among these firms, which prioritize climate-related communications. Furthermore, regarding the role of FO, our results suggest that family-owned firms are reluctant to engage in substantive climate efforts, contrary to our expectations. These effects tend to be more pronounced for higher levels of family control and are not evident for family-managed firms. We interpret this as evidence that family owners with higher stakes, who are relatively more exposed to climate risks affecting their assets, are counterintuitively more reluctant to transform their business through substantive climate strategies.

Finally, our results have important *practical implications* for corporations as well as regulators, specifying the joint and individual effects of BGD and FO for corporate climate strategies. Firms, being subject to increasingly tight regulation and mounting expectations to reduce their carbon emissions, must set up their corporate governance systems in accordance with the climate expectations of their stakeholders. Regulators, at both the national and European levels, may gain additional insights into the opportunities and limits of regulatory initiatives, such as the European BGD directive and the CSDDD, to promote substantive climate efforts within the European capital market. Besides the high practical relevance of achieving global decarbonization targets, the results contribute to the ongoing academic discourse on greenwashing by providing quantifiable evidence on the extent to which firms follow up on their decarbonization commitments.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Appendix A

Variable Definitions

Variable name	Definition	Data source
Dependent variables		
Talk and walk	Composite score measuring different levels of climate action on a scale from 0 to 5, including *participation* in the CDP, *publication* of CDP data, existence of a decarbonization *target*, validation of the target by *SBTi* and the subsequent *adherence* to this target. A detailed description of each score item can be found below.	CDP
Talk	The sum of *participation*, *publication* and *target* for each firm-year	CDP
Walk	The sum of *SBTi* and *adherence* for each firm-year	CDP
Individual items		
participation	Dummy variable indicating whether a firm participated in the CDP survey in a given year. 1 = participated in year *t*, 0 otherwise.	CDP
publication	Dummy variable indicating whether a participating firm subsequently published the CDP survey data (see Ott et al. 2017 for a detailed discussion). 1 = published survey results in year *t*, 0 otherwise.	CDP
target	Dummy variable indicating whether a firm has set a decarbonization target in a given year. 1 = emission reduction target is set in year *t*, 0 otherwise.	CDP
SBTi	Dummy variable indicating if at least one emission reduction target has been validated by the science-based targets initiative (SBTi). 1 = at least one science-based target has been approved by SBTi in any year, 0 otherwise.	CDP
adherence	Dummy variable indicating whether a firm adheres to its decarbonization target in a given year. The variable is computed based on the time passed from start to target year (%) versus the progress made to achieve the respective target (%). 1 = emission reduction meets or exceeds the target in year *t*, 0 otherwise. In the case of more than one target per firm-year, the mean value is used, similar to Ioannou et al. (2016). For a detailed discussion, see Section 3.2.	CDP
Independent variables		
BGD	Ratio of female board members in %	LSEG
blau_index	Board gender diversity index that ranges from 0 (complete homogeneity) to 0.5 (complete heterogeneity)	LSEG
One_woman; *two_women*; *three_women*; *four_women*	Dummy variables, where 1 indicates at least one woman, two women, three women or four women on the board of directors, and 0 otherwise	LSEG
famown	Dummy variable equal to 1 if the global ultimate owner at the 25.01% level is 'one or more named individuals or families'	BvD Orbis
famown_direct_5percent	Dummy variable equal to 1 if at least 5% of the company is directly owned by 'one or more named individuals or families' based on data from the top 10 largest direct shareholders	BvD Orbis
famown_direct_10percent	Dummy variable equal to 1 if at least 10% of the company is directly owned by 'one or more named individuals or families' based on data from the top 10 largest direct shareholders	BvD Orbis
fam_mgmt	Dummy variable equal to 1 if the family owner (global ultimate owner) is also involved in management	BvD Orbis
Control variables		
incentive	Dummy variable indicating whether senior executive compensation is linked to sustainability or CSR-related incentives (dummy)	LSEG
independence	Percentage of independent board members	LSEG
csr_com	Existence of CSR/sustainability committee (dummy)	LSEG
B_skills	Board member specific skills (%), i.e., percentage of board members who have either an industry-specific background or a strong financial background	LSEG
B_size	Board size (total number of board members)	LSEG

Variable name	Definition	Data source
B_affiliation	Average number of other corporate affiliations for the board members.	
size	Log of total assets	LSEG
emissions	Total estimated CO_2e emissions by revenues (tCO_2/EUR mn)	LSEG
roa	Return on assets (%)	LSEG
ln_age	Log of firm age	LSEG
freefloat	Free float of shares (%)	LSEG

Appendix B

Breakdown of Target-Level Data

Panel A: Target characteristics		
Average target duration (start yo target-year)	9.86 years	
Total # firm-year targets	14,362	
Thereof ongoing targets	10,713 (74.59%)	
Thereof fully elapsed targets	3649 (25.41%)	
Panel B: Adherence by target type		
Ongoing targets	10,713	
Thereof on track to meet target	7147	
Thereof not on track to meet target	3566	
Fully elapsed targets	3649	
Thereof target met or exceeded	2569	
Thereof target not met	1080	
Panel C: Adherence by industry		
	Meet target (or on track)	Not meet target (or not on track)
Accommodation and Food Services	59.72%	40.28%
Admin. and Support and Waste Management and Remediation Services	63.56%	36.44%
Agriculture, Forestry, Fishing and Hunting	13.33%	86.67%
Arts, Entertainment and Recreation	33.33%	66.67%
Construction	63.06%	36.94%
Health Care and Social Assistance	100.00%	0.00%
Information	69.09%	30.91%
Manufacturing	65.41%	34.59%
Mining, Quarrying and Oil and Gas Extraction	62.39%	37.61%
Other Services (except Public Administration)	72.73%	27.27%
Professional, Scientific and Technical Services	74.52%	25.48%
Real Estate and Rental and Leasing	72.51%	27.49%
Retail Trade	64.24%	35.76%
Transportation and Warehousing	62.13%	37.87%
Utilities	73.75%	26.25%
Wholesale Trade	62.50%	37.50%
Grand total	66.70%	33.30%

Appendix C

Sample Overview Prematch and Postmatch

	Prematch			Prematch		
	Nonfamily (1)	Family (2)	Difference in means	Nonfamily (3)	Family (4)	Difference in means
Panel A: *T*-tests	Mean	Mean	(1)–(2)	Mean	Mean	(3)–(4)
Size	22.060	21.900	0.160***	21.925	21.880	0.045
Emissions	378.604	321.692	56.912**	391.185	355.113	36.072

	Prematch			Postmatch		
Panel B: Distribution by country	Nonfamily	Family	Total	Nonfamily	Family	Total
Austria	123	66	189	31	47	78
Belgium	198	60	258	49	20	69
Cyprus	0	1	1	0	1	1
Czech Republic	12	0	12	0	0	0
Denmark	259	12	271	12	12	24
Finland	312	27	339	127	27	154
France	689	338	1027	235	293	528
Germany	720	327	1047	238	265	503
Greece	61	26	87	11	13	24
Hungary	39	2	41	4	0	4
Iceland	4	0	4	0	0	0
Ireland	267	0	267	0	0	0
Italy	79	34	113	14	27	41
Luxembourg	76	8	84	25	0	25
Malta	7	0	7	7	0	7
Netherlands	275	25	300	28	25	53
Norway	234	35	269	30	32	62
Poland	191	60	251	19	24	43
Portugal	54	6	60	4	0	4
Romania	2	0	2	2	0	2
Russia	168	86	254	55	76	131
Slovenia	6	0	6	0	0	0
Spain	265	59	324	36	35	71
Sweden	459	133	592	105	109	214
Switzerland	571	210	781	129	198	327
Turkey	47	49	96	1	49	50
United Kingdom	2578	337	2915	495	304	799
Total	7696	1901	9597	1657	1557	3214

Panel C: Distribution by industry	Prematch			Postmatch		
	Nonfamily	Family	Total	Nonfamily	Family	Total
Accommodation and Food Services	132	47	179	26	26	52
Administrative and Support and Waste Management and Remediation Services	236	48	284	6	17	23
Agriculture, Forestry, Fishing and Hunting	26	19	45	6	19	25
Arts, Entertainment and Recreation	99	9	108	21	4	25
Construction	364	69	433	31	63	94
Educational Services	6	0	6	0	0	0
Health Care and Social Assistance	50	23	73	2	12	14
Information	669	191	860	139	145	284
Management of Companies and Enterprises	4	0	4	0	0	0
Manufacturing	2999	813	3812	790	729	1519
Mining, Quarrying and Oil and Gas Extraction	446	118	564	140	117	257
Other Services (except Public Administration)	28	23	51	6	0	6
Professional, Scientific and Technical Services	538	115	653	120	115	235
Real Estate and Rental and Leasing	630	102	732	142	90	232
Retail Trade	403	239	642	97	165	262
Transportation and Warehousing	393	46	439	35	40	75
Utilities	461	13	474	42	11	53
Wholesale Trade	212	26	238	54	4	58
Total	7696	1901	9597	1657	1557	3214

Note: Considering the limited absolute number of observations across countries and industries, the CEM matching has been performed based on firm size as well as country and industry (see Section 4.2 for a detailed discussion). Panel A presents two-sample *t*-tests with unequal variances on the equality of means, disaggregated by family (treatment) and nonfamily firms (control) before and after matching. The *t*-test results indicate that the matching successfully reduces variation between treatment and control groups. Panels B and C further document the sample distribution by country and industry prematch and postmatch indicating an overall more balanced sample after matching.
$^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$.