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Family ownership and environmental performance: The mediation effect of human resource practices

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**FAMILY OWNERSHIP AND ENVIRONMENTAL PERFORMANCE:  
THE MEDIATION EFFECT OF HUMAN RESOURCE PRACTICES**

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**FAMILY OWNERSHIP AND ENVIRONMENTAL PERFORMANCE:  
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**Abstract.** Previous literature has found that listed family firms underperform their nonfamily counterparts in term of environmental performance, but has not explained why this occurs. We address this research gap by hypothesizing that training and development practices (i.e., managerial practices devoted to providing training and development for the workforce) mediate the relationship between family blockholders and environmental performance. Using a sample of 33,901 firm-year observations from 2002 to 2016 distributed across 56 countries and employing the structural equation model technique, we find that investment in training and development practices explains almost half of the negative relationship between family blockholders and environmental performance. Our study contributes to the agency theory debate on principal–principal problems by explaining why family blockholders could damage other blockholders and minority shareholders.

**Keywords:** Environmental Performance; Principal–Principal Problem; Environmental Behavior; Family Firms; Training and Development; Corporate Sustainability.

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## INTRODUCTION

The recent increase in awareness of corporations' environmental, social, and ethical responsibilities has generated intense debate about corporate social responsibility in academic and political spheres (see Ioannou & Serafeim, 2017; Money & Schepers, 2007). Current research has focused on why some firms have better environmental performance than others (Ioannou & Serafeim, 2012). Ownership structure is one of the most relevant dimensions for explaining environmental performance differences among firms (Dou, Su, & Wang, 2017; Lamb & Butler, 2016). This is because blockholders of listed firms are the ultimate decision-makers (Kumar & Zattoni, 2017; Putterman, 1993) and different types of blockholders (i.e., family or nonfamily owners) matter for corporate governance (Claessens, Djankov, & Lang, 2000; Faccio & Lang, 2002) and firm performance (Heugens, Van Essen, and Van Oosterhout, 2009).

Rees and Rodionova (2015) found that listed family firms have worse environmental performance than listed nonfamily firms have, and argued that family firms are more concerned about their own wealth than are nonfamily firms. Specifically, the authors assumed that family blockholders can impose their interests in the organization. However, to the best of our knowledge, no studies have empirically tested this assumption to date. Thus, the academic debate about why listed family firms underperform listed nonfamily firms in terms of environmental performance remains open. Our study aims to fill this research gap.

Based on the principal–principal agency theory framework (Young, Peng, Ahlstrom, Bruton, & Jiang, 2008), our study attempts to shed light on the aforementioned research question by exploring how family blockholders affect firm behavior and expose firms to principal–principal problems (Boyd & Solarino, 2016). In principal–principal conflicts,

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blockholders' interests and goals do not align with those of minority shareholders or other blockholders (e.g., Minichilli, Brogi, & Calabrò, 2016), increasing the likelihood of the expropriation of nonblockholders. In the context of family firms, goal discrepancy among shareholders is aggravated by the pursuit of goals other than economic wealth by owner-families (Aparicio, Basco, Iturralde, & Maseda, 2017). Such family-oriented goals include family reputation, transgenerational family control (dynastic succession), and concern about family unity and harmony (Gómez-Mejia, Haynes, Núñez-Nickel, Jacobson, & Moyano-Fuentes, 2007). Corporate governance research recognizes that this kind of problem can be resolved by organizing and defining suitable corporate governance structures (Renders & Gaeremynck, 2012), although certain blockholders can circumvent those structures and affect firm performance through decision-making interventions, such as strategy, diversification, and internationalization (Anderson & Reeb, 2003; Van Essen, Carney, Gedajlovic, & Heugens, 2015). If so, family blockholders should be able to impose their vision in the management arena, specifically on human resource practices.

Family blockholders are known to promote such behavior as preferential treatment and parental altruism in human resource practices (Combs, Jaskiewicz, Shanine, & Balkin, 2017) to ensure self-selection of particular human resources, such as more conservative employees (Hauswald, Hack, Kellermanns, & Patzelt, 2016). By investing less in employee training, family firms are worse organizational stewards than nonfamily firms are (Neckebrouck, Schulze, & Zellweger, 2018). While training and development practices foster the advancement of employees' knowledge, skills, and abilities (Vidal-Salazar, Hurtado-Torres, &

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Matías-Reche, 2012) while also linking firms to superior performance<sup>1</sup> (Bloom & Van Reenen, 2007), poor employee practices are associated with lower firm performance, specifically, lower environmental performance (Jabbour & Santos, 2008). As blockholders have strong influence on a firm's management (e.g., Shleifer & Vishny, 1986) and that corporate ownership structure explains managers' motivation toward social responsibility (Zeitoun & Pamini, 2015), we hypothesize that the reason listed family firms underperform their nonfamily counterparts in terms of environmental performance is the mediating role of firms' investment in employee training and development practices<sup>2</sup>.

We test our mediation hypothesis using information available on the Asset4 database. With a sample of 33,901 firm-year observations (4,932 single firms) during 2002–2016 distributed across 56 countries, we apply structural equation modeling and find that investment in training and development practices explains almost 50% of the negative relationship between family blockholders and firms' environmental performance.

This study makes two contributions to the literature. First, we contribute to the debate about ownership composition and environmental performance (e.g., Dam & Scholtens, 2012; Jain & Jamali, 2016) by explaining why the environmental performance of family firms and nonfamily firms varies. In this sense, we disentangle and empirically test Rees and Rodionova's (2015) assumption that family blockholders can impose their interests in the management arena. Our study explores the links between corporate governance and

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<sup>1</sup> Firm performance is measured in term of productivity, profitability, Tobin's Q, sales growth, etc. (see Bloom & Van Reenen, 2007).

<sup>2</sup> In principle, this reasoning also applies to unlisted firms, in which owners are typically owner-managers (see, e.g., Colombo, Croce, & Murtinu, 2014). However, the decision to explain previous results for listed companies, and the fact that unlisted firms are less likely to implement formal practices of training and development make listed firms a more appropriate context for analysis.

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management studies, specifically human resource management, by testing the mediating relationship of training and development practices between family ownership and environmental performance. Moreover, we present evidence of the agency mechanism that blockholders use, namely, poor human resource practices, to impose their interests as a manifestation of principal–principal problems.

Second, we contribute to the debate on human resource practices within the family business literature by showing that listed family firms are penalized by their condition of being family owned while competing in the labor market. Previous studies have shown that family businesses have limited access to resources (Sirmon & Hitt, 2003); face a self-selection problem of particular human resources, such as more conservative employees (Hauswald et al., 2016) and bifurcation bias (Daspit, Madison, Barnett, & Long, 2018); and develop poor employment practices (Neckebrouck et al., 2018). Extending this research, we provide empirical evidence of the negative effect of poor training and development practices on environmental performance in family firms when compared to nonfamily firms.

The rest of the paper is organized as follows. In the next section, we discuss the theoretical framework and theories used to develop the research question. The following two sections explain the sample, data, and methodology used in this study. Finally, the last two sections report the results and discuss the main findings and conclusions.

## **RELATED LITERATURE**

### *Corporate social responsibility*

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Recent corporate scandals, climate change, and environmental concerns have led to increased awareness about companies' environmental and social impacts (Money & Schepers, 2007). Society “[...] has certain expectations for appropriate business behavior and outcomes” (Wood, 1991, p. 695). Thus, firms have started incorporating social and environmental issues into their strategies (Eccles, Ioannou, & Serafeim, 2014) to restore congruence between corporate operations and societal values (Porter & Kramer, 2011).

Within the wide range of information covered by corporate social responsibility reporting (e.g., social and environmental), strong interest has been documented in recent years in environmental information because of increased stakeholder pressure on firms' environmental performance (Ramanathan, 2018)<sup>3</sup>. While most of the previous literature has focused on the relationship between environmental and firm performance (e.g., Han, Lin, Wang, Wang, & Jiang, 2019; Lee, Cin, & Lee, 2016; Molina-Azorín, Claver-Cortés, López-Gamero, & Tarí, 2009; Xie, Nozawa, Yagi, Fujii, & Managi, 2019; Yadav, Han, & Rho, 2016), there is ongoing academic debate about the determinants of environmental performance (e.g., Dekker & Hasso, 2016). Specifically, firm ownership structure—the difference between family and nonfamily blockholders—is considered one of the most relevant dimensions, owing to family ownership penetration in listed companies in both developed and developing countries.

### ***Family firms and their environmental behavior***

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<sup>3</sup> Our analysis focuses on environmental performance rather than social performance, because Eccles, Serafeim, and Krzus (2011) documented relatively strong interest from worldwide analysts (on both the sell and buy sides) in environmental information and activities compared to other elements of corporate sustainability.

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Although the importance of family firms in worldwide economies is well recognized (e.g., Prencipe, Bar-Yosef, & Dekker, 2014), the relationship between family ownership involvement and a firm's level of sustainability has received less attention (Sharma & Sharma, 2011). While most studies have focused on market strategy choices between family and nonfamily firms, there is a lack of agreement on nonmarket strategy choices and the extent to which family ownership leads to higher sustainability (e.g., Adomako, Amankwah-Amoah, Danso, Konadu, & Owusu-Agyei, 2019; Cruz, Larraza-Kintana, Garcés-Galdeano, & Berrone, 2014; Shahzad, Rehman, Nawaz, & Nawab, 2018). Several literature reviews contain inconsistent and sometimes contradictory results (e.g., Van Gils, Dibrell, Neubaum, & Craig, 2014) on the relationship between family ownership and environmental practice and performance. The underlying perspective from family business studies is that family firms behave differently from nonfamily firms, because family owners aim to shape and pursue the vision of the business. Being owned by a family alters the firm's goals (Basco, 2017), thereby changing the reference point for making strategic decisions (Cennamo, Berrone, Cruz, & Gómez-Mejía, 2012), such as environmentally related practices (Doluga, Wagner, & Block, 2018; Sharma & Sharma, 2011).

According to the perspective of agency theory and the “dark side” of the socioemotional wealth approach (Kellermanns, Eddleston, & Zellweger 2012; Zientara, 2017), it can be argued that family firms are not necessarily more environmentally responsible than nonfamily firms. Even though family firms may experience fewer agency problems and, consequently, fewer agency costs than nonfamily firms may (Jensen & Meckling, 1976), other agency problems can emerge to affect firms' environmental behavior and performance. Family entrenchment, caused by excessive family-centered orientation, creates an “us-against-them” mentality (i.e.,

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Gordon & Nicholson, 2008), which increases agency conflicts by imposing family interests above those of other stakeholders, thereby reducing socially responsible performance (El Ghoul, Guedhami, Wang, & Kwok, 2016). In addition, principal–principal conflicts between majority blockholders and minority shareholders (i.e., agency problem type II) may cause family owners’ interests to diverge (Gómez-Mejía, Cruz, Berrone, & De Castro, 2011; Gu, Lu, & Chung, 2016). In this sense, family owners may act for their own benefit to satisfy their economic (financial endowment) and noneconomic interests (social and emotional endowment). Family firms’ investments are significantly more sensitive to uncertainty than nonfamily firms’ investments are (Bianco, Bontempi, Golinelli, & Parigi, 2013), and because environmental practices are uncertain, it is unclear how and when firms profit from them; family firms may be more reticent to commit to positive environmental practices.

In other words, when family owners do not have diversified wealth, they may prefer to invest in short-term profitable investments than long-term green investment (which may foster the firm’s social image but does not guarantee financial return). As such, the principal–principal problem arguments derived from the agency theory (dark side) justifies the negative relationship between family blockholders and a firm’s environmental performance, *ceteris paribus* (Rees & Rodionova, 2015)<sup>4</sup>.

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<sup>4</sup> Even though it has been proved that family firms are less environmentally responsible than nonfamily firms are (e.g., El Ghoul et al., 2016; Rees & Rodionova, 2015), we acknowledge that the socioemotional wealth approach could push firms to adopt pro-environmental practices to preserve their positive images and good reputation with stakeholders (Dyer & Whetten, 2006; Whetten & Mackey, 2002). Arena and Michelon (2018) found that family firms with strong family identity are more likely to engage in voluntary environmental disclosure than nonfamily firms to strengthen the firm’s SEW over time. Nonetheless, by splitting the sample into different age classes, the authors showed that while the relationship between identity and environmental disclosure is positive for middle-aged family firms, it becomes negative for aged firms. Because our sample is composed of listed firms, which are more likely to have been in business for a long time, we consider that Arena and Michelon’s (2018) finding is consistent with our theoretical framework.

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### *Training and development as a mediator of family firms and environmental performance*

The process through which family blockholders are commonly assumed to affect environmental performance is firms' human resource management practices (Neckebrouck et al., 2018).

Human resource management practices (i.e., employee training and development), which are part of a firm's human capital, affect firm performance generally (Huselid, 1995; Subramony, 2009) and environmental performance specifically (Ji, Huang, Liu, Zhu, & Cai, 2012)<sup>5</sup>. The strategic perspective of human resource management emphasizes the effect of human resource practices on human capital development (Wright & McMahan, 1992). Training and development practices foster employees' knowledge, skills, and abilities (Vidal-Salazar et al., 2012), thereby altering aggregate dimensions of firm human capital and increasing firm competitiveness (Wright & McMahan, 2011). Specifically, employee training should improve performance in corporate sustainability because it enhances employees' sense of business ethics, engagement, and responsibility (Ji et al., 2012). In this vein, Yong et al. (2019) examined the influence of green human resource management practices on business sustainability using a sample of large manufacturing firms in Malaysia. The results showed that green recruitment and green training have positive effects on the alignment of business strategy and the environment by providing environmentally committed employees and diffusing environmental values throughout the firm.

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<sup>5</sup> There is evidence that HR practices can influence behavior, and that organizational culture can support the achievement of various sustainability objectives. For a detailed review of literature on this topic, refer to De Stefano, Bagdadli, and Camuffo (2018).

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As a dominant coalition, family blockholders have a unique logic characterized by a long-term investment horizon; high psychological ownership; and large social, emotional, and economic investment in the firm (e.g., Miller & Le Breton-Miller, 2005; Morgan & Gómez-Mejía, 2014; Pieper, 2010). Family logic, with a special concern for listed firms in which ownership is usually spread over thousands of minor investors, puts a family coalition in a position in which they are either willing or able to influence managerial practices (e.g., Pindado, Requejo, & de la Torre, 2012) by imposing their interests in the decision-making process (Basco & Pérez Rodríguez, 2011).

Two theoretical perspectives support the imposition of such family logic: (1) agency theory (i.e., principal–principal problem) and (2) the socioemotional wealth approach. According to agency theory, different types of conflicts between the majority (controlling) and minority shareholders (Young et al., 2008) are sources of inefficiencies (Dalziel, White, & Arthurs, 2011). These conflicts may arise when blockholders abuse their ownership control to obtain private benefits. In the context of a family business, benefits can be understood in various ways (e.g., economic, social, and emotional) guiding blockholders to divert firm assets or cash flows from equity holders (Love, 2010) by conventional practices (e.g., tunneling, asset-stripping, and related-party transactions) and other soft practices (e.g., family management entrenchment) (e.g., Bertrand & Schoar, 2006; Bhaumik & Gregoriou, 2010; Morck & Yeung, 2003).

In addition, a deeper explanation for the principal–principal problem in the context of family firms is framed by the socioemotional wealth approach (see Stevens, Kidwell, & Sprague, 2015; Young et al., 2008) because of the meaning family members give to the firm arising from their emotional, social, and economic investment in it. This problem leads family

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owners to have both economic and noneconomic goals (i.e., family-related goals) (Basco, 2017). In this context, family influence alters the reference point for making decisions, which is related to a family's intention to protect its endowment of socioemotional wealth (Gómez-Mejía et al., 2007, 2011). Family blockholders are willing to exert their authority over firm strategy, act altruistically toward their family members, implement nepotism as a dominant culture, and create family dynasties through management succession (Astrachan, 2010; Firfiray, Cruz, Neacsu, & Gómez-Mejía, 2017; Handler, 1994; Schulze, Lubatkin, & Dino, 2003), among other actions accentuating family management entrenchment. As a result, family firms differ substantially from nonfamily firms regarding CEO successor intention (Basco & Calabrò, 2017), management development (e.g., Griffeth, Allen, & Barrett, 2006), and workplace justice perceptions (Van der Heyden, Blondel, & Carlock, 2005), among other human resource issues. Family owners promote behavior and values undermining firm human resources<sup>6</sup>, such as entitlement (Aronoff, 2004; Schulze et al. 2003), preferential or asymmetric treatment (e.g., bifurcation bias, Daspit et al., 2018; Jennings, Dempsey, & James, 2017), and parental altruism (Lubatkin, Schulze, Ling, & Dino 2005; Schulze, Lubatkin, & Dino, 2002).

Overall, these specificities of family firms impact human capital and, consequently, firm performance. Neckebrouck et al. (2018) showed that family firms are better financial stewards and worse organizational stewards than nonfamily firms are. For this reason “they offer lower compensation, invest less in employee training, and exhibit higher voluntary turnover and lower labor productivity” (Neckebrouck et al., 2018, p. 553). Family blockholders have a detrimental effect on human resource practices (Liu, Van Jaarsveld, Batt, & Frost, 2014),

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<sup>6</sup> For instance, in the case of cross-border mergers and acquisitions, family-controlled firms often impose human resource constraints to maintain management control (Chen, Huang, & Chen, 2009).

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specifically on training and development (Neckebrouck et al. 2018). Poor employee practices affect both firm performance—such as productivity, profitability, Tobin’s Q, sales growth, and survival (Bloom & Van Reenen, 2007)—and environmental performance (Jabbour & Santos, 2008; Ji et al., 2012).

Relying on the above theoretical arguments, we formulate the following hypothesis.

Hypothesis 1: *Training and development of employees negatively mediates the relationship between family blockholders and a firm’s environmental performance, ceteris paribus.*

## **DATA**

### ***Sample***

We obtain firm-specific data from Worldscope and firms’ environmental information from Thomson Asset4. We start selecting our initial sample based on all firms with environmental performance scores measured by Asset4 from 2002 to 2016, and we remove observations with missing firm-specific variables required to run our regression models. The final sample comprises 33,901 firm-year (4,932 firms) observations from 2002 to 2016 spread across 56 countries. To account for the possibility of sample selection bias, we include in our regression analysis the inverse Mills ratio (IMR) constructed using the entire Asset4 dataset<sup>7</sup>. Most observations are for the United States (10,422), followed by Japan (3,985), the United Kingdom (3,301), Australia (2,392), Canada (1,973), Hong Kong (1,063), and France (958).

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<sup>7</sup> Following Lee (1983), we use a Logit model and our explanatory variables (*Family<sub>i</sub>*, *Closely<sub>i</sub>*, *Leverage<sub>i</sub>*, *Profitability<sub>i</sub>*, *Market-to-Book<sub>i</sub>*, and *Size<sub>i</sub>*) to assess the probability (IMR) of having a nonmissing value of the environmental score in Asset4. The findings from the analysis without the Mills ratio are consistent with our main results.

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The observations are concentrated in the following sectors: industrials (7,637), consumer services (5,561), consumer goods (4,464), and basic materials (4,087).

### ***Dependent variable***

Relying on Rees and Rodionova (2015), we proxy the firms' environmental performance with the Asset4 Environmental performance score (*Environment*), which "reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities to generate long-term shareholder value (*ENVSCORE—Asset4 ESG glossary*)"<sup>8</sup>. We select this measure over the Bloomberg ESG measure, because we are interested in a metric of the level of performance instead of the level of a firm's environmental disclosure (see, e.g., El Ghouli et al., 2016; Ioannou & Serafeim, 2012; Rees & Rodionova, 2015)<sup>9</sup>.

### ***Independent variables***

Since we aim to explore the relationship between family ownership and firms' environmental performance, we adopt the accepted specification of Rees and Rodionova (2015) augmented with the firm's level of training and development as a predictor. Following the academic

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<sup>8</sup> For a description of Asset4 constituents, see the related webpage <http://extranet.datastream.com/data/ASSET4%20ESG/Index.htm>. Chatterji, Durand, Levine, and Touboul (2016) showed how different datasets on environmental and social performance lead to different rankings among firms. Therefore, in principle, our dependent variable could be affected by measurement errors. If these errors were limited to the dependent variable, they would eventually inflate our standard errors, and our significant results would be even more significant. If the errors were correlated with the independent variables, as suggested by Chatterji et al. (2016), a fixed-effects approach and a structural model could address this relevant issue.

<sup>9</sup> Different articles show that the Asset4 *Environmental Score* is a measure of performance (e.g., Cheng, Ioannou, & Serafeim, 2014; Ioannou & Serafeim, 2012; Semenova & Hassel, 2015). Nonetheless, as a robustness check, we repeat the analysis using two different dependent variables, *Emission Reduction* (ENER, Asset4) and *Resources Reduction* (ENRR, Asset4), and corroborate our main inferences (Table E1, supplementary material).

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convention to operationalize when a listed firm is a family firm (Miller, Le Breton-Miller, Lester, & Cannella, 2007), we use two alternative measures of family ownership: percentage of equity held by family or employee shareholders (*Family(%)*) and a dummy variable taking the value of 1 if the percentage of shares held by the family is more than 10% and 0 otherwise (*Family*)<sup>10</sup>.

In addition, we isolate the role of possible cofounders by controlling for a set of variables capturing the structure of firm ownership, financial leverage, firm profitability, firm growth, and firm size. In particular, the structure of ownership (*Closely*) is measured through the percentage of shares closely held by different blockholders (Rees & Rodionova, 2015), leverage (*Leverage*) is long-term debt over total assets (El Ghouli et al., 2016), profitability (*Profitability*) is measured as net income over total assets (Berrone, Cruz, Gómez-Mejía, & Larrazza-Kintana, 2010; El Ghouli et al. 2016; Ioannou & Serafeim, 2012), firm growth is proxied with the market-to-book ratio (*Market-to-Book*) (Berrone et al., 2010; Block & Wagner, 2014; Ioannou & Serafeim, 2012), and firm size (*Size*) is the natural logarithm of market capitalization expressed in US dollars at the fiscal year-end (e.g., Rees & Rodionova, 2015)<sup>11</sup>.

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<sup>10</sup> However, Rees and Rodionova's (2015) method of operationalizing the family firm measure can be criticized because it does contain noise by including employee shareholders and family shareholders. To address this issue, we perform several sensitivity tests in which we adopt alternative definitions of the family firm. Specifically, we use *Family Management*, which takes a value of one if the larger shareholder is a family or an individual who holds the CEO, Chairman, or Vice-Chairman position and *Family Influence*, which is the ratio of the number of shares of all classes held by the family to total shares outstanding only when the largest shareholder is a family or an individual who holds the CEO, Chairman, or Vice-Chairman position, and zero otherwise (data are from a proprietary database of NRG Metrics, see <http://www.nrgmetrics.com/>). As reported in Table C1 (supplementary material), our results are robust to different proxies of family ownership.

<sup>11</sup> We measure *Leverage* as the difference between total debt (WC03255) and current liabilities (WC03101) scaled by total assets (WC02999), *Profitability* as the ratio between net income basic for the EPS calculation (WC01706) scaled by total equity (WC03501), *Market-to-Book* as the ratio between the market capitalization at the fiscal year

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Moreover, we include a measure of firms' investment in training and development practices (*Training & Development*). This mediator variable measures a company's management commitment and effectiveness at providing training and development (education) for its workforce. This variable reflects a company's capacity to increase human capital, workforce loyalty, and productivity by developing the workforce's skills, competences, employability, and careers (SOTD—Asset4 Glossary). Following our hypothesis, we expect *Training & Development* to mediate the relationship between family blockholders and environmental performance.

To address possible endogeneity issues, we instrument *Training & Development* with a dummy variable indicating whether the company has the appropriate communication tools (whistle blower, ombudsman, suggestion box, hotline, newsletter, website, etc.) to improve employee relations (*Employee Relations*). This is a self-reported variable and does not enter the construction of the *Training & Development* index. In fact, while *Employee Relations* belongs to indicators coded as SOEQ (SOcial Employment Quality), *Training & Development* belongs to those coded as SOTD (SOcial Training and Development). As a result, these two indicators measure two different aspects related to a firm's social activity (i.e., two different "Category Score"). We discuss the validity of this instrument in the next section.

Table 1 presents the main descriptive statistics of our dataset. *Environment*, *Training & Development*, *Leverage*, *Profitability*, and *Market-to-Book*, constructed to range between 0 and 100, have average values close to 50. The average family share is 4.1% (*Family(%)*), whereas

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end (WC08002) over total equity (WC03501), and *Size* as the natural logarithm of the market capitalization at the fiscal year end expressed in US dollars (WC08002). As in the previous literature (e.g., Rees & Rodionova, 2015), *Leverage*, *Profitability*, and *Market-to-Book* are rescaled to range between 0 and 100. *Closely* is as provided by Datastream (WC08021).

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the mean value of *Family* indicates that only 12.5% of listed firms have family shares equal to or above 10%. Finally, the average share of closely held equity is 24.8% (*Closely*).

--- Insert Table 1 about here ---

Table 2 displays all the pairwise correlation coefficients between the variables in the analysis.

--- Insert Table 2 about here ---

## METHODOLOGY

### *Training and development practices and firms' environmental performance*

To assess the importance of the relationship between human capital accumulation and environmental performance, we estimate two different models. Following Rees and Rodionova (2015), we first estimate the following specification (firm subscripts are suppressed):

$$\begin{aligned} Environment_t = & \beta_0 + \beta_1 Family(\%)_t + \beta_2 Closely_t + \beta_3 Leverage_t + \beta_4 Profitability_t \\ & + \beta_5 Market - to - Book_t + \beta_6 Size_t + \beta_7 Mills_t + \mu_t + \mu_s + \mu_c + \varepsilon_t \quad (1) \end{aligned}$$

where  $t$  denotes a time subscript,  $\beta_0$  is a constant intercept,  $Mills$  denotes the inverse Mills ratio to control for sample selection problems,  $\mu_t$  is a vector of time fixed effects,  $\mu_s$  captures sector fixed effects,  $\mu_c$  represents country fixed effects, and  $\varepsilon$  is the error term. As a robustness check, we estimate equation (1) by replacing the family share (*Family(%)*) with the dummy variable

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selecting firms with a strong family presence (*Family*)<sup>12</sup>. Standard errors are clustered at the firm level<sup>13</sup>.

The second model adds the *Training & Development* variable to (1). In this way, we test whether training and development is an important omitted variable in model (1). A significant coefficient for *Training & Development* would improve our understanding of the drivers of environmental performance and would eventually affect the coefficients of other covariates, signaling omitted variable bias. Formally, we estimate the following equation:

$$\begin{aligned} Environment_t = & \beta_0 + \beta_1 Family(\%)_t + \beta_2 Closely_t + \beta_3 Leverage_t + \beta_4 Profitability_t \\ & + \beta_5 Market - to - Book_t + \beta_6 Size_t + \beta_7 Mills_t + \beta_8 Training \& Development_t + \mu_t \\ & + \mu_s + \mu_c + \varepsilon_t \quad (2) \end{aligned}$$

### ***Training and development practices, family ownership, and environmental score: a mediation analysis***

A change in the coefficients of some predictors does not necessarily imply the existence of a mediation channel. Therefore, after assessing the impact of *Training & Development* on *Environment*, we test our mediation hypothesis with a structural equation model. We estimate the following system:

<sup>12</sup> Like Ardito, Messeni Petruzzelli, Pascucci, and Peruffo (2019), we raise the threshold to 20% as a sensitivity check. Untabulated results confirm the validity of the estimates.

<sup>13</sup> We also estimate standard errors using a bootstrap technique and clustering at the sector level. Nonetheless, firm-level clustering provides the largest confidence intervals, and therefore, our confidence intervals are rather conservative.

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*Training & Development*<sub>t</sub>

$$\begin{aligned} &= \alpha_0 + \alpha_1 \text{Family}(\%)_t + \alpha_2 \text{Closely}_t + \alpha_3 \text{Leverage}_t + \alpha_4 \text{Profitability}_t \\ &+ \alpha_5 \text{Market} - \text{to} - \text{Book}_t + \alpha_6 \text{Size}_t + \alpha_7 \text{Mills}_t + \alpha_8 \text{Employee Relations}_t + \eta_t + \eta_s \\ &+ \eta_c + u_t \quad (3) \end{aligned}$$

$$\begin{aligned} \text{Environment}_t &= \beta_0 + \beta_1 \text{Family}(\%)_t + \beta_2 \text{Closely}_t + \beta_3 \text{Leverage}_t + \beta_4 \text{Profitability}_t \\ &+ \beta_5 \text{Market} - \text{to} - \text{Book}_t + \beta_6 \text{Size}_t + \beta_7 \text{Mills}_t + \beta_8 \text{Training \& Development}_t + \mu_t \\ &+ \mu_s + \mu_c + \varepsilon_t \quad (4) \end{aligned}$$

Equation (3) is known as the *mediation equation*. In principle, substituting *Training & Development* in equation (4) with the right-hand side of equation (3), *Family*(%) may affect *Environment* through a direct channel ( $\beta_1$ ) and an indirect channel ( $\alpha_1$  times  $\beta_8$ ). The indirect channel captures how much of the relationship between *Family*(%) and *Environment* is mediated by *Training & Development*, that is, how much of the relationship between *Environment* and *Family*(%) is because a larger (smaller) family share is associated with a lower (higher) investment in *Training & Development*. Generally, we test whether *Training & Development* mediates the relationship between *Environment* and any explanatory variable by simply multiplying  $\beta_8$  with the corresponding coefficient of equation (3).

Equations (3) and (4) form a triangular system in which *Employee Relations* acts as an excluded instrumental variable<sup>14</sup>. One could argue that firms characterized by high

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<sup>14</sup> By using a triangular system and an excluded regressor, our methodology allows us to make a precise causal inference about the relationship between family ownership and environmental performance. A common criticism of experimentation and traditional causal analyses is that they detect causality without explaining it. Indeed, our study identifies an intermediate variable that lies in the causal pathway between family ownership and environmental performance. In other words, we test whether our theoretical construct explains the causal relationship.

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environmental performance are obliged to train their employees in the usage of greener technologies. Therefore, to rule out simultaneity problems and identify the impact of *Training & Development* on environmental performance, we need some exclusion restrictions. This problem means that *Employee Relations* must satisfy two conditions: it should be correlated with *Training & Development* (instrument relevance) and uncorrelated with the error term in equation (4) (instrument exogeneity). If these conditions hold, *Training & Development* has an independent and exogenous source of variation, which, in our model, is *Employee Relations*.

Regarding the relevance of the instrument, the availability of employee relations tools reveals the existence of strategic human resources management (SHRM); therefore, we can also expect other human resource practices, such as training and development, to be adopted. Regarding the instrument conditional exogeneity, communication tools per se do not influence firms' emissions. It is difficult to imagine any other channel through which employee relations tools affect the environmental score (instrument conditional exogeneity)<sup>15</sup>.

## RESULTS

Table 3 reports the estimates of equations (1) and (2). In columns 1 and 2, we use a continuous measure of family share (*Family(%)*); in columns 3 and 4, we replace it with a dummy variable

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<sup>15</sup> To test the validity of *Employee Relations* as an excluded instrument, we rewrite our structural equation model using a two-stage least squares method. We also consider a second instrument reflecting a company's management commitment and effectiveness at maintaining diversity and equal opportunities in its workforce (for the results, see the supplementary material). The second-stage estimates obtained using the two instruments separately lead to very similar coefficients for the impact of training and development practices on the environmental score. This is a rather encouraging result, since it confirms a certain stability of our IV estimates, making us confident about our IV choice. Moreover, when we use both IVs together, we can perform the Sargan overidentification test, which confirms the validity of our instruments. Indeed, we cannot reject the null hypothesis that our IVs are uncorrelated with the second-stage error term.

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taking the value 1 if the family share is greater than or equal to 10% (*Family*). This second measure allows us to identify firms whose family shareholdings are sufficiently large to exert certain control over the business.

Table 3 provides a series of interesting results. First, columns 1 and 3 show that Rees and Rodionova's (2015) results are robust to period and sample size. In column 1, the coefficient of *Family*(%) is practically the same magnitude as found in Rees and Rodionova (2015). In addition, column 3 shows that, on average, the environmental score of family-controlled firms is 5.5 percentage points lower than the environmental score of firms with family shares of less than 10%. Therefore, we conclude that listed family firms underperform nonfamily firms in terms of environmental performance scores.

#### ***Do training and development practices determine firms' environmental performance?***

By comparing columns 1 and 2 as well as columns 3 and 4 of Table 3, we notice that the inclusion of *Training & Development* significantly increases the model fit. The coefficient of determination ( $R^2$ ) passes from 45.4% to 62.3%. In addition, the impact of *Training & Development* on *Environment* is positive and statistically significant ( $\beta=0.516$ ,  $p<.001$ ). Finally, the inclusion of *Training & Development* absorbs part of the effects and statistical significance of the other explanatory variables. In particular, the coefficients of *Family*(%) and *Family* decrease by 30%. *Training & Development* is an important explanatory variable of firms' environmental performance, and its omission seems to cause serious omitted variable problems. For instance, the leverage coefficient is now statistically insignificant. This result confirms the importance of training and development practices for firms' environmental performance (see Jabbour & Santos, 2008).

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--- Insert Table 3 about here ---

***Training and development practices and environmental performance: a mediation analysis***

In the previous subsection, we find that training and development practices play a significant role in determining firms' environmental scores. However, these results say nothing about the causal direction of this relationship or the role of *Training & Development* in mediating the effects of other explanatory variables on the environmental score. We use a structural equation model to tackle these questions specifically. Tables 4 and 5 present the estimates of the triangular system described in equations (3) and (4) in which family ownership is entered as a continuous variable and a dummy variable, respectively.

The first columns in both Tables 4 and 5 report the estimates of the mediation equation; the second columns in both Tables 4 and 5 present the direct effects of the explanatory variables on the environmental score; and the third columns in both tables show the effects of the explanatory variables on the environmental score, which is mediated by investment in *Training & Development* practices (indirect effects). The total effects, that is, the combination of direct and indirect effects, are reported in the fourth column.

Both Tables 4 and 5 provide consistent results to support our hypothesis. First, the excluded instrument (*Employee Relations*) is positively correlated with investment in *Training & Development* practices (first column). This result is consistent with the postulation that firms training their employees tend to adopt other SHRM practices too, such as monitoring employee relations with specific tools. Second, in line with Neckebrouck et al. (2018), the first column in Tables 4 and 5 reveals a negative correlation between *Family*(%) ( $\beta = -0.076$ ,  $p < .01$ ), *Family* ( $\beta = -3.076$ ,  $p < .001$ ), and *Training & Development* practices. Therefore, by multiplying these

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coefficients with the direct impact of *Training & Development* on *Environment* (i.e., second column,  $\beta=0.944$  and  $\beta=0.946$  in Tables 4 and 5, respectively), we obtain the effect of family blockholders on *Environment*, which is mediated by *Training & Development* (coefficients of *Family(%)* and *Family* reported in the third column)<sup>16</sup>. The third column shows that almost 50% of the total impact of family blockholders on the environmental score is mediated by investment in *Training & Development*. Therefore, an important reason for the poor environmental performance of family firms is that these firms invest less in *Training & Development* practices; therefore, they do not take advantage of the positive relationship between human capital accumulation and environmental performance.

*Training & Development* acts as a mediator for other explanatory variables as well. Interestingly, the leverage effect is completely mediated by *Training & Development*, while profitability has a negative direct effect and a positive indirect effect on the environmental score. First, the complete mediation of leverage may be the result of the higher risk associated with long-term debt, which decreases the firm likelihood of investment in *Training & Development* and consequently, reduces the investment in environmental activities. Second, the lack of correlation between profitability and *Environment* is masked by two opposite effects: on the one hand, firms with higher profitability tend to invest more in *Training & Development*, and through this channel they may improve their environmental performance; on the other hand, greener technologies are expensive. Finally, our estimates show that, if we

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<sup>16</sup> For clarity, the coefficient of *Family(%)* in Table 4, column 3, (i.e.,  $\beta= -0.072$ ) is given by multiplying the coefficient of *Family(%)* in column 1 (i.e.,  $\beta= -0.076$ ) with the coefficient of *Training & Development* in column 2 (i.e.,  $\beta= 0.944$ ). Similarly, the coefficient of *Family* in Table 5, column 3, (i.e.,  $\beta= -2.909$ ) is given by multiplying the coefficient of *Family* in column 1 (i.e.,  $\beta= -3.076$ ) with the coefficient of *Training & Development* in column 2 (i.e.,  $\beta= 0.946$ ).

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control for simultaneity problems between *Training & Development* and *Environment*, the effect of *Training & Development* on *Environment* increases when compared to simple ordinary least squares estimates, and the coefficient of determination is deflated by the endogeneity issue.

--- Insert Tables 4 and 5 about here ---

### ***Additional results and robustness checks***

In this subsection, we check the robustness of our main findings by performing several sensitivity tests using alternative measures of *Training and Development* and *Family ownership* (see supplementary material).

Regarding the alternative measures of training and development, we perform two analyses. First, since our measure of *Training & Development* aggregates different dimensions, we explore whether any training and development dimension drives the mediation. We perform three mediation analyses for each disaggregate measure of training and developing practices (management training, implementation, and policy)<sup>17</sup>. As shown in Table B1 (supplementary material, available online), we confirm the validity of the estimates and find that the direct effect between *Family(%)* and *Environment* becomes insignificant, thereby denoting complete mediation. Therefore, we also prove that our main inferences are rather prudent. Second,

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<sup>17</sup> We replace Training & Development with the following three alternatives measures available in Asset4: (1) Training and Development/Management Training (SOTDO04S), which goes from 0 to 100 based on the answer to the following question “Does the company claim to provide regular staff and business management training for its managers?”; (2) Training and Development/Implementation (SOTDD02S), which goes from 0 to 100 based on the answer to the following question “Does the company describe the implementation of its training and development policy?”; and (3) Training and Development/Policy (SOTDD01S), which goes from 0 to 100 based on the answer to the following question “Does the company have a policy to support the skills training or career development of its employees?” (source Asset4 - Glossary).

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because the previous literature has proved that environmental training and development practices provide more environmentally committed employees (Yong et al., 2019), we examine the impact of specific environmental training and development practices (i.e., *Environmental T&D*) as a mediator variable. Therefore, we replace *Training & Development* with *Environmental T&D*, which takes the value of one if the company trains its employees on environmental issues<sup>18</sup>. As shown in Table B2 (supplementary material), the results are even stronger, and the direct effect (i.e., from *Family(%)* to *Environment*) becomes statistically insignificant, corroborating the validity of the estimates of the study.

Regarding our main predictor, we check the robustness of our main findings by adopting two alternative measures of family ownership, *Family Management* and *Family Influence*<sup>19</sup>. *Family Management*, is a family's ability to influence the management of the firm; it takes the value of one if the largest shareholder is a family or an individual who holds the CEO, Chairman or Vice-Chairman position. *Family Influence* is the ratio of the number of shares of all classes held by the family to total shares outstanding only when the largest shareholder is a family or an individual who holds the CEO, Chairman, or Vice-Chairman position, and zero otherwise. The results in Table C1 (supplementary material) show that the direct effect becomes statistically insignificant, confirming that the *Training & Development* channel captures some family firms' specific characteristics.

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<sup>18</sup> While the main advantage of Environmental T&D (ENRRDP008- Asset4) is that it highlights a specific type of training and development practice, its main limitation is that it is expressed as a dummy. Thus, we cannot control for different intensity in training and development practices, which is instead considered when using the continuous variable. This explains why we perform this exercise as sensitivity.

<sup>19</sup> Since Asset4 contains no detailed information on family firms, we merge our data with a proprietary database from NRG Metrics, which provides accurate information collected from firms' annual reports (see <http://www.nrgmetrics.com/>). After merging (based on ISIN codes), we obtain 15,515 observations (i.e., about half of our initial sample). Therefore, we use the new dataset as a robustness check.

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Finally, the mediation effect could be guided by the strong influence of the biggest blockholder regardless of its identity. Therefore, we compute an additional test by replacing the family firm variables with an alternative measure capturing the ownership concentration of the *lone owner* (the largest share belonging to a single owner). The results in Table D (supplementary material) show that the level of ownership held by a single individual is correlated neither with the level of *Training & Development* nor the *Environment*, corroborating that our main findings are driven by family firms' characteristics<sup>20</sup>.

## DISCUSSION AND CONCLUSION

Much of the debate in corporate governance research has focused on the relationship between ownership structure and environmental performance (Walls, Berrone, & Phan, 2012) given that owners determine firm behavior and, consequently, firm performance (Van Essen et al., 2015). While previous studies have found contradictory results (i.e., ownership can be either negatively or positively associated with environmental performance), the theoretical support adopted to explain such behavior mostly comes from agency theory, specifically the principal–principal problem, by which blockholders' needs, interests, and goals vary, and the bargaining power of the dominant coalition may impose particular goals on the business (Boyd & Solarino, 2016). To alleviate principal–principal problems, firms have been advised to define appropriate corporate governance structures and internal processes (Basco & Voordeckers, 2015) to limit managerialism (see Raelin & Bondy, 2013) and nepotism. However, Rees and Rodionova

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<sup>20</sup> We measure lone owner as the percentage ownership of the single biggest owner (by voting power, CGSRDP045-Asset4).

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(2015) claimed blockholders can impose their logic at the managerial level, thereby affecting environmental practices and performance. Nevertheless, this assumption has rarely been tested with respect to why some firms are greener than others.

Our study addresses this research gap by testing the mediation effect of training and development practices between family blockholders and environmental performance. We focus on family blockholders because of their particular relationship with the firm in which they impose specific business- and family-related (Aparicio et al., 2017) goals. The high endowment of socioemotional wealth strategically invested in the firm has different meanings for families, such as family concern about organizational reputation (Zellweger, Nason, Nordqvist, & Brush, 2013), family intention to preserve socioemotional endowment (Gómez-Mejía et al., 2007), purpose in building a family legacy (Englisch, Hall, & Astrachan, 2015), and aspiration to keep family control and pass a healthy firm across generations. The family imposes its interests on strategy (Kappes & Schmid, 2013), decision-making (Schmid, Ampenberger, Kaserer, & Achleitner, 2015), and human resource practices (Konzelmann, Conway, Trenberth, & Wilkinson, 2006). Investing less in employee training leads a company to lower firm performance, specifically, lower environmental performance (Jabbour & Santos, 2008).

Using a sample of 33,901 firm-year observations from 2002 to 2016 distributed across 56 countries and implementing the structural equation model technique, we find evidence that employee training and development practices mediates almost 50% of the relationship between family blockholders and environmental performance. This supports our hypothesis that family owners can impose their agendas, affecting managerial practices, such as training and development. Indeed, when we consider specific training and development practices or the

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family's willingness and capacity to guarantee equal rights to minority shareholders, our mediation channel fully explains the low environmental performance of family firms.

### ***Contributions***

This study makes three contributions to corporate governance and family business research. First, we contribute to the debate on ownership structure and environmental performance (e.g., Lopatta, Jaeschke, Canitz, & Kaspereit, 2017) by focusing on family blockholders (Rees & Rodionova, 2015). Our study extends Rees and Rodionova's (2015) findings, by explaining *why* family and nonfamily firms vary in their environmental performance. Accordingly, we show that family blockholders can interfere in human resource practices, specifically training and development, and that this difference explains almost 50% of the underperformance of family blockholders in terms of environmental performance. Our study links the fields of corporate governance and management. The principal–principal issue is not a new agency problem and has long been debated (Renders & Gaeremynck, 2012). However, less clear are the specificities of this problem with regard to family blockholders and how the problem has spread across the management arena. The coexistence of different blockholders has given rise to agency type II problems (e.g., Young et al., 2008). One solution is to implement particular governance structures to align shareholders' goals and expectations. However, we prove that in the case of family blockholders, family ownership affects human resource practices and, consequently, environmental performance. Family blockholders seem able to impose their own logic by affecting the management arena in which daily decision-making defines firm behavior and performance. Future studies should explore the mechanisms by which family blockholders,

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or any other blockholder type, impose their interests while maintaining the external image that corporate governance follows market logic.

Second, we contribute to the theoretical development of family business studies by explaining how family ownership affects firm behavior and performance (Van Essen et al., 2015). We provide evidence that family businesses have competitive disadvantages regarding human resource management. In fact, our study shows that listed family firms are penalized (at least in their environmental performance) for being family-owned, which is in line with other studies that showed family firms have limited access to resources (Sirmon & Hitt, 2003); experience self-selection of particular human resources, such as more conservative employees (Hauswald et al., 2016); exhibit bifurcation bias (Daspit et al., 2018); and implement poor employment practices (Neckebrouck et al., 2018). Overall, the studies seem to indicate that regardless of firm size, family firms fail to manage human resources (e.g., Kotey & Folker, 2007; Neckebrouck et al., 2018), and, based on our empirical evidence, the negative features of family business persist even when they are under market disciplinary measures, such as being listed. However, while the dominant logic approach in family business studies assumes that family firms have different sets of goals to nonfamily firms (Aparicio et al., 2017)—which creates specific social, emotional, and economic endowments (Gómez-Mejía et al., 2007) linking family and business and affecting corporate governance (Carney, 2005) and managerial practices (Sirmon & Hitt, 2003)—hardly any evidence exists of the mechanisms determining the underdevelopment of human resource practices. One possible explanation, which represents an interesting avenue for future research, is that family logic may change perceptions of the meaning of risk, and since risk is associated with human resource investment (moral hazard and adverse selection), it disadvantages family firm human resources. Finally, by using

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a triangular system and excluded regressor, our methodology allows us to make conclusions about the causal relationship. We do not only identify a relationship between family ownership, human resource practices, and environmental performance; we also establish a causal channel among them.

### ***Limitations and future research directions***

Our study has several limitations, which represent opportunities for future research. First, the direct effect of *Family(%)* on the environmental score remains unexplained; future research could explore the determinants of this negative association. A possible starting point is Rees and Rodionova's (2015) argument: families invest their private wealth in the business, and since they want to transmit wealth to future generations, they usually have a long-term commitment to their investments. Therefore, family firms are guided by personal benefits, which may contrast with environmental and social considerations. Another possible research direction is to continue exploring principal–principal problems using agency theory and the socioemotional wealth approach, which may reveal additional mediation paths, for instance, organizational cultural aspects as substitutes for human resource practices. The second limitation is that family blockholders could impose their personal interests, interfering in managerial practices by bypassing corporate governance. Therefore, future studies should disentangle the interface between ownership, corporate governance, and management, testing whether family blockholders bypass government mechanisms, such as boards of directors, to maximize their benefits. If so, good corporate governance practices do not guarantee the elimination of principal–principal problems, and the cost of preventing them might amount to inefficient investments. Finally, future studies should investigate whether our main results are

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influenced by the industry and institutional landscape in which firms operate. Indeed, it may be worthwhile to test whether our results differ in shareholder- versus stakeholder-oriented countries and in environmentally sensitive industries<sup>21</sup>.

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<sup>21</sup> We thank an anonymous reviewer for this suggestion.

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## TABLES

**TABLE 1: DESCRIPTIVE STATISTICS**

<b>Variable</b>	<b>Obs.</b>	<b>Mean</b>	<b>St. Dev.</b>	<b>Min</b>	<b>Q1</b>	<b>Median</b>	<b>Q3</b>	<b>Max</b>
Environment	33,901	50.944	31.676	8.28	18.22	48.83	84.59	97.5
Family(%)	33,901	4.090	11.772	0	0	0	0	93
Family	33,901	0.125	0.330	0	0	0	0	1
Training & Development	33,901	51.012	31.284	4.57	17.06	53.16	81.26	97.41
Closely	33,901	24.817	24.254	0	2.34	17.19	42.17	100
Leverage	33,901	51.377	28.475	1	27	52	76	100
Profitability	33,901	51.974	29.090	1	27	53	78	100
Market-to-Book	33,901	53.700	29.065	1	29	56	79	100
Size	33,901	15.182	1.440	7.422	14.344	15.177	16.054	20.277
Mills	33,901	0.415	0.426	0.000	0.115	0.297	0.572	4.925
Employee Relations	33,901	0.189	0.392	0	0	0	0	1

Notes: Environment is the Asset4 measure of firms' environmental performance, Family(%) is the share of equity held by family or employees, Family is a dummy for firms with a family share higher than 10% while Training & Development measures a firm's capacity to increase human capital, workforce loyalty, and productivity (SOTD-Asset4). Closely is the Worldscope measure of closely held stock in total. Leverage, Profitability and Market-to-book are the cross-sample percentiles of each variable where the original ratios are calculated as long-term debt over the total asset, net income over total equity and market value of equity over book value of equity, respectively. Size is the natural logarithm of market capitalization in US\$, Mills is the inverse Mills' ratio and Employee Relations is a dummy indicating whether the company has the appropriate communication tools to improve employee relations (SOEQDP006-Asset4).

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**TABLE 2: PEARSON CORRELATION COEFFICIENTS**

	1	2	3	4	5	6	7	8	9	10	11	
Environment	1	1										
Family(%)	2	-0.088***	1									
Family	3	-0.105***	0.835***	1								
Training & Development	4	0.668***	-0.009	-0.032***	1							
Closely	5	-0.058***	0.305***	0.249***	0.037***	1						
Leverage	6	-0.039***	-0.049***	-0.063***	-0.056***	-0.060***	1					
Profitability	7	0.048***	0.033***	0.021***	0.113***	-0.001	-0.162***	1				
Market-to-Book	8	-0.077***	0.039***	0.034***	-0.014*	-0.063***	-0.133***	0.571***	1			
Size	9	0.390***	-0.059***	-0.091***	0.332***	-0.043***	0.050***	0.298***	0.316***	1		
Mills	10	-0.369***	0.108***	0.133***	-0.276***	0.213***	-0.047***	-0.084***	-0.035***	-0.844***	1	
Employee Relations	11	0.312***	-0.015**	-0.017**	0.330***	-0.016**	-0.006	0.046***	-0.014*	0.178***	-0.145***	1

Notes: Number of observations 33,901. Environment is the Asset4 measure of firms' environmental performance, Family(%) is the share of equity held by family or employees, Family is a dummy for firms with a family share higher than 10% while Training & Development measures a firm's capacity to increase human capital, workforce loyalty, and productivity. Closely is the Worldscope measure of closely held stock in total. Leverage, Profitability and Market-to-book are the cross-sample percentiles of each variable where the original ratios are calculated as long-term debt over the total asset, net income over total equity and market value of equity over book value of equity, respectively. Size is the natural logarithm of market capitalization in US\$, Mills is the inverse Mills' ratio and Employee Relations is a dummy indicating whether the company has the appropriate communication tools to improve employee relations. \*p<.05 \*\*p<.01 \*\*\*p<.001.

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**TABLE 3: ENVIRONMENTAL PERFORMANCE (OLS ESTIMATES)**

Dependent variable:	Column (1)	Column (2)	Column (3)	Column (4)
	<i>Environment</i>	<i>Environment</i>	<i>Environment</i>	<i>Environment</i>
<i>Constant</i>	-154.559*** (8.391)	-89.744*** (6.699)	-154.714*** (8.382)	-89.913*** (6.695)
<b>Family(%)</b>	<b>-0.155***</b> <b>(0.025)</b>	<b>-0.111***</b> <b>(0.020)</b>		
<b>Family</b>			<b>-5.550***</b> <b>(0.885)</b>	<b>-3.843***</b> <b>(0.697)</b>
<b>Training &amp; Development</b>		<b>0.516***</b> <b>(0.009)</b>		<b>0.516***</b> <b>(0.009)</b>
Closely	-0.123*** (0.016)	-0.073*** (0.012)	-0.128*** (0.016)	-0.077*** (0.012)
Leverage	-0.040*** (0.012)	-0.007 (0.010)	-0.041*** (0.012)	-0.008 (0.010)
Profitability	0.016 (0.009)	-0.003 (0.007)	0.015 (0.009)	-0.003 (0.007)
Market-to-Book	-0.221*** (0.013)	-0.118*** (0.010)	-0.222*** (0.013)	-0.119*** (0.010)
Size	14.085*** (0.516)	7.947*** (0.413)	14.103*** (0.515)	7.965*** (0.412)
Mills	12.464*** (1.520)	7.706*** (1.192)	12.688*** (1.517)	7.870*** (1.192)
Year Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Observations	33,901	33,901	33,901	33,901
R <sup>2</sup>	0.454	0.623	0.454	0.623

Notes: This table presents the OLS estimates of equations (1) and (2). Environment is the Asset4 measure of firms' environmental performance, Family(%) is the share of equity held by family or employees, Family is a dummy for firms with a family share higher than 10% while Training & Development measures a firm's capacity to increase human capital, workforce loyalty, and productivity. Closely is the Worldscope measure of closely held stock in total. Leverage, Profitability and Market-to-book are the cross-sample percentiles of each variable where the original ratios are calculated as long-term debt over the total asset, net income over total equity and market value of equity over book value of equity, respectively. Size is the natural logarithm of market capitalization in US\$, Mills is the inverse Mills' ratio. Clustered standard errors are reported in parentheses. \*p<.05 \*\*p<.01 \*\*\*p<.001.

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**TABLE 4: ENVIRONMENTAL PERFORMANCE AND FAMILY SHARE (A STRUCTURAL EQUATION MODEL)**

	Column (1)	Column (2)	Column (3)	Column (4)
	Mediation	Direct Effect	Indirect Effect	Total Effect
<i>Dependent variable:</i>	<i>Training &amp; Development</i>	<i>Environment</i>	<i>Environment</i>	<i>Environment</i>
<i>Constant</i>	-115.001*** (13.94)	-56.264*** (10.508)		-56.264*** (10.508)
<b>Training &amp; Development</b>		<b>0.944***</b> <b>(0.045)</b>		<b>0.944***</b> <b>(0.045)</b>
<b>Family(%)</b>	<b>-0.076**</b> <b>(0.024)</b>	<b>-0.074***</b> <b>(0.022)</b>	<b>-0.072**</b> <b>(0.023)</b>	<b>-0.146***</b> <b>(0.025)</b>
Closely	-0.087*** (0.016)	-0.031* (0.014)	-0.082*** (0.015)	-0.113*** (0.015)
Leverage	-0.061*** (0.012)	0.021 (0.011)	-0.058*** (0.011)	-0.037** (0.012)
Profitability	0.035*** (0.009)	-0.018* (0.008)	0.033*** (0.009)	0.015 (0.009)
Market-to-book	-0.182*** (0.013)	-0.032* (0.014)	-0.172*** (0.015)	-0.205*** (0.013)
Size	10.649*** (0.535)	2.847*** (0.707)	10.057*** (0.724)	12.904*** (0.508)
Mills	8.147*** (1.582)	3.752** (1.385)	7.694*** (1.550)	11.446*** (1.480)
Employee Relations	13.820*** (0.720)		13.052*** (0.707)	13.052*** (0.707)
Year Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Observations	33,901	33,901	33,901	33,901
Pseudo-Likelihood (Log)			2524738.9	

Notes: This table reports the ML estimates of the system (3)-(4). Environment is the Asset4 measure of firms' environmental performance, Family(%) is the share of equity held by family or employees while Training & Development measures a firm's capacity to increase human capital, workforce loyalty, and productivity. Closely is the Worldscope measure of closely held stock in total. Leverage, Profitability and Market-to-book are the cross-sample percentiles of each variable where the original ratios are calculated as long-term debt over the total asset, net income over total equity and market value of equity over book value of equity, respectively. Size is the natural logarithm of market capitalization in US\$, Mills is the inverse Mills' ratio and Employee Relations is a dummy indicating whether the company has the appropriate communication tools to improve employee relations. Estimates are robust to the correlation between errors. Clustered standard errors are reported in parentheses. \*p<.05 \*\*p<.01 \*\*\*p<.001.

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**TABLE 5: ENVIRONMENTAL PERFORMANCE AND FAMILY CONTROL (A STRUCTURAL EQUATION MODEL)**

	Column (1)	Column (2)	Column (3)	Column (4)
	Mediation	Direct Effect	Indirect Effect	Total Effect
<i>Dependent variable:</i>	<i>Training &amp; Development</i>	<i>Environment</i>	<i>Environment</i>	<i>Environment</i>
<i>Constant</i>	-114.945*** (13.807)	-56.256*** (10.535)		-56.256*** (10.535)
<b>Training &amp; Development</b>		<b>0.946***</b> <b>(0.045)</b>		<b>0.946***</b> <b>(0.045)</b>
<b>Family</b>	<b>-3.076***</b> <b>(0.885)</b>	<b>-2.421**</b> <b>(0.785)</b>	<b>-2.909***</b> <b>(0.850)</b>	<b>-5.330***</b> <b>(0.857)</b>
Closely	-0.088** (0.016)	-0.034* (0.014)	-0.083** (0.015)	-0.117** (0.015)
Leverage	-0.061** (0.012)	0.020 (0.011)	-0.058** (0.011)	-0.038** (0.012)
Profitability	0.035*** (0.009)	-0.019* (0.008)	0.033*** (0.009)	0.014 (0.009)
Market-to-book	-0.182** (0.013)	-0.033* (0.014)	-0.172** (0.015)	-0.205** (0.013)
Size	10.647*** (0.534)	2.847*** (0.707)	10.068*** (0.723)	12.915*** (0.507)
Mills	8.246*** (1.576)	3.853** (1.389)	7.798*** (1.547)	11.651*** (1.477)
Employee Relations	13.829*** (0.721)		13.077*** (0.707)	13.077*** (0.707)
Year Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Observations	33,901	33,901	33,901	33,901
Pseudo-Likelihood (Log)			2645120.2	

Notes: This table reports the ML estimates of the system (3)-(4). Environment is the Asset4 measure of firms' environmental performance, Family is a dummy for firms with a family share higher than 10% while Training & Development measures a firm's capacity to increase human capital, workforce loyalty, and productivity. Closely is the Worldscope measure of closely held stock in total. Leverage, Profitability and Market-to-book are the cross-sample percentiles of each variable where the original ratios are calculated as long-term debt over the total asset, net income over total equity and market value of equity over book value of equity, respectively. Size is the natural logarithm of market capitalization in US\$, Mills is the inverse Mills' ratio and Employee Relations is a dummy indicating whether the company has the appropriate communication tools to improve employee relations. Estimates are robust to the correlation between errors. Clustered standard errors are reported in parentheses. \*p<.05 \*\*p<.01 \*\*\*p<.001.

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# **FAMILY OWNERSHIP AND ENVIRONMENTAL PERFORMANCE: THE MEDIATION EFFECT OF HUMAN RESOURCE PRACTICES**

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Thomas Bassetti<sup>vii</sup>

Nicola Lattanzi<sup>viii</sup>

## **SUPPLEMENTARY MATERIAL AVAILABLE ONLINE**

This supplementary material (SM) provides additional robustness checks for the analyses and conclusions reported in the article “*Family ownership and environmental performance: the mediation effect of human resource practices.*”

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## SUPPLEMENTARY MATERIAL A.

### SAMPLE COMPOSITION

Table A1 shows the composition of our sample by country and year, whereas Table A2 reports the number of observations by sector and year.

**Table A1: Sample composition by Country and Year**

COUNTRY	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	TOTAL
AUSTRALIA	3	3	44	52	52	57	69	159	235	251	269	305	315	317	261	2,392
AUSTRIA	5	6	7	11	11	12	14	13	12	11	9	9	10	11	5	146
BAHRAIN	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4
BELGIUM	9	10	10	13	13	13	14	15	16	14	14	16	17	20	3	197
BRAZIL	1	0	1	1	0	6	14	24	55	66	55	69	66	70	20	448
CANADA	5	5	45	65	68	104	169	187	190	216	202	221	232	242	22	1,973
CAYMAN ISLANDS	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
CHILE	0	0	0	0	0	2	6	12	17	17	17	18	19	19	1	128
CHINA	0	0	1	1	1	1	16	35	63	68	61	59	64	76	0	446
COLOMBIA	0	0	0	0	0	0	0	1	5	6	5	7	7	7	2	40
CZECH REPUBLIC	0	0	0	0	0	1	1	3	3	3	2	3	3	3	2	24
DENMARK	8	10	11	14	13	16	17	17	19	20	15	11	13	21	19	224
EGYPT	0	0	0	0	0	0	1	1	1	8	8	8	8	7	4	46
FINLAND	12	13	14	18	20	22	22	23	24	25	16	26	24	24	20	303

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FRANCE	38	40	50	62	61	70	74	76	80	83	72	77	80	87	8	958
GERMANY	23	26	40	45	45	44	57	56	61	69	49	57	47	75	54	748
GREECE	5	7	7	5	5	5	10	10	13	14	11	13	13	13	1	132
HONG KONG	3	4	26	31	33	42	49	61	106	120	121	135	151	154	27	1,063
HUNGARY	0	0	0	0	0	0	1	2	3	3	1	3	3	3	2	21
INDIA	0	0	0	0	0	5	16	28	50	64	66	68	75	80	59	511
INDONESIA	0	0	0	0	0	0	4	9	20	20	15	27	30	33	10	168
IRELAND	3	3	6	8	8	7	9	9	10	10	12	12	12	12	4	125
ISRAEL	1	1	1	1	1	1	1	7	9	8	9	9	9	11	1	70
ITALY	17	18	21	23	23	26	29	30	30	32	26	28	27	28	14	372
JAPAN	22	23	189	325	330	335	338	344	347	341	343	70	365	372	241	3,985
JERSEY	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
KAZAKHSTAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	6
KOREA REP.	1	1	3	3	3	7	1	30	77	82	86	86	86	96	0	562
KUWAIT	0	0	0	0	0	0	0	0	0	1	1	1	1	5	2	11
LUXEMBOURG	0	0	1	1	2	2	2	2	2	2	1	1	3	3	0	22
MALAYSIA	0	0	0	0	0	0	7	13	33	35	28	23	41	44	16	240
MEXICO	0	0	0	0	0	0	7	11	6	17	11	17	21	25	0	115
MOROCCO	0	0	0	0	0	0	1	1	1	1	1	1	2	2	0	10
NETHERLANDS	13	14	18	20	21	22	20	21	22	26	23	24	23	29	14	310
NEW ZEALAND	0	0	5	8	8	9	9	9	10	10	9	10	14	37	31	169
NORWAY	9	11	16	19	20	19	18	18	18	19	10	18	17	23	12	247
OMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4
PERU	0	0	0	0	0	0	1	1	1	2	2	2	1	2	0	12
PHILIPPINES	0	0	0	0	0	0	1	5	12	16	11	18	19	19	0	101
POLAND	0	0	0	0	0	1	3	5	13	15	17	16	20	18	10	118

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PORTUGAL	1	2	2	8	8	9	9	9	9	9	8	8	8	8	5	103
QATAR	0	0	0	0	0	0	0	0	0	1	1	1	5	6	4	18
RUSSIAN FED.	0	0	0	1	2	5	18	27	21	25	24	28	24	30	6	211
SAUDI ARABIA	0	0	0	0	0	0	0	5	5	5	1	5	5	7	3	36
SINGAPORE	0	0	20	26	26	28	31	36	35	36	36	35	36	35	8	388
SOUTH AFRICA	0	0	0	0	0	0	9	12	34	51	97	80	94	93	55	525
SPAIN	18	19	27	32	30	32	32	32	33	33	31	33	34	34	11	431
SRI LANKA	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2
SWEDEN	22	25	32	36	35	33	35	35	36	36	16	28	32	49	27	477
SWITZERLAND	24	27	31	36	34	38	39	45	48	45	37	41	41	51	24	561
TAIWAN	1	1	1	1	1	2	15	24	105	109	113	113	116	114	0	716
THAILAND	0	0	0	0	0	1	4	7	15	14	18	18	22	25	1	125
TURKEY	0	0	0	0	0	0	8	10	16	17	12	15	15	19	2	114
UNITED ARAB EMIRATES	0	0	0	0	0	0	0	1	0	2	1	1	3	6	2	16
UNITED KINGDOM	82	85	203	239	249	239	239	264	262	265	247	222	255	286	164	3,301
UNITED STATES OF AMERICA	337	353	479	532	513	512	704	791	818	810	777	778	810	1,276	932	10,422
TOTAL	663	707	1,311	1,637	1,636	1,728	2,144	2,536	3,002	3,155	3,019	2,875	3,340	4,036	2,112	33,901

**Table A2: Sample composition by ICB Industry and Year**

ICB INDUSTRY	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	TOTAL
BASIC MATERIALS	50	53	119	154	154	178	238	317	410	442	423	418	444	478	209	4,087
CONSUMER GOODS	95	102	171	230	230	238	281	330	386	413	402	351	441	521	273	4,464
CONSUMER SERVICES	119	128	225	286	286	293	351	403	461	486	466	438	529	652	438	5,561
FINANCIALS	8	8	37	43	47	49	63	71	96	103	100	124	148	177	92	1,166

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HEALTH CARE	71	73	111	123	114	125	140	164	181	186	174	159	197	306	202	2,326
INDUSTRIALS	139	153	311	387	382	403	483	559	674	714	671	614	732	903	512	7,637
OIL & GAS	38	38	106	125	131	148	210	242	264	275	262	288	290	315	114	2,846
TECHNOLOGY	75	79	124	160	156	149	177	211	261	253	247	220	267	344	149	2,872
TELECOMMUNICATIONS	24	26	35	43	46	47	72	88	94	105	103	99	109	123	39	1,053
UTILITIES	44	47	72	86	90	98	129	151	175	178	171	164	183	217	84	1,889
<b>TOTAL</b>	<b>663</b>	<b>707</b>	<b>1,311</b>	<b>1,637</b>	<b>1,636</b>	<b>1,728</b>	<b>2,144</b>	<b>2,536</b>	<b>3,002</b>	<b>3,155</b>	<b>3,019</b>	<b>2,875</b>	<b>3,340</b>	<b>4,036</b>	<b>2,112</b>	<b>33,901</b>

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## SUPPLEMENTARY MATERIAL B.

### ALTERNATIVE *TRAINING & DEVELOPMENT* VARIABLES

In this section, we replicate the triangular system described in equations (3) and (4) with alternative measures of *Training & Development*. Specifically, we replace the *Training & Development* variable with (1) *Training and Development-Management Training* (SOTDO04S), which goes from 0 to 100 based on the answer to the following question “Does the company claim to provide regular staff and business management training for its managers?”; (2) *Training and Development-Implementation* (SOTDD02S), which goes from 0 to 100 based on the answer to the following question “Does the company describe the implementation of its training and development policy?”; and (3) *Training and Development-Policy* (SOTDD01S), which goes from 0 to 100 based on the answer to the following question “Does the company have a policy to support the skills training or career development of its employees?” (Source Asset4 - Glossary). Table B1 reports the estimates for the triangular system described in equations (3) and (4) in which family ownership is entered as a continuous variable (*Family%*)<sup>22</sup>. As shown, the results confirm the validity of the estimates reported in the article.

Second, because it has been proved that green training provides environmentally committed employees (Yong et al, 2019), we examine the impact of specific environmental training and development practices as the mediator variable. While our main *Training & Development* variable is a continuous measure of a broad set of training and development practices, we replace it with *Environmental T&D* that takes value of 1 if the company trains its employees on environmental issues, 0 otherwise (ENRRDP008-Asset4). While this new dummy variable allows us to specifically investigate the impact of environmental training and development practice as a mediator, it doesn’t control for different intensity of T&D practices, which is instead accounted when using the continuous variable<sup>23</sup>. In Table B2 we report the estimates for the

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<sup>22</sup> Results are robust even when family ownership is measured as a dicotomic variable (*Family*).

<sup>23</sup> This is the reason why we use it as a sensitivity test.

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triangular system described in equations (3) and (4) in which family ownership is entered as a continuous variable (*Family%*)<sup>24</sup> and *Environmental T&D* is the moderator. As reported, the new mediator is able to explain the whole direct effect between ownership and environmental performance. Thus, the results confirm the validity of the estimates reported in the article.

**Table B1: Environmental performance and family share**

**Alternative T&D mediators (SEM)**

	Column (1)	Column (2)	Column (3)	Column (4)
	Mediation	Direct Effect	Indirect Effect	Total Effect
<i>Panel A: T&amp;D - Management Training</i>				
<i>Dependent variable:</i>	<i>Management training</i>	<i>Environment</i>	<i>Environment</i>	<i>Environment</i>
<b>T&amp;D - Management Training</b>		<b>1.134***</b> (0.082)		<b>1.134***</b> (0.082)
<b>Family(%)</b>	<b>-0.095***</b> (0.028)	<b>-0.039</b> (0.033)	<b>-0.108***</b> (0.033)	<b>-0.147***</b> (0.025)
<i>Panel B: T&amp;D - Implementation</i>				
<i>Dependent variable:</i>	<i>Implementation</i>	<i>Environment</i>	<i>Environment</i>	<i>Environment</i>
<b>T&amp;D - Implementation</b>		<b>1.354***</b> (0.091)		<b>1.354***</b> (0.091)
<b>Family(%)</b>	<b>-0.079**</b> (0.025)	<b>-0.040</b> (0.033)	<b>-0.107**</b> (0.035)	<b>-0.147***</b> (0.025)
<i>Panel C: T&amp;D - Policy</i>				
<i>Dependent variable:</i>	<i>Policy</i>	<i>Environment</i>	<i>Environment</i>	<i>Environment</i>
<b>T&amp;D - Policy</b>		<b>1.466***</b> (0.104)		<b>1.466***</b> (0.104)
<b>Family(%)</b>	<b>-0.091***</b> (0.026)	<b>-0.015</b> (0.037)	<b>-0.133***</b> (0.039)	<b>-0.147***</b> (0.025)
Firm controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes

<sup>24</sup> Results are robust even when family ownership is measured as a dicotomic variable (*Family*).

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Observations	33,287	33,287	33,287	33,287
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Notes: This table reports the ML estimates of the system (3)-(4). Environment is the ASSET4 measure of firms' environmental performance, Family(%) is the share of equity held by family or employees, while Training & Development is measured using the following three alternatives measures available in Asset4: Training and Development/Management Training (SOTDO04S, Panel A), which goes from 0 to 100 based on the answer to the following question "Does the company claim to provide regular staff and business management training for its managers?"; Training and Development/Implementation (SOTDD02S, Panel B), which goes from 0 to 100 based on the answer to the following question "Does the company describe the implementation of its training and development policy?"; and Training and Development/Policy (SOTDD01S, Panel C), which goes from 0 to 100 based on the answer to the following question "Does the company have a policy to support the skills training or career development of its employees?" (source Asset4 - Glossary). The firm controls variables are as described in the manuscript. Estimates are robust to the correlation between errors. Clustered standard errors are reported in parentheses. \*p<.05 \*\*p<.01 \*\*\*p<.001.

**Table B2: Environmental performance and family share**  
**Environmental T&D as a mediator (SEM)**

	Column (1)	Column (2)	Column (3)	Column (4)
	Mediation	Direct Effect	Indirect Effect	Total Effect
<i>Dependent variable:</i>	<i>Environmental T&amp;D</i>	<i>Environment</i>	<i>Environment</i>	<i>Environment</i>
<b>Environmental T&amp;D</b>		<b>84.273***</b> (6.293)		<b>84.273***</b> (6.293)
<b>Family(%)</b>	<b>-0.001***</b> (0.000)	<b>-0.032</b> (0.032)	<b>-0.116**</b> (0.036)	<b>-0.148***</b> (0.025)
Firm controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Observations	33,538	33,538	33,538	33,538
Pseudo-Likelihood (Log)			2533282.8	

Notes: This table reports the ML estimates of the system (3)-(4). Environment is the Asset4 measure of firms' environmental performance, Family(%) is the share of equity held by family or employees while Environmental T&D is a dummy variable which takes the value of 1 if the company trains its employees on environmental issues, 0 otherwise (ENRRDP008-Asset4). The firm controls variables are as described in the manuscript. Estimates are robust to the correlation between errors. Clustered standard errors are reported in parentheses. \*p<.05 \*\*p<.01 \*\*\*p<.001.

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## SUPPLEMENTARY MATERIAL C.

### ALTERNATIVE MEASURE FOR *FAMILY FIRMS*

Because the identification of family firms is not an easy task, the existing literature uses different definitions of family firms. While we adopted the same definitions of Rees and Rodionova (2015), other definitions can be useful to test whether the mediation effect is associated with some family-specific characteristics. Since Asset4 does not contain detailed information on family firms, we merged our initial dataset with the NRG Metrics proprietary database (a team of market professionals and academic researchers in the field of corporate governance). This database provides accurate information collected from the firms' annual reports (see <http://www.nrgmetrics.com/>). Once we merge our initial dataset with this new data (based on the ISIN code), we obtain 15,515 observations (i.e., about half of our initial sample)<sup>25</sup>.

Specifically, we run two robustness tests. First, we consider the ability of the family to influence the management of the firm. Accordingly, we use a dummy variable taking value one if the largest shareholder is a family or an individual who holds the CEO, Chairman or Vice-Chairman position (*Family Management*). Second, we measure *Family Influence* as the ratio of the number of shares of all classes held by the family to total shares outstanding only when the largest shareholder is a family or an individual who holds the CEO, Chairman, or Vice-Chairman position, and zero otherwise.

In line with our interpretations, Table C1 (Panel A and B) shows that results are even stronger and the direct effect becomes statistically insignificant. Therefore, this additional exercise confirms the fact that the *Training & Development* channel is capturing some family firms' specific characteristics.

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<sup>25</sup> This is why we use the new dataset as a robustness check.

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**Table C1: Environmental performance and family influence/management (SEM)**

	Column (1)	Column (2)	Column (3)	Column (4)
	Mediation equation	Direct Effect	Indirect Effect	Total Effect
<i>Dependent variable:</i>	<i>Training &amp; Development</i>	<i>Environment</i>	<i>Environment</i>	<i>Environment</i>

*Panel A: Family management*

<b>Training &amp; Development</b>		<b>1.062<sup>***</sup></b>		<b>1.062<sup>***</sup></b>
		<b>(0.077)</b>		<b>(0.077)</b>
<b>Family management</b>	<b>-4.781<sup>***</sup></b>	<b>-1.790</b>	<b>-5.080<sup>**</sup></b>	<b>-6.870<sup>***</sup></b>
	<b>(1.425)</b>	<b>(1.359)</b>	<b>(1.557)</b>	<b>(1.397)</b>

*Panel B: Family influence*

<b>Training &amp; Development</b>		<b>1.064<sup>***</sup></b>		<b>1.064<sup>***</sup></b>
		<b>(0.077)</b>		<b>(0.077)</b>
<b>Family influence</b>	<b>-16.001<sup>**</sup></b>	<b>-6.333</b>	<b>-17.031<sup>**</sup></b>	<b>-23.364<sup>***</sup></b>
	<b>(6.078)</b>	<b>(6.316)</b>	<b>(6.584)</b>	<b>(6.826)</b>

Firm controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes

Observations	15,515	15,515	15,515	15,515
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Notes: This table reports the ML estimates of the system (3)-(4). Environment is the Asset4 measure of firms' environmental performance, Family Management is a dummy variable taking value one if the largest shareholder is a family or an individual who holds the CEO, Chairman or Vice-Chairman position, Family Influence is the ratio of the number of shares of all classes held by the family to total shares outstanding only when the largest shareholder is a family or an individual who holds the CEO, Chairman, or Vice-Chairman position, and zero otherwise, while Training & Development measures a firm's capacity to increase human capital, workforce loyalty, and productivity. The firm controls variables are as described in the manuscript. Estimates are robust to the correlation between errors. Clustered standard errors are reported in parentheses. \*p<.05 \*\*p<.01 \*\*\*p<.001.

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## SUPPLEMENTARY MATERIAL D.

### ALTERNATIVE MEASURE FOR OWNERSHIP

In the following sensitivity check, we tried to isolate the role of possible confounders by controlling for firm ownership concentration. Indeed, a potential concern may arise from the fact that our main results are driven by “controlling power” held by the strong shareholder instead of due to some family characteristics. Accordingly, we replace the *Family(%)* with a variable named “*Single Biggest Owner*” which indicates the largest share belonging to a single owner. As shown in table D1, the level of ownership held by one single individual is neither correlated with the level of *Training & Development* nor with the *Environment*. Therefore, we corroborate our idea that our main findings are because of family firms’ specific characteristics.

**Table D1: Environmental performance and single biggest owner influence (OLS)**

	Column (1) <i>Environment</i>	Column (2) <i>Training &amp; Development</i>	Column (3) <i>Environment</i>
<i>Constant</i>	-141.085*** (9.076)	-104.220*** (9.389)	-89.074*** (7.407)
<b>Single Biggest Owner</b>	<b>0.003</b> <b>(0.024)</b>	<b>0.006</b> <b>(0.024)</b>	<b>-0.000</b> <b>(0.020)</b>
Training & Development			0.499*** (0.010)
Firm controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes
<i>Observations</i>	27,226	27,226	27,226

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R <sup>2</sup>	0.459	0.349	0.613
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Notes: This table presents the OLS estimates of equations (1) and (2). Environment is the Asset4 measure of firms' environmental performance, Training & Development measures a firm's capacity to increase human capital, workforce loyalty, and productivity while, Single Biggest Owner is the percentage ownership of the single biggest owner (by voting power, CGSRDP045-Asset4). The firm controls variables are as described in the manuscript. Clustered standard errors are reported in parentheses. \*p<.05 \*\*p<.01 \*\*\*p<.001.

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## SUPPLEMENTARY MATERIAL E.

### ENVIRONMENTAL SCORE AS A MEASURE OF ENVIRONMENTAL PERFORMANCE

The environmental score results from different environmental dimensions. One of these dimensions is the company's capacity to reduce air emissions (greenhouse gases, F-gases, ozone-depleting substances, NO<sub>x</sub> and SO<sub>x</sub>, etc.), waste, hazardous waste, water discharges, spills or its impacts on biodiversity and to partner with environmental organizations to reduce the environmental impact of the company in the local or broader community (ENER, Asset4). Another one measures the company's commitment and effectiveness towards reducing the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management (ENRR, Asset4). Therefore, if family firms disclose less and the environmental score is a proxy of disclosure, our structural estimates should be less significant when we replace *Environment* with *Emission Reduction* and *Resource Reduction*.

Table E1 (Panel A and B) reports the estimates for the triangular system described in equations (3) and (4) in which family ownership is entered as a continuous variable (*Family%*)<sup>26</sup>. As shown, the results confirm the validity of the estimates reported in the article and support the idea that *Environment* is a measure of performance.

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<sup>26</sup> Results are robust even when family ownership is measured as a dicotomic variable (*Family*).

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**Table E1: Emission & Resource reduction and family share (SEM)**

	Column (1)	Column (2)	Column (3)	Column (4)
	Mediation equation	Direct Effect	Indirect Effect	Total Effect
<i>Panel A : Emission reduction</i>				
	<i>Training &amp; Development</i>	<i>Emission reduction</i>	<i>Emission reduction</i>	<i>Emission reduction</i>
<b>Training &amp; Development</b>		<b>0.972***</b>		<b>0.972***</b>
		<b>(0.048)</b>		<b>(0.048)</b>
<b>Family(%)</b>	<b>-0.076**</b>	<b>-0.091***</b>	<b>-0.074**</b>	<b>-0.165***</b>
	<b>(0.024)</b>	<b>(0.024)</b>	<b>(0.024)</b>	<b>(0.026)</b>
<i>Panel B: Resource reduction</i>				
	<i>Training &amp; Development</i>	<i>Resource reduction</i>	<i>Resource reduction</i>	<i>Resource reduction</i>
<b>Training &amp; Development</b>		<b>0.950***</b>		<b>0.950***</b>
		<b>(0.048)</b>		<b>(0.048)</b>
<b>Family(%)</b>	<b>-0.076**</b>	<b>-0.059**</b>	<b>-0.072**</b>	<b>-0.131***</b>
	<b>(0.024)</b>	<b>(0.022)</b>	<b>(0.023)</b>	<b>(0.026)</b>
Firm controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Observations	33,901	33,901	33,901	33,901

Notes: This table reports the ML estimates of the system (3)-(4). Emission reduction is the company's capacity to reduce air emissions (greenhouse gases, F-gases, ozone-depleting substances, NOx and SOx, etc.), waste, hazardous waste, water discharges, spills or its impacts on biodiversity and to partner with environmental organizations to reduce the environmental impact of the company in the local or broader community (ENER, Asset4), while Resource reduction measures the company's commitment and effectiveness towards reducing the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management (ENRR, Asset4). Family(%) is the share of equity held by family or employees while Training & Development measures a firm's capacity to increase human capital, workforce loyalty, and productivity. The firm controls variables are as described in the manuscript. Estimates are robust to the correlation between errors. Clustered standard errors are reported in parentheses. \*p<.05 \*\*p<.01 \*\*\*p<.001.

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## SUPPLEMENTARY MATERIAL F.

### EMPLOYEE RELATIONS VARIABLE IS A VALID INSTRUMENT

The econometric estimates reported in the article are based on the SEM command available on Stata. This command can be used for mediation analyses and has the main advantage of disentangling the direct and indirect effects, providing the corresponding standard errors. However, as pointed out by Cameron and Trivedi (2005)<sup>27</sup>, our specification can be used for causal analysis only if *Training & Development* has an independent and exogenous source of variation, which in our model is *Employee Relations*. This means that *Employee Relations* acts as an excluded instrument and our SEM can be re-written in a two-stage least squares (2SLS) fashion. Tables F1 and F2 report the first and second stage, respectively. For the sake of representation, we report the estimates where the family ownership is entered as a continuous variable (*Family%*)<sup>28</sup>.

Notice that we also consider a second instrument (*Diversity & Opportunity*) which measures a company's management commitment and effectiveness towards maintaining diversity and equal opportunities in its workforce. Specifically, it reflects a company's capacity to increase its workforce loyalty and productivity by promoting an effective life-work balance, a family-friendly environment, and equal opportunities regardless of gender, age, ethnicity, religion or sexual orientation (SODO-Asset4). Finally, we use both instruments at the same time.

Table F1 shows that both instruments have the expected relationship with Training & Development; moreover, the Kleibergen-Paap rk Wald F-statistic confirms the relevance of the instruments. Table F2 reports the second stage results. Notice that both *Family(%)* and *Training & Development* coefficients remain noticeably stable across regressions. This means that the two IVs are valid instruments. This is also confirmed by the Sargan test. Indeed, we cannot reject the null hypothesis that our IVs are uncorrelated with the second stage error term.

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<sup>27</sup> Cameron, A.C., & Trivedi, P.K. (2005). *Microeconometrics: methods and applications*. Cambridge university press.

<sup>28</sup> Results are robust even when family ownership is measured as a dicotomic variable (*Family*).

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**Table F1: Environmental performance and family share (IV approach – 1<sup>st</sup> stage)**

	Column (1)	Column (2)	Column (3)
Dependent variable:	<i>Training &amp; Development</i>	<i>Training &amp; Development</i>	<i>Training &amp; Development</i>
Constant	-115.001*** (7.222)	-44.449*** (6.713)	-37.078*** (6.745)
Family(%)	-0.076*** (0.012)	-0.032** (0.011)	-0.030** (0.011)
<b>Employee Relations</b>	<b>13.820***</b> <b>(0.346)</b>		<b>7.131***</b> <b>(0.322)</b>
<b>Diversity &amp; Opportunity</b>		<b>0.488***</b> <b>(0.005)</b>	<b>0.468***</b> <b>(0.005)</b>
Firm controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes
Observations	33,901	33,901	33,901
Kleibergen-Paap rk Wald F-statistic	1594.32	10997.11	5876.49
Stock-Yogo (10%)	16.38	16.38	19.93

Notes: This table reports the Instrumental Variable approach. Training & Development measures a firm's capacity to increase human capital, workforce loyalty, and productivity, Family(%) is the share of equity held by family or employees, Employee Relations is a dummy indicating whether the company has the appropriate communication tools to improve employee relations while Diversity & Opportunity measures a company's management commitment and effectiveness towards maintaining diversity and equal opportunities in its workforce (source Asset4). The firm controls variables are as described in the manuscript. Robust standard errors are reported in parentheses. \*p<.05 \*\*p<.01 \*\*\*p<.001.

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**Table F2: Environmental performance and family share (IV approach – 2<sup>nd</sup> stage)**

	Column (1)	Column (2)	Column (3)
Dependent variable:	<i>Environment</i>	<i>Environment</i>	<i>Environment</i>
Constant	-56.264*** (10.507)	-59.844*** (8.611)	-59.563*** (8.611)
<b>Training &amp; Development</b>	<b>0.944***</b> <b>(0.045)</b>	<b>0.918***</b> <b>(0.019)</b>	<b>0.920***</b> <b>(0.019)</b>
<b>Family(%)</b>	<b>-0.074***</b> <b>(0.022)</b>	<b>-0.076***</b> <b>(0.021)</b>	<b>-0.076***</b> <b>(0.021)</b>
<i>Instrument(s)</i>	<i>Employee Relations</i>	<i>Diversity &amp; Opportunity</i>	<i>Both</i>
Firm controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes
Observations	33,901	33,901	33,901
R <sup>2</sup>	0.506	0.520	0.519
Sargan Test	-	-	1.21
p-value	-	-	0.272

Notes: This table reports the Instrumental Variable approach. Environment is the ASSET4 measure of firms' environmental performance, Training & Development measures a firm's capacity to increase human capital, workforce loyalty, and productivity while Family(%) is the share of equity held by family or employees. The firm controls variables are as described in the manuscript. Clustered standard errors are reported in parentheses. \*p<.05 \*\*p<.01 \*\*\*p<.001.

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