Managerial Response to Investor Environmental Demand: The Role of Firm Ownership Structure[*]

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Abstract

We provide evidence suggesting that managers respond to investor demand for environmental investments when the market offers a stock price premium on firm's environmental performance. We further find that the managerial response relates to firms' ownership structures with a stronger response arising when the largest shareholders are more powerful in terms of voting rights or cash flow rights (particularly family firms and firms with dual class shares) and when the stock is more important in the largest shareholders' portfolios. These findings suggest that managerial response to investor demand for environmental performance is associated with the power of dominant (long-term) owners.

Keywords: ESG, catering theory, firm ownership structure, dual class shares, portfolio composition.

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I. Introduction

Evidence suggests that investors and analysts have broad and increasing interests in firms with stronger environmental profiles (e.g., Krueger, Sautner, and Starks, 2020; Sautner, van Lent, Vilkov, and Zhang, 2023; Bolton and Kacperczyk, 2021, 2022; Pastor, Stambaugh, and Taylor, 2022; Jing, Keasey, Lim, and Xu (2022); Starks, 2023; Li, Mai, Wong, Yang, and Zhang, 2023). However, the extent to which the firms' owners and managers respond to such market interest is unclear. Moreover, an understanding of managers' decision-making processes regarding the environmental aspects of their firms requires consideration of the interrelationship between investor demand and shareholder preferences, particularly in the presence of powerful owners.

We examine these issues in a setting in which we have the advantage of detailed data on both a firm's environmental profile and its ownership structure. Specifically, the Swedish data that we use includes details regarding the major shareholders, such as their ownership type, voting rights, and cash flows rights. This data allows us to test our hypotheses using a comprehensive picture of firms' ownership structures, which is advantageous given the potential for owners, particularly powerful owners, to influence managerial decisions. Another advantage of the detailed Swedish data derives from the direct influence the largest shareholders have on firm governance since according to Swedish law, the director nomination committee typically includes the largest five shareholders (Dent Jr, 2013). Although the Swedish data we employ is somewhat unique in its scope, it is also representative of ownership structures in other European countries. Further, as Anderson, Jones, and Martinez (2020) point out, the Swedish stock market is large (in terms of total stock market capitalization), well-developed and competitive.

To measure investor environmental demand, we employ a catering approach analogous to that of Baker and Wurgler's (2004) focus on to how managers respond to fluctuating investor demand for dividends. According to Baker, Greenwood, and Wurgler (2009), managers are often interested in making decisions that deliver certain firm characteristics, such as dividends, for which

investors are willing to pay a premium. In our context, if the catering occurs, then we expect to observe that the managers who are sensitive to investor environmental demand, all else equal, seek to improve their firms' environmental profiles during periods when investors are willing to pay a premium for such investments. Naughton, Wang, and Yeung (2019) have adopted the Baker and Wurgler catering perspective in terms of firms' aggregate ESG or CSR and examine the role of CSR and transient institutional investors. Jiao, Tong, and Yan (2021) measure catering for aggregate CSR by studying mutual fund holdings for high versus low CSR firms. However, an issue not considered by these studies is the fact that managers can be constrained by the interests of their large dominant shareholders. This is an important consideration given the ownership structure of firms in Sweden, and Europe more generally. Moreover, prior work suggests that investor incentives and preferences, particularly those of the largest shareholders, have the potential to influence firm policies and outcomes (e.g., Cronqvist and Nilsson, 2003; Anderson and Reeb, 2003a; Anderson and Reeb, 2003b; Edmans and Holderness, 2017; McCahery, Sautner, and Starks, 2016; Maury, 2006; Lowry, Wang, and Wei, 2023). This research implies that viewing managerial responses to investor demand in isolation from the presence of powerful ownership effects can be problematic. Thus, we study investor demand in concert with ownership structure.

We find that when stock market prices reflect a premium on stocks with high environmental scores, firm managers, on average, appear to respond by increasing their environmental investments as reflected in the subsequent increases in firm-level environmental scores. Further, when we examine the environmental catering in the presence of dominant ownership, we find that the firm's ownership structure is highly important, particularly with regard to the power of the ownership. We consider the concept of powerful ownership from several different perspectives. We first focus on the largest owner's voting power and cash flow rights and find, consistent with our hypothesis, that the catering to demand for environmental investments is increasing in both voting rights and cash flow rights. Additionally, we consider other aspects of the owner's

motivation and power by examining the stock's position in the owner's portfolio and again find a positive association between the firm's catering to environmental demand and the stock being a significant part of the owner's portfolio.

Further, we examine whether the power is effectuated through specific ownership structures such as family firms or dual class shares and find this to be the case, which is important since family firms and dual class ownership structures have been shown to be prevalent not only in Sweden (e.g., Cronqvist and Nilsson, 2003), but also in Europe more generally (e.g., Faccio and Lang, 2002, Maury and Pajuste, 2005).

These results are consistent with previous research that has shown firm's ownership structures and the largest owner's power, portfolio composition, type, and dual class shareholdings to be related to corporate outcomes (e.g., Cronqvist and Nilsson, 2003; Lyandres, Marchica, Michaely, and Mura, 2019; Faccio, Marchica, and Mura, 2011; Fich, Harford, and Tran, 2015; Maury, 2006; Ekholm and Maury, 2014; Maury and Pajuste, 2005; Ravid and Sekerci, 2020). We examine alternative explanations and specifications and find our results to be robust.

Our findings demonstrate a positive association between management's catering to demand for environmental investment and the presence of dominant and long-term oriented owners (owners with substantial voting and cash flow rights, concentrated portfolios, including those associated with the presence of dual class shares and family ownership). This suggests that dominant owners are cognizant of externalities as their presence is associated with increased environmental investments when the market places a premium on such investments. Overall, our empirical results suggest that managerial decisions on environmental investments vary jointly with investor environmental demand and firms' ownership structures.

Our research contributes to several different strands of the literature. First, by showing that investor environmental demand can help explain variation in firms' environmental profiles, we add

a unique perspective to the growing body of work examining the determinants of corporate ESG/CSR decisions (e.g., El Ghoul, Guedhami, Wang, and Kwok, 2016; Ferrell, Liang, and Renneboog, 2016; Liang and Renneboog, 2017; Dyck, Lins, Roth, and Wagner, 2019; Abeysekera and Fernando, 2020; Freund, Nguyen, and Phan, 2022) and the work showing the influence of investors and owners on firms' environmental activities. For example, Dimson, Karakas, and Li (2015, 2021) provide evidence that institutional investor engagement, both on an individual basis and in collaboration can affect firms' environmental and social choices. More recently, Hoepner, Oikonomou, Sautner, Starks, and Zhou (2023) show that large shareholder engagement on environmental issues can affect firms' subsequent downside risk.

Second, we contribute to the research that examines managerial responses to investor demand through a catering perspective (e.g., Baker and Wurgler, 2004; Baker et al., 2009; Li and Lie, 2006; Braggion and Giannetti, 2019; Naughton et al., 2019; Jiao et al., 2021). We provide new evidence that managerial responses to investor environmental demand are inextricably linked to the firm's ownership structure, suggesting that certain ownership structures, in particular, long-term dominant owners (a large shareholder, family owners, or owners with dual class shares), promote the managerial response to investors' environmental demand. This in turn supports the view that shareholder *voice* is influential in shaping firms' environmental policies. In this regard our findings compliment those of Gantchev, Giannetti, and Li (2022), who focus on the role of *exit* by institutional investors and show that following negative ES news, and subsequent stock price declines, the presence of ES-conscious institutional investors is associated with improvement in firm ES policies, particularly when managers receive stock-based compensation.

Further, our study differs significantly from work examining catering to investor demand for CSR/ESG in two primary ways. First, we emphasize how various aspects of firms' ownership structures could be an important component of how managers respond to increased market demand for environmental investments. Second, we focus on investor demand regarding firms'

environmental profiles rather than aggregate CSR (or ESG). This more concentrated focus provides several advantages. Specifically, as has been documented by a number of studies (e.g., Berg, Kolbel, and Rigobon, 2022), there are considerable complexities in combining the disparate elements of E, S and G into an aggregate ESG score. Moreover, investor demand can vary across the dimensions of ESG. For example, there has been an increasing world-wide focus on environmental issues. Further, given our focus on the influence of the long-term owners in the firm, investors' environmental goals can differ from their social or governance goals. Thus, isolating environmental issues can provide a clearer understanding of the relationship.

Third, our paper contributes to the "long-termism" debate in the literature (e.g., Krueger et al., 2020; Starks, Venkat, and Zhu, 2022; Kim, Kim, Kim, and Park, 2019). Specifically, our results suggest that the managerial response to investor environmental demand is linked to the presence of long-term-oriented owners (i.e., family owners, owners holding dual class shares) and those with large economic incentives to monitor (i.e., owners with substantial voting rights and owners with concentrated portfolios).[1] Overall, our results suggest evidence on how firm sustainability activities can be governed by their (long-term) owners.

II. Data, Variables and Descriptive Statistics

A. Data

Focusing on Swedish data provides distinct advantages for testing our hypotheses. First, the existence of granular ownership data for Swedish firms allows us to measure aspects of ownership structure that are not as readily available in other markets. Specifically, we can measure the owners' voting power along with their cash flow rights and their affiliation with the firm (e.g., as the CEO,

[1] One could also interpret these findings as being consistent with long-term oriented owners, especially family owners, promoting catering as a result of public attention on environmental issues. That is, external reputational pressures might result in family owners seeking environmental reforms at firms (for example, see Giannetti and Wang (2023) for the role of public attention on gender issues on corporate governance).

a member of the management team, the chairman of the board, or a board member). We can also determine the ownership type (e.g., families, financial institutions, and other entities such as corporations, governments, foundations, and individuals), whether the firm has dual class shares and the firm's ownership concentration. Moreover, the database provides information regarding each investor's portfolio composition, which allows us to calculate the relative weight a firm constitutes in a shareholder's portfolio, a measure we refer to as 'stock importance' as in Ravid and Sekerci (2020).

Second, Sweden ranks as one of the highest ranked countries in the world in terms of cultural norms towards environmental preferences (e.g., Dyck et al., 2019; Starks, 2023), thus providing an ideal setting to investigate both investor demand for, and corporate policies on, environmental issues. Moreover, restricting the analysis to one country holds constant cultural norms, institutions and country-specific characteristics that are potentially important in explaining cross-country variation in firms' ESG choices (Cai, Pan, and Statman, 2016; Liang and Renneboog, 2017; Dyck et al., 2019).

Our sample comprises 208 non-financial Swedish firms listed on the NASDAQ-OMX stock exchange in Stockholm. We gather firm characteristics from Thomson Reuters Datastream. Firm-level environmental ratings for the 2009-2015 period are obtained from Global Engagement Services International AB (GES).[2] The GES data has advantages for our empirical tests because GES was the leading ESG data provider in the Swedish market during our sample period and the scores take into consideration sector specific issues (e.g., sectors with high supply chain environmental risks have supply chain related criteria in the assessment) (Eccles and Stroehle, 2018). The data coverage provided by GES is advantageous due to its comprehensive coverage of

[2] GES is intimately familiar with the Swedish market as Eccles and Stroehle (2018), who review the ESG data providers, note that: GES is "…very much a product of Swedish culture and depicts an interesting development in its conceptualization of sustainability." GES International was acquired by Sustainalytics, a global leader in ESG and corporate governance research, ratings and analytics, in January 2019 (https://www.sustainalytics.com/press-release/sustainalytics-acquires-ges-international/).

the Swedish market (relative to other possible databases). This allows for a larger, representative sample and more meaningful tests (Krueger, Metzger, and Wu, 2023).

Firm ownership data is from Modular Finance AB (previously SIS Ägarservice AB), which provides the Swedish government share registry data of all shareholders for firms listed on the Stockholm Stock Exchange.[3] We focus on each firm's largest shareholders given that such shareholders are generally viewed as having the ability to influence firm governance (e.g., Shleifer and Vishny, 1986; Edmans and Holderness, 2017).[4] Since, as noted above, Swedish law delegates the nomination of directors to a nomination committee that typically comprises representatives of the firm's largest five shareholders, we also examine ownership concentration based on the three largest and five largest shareholders.

B. Variable Construction and Descriptive Statistics

All variable definitions are reported in Table 1, where the currency is the Swedish Krona (SEK). The GES database reports firms' environmental ratings (*Escore)* on a scale of 0-3, based on an average of a firm's environmental 'preparedness' and 'performance' scores, evaluated based on a detailed company-specific analysis which depends on management's disclosure and actions. For example, the questions addressed by management and assessed by GES include, 'Does the company describe its environmental organization and routines?', 'To what extent does the company present its environmental policies and targets?', and 'Has the amount of greenhouse gases released by the company changed over time?'. (All of the environmental-related questions are listed in Appendix A.) To illustrate, the *Escore* for AAK (formerly, AarhusKarlshamn AB) increased from 1.17 in 2013 to 1.42 in 2014. The firm's 'E preparedness' score did not change, thus the increased *Escore* was due to the change in the firm's 'E performance'. Specifically, the firm's performance

[3] This data has been used previously by Cronqvist and Nilsson, 2003; Giannetti and Simonov, 2006; Giannetti and Laeven, 2008; Ravid and Sekerci, 2020, among others.

improved in the following three sub-categories, which are all measured relative to the firm's turnover: the change in the amount of waste, the change in the firms' energy consumption, and the amount of water consumption.

In order to facilitate the interpretation of results we rescale the *E* scores to lie between 0 and 1.[5] We present the summary statistics in Table 2. The *Escore* across the sample firms averages 0.313 (with a standard deviation of 0.234).

Our measure of investor environmental demand (*Demand for E*) is analogous to the dividend premium concept in Baker and Wurgler (2004). That is, we measure the investor environmental demand for each year as the difference in the logs of the value-weighted average of the market-to-book ratios of more environmentally-conscious firms versus less environmentally-conscious firms in year *t-1*. We classify firms as more environmentally-conscious if they are above the sample median *Escore* and less environmentally-conscious if they are below the sample median *Escore*. Table 2 shows that the *Demand for E* has a mean of 1.852 with a standard deviation of 0.126, a minimum of 1.635 and a maximum of 2.064.[6]

To capture the relevant aspects of a firm's ownership structure, we employ several different variables. First, we focus on the power and control of the largest owner in the firm. As pointed out by Burkart and Lee (2008), the allocation of voting rights not only provides evidence regarding the balance of power among shareholders, it also represents the shareholders' leverage over management. Similarly, Adams and Ferreira (2008) summarize substantial theoretical and empirical evidence showing that the differences between voting rights and cash flow rights can affect managerial decisions. Consequently, we use two measures to capture these aspects of firms' ownership and control structures with regard to the largest shareholder. First, *Vote 1SH* represents

[5] Our results are robust to using the unscaled data.

[6] This result of a positive demand for firms' environmental activities is consistent with the results in Liu, Cheong, and Zurbruegg (2020) that firms with higher CSR scores are punished more when they are served with environmental lawsuits. Further, our results of a premium are consistent with the Fernando, Sharfman and Uysal (2017) findings of a nonmonotonic relationship between institutional investor holdings and firms' environmental profiles.

the percentage of votes held by the largest shareholder, while *Capital 1SH* captures the percentage of cash flow rights held by the largest shareholder. As Table 2 shows, on average, the largest shareholder in our sample controls 33.1% of the votes (*Vote 1SH*) and holds 24.4% of the cash flow rights.

In Table 2, we show that, on average, the 2nd and 3rd largest shareholders in our sample also have significant presences as they control 10.6% and 6% of the votes, respectively. These statistics are similar to those in prior work for other Continental European firms, e.g., Maury and Pajuste (2005) who report that the voting rights of the first, second and third largest shareholders in their Finnish sample are 42.3%, 11.5%, and 6%, respectively.

We capture the importance of the company to the largest shareholder by using the relative size of the firm in that shareholder's portfolio. *Stock importance weight* is the weight of the stock in the largest shareholders' portfolio, and *Stock importance I* is an indicator variable that equals 1 if the stock has the highest weight in the portfolio.[7] In our analyses, we use *Stock importance I* to simplify the interpretation in the interaction models. Similar to Faccio et al. (2011), who examine ownership in Western European countries, we find that shareholder portfolio concentration varies widely. Some shareholders in our sample have quite diverse portfolios with a minimum value of *Stock importance weight* equal to 0.001, while others are reported to have just one stock in their portfolio and consequently, have a *Stock importance weight* value of 1. On average, we find that about 62% of the largest owners have the focal firm as the most significant part of their portfolio and the average portfolio share is 59%.

We measure the largest shareholder's role in the firm by using an indicator variable (*Insider*), which takes a value of 1 if the largest shareholder also holds an official role in the firm,

[7] For example, in 2005 Melker Schörling was AAK's largest shareholder, and at the end of 2005 Schörling's portfolio comprised five firms with the following weights: AAK (43.34%), Securitas (28.29%), Assa Abloy (24.83%), Bong (3.09%), H&M (0.44%). In this example, our *Stock importance weight* measure for the AAK is 43.34%, which is the weight that Schörling gives to AAK in his portfolio; and our *Stock importance I* is 1 since AAK has the highest weight in Schörling's portfolio.

i.e., the CEO, a member of the management team, the chairman of the board, or a board member, and 0, otherwise. We find that about 56% of the largest shareholders are also insiders. In further analyses we include a measure of ownership type using three indicator variables that take a value of 1 if the largest owner is i) a *Family* and 0, otherwise, ii) a *Financial institution* and 0, otherwise, or iii) *Other entities* (i.e., corporations, government, foundations, and individuals) and 0, otherwise. Family firms constitute around 55% of our sample, which is similar to that for other Continental European countries (e.g., Faccio and Lang, 2002, Maury and Pajuste, 2005).

We also differentiate firms with disproportional voting rights by designating a *Dual class* indicator variable that equals 1 if the firm has a dual class share structure and 0, otherwise. We find dual class shares to be prevalent in our Swedish sample with slightly over half of the firms (50.6%) having a dual class structure. This can be compared to the 66% ratio reported for loyalty shares in France, which effectively impose a dual class structure (Belot, Ginglinger, and Starks, 2023).

We utilize two other measures of dominant owners' power by employing the firm's shareholder concentration through *Herfindahl top3* and *Herfindahl top5*, which are, respectively, measured as the Herfindahl index of the holdings of the top three or five shareholders, using the sum of the squares of the top three or five shareholders' voting rights. The higher the values, the higher the firm ownership concentration. The means of 17% and 17.3%, respectively, is comparable to the literature focusing on Continental Europe where firm ownership is largely concentrated (e.g., Maury and Pajuste, 2005).

We also control for firm-specific variables. Firm size (*Total assets*) measured as the natural logarithm of total assets. *ROA* is EBITDA divided by total assets. *Leverage* is measured as the total long-term debt divided by total assets. *Net sales/Total assets* is the net sales divided by total assets. *Capex/Total assets* is capital expenditures divided by total assets.

In Table 3 we present the correlation matrix of the major variables. We observe that the firm *Escore* and *Demand for E* are positively correlated with each other (at the 10% significance level). In the following section we conduct our multivariate analyses to further investigate the relationship between *Demand for E* and the firm's E rating while controlling for other variables.

III. Empirical Results on the Role of Firm Ownership Structure on Managerial Responses to Investor Environmental Demand

In this section we examine the relation between the managerial response to investor environmental demand and a firm's ownership.

A. Largest Owner Control and Managerial Responses to Investor Environmental Demand

We examine the relation between the firm's environmental profile, i.e., environmental rating (*Escore),* in year *t* and *Demand for E* measured in year *t-1* through the following baseline regression model:

(1) $$Escore_{it} = \beta_0 + \beta_1(Demand\ for\ E_{t-1}) + \beta_2 Vote\ 1SH_{i,t-1} + \beta_3 X_{Firm\ Controls,i,t-1} + u_{it}$$

In our primary analyses we employ OLS specifications. However, given that the *Escore* ranges from zero to one, in the robustness section (Section IV) we report results using Tobit models. In Equation (1) we control the power of the largest shareholder (based on their voting rights, *Vote 1SH*) and firm characteristics ($X_{Firm\ Controls,i,t-1}$). We make two slight modifications to the Baker and Wurgler (2004) methodology by including industry fixed effects (FE) and clustering standard errors at the firm level. Although it seems unlikely that the aggregate *Demand for E* would be affected by the *Escore* of a single firm, in order to mitigate potential endogeneity problems stemming from reverse causality we lag all right-hand-side variables by one year. We also discuss endogeneity issues in more depth in the robustness section (Section IV) below.

We provide the results of these analyses in Table 4 where we report different specifications of Equation (1) with Column 1 only including the *Demand for E* variable and Column 2 including the control variables. In both Columns 1 and 2, the positive and significant coefficients on *Demand for E* suggest that firms cater to investor environmental demand. In terms of the economic magnitude, in Column 2, a one standard deviation increase in *Demand for E* (0.126) is associated with a 1% higher (=0.126*0.080) *Escore*. Examining the coefficients for the control variables, we find firm size to be positively associated with higher environmental scores and a lack of significance for the other control variables.

Given the potential of dominant owners to influence firm decisions, and in turn, firm performance and value (e.g., Edmans and Holderness, 2017) we examine whether the managerial response to environmental demand, i.e., catering, is related to measures of firms' ownership structures. In Column 3 of Table 4, we include the voting power of the largest owner (*Vote 1SH*) and this variable's interaction with *Demand for E*. The coefficient on *Vote 1SH* is significantly negative when *Demand for E* is zero, suggesting that environmental investments are lower in the presence of powerful shareholders *when* the market demand for such investments is zero (i.e., when there exists no valuation difference between more environmentally-conscious firms and less environmentally-conscious firms). In contrast, the positive coefficient on the interaction of *Demand for E* and *Vote 1SH* suggests that managerial response to investors' environmental demand is greater when the voting rights of the largest shareholder are greater. In terms of economic magnitude, in Column 3 a one standard deviation increase in the interaction term (0.390) is associated with an *Escore* that is 8.5% higher (=0.390*0.217). Similarly, in Column 4 we consider the largest owner's cash flow rights rather than voting rights and again find a negative coefficient on the ownership measure and a significantly positive coefficient on the interaction between the *Capital 1SH* and the investors' environmental demand. The positive link between powerful

shareholders and catering to demand for firm's environmental investments is consistent with large shareholder monitoring.

Prior work reports links between the presence of large owners and their portfolio composition and mergers and acquisitions (Fich et al., 2015), firm value by way of exit (Ekholm and Maury, 2014) or voice (Ravid and Sekerci, 2020). The rationale is that owners who have large portions of their portfolio in a given company have stronger incentives to monitor. In order to capture this aspect of the largest owner's portfolio composition we use the *Stock importance I* variable, which takes a value of 1 if the stock has the highest weight in the largest shareholder's portfolio.

In Columns 1-2 of Table 5 the coefficient on *Stock importance I* is negative when *Demand for E* is zero, while the interaction between the *Demand for E* variable and *Stock importance I* is positive. In terms of the economic magnitude, in Column 2 a one standard deviation increase in the interaction term (0.907) is associated with a 9% higher (=0.907*0.099) subsequent *Escore*. Our findings suggest that managerial responses to investor environmental demand are related to heterogeneity in the largest owner's portfolio. Specifically, managers respond to investor environmental demand in the presence of large investors whose stake in the firm is economically large within their portfolio. Moreover, this finding supports the premise in the literature that large owners with concentrated ownership have incentives to monitor and potentially influence firm decisions.

Another aspect of the largest shareholder's motivation and power is whether the largest owner is also an insider, which we define as being the CEO, a member of the management team, the chairman of the board, or a board member. *Insider voting rights* captures the percentage of votes held by this insider. Not surprisingly, given the large percentage of family firms in Europe (and Sweden in particular), this variable is closely related to family voting rights as the correlation between insider (voting rights) and family (voting rights) is: 0.635 (0.869) at the 1% significance

level. We interact *Insider voting rights* with the *Demand for E* in Column 3 of Table 5. We find a positive yet marginally significant coefficient on this interaction term.

B. Family Firm and Dual Class Share Ownership Structures and Managerial Responses to Investor Environmental Demand

In this section, we further examine the link between a firm's ownership structure and the managerial response to demand for environmental investing. Owners, including the largest owner, can have enhanced control under a family firm as well as a dual class equity structure. While related, these measures capture different aspects of ownership structure. Indeed, we note that the correlation between *Family* and *Dual class* is 0.357 (significant at the 1% level), indicating that many, but certainly not most, family firms employ dual class structures. Moreover, nonfamily firms also utilize dual class shares.

As discussed above, prior work suggests that ownership type is an important determinant of firm decisions, including ESG-related decisions (e.g., El Ghoul et al., 2016; Dyck et al., 2019; Abeysekera and Fernando, 2020). However, the previous empirical results are mixed on the nature of the relation between family ownership and firms' ESG choices. For example, using an international sample, El Ghoul et al. (2016) report that family-controlled firms have lower ESG performance. On the other hand, for a sample of U.S. firms, Abeysekera and Fernando (2020) show that family-owned firms appear to be more environmentally responsible relative to non-family firms. Our analysis allows us to provide further insights on this issue. As family owners tend to have long-term goals for their firms, have incentives to monitor management, and be involved in strategic decisions (e.g., Anderson and Reeb, 2003b), we expect that the distinct governance features of family ownership would be reflected in the firm's decisions on environmental investments if such investments meet the family owners' goals.

In Table 6 we report the regression results when we employ family ownership or dual class shares as the primary ownership variables of interest. In Columns 1-2 we report the results for the *Family* ownership classification. Specifically, in Column 1 we compare *Family* to nonfamily firms. In Column 2 we add the *Other entities* as a second ownership type, thus our basis for comparison is *Financial institutions*. The corresponding *voting rights* variables for each ownership classification capture the percentage of votes held by the respective shareholder category.

The results show that although family ownership structure is associated with lower environmental investment when *Demand for E* is zero, the positive coefficient on the interaction term (*Demand for E*Family's voting rights)* in Column 1 of Table 6 indicates that managerial response to investor environmental demand is significantly larger as the voting rights of the family increase compared to non-family firms (the base group in Column 1). Column 2 shows that these results persist after incorporating the voting rights of *Other entities*. Further, the result is economically significant. For example, in Column 2, a one standard deviation increase in the interaction term (0.462) is associated with an *Escore* that is 8% higher (=0.462*0.176). The interaction results suggest that firms' environmental investments increase with market demand for environmental investing in the presence of family owners. While our findings are consistent with other work showing links between family ownership and firm outcomes (e.g., Abeysekera and Fernando, 2020), there exists a key difference in that we show that family owners' governance roles explain the managerial catering decisions regarding environmental investments.

In Columns 3-4 of Table 6 we examine whether dual class share structures are associated with managerial responses to investor demand. The prior literature does not provide a clear expectation. Some work suggests that dual class shares can be detrimental to firm value due to the entrenchment potential that can result from differential voting rights (e.g., Cronqvist and Nilsson, 2003). At the same time, dual class share structures could increase the (long-term) commitment of superior voting class shareholders to the firm, improve their monitoring incentives, and ultimately

enhance firm value (Ravid and Sekerci, 2020). Accordingly, we interact the *Demand for E* with the *Dual class* indicator to determine if a link exists between dual class structures and managerial responses to demand for environmental investing.

Although the presence of dual class structures is associated with lower environmental investment when *Demand for E* is zero, again we observe positive coefficients on the interaction terms in Columns 3-4 of Table 6 suggesting that dual class structures are associated with greater managerial response to investor environmental demand than non-dual class structures (in Column 4 we control for the voting rights of the largest owner, *Vote 1SH*). In terms of the economic magnitude, in Column 4 a one standard deviation increase in the interaction term (0.930) is associated with a 7% higher (=0.930*0.076) *Escore*. The magnitude is economically significant and similar to that for family ownership.

Overall, the interaction results from Table 6 suggest that firms' environmental investments increase with the market demand for environmental investing in the presence of both family firms and dual class structures. These findings suggest that catering to environmental demand is promoted by long-term oriented owners as family ownership and dual class share structures are two ownership features that are shown to be associated with long-termism in the literature (e.g., Anderson and Reeb, 2003a; Anderson and Reeb, 2003b, Ravid and Sekerci, 2020).

C. Firm Ownership Concentration and Managerial Response to Investor Environmental Demand

Prior work suggests that the presence of multiple large owners in a firm's ownership structure is associated with firm-level outcomes (e.g., Maury and Pajuste, 2005; Attig, Guedhami, and Mishra, 2008). In Sweden, large owners are influential as they can easily account for 15-25% of the votes at a given company. Moreover, as pointed out by Dent Jr (2013), the Swedish Corporate Governance Code recommends that the nominating committee comprise a majority of non-board

members, no members of management, and at least one member must be independent of the company's largest shareholders. At the same time, most nominating committees have five members, typically comprising the board chair and the firm's largest shareholders (Eckbo, Paone, and Urheim, 2010). For example, at AAK (formely AarhusKarlshamn AB) the nominating committee for the 2015 annual meeting comprised four representatives from major shareholders including Mikael Ekdahl (Melker Schörling AB), Henrik Didner (Didner & Gerge Fonder), Åsa Nisell (Swedbank Robur fonder) and Lars-Åke Bokenberger (AMF Fonder). The company noted that "In case a shareholder, represented by a member of the Nomination Committee, no longer be one of the major shareholders of AarhusKarlshamn AB, or if a member of the Nomination Committee is no longer employed by such shareholder or for any other reason leaves the Nomination Committee before the Annual General Meeting 2015, the Committee shall be entitled to appoint another representative among the major shareholders to replace such member."[8] Nominating committees are charged with providing recommendations on election and compensation issues for the annual meeting.

Consequently, we consider the top three shareholders as potentially influential particularly since they are also, on average, blockholders (i.e., shareholders who control a minimum of 5% of the firm votes). Specifically, we capture the firm's ownership concentration by the variable, *Herfindahl top3*. We also include the top five shareholders using *Herfindahl top5*. The larger the Herfindahl measure, the greater the firm's ownership concentration. We again interact the ownership measures with the *Demand for E* variable and focus on the interaction terms.

Columns 1 and 2 in Table 7 present the results from this analysis, which provides some evidence that managerial response to investor environmental demand is positively associated with the firm's ownership concentration, although marginally significant (at the 10 percent level). In

[8] https://news.cision.com/aak-ab/r/invitation-to-the-annual-general-meeting-of-aarhuskarlshamn-ab--publ-,c9561565

terms of the economic magnitude, in Column 2, for example, a one standard deviation increase in the interaction term (0.326) is associated with a significantly higher *Escore* of some 7.5% (=0.326*0.230). More specifically, the interaction results suggest that firms' environmental investments increase with the overall market demand for environmental investing in the presence of multiple large blockholders. Overall, our findings are consistent with prior work suggesting that interaction between blockholders has an influence on firm-level outcomes as the presence of multiple blockholders help improve the overall monitoring in the firm and thus the firm governance (e.g., Pagano and Roell, 1998; Maury and Pajuste, 2005; Attig et al., 2008).

Overall, the results from Tables 4 to 7 suggest that firms' environmental investments are somewhat lower in the presence of large powerful shareholders when the market-wide demand for E is zero, but that they increase with investor environmental demand in the presence of such owners. These findings indicate that catering to environmental demand tends to be promoted by large owners who have strong economic incentives to monitor (i.e., owners with substantial voting rights and owners with concentrated portfolios) and who are long-term-oriented (i.e., family owners, owners holding dual class shares).

IV. Robustness Tests and Endogeneity

We conduct a number of robustness tests, the results of which are reported in Table 8. First, we further address the question of endogeneity that might stem from reverse causality. To do so, we lag the *Demand for E* by two years to allow for a potential delay in catering to materialize (in our primary analyses we use a 1-year lag). As the results in Column 1 show, the main results hold.

Second, we consider another endogeneity concern that could derive from omitted variables being potentially correlated with the *Demand for E*. For example, one might argue that unobserved managerial preferences at a particular firm affect the firm's environmental investments and thus

constitute omitted variables in our analyses. It is, however, unlikely that unobserved managerial preferences at the firm level would *also* impact the average market-to-book ratios of all high-*E* firms or all low-*E* firms. In other words, a correlation between such an omitted variable and *Demand for E* is unlikely. The same logic applies more generally to unobserved firm-level factors. That is, due to the way our *Demand for E* variable is constructed, it is unlikely that unobserved firm-level heterogeneity would be correlated with our *Demand for E* variable.

However, we still use alternative estimation techniques to control for such omitted variables that would potentially be correlated with our *other* independent variables. To this end, in Columns 2 and 3 of Table 8 we control for firm fixed effects using the least squares dummy variable (LSDV) approach and the within estimator, respectively. The LSDV firm fixed effects model introduces an indicator variable for each firm and thus estimates unobserved firm heterogeneity. The within estimator firm fixed effects model mitigates the effect of unobserved firm heterogeneity by de-meaning variables over time. Our results continue to hold in both of these specifications.

Finally, by construction the *Escore* is bounded between zero and one. Yet one could argue that some firms have actual *Escores* greater than the upper bound, while others could even have negative scores. Consequently, we employ Tobit specifications, the results of which are reported in Table 9. Column 1 reports the coefficients for standard Tobit specifications, while Column 2 reports the average partial effects (APE) of E(y|x), where y is the *observed* outcome, following Wooldridge (2002).[9] The APE of E(*Escore* | *Demand for E*), where *Escore* is the observed outcome, is 0.082 as seen in Column 2.[10] These results are consistent with those of the earlier OLS analyses

[9] We use the "margins" command in Stata to calculate the marginal effects for the *observed* dependent variable as we only observe the third-party data provider's *E* scores, i.e., the observed outcomes (*y*). While not commonly used, Tobit specifications can also be used as a basis for modelling the underlying or true value of the firm's *unobserved* E investments (or the latent variable, denoted as *y** in standard econometric treatments of the Tobit model (e.g., McDonald and Moffitt, 1980; and Wooldridge, 2002). In some sense, firms might wish to invest (or have an E score) above the upper bound or below the lower bound (even negative). From this perspective, the marginal effects for the latent variable correspond to the Stata coefficients output in a standard Tobit specification as reported in Table 9.

[10] In further robustness tests, not included in the table, we used the original *Escore* from the data provider, which ranges from 0-3. The results are qualitatively similar.

(Table 4) where we report coefficients of 0.080 for *Demand for E*. As a result, our main findings are robust to different estimation techniques.

V. Alternative Explanations

In this section we consider alternative explanations for our findings. First, we recognize the potential concern that firms that "do well" might also "do good". Thus, any observed *E* value premium could be correlated with demand for profitability or might simply capture a demand for profitability premium. To examine these issues, we measure demand for profitability in a manner analogous to that for our *Demand for E* variable: *Demand for P* is calculated each year as the difference in the logs of the value-weighted average of market-to-book ratios of more profitable firms versus less profitable firms in year t-1, where high or low profitability is defined by using the sample median *ROA* as the cut-off. Although we find a small positive correlation between *Demand for P* and *Demand for E* of 0.265 (significant at the 1% level), as Table 10 shows, when we include *Demand for P* as an alternative variable (and interact it with the major owner's voting rights), our primary findings on *Demand for E* persist. This suggests that our results are not driven by the omitted variable, *Demand for P*. Further as shown in Table 10, we find that the relationship between the firm's *Escore* and *Demand for P* is actually negative. Thus, evidence does not support the hypothesis that *Demand for P* is an alternative proxy for *Demand for E*.

Second, one might argue that firms make environmental investments due to a general lack of investment opportunities rather than as purposeful investments. We consider this possibility in our original specification in which we adopt the Baker and Wurgler (2004) approach and control for a firm's growth opportunities using *Capex/Total assets*. We now consider alternative proxies by including *Dividend yield* and *M-B ratio* in Panel A of Table 11. We show that our main finding holds when we use alternative measures to proxy for a firm's growth opportunities. Additionally,

in Panel B of Table 11, we re-estimate our baseline regressions separately for subsamples of firms with high investment opportunities and for those with low investment opportunities. For this analysis, we split the sample based on the median values of *Capex/Total assets*, *Dividend yield* and *M-B ratio*. Our results are robust to these alternative specifications.

Lastly, one might argue that our variable of interest, *Demand for E* has an increasing trend that would potentially induce a spurious relationship with our outcome variable, environmental scores, and thus, drive our results. There is no trend in this variable, which increases our confidence that we are not detecting a spurious relationship between our primary dependent and independent variables. Rather, managers have incentives to cater to the market demand for environmental investment by adjusting their environmental policies.

VII. Conclusions

We provide evidence of managerial response to investor environmental demand. We measure investor environmental demand using a modification of the Baker-Wurgler (2004) catering demand methodology and we use firms' subsequent environmental scores as a measure of how managers respond. For a sample of Swedish firms our tests show a positive relation between investor environmental demand and subsequent firm environmental ratings. Moreover, we find that a firm's ownership structure is an important component of this relationship. That is, the relationship is statistically and economically stronger in firms with dominant owners measured either with regard to the largest shareholder (using the largest shareholder's voting rights, cash flow rights or the importance of the firm in that shareholder's portfolio) or with regard to family firms and those firms that use a dual class share structure.

Overall, our findings highlight investor demand as an important driver of firm-level investment in environmental issues and that changes in firms' environmental investments vary with

both investor environmental demand and aspects of firms' ownership structures. These results suggest that large long-term owners seem to care about externalities since they monitor managerial responses to the market appreciation of environmental investments. Our paper contributes to policy maker considerations as our results overall provide evidence regarding the interaction between a firm's governance structure and its environmental policies.

Appendix A

The GES Escore is the average of the ‘E preparedness’ score and ‘E performance’ score. The ‘E preparedness’ and ‘E performance’ are evaluated by GES based on a detailed company-specific analysis including an assessment of items, such as:

Does the company describe its environmental organization and routines?
To what extent does the company present its environmental policies and targets?
The scope of implementation of environmental management system.
To what extent is the company certified according to ISO14001 and/or EMAS?
What is the extent and quality of environmental information presented by the company?
Environmental requirements in relation to suppliers.
Has the amount of greenhouse gases released by the company changed over time?
How has the amount of hazardous waste changed based on turnover?
How has the amount of waste changed based on turnover?
How has the amount of air emissions other than greenhouse gases changed?
How has the energy consumption changed based on turnover?
How does the company handle the issue of hazardous substances?
Does the company conduct environmental impact assessment in its project development process?

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Table 1

Variable Definitions

This table presents definitions of the variables used in this paper. The currency used is SEK.

Environmental Variables	
Escore	Environmental (E) score of the firm as assessed by GES International. The rating scale is 0-1.
Demand for E	Proxy for the investor environmental demand. Analogous to the 'dividend premium' concept in Baker and Wurgler (2004), we measure the investor environmental demand for each year as the difference in the logs of the value-weighted average of market-to-book ratios of more environmentally-conscious firms versus less environmentally-conscious firms in year t-1, where more or less environmental-consciousness is defined by using the sample median *Escore* as the cut-off.
Largest Owner's Power	
Vote 1SH/2SH/3SH	% of votes held by the largest shareholder, 2nd and 3rd largest shareholder, respectively.
Capital 1SH	% of cash flow rights held by the largest shareholder.
Dual class	Indicator variable that equals 1 when the firm has a dual class share structure.
Largest Owner's Type	
Type dummy variables	Three indicator variables created to represent the type of the largest owner. The indicator variables take a value of 1 if the largest owner is a) a *family*, b) a *financial institution*, c) *other entities* (i.e., corporations, government, foundations, and individuals), and 0 otherwise.
Largest Owner's Portfolio Composition	
Stock importance weight	The weight of the stock in the largest shareholders' portfolio.
Stock importance I	Indicator variable that equals 1 if the stock has the highest weight in the portfolio of the largest owner, and 0 otherwise.
Largest Owner's Affiliation	
Insider	Indicator variable taking a value of 1 if the largest shareholder also holds an official role in the firm, i.e., the CEO, a member of the management team, the chairman of the board, or a board member, and 0 otherwise.
Firm Ownership Concentration	
Herfindahl top3	Herfindahl index of the holdings of the top 3 shareholders measured as the sum of the squares of the top 3 shareholders voting rights.
Herfindahl top5	Herfindahl index of the holdings of the top 5 shareholders measured as the sum of the squares of the top 5 shareholders voting rights.
Control Variables	
Total assets (in million)	The natural logarithm of total assets.

ROA	EBITDA divided by total assets.
Leverage	Total long-term debt divided by total assets.
Net sales/Total assets	Net sales divided by total assets.
Capex/Total assets	Capital expenditures divided by total assets.
Demand for P	Proxy for the investor demand for firm profitability. Analogous to the 'dividend premium' concept in Baker and Wurgler (2004), we measure the investor profitability demand for each year as the difference in the logs of the value-weighted average of market-to-book ratios of more profitable firms versus less profitable firms in year t-1, where high or low profitability is defined by using the sample median *ROA* as the cut-off.
Dividend yield	Dividend per share, as a percentage of the share price.
M-B ratio	Firm market value divided by firm book value.

Table 2
Summary Statistics

This table provides descriptive statistics of the main variables. All variables are described in Table 1.

	(1) Number of Observations	(2) Mean	(3) Standard Deviation	(4) Min	(5) Max
Escore	1452	0.313	0.234	0.000	1.000
Demand for E	1452	1.852	0.126	1.635	2.064
Vote 1SH	1476	0.331	0.208	0.010	0.934
Vote 2SH	1466	0.106	0.066	0.004	0.358
Vote 3SH	1394	0.060	0.036	0.003	0.219
Capital 1SH	1476	0.244	0.161	0.010	0.861
Dual class	1476	0.506	0.500	0.000	1.000
Family	1484	0.549	0.499	0.000	1.000
Financials	1484	0.183	0.387	0.000	1.000
Other entities	1484	0.268	0.443	0.000	1.000
Stock importance weight	1398	0.590	0.410	0.001	1.000
Stock importance I	1394	0.622	0.485	0.000	1.000
Insider	1457	0.564	0.496	0.000	1.000
Herfindahl top3	1394	0.170	0.175	0.001	0.872
Herfindahl top5	1392	0.173	0.174	0.001	0.872
Total assets	1714	14.629	2.155	9.332	22.579
ROA	1690	0.073	0.189	-0.917	0.444
Leverage	1711	0.208	0.188	0.000	1.160
Net sales/Total assets	1713	1.059	0.759	0.000	3.720
Capex/Total assets	1695	0.033	0.044	0.000	0.298
Demand for P	1517	0.498	0.264	-0.017	0.749
Dividend yield	1711	2.225	2.974	0.000	72.030
M-B ratio	1711	1.370	1.805	0.002	26.782

Table 3
Correlation Matrix

This table presents the correlation matrix of the main variables used in this study. All variables are described in Table 1. ***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Escore	Demand for E	Vote 1SH	Dual Class	Family	Financial institution	Insider	Stock importance I	Herfindahl top3
Escore	1								
Demand for E	0.043*	1							
Vote 1SH	0.053*	0.01	1						
Dual class	0.086***	-0.002	0.423***	1					
Family	0.140***	0.003	0.437***	0.357***	1				
Financial institution	-0.160***	-0.001	-0.358***	-0.395***	-0.522***	1			
Insider	0.111***	-0.013	0.403***	0.426***	0.635***	-0.547***	1		
Stock importance I	-0.102***	0.016	0.278***	0.196***	0.047**	-0.238***	0.120***	1	
Herfindahl top3	-0.005	0.012	0.969***	0.389***	0.411***	-0.296***	0.375***	0.270***	1

Table 4
Largest Owner Votes and Managerial Response to Investor Environmental Demand

This table reports OLS regression results in which the dependent variable is the firm's *Escore*, defined as the firm's environmental score. *Demand for E* proxies for the investor environmental demand. All independent variables are measured at time *t-1*. *Vote 1SH* is percentage of votes held by the largest shareholder. *Capital ISH* is the percentage of cash flow rights held by the largest shareholder. All other variables are described in Table 1. Clustered errors at firm level are in parentheses. The regressions include industry fixed effects. ***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent variable: *Escore*				
Demand for E	0.066***	0.080***	0.007	-0.018
	(0.018)	(0.017)	(0.036)	(0.041)
Vote 1SH		-0.004	-0.407**	
		(0.040)	(0.183)	
Demand for E*Vote 1SH			0.217**	
			(0.100)	
Capital 1SH				-0.711**
				(0.294)
Demand for E*Capital 1SH				0.393**
				(0.161)
Total assets		0.086***	0.086***	0.086***
		(0.006)	(0.006)	(0.006)
ROA		-0.063	-0.064	-0.066
		(0.041)	(0.042)	(0.041)
Leverage		-0.053	-0.053	-0.054
		(0.055)	(0.056)	(0.056)
Net sales/Total assets		0.017	0.018	0.017
		(0.014)	(0.014)	(0.014)
Capex/Total assets		-0.070	-0.063	-0.077
		(0.229)	(0.228)	(0.229)
Constant	0.233***	-1.027***	-0.894***	-0.855***
	(0.056)	(0.104)	(0.127)	(0.137)
Observations	1,234	1,182	1,182	1,182
R-squared	0.238	0.639	0.639	0.640

Table 5
Largest Owner's Stock Importance or Insider Position, and Managerial Response to Investor Environmental Demand

This table reports OLS regression results in which the dependent variable is the firm's *Escore*, defined as the firm's environmental score. *Demand for E* proxies for the investor environmental demand. All independent variables are measured at time *t-1*. *Stock importance I* equals 1 if the stock in question has the highest weight in the portfolio of the largest owner, and 0 otherwise. The insider is the largest shareholder who also holds an official role in the firm, i.e., the CEO, a member of the management team, the chairman of the board, or a board member, and 0 otherwise. Accordingly, *Insider voting rights* indicate the % of votes held by the insider. *Vote 1SH* is % of votes held by the largest shareholder. All other variables are described in Table 1. Clustered errors at firm level are in parentheses. The regressions include industry fixed effects. ***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)
Dependent variable: *Escore*			
Demand for E	0.023	0.023	0.045*
	(0.027)	(0.027)	(0.025)
Stock importance I	-0.186***	-0.186***	
	(0.070)	(0.070)	
Demand for E*Stock importance I	0.099***	0.099***	
	(0.038)	(0.038)	
Insider voting rights			-0.273*
			(0.145)
Demand for E*Insider voting rights			0.146*
			(0.080)
Vote 1SH		-0.002	
		(0.042)	
Total assets	0.086***	0.086***	0.086***
	(0.006)	(0.006)	(0.006)
ROA	-0.059	-0.059	-0.050
	(0.041)	(0.041)	(0.042)
Leverage	-0.070	-0.070	-0.061
	(0.058)	(0.058)	(0.059)
Net sales/Total assets	0.019	0.019	0.016
	(0.014)	(0.014)	(0.014)
Capex/Total assets	-0.068	-0.067	-0.056
	(0.227)	(0.227)	(0.226)
Constant	-0.921***	-0.920***	-0.968***
	(0.116)	(0.117)	(0.114)
Observations	1117	1117	1142
R-squared	0.642	0.642	0.644

Table 6
Family Ownership, Dual Class Shares and Managerial Response to Investor Environmental Demand

This table reports OLS regression results in which the dependent variable is the firm's *Escore*. *Demand for E* proxies for the investor environmental demand. All independent variables are measured at time *t-1*. The ownership type is either a) a *family*, b) a *financial institution*, c) *other entities* (i.e., corporations, government, foundations, and individuals), and 0 otherwise. *Family's voting rights* indicate the % of votes held by this category's largest shareholder. *Other entities voting rights* indicate the % of votes held by this category's largest shareholder. The base group in Column 1 is the voting rights of nonfamily firms; and in Column 2 it is *Financial institution*'s *voting rights*. *Dual class* indicator variable equals 1 when the firm has a dual class share structure, and 0 otherwise. *Vote 1SH* is % of votes held by the largest shareholder. All other variables are described in Table 1. Clustered errors at firm level are in parentheses. The regressions include industry fixed effects. ***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent variable: *Escore*				
Demand for E	0.049**	0.028	0.040	0.040*
	(0.023)	(0.031)	(0.024)	(0.024)
Family's voting rights	-0.250*	-0.324**		
	(0.133)	(0.160)		
Demand for E*Family's voting rights	0.135*	0.176**		
	(0.074)	(0.088)		
Other entities' voting rights		-0.294		
		(0.254)		
Demand for E*Other entities voting rights		0.161		
		(0.131)		
Dual class			-0.180***	-0.188***
			(0.061)	(0.061)
Demand for E*Dual class			0.077**	0.076**
			(0.033)	(0.033)
Vote 1SH				0.049
				(0.047)
Total assets	0.086***	0.086***	0.087***	0.088***
	(0.006)	(0.006)	(0.006)	(0.006)
ROA	-0.065	-0.065	-0.049	-0.053
	(0.042)	(0.042)	(0.042)	(0.042)
Leverage	-0.052	-0.053	-0.069	-0.072
	(0.055)	(0.056)	(0.055)	(0.055)
Net sales/Total assets	0.017	0.017	0.016	0.014
	(0.014)	(0.014)	(0.014)	(0.014)
Capex/Total assets	-0.072	-0.071	-0.034	-0.066
	(0.222)	(0.223)	(0.232)	(0.230)
Constant	-0.972***	-0.934***	-0.968***	-0.986***
	(0.109)	(0.120)	(0.103)	(0.104)
Observations	1182	1182	1182	1182
R-squared	0.639	0.639	0.645	0.646

Table 7
Firm Ownership Concentration and
Managerial Response to Investor Environmental Demand

This table reports OLS regression results. The dependent variable is the firm *Escore* defined as the firm's environmental score. *Demand for E* proxies for the investor environmental demand. All independent variables are measured at time *t-1*. *Herfindahl top3* is the Herfindahl index of the holdings of the top 3 shareholders measured as the sum of the squares of the top 3 shareholders voting rights. *Herfindahl top5* is the Herfindahl index of the holdings of the top 5 shareholders measured as the sum of the squares of the top 5 shareholders voting rights. All other variables are described in Table 1. Clustered errors at firm level are in parentheses. The regressions include industry fixed effects. ***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)
Dependent Variable: *Escore*		
Demand for E	0.037	0.036
	(0.025)	(0.026)
Herfindahl top3	-0.434*	
	(0.221)	
Demand for E*Herfindahl top3	0.230*	
	(0.121)	
Herfindahl top5		-0.443**
		(0.223)
Demand for E*Herfindahl top5		0.233*
		(0.122)
Total assets	0.085***	0.085***
	(0.006)	(0.006)
ROA	-0.062	-0.062
	(0.042)	(0.042)
Leverage	-0.076	-0.076
	(0.059)	(0.059)
Net sales/Total assets	0.017	0.017
	(0.014)	(0.014)
Capex/Total assets	-0.028	-0.027
	(0.240)	(0.240)
Constant	-0.939***	-0.936***
	(0.115)	(0.115)
Observations	1124	1122
R-squared	0.64	0.64

Table 8
Alternative Model Specifications

This table reports alternative estimation specifications. In Column 1, the *Demand for E* variable is lagged by two years rather than one year. Columns 2 and 3 report firm FE models by using either the LSDV approach or the within estimator. The dependent variable is the firm *Escore* defined as the firm's environmental score. *Demand for E* proxies for the investor environmental demand. All independent variables are measured at time *t-1*. *Vote 1SH* is % of votes held by the largest shareholder. All other variables are described in Table 1. ***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)
Dependent Variable: *Escore*			
Demand for E L2	0.042***		
	(0.015)		
Demand for E		0.054***	0.054***
		(0.017)	(0.015)
Vote 1SH	-0.018	-0.017	-0.017
	(0.040)	(0.094)	(0.085)
Total assets	0.085***	0.006	0.006
	(0.006)	(0.013)	(0.011)
ROA	-0.043	-0.014	-0.014
	(0.040)	(0.017)	(0.016)
Leverage	-0.064	0.056	0.056
	(0.057)	(0.047)	(0.042)
Net sales/Total assets	0.016	0.012	0.012
	(0.013)	(0.019)	(0.018)
Capex/Total assets	-0.093	0.065	0.065
	(0.235)	(0.114)	(0.103)
Constant	-0.960***	0.224	0.107
	(0.098)	(0.219)	(0.178)
Observations	972	1182	1182
Estimation	OLS	LSDV	Within
Industry FE	Yes	No	No
R-squared	0.646	0.94	0.022
Errors clustered at	Firm	Firm	Firm

Table 9
Tobit Specifications

This table reports Tobit regression results. Column 1 reports the coefficients for standard Tobit specifications, while Column 2 reports the average partial effects of E(y|x), where y is the observed outcome. The dependent variable is the firm *Escore* defined as the firm's environmental score. *Demand for E* proxies for the investor environmental demand. All independent variables are measured at time *t-1*. *Vote 1SH* is % of votes held by the largest shareholder. All other variables are described in Table 1. Clustered errors at firm level are in parentheses. The regressions include industry fixed effects. ***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)
Dependent Variable: *Escore*		
Demand for E	0.091***	0.082***
	(0.019)	(0.017)
Vote 1SH	-0.016	-0.014
	(0.042)	(0.038)
Total assets	0.089***	0.080***
	(0.006)	(0.006)
ROA	-0.057	-0.052
	(0.050)	(0.045)
Leverage	-0.056	-0.051
	(0.058)	(0.052)
Net sales/Total assets	0.015	0.013
	(0.016)	(0.014)
Capex/Total assets	-0.129	-0.117
	(0.241)	(0.217)
Constant	-1.078***	0.321***
	(0.108)	(0.008)
Observations	1182	1182
Pseudo R2	4	4

Table 10
Largest Owner Votes and Managerial Response to Investor Environmental Demand and to Profitability Demand

This table reports OLS regression results in which the dependent variable is the firm's *Escore*. *Demand for E* proxies for the investor environmental demand. *Demand for P* proxies for the investor demand for firm profitability. All independent variables are measured at time *t-1*. *Vote 1SH* is % of votes held by the largest shareholder. All other variables are described in Table 1. Clustered errors at firm level are in parentheses. The regressions include industry fixed effects. ***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Dependent Variable: *Escore*					
Demand for E		0.102***	0.102***	0.101***	0.101***
		(0.018)	(0.018)	(0.018)	(0.018)
Demand for P	-0.021*	-0.038***	-0.038***	-0.037***	-0.041***
	(0.012)	(0.008)	(0.013)	(0.008)	(0.013)
Vote 1SH	0.002	-0.004	-0.004	-0.007	-0.012
	(0.042)	(0.040)	(0.042)	(0.040)	(0.042)
Demand for P*Vote 1SH	-0.007		-0.001		0.012
	(0.029)		(0.029)		(0.031)
Total assets	0.086***	0.086***	0.086***	0.084***	0.084***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
ROA	-0.064	-0.062	-0.062		
	(0.041)	(0.041)	(0.041)		
Leverage	-0.055	-0.053	-0.053	-0.047	-0.047
	(0.056)	(0.055)	(0.055)	(0.056)	(0.056)
Net sales/Total assets	0.016	0.017	0.017	0.013	0.013
	(0.015)	(0.014)	(0.014)	(0.013)	(0.013)
Capex/Total assets	-0.037	-0.063	-0.063	-0.093	-0.093
	(0.219)	(0.227)	(0.228)	(0.226)	(0.226)
Constant	-0.872***	-1.049***	-1.049***	-1.018***	-1.015***
	(0.097)	(0.104)	(0.104)	(0.099)	(0.099)
Observations	1199	1182	1182	1193	1193
R-squared	0.642	0.641	0.641	0.637	0.637

Table 11
Growth Opportunities

This table reports OLS regression results in which the dependent variable is the firm's *Escore*, defined as the firm's environmental score. *Demand for E* proxies for the investor environmental demand. *Dividend yield* is dividend per share, as a percentage of the share price. *M-B ratio* is firm market value divided by firm book value. *Capex/Total assets* is capital expenditures divided by total assets. All independent variables are measured at time *t-1*. *Vote 1SH* is percentage of votes held by the largest shareholder. All other variables are described in Table 1. Clustered errors at firm level are in parentheses. The regressions include industry fixed effects. ***, **, * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A.				
	(1)	(2)	(3)	(4)
Dependent Variable: *Escore*				
	Growth opportunities measured with:			
	Dividend yield		M-B ratio	
Demand for E	0.080***	0.005	0.072***	-0.006
	(0.017)	(0.036)	(0.018)	(0.036)
Vote 1SH	-0.007	-0.424**	-0.001	-0.435**
	(0.040)	(0.181)	(0.040)	(0.180)
Demand for E*Vote 1SH		0.225**		0.234**
		(0.099)		(0.099)
Total assets	0.085***	0.085***	0.086***	0.086***
	(0.006)	(0.006)	(0.006)	(0.006)
ROA	-0.062	-0.062	-0.056	-0.057
	(0.042)	(0.042)	(0.040)	(0.040)
Leverage	-0.049	-0.048	-0.032	-0.031
	(0.056)	(0.056)	(0.055)	(0.055)
Net sales/Total assets	0.015	0.016	0.018	0.019
	(0.014)	(0.014)	(0.013)	(0.013)
Growth opportunities	0.002	0.002	0.008**	0.008**
	(0.002)	(0.002)	(0.004)	(0.004)
Constant	-1.029***	-0.891***	-1.045***	-0.901***
	(0.102)	(0.125)	(0.102)	(0.124)
Observations	1,167	1,167	1,167	1,167
R-squared	0.642	0.643	0.643	0.644

Panel B.						
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: *Escore*						
	Sub-samples based on the median values of the following measures of growth opportunities:					
	Capex/Total assets		Dividend yield		M-B ratio	
Demand for E	0.094***	0.053**	0.068**	0.076***	0.048*	0.102***
	(0.033)	(0.025)	(0.026)	(0.027)	(0.026)	(0.030)
Vote 1SH	-0.019	-0.024	-0.017	-0.011	-0.098*	0.034
	(0.064)	(0.040)	(0.044)	(0.058)	(0.054)	(0.052)
Total assets	0.094***	0.072***	0.090***	0.073***	0.083***	0.088***
	(0.010)	(0.007)	(0.008)	(0.008)	(0.009)	(0.006)
ROA	-0.039	-0.057	0.120	-0.084**	-0.021	-0.043
	(0.082)	(0.042)	(0.109)	(0.042)	(0.050)	(0.059)
Leverage	-0.198*	0.054	-0.107	0.015	-0.027	-0.071
	(0.105)	(0.062)	-0.083	(0.067)	(0.068)	(0.083)
Net sales/Total assets	0.013	0.016	-0.003	0.045**	0.019	0.020
	(0.031)	(0.014)	(0.019)	(0.017)	(0.013)	(0.027)
Constant	-1.110***	-0.830***	-1.073***	-0.835***	-0.940***	-1.059***
	(0.169)	(0.120)	(0.147)	(0.134)	(0.137)	(0.126)
Observations	474	701	656	523	614	560
R-squared	0.631	0.627	0.642	0.611	0.646	0.665