

# **Insider Entrenchment and Corporate Sustainability Around the World**

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January 28, 2019

## **Abstract**

Does insider entrenchment stand in the way of firms making investments to improve corporate sustainability? Using a global sample, we find that it does. In family-controlled firms, where outsiders have limited influence due to clear-cut insider entrenchment, environmental performance is significantly lower. When insiders' power is reduced through specific actionable governance changes, firms subsequently exhibit better environmental performance. In both widely-held and family-controlled firms, the two governance changes that produce the greatest sustainability improvements are the introduction of majority voting requirements for the board and female board representation. In widely-held firms, strengthening board independence and reducing the age and staleness of the board further increase environmental performance.

*Keywords:* Environmental performance, Ownership structure, Sustainability, Corporate social responsibility, ESG, Corporate governance

*JEL Classification:* G15, G23, G32

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## 1. Introduction

Does finance have an impact on sustainability that goes beyond its ability to price and hedge environmental risks? Outside investors own securities with control rights giving them the potential power to influence firms' actions, such as making investments to improve environmental performance. In many settings around the world, outsiders are unable to use this potential power because of weaknesses in corporate governance, leaving firms controlled by entrenched insiders. However, this has not stopped outsiders from trying to shift power in their direction, seeking to reduce entrenchment by improving governance. Does insider entrenchment, and steps taken by outside shareholders to reduce it, meaningfully impact firms' environmental (E) performance?

In theory, insider entrenchment should matter for environmental performance, as highlighted in the framework of Benabou and Tirole (2010). Consider an investment choice to improve environmental performance, controlled either by an entrenched insider or by an outsider, that requires a current cash outlay for some long-term benefit. Benabou and Tirole (2010) highlight two frictions that make the identity of the decision maker relevant for environmental performance: insider short-termism and the utility insiders and outsiders derive from non-pecuniary impacts of the investment.

Entrenched insiders will choose a higher level of environmental performance than outsiders only if insiders have both negligible short-termism and place a higher value on the non-pecuniary benefits of environmental performance than outsiders. Under these strong assumptions, actions taken by outside investors to reduce insider entrenchment will lower firms' environmental performance. More generally, however, insider entrenchment is likely to be associated with low levels of environmental performance. This outcome can arise solely from insider short-termism. Insiders are subject to short-termism due to compensation and career concerns or other factors

(e.g., Stein, 1989), making them less willing to make environmental investments that pay off only in the long-term. Short-termism also emerges when family owners are insiders, as family owners consume private benefits that similarly depend disproportionately on current cash flows (e.g., Kalcheva and Lins, 2007). Steps to reduce such insider short-termism will lead to increased environmental performance. When, in addition, outsiders place a higher value on the non-pecuniary benefits from environmental investments than do entrenched insiders, reducing entrenchment further increases environmental performance.

Empirically, the extent to which insider entrenchment impacts environmental performance is not well understood. We take up that challenge, considering in a global sample the full continuum of insider entrenchment possibilities. These range from clear-cut insider entrenchment via blockholder control, to intermediate entrenchment in which firms are widely held but outside investors have relatively weak governance mechanisms to work with, to low entrenchment where firms are widely held and strong corporate governance mechanisms give outsiders significant power over insiders. This analysis intentionally breaks up aggregate corporate sustainability, often labeled in the literature as ESG—Environmental, Social, and Governance—and examines the impact of G on E. If insider control rights are fundamental, governance deserves special consideration.

We construct a sample of 3,531 non-US firms from 41 countries over the 2004 to 2015 period. An international sample offers both within-country and cross-country variation in entrenchment and firm-specific environmental performance measures.

Our lead measure of insider entrenchment is strong and well-established in the international corporate governance literature—it measures whether a firm is controlled by a blockholder. For blockholder-controlled firms, (minority) outside investors will mostly or fully lack control rights.

As such, insiders in these firms can choose levels of environmental investments that are optimal for themselves, disregarding whether these choices are optimal for outside shareholders. We separate firms into three categories: firms controlled by a family, firms controlled by non-family blockholders, and widely-held firms without a controlling blockholder. By far the most prominent form of blockholding in our global sample is family ownership. The average percentage of family firms across countries is 22%. The average percentage of widely-held firms is 73%.

Our next four measures of insider entrenchment reflect outside shareholders' ability to shape the board of directors. We first classify entrenchment by identifying firms that lack a majority voting provision that gives investors power over board appointments by requiring that a board member receives more than 50% of the votes cast (compared to plurality voting). Investors are increasingly pushing for such voting provisions (Cunat, Gine, and Guadelupe, 2012; Ertimur, Ferri, and Oesch, 2013). Next, we measure the percentage of the directors on the board that are independent, with low independence reflecting greater entrenchment. Third, we capture entrenchment of the board by its overall age and tenure, characterizing a board as entrenched when a significant proportion of its members are old (by age), or stale (by tenure), or both. Finally, we capture entrenchment by identifying whether a board is entirely male. Ahern and Dittmar (2012) find that female board members are less likely than male board members to be insiders (and thus more independent), and are younger, while Kim and Starks (2016a) find that skill sets of boards are enhanced by female directors, including governance skill sets. Our conjecture is that insiders are more entrenched when the board is all male.

We use Thomson Reuters ASSET4 environmental performance data to test whether family control is associated with firms' environmental performance. Relative to widely-held firms, we find that family ownership is negatively associated with environmental performance. These tests

include controls for a variety of other observable factors that may affect environmental performance directly. All else equal, family-owned firms have an 8% to 13% lower environmental performance, depending on how environmental performance is measured.

We next assess whether governance mechanisms that plausibly reduce insider entrenchment impact family firms' environmental performance. Family firms that adopt majority voting provisions have 6% to 9% higher environmental performance than other family firms. Family firms that introduce female board representation improve their environmental performance by 12% to 13%. Both of these effects are economically important; their positive impact is similar in magnitude to the average negative impact of family control on firms' environmental performance reported earlier. Tackling entrenchment through greater board independence and moving away from an old and stale board have no significant impact on environmental performance in family firms.

Turning to widely-held firms, which by definition have a lower baseline level of insider entrenchment, we find that all four entrenchment-reducing governance mechanisms have statistically significant and economically meaningful environmental impacts, consistent with governance improvements having the greatest effect when control rights are contestable. We find that, all else equal, widely-held firms with a majority voting provision have 9% to 10% greater environmental performance than firms without such a rule. Among widely-held firms, an addition of one independent director is associated with a 2% increase in environmental performance. When a board of a widely-held firm ceases to be 'old and stale', this is associated with 6% to 9% better environmental performance. Finally, for widely-held firms, when boards cease to be entirely male, environmental performance increases by 13% to 16%.

A natural concern with these tests is the endogeneity of our entrenchment measures. For example, reverse causality could be a concern if families self-select into industries with lower environmental performance (dirty industries) leading to the empirical result that family firms have low environmental performance. Another possibility is that an omitted factor may affect both the entrenchment measure and firms' environmental performance. This is a well-noted concern, for example, when entrenchment is measured by board independence (e.g., Hermalin and Weisbach, 2003).

We address endogeneity concerns through three additional sets of tests. We first show that dirty industries do not drive the finding that family ownership is associated with worse environmental performance. Second, to control for time-invariant unobserved firm characteristics, we estimate firm fixed effects specifications. Our results are unchanged. Reducing entrenchment via changes in specific governance mechanisms increases firms' subsequent environmental performance. Third, we identify quasi-exogenous country-specific shocks to the entrenchment-reducing measures 'adopt majority voting' and 'add a female director.' These shocks allow us to estimate difference-in-difference models, comparing the subsequent environmental performance of firms affected by the treatment to otherwise similar unaffected firms. In these sub-samples, results are again unaffected. These sets of tests support a causal interpretation that reducing entrenchment by expanding outsiders' control rights improves firms' subsequent environmental performance.

Finally, we exploit the cross-country feature of our data to test whether the negative effect of family firms with entrenched insiders is moderated when families place a greater premium on non-pecuniary environmental benefits as Benabou and Tirole (2010) predict. A plausible measure of the premium family insiders place on such benefits is provided by country-level measures of

attitudes towards the environment. We compare the impact of family ownership in countries where prevailing social norms towards the environment are strong with countries where they are not. Consistent with families' preferences varying by social norms, the negative impact of family ownership on environmental performance is concentrated in countries with weak social norms towards the environment. For example, in continental Europe, where such social norms are strong, family control is no longer associated with a negative impact on environmental performance.

Our paper shows that when outside shareholders are able to meaningfully exercise their control rights, firms' future environmental performance improves significantly—finance has a direct impact on sustainability around the world. This contribution adds to the literature on corporate social responsibility in general (e.g. Hong and Kacperczyk, 2009; Edmans, 2011; Liang and Renneboog, 2017; Hong and Liskovich, 2016; Cronqvist and Yu, 2017; Hart and Zingales, 2017; Lins, Servaes, and Tamayo, 2017), and adds an extra dimension to the literature that focuses specifically on the importance of investor power in driving CSR (Dimson, Karakas, and Li (2015), Barber, Morse and Yasuda (2018), Dyck, Lins, Roth and Wagner (2018)). Our findings highlight the centrality of governance for investor power. These results have important implications for analyses that link stand-alone environmental performance measures to subsequent firm performance. The fundamental driver of environmental (E) improvement is governance (G), and thus, firm performance changes could come from either E or embedded G.

Our work is most closely related to two papers (Krueger, 2015; Ferrell, Liang, and Renneboog, 2016) that assess whether broad proxies indicative of agency problems are linked to CSR. Neither of these papers explores the potential importance of G before E, nor do they focus on governance mechanisms that outsiders can use to improve G. We complement these papers by

bringing to the forefront and quantifying the impact of specific actionable governance mechanisms that reduce entrenchment, such as majority voting provisions and adding a female director.

Further, we contribute to the broader literature on the importance of governance and family ownership. We extend the existing work that explores the performance implications of majority voting rules (e.g., Cunat, Gine, and Guadelupe, 2012; Ertimur, Ferri, and Oesch, 2013; Doidge, Dyck, Mahmudi, and Virani, 2018) and female board participation (e.g., Adams and Ferreira, 2009; Adams and Funk, 2012; Ahern and Dittmar, 2012; Kim and Starks, 2016a) by showing the impact of these governance mechanisms for firms' environmental performance. Our paper also contributes to the extensive literature on the financial costs and benefits generated by control through insiders, and families more specifically (e.g., Morck, Wolfenzon, and Yeung, 2005; Bennedsen, Nielsen, Perez-Gonzalez, and Wolfenzon, 2007), which we expand upon by considering environmental performance.

## **2. Insider Entrenchment and Firms' Environmental Performance**

In this section we develop hypotheses regarding connections between insider entrenchment and firms' environmental performance, building on the theoretical framework of Benabou and Tirole (2010). The nuances they ascribe to overall CSR performance apply directly to the stand-alone environmental component of CSR, leading to predictions for environmental performance depending on the degree of insider entrenchment. There are two frictions in their framework: managerial short-termism and the utility that controlling shareholders receive from non-pecuniary impacts of CSR investments.

Because of well-known compensation and career concerns (e.g., Stein, 1989; Edmans, Gabaix, and Jenter, 2017), Benabou and Tirole (2010) suggest managers place a disproportionate focus on current performance. The typical environmental investment requires a current cash outlay

for some potentially value-enhancing long-term benefit. Thus, the greater this short-termism, the lower the managers' environmental investments. Short-termism also emerges when we consider family owners as the insiders, as family owners consume private benefits that similarly depend disproportionately on current performance. There is ample evidence to support the assumption that private benefits come from cash holdings or current cash flow and that, consistent with such a distortion, family insiders will be unwilling to make potential value-enhancing investments if those investments limit their private benefits.<sup>1</sup>

Benabou and Tirole (2010) also posit another friction, that insiders and outsiders can also receive non-pecuniary utility from environmental investments. They do not delve into the sources of that utility. This could be garden-variety non-pecuniary benefits such as the environmental investment endearing the manager to the community and the non-profit board she sits on. Behavioral economics research suggests that this utility also may arise from social norm pressures, innate preferences, or other factors.

When both outsiders and insiders do not receive non-pecuniary benefits from environmental investments, shifting to low entrenchment in widely-held firms with strong corporate governance mechanisms increases environmental investments. This arises from outsiders addressing managerial short-termism. The resulting environmental investments are NPV enhancing. This corresponds to the 'win-win' view of CSR investments in Benabou and Tirole (2010).

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<sup>1</sup> For example, markets put a lower value on corporate cash holdings when firms have entrenched insider/family control, indicating a fear that such cash will be consumed for private benefits (Kalcheva and Lins, 2007). Similarly, transfer pricing schemes that involve trading between public companies overwhelmingly have private benefits created from current (rather than future) cash flows (Cheung, Rau, and Stouraitis, 2006; Desai, Dyck, and Zingales, 2007; Jiang, Lee, and Yue, 2010). Further, family-controlled firms have been shown to both underperform and be unwilling to make current investments particularly during periods where cash holdings are most valuable (Lemmon and Lins, 2003; Lins, Volpin, and Wagner, 2013).

When outsiders receive more non-pecuniary benefits than insiders from environmental investments, shifting the power away from insiders to outsiders again increases environmental investments. In this case, the change arises from the utility outsiders derive from the non-financial impacts as well as from outsiders addressing managerial short-termism. Notably, the resulting environmental investments are not necessarily NPV enhancing, as the outsiders have an incentive to overinvest because of the weight they place on non-pecuniary factors. This situation corresponds to Benabou and Tirole’s view of environmental investments as ‘outsider-initiated corporate philanthropy.’

There is only one situation where we generate the reverse, in which giving outsiders more power will decrease environmental investments. This stems from the tradeoff insiders face as they consider both the value they derive from non-pecuniary benefits from environmental investments and their attendant short-termism costs. If short-termism costs are negligible, and the utility insiders derive from non-pecuniary impacts is high (e.g., Masulis and Reza, 2015), we arrive at Benabou and Tirole’s view of environmental investments driven by ‘insider-initiated corporate philanthropy’—entrenched insiders will choose a higher level of environmental investment.

In summary, there are competing predictions for how insider entrenchment affects environmental performance. We now turn to the data to identify the relationship between insider entrenchment and environmental performance and, based on our findings, offer interpretations.

### **3. Sample and Summary Statistics**

#### *3.1 Variables and Data Sources*

We obtain data on firms’ environmental performance from the Thomson Reuters ASSET4 ESG database. ASSET4 is well suited for an international study, providing coverage of a large number of firms from around the world over an extensive time period. Thomson Reuters acquires

information from annual reports, corporate sustainability reports, NGOs, and news sources for large, publicly traded companies from over 45 countries, at annual frequency. Thomson Reuters states that reported data items are chosen to maximize company coverage, timeliness of reporting, data availability, quality, and perceived materiality for investors. Consistent coverage of firms begins in 2004, with coverage for a few countries starting in 2009. We use data from the first year of coverage through year-end 2015 for our analysis.<sup>2</sup>

ASSET4 evaluates firms' environmental commitments in three areas: Emission Reduction, Product Innovation, and Resource Reduction. Within each area, ASSET4 analysts identify specific line items (e.g., "Are the firm's greenhouse gas emissions/sales below the industry median in that year?"), with 70 items in total (see Appendix Table 1A).

There is no obvious correct weighting scheme of these line items that an investor should use. We use two weighting approaches for our main tests. As our first measure we use the proprietary-weighted aggregate scores that ASSET4 provides to investors (ASSET4 *z*-scores).<sup>3</sup> These rank-based scores range from 0 to 100 and measure the environmental performance relative to all other companies in a given year. For our second measure, we first transform all line items into indicator variables such that a 'one' corresponds to better environmental performance (e.g., a below-median greenhouse gas emission firm would get a 'one')<sup>4</sup> and construct an equally-

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<sup>2</sup> While data providers differ in their methodologies for measuring environmental performance, Dyck et al. (2018) consider three different sources for environmental performance data—ASSET4, Bloomberg, Sustainalytics—and show that their findings are generally not affected by use of alternative sources. Similarly, Ferrell, Liang, Renneboog (2016) also find that their results are robust to several alternative ESG data sources.

<sup>3</sup> The ASSET4 ESG database was first created in 2003. The data we use is based on their optimization released in 2014 which reports raw data only for 'strategic' items, which were collected beginning in 2003.

<sup>4</sup> Specifically, for questions with a positive direction (i.e., a 'yes' answer or a greater number is associated with better environmental performance), we translate the answers to Y/N questions into 0 (N) and 1 (Y); the answers to double Y/N questions into 0 (NN), 0.5 (YN or NY), and 1 (YY); and the answers to numerical questions into 0 (value is less (or equal) than zero; or value is less (or equal) than the median) and 1 (value is greater than zero; or value is greater than the median). For questions with a negative direction (i.e., a 'no' answer or a lower number is associated with better environmental performance), the opposite coding applies.

weighted performance measure, where we weight all three environmental areas equally, and then sum across the areas to produce aggregate environmental performance scores.

To classify the degree of insider entrenchment, we first turn to a well-established measure of insider entrenchment: whether or not a firm is block controlled. For these firms, outside investors will mostly or fully lack control rights. We obtain detailed firm-level data on controlling blockholders from Thomson Reuters ASSET4, Datastream, Orbis (Bureau van Dijk), and the Global Family Business Index (obtained from Center for Family Business at the University of St. Gallen, Switzerland). We use the ownership information from these databases to group firms into the following three categories: firms controlled by a family; widely-held firms that are known to not have a controlling blockholder; and firms controlled by non-family blockholders.<sup>5</sup>

Beginning with family control, in each firm year we define a firm as being family controlled if any of the following conditions are met, across the four databases:

- Orbis identifies a family as the ultimate owner of the firm, where Orbis traces control by voting rights internationally and considers stakes held directly or indirectly, with a minimum controlling threshold of 25% (see also Lins, Volpin, and Wagner, 2013).
- Orbis identifies the ultimate owner to be a Nominee, Trust, or Trustee, and the firm has dual class shares (obtained from ASSET4).
- Datastream reports a minimum family stake of 20%, or Datastream reports a minimum family stake of 5% and the firm has dual class shares.
- The Global Family Business Index reports the firm as family controlled.

For each firm, we impute intermittent years as family controlled if a firm is classified as family controlled in at least one earlier and one later year. We further extend family control both

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<sup>5</sup> Hsu, Liang, and Matos (2018) focus in particular on the impact of state ownership (one type of non-family blockholder) on firms' environmental performance, particularly for firms in the energy sector.

backwards and forwards in time if ASSET4 indicates that the votes of a firm's largest blockholder are within 5% of the year during which a firm is known to be family controlled and the largest blockholder's stake is at least 20%.

Next, in each firm year we define a firm as being widely held if any of the following conditions are met:

- Orbis classifies the firm as known to be widely held and the firm is not classified as family controlled by the previous rules.
- ASSET4 indicates the largest blockholder's stake is below 50%, or does not report any largest blockholder stake, and the firm is not classified as family controlled.

Firms that are not family controlled or widely held we classify as other blockholder controlled.<sup>6</sup>

Next, we examine specific governance mechanisms that potentially reduce insider entrenchment and have been the focus of much of the governance literature. We focus on measures of outside shareholders' ability to shape the board of directors and board characteristics that impact shareholders' power.

We first measure investors' power to elect the board. Traditionally in director elections shareholders could vote either 'for' or 'withhold' their vote (which was equivalent to not voting), and in most cases the vote is for a slate of directors. Around the world investors have been asking regulators, stock exchanges, as well as firms themselves to adopt majority voting policies. Such policies would allow individual directors to be listed on the proxy, and directors that fail to receive a majority of the votes cast would submit their resignation (while counting withheld votes as votes cast negatively). These majority voting policies have the potential to significantly increase outside

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<sup>6</sup> This latter category includes controlling blockholders that are non-financial firms (themselves widely held), financial investors, governments, banks, and insurance firms.

shareholders power over director selection (Cunat, Gine, and Guadelupe, 2012; Ertimur, Ferri, and Oesch, 2013), and outsiders would be able to vote ‘against’ directors they do not want. Moreover, as outsiders have this power, boards have an incentive to consult outside shareholders before selecting directors for election. For our tests, Majority Election is an indicator variable that equals one if the company’s board members are generally elected with a majority vote, and zero otherwise.

We consider a variety of board characteristics that reflect the extent of insider entrenchment. We follow Hermalin and Weisbach’s (1998) model of corporate boards and measure board independence, predicting greater outside investor control rights when there are a greater percentage of independent board members (as opposed to executive board members). Board Independence is the number of independent board members scaled by the total number of board members.

We create a measure that captures overall board entrenchment by combining two governance indicators. Tenure provides one indicator of an individual board members’ entrenchment. In the UK, for example, when board members are on the board more than 9 years they are no longer considered independent and can no longer serve on key board committees that require independence such as the audit and compensation committees (UK Corporate Governance Code, 2016). Age provides another indicator of a lack of independence. We combine these two, categorizing boards as ‘Old or Stale’ using an indicator variable that equals one if either at least 50% of directors have tenure greater than 9 years or at least 20% of the directors are over 70 years old, and zero otherwise. We expect ‘Old or Stale’ boards to reflect insider entrenchment.

Finally, we capture entrenchment by identifying boards with at least one female director. Around the world, a large number of regulators and investors have pushed for more female

involvement in a variety of ways including ‘hard’ measures such as regulatory mandates that specify gender quotas and ‘soft’ measures including regulatory initiatives demanding firms comply-or-explain against gender targets as well as investor coalition requests for enhanced female board representation. As Adams and Ferreira (2009) describe, this push stems from two beliefs, both related to governance: first, board quality will be improved by drawing from the broader talent pool that includes women; second, as they note “[...] because they do not belong to the ‘old boys club,’ female directors could more closely correspond to the concept of the independent director emphasized in theory.” (p. 292).

There is evidence that increased female board representation significantly impacts governance. Adams and Ferreira (2009), for example, study US firms and find greater board attendance and a higher sensitivity of CEO turnover to financial performance when women are on the board. In a Norwegian sample, Ahern and Dittmar (2012) find that women added to the board are less likely than male board members to be insiders (and, thus, more independent), and have higher levels of education, are younger, and have less experience. Kim and Starks (2016a) focus on director skills sets in US firms and find that female directors bring skill diversity to the board, and in particular sets of expertise currently missing, one of which is corporate governance.<sup>7</sup>

Finally, we obtain financial statement and stock market valuation data, institutional holdings, and cross-listed status from Worldscope, Datastream, Factset Ownership, ADR lists, and CRSP. Our final sample consists of 25,143 firm-year observations and covers 3,531 firms from 41 countries during the period 2004-2015.

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<sup>7</sup> The evidence of the impact of adding females to the board and increasing board diversity on firm performance is mixed. Adams and Ferreira (2009), Ahern and Dittmar (2012), and Adams, Akyol, and Verwijmeren (2018) find negative effects, while others report positive impacts (e.g., Kim and Starks, 2016b, find diversity increases performance related to M&A decisions).

### *3.2 Descriptive Statistics*

In Panel A of Table 1 we report summary statistics of firms' environmental performance, specific governance mechanisms, and other characteristics, grouping firms by whether they are family controlled, widely held, or controlled by another block holder.

There is significant variation in firms' environmental performance across countries, industries, and time. As we describe below, in all of our tests we control for most of these sources of variation with fixed effects. Environmental scores for our entire sample are such that the mean (median) ASSET4 Environmental  $z$ -Score is 53.7 (56.1) and the mean (median) Equally-Weighted Environmental Score is 37.8 (34.8), where a perfect score would be 100 for each of the two measures. Environmental performance measures are lowest among family-controlled firms and highest among widely-held firms.

In terms of governance mechanisms that can reduce insider entrenchment, there is significant variation across firms, providing power for our empirical tests. Majority voting, for example, is present in roughly half of firms. The average percentage of the board that is independent is 50%. One fifth of firms has an old or stale board and almost two thirds of firms have at least one female board member. Comparing these specific governance mechanisms across blockholder groups, we find that family-controlled firms have weaker governance across the measures of independence and old or stale board composition.

In Panel B, we report, by country, the average environmental performance of firms as well as the average fractions of firms that are family controlled, widely held, or controlled by other blockholders (data are for year 2012 to facilitate comparisons).

The countries where firms have the highest environmental performance are all European (France, Finland, Spain, Sweden, for example, are ranked in the top five for the two measures of

environmental performance). Countries where firms' environmental scores are lowest are concentrated in Asia, Australia, and Africa.<sup>8</sup>

Regarding control type, overall 22% of the sample firms are family controlled, 73% are widely held, and 5% are controlled by other blockholders. As expected, control type vary substantially across countries. For example, Luxembourg, Mexico, and Turkey are the countries with the greatest fraction of family-controlled firms, whereas family-controlled firms are relatively rare in Australia, Ireland, Japan, and Taiwan. Widely-held firms are most common and represent more than 80% of all firms in Ireland, Taiwan, and the UK, whereas widely-held firms comprise a quarter of all firms or less in Luxembourg, Mexico, Russia, and Turkey. Finally, non-family blockholder control is most frequent in Indonesia, Poland, and Russia. In all our multivariate analysis we include country fixed effects to ensure that any relation between environmental performance and control rights is identified by within-country variation.

#### **4. Does Insider Entrenchment Drive Firms' Environmental Performance?**

In this section, we assess whether there is global evidence that insider entrenchment is a driving force behind firms' environmental performance.

##### *4.1 Control Type and Firms' Environmental Performance*

Our baseline tests in Table 2 examine the relation between insider entrenchment, measured with blockholder control indicators and specific corporate governance mechanisms to reduce entrenchment, and firms' environmental performance using the following specification:

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<sup>8</sup> We also find significant variation across industries (not reported). Unsurprisingly, the industries with the lowest environmental performance are mining (which includes oil and gas) and agriculture, forestry, and fishing (industries based on SIC divisions).

$$\text{Log}(\text{Score}_{it}) = \alpha + \beta' X_{it-1} + \gamma' Y_{it-1} + \Lambda + \varepsilon_{it}, \quad (1)$$

where the dependent variable is the log of one of the environmental scores of firm  $i$  in year  $t$ ,  $X_{it-1}$  are measures of insider entrenchment in firm  $i$  in year  $t-1$ ,  $Y_{it-1}$  are a set of firm-level controls in year  $t-1$ , and  $\Lambda$  are year, country, and industry fixed effects.<sup>9</sup> Our main variables of interest are the insider entrenchment measures. In column 1, to capture entrenchment, we use the dummy variables Family and Other blockholder control. In columns 2 through 5 we add to these specifications the four additional entrenchment measures that focus on the ability of outsiders to shape the board. Column 6 includes all entrenchment measures at the same time.

We use logs of environmental scores to obtain better distributional properties and to reduce the impact of outliers.<sup>10</sup> For firm-level control variables we use firm size (log of assets), cash, asset tangibility, leverage, profitability, institutional ownership, and whether a firm is cross-listed on a major US stock exchange. We include firm size as prior literature has shown it to be related to ownership structures, and larger firms may be subject to more external pressures. Hong, Kubik, and Scheinkman (2012) suggest that financial slack also explains environmental adoption. Following them, we include cash, asset tangibility, and leverage to capture credit constraints, and profitability to capture the impact of performance. Cross-listing captures broad ownership and governance structures. Institutional ownership is included as Dyck et al. (2018) find that institutional investors are a major factor in environmental performance around the world. As noted in Eq. 1, all right-hand side variables are lagged by one year. We cluster standard errors by country.

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<sup>9</sup> Environmental variables reflect data available to ASSET4 analysts that covers the firm's fiscal year. A score for fiscal year 2010, for example, would reflect items that occurred during the 2010 fiscal year as well as information contained in the company annual report and any company sustainability reports published after the fiscal-year end early 2011. Thus, our baseline model with 2010 environmental scores would have fiscal-year-2009 right-hand-side variables.

<sup>10</sup> Our main results are unaffected if we use the raw scores rather than the log scores.

Regardless of the environmental performance measure, and the specification, across Panels A and B we find a negative and statistically significant ( $p$ -values  $< 5\%$  in all models) coefficient on Family, whereas the coefficient on Other never obtains statistical significance. These results imply that when insiders are fully entrenched, as is the case in family-controlled firms, they choose environmental performance levels significantly below those in otherwise similar widely-held firms. Focusing on the column 1 results, family-controlled firms have a 10% to 13% lower environmental performance compared to the rest of the sample firms.

Column 2 through 5 of Table 2 allow us to understand whether governance mechanisms that can reduce insider entrenchment, in which we focus specifically on measures of outsiders' ability to shape the board, impact a firms' environmental performance. For each of these entrenchment-reducing measures, we find significantly higher environmental performance ( $p$ -values  $< 1\%$ ). For instance, column 2 shows that firms that elect directors based on majority voting rules have 8% to 10% greater environmental performance compared to firms that do not have such a rule in place. The coefficient estimates in column 3 imply that if a firm were to replace a non-independent director with an independent director, environmental performance would increase on average by 2.0% to 2.4%.<sup>11</sup> Column 4 shows that moving from an 'Old or Stale' board to one that is not would increase environmental performance by 5% to 8%. Going away from an all-male board by introducing at least one female director would increase environmental performance by 12% to 15%, as shown in column 5.

Finally, in the last column of Table 2 we include all entrenchment measures in one specification. These four measures could be interrelated, so by including them all in one specification we can get a sense of whether each measure has a unique impact on firms'

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<sup>11</sup> Average board size is 10 with an average of 5 independent directors; a move to 6 independent directors is equivalent to a 10 percentage point increase in board independence.

environmental performance (or whether one measure dominates). We obtain similar significance levels and coefficients for each specific entrenchment-reducing governance mechanism, with only slightly attenuated magnitudes. This indicates that each of the governance mechanisms to reduce entrenchment has a stand-alone impact on environmental performance.

As for the other control variables, we find that larger firms, more profitable firms, and firms with greater tangibility show stronger environmental performance. Consistent with Dyck et al. (2018), firms with more institutional ownership have higher environmental scores.

#### *4.2 Robustness to Alternative Measures*

In this section we test whether the Table 2 baseline results are robust to alternative measures of our dependent variable (environmental performance) and to other cutoff choices that could be made when constructing two of our independent variables of interest (the extent to which a board is ‘old or stale’ and the extent of female board representation).

We use two measures of environmental performance, each of which is based on line items collected by ASSET4: the first measure is an aggregate  $z$ -score and the second is an equally-weighted aggregate score that we construct ourselves. Such aggregate scores are well accepted by investors worldwide and frequently used in the literature. It is possible of course, that an aggregate score is not the most appropriate measure for capturing environmental performance, or that a summary measure is not equally important across all industries. For example, one might argue that reducing resources used in the production process of a firm matters more than emission reduction, or that some of the components in the aggregate environmental scores, such as product innovation scores, might not be material for investors.

To address concerns that our results may be sensitive to the chosen environmental performance measure, we reproduce our baseline results using alternative measures of

environmental performance. We first decompose the environmental performance score into its three ASSET4 categories—Emission Reduction, Product Innovation, and Resource Reduction. In Appendix Table A3, in columns 1 to 6 we repeat the tests from Table 2 using the three ASSET4 Environmental Category scores (Panel A reports category  $z$ -scores, Panel B reports equally-weighted category scores). In columns 7 to 8 of Panel B we take a different approach and introduce what we call a ‘Material Environmental Score’ that is based on a subset of the ASSET4 line items. We choose only those line items that are material according to the SASB Materiality Map, and these items vary across industries.<sup>12</sup> Across all of the tests using these alternative environmental performance measures, we find no difference in the sign or the strength of the coefficient estimates relative to our Table 2 baseline models. Our interpretation is that the strong impact we find of insider entrenchment on environmental performance applies very broadly and is not concentrated in particular types of environmental performance categories.

We next conduct tests in which we re-estimate the Table 2 models but replace our ‘Old or Stale’ board categorization, that uses cutoffs we choose based on the age and tenure of board members, with a categorization that the MSCI group adopts in its ‘Entrenched Board’ measure (MSCI ESG Research, 2015). They categorize a board as entrenched if any of the following conditions exist: (more than 35% of the board has a tenure greater than 15 years; more than 4 directors have a tenure greater than 15 years; more than 4 directors are over 70 years old; or more than 22% of the board has a tenure greater than 15 years) and (more than 15% of the directors are over 70 years old). The findings, presented in Appendix Table A4, are virtually identical to those in Table 2 and highlight that our main results are robust to an alternative measure of ‘Old or Stale.’

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<sup>12</sup> This classification by SASB is to our knowledge the most comprehensive attempt yet to classify sustainability issues by whether or not they are likely to affect the financial or operating performance of firms. The SASB classification was published in November 2018, we use the pre-publication online version as of December 2017. See [materiality.sasb.org](http://materiality.sasb.org).

In additional tests, we replace the single indicator measure of Female Director with alternative measures that capture the magnitude of female board representation. We first estimate a model that contains two indicator variables: Has One Female Director, a dummy variable that equals one if the firm has exactly one female director on the board, and zero otherwise; and, Has Two+ Female Directors, a dummy variable that equals one if the firm has two or more female directors on the board, and zero otherwise. On average, 30% of firms have one female director, 33% have two or more female directors (see Appendix Table A2), and only 14% of firms have more than two female directors on the board. We next estimate a model that captures female board representation using the continuous measure Percent Female Directors, calculated as the number of female directors divided by the total number of directors on the board.

Appendix Table A5 reports regression results when we use these alternative measures of female board representation. Overall, the results again show that female board representation corresponds to higher environmental scores. And there is modest evidence that a greater proportion of female directors incrementally increases environmental scores, reflected both in the larger coefficient on Has Two+ Female Directors and in the positive coefficient on Percent Female Directors. However, the coefficients on Has One Female Director and Has Two+ Female Directors are not significantly different from each other. For the sake of brevity, we use the single Female Director indicator variable in what follows.

#### *4.3 Do Mechanisms That Reduce Entrenchment Affect Family-controlled Firms' Environmental Performance?*

Our next tests examine whether mechanisms that plausibly reduce insider entrenchment have a differential effect on firms' environmental performance in family-controlled firms compared to other firms. As mentioned at the outset, if a firm is controlled by a family then insider

entrenchment is likely to be strong and it may be challenging for outsiders to pressure insiders through traditional governance channels. Or it could be that one or more specific entrenchment-reducing governance mechanisms seem to be an effective channel to improve environmental performance in family-controlled firms. To assess this, we estimate the following regression specification:

$$\text{Log}(\text{Score}_{it}) = \alpha + \beta_1 \text{Family}_{it-1} + \beta_2 \text{Gov}_{it-1} + \beta_3 \text{Family}_{it-1} \times \text{Gov}_{it-1} + \gamma' Y_{it-1} + \Lambda + \varepsilon_{it}, \quad (2)$$

where the dependent variable is the log of one of the environmental scores of firm  $i$  in year  $t$ ,  $\text{Family}_{it-1}$  is an indicator variable equal to one if the firm is family controlled, and zero otherwise,  $\text{Gov}_{it-1}$  are measures of specific entrenchment-reducing governance mechanisms,  $Y_{it-1}$  are a set of firm-level controls, and  $\Lambda$  are year, country, and industry fixed effects. The overall effect of a particular governance mechanism that reduces insider entrenchment in family-controlled firms is the sum of the coefficient estimates on the governance measure and the interaction of the governance measure with the family indicator variable. The statistical significance is calculated using an F-test on the sum of these two coefficient estimates. For the widely-held/other firms, the effect of a particular entrenchment-reducing governance mechanism is equal to the coefficient estimate on the stand-alone governance variable.

Table 3 reports the overall effects of our governance measures on firms' environmental performance in family-controlled firms and widely held/other firms. Consistent with family firms being relatively immune to outside pressures through specific governance mechanisms to reduce entrenchment, increasing board independence and making a board less 'old or stale' have no significant impact on environmental performance in family owned firms. Two governance mechanisms, however, do impact environmental performance: adopting majority voting and adding a woman to the board. In terms of economic significance, majority elections are associated

with a 6% to 9% higher environmental performance and introducing a woman to the board is associated with a 12% to 13% greater environmental performance in family-controlled firms. Interestingly, the positive female board effect is greater than the average negative impact of family control on firms' environmental performance, which varies from 8% to 13%. In other words, by adding a woman to the board of a family firm, the negative environmental performance associated with family control disappears.

Focusing on the widely-held/other firms in our sample, the specific entrenchment-reducing governance measures are all statistically significantly associated with firms' environmental performance. In terms of economic magnitude, for example, widely-held/other firms with majority director election rules have on average a 10% greater ASSET4 Environmental z-Scores compared to firms without majority director elections. Further, widely-held/other firms with a female director have on average a 13% to 16% higher environmental scores.

## **5. Further Tests Addressing Causality**

Further analysis is required to support the interpretation that the degree of insider entrenchment is affecting firms' environmental performance. For example, one possibility is that families choose to control firms in industries with low average environmental performance. This could lead to the empirical result that family firms have low environmental performance but not reflect anything specifically about the increased insider entrenchment in family firms (although the inclusion of industry fixed effects in all of our models should lessen this concern). Another possibility is that some omitted variable is correlated with the firm's degree of insider entrenchment and its environmental performance.

### *5.1 Selection Issues*

To address the first concern—that selection potentially determines the family firm results—we split SIC divisions into plausibly ‘dirty’ and ‘clean’ industries, and look for differences in these sub-samples of firms belonging to these industries. If selection were driving the results, the negative effect of family on environmental performance would be concentrated in dirty industries.

We use two different criteria to split the industries. First, we take advantage of the fact that the SASB has categorized industries by the degree to which environmental performance scores are material. Dirty industries, according to SASB standards, include the SIC Divisions ‘Agriculture, Forestry, Fishing,’ ‘Mining,’ and ‘Services.’ Second, we use the ASSET4  $z$ -scores themselves, categorizing as dirty the five Divisions (out of 9) that have the lowest average environmental scores. These SIC Divisions are ‘Agriculture, Forestry, Fishing,’ ‘Mining,’ ‘Services,’ ‘Retail Trade,’ and ‘Wholesale Trade.’ We report in Appendix Table A6 the details of the mapping, summary statistics by SIC Division and regression results.

We find no difference in the likelihood of having family ownership in dirty versus clean industries. Further, repeating the empirical specification of Table 2, we find a similar negative impact of family control on environmental performance in both dirty and clean industries. These results suggest that family firms’ lower environmental performance does not arise from families selecting to control firms in dirty industries.

### *5.2 Omitted Variables and Firm Fixed Effects*

To address the concern that our results are driven by omitted variables, we first introduce firm fixed effects specifications. These specifications control for time-invariant unobservable firm characteristics. These regressions, as before, also include time varying observable firm characteristics that could also drive environmental performance.

We estimate these models in Table 4. For these tests we keep only those observations where the governance variables are time-varying during the sample period. The premise in these tests is similar to that of prior studies of activist engagements in which an initial governance improvement in a target firm later helps achieve a specific performance outcome (e.g., Becht, Franks, Grant, and Wagner, 2017). This within-firm specification is relatively demanding in terms of model power as entrenchment-reducing governance mechanisms are generally sticky over time.

The Table 4 tests confirm our prior results—stronger (lagged) specific governance mechanisms that plausibly reduce insider entrenchment are positively associated with firms’ (future) environmental performance. We continue to find strong statistical significance ( $p$ -value < 5% in all cases). Not surprisingly, the implied economic impact of the entrenchment-reducing governance mechanisms are somewhat attenuated but still sizable.

### *5.3 Causality and Quasi-exogenous Shocks*

To further assess causality, we seek exogenous shocks to governance mechanisms to reduce insider entrenchment that are not simultaneously shocks to firms’ environmental performance. Broadly speaking there are two types of such shocks: ‘hard’ regulatory mandates that require firms to change governance mechanisms; and, ‘soft’ regulatory mandates or investor group pressures that induce a substantial number of firms to change governance mechanisms. After reviewing available data for the countries in our sample, we focus our attention on majority voting adoption and female board representation. For these entrenchment-reducing governance mechanisms we are able to identify potentially exogenous shocks (we refer to these as ‘quasi-exogenous’ shocks) for some countries in our sample. There are no such shocks for family ownership and we could not find compelling exogenous shocks for the other governance mechanisms.

Canada provides a good example of a majority voting adoption shock and offers a laboratory to test whether ‘forced’ changes in majority voting lead to subsequent changes in firms’ environmental performance. As detailed in Doidge et al. (2018), the driving force behind firms’ adoption of majority voting was the creation of the Canadian Coalition for Good Governance (CCGG) that had as its first major campaign a request for firms to adopt a majority voting policy. Starting from a situation in which very few firms had majority voting in Canada, in 2005 and 2006 the CCGG contacted firms through letters and phone calls, requesting they adopt this change. Over the next two years, Doidge et al. (2018) report substantial increases in firm adoption, with regressions and a fuzzy RDD supporting a causal interpretation that majority voting adoption was driven by the CCGG. Also of importance, at this time the CCGG investor group took no steps to request that firms increase their environmental performance.

We test whether this shock that increased majority voting adoption leads to subsequent increases in firms’ environmental performance in Panel A of Table 5. To that end, we use a difference-in-differences specification spanning the 2004 to 2008 period, that is, two years before and two years after the initiative to push firms to adopt majority voting policies. We define treated firms as those that adopted majority voting either in 2006 or 2007. Control firms are those that did not change their majority voting policy during the 2004 to 2008 period. We require that treated and control firms have at least one observation before and after the adoption years and drop the year when the external pressure happened (2006). Further, to make sure the results are not driven by other major changes in the firm, we exclude any firms in which there was a change in family control or other-blockholder ownership control status. All specifications include year fixed effects and firm fixed effects to control for time-invariant firm characteristics.

The specifications in columns 1 and 2 of Panel A compare changes in treated firms (those that adopted majority voting in the context of external pressure) relative to changes in control firms that either did not adopt majority voting in this period or had already adopted it. Control firms capture any secular trend to increase environmental performance. Focusing on the interaction of the treated firm dummy with the Post Majority Election Adoption variable, we find a positive and significant coefficient. In terms of economic significances, the effects on environmental performance of the plausibly exogenous change in insider entrenchment is sizable with increases between 23% and 28% (depending on environmental score used; also note, Canadian firms had very low scores to start with).

These results based on the Canada sub-sample support a causal interpretation from control rights to firms' environmental performance. We build on this same approach to identification and select countries where a substantial number of firms adopt majority director election rules in a short time period. For these tests, we adopt a stringent selection criteria, requiring that the percentage of firms that have majority voting increases by at least 20 percentage points in a single year. Ten countries meet this criteria. We posit that such dramatic changes in a short time period are likely driven by some external push from investor groups, regulators or both. In Appendix Table A7 we list the country, year, and percentage change in majority voting. We also cite specific sources of pressure to adopt majority voting rules in countries for which we can obtain them. We note that by limiting the number of countries and the years we focus on, we address the concern that the majority voting effects derive from some omitted variable.

We follow a similar empirical approach in columns 3 and 4 of Panel A performing a difference-in-differences analysis around the two years before and two years after the quasi-exogenous shocks to adopt majority voting. Treated firms are again the firms that adopted majority

voting following the shock and control firms are those that did not change their majority voting policy during the time period considered. The adoption of majority voting is again associated with a positive and significant increase in firms' environmental performance. The estimated economic impact is an increase in firms' environmental performance of 8% to 10% (depending on environmental score) in the two years following the adoption of a majority voting provisions. The results are similar to those of the Canadian sub-sample and are consistent with our prior findings in Tables 2 through 4. Columns 5 and 6 repeat the analysis for this broader sample, while excluding Canada, with similar results.

We next turn to quasi-exogenous shocks to female board representation, in Panel B of Table 5. Exogenous pressures to encourage firms to increase female board representation include regulator-mandated female quotas, introduced first in Norway, and as of 2018 in place in a number of largely European countries. Exogenous pressures also come from investor group demands, often accompanied by softer regulatory pressures to increase disclosures about policies regarding diversity.

In countries that adopted quotas to increase the percentage of female board members, we note that a large majority of the treated firms already had at least one female director to start with, resulting in little power for these empirical tests. In the case of Norway, which had low female representation before passage of the quota legislation, we cannot conduct tests because the quota was passed in 2003 and we have no data on environmental performance before this time period. In general, mandated quota tests lack power in our sample.

For our first tests of external-pressure-driven changes in female board representation we turn to the UK, for which female board representation was initially low, and where there was a powerful push to increase female board representation (that was not a quota) that was successful.

In the UK, in 2011 Lord Davies published his Women on Boards review. This report made ten recommendations regarding disclosure and policies on diversity, including a recommendation that FTSE100 firms should have 25% female board representation within four years. The effort was supported by investor groups such as the Association of British Insurers which disclosed that it would now start monitoring female board representation.

For our tests, we use a difference-in-differences specification spanning the 2009 to 2015 period, that is, two years before and two years after the pressure to add more women to the board (2011 and 2012). We define treated firms as those that added a female in 2011 or 2012. Control firms are those that did not change their status of having at least one female director during the 2009 to 2015 period (they either had a female in all years or in none of the years). We require that treated and control firms are present for all six years. We verify that for the UK firms in our sample, the externally driven pressure did make a difference, with 19% more firms with at least one female on the board in 2013 compared to 2011.<sup>13</sup>

We present results in Table 5, Panel B, columns 1 and 2. The key variable of interest is the Post Female Board Representation indicator variable that we interact with the treated firms' indicator variable for those firms that add one or more female directors to the board. The positive and significant coefficient on the interaction term in both columns 1 and 2 provides support for a causal interpretation that adding a woman to a board increases firms' environmental performance. The implied economic impact is 4.8% to 8.0% higher environmental performance.

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<sup>13</sup> We note that firms might improve their environmental performance and appoint female directors as a response to past environmental controversies. As an example, Nike, Inc. faced considerable outside pressure with the global boycott campaign due to apparent human rights violations during the 1990s. In response, the firm significantly improved its ESG performance, including the appointment of a female board member. To address this concern, in addition to the quasi-exogenous shocks above, we test whether the appointment of a female director is related to prior-year environmental controversies (measured using ASSET4's environmental controversies indicators; see Appendix Table A1). The results show that there is no significant relation with  $p$ -values ranging from 0.39 to 0.95. We obtain similar insignificant results when repeating these tests for majority election provisions, board independence, and old or stale measures.

As before, to increase the sample size for our quasi-exogenous shock tests, we identify countries that experience a substantial increase in having at least one female board member in a short period of time. Here we use a threshold increase of 10 percentage points in a given year (this represents a substantial one year increase, as the majority of sample firms (63%) have a female director). This criteria yields nine countries in total, including the UK.

We report the results of these difference-in-differences tests in columns 3 and 4. For this larger sample, results are similar. Adding a woman to the board as a result of a plausibly exogenous shock is estimated to increase environmental performance by 5.0% to 8.6%. Again, columns 5 and 6 repeat the analysis for this broader sample, while excluding UK, with similar results.<sup>14</sup>

## **6. The Effect of Insider Entrenchment When Families Care More About the Environment**

We conclude our analysis by performing additional tests for family-owned firms. First, we have an empirical interest in learning whether the negative impact of family ownership can be mitigated by factors that are unrelated to decreasing insider entrenchment. Second, we are motivated by the theoretical framework introduced earlier.

As noted in Section 2, when families are in control, insiders face a tradeoff between the value they derive from non-pecuniary benefits from environmental investments and their attendant short termism costs. Our results so far are consistent with short-termism costs being dominant as we find lower environmental performance for family-controlled firms. A natural question that arises is whether this negative effect of family control is moderated when family owners place a greater premium on non-pecuniary benefits associated with their firms' environmental performance. A plausible measure of the premium family owners place on non-pecuniary

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<sup>14</sup> Results in the panel are unchanged if we restrict the control group firms to those that already have at least one female director.

environmental benefits is provided by country-level measures of environmental performance (Dyck et al., 2018).

To capture the social norms facing insiders, we assume that controlling family owners live in the same country as the firms they own and we use data on social norms prevailing in that country. Specifically, we measure a country's social norms concerning environmental issues with geographic location, continental Europe or not; and the Environmental Performance Index (EPI) obtained from Yale Center for Environmental Law (Yale University) and Center for International Earth Science Information Network (Columbia University)—we use a median split based on the median EPI scores over the 2004-2014 period. The average EPI scores in continental Europe are significantly higher than in other countries in our sample.

We present the results in Table 7. The odd columns focus on the blockholder status of firms and the even columns include in addition all of the entrenchment-reducing governance mechanisms. We find that the negative effect of family ownership on environmental performance is concentrated in the settings with lower environmental norms. In columns 1 and 2, that focus on the Continental European sample where environmental norms are high, there is no significant impact of family ownership on environmental performance. In contrast, outside of Continental Europe in columns 3 and 4, results are as previously reported with a strong and significant negative impact of family ownership. As shown in columns 5 through 8, the negative impact of family ownership is again concentrated in countries with below-median EPI scores, with higher negative coefficients. We note also that family ownership does have a significant negative effect (albeit lower) even in high EPI score countries.

## 7. Discussion and Conclusion

Where insiders are entrenched, as is the case with family firms, we find relatively low environmental performance. In these firms, insider short-termism appears to dominate the desire to address long-term environmental issues. Particularly in firms without entrenched insiders, we find that entrenchment-reducing governance mechanisms that increase outside investors' power lead to subsequent improvements in environmental performance.

These findings indicate that insider short-termism is important. We find suggestive evidence that having a controlling party who derives non-pecuniary benefits from higher environmental performance offers one path to overcome short-termism. When we split the sample by country-level norms for environmental performance, the negative effect of family control is moderated precisely where family owners are more likely to have a greater concern for environmental performance. A similar logic could be offered to explain the positive impact on firms' environmental performance that we find when a woman is elected to the board of directors, giving that board member control rights. A substantial behavioral economics literature suggests that females in general (not specifically female board members) have stronger 'other regarding' preferences than men and thus when given control rights could seek to improve a firm's environmental performance for this reason (Andreoni and Vesterlund, 2001; Adams and Funk, 2012; Thaler, 2016; Cronqvist and Yu, 2017).

However, we think it premature to emphasize solely this interpretation for our finding of a substantial impact of female board representation on environmental performance. Another strand of literature finds that in the US, where disclosure regulations make it is feasible to measure board member characteristics across many dimensions, adding female board members is a powerful

entrenchment-reducing mechanism because female directors have many different characteristics than existing male board members, including stronger sustainability experience.

We therefore conjecture that the strongest result in our paper—that a female director is associated the largest improvement in a firm’s environmental performance—is a result of both mechanisms being in play, with both stronger innate preferences for the environment and more diverse perspectives that help to reduce entrenchment. Should sufficient data become available internationally, disentangling these various mechanisms to explain the impact of female board involvement on environmental performance in a global setting would be a ripe area for research.

More broadly, the findings in this paper have implications for institutional investors that are increasingly interested in corporate sustainability worldwide and are exerting influence to push firms towards improving their environmental performance. Our paper shows that they should not focus on aggregate measures of ESG, or even E as a stand-alone measure. Rather, governance mechanisms that reduce entrenchment are fundamental to achieving environmental performance objectives.

Further, we provide quantitative estimates of the benefits to specific actionable governance changes investors could push for that lead to improved environmental performance, particularly in firms without dominant insiders. The mechanisms of adopting majority voting for board members, increasing the percentage of independent directors, reducing ‘old or stale’ boards, and including at least one woman on the board of directors are all associated with measurable improvements in environmental performance, with each having an incremental effect.

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**Table 1**  
**Descriptive Statistics**

This table shows summary statistics of environmental scores, measures of entrenchment, and other key variables. Panel A shows summary statistics for firms grouped by whether they are family controlled, widely held, or have a different control structure (other). For each firm-year, we classify a firm as controlled by a family if any of the following conditions are met: 1) Orbis (Bureau van Dijk) identifies a family as the ultimate owner of the firm with a minimum controlling threshold of 25% (following Lins, Volpin, and Wagner, 2013); 2) Orbis identifies the ultimate owner to be a Nominee, Trust, or Trustee, and the firm has dual class shares (obtained from ASSET4); 3) Datastream reports a minimum family stake of 20%, or Datastream reports a minimum family stake of 5% and the firm has dual class shares; 4) the Global Family Business Index (obtained from Center for Family Business at the University of St. Gallen, Switzerland) reports the firm as family controlled. For each firm, we impute intermittent years as family controlled if a firm is classified as family controlled in at least one earlier and one later year. We further extend family control both backwards and forwards in time if ASSET4 indicates that the votes of a firm's largest blockholder are within 5% of the year during which a firm is known to be family controlled and the largest blockholder's stake is at least 20%. For each firm-year, we classify a firm as widely held if the firm is not classified as family controlled by the above rule and any of the following conditions are met: 1) Orbis classifies the firm as widely held; 2) ASSET4 indicates the largest blockholder's stake is less than 50% or does not report any largest blockholder stake. The remaining firms that are not family controlled or widely held we classify as controlled by another blockholder (other). The ASSET4 Environmental z-score is a standardized score, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measures firms' environmental performance relative to other companies in a given year. The Equally-weighted Environmental Score is the average of three category scores (Emission Reduction, Product Innovation, and Resource Reduction). The category scores are calculated as the sum of all indicator variables in each category divided by the number of reported items times 100. Appendix Table A1 describes the indicator variables used to calculate the environmental scores. Majority Election is an indicator variable that equals one if the company's board members are generally elected with a majority vote, and zero otherwise. Board Independence is the number of independent board members scaled by the total number of board members. Old or Stale Board is an indicator variable that equals one if at least 20% of the directors is over 70 years old or if at least 50% of directors have a tenure greater than 9 years, and zero otherwise. Female Director is an indicator variable that equals one if a firm has at least one female director, and zero otherwise. These data are from Thomson Reuters and BoardEx. Total Assets is in US\$ million, Log (Total Assets) is the natural logarithm of total assets, Tangibility is property, plant, and equipment to total assets, Cash is cash and cash equivalents to total assets, Leverage is total debt to total assets, Profitability is net income plus after-tax interest expenses to total assets. Institutional Ownership is the total institutional ownership. Cross-list is an indicator variable that equals one if the firm is cross-listed on a major U.S. exchange, and zero otherwise. These data are obtained from Worldscope, Factset, ADR lists, and CRSP. The sample period is 2004-2015. All variables are winsorized at the 1st and 99th percentiles. Panel B shows country averages of environmental scores, control rights, and the number of observations for the year 2012 and the full sample.

Panel A: Summary Statistics by Control Type

	Full Sample (N=25,143)	Family (N=5,420)			Widely Held (N=18,346)			Other (N=1,377)		
	Mean	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
ASSET4 E z-Score	53.7	48.5	44.5	31.0	55.4	60.2	31.7	51.7	54.8	29.2
Equally-weighted E Score	37.8	35.2	31.5	20.7	38.5	35.7	21.5	37.5	37.4	19.0
Majority Election	0.48	0.48	0.00	0.50	0.48	0.00	0.50	0.52	1.00	0.50
Board Independence	0.50	0.44	0.44	0.22	0.54	0.57	0.26	0.38	0.36	0.22
Old or Stale Board	0.17	0.30	0.00	0.46	0.13	0.00	0.33	0.13	0.00	0.33
Female Director	0.63	0.65	1.00	0.48	0.63	1.00	0.48	0.63	1.00	0.48
Log(Total Assets)	8.68	8.56	8.56	1.47	8.67	8.51	1.83	9.34	9.30	1.69
Tangibility	0.31	0.29	0.25	0.23	0.31	0.26	0.26	0.35	0.33	0.28
Cash	0.13	0.14	0.10	0.12	0.13	0.08	0.13	0.12	0.09	0.11
Leverage	0.24	0.25	0.24	0.17	0.23	0.22	0.18	0.23	0.21	0.17
Profitability	0.06	0.07	0.06	0.08	0.05	0.05	0.08	0.06	0.05	0.08
Institutional Ownership	0.23	0.19	0.16	0.14	0.25	0.20	0.18	0.13	0.10	0.11
Cross-list	0.10	0.07	0.00	0.26	0.10	0.00	0.30	0.16	0.00	0.36

Panel B: Summary Statistics by Country

Country	Environmental Scores		Control Type			Obs	
	ASSET4 z-Score	Equally-weighted Score	Family	Widely Held	Other	Year 2012	Full Sample
Australia	33.0	28.1	0.13	0.03	0.84	280	2,217
Austria	61.4	47.5	0.31	0.13	0.56	16	195
Belgium	57.2	44.3	0.38	0.04	0.58	24	262
Brazil	56.5	43.9	0.38	0.24	0.39	80	532
Canada	39.9	32.4	0.18	0.02	0.80	235	2,088
Chile	41.2	33.7	0.41	0.23	0.36	22	146
China	31.3	26.6	0.28	0.17	0.55	123	813
Colombia	37.6	32.1	0.18	0.36	0.45	11	64
Denmark	68.3	50.7	0.28	0.00	0.72	25	265
Egypt	18.3	18.1	0.36	0.18	0.45	11	65
Finland	81.4	62.1	0.16	0.08	0.76	25	291
France	81.7	63.1	0.50	0.03	0.47	90	963
Germany	68.6	54.7	0.30	0.04	0.66	76	859
Greece	56.0	44.9	0.47	0.00	0.53	17	214
Hong Kong	36.6	30.5	0.45	0.19	0.36	106	972
India	50.2	42.3	0.33	0.18	0.50	80	530
Indonesia	46.3	36.6	0.29	0.32	0.39	28	197
Ireland	49.2	41.6	0.13	0.00	0.87	15	159
Israel	42.1	33.7	0.53	0.00	0.47	15	104
Italy	60.8	50.1	0.27	0.07	0.67	45	496
Japan	63.4	51.6	0.06	0.00	0.94	384	4,345
Luxembourg	56.0	41.3	0.63	0.13	0.25	8	66
Malaysia	41.5	33.8	0.36	0.10	0.55	42	279
Mexico	45.4	35.8	0.77	0.04	0.19	26	200
Netherlands	66.7	51.7	0.19	0.00	0.81	36	381
New Zealand	44.2	34.2	0.10	0.20	0.70	10	137
Norway	68.1	52.0	0.18	0.06	0.76	17	196
Philippines	43.9	34.9	0.11	0.16	0.74	19	126
Poland	35.0	30.3	0.21	0.38	0.42	24	159
Portugal	73.4	57.5	0.58	0.08	0.33	12	132
Russia	45.7	35.9	0.55	0.24	0.21	33	250
Singapore	41.9	35.3	0.11	0.20	0.68	44	451
South Africa	49.9	39.2	0.12	0.08	0.80	120	586
South Korea	60.8	48.1	0.34	0.03	0.63	99	582
Spain	75.7	57.4	0.30	0.05	0.65	43	502
Sweden	75.3	57.1	0.42	0.04	0.53	45	552
Switzerland	57.6	45.3	0.32	0.02	0.67	60	612
Taiwan	46.9	37.5	0.06	0.00	0.94	126	724
Thailand	53.4	42.8	0.21	0.17	0.63	24	152
Turkey	57.9	44.7	0.54	0.17	0.29	24	158
UK	60.8	46.0	0.18	0.00	0.82	280	3,121
Overall	53.2	42.2	0.31	0.11	0.58	2,800	25,143

**Table 2**  
**Does Insider Entrenchment Affect Firms' Environmental Performance?**

This table reports regression estimates of environmental scores on entrenchment measures and control variables. The dependent variables are the natural logarithm of environmental scores. The ASSET4 Environmental  $z$ -score is a standardized score, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measures firms' environmental performance relative to other companies in a given year. The Equally-weighted Environmental Score is the average of three category scores (Emission Reduction, Product Innovation, and Resource Reduction). Appendix Table A1 describes the indicator variables used to calculate the environmental scores. All other variables are described in Table 1. The data are from the Thomson Reuters ASSET4 database, Orbis, Datastream, Worldscope, BoardEx, Factset, ADR lists, and CRSP, and are obtained for the years 2004-2015. All variables are winsorized at the 1st and 99th percentiles. All right-hand side variables are lagged by one year. Standard errors are clustered at the country-level and  $t$ -statistics are reported in parentheses. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: ASSET4 Environmental  $z$ -Scores

	ASSET4 Environmental $z$ -Scores $t$					
	(1)	(2)	(3)	(4)	(5)	(6)
Family $t_{-1}$	-0.127*** (-3.52)	-0.124*** (-3.39)	-0.092*** (-3.00)	-0.092*** (-3.13)	-0.105*** (-3.60)	-0.080*** (-2.74)
Other $t_{-1}$	0.014 (0.40)	0.013 (0.37)	0.041 (1.15)	0.019 (0.51)	0.023 (0.66)	0.039 (1.15)
Majority Election $t_{-1}$		0.100*** (4.12)				0.067*** (2.84)
Board Independence $t_{-1}$			0.243*** (3.93)			0.212*** (3.74)
Old or Stale Board $t_{-1}$				-0.078*** (-3.32)		-0.068*** (-2.93)
Female Director $t_{-1}$					0.155*** (5.70)	0.145*** (5.36)
Log (Total Assets) $t_{-1}$	0.242*** (13.24)	0.238*** (13.10)	0.227*** (10.46)	0.232*** (10.53)	0.219*** (10.78)	0.214*** (10.62)
Cash $t_{-1}$	-0.120 (-1.09)	-0.124 (-1.15)	-0.034 (-0.52)	-0.032 (-0.47)	-0.030 (-0.45)	-0.035 (-0.54)
Tangibility $t_{-1}$	0.174** (2.45)	0.179** (2.59)	0.226*** (3.54)	0.229*** (3.56)	0.225*** (3.78)	0.226*** (3.70)
Leverage $t_{-1}$	-0.141 (-1.28)	-0.138 (-1.25)	-0.225*** (-3.18)	-0.229*** (-3.32)	-0.214*** (-3.13)	-0.213*** (-3.08)
Profitability $t_{-1}$	0.304** (2.69)	0.312*** (2.75)	0.268** (2.50)	0.267** (2.47)	0.236** (2.24)	0.244** (2.31)
Institutional Ownership $t_{-1}$	0.211** (2.32)	0.195** (2.06)	0.118 (1.19)	0.184* (1.86)	0.156 (1.65)	0.100 (1.03)
Cross-list $t_{-1}$	-0.049 (-1.37)	-0.059 (-1.65)	-0.067 (-1.68)	-0.058 (-1.56)	-0.054 (-1.46)	-0.067* (-1.79)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs	25,143	25,134	19,120	19,120	19,120	19,115
Adjusted $R^2$	0.436	0.439	0.465	0.464	0.470	0.475

Panel B: Equally-weighted Environmental Scores

	Equally-weighted Environmental Scores $t$					
	(1)	(2)	(3)	(4)	(5)	(6)
Family $t-1$	-0.096*** (-3.28)	-0.094*** (-3.16)	-0.069** (-2.67)	-0.071*** (-2.86)	-0.079*** (-3.21)	-0.061** (-2.49)
Other $t-1$	-0.009 (-0.32)	-0.010 (-0.34)	0.015 (0.55)	-0.003 (-0.09)	0.001 (0.02)	0.014 (0.51)
Majority Election $t-1$		0.082*** (4.00)				0.055*** (2.83)
Board Independence $t-1$			0.200*** (4.05)			0.175*** (3.84)
Old or Stale Board $t-1$				-0.052*** (-2.84)		-0.043** (-2.42)
Female Director $t-1$					0.124*** (6.73)	0.116*** (6.31)
Log (Total Assets) $t-1$	0.210*** (14.09)	0.207*** (14.12)	0.197*** (11.92)	0.201*** (12.06)	0.191*** (12.17)	0.186*** (11.94)
Cash $t-1$	-0.035 (-0.37)	-0.039 (-0.42)	0.046 (0.75)	0.048 (0.77)	0.050 (0.80)	0.045 (0.75)
Tangibility $t-1$	0.165*** (3.29)	0.169*** (3.46)	0.200*** (4.35)	0.203*** (4.40)	0.200*** (4.70)	0.200*** (4.52)
Leverage $t-1$	-0.131 (-1.61)	-0.129 (-1.57)	-0.186*** (-3.58)	-0.189*** (-3.73)	-0.178*** (-3.51)	-0.177*** (-3.45)
Profitability $t-1$	0.256** (2.64)	0.262*** (2.72)	0.236** (2.49)	0.235** (2.45)	0.211** (2.27)	0.216** (2.35)
Institutional Ownership $t-1$	0.137** (2.08)	0.123* (1.78)	0.063 (0.85)	0.116 (1.57)	0.095 (1.33)	0.047 (0.65)
Cross-list $t-1$	-0.015 (-0.62)	-0.023 (-0.95)	-0.022 (-0.80)	-0.015 (-0.57)	-0.012 (-0.46)	-0.023 (-0.89)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs	25,143	25,134	19,120	19,120	19,120	19,115
Adjusted $R^2$	0.517	0.519	0.549	0.547	0.553	0.557

**Table 3****Do Mechanisms That Reduce Entrenchment Affect Family-controlled Firms' Environmental Performance?**

This table shows overall effects of various mechanisms that reduce entrenchment on firms' environmental performance for firms with different blockholder-control types (family-controlled vs. widely held/other). Each regression model includes an indicator variable for whether a firm is controlled by a family, the governance measure to reduce entrenchment in question, an interaction term between the family indicator and the governance measure, and controls. For each column in this table, the reported coefficient estimate on Family is the sum of the coefficient estimates on the entrenchment-reducing governance measure and the interaction between the family indicator variable and the governance measure; and statistical significance is calculated using an F-test on the sum of these two coefficients. The reported coefficient on Widely Held/Other is the coefficient estimate on the standalone governance variable. The dependent variables are the natural logarithm of environmental scores. The ASSET4 Environmental z-score is a standardized score, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measures firms' environmental performance relative to other companies in a given year. The Equally-weighted Environmental Score is the average of three category scores (Emission Reduction, Product Innovation, and Resource Reduction). Appendix Table A1 describes the indicator variables used to calculate the environmental scores. All other variables are described in Table 1. Controls as in Table 2 are included but not reported. The data are from the Thomson Reuters ASSET4 database, Orbis, Datastream, Worldscope, BoardEx, Factset, ADR lists, and CRSP, and are obtained for the years 2004-2015. All variables are winsorized at the 1st and 99th percentiles. All right-hand side variables are lagged by one year. Standard errors are clustered at the country-level and *p*-values are reported in parentheses. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5%, and 10% level, respectively.

## Panel A: ASSET4 Environmental z-Scores

Governance Measure	ASSET4 Environmental z-Scores			
	Majority Election	Board Independence	Old or Stale Board	Female Director
	(1)	(2)	(3)	(4)
Family	0.089* (0.065)	0.098 (0.263)	-0.056 (0.352)	0.128*** (0.001)
Widely Held/Other	0.104*** (0.000)	0.275*** (0.000)	-0.091*** (0.003)	0.163*** (0.000)
Controls	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Obs	25,134	19,120	19,120	19,120
Adjusted R <sup>2</sup>	0.439	0.466	0.464	0.470

## Panel B: Equally-weighted Environmental Scores

Governance Measure	Equally-weighted Environmental Scores			
	Majority Election	Board Independence	Old or Stale Board	Female Director
	(1)	(2)	(3)	(4)
Family	0.064* (0.076)	0.085 (0.296)	-0.039 (0.376)	0.115*** (0.000)
Widely Held/Other	0.087*** (0.000)	0.229*** (0.000)	-0.058*** (0.006)	0.127*** (0.000)
Controls	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Obs	25,134	19,120	19,120	19,120
Adjusted R <sup>2</sup>	0.519	0.549	0.547	0.553

**Table 4**  
**Mechanisms to Reduce Entrenchment and Firms' Environmental Performance: Firm Fixed Effects**

This table reports firm fixed effects regression estimates of environmental scores on mechanisms that reduce entrenchment and control variables. The dependent variables are the natural logarithm of environmental scores. The ASSET4 Environmental z-score is a standardized score, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measures firms' environmental performance relative to other companies in a given year. The Equally-weighted Environmental Score is the average of three category scores (Emission Reduction, Product Innovation, and Resource Reduction). We drop firms if the measure of corporate governance (Majority Election, Board Independence, Old or Stale Boards, and Female Director) is time invariant. Appendix Table A1 describes the indicator variables used to calculate the environmental scores. All other variables are described in Table 1. Controls as in Table 2 are included but not reported. The data are from the Thomson Reuters ASSET4 database, Orbis, Datastream, Worldscope, BoardEx, Factset, ADR lists, and CRSP, and are obtained for the years 2004-2015. All variables are winsorized at the 1st and 99th percentiles. All right-hand side variables are lagged by one year. Standard errors are clustered at the country-level and *t*-statistics are reported in parentheses. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: ASSET4 Environmental z-Scores

	ASSET4 Environmental z-Scores			
	(1)	(2)	(3)	(4)
Majority Election	0.054*** (4.09)			
Board Independence		0.104** (2.18)		
Old or Stale Board			-0.020** (-2.09)	
Female Director				0.035*** (3.23)
Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Obs	12,994	17,623	6,960	10,540
Adjusted $R^2$	0.819	0.852	0.855	0.843

Panel B: Equally-weighted Environmental Scores

	Equally-weighted Environmental Scores			
	(1)	(2)	(3)	(4)
Majority Election	0.036*** (4.32)			
Board Independence		0.070* (2.01)		
Old or Stale Board			-0.012 (-1.63)	
Female Director				0.018** (2.46)
Controls	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Obs	12,994	17,623	6,960	10,540
Adjusted $R^2$	0.879	0.903	0.904	0.898

**Table 5**

**Mechanisms to Reduce Entrenchment and Firms' Environmental Performance: Quasi-natural Experiments**

This table reports regression estimates of environmental scores for years surrounding quasi-exogenous shocks to majority director election rules and female board representation, two measures that reduce entrenchment. The dependent variables are the natural logarithm of environmental scores. The ASSET4 Environmental  $z$ -score is a standardized score, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measures firms' environmental performance relative to other companies in a given year. The Equally-weighted Environmental Score is the average of three category scores (Emission Reduction, Product Innovation, and Resource Reduction). Appendix Table A1 describes the indicator variables used to calculate the environmental scores. All other variables are described in Table 1. Panel A shows results for countries for which there was significant outside pressure to adopt majority director election rules. Columns 1 and 2 focus on Canada and the initiative of the CCGG to increase majority voting adoption (Doidge et al., 2018) leading to significant changes in firm adoptions in 2006 and 2007. We define treated firms as those that adopted majority voting in 2006 or 2007 and control firms are those that did not change their majority voting policy during the 2004 to 2008 period. Columns 3 and 4 includes all countries in which the fraction of firms that have majority director elections increased by more than 20 percentage points in a single year (event year), including Canada. Columns 5 and 6 repeat the analysis from columns 3 and 4 without the Canadian firms. For details see Appendix Table A7. Treated firms are those that adopt majority voting following the event year and control firms are those that did not change their majority voting policy during the time period considered. Panel B shows results for countries for which there was significant outside pressure for greater female board representation. Columns 1 and 2 focus on the UK and the 2011 Women on Boards review published by Lord Davies who recommended that FTSE100 firms should have 25% female board representation within 4 years. The effort was supported by investor groups such as the Association of British Insurers which disclosed that it would now start monitoring female board representation. We define treated firms as those that add women to the board in 2011 or 2012. Control firms are those that did not change their status of having at least one female director during the 2009 to 2015 period (they either had a female in all years or in none of the years). Columns 3 and 4 focus on countries for which the fraction of firms that have female board representation increased by more than 10 percentage points in a single year, including the UK. Columns 5 and 6 repeat the analysis from columns 3 and 4 without firms from the UK. For details see Appendix Table A7. Treated firms are firms that went from no woman to at least one woman on the board in the two years following the event year and control firms are those that always or never had women on the board during the time period considered. In all specifications, we include the two years before and two years after the event years. We require that treated and control firms appear in all years around the treatment. Firms that change family control, other-blockholder control, or cross-listing status are excluded. The data are from the Thomson Reuters ASSET4 database, Orbis, Datastream, Worldscope, BoardEx, Factset, ADR lists, and CRSP, and are obtained for the years 2004-2015. All variables are winsorized at the 1st and 99th percentiles. All right-hand side variables are lagged by one year. Standard errors are clustered at the country-level and  $t$ -statistics are reported in parentheses. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Quasi-exogenous Shocks to Majority Director Election Rules

	Single Country Experience		Broad Sample		Broad Sample Excl. Canada	
	ASSET4 E z- Scores	Equally- weighted E Scores	ASSET4 E z- Scores	Equally- weighted E Scores	ASSET4 E z- Scores	Equally- weighted E Scores
	(1)	(2)	(3)	(4)	(5)	(6)
Post Majority Election Adoption $\times$ Treated	0.284** (2.16)	0.231** (2.41)	0.103*** (2.69)	0.079*** (2.77)	0.076* (1.85)	0.053* (1.76)
Log (Total Assets)	0.006 (0.04)	0.051 (0.72)	0.088 (1.62)	0.077* (1.81)	0.095 (1.52)	0.076 (1.55)
Cash	-0.078 (-0.11)	0.048 (0.10)	-0.308 (-1.48)	-0.198 (-1.32)	-0.251 (-1.22)	-0.156 (-1.01)
Tangibility	0.615 (0.83)	0.435 (0.82)	-0.172 (-0.79)	-0.148 (-0.92)	-0.274 (-1.10)	-0.241 (-1.29)
Leverage	-0.704 (-1.59)	-0.666* (-1.93)	-0.006 (-0.03)	0.011 (0.08)	0.133 (0.61)	0.138 (0.88)
Profitability	0.423 (0.72)	0.315 (0.83)	0.233 (1.33)	0.138 (1.11)	0.227 (1.29)	0.135 (1.06)
Institutional Ownership	0.170 (0.41)	0.425 (1.46)	0.042 (0.21)	0.118 (0.80)	0.009 (0.04)	0.015 (0.10)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs	206	206	1,555	1,555	1,349	1,349
Adjusted $R^2$	0.798	0.858	0.821	0.864	0.822	0.859
Countries in Sample	Canada		Australia, Austria, Belgium, Canada, Denmark, Ireland, Italy, Spain, Switzerland, UK		Australia, Austria, Belgium, Denmark, Ireland, Italy, Spain, Switzerland, UK	

Panel B: Quasi-exogenous Shocks to Female Board Representation

	Single Country Experience		Broad Sample		Broad Sample Excl. the UK	
	ASSET4 E z- Scores	Equally- weighted E Scores	ASSET4 E z- Scores	Equally- weighted E Scores	ASSET4 E z- Scores	Equally- weighted E Scores
	(1)	(2)	(3)	(4)	(5)	(6)
Post Female Board Representation × Treated	0.080* (1.88)	0.048** (2.30)	0.086*** (4.10)	0.050** (3.10)	0.096** (2.77)	0.055* (2.02)
Log (Total Assets)	0.016 (0.25)	0.014 (0.38)	0.020 (0.64)	0.014 (0.72)	0.031 (0.70)	0.017 (0.59)
Cash	-0.079 (-0.70)	-0.033 (-0.43)	-0.106** (-2.55)	-0.022 (-0.61)	-0.095 (-1.48)	-0.003 (-0.05)
Tangibility	0.281 (0.77)	0.223 (1.21)	-0.087 (-1.37)	0.018 (0.54)	-0.143* (-2.16)	-0.008 (-0.19)
Leverage	0.049 (0.26)	-0.040 (-0.37)	-0.045 (-1.19)	-0.081** (-2.58)	-0.071* (-2.00)	-0.092* (-2.07)
Profitability	0.120 (0.59)	0.039 (0.35)	0.016 (0.17)	0.003 (0.05)	-0.004 (-0.03)	-0.005 (-0.06)
Institutional Ownership	0.199 (1.07)	0.084 (0.62)	0.081 (0.91)	0.099** (3.20)	0.095 (0.72)	0.141*** (3.71)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs	954	954	2,454	2,454	1,500	1,500
Adjusted R <sup>2</sup>	0.879	0.934	0.909	0.946	0.916	0.948
Countries in Sample	UK		Australia, Austria, Germany, Greece, Italy, Malaysia, Portugal, Switzerland, UK		Australia, Austria, Germany, Greece, Italy, Malaysia, Portugal, Switzerland	

**Table 6**  
**Environmental Social Norms, Entrenchment, and Firms' Environmental Performance**

This table reports regression estimates of environmental scores on entrenchment measures and control variables for firms grouped by their countries' environmental social norms. The dependent variables are the natural logarithm of environmental scores. The ASSET4 Environmental  $z$ -score is a standardized score, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measures firms' environmental performance relative to other companies in a given year. The Equally-weighted Environmental Score is the average of three category scores (Emission Reduction, Product Innovation, and Resource Reduction). Appendix Table A1 describes the indicator variables used to calculate the environmental scores. All other variables are described in Table 1. We sort firms into low and high-social-norm groups based on the environmental social norms in the firm's country of domicile. We measure a country's social norms concerning environmental issues with a) geographic location, that is, whether a firm is from Continental Europe or from another country; and b) the Environmental Performance Index (median over the 2004-2014 period, obtained from Yale Center for Environmental Law (Yale University) and Center for International Earth Science Information Network (Columbia University), median split). The data are from the Thomson Reuters ASSET4 database, Orbis, Datastream, Worldscope, BoardEx, Factset, ADR lists, and CRSP, and are obtained for the years 2004-2015. All variables are winsorized at the 1st and 99th percentiles. All right-hand side variables are lagged by one year. Standard errors are clustered at the country-level and  $t$ -statistics are reported in parentheses. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: ASSET4 Environmental  $z$ -Scores

	ASSET4 Environmental $z$ -Scores							
	Continental Europe		All Other Countries		High (Above-median) Environmental Protection Index		Low (Below-median) Environmental Protection Index	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family	-0.062 (-1.38)	-0.061 (-1.57)	-0.168*** (-4.51)	-0.102*** (-3.39)	-0.089** (-2.89)	-0.072** (-2.74)	-0.194*** (-3.21)	-0.126** (-2.48)
Other	0.032 (0.68)	0.020 (0.39)	-0.002 (-0.04)	0.046 (1.09)	0.114** (2.16)	0.103* (2.05)	-0.033 (-0.62)	0.004 (0.07)
Majority Election		0.055 (1.42)		0.075** (2.64)		0.069* (1.81)		0.072** (2.48)
Board Independence		0.135 (1.62)		0.288*** (3.91)		0.181*** (3.08)		0.217** (2.73)
Old or Stale Board		-0.140** (-2.75)		-0.046* (-1.95)		-0.110*** (-3.05)		-0.048 (-1.45)
Female Director		0.094* (1.96)		0.151*** (5.29)		0.184*** (5.69)		0.083*** (3.14)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	6,304	6,038	18,839	13,077	12,720	12,089	11,451	6,346
Adjusted $R^2$	0.454	0.462	0.428	0.474	0.502	0.519	0.424	0.450
$p$ -value of Difference in Family Coefficient Between ('Low' vs. 'High') Social Norm Groups	(0.06)	(0.40)			(0.11)	(0.34)		

Panel B: Equally-weighted Environmental Scores

	Equally-weighted Environmental Scores							
	Continental Europe		All Other Countries		High (Above-median) Environmental Protection Index		Low (Below-median) Environmental Protection Index	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family	-0.050 (-1.30)	-0.046 (-1.31)	-0.125*** (-4.07)	-0.077*** (-3.03)	-0.062** (-2.53)	-0.050** (-2.29)	-0.149*** (-3.22)	-0.105** (-2.39)
Other	0.016 (0.47)	0.004 (0.12)	-0.020 (-0.59)	0.022 (0.66)	0.045 (1.12)	0.034 (0.89)	-0.030 (-0.65)	0.007 (0.17)
Majority Election		0.055* (1.81)		0.059** (2.44)		0.055* (1.76)		0.067*** (2.96)
Board Independence		0.118 (1.73)		0.224*** (4.15)		0.143** (2.76)		0.181*** (3.00)
Old or Stale Board		-0.099** (-2.85)		-0.024 (-1.20)		-0.073** (-2.81)		-0.035 (-1.49)
Female Director		0.081** (2.39)		0.122*** (6.33)		0.142*** (6.06)		0.073*** (3.88)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	6,304	6,038	18,839	13,077	12,720	12,089	11,451	6,346
Adjusted R <sup>2</sup>	0.587	0.590	0.492	0.538	0.593	0.604	0.488	0.523
<i>p</i> -value of Difference in Family Coefficient Between ('Low' vs. 'High') Social Norm Groups	(0.12)	(0.47)			(0.09)	(0.26)		

## Appendix

**Table A1**  
**Environmental Indicators Based on Thomson Reuters ASSET4 ESG Environmental Data**

We create environmental indicator variables based on the Thomson Reuters ASSET4 ESG environmental indicator values. Indicator values are the answers to Y/N questions, double Y/N questions, and numerical questions. We translate the answers to these questions into indicator variables. More specifically, for questions with a positive direction (i.e., a “yes” answer or a greater number is associated with better environmental performance), we translate the answers to Y/N questions into 0 (N) and 1 (Y); the answers to double Y/N questions into 0 (NN), 0.5 (YN or NY), and 1 (YY); and the answers to numerical questions into 0 (value is less (or equal) than zero; or value is less (or equal) than the median; see also column “Translation Numeric Values”) and 1 (value is greater than zero; or value is greater than the median; see also column “Translation Numeric Values”). For questions with a negative direction (i.e., a “no” answer or a lower number is associated with better social performance), the opposite coding applies. The data are from the ASSET4 ESG database.

	Description	Direction	Question Type	Translation Numeric Values
<b>A. Emission Reduction</b>				
1)	Biodiversity Controversies	Is the company under the spotlight of the media because of a controversy linked to biodiversity?	Negative	Y/N
2)	Biodiversity Impact	Does the company report on initiatives to protect, restore or reduce its impact on native ecosystems and species, biodiversity, protected and sensitive areas?	Positive	Y/N
3)	Cement CO2 Emissions	Total CO2 and CO2 equivalents emission in kilograms per tonne of cement produced.	Negative	Number Median
4)	Climate Change Risks and Opportunities	Is the company aware that climate change can represent commercial risks and/or opportunities?	Positive	Y/N
5)	CO2 Reduction	Does the company show an initiative to reduce, reuse, recycle, substitute, phased out or compensate CO2 equivalents in the production process?	Positive	Y/N
6)	Discharge into Water System	Total weight of water pollutant emissions in tonnes divided by net sales or revenue in U.S. dollars.	Negative	Number Median
7)	Environmental Compliance	All real or estimated penalties, fines from lost court cases, settlements or cases not yet settled regarding environmental controversies in U.S. dollars.	Negative	Number Zero
8)	Environmental Expenditures	Does the company report on its environmental expenditures or does the company report to make proactive environmental investments to reduce future risks or increase future opportunities?	Positive	Y/N
9)	Environmental Management Systems	The percentage of company sites or subsidiaries that are certified with any environmental management system.	Positive	Number Median
10)	Environmental Partnerships	Does the company report on partnerships or initiatives with specialized NGOs, industry organizations, governmental or supragovernmental organizations that focus on improving environmental issues?	Positive	Y/N
11)	Environmental Restoration Initiatives	Does the company report or provide information on company-generated initiatives to restore the environment?	Positive	Y/N
12)	F-Gases Emissions	Does the company report on initiatives to recycle, reduce, reuse or phase out fluorinated gases such as HFCs (hydrofluorocarbons), PFCs (perfluorocarbons) or SF6 (sulphur hexafluoride)?	Positive	Y/N
13)	Greenhouse Gas Emissions	Total CO2 and CO2 equivalents emission in tonnes divided by net sales or revenue in U.S. dollars.	Negative	Number Median
14)	Hazardous Waste	Total amount of hazardous waste produced in tonnes divided by net sales or revenue in U.S. dollars.	Negative	Number Median
15)	Implementation	Does the company describe the implementation of its emission reduction policy through a public commitment from a senior management or board member? AND Does the company describe the implementation of its emission reduction policy through the processes in place?	Positive	Double Y/N
16)	Improvements	Does the company set specific objectives to be achieved on emission reduction?	Positive	Y/N
17)	Innovative Production	Does the company report on the concentration of production locations in order to limit the environmental impact during the production process? OR Does the company report on its participation in any emissions trading initiative? OR Does the company report on new production techniques to improve the global environmental impact (all emissions) during the production process?	Positive	Y/N
18)	Monitoring	Does the company monitor its emission reduction performance?	Positive	Y/N
19)	NOx and SOx Emissions Reduction	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulphur oxides) or NOx (nitrogen oxides) emissions?	Positive	Y/N
20)	Ozone-Depleting Substances Reduction	Does the company report on initiatives to reduce, substitute, or phase out ozone-depleting (CFC-11 equivalents, chlorofluorocarbon) substances?	Positive	Y/N
21)	Policy	Does the company have a policy for reducing environmental emissions or its impacts on biodiversity? AND Does the company have a policy for maintaining an environmental management system?	Positive	Double Y/N
22)	Spill Impact Reduction	Does the company report on initiatives to reduce, avoid or minimize the effects of spills or other polluting events (crisis management system)?	Positive	Y/N
23)	Spills and Pollution Controversies	Is the company directly or indirectly (through a supplier) under the spotlight of the media because of a controversy linked to the spill of chemicals, oils and fuels, gases (flaring) or controversy relating to the overall impacts of the company on the environment?	Negative	Y/N
24)	Transportation Impact Reduction	Does the company report on initiatives to reduce the environmental impact of transportation of its products or its staff?	Positive	Y/N
25)	VOC Emissions Reduction	Does the company report on initiatives to reduce, substitute, or phase out volatile organic compounds (VOC) or particulate matter less than ten microns in diameter (PM10)?	Positive	Y/N
26)	Waste	Total amount of waste produced in tonnes divided by net sales or revenue in U.S. dollars.	Negative	Number Median
27)	Waste Recycling Ratio	Total recycled and reused waste produced in tonnes divided by total waste produced in tonnes.	Positive	Number Median
28)	Waste Reduction	Does the company report on initiatives to recycle, reduce, reuse, substitute, treat or phase out total waste, hazardous waste or wastewater?	Positive	Y/N
<b>B. Product Innovation</b>				
1)	Animal Testing	Is the company endorsing guidelines on animal testing (e.g., the EU guideline on animal experiments)? OR Has the company established a programme or an initiative to reduce, phase out or substitute for animal testing?	Positive	Y/N

2)	Eco-Design Products	Does the company report on specific products which are designed for reuse, recycling or the reduction of environmental impacts?	Positive	Y/N	
3)	Energy Footprint Reduction	Does the company describe initiatives in place to reduce the energy footprint of its products during their use?	Positive	Y/N	
4)	Environmental Asset Management	Does the company report on assets under management which employ environmental screening criteria or environmental factors in the investment selection process?	Positive	Y/N	
5)	Environmental Labels and Awards	Has the company received product awards with respect to environmental responsibility? OR Does the company use product labels (e.g., FSC, Energy Star, MSC) indicating the environmental responsibility of its products?	Positive	Y/N	
6)	Environmental Products	Does the company report on at least one product line or service that is designed to have positive effects on the environment or which is environmentally labelled and marketed?	Positive	Y/N	
7)	Environmental Project Financing	Is the company a signatory of the Equator Principles (commitment to manage environmental issues in project financing)? OR Does the company claim to evaluate projects on the basis of environmental or biodiversity risks as well?	Positive	Y/N	
8)	Environmental R&D	Does the company invest in R&D on new environmentally friendly products or services that will limit the amount of emissions and resources needed during product use?	Positive	Y/N	
9)	Environmental R&D Expenditures	Total amount of environmental R&D costs (without clean up and remediation costs) divided by net sales or revenue in U.S. dollars.	Positive	Number	Median
10)	GMO Free Products	Does the company make a commitment to exclude GMO ingredients from its products or retail offerings?	Positive	Y/N	
11)	Hybrid Vehicles	Is the company developing hybrid vehicles?	Positive	Y/N	
12)	Implementation	Does the company describe the implementation of its environmental product innovation policy?	Positive	Y/N	
13)	Improvements	Does the company set specific objectives to be achieved on environmental product innovation?	Positive	Y/N	
14)	Labelled Wood Percentage	The percentage of labelled wood or forest products (e.g., Forest Stewardship Council (FSC)) from total wood or forest products.	Positive	Number	Median
15)	Liquefied Natural Gas	Does the company develop new products and services linked to liquefied natural gas?	Positive	Y/N	
16)	Monitoring	Does the company describe, claim to have or mention the processes it uses to accomplish environmental product innovation?	Positive	Y/N	
17)	Noise Reduction	Does the company develop new products that are marketed as reducing noise emissions?	Positive	Y/N	
18)	Organic Products	Does the company report or show initiatives to produce or promote organic food or other products?	Positive	Y/N	
19)	Policy	Does the company have an environmental product innovation policy (eco-design, life cycle assessment, dematerialization)?	Positive	Y/N	
20)	Product Impact Controversies	Is the company under the spotlight of the media because of a controversy linked to the environmental impact of its products or services?	Negative	Y/N	
21)	Product Impact Minimization	Does the company reports about take-back procedures and recycling programmes to reduce the potential risks of products entering the environment? OR Does the company report about product features and applications or services that will promote responsible, efficient, cost-effective and environmentally preferable use?	Positive	Y/N	
22)	Renewable Energy Supply	Total energy distributed or produced from renewable energy sources divided by the total energy distributed or produced.	Positive	Number	Median
23)	Renewable/Clean Energy Products	Does the company develop products or technologies for use in the clean, renewable energy (such as wind, solar, hydro and geo-thermal and biomass power)?	Positive	Y/N	
24)	Sustainable Building Products	Does the company develop products and services that improve the energy efficiency of buildings?	Positive	Y/N	
25)	Water Technologies	Does the company develop products or technologies that are used for water treatment, purification or that improve water use efficiency?	Positive	Y/N	

### C. Resource Reduction

1)	Cement Energy Use	Total energy use in gigajoules per tonne of clinker produced.	Negative	Number	Median
2)	Energy Efficiency Initiatives	Does the company report on initiatives to use renewable energy sources? AND Does the company report on initiatives to increase its energy efficiency overall?	Positive	Double Y/N	
3)	Energy Use	Total direct and indirect energy consumption in gigajoules divided by net sales or revenue in U.S. dollars.	Negative	Number	Median
4)	Environmental Resource Impact Controversies	Is the company under the spotlight of the media because of a controversy linked to the environmental impact of its operations on natural resources or local communities?	Negative	Y/N	
5)	Environmental Supply Chain Management	Does the company use environmental criteria (ISO 14000, energy consumption, etc.) in the selection process of its suppliers or sourcing partners? AND Does the company report or show to be ready to end a partnership with a sourcing partner, if environmental criteria are not met?	Positive	Double Y/N	
6)	Green Buildings	Does the company have environmentally friendly or green sites or offices?	Positive	Y/N	
7)	Implementation	Does the company describe the implementation of its resource efficiency policy through a public commitment from a senior management or board member? AND Does the company describe the implementation of its resource efficiency policy through the processes in place?	Positive	Double Y/N	
8)	Improvements	Does the company set specific objectives to be achieved on resource efficiency? AND Does the company comment on the results of previously set objectives?	Positive	Double Y/N	
9)	Land Use	Does the company report on initiatives to reduce the environmental impact on land owned, leased or managed for production activities or extractive use?	Positive	Y/N	
10)	Materials	Total amount of materials used in tonnes divided by net sales or revenue in U.S. dollars.	Negative	Number	Median
11)	Materials Recycled and Reused Ratio	The percentage of recycled materials of the total materials used.	Positive	Number	Median
12)	Monitoring	Does the company monitor its resource efficiency performance?	Positive	Y/N	
13)	Policy	Does the company have a policy for reducing the use of natural resources? AND Does the company have a policy to lessen the environmental impact of its supply chain?	Positive	Double Y/N	
14)	Renewable Energy Use	Total energy generated from primary renewable energy sources divided by total energy.	Positive	Number	Median
15)	Toxic Chemicals	Does the company report on initiatives to reduce, reuse, substitute or phase out toxic chemicals or substances?	Positive	Y/N	
16)	Water Recycling	Does the company report on initiatives to reuse or recycle water? OR Does the company report on initiatives to reduce the amount of water used?	Positive	Y/N	
17)	Water Use	Total water withdrawal in cubic meters divided by net sales or revenue in U.S. dollars.	Negative	Number	Median

**Table A2**  
**Additional Descriptive Statistics**

This table shows summary statistics for additional variables used in the Appendix tables. The ASSET4 Environmental Category z-scores are standardized scores, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measure firms' environmental performance relative to other companies in a given year for the categories Emission Reduction, Product Innovation, and Resource Reduction. The Environmental Category Scores for the categories Emission Reduction, Product Innovation, and Resource Reduction are calculated as the sum of all indicator variables in each category divided by the number of reported items times 100. The Material Environmental Score measures each firm's environmental performance using only those line items from ASSET4 that are material according to the SASB Materiality Map. Appendix Table A1 describes the indicator variables used to calculate the environmental scores. 'Old and Stale' per MSCI is a dummy variable that equals one if any of the following conditions exist: (more than 35% of the board has a tenure greater than 15 years; more than 4 directors have a tenure greater than 15 years; more than 4 directors are over 70 years old; or more than 22% of the board has a tenure greater than 15 years) and (more than 15% of the directors are over 70 years old), and zero otherwise (MSCI ESG Research, 2015). Has One Female Director is a dummy variable that equals to one if the firm has one female director on the board, and zero otherwise. Has Two+ Female Directors is a dummy variable that equals one if the firm has two or more female directors on the board, and zero otherwise. Percent Female Directors is calculated as the number of female directors divided by the number of directors on the board. These data are obtained from Thomson Reuters and BoardEx.

	Full Sample (N=25,143)	Family (N=5,420)			Widely Held (N=18,346)			Other (N=1,377)		
	Mean	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
ASSET4 Environmental Category z-scores										
Emission Reduction	53.9	48.4	43.8	31.2	55.7	60.2	31.7	51.6	52.4	30.2
Product Innovation	50.6	46.0	31.6	30.3	52.1	44.8	31.7	48.2	40.6	28.8
Resource Reduction	53.8	50.0	50.3	31.7	55.0	62.1	31.5	52.0	56.0	29.7
Environmental Category Scores										
Emission Reduction	44.0	40.8	37.5	21.4	45.0	43.3	22.4	44.2	43.5	21.7
Product Innovation	30.5	27.8	16.7	23.2	31.3	23.5	24.4	29.1	23.1	21.1
Resource Reduction	45.1	42.7	42.3	25.2	45.8	46.4	24.8	45.1	45.8	23.2
Material Environmental Score	31.5	29.0	25.0	23.3	32.3	30.0	24.2	29.4	27.4	20.5
'Old and Stale' per MSCI	0.09	0.20	0.00	0.40	0.06	0.00	0.24	0.05	0.00	0.21
Has One Female Director	0.30	0.30	0.00	0.46	0.31	0.00	0.46	0.30	0.00	0.46
Has Two+ Female Directors	0.33	0.36	0.00	0.48	0.32	0.00	0.47	0.33	0.00	0.47
Percent Female Directors	0.11	0.11	0.10	0.12	0.11	0.10	0.11	0.10	0.09	0.11

**Table A3**  
**Robustness Tests: Alternative Environmental Performance Measures**

This table reports regression estimates of alternative environmental performance measures on entrenchment measures and control variables. The dependent variables are the natural logarithm of environmental scores. The ASSET4 Environmental Category z-scores are standardized scores, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measure firms' environmental performance relative to other companies in a given year for the categories Emission Reduction, Product Innovation, and Resource Reduction (Panel A). The Environmental Category Scores for the categories Emission Reduction, Product Innovation, and Resource Reduction are calculated as the sum of all indicator variables in each category divided by the number of reported items times 100. The Material Environmental Score measures each firm's environmental performance using only those line items from ASSET4 that are material according to the SASB Materiality Map (Panel B). Appendix Table A1 describes the indicator variables used to calculate the environmental scores. All other variables are described in Table 1 and Appendix Table A2. The data are from the Thomson Reuters ASSET4 database, Orbis, Datastream, Worldscope, BoardEx, Factset, ADR lists, and CRSP, and are obtained for the years 2004-2015. All variables are winsorized at the 1st and 99th percentiles. All right-hand side variables are lagged by one year. Standard errors are clustered at the country-level and *t*-statistics are reported in parentheses. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: ASSET4 Environmental Category z-Scores

Categories	ASSET4 Environmental Category z-scores					
	Emission Reduction		Product Innovation		Resource Reduction	
	(1)	(2)	(3)	(4)	(5)	(6)
Family	-0.125*** (-3.74)	-0.084*** (-2.95)	-0.095*** (-3.05)	-0.064** (-2.19)	-0.128*** (-3.32)	-0.079** (-2.51)
Other	-0.012 (-0.34)	0.008 (0.23)	0.039 (0.96)	0.067* (1.92)	-0.015 (-0.33)	0.002 (0.04)
Majority Election		0.066** (2.59)		0.055*** (2.94)		0.060** (2.46)
Board Independence		0.201*** (3.26)		0.150** (2.61)		0.229*** (3.79)
Old or Stale Board		-0.056** (-2.36)		-0.063*** (-3.34)		-0.066** (-2.61)
Female Director		0.124*** (4.71)		0.071*** (4.73)		0.157*** (4.99)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs	25,143	19,115	25,143	19,115	25,143	19,115
Adjusted R <sup>2</sup>	0.416	0.442	0.400	0.425	0.361	0.398

Panel B: Environmental Category Scores and Material Environmental Score

Categories	Environmental Category Scores						Material Environmental Scores	
	Emission Reduction		Product Innovation		Resource Reduction		(7)	(8)
	(1)	(2)	(3)	(4)	(5)	(6)		
Family	-0.085*** (-3.33)	-0.056** (-2.50)	-0.098** (-2.63)	-0.060* (-1.72)	-0.114*** (-3.26)	-0.073** (-2.53)	-0.148** (-2.46)	-0.105* (-1.91)
Other	-0.026 (-0.97)	-0.009 (-0.34)	0.041 (0.81)	0.082* (2.01)	-0.027 (-0.66)	-0.010 (-0.23)	0.020 (0.38)	0.044 (0.76)
Majority Election		0.048** (2.58)		0.067*** (2.98)		0.056** (2.47)		0.034 (0.91)
Board Independence		0.141*** (3.01)		0.197*** (2.91)		0.209*** (4.12)		0.190** (2.08)
Old or Stale Board		-0.032* (-2.01)		-0.066*** (-3.16)		-0.048** (-2.07)		-0.080** (-2.64)
Female Director		0.097*** (5.74)		0.100*** (5.35)		0.140*** (5.50)		0.139*** (5.55)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	25,143	19,115	25,136	19,108	25,142	19,114	16,128	11,879
Adjusted R <sup>2</sup>	0.501	0.532	0.464	0.493	0.424	0.457	0.494	0.540

**Table A4**  
**Robustness Test: MSCI Board Entrenchment Measure**

In Table 2 we identify ‘Old or Stale’ boards using cutoffs based on the age and tenure of board members. In this Table we replace this measure with the cutoffs that the MSCI adopts in its ‘Entrenched Board’ measure. We follow MSCI’s definition (MSCI ESG Research, 2015) and measure board entrenchment if any of the following conditions exist: (more than 35% of the board has a tenure greater than 15 years; more than 4 directors have a tenure greater than 15 years; more than 4 directors are over 70 years old; or more than 22% of the board has a tenure greater than 15 years) and (more than 15% of the directors are over 70 years old). The dependent variables are the natural logarithm of environmental scores. The ASSET4 Environmental z-score is a standardized score, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measures firms’ environmental performance relative to other companies in a given year. The Equally-weighted Environmental Score is the average of three category scores (Emission Reduction, Product Innovation, and Resource Reduction). Appendix Table A1 describes the indicator variables used to calculate the environmental scores. All other variables are described in Table 1 and Appendix Table A2. The data are from the Thomson Reuters ASSET4 database, Orbis, Datastream, Worldscope, BoardEx, Factset, ADR lists, and CRSP, and are obtained for the years 2004-2015. All variables are winsorized at the 1st and 99th percentiles. All right-hand side variables are lagged by one year. Standard errors are clustered at the country-level and t-statistics are reported in parentheses. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5%, and 10% level, respectively.

	ASSET4 Environmental z-Scores		Equally-weighted Environmental Scores	
	(1)	(2)	(3)	(4)
Family	-0.095*** (-3.24)	-0.083*** (-2.87)	-0.073*** (-2.94)	-0.063** (-2.59)
Other	0.019 (0.52)	0.039 (1.14)	-0.002 (-0.08)	0.014 (0.51)
‘Old and Stale’ per MSCI	-0.088** (-2.40)	-0.072* (-1.95)	-0.057** (-2.20)	-0.043 (-1.67)
Majority Election		0.068*** (2.83)		0.056*** (2.82)
Board Independence		0.202*** (3.51)		0.169*** (3.63)
Female Director		0.147*** (5.41)		0.118*** (6.37)
Controls	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Obs	19,120	19,115	19,120	19,115
Adjusted R <sup>2</sup>	0.464	0.474	0.547	0.557

**Table A5**  
**Robustness Tests: Alternative Measures of Female Board Representation**

This table reports regression estimates of environmental scores on blockholder-control type, alternative measures of female board representation, and control variables. The dependent variables are the natural logarithm of environmental scores. The ASSET4 Environmental  $z$ -score is a standardized score, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measures firms' environmental performance relative to other companies in a given year. The Equally-weighted Environmental Score is the average of three category scores (Emission Reduction, Product Innovation, and Resource Reduction). Appendix Table A1 describes the indicator variables used to calculate the environmental scores. Female board representation is measured with the following variables: Has One Female Director is a dummy variable that equals to one if the firm has one female director on the board, and zero otherwise. Has Two+ Female Directors is a dummy variable that equals one if the firm has two or more female directors on the board, and zero otherwise. Percent Female Directors is calculated as the number of female directors divided by the number of directors on the board. All other variables are described in Table 1 and Appendix Table A2. The data are from the Thomson Reuters ASSET4 database, Orbis, Datastream, Worldscope, BoardEx, Factset, ADR lists, and CRSP, and are obtained for the years 2004-2015. All variables are winsorized at the 1st and 99th percentiles. All right-hand side variables are lagged by one year. Standard errors are clustered at the country-level and  $t$ -statistics are reported in parentheses. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5%, and 10% level, respectively.

	ASSET4 Environmental $z$ -Scores		Equally-weighted Environmental Scores	
	(1)	(2)	(3)	(4)
Family	-0.107*** (-3.65)	-0.106*** (-3.59)	-0.081*** (-3.26)	-0.080*** (-3.20)
Other	0.022 (0.65)	0.021 (0.60)	-0.000 (-0.00)	-0.001 (-0.04)
Has One Female Director	0.131*** (5.60)		0.103*** (6.36)	
Has Two+ Female Directors	0.198*** (5.25)		0.164*** (6.34)	
Percent Female Directors		0.683*** (5.65)		0.558*** (6.73)
Controls	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Obs	19,120	19,120	19,120	19,120
Adjusted $R^2$	0.471	0.469	0.554	0.553

**Table A6**  
**Do Family-controlled Firms Select Into ‘Dirty’ Industries?**

This table shows summary statistics (Panel A) and regression estimates (Panels B and C) of environmental scores on blockholder-control type and control variables for firms grouped by industries with low and high environmental performance. Industries are classified as ‘dirtier’ based on a SASB materiality map by industry (Panel B) and the median ASSET4 Environmental z-score (Panel C). We map the 11 sub-categories from the SASB sections pertaining to environmental performance (Environment and Business Model and Innovation) and construct our own score as 2 points if classified as “material for more than 50% of industries in the sector”, 1 point if “material for less than 50% of industries” and 0 points if “issue not likely to be material for any industries”. These scores suggest that the sectors that are most material (‘dirtier’) are SIC Divisions Agriculture, Forestry, and Fishing (A), Mining (B), and Services (I). Based on the SASB classification, SIC Divisions Construction (C), Manufacturing (D), Transportation, Communications, Public Utilities (E), Wholesale Trade (F), Retail Trade (G), and Finance, Insurance, and Real Estate (H) are ‘cleaner’ industries. Our second classification is based on the median-sector ASSET4 Environmental z-score. SIC Divisions Agriculture, Forestry, and Fishing (A), Mining (B), Wholesale Trade (F), Retail Trade (G), and Services (I) are classified as ‘dirtier’ sectors because they are below (or equal to) the median of 46.7. SIC Divisions Construction (C), Manufacturing (D), Transportation, Communications, Public Utilities (E), and Finance, Insurance, and Real Estate (H) are ‘cleaner’ sectors. The dependent variables are the natural logarithm of environmental scores. The ASSET4 Environmental z-score is a standardized score, calculated by and obtained from Thomson Reuters ASSET4 ESG, and measures firms’ environmental performance relative to other companies in a given year. The Equally-weighted Environmental Score is the average of three category scores (Emission Reduction, Product Innovation, and Resource Reduction). Appendix Table A1 describes the indicator variables used to calculate the environmental scores. All other variables are described in Table 1. The data are from the Thomson Reuters ASSET4 database, Orbis, Datastream, Worldscope, BoardEx, Factset, ADR lists, and CRSP, and are obtained for the years 2004-2015. All variables are winsorized at the 1st and 99th percentiles. All right-hand side variables are lagged by one year. Standard errors are clustered at the country-level and t-statistics are reported in parentheses. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Summary Statistics

SIC Division	Industry Name / Classification	Obs	% Family-controlled Firms	Average ASSET4 Environmental z-Scores
A	Agriculture, Forestry, Fishing	140	41.4%	40.3
B	Mining	2,524	15.0%	38.4
C	Construction	1,106	25.5%	53.0
D	Manufacturing	9,093	23.5%	65.6
E	Transportation, Communications, Public Utilities	3,633	19.4%	56.4
F	Wholesale Trade	606	18.3%	46.7
G	Retail Trade	1,506	36.9%	45.0
H	Finance, Insurance, Real Estate	4,154	14.5%	47.3
I	Services	2,381	24.9%	28.6
A, B, I	Industries ‘Dirtier’ Based on SASB	5,045	20.4%	39.0
C, D, E, F, G, H	Industries ‘Cleaner’ Based on SASB	20,098	21.8%	57.4
A, B, F, G, I	Industries ‘Dirtier’ Based on ASSET4 z-scores	7,157	23.7%	37.3
C, D, E, H	Industries ‘Cleaner’ Based on ASSET4 z-scores	17, 986	20.7%	58.7

Panel B: Regressions Based on Dirty/Clean SASB Industries

SIC Divisions	ASSET4 Environmental z-Scores		Equally-weighted Environmental Scores	
	'Dirtier'	'Cleaner'	'Dirtier'	'Cleaner'
	A, B, and I	C, D, E, F, G, and H	A, B, and I	C, D, E, F, G, and H
	(1)	(2)	(3)	(4)
Family	-0.109** (-2.04)	-0.127*** (-3.08)	-0.079*** (-2.08)	-0.094** (-2.76)
Other	0.078 (1.16)	0.019 (0.50)	0.057 (1.09)	-0.004 (-0.13)
Controls	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Obs	5,045	20,098	5,045	20,098
Adjusted R <sup>2</sup>	0.526	0.398	0.582	0.485
<i>p</i> -value of Difference in Family Coefficients Between Industry Groups		(0.79)		(0.76)

Panel C: Regressions Based on Dirty/Clean Industry-average ASSET4 Environmental z-scores

SIC Divisions	ASSET4 Environmental z-Scores		Equally-weighted Environmental Scores	
	'Dirtier'	'Cleaner'	'Dirtier'	'Cleaner'
	A, B, F, G, and I	C, D, E, and H	A, B, F, G, and I	C, D, E, and H
	(1)	(2)	(3)	(4)
Family	-0.111*** (-2.99)	-0.133*** (-2.89)	-0.083*** (-3.09)	-0.098** (-2.57)
Other	0.056 (0.85)	0.019 (0.48)	0.028 (0.56)	-0.002 (-0.05)
Controls	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Obs	7,157	17,986	7,157	17,986
Adjusted R <sup>2</sup>	0.489	0.394	0.552	0.483
<i>p</i> -value of Difference in Family Coefficients Between Industry Groups		(0.69)		(0.74)

**Table A7**  
**Quasi-exogenous Shocks to Majority Voting and Female Board Representation**

This table reports summary statistics for quasi-exogenous shocks to majority director election rules and female board representation.

Panel A: Quasi-exogenous Shocks to Majority Director Election Rules

Country	Event Years	Percentage of Firms with a Majority Director Election Rule	
		Change Over One Year	Change Over Two Years
Australia	2008	From 12% to 35%	From 12% to 44%
Austria	2007	24% to 53%	24% to 68%
Belgium	2007	13% to 42%	13% to 46%
Canada	2005/2006	22% to 37%	22% to 51%
Denmark	2008	35% to 70%	35% to 83%
Ireland	2009	29% to 53%	29% to 56%
Italy	2007	27% to 62%	27% to 67%
Spain	2007	14% to 29%	14% to 43%
Switzerland	2007	43% to 64%	43% to 76%
UK	2008	14% to 35%	14% to 51%

Panel B: Quasi-exogenous Shocks to Female Board Representation

Country	Event Years	Percentage of Firms with at Least One Woman on the Board of Directors	
		Change Over One Year	Change Over Two Years
Australia	2011	From 40% to 50%	From 40% to 55%
Austria	2011	63% to 73%	63% to 88%
Germany	2011	70% to 80%	70% to 91%
Greece	2010	56% to 71%	56% to 75%
Italy	2011	59% to 73%	59% to 83%
Malaysia	2012	50% to 60%	50% to 74%
Portugal	2009	31% to 46%	31% to 58%
Switzerland	2008	44% to 53%	44% to 56%
UK	2011	57% to 64%	57% to 76%

## Panel C: Sources of Quasi-exogenous Shocks

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### *Majority Director Election*

Canada (2005/2006), Canadian Coalition for Good Governance push to get Canadian firms to adopt majority voting in 2005/2006 (Doidge et al., 2018).

UK (2006), Companies Act 2006 widely introduced appointment of board members by ordinary resolution.

### *Female Board Representation*

UK (2011), Lord Davies, a Labour government minister, published a report telling FTSE 100 companies they should double the number of women directors by 2015. This report was met with enthusiastic support publicly and from a number of shareholder organization. For example, one of the UK's largest shareholder organizations, the Association of British Insurers, disclosed that it would start monitoring the number of women on FTSE boards. No formal rule on female board representation introduced.

Australia (2011), ASX Corporate Governance Council updated its Corporate Governance Principals and Recommendations for diversity in Australia, the Australian Institution of Company Directors pushed for an increase in the number of women on the board. No formal rule on female board representation introduced.

Austria (2011), A gender quota (25%) for supervisory boards of companies in which the state has a majority stake introduced in 2011.

Germany (2011), A group of 18 multinational German firms publicly commit to promote women into leadership positions (May 2010). A bipartisan parliamentary group issues *Berliner Erklarung* with the goal of introducing a 30% female board representation quota (December 2011).

Greece (2010), Start of the *National Programme for Substantive Gender Equality* (2010-2013).

Italy (2011), A gender quota (33%) for supervisory boards of companies introduced in 2011.

Malaysia (2012), A gender quota (30%) for supervisory boards introduced in 2011.

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