# Insider Entrenchment and Corporate Sustainability Around the World

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**Abstract**

We break up aggregate corporate sustainability (ESG) and test the impact of firms' corporate governance structures (G) on firms' environmental performance (E). Using a global sample, we find that family-controlled firms, where outsiders have limited influence due to clear-cut insider entrenchment, have 6-13% lower environmental performance. Entrenchment-reducing governance structures positively impact environmental performance. In both widely-held and family-controlled firms, the introduction of majority voting requirements for corporate boards and female board representation are associated with environmental performance that is 6-10% and 12-16% higher, respectively. We conclude that corporate governance is fundamental for the environmental component of sustainability—that is, G drives E.

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

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## 1. Introduction

How difficult is it for outside investors to improve environmental sustainability in the firms they hold? In theory, all that is required is a significant ownership stake because the control rights obtained with ownership provide influence over corporate actions, including investments to improve environmental performance. While this may be true in some settings, it is naïve to claim that higher ownership stakes automatically provide greater control rights. Control rights are meaningful only when there is effective governance. When insiders have different views on the appropriate level of environmental performance than outsiders, corporate governance will be fundamental for improving environmental sustainability.

Corporate sustainability tends to be viewed by practitioners and academics as a composite measure, labeled as ESG (Environmental, Social, and Governance). In this paper, we break up aggregate ESG and specifically quantify the impact of firms' corporate governance structures (G) on firms' environmental performance (E). We test for this impact of G on E using a sample of 3,531 non-US firms from 41 countries over the 2004 to 2015 period.

The international corporate governance literature has long shown that in many settings around the world outsiders are unable to use their control rights, leaving firms controlled by entrenched insiders. Outside investors have the weakest control rights when insiders are firmly entrenched via blockholder control. In these firms, formal governance structures are unlikely to yield much actual power to outside investors. In turn, outsiders have the most meaningful control rights when firms are widely held and strong corporate governance structures are in place. Our international sample provides both cross-country and within-country variation in meaningful control rights and environmental performance measures.

How might one expect G to impact E? The theoretical framework of Bénabou and Tirole (2010) provides some guidance. 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. Bénabou 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. Under these strong assumptions, actions taken by outside investors to reduce insider entrenchment will lower firms' environmental performance.

In all other cases, insider entrenchment is associated with *lower* levels of environmental performance because of insider short-termism. Insiders are subject to short-termism due to compensation and career concerns (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). Shifting control from insiders to outsiders via improved governance will lessen short-termism and improve environmental performance. This positive impact of governance on environmental performance will be even greater when outsiders place a higher value on the non-pecuniary benefits from environmental investments than entrenched insiders.

For our empirical tests, we separate firms into three categories based on control rights: firms controlled by a family, firms controlled by non-family blockholders, and widely-held firms without a controlling blockholder. The international corporate governance literature has

specifically identified family control as the strongest measure of insider entrenchment. Family control is also the most prominent form of blockholding in our global sample: the average percentage of family firms across countries is 22% and the average percentage of widely-held firms is 73%.

For each category of firm control, we identify four governance structures that plausibly increase the power of outside investors, potentially reducing insider entrenchment. We first focus on a majority voting provision. This governance structure gives investors significant power over board appointments by requiring that a board member receives more than 50% of the votes cast (compared to a requirement to receive a plurality of votes cast). Investors are increasingly pushing for this voting provision (e.g., Cunat, Gine, and Guadelupe, 2012; Ertimur, Ferri, and Oesch, 2013). Next, we focus on board independence, measuring the percentage of independent directors on the board. A lack of independence reflects greater insider entrenchment. Third, we classify a board as entrenched when a significant proportion of its members are old (by age), or stale (by tenure), or both. We expect outside investors' power to be weaker when they face an entrenched board. Finally, we identify whether a board is entirely male. Our conjecture is that insiders are more entrenched when the board is all 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 skills.

We first test whether family control is associated with firms' environmental performance. For this and all other tests, we use data from Thomson Reuters ASSET4 to construct firm-level environmental performance measures. 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-controlled firms have a 6% to 13% lower environmental performance (depending on how environmental performance is measured and the governance structures included in the model).

We next assess whether better governance structures lessen this negative impact of family control on environmental performance. Our results highlight the difficulties outsiders face in improving environmental performance at family firms. Two traditional measures of strong governance, having greater board independence and moving away from an old or stale board, have no significant impact on environmental performance in family firms. More fruitful for driving changes is getting family firms to adopt majority voting provisions, as this is associated with 6% to 9% higher environmental performance. Notably, a non-traditional governance measure, having at least one female board member, improves environmental performance of family firms by 12% to 13%.

Turning to widely-held firms, which by definition have a lower baseline level of insider entrenchment, we find that all four entrenchment-reducing governance structures positively impact environmental performance in a statistically significant and economically meaningful way. 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. Adding one independent director to the board is associated with a 2% increase in environmental performance. When a board of a widely-held firm ceases to be 'old or stale', this is associated with 6% to 9% better environmental performance. Finally, when having at least one female board member, environmental performance increases by 13% to 16%.

Our tests thus far show that stronger G has a positive impact on E. However, a natural concern with a causal interpretation is that the entrenchment-reducing governance measures are potentially endogenous. 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 strength of governance and a firm's environmental performance. This is a well-noted concern, for example, when governance 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 and confirm that reducing entrenchment via changes in specific governance structures increases firms' subsequent environmental performance. Third, we identify quasi-exogenous country-specific shocks to the governance structures 'adopt majority voting' and 'add a female director.' These shocks allow us to estimate difference-in-differences models, comparing the subsequent environmental performance of firms affected by the treatment to otherwise similar unaffected firms. In these sub-samples, the results confirm our previous findings. Taken together, these sets of tests support a causal interpretation that reducing entrenchment by expanding outsiders' control rights improves firms' subsequent environmental performance.

Finally, we test whether the negative environmental performance of family firms is moderated when families place a greater premium on non-pecuniary environmental benefits, as Bénabou 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 between countries where prevailing social norms towards the environment are strong and countries where they are weak. Consistent with controlling 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 corporate governance is indeed fundamental for environmental sustainability—that is, G drives E. 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, 2017; 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, 2019). In particular, Dyck et al. (2019) show that environmental performance depends upon institutional investor ownership stakes and the social norms institutional investors face. In contrast, this paper's findings highlight the centrality of governance for investors' ability to improve environmental sustainability.

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 structures that outsiders can use to improve G. We complement these papers by bringing to the forefront and quantifying the impact of specific actionable governance structures 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 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 structures for firms' environmental performance. Our paper also contributes to the extensive literature on the financial costs and benefits generated when control is held by insiders, and families more specifically (e.g., Morck, Wolfenzon, and Yeung, 2005; Bennedsen, Nielsen, Perez-Gonzalez, and Wolfenzon, 2007; Lins, Volpin, and Wagner, 2013), which we expand upon by considering environmental performance.

Finally, our findings have practical importance for investors, analysts, and academics. Increasingly, efforts to improve environmental sustainability focus on materiality—that is, identifying which specific reporting items matter for both environmental and financial performance (e.g., Khan, Serafeim, and Yoon, 2016; Christensen, Hail, and Leuz, 2018). Our paper shows that an omitted variable in tests of the impact of stand-alone measures of environmental performance is governance. It could be that a firm's performance change comes from (embedded) G rather than from E. To fully understand materiality, governance must be included in any analysis.

## 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 Bénabou 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), Bénabou 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 flows 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.[1]

Bénabou 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

[1] 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).

corporate governance structures 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 Bénabou and Tirole (2010).

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 Bénabou 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 Bénabou 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 provides 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.[2]

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 A1).

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).[3] 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

[2] While data providers differ in their methodologies for measuring environmental performance, Dyck et al. (2019) 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.

[3] 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.

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')[4] and construct an equally-weighted performance measure. That is, we sum up the indicators variables in each of the three environmental areas and take an average across the areas to produce equally-weighted 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 without a controlling blockholder, and firms controlled by non-family blockholders.[5]

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

- 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% (Lins, Volpin, and Wagner, 2013).

[4] 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.

[5] 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.

- 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 our family control classification both backwards and forwards in time if ASSET4 indicates that the ownership of a firm's largest blockholder is at least 20% and is within 5% of the surrounding years during which a firm is known to be family controlled.

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 non-family blockholder controlled.[6]

Next, we examine specific governance structures that potentially reduce insider entrenchment and have been the focus of much of the governance literature. We focus on measures

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

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 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 shareholders' power over director selection (e.g., 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 that predicts 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 and age. Long tenure provides one indicator of an individual board member's 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). Old age provides another indicator of entrenchment. 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. Among Norwegian firms, 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. [7]

Finally, we obtain financial statement and stock market valuation data, institutional holdings, and US 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.

*3.2 Descriptive Statistics*

In Panel A of Table 1 we report summary statistics of firms' environmental performance, specific governance structures, and other characteristics, grouping firms by whether they are family controlled, widely held, or controlled by another (non-family) blockholder.

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 structures 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%.

[7] 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).

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 structures across blockholder groups, family-controlled firms have weaker governance when considering 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. To facilitate comparisons across countries, we report summary statistics for the cross-section in year 2012. 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.[8]

Regarding control type, in year 2012, 31% of the sample firms are family controlled, 58% are widely held, and 11% are controlled by other blockholders. Average 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. 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.

[8] 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).

## 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 structures to reduce entrenchment, and firms' environmental performance using the following specification:

$$Log\left(Score_{it}\right) = \alpha + \beta' X_{it-1} + \gamma' Y_{it-1} + \Lambda + \varepsilon_{it}, \quad (1)$$

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 Λ are year, country, and industry fixed effects.[9] 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 governance structure measures to reduce entrenchment 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.[10] 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

[9] 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.

[10] Our main results are unaffected if we use the raw scores rather than the log scores.

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. (2019) 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.

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.

Columns 2 through 5 of Table 2 allow us to understand whether governance structures that can reduce insider entrenchment impact a firms' environmental performance. For each of these entrenchment-reducing measures, we find significantly higher environmental performance ($p$-values < 1%). For instance, across Panels A and B, 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%.[11] Column 4 shows that moving from an

[11] 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.

'Old or Stale' board to one that is not would increase environmental performance by 5% to 8%. Finally, going away from an all-male board by introducing at least one female director would increase environmental performance by 12% to 16%, 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' environmental performance (or whether one measure dominates). We obtain similar significance levels and coefficients for each specific entrenchment-reducing governance structure, with only slightly attenuated magnitudes. This indicates that each of the governance structures 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. (2019), 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 firms' environmental performance and to other cutoff choices that could be made when constructing two of our independent variables—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. 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.[12] 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 and 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.[13] 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

[12] Appendix Table A2 shows descriptive statistics.
[13] 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.

(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.'

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 also 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 Governance Structures That Reduce Entrenchment Affect Family-controlled Firms' Environmental Performance?*

Our next tests examine whether governance structures 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 structures seem to be an effective channel to improve environmental performance in family-controlled firms. To assess this, we estimate the following regression specification:

$$Log\left(Score_{it}\right) = \alpha + \beta_1 Family_{it-1} + \beta_2 Gov_{it-1} + \beta_3 Family_{it-1} \times Gov_{it-1} + \gamma' Y_{it-1} + \Lambda + \varepsilon_{it}, \qquad (2)$$

where the dependent variable is the log of one of the environmental scores of firm *i* in year *t,* $Family_{it-1}$ is an indicator variable equal to one if the firm is family controlled, and zero otherwise, $Gov_{it-1}$ are measures of specific entrenchment-reducing governance structures, $Y_{it-1}$ are a set of firm-level controls, and $\Lambda$ are year, country, and industry fixed effects. The overall effect of a particular governance structure 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 structure 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 structures to reduce entrenchment, increasing board independence and making a board less 'old or stale' have no significant impact on environmental performance in family-controlled firms. Two governance structures, however, do impact environmental performance: adopting majority voting and adding a woman to the board. In terms of economic significance, across Panels A and B, 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 6% 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 structures 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 the 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.

As shown in the bottom of Panel A, the summary statistics suggest no difference in the likelihood of having family ownership in dirty versus clean industries. Further, repeating the empirical specification of Table 2 in Panels B and C, in both dirty and clean industries we find a similar negative impact of family control on environmental performance. 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, and as before, also include time varying observable firm characteristics that could also drive environmental performance.

For these firm fixed effects 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). Such a within-firm specification is relatively demanding in terms of model power as entrenchment-reducing governance structures are generally sticky over time.

The tests are shown in Table 4 and confirm our prior results—stronger (lagged) specific governance structures 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 structures are somewhat attenuated but still sizable.

*5.3 Causality and Quasi-exogenous Shocks*

To further address causality, we seek exogenous shocks to governance structures 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 structures; and, 'soft' regulatory mandates or investor group pressures that induce a substantial number of firms to change governance structures. 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 structures 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 structures.

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% (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 identification approach 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 of Table 5 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% 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 and successful push to increase female board representation (that was not a quota). In 2011 Lord Davies published his Women on Boards review that made ten recommendations regarding disclosure and policies on diversity, including a recommendation that FTSE 100 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.[14]

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 5% to 8% higher environmental performance.

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. 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 already at least one 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% to 9%. Columns 5 and 6 repeat the analysis for this broader sample, while excluding UK, with similar results.

[14] 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.

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

We conclude our analysis by performing additional tests for family-controlled firms. The theoretical framework introduced earlier features non-pecuniary benefits. In this section, we seek to understand whether the negative impact of family control can be mitigated by factors that are unrelated to decreasing insider entrenchment.

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 families place a greater premium on non-pecuniary benefits associated with their firms' environmental performance. A plausible measure of the premium families place on non-pecuniary environmental benefits is provided by country-level measures of environmental performance (Dyck et al., 2019).

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 6. The odd columns focus on the blockholder status of firms and the even columns include in addition all of the entrenchment-reducing governance structures.

We find that the negative effect of family control 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 control 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 control. As shown in columns 5 through 8, the negative impact of family control is again concentrated in countries with below-median EPI scores, with higher negative coefficients. We note also that family control does have a significant negative effect (albeit lower) even in high EPI score countries.

## 7. Discussion and Conclusion

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 structures that reduce entrenchment are fundamental to achieving sustainability objectives.

Further, we provide quantitative estimates of the benefits to specific actionable governance changes investors could push for that lead to improved sustainability, 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.

Our results also speak to the broader debate about the importance of short-termism. 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 structures that increase outside investors' power lead to subsequent improvements in environmental performance. We also find suggestive evidence that having a controlling party who derives non-pecuniary benefits from better 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.

The strongest result in our paper is that environmental performance improves significantly when a woman is elected to the board of directors. A plausible and prominent interpretation for this finding is that adding female board members is a powerful entrenchment-reducing mechanism. As discussed earlier, female director characteristics differ from existing male board members along several dimensions, including stronger sustainability experience. There are alternative interpretations as well. A substantial behavioral economics literature, for example, 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 (e.g., Andreoni and Vesterlund, 2001; Adams and Funk, 2012; Thaler, 2016; Cronqvist and Yu, 2017). We conjecture that both mechanisms are in play. A ripe area for research is to disentangle these mechanisms to explain the impact of female board involvement on environmental performance in a global setting. This will be feasible when other countries require the same disclosure regarding director skill sets as is available in the US.

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

This table shows descriptive statistics of environmental scores, control type, governance structures, and other key variables. Panel A shows summary statistics for the full sample and three sub-samples based on control rights: firms controlled by a family, widely-held firms, and firms controlled by non-family blockholders (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 rules 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 non-family blockholders (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 US 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 and the fraction of firms by control type for the year 2012.

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 | | Fraction of Firms by Control Type | | | Obs | |
|---|---|---|---|---|---|---|---|
| | ASSET4 *z*-Score | Equally-weighted Score | Family | Widely Held | Other | Year 2012 | Full Sample |
| Australia | 33.0 | 28.1 | 0.13 | 0.84 | 0.03 | 280 | 2,217 |
| Austria | 61.4 | 47.5 | 0.31 | 0.56 | 0.13 | 16 | 195 |
| Belgium | 57.2 | 44.3 | 0.38 | 0.58 | 0.04 | 24 | 262 |
| Brazil | 56.5 | 43.9 | 0.38 | 0.39 | 0.24 | 80 | 532 |
| Canada | 39.9 | 32.4 | 0.18 | 0.80 | 0.02 | 235 | 2,088 |
| Chile | 41.2 | 33.7 | 0.41 | 0.36 | 0.23 | 22 | 146 |
| China | 31.3 | 26.6 | 0.28 | 0.55 | 0.17 | 123 | 813 |
| Colombia | 37.6 | 32.1 | 0.18 | 0.45 | 0.36 | 11 | 64 |
| Denmark | 68.3 | 50.7 | 0.28 | 0.72 | 0.00 | 25 | 265 |
| Egypt | 18.3 | 18.1 | 0.36 | 0.45 | 0.18 | 11 | 65 |
| Finland | 81.4 | 62.1 | 0.16 | 0.76 | 0.08 | 25 | 291 |
| France | 81.7 | 63.1 | 0.50 | 0.47 | 0.03 | 90 | 963 |
| Germany | 68.6 | 54.7 | 0.30 | 0.66 | 0.04 | 76 | 859 |
| Greece | 56.0 | 44.9 | 0.47 | 0.53 | 0.00 | 17 | 214 |
| Hong Kong | 36.6 | 30.5 | 0.45 | 0.36 | 0.19 | 106 | 972 |
| India | 50.2 | 42.3 | 0.33 | 0.50 | 0.18 | 80 | 530 |
| Indonesia | 46.3 | 36.6 | 0.29 | 0.39 | 0.32 | 28 | 197 |
| Ireland | 49.2 | 41.6 | 0.13 | 0.87 | 0.00 | 15 | 159 |
| Israel | 42.1 | 33.7 | 0.53 | 0.47 | 0.00 | 15 | 104 |
| Italy | 60.8 | 50.1 | 0.27 | 0.67 | 0.07 | 45 | 496 |
| Japan | 63.4 | 51.6 | 0.06 | 0.94 | 0.00 | 384 | 4,345 |
| Luxembourg | 56.0 | 41.3 | 0.63 | 0.25 | 0.13 | 8 | 66 |
| Malaysia | 41.5 | 33.8 | 0.36 | 0.55 | 0.10 | 42 | 279 |
| Mexico | 45.4 | 35.8 | 0.77 | 0.19 | 0.04 | 26 | 200 |
| Netherlands | 66.7 | 51.7 | 0.19 | 0.81 | 0.00 | 36 | 381 |
| New Zealand | 44.2 | 34.2 | 0.10 | 0.70 | 0.20 | 10 | 137 |
| Norway | 68.1 | 52.0 | 0.18 | 0.76 | 0.06 | 17 | 196 |
| Philippines | 43.9 | 34.9 | 0.11 | 0.74 | 0.16 | 19 | 126 |
| Poland | 35.0 | 30.3 | 0.21 | 0.42 | 0.38 | 24 | 159 |
| Portugal | 73.4 | 57.5 | 0.58 | 0.33 | 0.08 | 12 | 132 |
| Russia | 45.7 | 35.9 | 0.55 | 0.21 | 0.24 | 33 | 250 |
| Singapore | 41.9 | 35.3 | 0.11 | 0.68 | 0.20 | 44 | 451 |
| South Africa | 49.9 | 39.2 | 0.12 | 0.80 | 0.08 | 120 | 586 |
| South Korea | 60.8 | 48.1 | 0.34 | 0.63 | 0.03 | 99 | 582 |
| Spain | 75.7 | 57.4 | 0.30 | 0.65 | 0.05 | 43 | 502 |
| Sweden | 75.3 | 57.1 | 0.42 | 0.53 | 0.04 | 45 | 552 |
| Switzerland | 57.6 | 45.3 | 0.32 | 0.67 | 0.02 | 60 | 612 |
| Taiwan | 46.9 | 37.5 | 0.06 | 0.94 | 0.00 | 126 | 724 |
| Thailand | 53.4 | 42.8 | 0.21 | 0.63 | 0.17 | 24 | 152 |
| Turkey | 57.9 | 44.7 | 0.54 | 0.29 | 0.17 | 24 | 158 |
| UK | 60.8 | 46.0 | 0.18 | 0.82 | 0.00 | 280 | 3,121 |
| Overall | 53.2 | 42.2 | 0.31 | 0.58 | 0.11 | 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$^{***}$ | -0.124$^{***}$ | -0.092$^{***}$ | -0.092$^{***}$ | -0.105$^{***}$ | -0.080$^{***}$ |
| | (-3.52) | (-3.39) | (-3.00) | (-3.13) | (-3.60) | (-2.74) |
| Other $_{t-1}$ | 0.014 | 0.013 | 0.041 | 0.019 | 0.023 | 0.039 |
| | (0.40) | (0.37) | (1.15) | (0.51) | (0.66) | (1.15) |
| Majority Election $_{t-1}$ | | 0.100$^{***}$ | | | | 0.067$^{***}$ |
| | | (4.12) | | | | (2.84) |
| Board Independence $_{t-1}$ | | | 0.243$^{***}$ | | | 0.212$^{***}$ |
| | | | (3.93) | | | (3.74) |
| Old or Stale Board $_{t-1}$ | | | | -0.078$^{***}$ | | -0.068$^{***}$ |
| | | | | (-3.32) | | (-2.93) |
| Female Director $_{t-1}$ | | | | | 0.155$^{***}$ | 0.145$^{***}$ |
| | | | | | (5.70) | (5.36) |
| Log (Total Assets) $_{t-1}$ | 0.242$^{***}$ | 0.238$^{***}$ | 0.227$^{***}$ | 0.232$^{***}$ | 0.219$^{***}$ | 0.214$^{***}$ |
| | (13.24) | (13.10) | (10.46) | (10.53) | (10.78) | (10.62) |
| Cash $_{t-1}$ | -0.120 | -0.124 | -0.034 | -0.032 | -0.030 | -0.035 |
| | (-1.09) | (-1.15) | (-0.52) | (-0.47) | (-0.45) | (-0.54) |
| Tangibility $_{t-1}$ | 0.174$^{**}$ | 0.179$^{**}$ | 0.226$^{***}$ | 0.229$^{***}$ | 0.225$^{***}$ | 0.226$^{***}$ |
| | (2.45) | (2.59) | (3.54) | (3.56) | (3.78) | (3.70) |
| Leverage $_{t-1}$ | -0.141 | -0.138 | -0.225$^{***}$ | -0.229$^{***}$ | -0.214$^{***}$ | -0.213$^{***}$ |
| | (-1.28) | (-1.25) | (-3.18) | (-3.32) | (-3.13) | (-3.08) |
| Profitability $_{t-1}$ | 0.304$^{**}$ | 0.312$^{***}$ | 0.268$^{**}$ | 0.267$^{**}$ | 0.236$^{**}$ | 0.244$^{**}$ |
| | (2.69) | (2.75) | (2.50) | (2.47) | (2.24) | (2.31) |
| Institutional Ownership $_{t-1}$ | 0.211$^{**}$ | 0.195$^{**}$ | 0.118 | 0.184$^{*}$ | 0.156 | 0.100 |
| | (2.32) | (2.06) | (1.19) | (1.86) | (1.65) | (1.03) |
| Cross-list $_{t-1}$ | -0.049 | -0.059 | -0.067 | -0.058 | -0.054 | -0.067$^{*}$ |
| | (-1.37) | (-1.65) | (-1.68) | (-1.56) | (-1.46) | (-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*** | -0.094*** | -0.069** | -0.071*** | -0.079*** | -0.061** |
| | (-3.28) | (-3.16) | (-2.67) | (-2.86) | (-3.21) | (-2.49) |
| Other $_{t-1}$ | -0.009 | -0.010 | 0.015 | -0.003 | 0.001 | 0.014 |
| | (-0.32) | (-0.34) | (0.55) | (-0.09) | (0.02) | (0.51) |
| Majority Election $_{t-1}$ | | 0.082*** | | | | 0.055*** |
| | | (4.00) | | | | (2.83) |
| Board Independence $_{t-1}$ | | | 0.200*** | | | 0.175*** |
| | | | (4.05) | | | (3.84) |
| Old or Stale Board $_{t-1}$ | | | | -0.052*** | | -0.043** |
| | | | | (-2.84) | | (-2.42) |
| Female Director $_{t-1}$ | | | | | 0.124*** | 0.116*** |
| | | | | | (6.73) | (6.31) |
| Log (Total Assets) $_{t-1}$ | 0.210*** | 0.207*** | 0.197*** | 0.201*** | 0.191*** | 0.186*** |
| | (14.09) | (14.12) | (11.92) | (12.06) | (12.17) | (11.94) |
| Cash $_{t-1}$ | -0.035 | -0.039 | 0.046 | 0.048 | 0.050 | 0.045 |
| | (-0.37) | (-0.42) | (0.75) | (0.77) | (0.80) | (0.75) |
| Tangibility $_{t-1}$ | 0.165*** | 0.169*** | 0.200*** | 0.203*** | 0.200*** | 0.200*** |
| | (3.29) | (3.46) | (4.35) | (4.40) | (4.70) | (4.52) |
| Leverage $_{t-1}$ | -0.131 | -0.129 | -0.186*** | -0.189*** | -0.178*** | -0.177*** |
| | (-1.61) | (-1.57) | (-3.58) | (-3.73) | (-3.51) | (-3.45) |
| Profitability $_{t-1}$ | 0.256** | 0.262*** | 0.236** | 0.235** | 0.211** | 0.216** |
| | (2.64) | (2.72) | (2.49) | (2.45) | (2.27) | (2.35) |
| Institutional Ownership $_{t-1}$ | 0.137** | 0.123* | 0.063 | 0.116 | 0.095 | 0.047 |
| | (2.08) | (1.78) | (0.85) | (1.57) | (1.33) | (0.65) |
| Cross-list $_{t-1}$ | -0.015 | -0.023 | -0.022 | -0.015 | -0.012 | -0.023 |
| | (-0.62) | (-0.95) | (-0.80) | (-0.57) | (-0.46) | (-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 Governance Structures That Reduce Entrenchment Affect Family-controlled Firms' Environmental Performance?**

This table shows overall effects of various governance structures 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$^{*}$ | 0.098 | -0.056 | 0.128$^{***}$ |
| | (0.065) | (0.263) | (0.352) | (0.001) |
| Widely Held/Other | 0.104$^{***}$ | 0.275$^{***}$ | -0.091$^{***}$ | 0.163$^{***}$ |
| | (0.000) | (0.000) | (0.003) | (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 $R^2$ | 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$^{*}$ | 0.085 | -0.039 | 0.115$^{***}$ |
| | (0.076) | (0.296) | (0.376) | (0.000) |
| Widely Held/Other | 0.087$^{***}$ | 0.229$^{***}$ | -0.058$^{***}$ | 0.127$^{***}$ |
| | (0.000) | (0.000) | (0.006) | (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 $R^2$ | 0.519 | 0.549 | 0.547 | 0.553 |

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

This table reports firm fixed effects regression estimates of environmental scores on governance structures 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 governance structure measure (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 nor 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**
**Governance Structures 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. 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 FTSE 100 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 × Treated | 0.284** | 0.231** | 0.103*** | 0.079*** | 0.076* | 0.053* |
| | (2.16) | (2.41) | (2.69) | (2.77) | (1.85) | (1.76) |
| Log (Total Assets) | 0.006 | 0.051 | 0.088 | 0.077* | 0.095 | 0.076 |
| | (0.04) | (0.72) | (1.62) | (1.81) | (1.52) | (1.55) |
| Cash | -0.078 | 0.048 | -0.308 | -0.198 | -0.251 | -0.156 |
| | (-0.11) | (0.10) | (-1.48) | (-1.32) | (-1.22) | (-1.01) |
| Tangibility | 0.615 | 0.435 | -0.172 | -0.148 | -0.274 | -0.241 |
| | (0.83) | (0.82) | (-0.79) | (-0.92) | (-1.10) | (-1.29) |
| Leverage | -0.704 | -0.666* | -0.006 | 0.011 | 0.133 | 0.138 |
| | (-1.59) | (-1.93) | (-0.03) | (0.08) | (0.61) | (0.88) |
| Profitability | 0.423 | 0.315 | 0.233 | 0.138 | 0.227 | 0.135 |
| | (0.72) | (0.83) | (1.33) | (1.11) | (1.29) | (1.06) |
| Institutional Ownership | 0.170 | 0.425 | 0.042 | 0.118 | 0.009 | 0.015 |
| | (0.41) | (1.46) | (0.21) | (0.80) | (0.04) | (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* | 0.048** | 0.086*** | 0.050** | 0.096** | 0.055* |
| | (1.88) | (2.30) | (4.10) | (3.10) | (2.77) | (2.02) |
| Log (Total Assets) | 0.016 | 0.014 | 0.020 | 0.014 | 0.031 | 0.017 |
| | (0.25) | (0.38) | (0.64) | (0.72) | (0.70) | (0.59) |
| Cash | -0.079 | -0.033 | -0.106** | -0.022 | -0.095 | -0.003 |
| | (-0.70) | (-0.43) | (-2.55) | (-0.61) | (-1.48) | (-0.05) |
| Tangibility | 0.281 | 0.223 | -0.087 | 0.018 | -0.143* | -0.008 |
| | (0.77) | (1.21) | (-1.37) | (0.54) | (-2.16) | (-0.19) |
| Leverage | 0.049 | -0.040 | -0.045 | -0.081** | -0.071* | -0.092* |
| | (0.26) | (-0.37) | (-1.19) | (-2.58) | (-2.00) | (-2.07) |
| Profitability | 0.120 | 0.039 | 0.016 | 0.003 | -0.004 | -0.005 |
| | (0.59) | (0.35) | (0.17) | (0.05) | (-0.03) | (-0.06) |
| Institutional Ownership | 0.199 | 0.084 | 0.081 | 0.099** | 0.095 | 0.141*** |
| | (1.07) | (0.62) | (0.91) | (3.20) | (0.72) | (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 $R^2$ | 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, Insider 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 | -0.061 | -0.168$^{***}$ | -0.102$^{***}$ | -0.089$^{**}$ | -0.072$^{**}$ | -0.194$^{***}$ | -0.126$^{**}$ |
| | (-1.38) | (-1.57) | (-4.51) | (-3.39) | (-2.89) | (-2.74) | (-3.21) | (-2.48) |
| Other | 0.032 | 0.020 | -0.002 | 0.046 | 0.114$^{**}$ | 0.103$^{*}$ | -0.033 | 0.004 |
| | (0.68) | (0.39) | (-0.04) | (1.09) | (2.16) | (2.05) | (-0.62) | (0.07) |
| Majority Election | | 0.055 | | 0.075$^{**}$ | | 0.069$^{*}$ | | 0.072$^{**}$ |
| | | (1.42) | | (2.64) | | (1.81) | | (2.48) |
| Board Independence | | 0.135 | | 0.288$^{***}$ | | 0.181$^{***}$ | | 0.217$^{**}$ |
| | | (1.62) | | (3.91) | | (3.08) | | (2.73) |
| Old or Stale Board | | -0.140$^{**}$ | | -0.046$^{*}$ | | -0.110$^{***}$ | | -0.048 |
| | | (-2.75) | | (-1.95) | | (-3.05) | | (-1.45) |
| Female Director | | 0.094$^{*}$ | | 0.151$^{***}$ | | 0.184$^{***}$ | | 0.083$^{***}$ |
| | | (1.96) | | (5.29) | | (5.69) | | (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 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 | -0.046 | -0.125*** | -0.077*** | -0.062** | -0.050** | -0.149*** | -0.105** |
| | (-1.30) | (-1.31) | (-4.07) | (-3.03) | (-2.53) | (-2.29) | (-3.22) | (-2.39) |
| Other | 0.016 | 0.004 | -0.020 | 0.022 | 0.045 | 0.034 | -0.030 | 0.007 |
| | (0.47) | (0.12) | (-0.59) | (0.66) | (1.12) | (0.89) | (-0.65) | (0.17) |
| Majority Election | | 0.055* | | 0.059** | | 0.055* | | 0.067*** |
| | | (1.81) | | (2.44) | | (1.76) | | (2.96) |
| Board Independence | | 0.118 | | 0.224*** | | 0.143** | | 0.181*** |
| | | (1.73) | | (4.15) | | (2.76) | | (3.00) |
| Old or Stale Board | | -0.099** | | -0.024 | | -0.073** | | -0.035 |
| | | (-2.85) | | (-1.20) | | (-2.81) | | (-1.49) |
| Female Director | | 0.081** | | 0.122*** | | 0.142*** | | 0.073*** |
| | | (2.39) | | (6.33) | | (6.06) | | (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 $R^2$ | 0.587 | 0.590 | 0.492 | 0.538 | 0.593 | 0.604 | 0.488 | 0.523 |
| *p*-value of Difference in Family Coefficient Between Social Norm Groups | (0.12) | (0.47) | | | (0.09) | (0.26) | | |

# Appendix

**Table A1**
**Thomson Reuters ASSET4 ESG Environmental Data**

We create environmental indicator variables based on the Thomson Reuters ASSET4 ESG environmental indicator values (line items). 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.

| Items | | Description | Direction | Question Type | Translation Numeric Values |
|---|---|---|---|---|---|
| A. | Emission Reduction | | | | |
| 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. | Product Innovation | | | | |
| 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 Equally-weighted 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 or 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 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 E 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 |
| Equally-weighted E 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 or 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 Equally-weighted 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. 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*** | -0.084*** | -0.095*** | -0.064** | -0.128*** | -0.079** |
| | (-3.74) | (-2.95) | (-3.05) | (-2.19) | (-3.32) | (-2.51) |
| Other | -0.012 | 0.008 | 0.039 | 0.067* | -0.015 | 0.002 |
| | (-0.34) | (0.23) | (0.96) | (1.92) | (-0.33) | (0.04) |
| Majority Election | | 0.066** | | 0.055*** | | 0.060** |
| | | (2.59) | | (2.94) | | (2.46) |
| Board Independence | | 0.201*** | | 0.150** | | 0.229*** |
| | | (3.26) | | (2.61) | | (3.79) |
| Old or Stale Board | | -0.056** | | -0.063*** | | -0.066** |
| | | (-2.36) | | (-3.34) | | (-2.61) |
| Female Director | | 0.124*** | | 0.071*** | | 0.157*** |
| | | (4.71) | | (4.73) | | (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 $R^2$ | 0.416 | 0.442 | 0.400 | 0.425 | 0.361 | 0.398 |

Panel B: Equally-weighted Environmental Category Scores and Material Environmental Score

| Categories | Equally-weighted Environmental Category Scores | | | | | | Material Environmental Scores | |
|---|---|---|---|---|---|---|---|---|
| | Emission Reduction | | Product Innovation | | Resource Reduction | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Family | -0.085*** | -0.056** | -0.098** | -0.060* | -0.114*** | -0.073** | -0.148** | -0.105* |
| | (-3.33) | (-2.50) | (-2.63) | (-1.72) | (-3.26) | (-2.53) | (-2.46) | (-1.91) |
| Other | -0.026 | -0.009 | 0.041 | 0.082* | -0.027 | -0.010 | 0.020 | 0.044 |
| | (-0.97) | (-0.34) | (0.81) | (2.01) | (-0.66) | (-0.23) | (0.38) | (0.76) |
| Majority Election | | 0.048** | | 0.067*** | | 0.056** | | 0.034 |
| | | (2.58) | | (2.98) | | (2.47) | | (0.91) |
| Board Independence | | 0.141*** | | 0.197*** | | 0.209*** | | 0.190** |
| | | (3.01) | | (2.91) | | (4.12) | | (2.08) |
| Old or Stale Board | | -0.032* | | -0.066*** | | -0.048** | | -0.080** |
| | | (-2.01) | | (-3.16) | | (-2.07) | | (-2.64) |
| Female Director | | 0.097*** | | 0.100*** | | 0.140*** | | 0.139*** |
| | | (5.74) | | (5.35) | | (5.50) | | (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 $R^2$ | 0.501 | 0.532 | 0.464 | 0.493 | 0.424 | 0.457 | 0.494 | 0.540 |

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

This table reports regression estimates of environmental performance measures on entrenchment measures, an alternative measure of old or stale board, 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. We use an alternative measure of old or stale board based on the cutoffs that the MSCI adopts in its Entrenched Board measure. We follow MSCI's definition (MSCI ESG Research, 2015) and create a dummy variable 'Old or Stale' per MSCI that is equal to 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). 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.

| | ASSET4 Environmental *z*-Scores | | Equally-weighted Environmental Scores | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Family | -0.095$^{***}$ | -0.083$^{***}$ | -0.073$^{***}$ | -0.063$^{**}$ |
| | (-3.24) | (-2.87) | (-2.94) | (-2.59) |
| Other | 0.019 | 0.039 | -0.002 | 0.014 |
| | (0.52) | (1.14) | (-0.08) | (0.51) |
| 'Old or Stale' per MSCI | -0.088$^{**}$ | -0.072$^{*}$ | -0.057$^{**}$ | -0.043 |
| | (-2.40) | (-1.95) | (-2.20) | (-1.67) |
| Majority Election | | 0.068$^{***}$ | | 0.056$^{***}$ |
| | | (2.83) | | (2.82) |
| Board Independence | | 0.202$^{***}$ | | 0.169$^{***}$ |
| | | (3.51) | | (3.63) |
| Female Director | | 0.147$^{***}$ | | 0.118$^{***}$ |
| | | (5.41) | | (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 $R^2$ | 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 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. 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$^{***}$ | -0.106$^{***}$ | -0.081$^{***}$ | -0.080$^{***}$ |
| | (-3.65) | (-3.59) | (-3.26) | (-3.20) |
| Other | 0.022 | 0.021 | -0.000 | -0.001 |
| | (0.65) | (0.60) | (-0.00) | (-0.04) |
| Has One Female Director | 0.131$^{***}$ | | 0.103$^{***}$ | |
| | (5.60) | | (6.36) | |
| Has Two+ Female Directors | 0.198$^{***}$ | | 0.164$^{***}$ | |
| | (5.25) | | (6.34) | |
| Percent Female Directors | | 0.683$^{***}$ | | 0.558$^{***}$ |
| | | (5.65) | | (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 'dirty' and 'clean' 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 ('dirty') 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 'clean' 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 'dirty' 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 'clean' 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 | 'Dirty' Industries Based on SASB | 5,045 | 20.4% | 39.0 |
| C, D, E, F, G, H | 'Clean' Industries Based on SASB | 20,098 | 21.8% | 57.4 |
| A, B, F, G, I | 'Dirty' Industries Based on ASSET4 z-scores | 7,157 | 23.7% | 37.3 |
| C, D, E, H | 'Clean' Industries 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 | |
|---|---|---|---|---|
| | 'Dirty' A, B, and I | 'Clean' C, D, E, F, G, and H | 'Dirty' A, B, and I | 'Clean' C, D, E, F, G, and H |
| | (1) | (2) | (3) | (4) |
| Family | -0.109** | -0.127*** | -0.079*** | -0.094** |
| | (-2.04) | (-3.08) | (-2.08) | (-2.76) |
| Other | 0.078 | 0.019 | 0.057 | -0.004 |
| | (1.16) | (0.50) | (1.09) | (-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 $R^2$ | 0.526 | 0.398 | 0.582 | 0.485 |
| *p*-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 | |
|---|---|---|---|---|
| | 'Dirty' A, B, F, G, and I | 'Clean' C, D, E, and H | 'Dirty' A, B, F, G, and I | 'Clean' C, D, E, and H |
| | (1) | (2) | (3) | (4) |
| Family | -0.111*** | -0.133*** | -0.083*** | -0.098** |
| | (-2.99) | (-2.89) | (-3.09) | (-2.57) |
| Other | 0.056 | 0.019 | 0.028 | -0.002 |
| | (0.85) | (0.48) | (0.56) | (-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 $R^2$ | 0.489 | 0.394 | 0.552 | 0.483 |
| *p*-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 descriptive statistics for quasi-exogenous shocks at the country level for 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 | 2005/06 | 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

*Majority Director Election*

Canada (2005/06), Canadian Coalition for Good Governance push to get Canadian firms to adopt majority voting in 2005/06 (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 Erklaerung* 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.