The changing landscape of corporate governance disclosure: Impact on shareholder voting

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December 2023

Abstract:
Many mutual funds satisfy their fiduciary duty to vote on portfolio firms' directors by following the recommendations of proxy advisory service companies such as ISS. However, companies complain that ISS recommendations are misguided. A rational response to such frictions would be for firms to decrease investors' costs of evaluating directors' expertise. Consistent with this conjecture, we find that firms increasingly disclose directors' expertise in image-based formats. These disclosures lead to less reliance on ISS, particularly in cases where ISS's recommendations tend to be less precise. An analysis of the channels underlying the higher voting support reveals both the upside and downside of these image-based disclosures: on average these disclosures are informative, but they also facilitate window dressing.

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We thank Vineet Bhagwat, Nikki Boyson, Andrew Koch, seminar participants at Washington University Saint Louis, Drexel University, and Indiana University, and conference participants at the 2022 FMA Annual Meetings and the 2023 NFA Annual Meetings. We acknowledge Daniel Kelly and Dimitri Dumbadze for outstanding research support.

1. Introduction

The board of directors plays a critical role in a company, as the liaison between shareholders and management. In fact, Burt, Harford, and Hrdlicka (2020) conclude that a director influences up to 1% of firm value. Shareholders have significant input into the composition of the board via shareholder votes, and prior literature highlights the salience of these votes. Cai, Garner and Walking (2009), Ertimur, Ferri and Oesch (2018) and Aggarwal, Dahiya and Prabhala (2019) highlight the influence of director votes on director turnover, firm policies, changes in governance provisions, and CEO turnover. Moreover, several factors suggest that shareholder votes on directors are becoming more influential; for example, the increasing percentage of firms with majority voting provisions and the SEC's adoption of the universal proxy.

Critically, there are substantial challenges surrounding voting, many of which stem from the high costs to shareholders of evaluating directors. Many mutual funds satisfy their fiduciary requirement to vote for directors of portfolio firms by relying, at least partially, on the recommendations of proxy advisory service firms, for example ISS or Glass Lewis. However, firms regularly complain that some of these recommendations are misguided, potentially due to the proxy advisory service firms failing to understand firms' true governance demands or having incomplete information regarding directors' skillsets. Relatedly, firms also complain that it can be difficult to effectively communicate their governance choices to investors.

A rational response to such frictions would be for firms to decrease investors' costs of evaluating the expertise of each director (and for investors to pressure firms to make such changes). A decrease in these costs should result in fewer investors relying on proxy advisory company recommendations. We present evidence indicating that this is precisely what has occurred.

Firms increasingly present directors' qualifications and expertise in image-based formats, commonly referred to as director skills matrices. As shown by Hartzmark and Sussman (2019), image-based representations can significantly affect investors' evaluations. Anecdotal evidence is consistent with investors valuing this disclosure format. In 2014 the Council of Institutional Investors highlighted skills matrices as a best disclosure practice, and in 2017 the NYC Pension Fund reached out to companies requesting that they include skills matrices.[1]

Our empirical analyses are based on detailed data collected from the proxy statements of S&P1500 firms over 2011 – 2021. For each firm-year, we determine whether the firm provides a director skills matrix, which is typically a tabular description where directors are listed in each row and skills are listed across the columns. We group reported skills into 20 categories, to facilitate comparison across firms. The percentage of firms presenting director skills matrices grew from less than 5% in 2011 to nearly 65% in 2021. This change is striking because unlike most disclosure changes, it was not precipitated by any regulatory requirement. The fact that these disclosures are voluntary suggests that firms perceive the benefits of such disclosures to outweigh the costs.

Descriptive evidence indicates that skills matrices highlight information in ways that cannot be readily identified from director bios. For a random sample of matrix firm-years, we compare the skills listed within the matrix to the director's full textual bio. Even using a broad matching algorithm, which allows for the possibility that the bio lists related terms rather than the specific word(s) employed in the matrix, only 62% of the matrix skills are identifiable from the bio, for the average director. At the director level, we are unable to match *any* skills denoted within these image-based representations for 8% of directors. Turning to the firm-year level, we are only able to match the skills of *all* directors serving on a firm's Board for 7% of firms.

[1] See *'Best disclosure: director qualifications & skills'*, Council of Institutional Investors, February 2014; and *'"Best Practices" in board matrices'*, New York City Pension Funds, New York City Comptroller Scott M. Stringer, August 2018.

If investors assess these image-based representations to be informative, then matrices should decrease investors' costs of evaluating directors up for vote and thus diminish reliance on ISS. Following the difference-in-difference approach of Baker, Larcker, and Wang (2022) with a matched sample to overcome endogeneity concerns, we find evidence consistent with this prediction. Moreover, effects are greater among investors for whom a decrease in information costs is most likely to be influential, specifically among investors who do not indiscriminately follow ISS across all agenda items up for vote.[2] Focusing on directors for which there is likely to be disagreement (defined as management and ISS having opposing recommendations), the presence of a skills matrix increases active voters' propensity to come to a different conclusion from ISS by five percentage points, which represents a 10% change in the unconditional likelihood to vote for.

We further find that the effects of these image-based disclosures on investors' propensity to independently vote are greatest when ISS's recommendation is less precise, that is, when the recommendation is a noisier representation of director quality. First, effects are significantly larger among director types on which ISS tends to issue blanket against recommendations, for example affiliated directors and overboarded directors. While ISS has stated polices of recommending against such directors, Coles, Daniel, and Naveen (2008) and Field, Lowry, and Mkrtchyan (2013) conclude that the unique knowledge and expertise of these candidates make them valuable in certain types of firms.[3] Second, effects are significantly greater among firms with higher information asymmetry. Such firms are arguably more likely to have unique governance demands that are not readily transparent, suggesting that ISS's recommendation would be less precise.

[2] As shown by Iliev and Lowry (2015), while many mutual funds indiscriminately follow ISS's recommendations, it is relatively uncommon to indiscriminately follow management's recommendations.

[3] For example, ISS's policy states that it will recommend against any non-independent director who sits on the compensation, nominating, or audit committee. See https://www.issgovernance.com/file/policy/active/americas/US-Voting-Guidelines.pdf.

Our finding that skills matrices decrease information processing costs suggests that the matrices should also influence ISS recommendations. Alternatively, if ISS is less focused on shareholder value (see, e.g., Iliev and Lowry (2015), Malenko and Shen (2016)), then they may be slow to change existing policies and practices and we may fail to find an effect. Our results here are mixed. On the one hand, we find that matrices contribute to more positive ISS recommendations, suggesting that ISS takes advantage of this disclosure format when evaluating directors' expertise. However, we only find that to be the case in the latter part of our sample, and we find no evidence that matrices decrease ISS's practices regarding blanket against recommendations. In aggregate, our findings are in line with prior literature suggesting that while ISS has incentives to make high-quality recommendations, these incentives are weaker than those of shareholders due to a lower focus on shareholder value.

Next, we examine whether these image-based representations lead to higher support for directors. First, skills matrices might enable investors to assess the incremental contribution of each director more accurately, which will lead to higher average support if most firms strive to appoint high quality directors. Second, the positive influence of matrices on ISS recommendations, at least during the latter portion of our sample period, would contribute to higher aggregate support. Finally, firms may exaggerate directors' expertise within skills matrices, which will lead to higher support if investors do not see through this window-dressing type behavior. For example, a firm may list a director as possessing 'corporate governance' expertise in the matrix, even though the underlying experience – as listed in the bio – is only tangentially related. Consistent with at least one of these channels being influential, we find that firms with skills matrices enjoy significantly higher average voting support. Both a stringent set of fixed effects and an instrumental variable approach suggest that this relation is causal. Moreover, heterogeneity analyses indicate that effects are concentrated among directors whose contribution to the firm is least clear.

Having demonstrated the positive relation between skills matrices and voting support, we seek to disentangle underlying channels: informativeness / readily digestible format of matrices versus window dressing (that investors do not see through). Ex ante, it is not clear whether we would expect the window dressing channel to be influential. On the one hand, investors' attention to skills matrices, as reflected by our findings regarding voting patterns, incentivizes window dressing-type behavior. On the other hand, the repeated game-nature of shareholder voting, where the same investors tend to own and vote shares in a firm for multiple years, represents a constraint. Importantly, these two channels (informativeness and window dressing) are not mutually exclusive: firms are heterogeneous and may employ matrices in different ways.

To empirically test the informativeness channel, we examine the relation between directors' skills as reported in the matrix and future firm outcomes. Results indicate that on average across broad samples, these image-based representations are informative. For example, firms with at least one director with risk management expertise are significantly less likely to face a class action lawsuit in the next three years. Drilling down even further, we find that cybersecurity expertise is significantly negatively related to future cybersecurity lawsuits. Turning to strategy-type issues, firms who have at least one director with strategy / M&A expertise are significantly less likely to make a value-decreasing acquisition.[4]

We next assess whether these image-based formats also facilitate the ability of some firms to engage in window dressing. We take advantage of the fact that 2,719 directors simultaneously sit on two or more boards that report matrices. After limiting to skills that all a director's firms

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[4] While endogeneity is typically a concern in such analyses, in this case endogeneity biases us against finding the predicted result. For example, to the extent that firms with greater litigation risk were more likely to appoint directors with risk expertise, firms with such directors would tend to experience a *greater* incidence of lawsuits.

denote as relevant (defined as being one of the firm's matrix categories), we find that in 33% of cases the director is classified as having a certain skill in only one of her firms. Using director fixed effects to precisely compare the effects of skills listed while holding true director quality constant, we find that this skill inflation is effective in terms of engendering greater voting support. That is, investors do not appear to see through this window dressing of inflating director skills.

In sum, our findings indicate that these image-based representations offer both advantages and disadvantages. On average across a broad sample, they are informative regarding future firm outcomes and can thus decrease investors' information-processing costs and lessen reliance on proxy advisory firms. However, they also facilitate the ability of firms to engage in window dressing through the exaggeration of director skills, which investors do not appear to see through. Our final analysis examines whether these behaviors are concentrated within certain firm types. Strikingly, the most significant differentiating characteristic is firm performance: firms with lower stock returns are more likely to engage in skill exaggeration in the subsequent year.

Our paper contributes to several streams of literature. First, we contribute to the literature on boards of directors. Boards are tasked with monitoring and advising management. However, it can be difficult for shareholders to assess directors' capacity to fulfill these roles. Adams, Akyol and Verwijmeren (2018) employ textual analysis of director descriptions provided in proxy statements to infer director skills. While this approach provides insights on the value of different skills, it would arguably be costly for an investor to employ this approach as they attempt to compare skills across broad sets of firms. Our evidence that matrices contribute to more independent voting builds upon the work of Ben-Rephael, Ronen, Ronen and Zhou (2021) and Hartzmark and Sussman (2019); images represent a more effective means of communication than text, in this case as a way for management to communicate board expertise to outside investors.

Incremental to this prior work that focused solely on the upside of image-based disclosures, our findings also highlight a downside. In this case, they enable firms to exaggerate directors' skills, and at least at the time of this analysis, not all investors appear to see through this window dressing.

Second, our paper contributes to literature on disclosure. A broad body of literature has shown that more transparent financial disclosure contributes to better firm outcomes, including for example a lower cost of capital, higher liquidity, better investment allocation, and more accurate analyst recommendations, to name a few.[5] However, academic evidence on the value of corporate-governance related disclosure is more mixed. Hermalin and Weisbach (2012) document that more disclosure contributes to better quality decisions but can also lead to increased agency costs. Iliev (2010) shows that although the added disclosure mandated by SOX might be value-increasing for large firms, it was value-decreasing for small firms. Given these costs and benefits, our finding that so many firms have voluntarily adopted this enhanced form of disclosure via director skills matrices is informative. As discussed by Stigler (1964), firms have incentives to voluntarily provide information if the benefits exceed the costs; absent frictions, regulations requiring disclosure should be unnecessary.

2. Data

2.1 Sample Description

Our sample includes S&P 1500 companies from 2011 through 2021, 16,804 firm-years with 2,008 unique firms. For each firm-year, we manually search the company's annual proxy statement to determine whether the company provided a director skills matrix. These director skills matrices are distinct from the textual director biographies, which are provided separately in the proxy statement.

[5] See review papers by Roychowdhury, Shroff and Verdi (2019), Healy and Palepu (2001).

Companies report matrices in several different formats. The most common format is a table, which includes each director's name along one axis and the reported skills along the opposite axis. The table provides markings that indicate which directors have each of the reported skills (see Figure 1 Panel A for an example).[6] Across our sample of 16,804 firm-years, 10.5% include a matrix with this tabular format.

A smaller portion of firms (8% of firm-years in our sample) similarly use check marks or icons to denote each director's skill, but instead of summarizing all skills within one table they instead include either a set of icons or a bulleted list of skills next to each director's biography (see Figure 1 Panel B for an example). Finally, across 3.3% of firm-years, the proxy simply includes a summary figure that lists each skill and the number (or percentage) of directors with that skill. To determine the individual skills held by each director, one must refer back to the director biographies (see Figure 1 Panel C for an example).[7]

We categorize all these cases as representing director skills matrices, a total of 3,672 firm-years (21.9% of firm-years in our sample) representing 960 unique firms (47.8% of our sample firms). For this set of firms, we extract detailed skills information, as reported in the matrices. To collect these skills, we first employ a combination of Python and manual collection. Once we have a complete listing of all directors and their reported skills, we standardize each reported skill into 20 main categories using Adams, Akyol, and Verwijmeren (2018) as a basis for the classification.[8] Appendix A provides the list of skill categories with examples of the sub-categories reported.

We merge our matrix disclosure data with Compustat to obtain firm-level accounting data,

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[6] In a small subset of these cases, the firm discloses the degree to which a director has a skill in a radial format.

[7] In a subset of cases, we are unable to link the summarized skillsets to the actual skills provided in the director biographies. In these cases, we code the firm as not having a matrix. In robustness tests, we exclude the 3.3% of firm-years in which each director is not explicitly matched to his / her skill and obtain qualitatively similar results.

[8] We retain the original skills categories provided in the proxy statements and, for robustness, alter the sub-categories or which skills are reported in which category. Across all alternate specifications, results are materially the same.

with the Center for Research of Stock Prices (CRSP) database for stock returns, and with the WRDS Thomson Reuters Stock Ownership database for institutional ownership. In addition, we use data from Factset for activist involvement with firms, Institutional Shareholder Services (ISS) and BoardEx for firm and director governance measures, ISS Voting Analytics for mutual funds' votes in director elections, AuditAnalytics for corporate litigation information, and the SDC U.S. Merger and Acquisitions database (SDC) for acquisition measures.

2.2 Summary Statistics

In December 2009, the SEC amended Regulation S-K to require that all publicly traded companies disclose in the annual proxy statement the qualifications, attributes, skills, or experience that led the board to conclude that the person should serve as a director. The regulation, however, did not provide guidance on the format in which to disclose this information. Historically, most firms complied with this regulation by providing free-form paragraph descriptions about director qualifications under the directors' biographies. In more recent years, an increasing percentage of firms has supplemented these textual descriptions with image-based representations, that is, with skills matrices.

To begin our investigation of director skills matrices, Figure 2 shows the time series trend in matrix disclosure. Less than five percent (66 firms) of companies in our sample voluntarily disclosed a skills matrix in 2011, compared to nearly 65% (837 firms) by 2021. The rate of increase is striking, given the absence of any changes in regulatory requirements over this period.

Matrix adoption also varies across both industry and firm size. Panel A of Figure 3 shows that, on average across the sample period, the healthcare industry has the lowest rate of skills matrices at 15%, compared to a high of 28% within the utility industry. Panel B indicates that the relation between firm size decile and matrix adoption is nearly monotonic, increasing from an average 11% among the smallest firms to 40% among the largest firms. This nearly four-fold increase in matrix disclosure across firm size deciles is consistent with the conclusions of Hermalin and Weisbach (2012) that larger companies will optimally adopt stricter disclosure policies.

Table 1 details summary statistics of firm characteristics, for both our entire sample of firms and also conditional on whether a matrix is disclosed in a given firm-year. Looking first at governance characteristics, there is some evidence that skills matrices are more common among firms with stronger governance, as evidenced by the fact that these firms' boards tend to be more independent, they are less likely to be classified, and the share structures are less likely to be dual class. Turning to financial characteristics, matrix adoption is higher among larger firms and firms with lower stock returns over the past year.

We also find that external pressures appear to contribute to matrix adoption. A firm is significantly more likely to have a matrix in a given year if it experienced board-related activism in the prior year. Furthermore, a firm's propensity to have a matrix is higher if a greater number of other firms in the same industry also have a matrix. A multiple regression analysis, which examines these characteristics together, provides consistent evidence. Regression results are shown in Internet Appendix Table A1.

Finally, Table 1 also shows that average director voting support is higher among firms with matrices, suggesting that investors react positively to firms having skills matrices. We examine the relation between matrices and voting in more detail in subsequent sections.

2.3. Skills reported within skills matrices

Apart from examining which firms voluntarily disclose director skills matrices, we also seek to understand which skills firms choose to report. In Figure 4, we detail the frequency with which individual director skills are disclosed, among companies that provide a matrix. Looking first at Panel A, *Finance* represents a base skill that nearly all firms reporting a matrix find valuable; among firm-years with a matrix, 92% list this skill. Approximately 70% list the skills *Leadership* and *Corporate Governance*. In contrast, some skills are quite specialized and are reported by relatively few firms (e.g., 11% report *Real Estate*).

Panel B of Figure 4 details the time series trends among the five individual skills that exhibit the largest changes across our sample period: *Diversity*, *Environmental & Social (E&S),* *Human Resources*, *Risk Management*, and *Technology. Human Resources*, *Diversity*, and *E&S* represent the skills with the largest increases, at 250%, 200%, and 175%, respectively. There is a 100% and 60% increase in both *Risk Managemen*t and *Technology* skills, respectively. Other skills remain relatively stable over the sample period (among firm-years with a matrix).

Panels A and B of Figure 5 show the distributions of the number of skills per firm and per director, respectively, among firm-years with a matrix. Looking at Panel A, firms most commonly report seven to nine skills in their matrix. However, 5% of matrix firm-years report only 2 to 4 skills, and 12% list 12 or more different skills. Focusing on the director level in Panel B, the most common scenario is 3 to 6 skills per director. However, 1,129 director-firm-years (3.5%) report only one skill, and ten director-firm-years detail 15 different skills.

The skillset of a firm's directors should reflect the firm's governance demands, and thus it should relate to the firm's operational environment. Table 2 shows that this is the case. We estimate linear probability models (OLS) of the likelihood of disclosing each various skill in a director skills matrix. The sample is limited to the subset of 3,600 firm-years that report a matrix and for which we have data on the individual director skills reported.

Panel A of Table 2 focuses on two skills that relate broadly to the operational structure of firms across multiple industries: *International* and *Technology*. Looking first at column 1, we find that firms with more international operations, as proxied by an international segment reported within the Compustat segment data, are significantly more likely to report a director with international expertise. Column 2 details that firms whose operations are more innovation-oriented, as proxied by number of patents, are significantly more likely to report a director with technology expertise.

In Panel B, we provide broader evidence regarding the link between firm characteristics and directors' reported expertise. We examine six skills that generally relate to industry expertise: *Investments, Scientific*, *Consumer-oriented*, *Environmental and Social (E&S)*, and *Regulatory*. Findings provide further evidence that director skills relate to a firm's operational characteristics. In particular, we find significant positive relations between the following director skills-firm types: *Investment* skills are greater in the financial industry; *Scientific* skills are greater in the healthcare industry; *Consumer-oriented* skills are greater in the consumer nondurables and retail industries; *E&S* skills are greater in the energy and utility industries, consistent with these industries facing greater environmental-related challenges; and, *Regulatory* skill is greater in the utility industry.

2.4 Comparison of director's skills as reported in skills matrix versus in bio

To gain insight into the information provided by matrices versus that in each director's bio, we download the full director bios for a random sample of 1,178 firms and 11,725 directors. For each director × firm × year, we employ two alternative approaches to compare the skills listed in the matrix with the text of the bio. Under the *narrow matching approach*, we search for the listed skill (or portion thereof) that is denoted in the matrix. For example, for the skill '*Brand Management & Marketing*' we code the director as having the '*Brand Management & Marketing'* skill if 'brand management' or 'marketing' is listed in the bio. Under the *broader matching approach*, we additionally search for the main skill category to which the raw skill belongs and any other related sub-categories, as listed in Appendix A. For example, for the skill '*Brand Management & Marketing*', we additionally search for 'consumer oriented', 'public relations', 'communications, 'sales', and 'retail'. Under both approaches, we focus on root words (e.g., 'financ' captures finance, financing, and financial) and account for common abbreviations (e.g., CEO is equivalent to Chief Executive Officer).

Descriptive statistics are provided in Table 3. Looking first at Panel A, on average across all directors, 51% of matrix skills can be readily discerned from the bio under the narrow matching procedure, and 62% under the broader procedure. Under both approaches there is considerable heterogeneity in the closeness of these two characterizations of director expertise. For example, for the director at the 25^{th} (75^{th}) percentile, 40% (100%) of matrix skills are discernible from the bio under the broader procedure. Panel B provides details on the extreme cases where no or all skills match, at both the director (columns 1 and 2) and firm (columns 3 and 4) levels. Focusing on the broader matching procedure, columns 1 and 2 show that 8% of directors have no matrix skills readily discernible from their bio, and 27% of directors have all matrix skills readily discernible. Columns 3 and 4 show that there are no firms in which no skills match across all the firm's directors, however there are only 7% of firms in which all skills match.

Panel C shows the heterogeneity across skills. Some matrix skills are much more frequently discernible from the bio, for example the *CEO* (86% of directors with this matrix skill also clearly specify this skill in the bio, based on the broader matching procedure), *Leadership* (75%), and *Operations* (73%) skills. In contrast, the *Environmental & Social, Risk Management*, and *Regulatory* skills tend to be less identifiable from the bio, as evidenced by matching rates of 40% – 43% based on the broader matching procedure. Conclusions are similar using the narrow matching procedure, albeit with lower matching percentages.

3. Influence of Director Skills Matrices on Investor Voting

3.1 Propensity of investors to independently vote

In this subsection, we focus on our first main question: do image-based representations of director skills decrease investors' costs of evaluating directors up for vote, in ways that diminish reliance on proxy advisory service companies? As discussed by Iliev and Lowry (2015), investors will only independently assess portfolio firms' directors when the benefits of doing so exceed the costs. Alternatively, when the net benefits of such evaluation are negative, they will fulfill their fiduciary duty to vote by relying on the recommendations of a proxy advisory service company such as ISS. If director skills matrices decrease investors' information processing costs, then reliance on ISS should fall.

The effects of matrix provision on voting behavior should be concentrated among investors whose net benefits of independently voting exceed some lower bound. Intuitively, this lower bound represents the point at which the decrease in information processing costs (as brought upon by provision of a matrix) is influential. There arguably exists a subsample of mutual funds whose net benefits of voting are sufficiently low that they would fall below such a cutoff. Such funds tend to outsource all voting-related matters to a proxy-advisory service company;[9] in many cases, such funds are likely not even aware of changes in voting-related disclosures. In contrast, other funds rely partially on ISS but also complement ISS's recommendations with their own research. We argue that the effect of image-based representations should be concentrated within the latter group.

To proxy for the set of investors for whom matrix provision is most likely to be influential, we define investors' net benefits of independently voting (equivalently referred to as active voting) following Iliev and Lowry (2015). Specifically, we take the first principal component of four fund

[9] For example, Iliev and Lowry (2015) find that during their 2006 – 2010 sample period, over 25% of mutual funds voted with ISS on over 99% of all proposals across all portfolio firms throughout the five-year period.

characteristics: fund assets under management, fund family assets under management, fund turnover, and location in an area of high fund concentration. Fund and family size capture economies of scale in research: when assets under management are greater, the costs of research can be spread over a wider asset base. In a similar vein, funds with lower turnover can spread the costs of research over a longer period of time. Finally, the geographical-based proxy is based on the premise that a larger concentration of fund managers within a close proximity lowers the cost of information sharing, as posited by Hong, Kubik and Stein (2005). The net benefits of independently voting are positively related to fund size, family size, and fund geographical concentration, and they are negatively related to fund turnover. Consistent with this intuition, the first principal component is correlated with each underlying factor in these directions. We define funds with a positive value of the first principal component (which is approximately equal to above median) to be active voters.

Results are reported in Table 4. Our empirical tests are based on a difference-in-difference framework, following the approach recommended by Baker, Larcker and Wang (2022) and similar to that employed by Gormley and Matsa (2011) to soak up potential sources of endogeneity. The sample is at the firm × year × director × mutual fund vote level, and the dependent variable is a dummy variable equal to one if the fund voted for the director, zero otherwise. The treatment sample represents firms that disclose a matrix, where the first year of matrix disclosure is considered the event year (year 0). The control sample consists of a matched sample of firms that do not disclose a matrix, where matching is conducted with replacement based on event year, Fama-French 12 industry classification, and a 10% firm size bandwidth (expanded to 25% if the treatment firm is not matched initially). We require that both the treatment and control firms have at least one firm-year in the pre-period (before matrix disclosure) and one firm-year in the post-period (following matrix disclosure). We also limit the sample to the (-3,+3) firm-year window around matrix disclosure. *Treatment* equals one for firms in the treatment sample, and *Post* equals one for the (0, +3) window.

The independent variable of interest is *Skills Matrix* × *Active Voter*. *Skills Matrix* equals one for firm-years that disclose a matrix, which within our difference-in-difference setup equates to *Treatment* × *Post*. (*Treatment* and *Post* are soaked up by fixed effects, which are described below.) *Active Voter* equals one for mutual fund-years with positive net benefits of voting, as defined above.

To capture the tendency of a fund to independently vote, we split the sample into two subsets: the set of directors on which ISS recommended against (column 1) and the set of directors on which ISS recommended for (column 2). If these image-based disclosures increase active funds' propensity to independently vote, then these disclosures will lead these funds to come to a different conclusion than ISS with a greater frequency. That is, amongst directors that ISS recommends against, we predict that active voters exhibit a greater frequency of voting for among firm-years with a skills matrix. Thus, in column 1 of Table 4, we predict a positive coefficient on *Skills Matrix* × *Active Voter*. In contrast, in column 2, disagreement with ISS manifests in a lower probability of voting for, that is, we predict a negative coefficient on this interaction term.

We include a wide array of control variables, which relate to voting: director characteristics, firm-level governance factors, and firm financial characteristics. We additionally include *cohort* × *firm* and *cohort* × *year* fixed effects. As Baker, Larcker and Wang (2022) discuss, when treatment is staggered in time (in our setting this equates to firms adopting matrices at different points) and treatment effects can be heterogeneous (in our setting, the influence of matrices on voting varies across firms), conventional staggered difference-in-difference estimators are likely biased. *Cohort × firm* fixed effects control for this potential bias, where a cohort is defined as a matched treatment firm to control firm(s) group. *Cohort × year* fixed effects allow for time trends that vary by type of firm. The variation we isolate represents the causal effects of a skills matrix. We estimate OLS regressions, and standard errors are clustered by fund.

Results are broadly consistent with predictions. Looking at column 1, the coefficient on *Active Voter* is significantly positive, consistent with active voters more likely to independently evaluate issues up for vote and thus come to a conclusion different from ISS, in this case to vote for the director when ISS recommends against.[10] The significantly positive coefficient on *Skills Matrix × Active Voter* demonstrates that this tendency to independently vote is significantly greater if a firm reports a skills matrix, thereby decreasing information processing costs.

Consistent with predictions, this interaction term has the opposite sign in column 2, when the sample consists of ISS 'for' recommendations. The finding of an insignificant effect within the ISS 'for' sample (column 2) is arguably not surprising because so few of these director elections are controversial: when both ISS and management support a director, the probability that the director is low quality is quite small.

In Table 5, we examine heterogeneity in the impact of skills matrices on funds' voting. We start in Panel A by looking across different types of directors and different types of firms. Our overarching prediction is that skills matrices will be most influential among directors for which ISS's recommendations tend to be least precise. Less precise recommendations are noisier estimates of whether a director would contribute positively to firm value, for example through the monitoring and advising services she would reasonably be expected to provide.

[10] One potential concern with these regressions is that the large number of fixed effects causes many 'bins' to have few numbers of observations. For robustness, we re-estimate these regressions including only firm and year fixed effects. As shown in Internet Appendix Table A2, results are qualitatively similar.

We focus on two channels of recommendation precision. First, prior literature (see, e.g., Iliev and Lowry (2015) and Malenko and Shen (2016)) document that ISS tends to issue one-size-fits-all recommendations, commonly referred to as blanket recommendations. Evidence that one-size-fits-all approaches toward governance are frequently not optimal (see, e.g., Coles Daniel and Naveen (2008)) implies that such recommendations will be less precise.[11] We predict that skills matrices will contribute to significantly more independent voting among directors subject to blanket recommendations. Based on ISS's policies, we use two measures of blanket recommendations: *affiliated director* and *overboarded director*. Our classification of *affiliated director* comes from the ISS US Directors database, and it is defined as an outside director with a material relationship with the firm. *Overboarded director* is defined as a director with four or more public directorships. In our sample of directors, affiliated directors are four times more likely to receive an 'against' recommendation from ISS compared to independent directors (16% of affiliated versus 4% of independent directors). Further, overboarded directors are almost three times more likely to receive an 'against' recommendation from ISS compared to non-overboard directors (9% of overboarded versus 3% of non-overboarded directors).

The second dimension of ISS recommendation precision focuses on firm-level effects. We predict that precision will be lower among firms with higher information asymmetry. Such firms tend to have more unique corporate governance demands (see, e.g., Coles, Daniel, and Naveen 2008) and, as such, ISS's tendency to issue one-size-fits-all recommendations will be more likely to result in suboptimal recommendations. We focus on absolute abnormal returns around earnings announcements as a measure of firm information asymmetry, Absolute abnormal return around earnings announcements is defined as the average absolute abnormal return surrounding a firm's

[11] Consistent with this conclusion, Iliev and Lowry show that mutual fund votes, in particular the votes of actively voting funds, are more focused on shareholder value than ISS's recommendations.

earnings announcements in the prior year and *High absolute abnormal earnings* return equals one if this measure is in the top quartile, zero otherwise.

Results are detailed in Panel A of Table 5. The regressions in column 1 – 6 are similar to those in column 1 of Table 4, where the sample is restricted to directors on which ISS recommends against. In columns 1 – 3 (4 – 6), we further restrict the sample to active voter funds (non-active voter funds). We additionally include an interaction term, *Skills Matrix* × *Less precise ISS Recommendation*. The precision variable represents measures of blanket recommendations, *Affiliated director* (columns 1 and 4) and *Overboarded director* (columns 2 and 5), and a measure of information asymmetry, *High absolute abnormal earnings return* (columns 3 and 6).

We predict that the positive influence of skills matrices on independent voting will be greater among directors for which recommendations tend to be less precise. Thus, in columns 1 – 6, where the sample consists of directors on which ISS recommends against, we predict a positive coefficient on the main interaction term, *Skills matrix* × *Less precise ISS Recommendation*. Moreover, the magnitudes should be greater in columns 1 – 3, where the sample consists of active voters, compared to the sample of non-active voters shown in columns 4 – 6. In contrast, in columns 7 – 9, where the sample consists of directors on which ISS recommends for, we predict a negative coefficient on the main interaction term.

Results are consistent with these predictions. Looking at column 1 where the precision proxy is affiliated director, results indicate that a skills matrix increases active investors' likelihood of disagreeing with ISS (and thus voting for the director) by 4.1 percentage points, relative to affiliated directors within non-matrix firms. Columns 2 and 3 show similar effects for the precision proxies overboarded director and high absolute abnormal return around earnings announcements.

Columns 4 – 6 show similar but weaker effects among non-active funds. Finally, columns

7 – 9 show that among the sample of directors on which ISS recommends for, the coefficients on *Skills matrix × Less precise ISS Recommendation* have the opposite sign, i.e., they are negative. In Internet Appendix Table A3, we detail similar specifications using two alternative proxies for information asymmetry, firm volatility and high bid-ask spread. Results are generally similar.

In Panel B of Table 5, we focus on a different dimension of heterogeneity: heterogeneity across investors. In our main results (Table 4), we divide investors into two groups based on their propensity to follow ISS, defined as mutual funds with above- versus below-median net benefits of independently voting, as defined above. Our finding that results are concentrated within active voters, i.e., those with above-median net benefits, is consistent with these investors evaluating directors themselves as opposed to indiscriminately following ISS. As a result, these investors' voting behavior is most changed by matrix disclosure. In Panel B we examine the further prediction that among active investors, matrices will have the greatest effect among 'marginal' active voters, that is, investors who are at the margin of evaluating directors themselves as opposed to simply following ISS. In contrast, investors with the greatest net benefits of active voting will find it optimal to independently vote irrespective of the matrices, and thus be less affected by matrices.

To test this prediction, we divide the active voters into two equal sized groups, which we label *Low active voter* and *High active voter*. Consistent with predictions, Panel B of Table 5 shows that effects are concentrated within the 'Low active voter' group, that is within investors whose net benefits of voting are between a lower bound (below which the net benefits of voting are sufficiently low that matrix disclosure has no effect) and an upper bound (above which the net benefits of voting are sufficiently high that matrix disclosure has no effect. In sum, results throughout this section provide strong evidence that image-based disclosures decrease investors' information costs in ways that increase independent voting, that is, they decrease investors' propensity to indiscriminately follow ISS. These effects are concentrated in directors and firms for which ISS's recommendations are likely to be least precise, and among investors whose propensity to independently vote are most affected by a decrease in the costs of evaluating directors.

3.2 ISS recommendations

If skills matrices decrease the costs of evaluating directors, then these matrices may also influence ISS recommendations. ISS is tasked with making recommendations on every director, in every publicly traded firm, every year. Moreover, because nearly 75% of firms have December fiscal year ends, there is a substantial clustering of annual meetings (when votes occur) in the spring, what is commonly referred to as the busy spring proxy season. In sum, ISS must make recommendations on an extremely large number of directors in a relatively short period of time.

We first examine the influence of skills matrices on average ISS support levels. If these image-based representations decrease the costs of evaluating the contribution of each director to the collective expertise of the board, then the matrices may contribute to more positive ISS recommendations. This would be the case if ISS tends to recommend against a director when the contribution of that director is not clear, and if matrices clarify that contribution.

Second, we examine the influence of skills matrices on cases where ISS tends to uniformly recommend for or against certain governance provisions, for example overboarded directors and affiliated directors, otherwise known as "blanket recommendations." These recommendations have been criticized on the grounds that a director's unique skills and experiences may outweigh the downsides stemming from that person's affiliation with the company or service on other company's boards. To the extent that matrices decrease the costs of recognizing these unique skills, then ISS may utilize them in ways that contribute to fewer blanket recommendations.

We examine the effects of skills matrices on ISS recommendations in Table 6. In columns

1 – 3 we include our entire sample period, 2011 – 2021. To allow for the possibility that ISS may be slower than investors to efficiently use this new disclosure format, in columns 4 – 6 we restrict the sample to 2019 – 2021. In columns 1 and 4, we employ a specification similar to that in Table 4, where we include cohort-firm and cohort-year fixed effects, and our independent variable of interest is *Skills matrix*, which equates to treatment × post. Different from Table 4, the observational level is firm-director-year (instead of fund-firm-director-year) and standard errors clustered by firm-meeting. In columns 2 - 6, we evaluate the incremental effects of skills matrices on blanket-type issues, overboarded director and affiliated director, using a specification similar to that in Table 5. The independent variable of interest in these columns is *Skills matrix × Blanket ISS recommendation proxy*.

Results indicate that ISS has started to take advantage of skills matrices in recent years. The coefficient on skills matrix is significantly positive in column 4, indicating that skills matrices contributed to more positive ISS recommendations over the 2019 – 2021 period. However, we find no evidence that ISS has benefited from these image-based formats in ways that decrease its use of blanket recommendations. This is despite evidence that these one-size-fits all recommendations are not optimal for many firms (see, e.g., Field and Lowry, 2021).

3.3 Support for directors

In this section, we focus on whether skills matrices influence the level of director support. There are several economic reasons to believe skills matrices will contribute to higher director support (in addition to more independent voting). First, skills matrices should clarify the contribution of each individual director. Clarity regarding what a director adds to the firm should lead to higher voting support, under the plausible assumption that firms on average strive to appoint high quality directors. Second, skills matrices decrease investors' reliance on ISS blanket against recommendations. Third, we find some evidence that skills matrices contribute to more positive ISS recommendations, at least during the later years of our sample period. Finally, it is possible that firms utilize these image-based disclosure formats to exaggerate the skills of their directors. Unlike the director bio, where the specific background is provided, in a skills matrix the firm generally labels the director has either 'having' or 'not having' a given skill. This necessitates judgment calls, and it arguably facilitates window dressing-type behavior.

We test the effects of skills matrices on the level of director voting support in a format similar to Table 4, using the difference-in-difference approach of Baker, Larcker, and Wang (2022). Results are shown in Panel A of Table 7. Looking first at column 1, the coefficient on Skills Matrix is significantly positive, indicating that firms with a skills matrix receive significantly higher voting support than firms without a matrix. The likelihood that a mutual fund votes 'for' an individual director increases by 0.4 percentage points following disclosure.

We predict that the greater support will be concentrated within subsamples where a director's contribution is least apparent. Specifically, effects should be concentrated among directors who previously received the lowest support, that is, among directors that investors had the most concerns regarding their contribution to firm value. The image-based representation of director skills both highlights the skills that the firm feels are most relevant and clearly depicts the directors with these relevant skills.

Column 2 of Table 7, Panel A shows results of this heterogeneity analysis. For each firm-cohort-director, we calculate average support during the pre-period. Based on this support level, we then place the directors into terciles within each firm-cohort.[12] The independent variable of

[12] As described in detail in the description of Table 3, We require that both the treatment and control firms have at least one firm-year in the pre-period (before matrix disclosure) and one firm-year in the post-period (following matrix disclosure).

interest equals *Skills Matrix* × *Low vote director*, where Low vote director represents directors in the lowest support tercile. We find that the higher average support is significantly greater among the Low vote directors; among this group, matrix disclosure is associated with a 1.2 percentage point increase in voting support. Among low vote directors, this represents a 17% decrease in against votes.[13] In sum, our results suggest that the disclosure of skills matrices enables investors to better discern the contribution of each director, particularly those directors whose contribution to the board was most in doubt prior to this disclosure.

The strict set of fixed effects in Panel A mitigates many endogeneity concerns. However, it does not fully account for the possibility that a firm adopts a matrix in a year when other factors cause voting support to be higher. For example, Table 2 shows that activist intervention increases the probability of matrix adoption, and such intervention may also alter investors' perception of the board. To address such concerns, we estimate a 2SLS analysis. To instrument for matrix adoption, we use the *percentage of directors (at the focal firm) with a board seat at a matrix firm*. Prior literature shows that peer firms' governance structures have a causal effect on a firm's own governance choices (see, e.g., Bouwman, 2011), suggesting that the relevance condition is plausibly satisfied. The exclusion condition requires that a peer firm's governance structures not be directly related to votes on the focal firm's directors, except through the effects of a skills matrix. This condition is also plausibly satisfied.

We estimate regressions at the director x firm level (as opposed to the fund x director x firm level in Tables 4 and 5). As shown in column 1 of Panel B, Table 7, this instrument is highly significant in explaining matrix adoption. Further, the first stage F-statistic is 38.9. Moreover, as shown in column 2, in the second stage, we find that instrumented matrix adoption is significantly

[13] On average, low vote directors receive 7.15% votes against. The presence of a skills matrix increases support by 1.2 percentage points, which represents a 1.2 / 7.15 = 17% increase.

positively related to director support. In sum, using both a fixed effects specification and a 2SLS specification, results indicate that matrices cause an increase in director support.

4. Channels underlying higher voting support

Having demonstrated the positive influence of these image-based disclosures on voting support, in this subsection we seek to discern the channel(s) underlying this relation. Section 4.1 focuses on the informativeness of skills matrices, and section 4.2 focuses on window dressing.

4.1. Informativeness channel

The purported advantage of providing a skills matrix is that it more effectively represents the expertise of the board. These image-based formats should decrease the time costs of evaluating directors and facilitate investors' ability to compare Board skillsets across firms. Such dynamics represent one channel through which skills matrices contribute to higher voting support.

To examine directly the informativeness of skills matrices, we examine the relation between skills reported and subsequent firm outcomes. If the skills reported in these matrices are informative, then the presence of certain skills should decrease the probability of a corresponding negative event. We investigate two distinct negative firm outcomes: litigation and value-destroying acquisitions. We limit our sample to the subset of firm-years that report a matrix in which we have data on the individual director skills reported.

We begin by examining whether firms with specific director skills are less likely to be subject to litigation. We use the AuditAnalytics database as our source of corporate litigation. AuditAnalytics includes case data on civil litigation filed in federal district courts on matters disclosed to the SEC as material pending litigation. We extract the date the litigation was filed and the litigation type. Across our sample of 2,017 firm-years that report a skills matrix from 2011 to 2019, the unconditional rate of litigation over the following fiscal year 10.6%, and the rate over the subsequent three fiscal years is 18.1%.[14]

Table 8 reports linear probability models (OLS) estimating the likelihood of litigation as a function of whether the company reports a particular skill in its matrix. The dependent variable is a dummy equal to one if the firm faces such a lawsuit over the next three years. We begin by examining the relation between the *Risk Management* skill and subsequent civil litigation, as filed in a federal district court and disclosed to the SEC. We focus on two measures of this skill: (1) an indicator variable equal to one if the firm reports *Risk Management* in its skills matrix (column 1) and (2) an indicator variable equal to one if 25% or more of the Board has this skill (column 4). All models include standard controls used in prior tables, an indicator variable equal to one if the firm faced a lawsuit in the prior three years, and year and industry fixed effects.

Results in Table 8 are consistent with the skills matrices being informative. The deficit of a key skill predicts the probability of future negative outcomes. Firms that report *Risk Management* as a director matrix skill are significantly less likely to face a lawsuit over the following three-year period. Moreover, this conclusion is robust to focusing on the presence of the skill within the board or threshold percent of the board. The effect is economically meaningful: firms that report this skill are 4 – 5 percentage points less likely to face litigation over the next three years, which equates to an approximate 30% reduction.[15]

One potential factor underlying these specifications is endogeneity. However, in this setting endogeneity arguably biases us against finding the predicted effect. The predominant source of endogeneity is that both the presence of *Risk Management* skills on the board and the

[14] For this analysis, we end the sample in 2019 to enable an analysis of firm outcomes up to three years in the future.
[15] Prior research suggests that having multiple directors of a given type can be more beneficial than just having one director of that type (see, e.g., Torchia, Calabro, and Huse (2011) regarding female representation on the board). However, our results provide no evidence to indicate that this is the case for specific director skills, as evidenced by the similar magnitude of coefficients in columns 1 and 4.

likelihood of facing lawsuits are related to underlying firm risk. To the extent that we are unable to completely control for firm risk, this represents a correlated omitted variable. Importantly, this would upwardly bias the relation between the *Risk Management* skill and subsequent litigation risk: Firms with higher risk would both have the *Risk Management* skill and be more likely to face lawsuits. In this sense, our finding of a significant negative relation between these two factors is a conservative estimate of the true magnitude of the effect.

To examine in more depth the relation between disclosed director skills and subsequent lawsuits, we focus on two specific types of litigation and the specific corresponding skills. Models 2 and 5 examine whether the presence of the *Cybersecurity* skill relates to the subsequent likelihood of a cybersecurity-related lawsuit, and Models 3 and 6 focus on the relation between the *Environment* skill and the subsequent likelihood of an environmental-related lawsuit. In our classification of 20 skills (as reported in Panel A of Figure 4), the *Cybersecurity* skill is a subset of the *Technology* skill category, and the *Environment* skill is a subset of the *Scientific* category. Across our sample of firm-years with a matrix, 4.8% report the *Cybersecurity* skill and 14.3% report the *Environment* skill.

Results suggest a strong relation between cybersecurity-related skills and litigation risk. Firms reporting the *Cybersecurity* skill are significantly less likely to be subject to cybersecurity-related litigation in the following three years. In economic terms, the presence of this skill is associated with a 2.0 percentage point decrease in facing a cybersecurity lawsuit. Relative to the unconditional probability of such a lawsuit, this represents over a 100% decrease. In contrast, we fail to find similar evidence for environmental lawsuits and skill. We note that this is potentially due to underlying endogeneity detailed above, which biases us against finding predicted effects.

Our second set of tests regarding the relation between director skills and subsequent firm outcomes focuses on the *Strategy / M&A* skill. We examine whether firms with deficits in this skill are more likely to engage in value-destroying deals. We collect information on acquisitions announced from SDC, and calculate the acquirer's three-day cumulative abnormal return (CAR) surrounding the announcement date. For the sub-sample used in this analysis (2,017 firm-years with a skills matrix), 446 firm-years announce at least one acquisition in the following three years.

We estimate linear probability models (OLS) in which the dependent variable is an indicator variable equal to one if the announcement CAR is in the bottom decile, that is, whether the acquisition is a value-destroying deal. Similar to specifications in Table 8, we focus on two measures of the *Strategy / M&A* skill: (1) an indicator variable equal to one if the firm reports *Strategy / M&A* in its skills matrix and (2) an indicator variable equal to one if at least 25% of the board lists this skill in the matrix. All models include year and industry fixed effects. Results are reported in Table 9.

Consistent with predictions, across both specifications the coefficient on *Strategy / M&A* skill is significantly negative as predicted. In economic terms, the presence of the *Strategy / M&A* skill decreases the probability of a value-destroying acquisition by 10.2%. This finding relates to Field and Mkrtchyan (2017) who find that board acquisition experience is positively related to subsequent acquisition performance.

Additionally, we examine the relation between the presence of the *Compensation* skill and say-on-pay votes. We find that firms that report the *Compensation* skill are associated with a lower probability of a negative say-on-pay vote over the subsequent three years. Firms with this skill are 25% less likely to obtain a say-on-pay vote that is in the lowest quintile of say-on-pay percent 'for' votes in the subsequent three years. Results are tabulated in Internet Appendix Table A4.

In sum, results throughout this section provide evidence that skills reported in the matrix are informative. As such, these findings provide support for the informativeness channel in explaining the positive relation between skills matrices and voting support.

4.2. Window dressing channel

While findings in the prior subsection provide support for the informativeness channel on average across all firms, it is possible that at least some firms utilize the image-based skills matrices to exaggerate the skills of their directors, in a type of window dressing behavior. An obvious challenge to this analysis is that it is impossible to observe a director's 'true' expertise and thus difficult to ascertain whether the skills reported in a matrix are exaggerated. To overcome this challenge, we take advantage of the fact that there are 2,719 director × year observations where one director sits on multiple boards of matrix firms. Focusing on this sample, which represents 5,885 director × firm × year observations (2,491 unique firm × year observations), we compare the skills listed for each director, across her firms. Our analysis proceeds in two parts. First, Panels A and B of Table 10, in conjunction with Figure 6, examine the frequency of window dressing. Second, Panel C of Table 10 examines whether investors see through such window dressing.

We begin our discussion with Figure 6, which provides an illustrative example. The 2020 boards of two firms are shown: Kennemetal Inc and Sherwin-Williams Co. There is one director, Steven Wunning, who sits on both boards. We summarize the skills that each firm lists Wunnning as having, using the classifications employed throughout the paper (as described in section 2.1 and Appendix A). There are four skills that Wunning is listed as having by both firms (consumer oriented, international, leadership, and operations), six skills that only Kennametal lists him as having, and one skill that only Sherwin-Williams lists him as having. Thus, in total across the two firms, Wunning has 11 unique skills. Looking at the first row of Panel A of Table 10, we see that across our entire multiple director sample, on average directors have 9.2 unique skills.

Looking at the specific skills listed, we see that some skills are only listed on one of the firms matrices. For example, Wunning is listed as having *Corporate Governance* skill in Kennemetal Inc, but not in Sherwin-Williams, but Sherwin Williams does not even have a 'corporate governance' category in their matrix. Among those skills that represent categories in both firms, Wunning has five unique skills across the two firms. Across these five skills, there are four skills that both firms list Wunning as having. Examining rows 2 and 3 of Panel A of Table 10, the overall sample averages for these two statistics are 4.1 unique skills (that represent categories in both firms' matrices), of which 2.8 are skills that the director is listed as possessing in both firms. In sum, we can infer that across those skills that represent a matrix category in both a director's firms, approximately one-third are skills that the director is listed as possessing by only one of her boards (1 – 2.8/4.1).

Continuing to focus on this sample of directors who sit on multiple boards, Panel B shows the number of director-years in which a skill is listed in the matrix of a firm-year (column 1) and the number and percent of these director-years in which the director is listed as having the skill in the focal firm but not the interlocked firm (i.e., not the other firm on whose board the director sits). We focus on a subset of our main skill categories (8 out of 20) that are arguably more comparable across firms.[16] Looking at the first row, across our sample of 2,719 director-years (in which the director sits on multiple boards), 2,285 have finance represented as a category in both of the director's firms' matrices; in 618 (27%) of these cases, the director is listed as having the *Finance* skill only in the focal firm. For example, across the two boards on which Steven Wunning sits, he is only listed as possessing the *Finance* skill in Sherwin-Williams. We label such cases (i.e., cases

[16] For example, we do not focus on the 'industry' skill, because this skill will be definition mean different things in different firms. We also choose to not focus on skills that include many sub-categories, under the premise that the relevant subcategory will differ across firms.

such as Wunning being labeled as having finance expertise in Sherwin-Williams) as firm-years with 'window dressing'. This categorization is based on the plausible assumption that if a person possessed a reasonably high level of finance expertise, it should be reported as such in both firms. Anecdotal evidence further supports this conclusion: looking at Wunning's Sherwin-Williams bio at the bottom of Figure 6, there is nothing that specifically conveys finance expertise.

Examining the subsequent rows in Panel B of Table 10, the *Finance* skill is more likely than other skills to be subject to window dressing. Compared to the 27% rate of window dressing for the *Finance* skill, the only other skill with a similarly high rate is *International* skill, at 25%. Both *Leadership* and *Risk* skills have rates of 15%, and other skills are 10% or less.

In Panel C, we examine whether such window dressing contributes to higher voting support. We estimate regressions at the director × firm × year × mutual fund level, in which the dependent variable equals one if the mutual fund voted for the director, zero otherwise. We limit our sample to those directors that hold multiple directorships on matrix boards. The key independent variable is 'Window dressing', which equals one if the director reported one or more skills only in the focal firm's skills matrix (and not in the interlocked firm).[17] Importantly, we hold director quality constant via the inclusion of director fixed effects. We additionally include year fixed effects and control variables used in prior tables, and standard errors are clustered by fund.

Results indicate that the presence of window dressing is associated with significantly higher voting support (column 1). Specifically, a greater number of skills reported for the director while holding constant director expertise (through director fixed effects) is associated with 0.7 percentage points higher voting support. For comparison purposes, this is similar in magnitude to the effects of independent directors within broader samples. These findings indicate that investors

[17] The skills used to define 'window dressing' are limited to eight main category skills listed in Panel B of Table 10.

are 'fooled' by the window dressing associated with matrix reporting. Column 2 investigates whether active voters, who devote more resources toward voting research, are more likely to see through firms' window dressing activities. However, we find no evidence in support of this possibility. The coefficient on window dressing × active voter is positive rather than negative as would be expected if they were less likely to be fooled.

This significantly positive coefficient is consistent with our earlier results that active voters are more likely than others to use skills matrices, and that this information contributes to higher voting support. However, it also suggests that while matrices facilitate evaluation of directors within a firm, they do not necessarily contribute to comparisons across firms. Even active voters do not expend the time and resources to compare a director's reported skills across firms, and can be fooled by window dressing behavior.

4.3. Heterogeneity across firms: informativeness versus window dressing

Results throughout the prior subsection suggest that the higher voting support engendered by skills matrices comes from both the informativeness of skills matrices and by firms' window-dressing behavior. As discussed throughout the paper, the informativeness of these image-based disclosures is consistent with prior literature highlighting the advantages of such formats, for example in decreasing time costs of assessing various information. However, our findings regarding window dressing suggest a downside to such formats. In this subsection, we analyze whether this window dressing behavior is concentrated within certain firm types.

We continue to focus on the sample of firm-years with one or more directors who serve on multiple boards, thereby enabling us to measure window dressing. Panel A of Table 11 provides a univariate comparison, of firm-years with window dressing (as defined in prior subsection) versus those without. Looking first at the top rows, we observe that window dressing firms tend to report a greater number of skills per director, 6.1 versus 5.3 for firms that do not window dress, significant at the 1% level. Across all skills that a firm reports, firms that window dress also list a greater average percentage of directors as possessing the skills, 68% vs 62%, also significant at the 1% level. In sum, while we define window dressing based on the director(s) who serve on multiple boards (generally only 1 or 2 directors within any given firm), these differences are consistent with these firms inflating the skills of all their directors.

The middle portion of Panel A illustrates the governance characteristics of the window dressing and non-window dressing samples. In general, most differences between the two samples are small. However, it is noteworthy that the window dressing firms have significantly lower institutional ownership, 74% versus 78%. This difference is particularly marked in light of the fact that the window dressing firms are also bigger (as shown in the bottom portion of the table) and, in general, institutional ownership is strongly positively correlated with firm size. Finally, the last set of rows in Panel A details firm characteristics. While some are statistically significant, most differences are relatively small in economic terms.

To focus more directly on factors that may affect the decision to exaggerate, in Panel B we limit the sample to the first year in which a firm exaggerates one or more directors' skills. This limits the sample to 358 firm-years (compared to the 1,071 firm-years with window dressing in Panel A). For each firm, we calculate abnormal returns in the fiscal year prior to skills exaggeration and the first fiscal year of skills exaggeration. As documented in Panel B, abnormal returns are significantly lower in the year in which a firm first exaggerates one or more director's skills: -5.4% versus -0.7%.

In the last row of Panel B of Table 11, we further restrict the sample to eliminate firm-years in which the first instance of window dressing coincided with the initial matrix adoption. We continue to find significant differences in returns. Our results suggest that firms are significantly more likely to exaggerate directors' skills when they are experiencing poorer performance.

In sum, while we are hesitant to draw overly strong conclusions from this univariate analysis, our findings suggest that firms with weaker monitoring and poorer past performance are significantly more likely to inflate their directors' skills. Perhaps surprisingly, investors do not see through this window dressing, and as such it benefits firms in terms of higher voting support for their directors.

5. Conclusion

The portion of firms voluntarily providing director skills matrices has increased markedly over the past decade. The fact that this has occurred in the absence of any changes in regulatory requirements suggests that firms and their investors perceive this image-based form of disclosure to be beneficial. Results throughout the paper provide evidence consistent with this conjecture, but they also point to a downside of such disclosure formats, in the form of window dressing that investors do not appear to see through.

First, we find that director skills matrices lead to decreased reliance on ISS, which is consistent with these image-based disclosures decreasing investors' costs of evaluating directors. These effects are concentrated in cases where ISS tends to issue blanket recommendations, for example affiliated directors and overboarded directors. In addition, the impact of skills matrices is significantly greater among higher information asymmetry firms, consistent with such firms being more likely to have unique governance demands that are not recognized by ISS.

Second, we find that director skills matrices lead to higher voting support, and these effects are concentrated within directors whose contribution was previously least clear, as measured by low support prior to the introduction of the matrix, and among firms with high information asymmetry. An investigation of the channels underlying this relation suggests that both informativeness and window dressing play a role. On the one hand, we find that the director skills reported in this transparent disclosure format are informative regarding future firm outcomes; including, for example, the risks of lawsuits as well as the risks of value-decreasing mergers. These significant relations, combined with the advantages of these image-based formats in terms of time required to assess directors' expertise, both represent significant benefits. However, we also find that firms utilize these image-based disclosure formats to exaggerate directors' skills, in a type of window dressing behavior. Moreover, an analysis of shareholder voting suggests that investors do not appear to see through this window dressing.

Overall, these image-based disclosure formats offer both upsides and downsides. On the one hand, by facilitating the comparison of expertise across boards, matrices enable investors to more readily identify weaknesses in firms' governances. To the extent that the presence of director skills matrices lowers the costs to investors of evaluating firms' governance structures, we would expect the efficacy of engagement to increase. This paints an optimistic future going forward, as firms and investors alike continue to work towards more effective governance. However, on the other hand, the finding that matrices facilitate window dressing suggests that this disclosure format also has the potential to make directors' true expertise less clear. This paints a more pessimistic future going forward. Our paper calls attention to the trade-off between these two issues.

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Appendix A: Matrix Skills Categories

The appendix reports the main and sub (bullet point) categories that skills disclosed in board skills matrices are categorized into.

Academia
- Education

Accounting
- Audit
- Compliance

CEO

Consumer Oriented
- Marketing
- Brand Management
- Public Relations
- Communications
- Sales
- Retail

Corporate Governance
- Board Service
- Investor Relations
- Compensation
- Succession
- Independence

Environmental & Social (E&S)
- Community
- Environment
- Non-profit
- Sustainability

Diversity
- Ethnicity

Finance
- Banking
- Wall Street Experience

Human Resources
- Talent Management
- Human Capital

Industry
- Multi-industry
- Labor

International
- Global
- Emerging Markets
- Trade

Investments
- Capital Markets
- Capital Allocation
- Private Equity
- Capital Management

Leadership
- Executive
- C-level
- Management

Operations
- Manufacturing
- Distribution
- Supply chain
- Logistics
- Product development

Real Estate

Regulatory
- Government
- Public Policy
- Legal

Risk Management
- Crisis Management

Scientific
- Science
- Engineering
- Health

Strategy / M&A
- Business Development
- M&A
- Corporate Affairs
- Consulting

Technology
- IT
- Digital
- Cybersecurity
- Ecommerce
- Software
- Data Analytics

Appendix B: Variable Definitions

	Source	Variable Definition
Panel A: Governance Characteristics		
Board independence	IRRC	Percentage of the board that is independent
Board size	IRRC	Number of directors
Classified board	IRRC	Indicator equal to one if directors are assembled into distinct classes with successive annual elections for a single class of directors
Dual class	IRRC	Indicator equal to one if the firm a dual class shareholder structure
CEO-Chair duality	IRRC	Indicator equal to one if the CEO is also chair of the board
Institutional ownership	Thomson	Percentage of outstanding shares held by institutional shareholders
Panel B: Firm Characteristics		
Firm size	Compustat	Natural logarithm of market capitalization
Market-to-book	Compustat	Natural logarithm of market-to-book ratio
ROA	Compustat	Operating income scaled by total book value of assets
Stock return	CRSP	Annual buy-and-hold return
Stock return volatility	CRSP	Annualized standard deviation of monthly stock returns
R&D	Compustat	R&D expenses scaled by total book value of assets
International operations	Compustat	An indicator variable equal to one if the firm has operations outside of the U.S. as reported in the firm's Compustat segment data
Log(1+# of patents)	USPTO	The natural log of one plus the number of patents filed in the prior fiscal year.
Bid-ask spread	CRSP	The average daily bid-ask spread over prior year
Absolute abnormal earnings return	IBES	The average absolute abnormal returns surrounding firms' earnings announcement in the prior year
Acquisition CAR	CRSP	Acquirer three-day cumulative abnormal return (CAR) surrounding announcement date of acquisition
Panel C: Board Matrix External Factors		
Board-related activism	FactSet	Indicator equal to one if activism event(s) with the following campaign objectives defined by Factset occurs: board control, board representation, support dissent group in proxy fight, or vote against a director election management proposal
Non-board-related activism	FactSet	Indicator equal to one if activism event(s) with non-board-related campaign objectives defined by Factset occurs
Percentage of industry peers with matrix		Percentage of firms in the same 2-digit SIC industry classification that disclosure a skills matrix in the prior year
Percentage of directors with other board seats at matrix firm		Percentage of directors that hold a directorship at a different S&P 1500 firm that reports a skills matrix in the prior year
Panel D: Director Voting Characteristics		
Percent 'for' votes	IRRC	Percent 'for' votes cast for an individual director at annual meeting
Average percent 'for' votes	IRRC	Average percent 'for' votes cast for directors up for election at annual meeting

Appendix B: Variable Definitions (continued)

	Source	Variable Definition
Panel D: Director Voting Characteristics		
Residual of ISS 'for' recommendation	IRRC	Residual estimate from a regression model of the ISS 'for' recommendation based on director, firm and governance characteristics
Residual of percent of board with ISS 'for' recommendation	IRRC	Residual estimate from a regression model of the average ISS 'for' recommendation based on firm and governance characteristics
Independent director	IRRC	Indicator equal to one if the director is defined as independent
Log(Age)	IRRC	Natural log of director age
Log(Tenure)	IRRC	Natural log of director tenure
Female	IRRC	Indicator equal to one if the director if female
Number of other directorships	IRRC	Number of board seats held at other publicly traded firms
Director ownership	IRRC	Shares held by director scaled by total shares outstanding
Audit committee	IRRC	Indicator equal to one if director is on audit committee
Audit committee chair	IRRC	Indicator equal to one if director is audit committee chair
Compensation committee	IRRC	Indicator equal to one if director is on compensation committee
Compensation committee chair	IRRC	Indicator equal to one if director is compensation committee chair
Nominating committee	IRRC	Indicator equal to one if director is on nominating committee
Nominating committee chair	IRRC	Indicator equal to one if director is nominating committee chair
Attendance problem	IRRC	Indicator equal to one if director's board meeting attendance is less than 75%
Affiliated director	IRRC	Indicator equal to one if director is defined by ISS to be an outside director with a material relationship to the firm
Overboarded director	IRRC	Indicator equal to one if director holds four or more public directorships
Panel E: Fund Voting Characteristics		
Active voter		Indicator equal to one if the fund's predicted active voter score calculated following Iliev and Lowry (2015) is greater than zero. The fund's predicted active voter score is the principal factor extracted from four fund-level proxies for net benefits of voting: fund size, membership in top-five family, location in top fund MSA and fund turnover.
Fund size		Fund total net assets
Family size		Fund family total net assets
Fund turnover		Minimum of aggregate purchases or aggregate sales of securities over the calendar year, divided by the average total net assets of the fund
Top 5 MSA		Indicator equal to one if the fund management company is located in one of the top-five MSAs based on number of mutual funds

Appendix B: Variable Definitions (continued)

Panel F: Director Skills Variables	
# skills reported	Total number of skills reported in a firm's skills matrix
# 'top industry' skills reported	Total number of top 3 most reported skills in a given Fama-French 12 industry-year (excluding Corporate Governance, Finance, and Leadership skills) included in a firm's skills matrix
# 'non-top industry' skills reported	Total number of non-top 3 most reported skills in a given Fama-French 12 industry-year (excluding Corporate Governance, Finance, and Leadership skills) included in a firm's skills matrix
Percent of board with 'top industry' skill	Percentage of board that is reported to have a top 3 industry skill
Risk Management skill (0/1)	Indicator equal to one if the firm discloses risk management as a matrix skill, zero otherwise
Risk Management skill (%)	Percentage of the board with risk management as a matrix skill
Cybersecurity skill (0/1)	An indicator equal to one if the firm discloses cybersecurity as a matrix skill, zero otherwise.
Cybersecurity skill (%)	Percentage of the board with cybersecurity as a matrix skill
Environment skill (0/1)	An indicator equal to one if the firm discloses environment as a matrix skill, zero otherwise.
Environment skill (%)	Percentage of the board with environment as a matrix skill
Strategy / M&A skill (0/1)	Indicator equal to one if the firm discloses strategy / M&A as a matrix skill, zero otherwise
Strategy / M&A skill (%)	Percentage of the board with strategy as a matrix skill
Compensation skill (0/1)	Indicator equal to one if the firm discloses compensation as a matrix skill, zero otherwise
Compensation skill (%)	Percentage of the board with compensation as a matrix skill

Figure 1: Examples of Director Skills Matrix Disclosure

The figure depicts examples of the three types of director skills matrix disclosure. Panel A provides the skills matrix disclosure for Microsoft Corporation from its 2019 proxy statement. Panel B provides the skills matrix disclosure for General Mills, Inc. from its 2019 proxy statement. Panel C provides the skills matrix disclosure for Marriott International Inc. from its 2019 proxy statement. Panel D provides an example of director biographies provided by Stryker Corporation without a board matrix disclosure from its 2019 proxy statement.

Panel A: Example #1 of Skills Matrix Disclosure (Microsoft Proxy Statement, 2019)

Experience, expertise, or attributes

	Gates	Hoffman	Johnston	List-Stoll	Nadella	Noski	Panke	Peterson	Pritzker	Scharf	Sorenson	Stanton	Thompson	Warrior
Financial	■		■	■		■	■			■	■	■	■	
Gender, ethnic, or national diversity				■	■		■	■	■				■	■
Global business	■		■	■	■	■	■	■	■	■	■	■	■	■
Leadership	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Mergers and acquisitions		■	■	■	■	■			■	■	■	■	■	■
Sales and marketing				■			■	■		■			■	
Technology	■	■			■	■		■		■		■	■	■

Panel B: Example #2 of Skills Matrix Disclosure (General Mills Proxy Statement, 2019)

R. Kerry Clark, Independent Lead Director

Age: 67

Independent Director Since: 2009

Committees: Corporate Governance; Finance

Other Public Directorships: Anthem, Inc. (formerly Wellpoint, Inc.)
Avnet, Inc.
Textron, Inc.

Senior Executive Leadership · Industry Focus · Global Experience · Governance Expertise · Health and Wellness

R. Kerry Clark served as Chairman and Chief Executive Officer of Cardinal Health, Inc., a provider of health care products and services, until his retirement in 2009. Mr. Clark joined Cardinal Health in 2006 as President and Chief Executive Officer and became Chairman in 2007. Prior to that, Mr. Clark had been with The Procter & Gamble Company, a consumer products company, since 1974. There, he held various positions including President of P&G Asia; President, Global Market Development and Business Operations; and from 2004 to 2006, Vice Chairman of the Board.

Contributions to the Board:

- As our Independent Lead Director, Mr. Clark draws on his business leadership, corporate strategy and governance expertise to provide strong, independent board leadership and to ensure board effectiveness by fostering active discussion and collaboration among the independent directors and serving as an effective liaison with management.
- With a strong background in consumer packaged goods and health care products, he brings to the board extensive experience in launching new products, brand-building, marketing and partnering with customers across sales channels.
- Mr. Clark also lends a global business perspective, developed through his leadership of global business operations at Procter & Gamble.

Panel C: Example #3 of Skills Matrix Disclosure (Marriott Proxy Statement, 2019)

Panel D: Example of Director Biographies without a Board Matrix (Stryker Proxy Statement, 2019)

MARY K. BRAINERD, Age 65, Director since 2017

Former President and Chief Executive Officer of HealthPartners, the largest, consumer-governed, nonprofit health care organization in the United States, which she led from 2002 to May 2017. Prior to joining HealthPartners in 1992, she held various executive roles with Blue Cross and Blue Shield of Minnesota from 1984 to 1992. She also serves as a director of Bremer Bank and Securian Financial, a financial services company headquartered in Minneapolis.

Ms. Brainerd's extensive experience surrounding both health care delivery and insurance enable her to provide unique and invaluable insight to our Board discussions, particularly in light of the evolving landscape in the health care delivery and payer markets.

ROCH DOLIVEUX, DVM, Age 62, Director since 2010

Chairman of the Board, Pierre Fabre SA, a global dermocosmetics and healthcare company. Chairman of GLG Institute, a community of senior executives for experience sharing and learning. Director of UCB, a global biopharmaceutical company, where he was Chief Executive Officer for 10 years. He is also Chairman of the Board of the Vlerick Business School, a top-100 business school in the world based in Belgium and of the Caring Entrepreneurship Fund, a philanthropic organization to help entrepreneurs start their own businesses in healthcare.

Dr. Doliveux has extensive experience in life science and healthcare companies, including research, development, regulatory, medical, marketing, market access, sales and M&A, as well as strategic and organizational change management. His exposure to business in many geographies and cultures is very valuable as Stryker seeks to expand its global presence.

Figure 2: Percentage and Number of Firms with Skills Matrix, by Year

The figure reports the time series trend in director skills matrix disclosure for the percentage of firm-years and number of firms in our sample from 2011 through 2021.

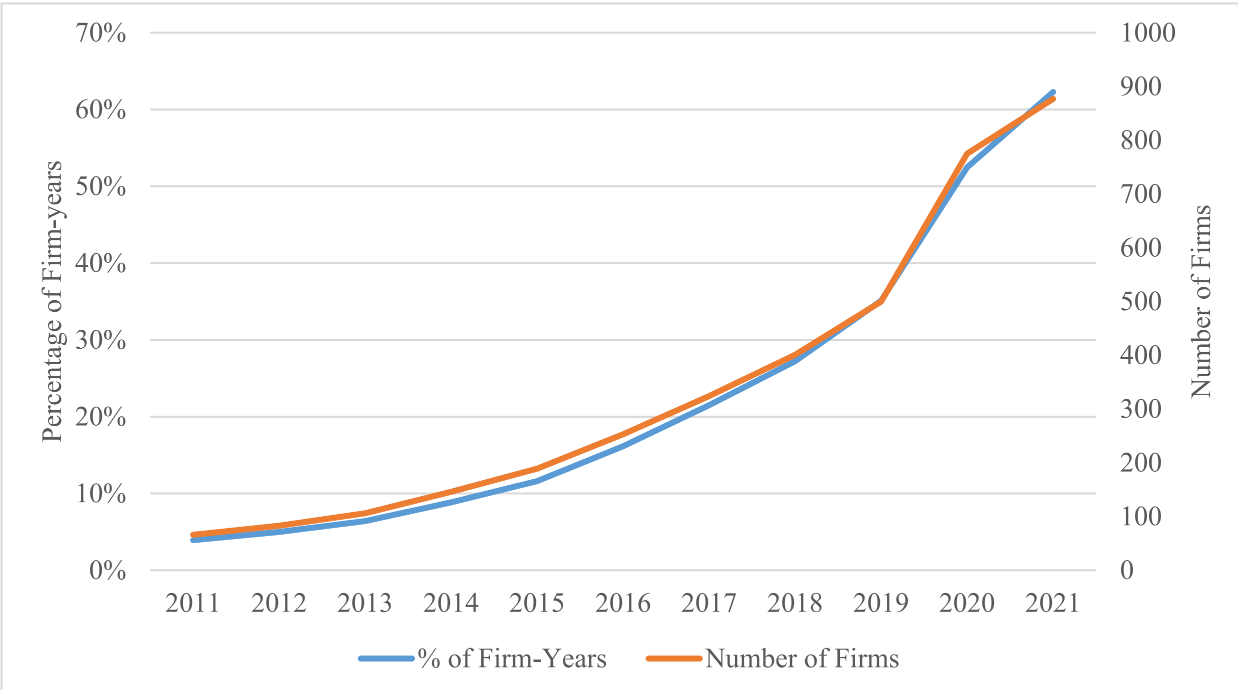
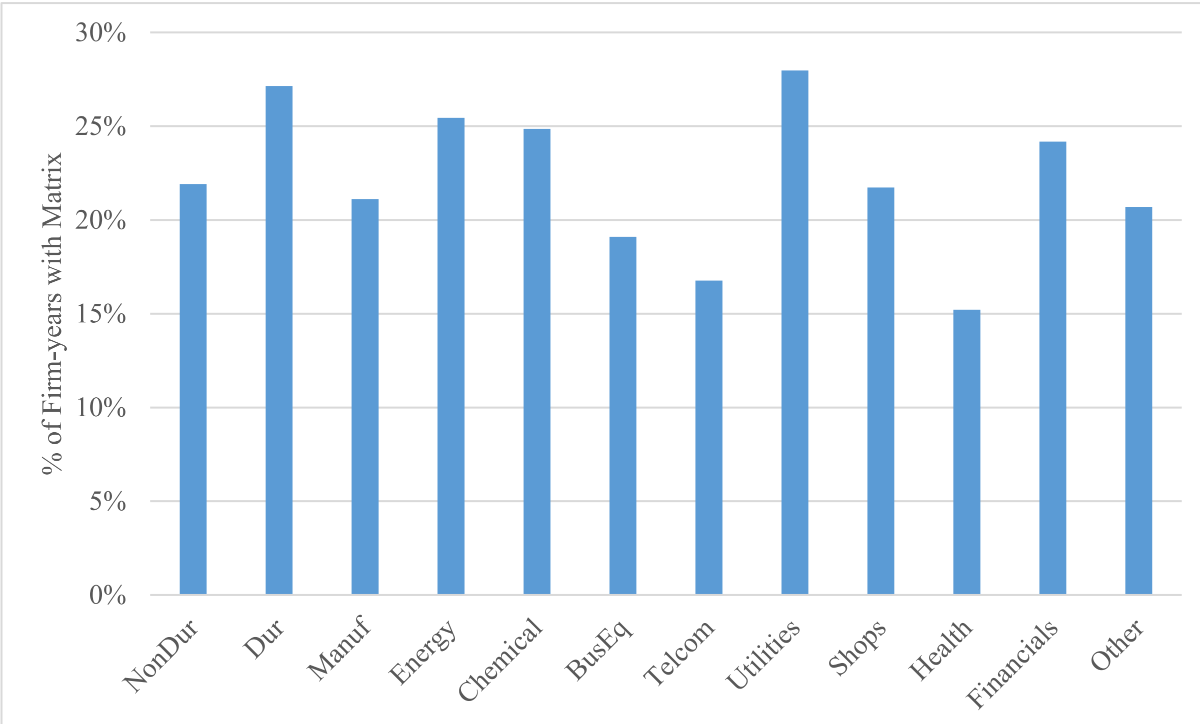


Figure 3: Percentage of Firms with Skills Matrix, by Industry and Size

This figure reports the distribution based on Fama-French 12 industry classifications (Panel A) and the market capitalization distribution based on deciles (Panel B) of director skills matrix disclosure.

Panel A



Panel B

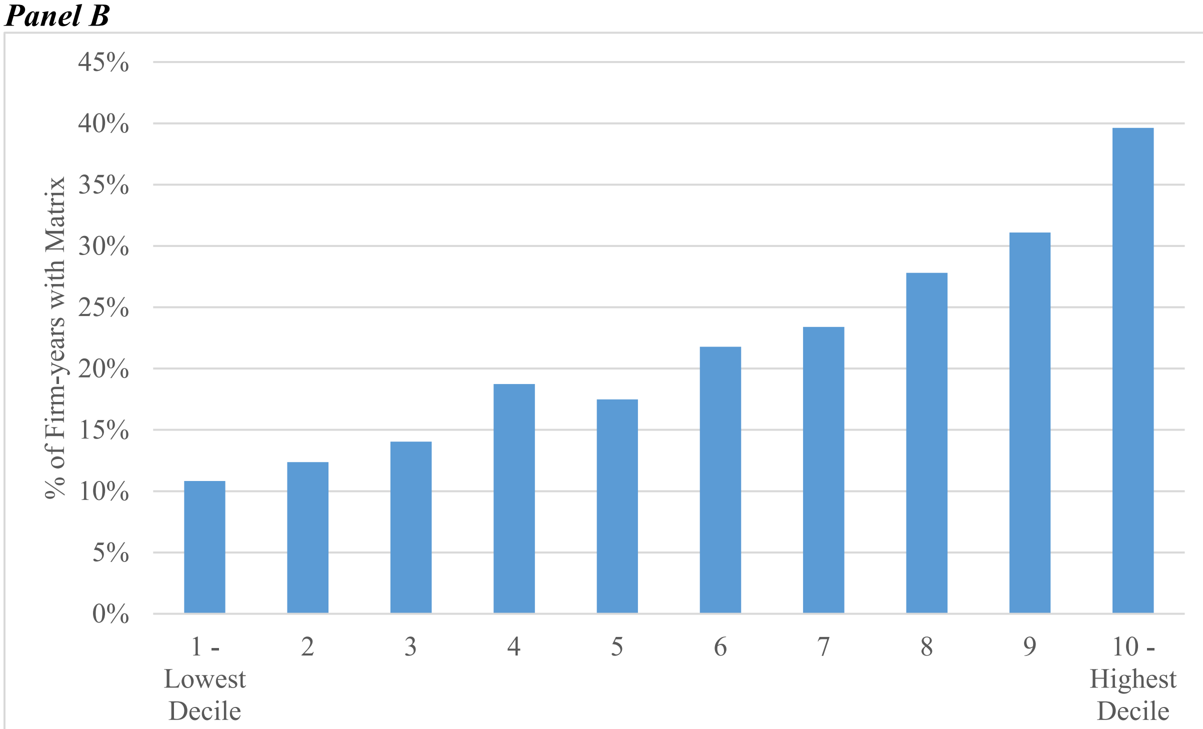
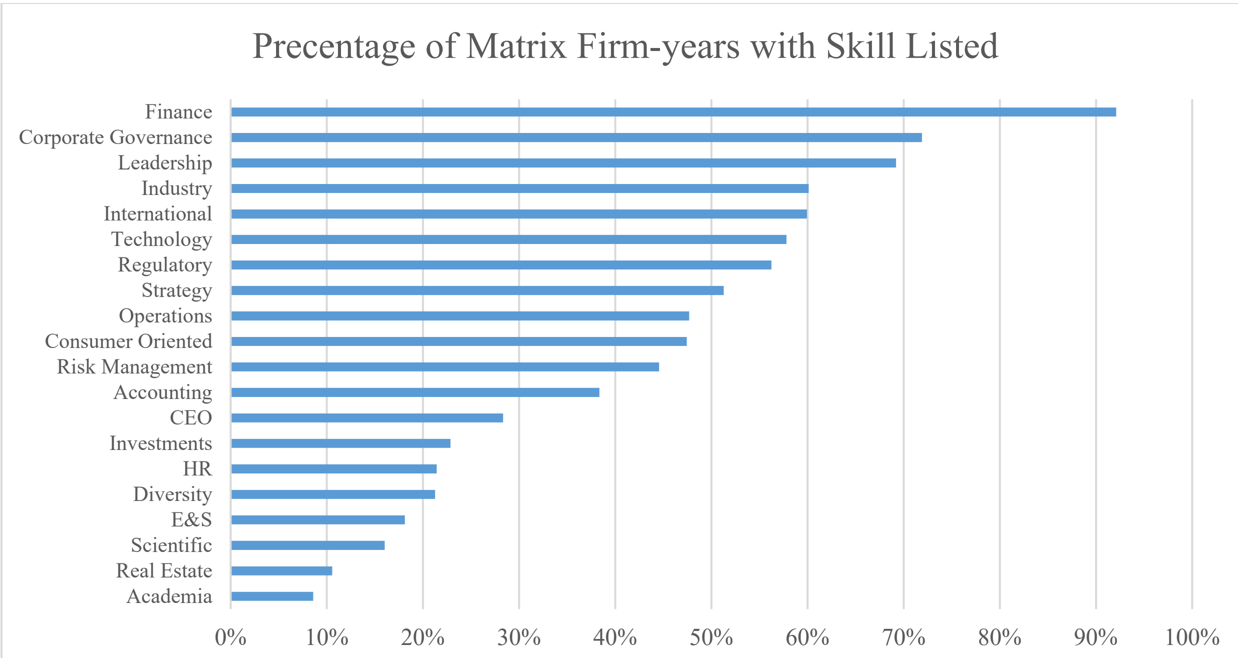


Figure 4: Frequency of Individual Director Skills Disclosed

These figure reports skills listed in a director skills matrix for companies that disclose a matrix from 2011 through 2021. Panel A details the percentage of firm-years in which a particular director skill is listed. For example, 92% of firm-years that disclose a matrix in their proxy statement list 'Finance' as a skill. Panel B reports the time series trend for these percentages of firm-years in which a particular director skill is listed. For example, 41% of firm-years that 3disclose a matrix in their proxy statement list 'Technology' as a skill in 2011 compared to 67% in 2021. The disclosed director skills are limited to those that increase in frequency over the sample period. The frequency of all other disclosed director skills from Panel A remain relatively stable throughout the sample period.

Panel A



Panel B

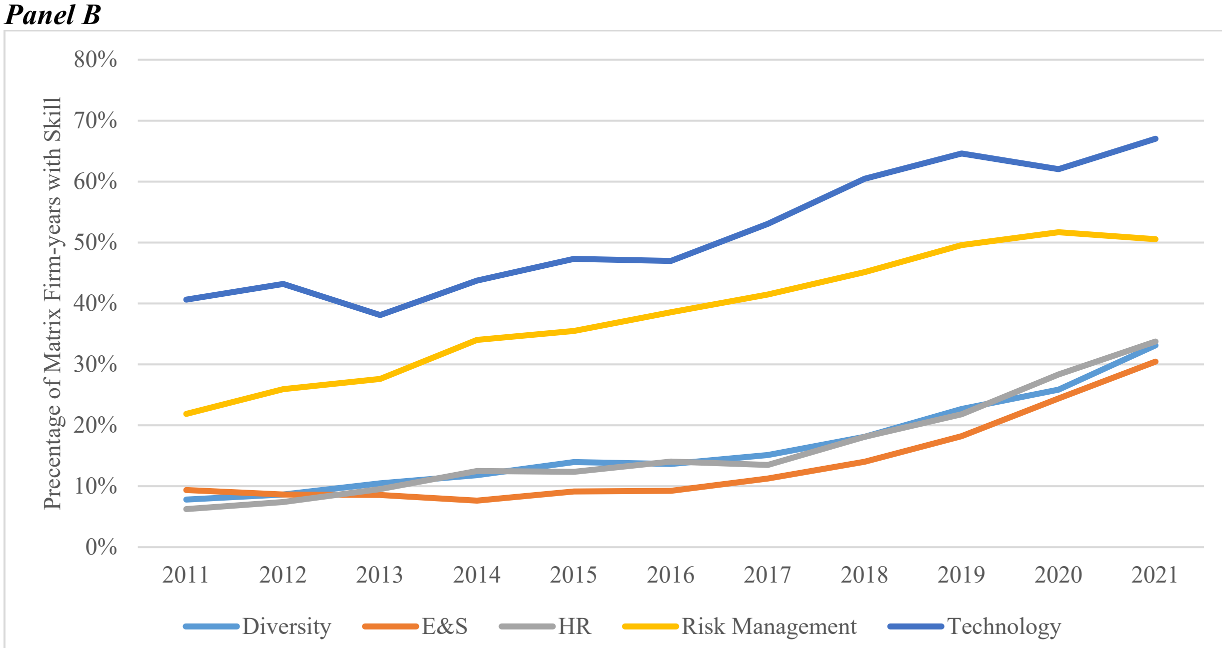
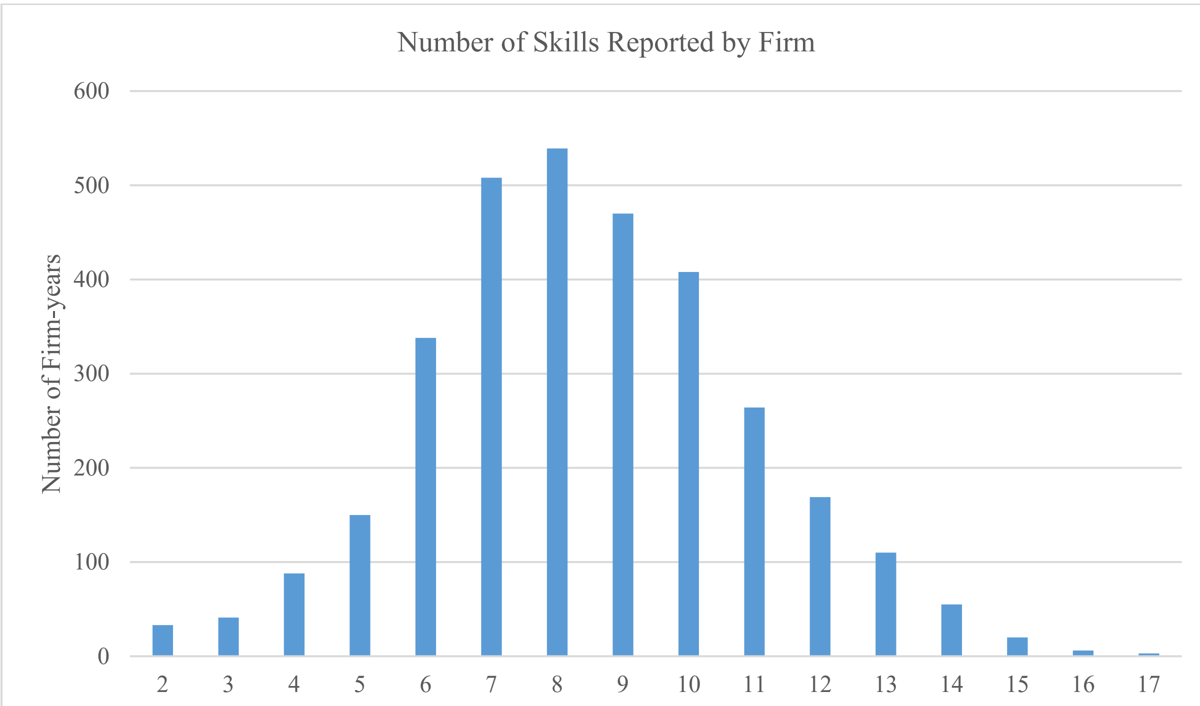


Figure 5: Average Number of Skills Reported by Firms and for Directors

The figure reports the distributions of the number of skills listed by a firm in a skills matrix (Panel A) and of the number of skills held by an individual director (Panel B) for companies that disclose a matrix from 2011-2021. For example, 539 board matrix firm-years list eight skills in their matrix and 5,353 director-firm-years have four matrix skills.

Panel A



Panel B

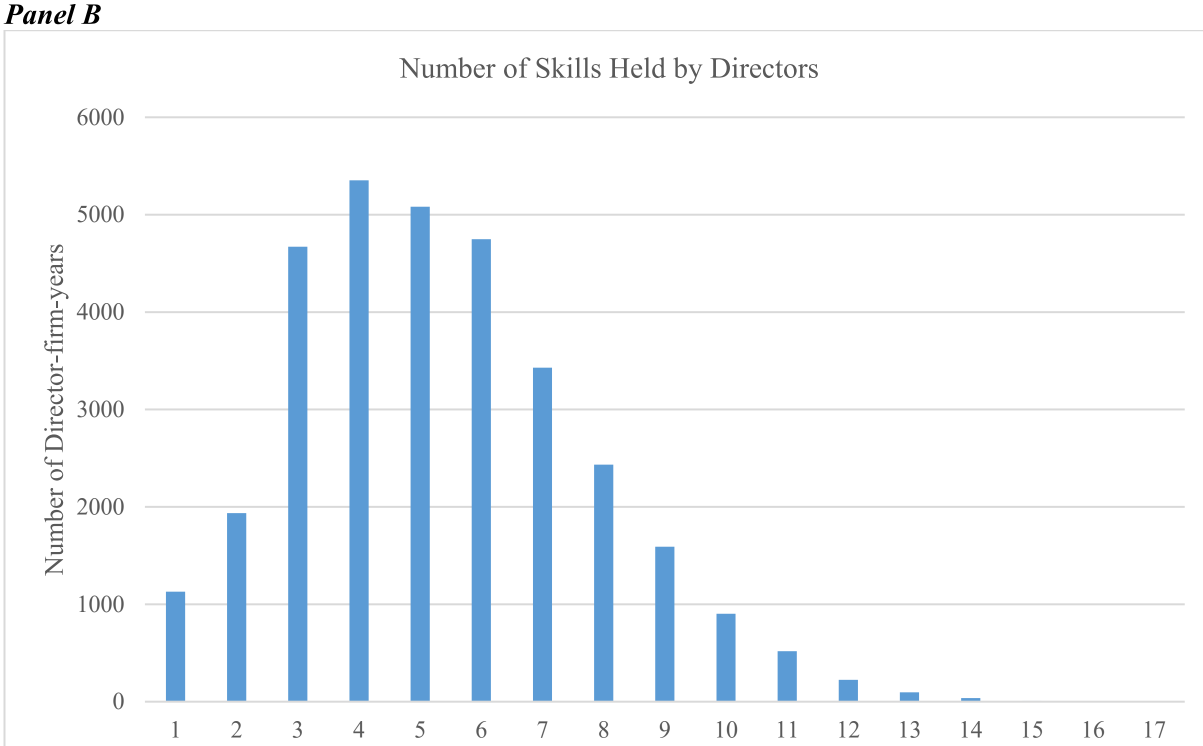


Figure 6: Directors Holding Multiple Matrix Directorships

The figure details an example of a director holding multiple matrix directorships and the skills listed in each firm's matrix. Director Steven Wunning sits on the boards of Kennametal Inc and Sherwin-Williams Co, both of whom report a skills matrix in their 2020 proxy statements. The skills reported in each matrix are standardized to our 20 main skill categories and reported below. A check mark represents that the director is reported to have that skill in the respective matrix. Across both directorships, Wunning possesses 11 unique skills. Of the skills that are included in both firms' matrices, Wunning possesses 5 unique skills (Consumer Oriented, International, Leadership, Operations and Finance). Both firms report that Wunning possesses 4 of these skills (Consumer Oriented, International, Leadership, Operations), while only Sherwin-Williams reports that Wunning possesses Finance skill. We classify Sherwin-Williams reporting of Finance skill for Wunning as an 'inflated' skill. We report at the bottom of the figure that Sherwin-Williams lists that 78% of their independent directors have Finance skill compared to Kennametal listing that 38% of independent directors possess Finance skill.

Director: Steven Wunning *Firm:* Kennametal Inc		*Director:* Steven Wunning *Firm:* Sherwin-Williams Co	
Consumer Oriented	✓	Consumer Oriented	✓
International	✓	International	✓
Leadership	✓	Leadership	✓
Operations	✓	Operations	✓
Finance		Finance	✓
CEO			
Corporate Governance	✓		
E&S			
Industry	✓		
Regulatory	✓		
Risk	✓		
Strategy	✓		
Technology	✓		
Percent of Independent Directors Listed with Finance Skill	37.5%	Percent of Independent Directors Listed with Finance Skill	77.8%

Director Bio - Qualifications (excerpt from Kennametal proxy statement):

- Mr. Wunning has extensive operational and management experience in the areas of quality, manufacturing, product support and logistics for a complex, global organization. He understands the challenges of managing a global manufacturing organization and provides valuable insight and perspective to our Board with respect to operations, supply chain logistics and customer relations. Mr. Wunning currently serves as the Chair of our Compensation Committee.

Director Bio - Qualifications (excerpt from Sherwin-Williams proxy statement):

- Through his broad range of assignments and experience gained during 41 years of service at Caterpillar, Mr. Wunning developed an in-depth understanding of manufacturing, quality, product support and logistics at a leading global manufacturing company. Mr. Wunning's extensive management experience provides the Board with a valuable, independent perspective on Sherwin-Williams' global manufacturing and supply chain operations.

Table 1: Summary Statistics

The table reports sample means of firm-level variables for all firm-years and those firm-years with and without a director skills matrix from 2011 to 2021. All variable definitions are included in Appendix B. ***, **, and * indicate statistical differences between the matrix and non-matrix firm-years at the 1%, 5%, and 10% levels, respectively.

	All firm-years (N = 16,804)	Matrix firm-years (N = 3,672)	Non-matrix firm-years (N = 13,132)
Governance Characteristics			
Board independence	73%	81%	70%***
Board size	9.3	10.0	9.1***
Classified board (0/1)	36%	25%	39%***
Dual class (0/1)	6%	4%	6%***
CEO-Chair duality (0/1)	41%	40%	42%**
Institutional ownership	77%	77%	77%
Firm Characteristics			
Firm size	$11,969	$24,230	$8,541***
Market-to-book	3.67	4.57	3.42***
ROA	0.11	0.11	0.11***
Stock return	1.5%	-1.8%	2.4%***
Stock return volatility	9.2%	9.7%	9.1%***
R&D	0.022	0.018	0.024***
Matrix External Effects			
Board-related activism	4%	7%	3%***
Non-board-related activism	8%	14%	6%***
Percentage of industry peers with matrix	18%	30%	14%***
Percentage of directors with other board seat at matrix firm	7%	15%	5%***
Director Voting Characteristics			
Average percent ‘for’ votes	95%	96%	95%***
Average percent ISS ‘for’ rec.	94%	96%	93%***

Table 2: Relation between Matrix Skills and Firm Characteristics

The table reports OLS models estimating the likelihood of disclosing a particular skill in a director skills matrix. The sample is limited to firms that disclose a matrix from 2011 through 2021. Panel A includes skills with strong firm-specific components to disclosure. Panel B includes skills with a strong industry component to disclosure. These specifications include indicator variables equal to one for each of the Fama-French 12 industry classifications. All independent variables are measured as of the fiscal year end prior to the board matrix disclosure in the firm's annual proxy statement, and they are defined in Appendix B. t-statistics based on standard errors cluster at the firm-level are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: International and Technology expertise

	Dependent Variable:	
	International	Technology
	Model 1	Model 2
International operations	0.383***	
	(9.960)	
Log (1+ # of patents)		0.027***
		(2.831)
Board independence	0.001*	0.002**
	(1.809)	(2.298)
Board size	0.005	0.024**
	(0.755)	(2.217)
Classified board	0.002	0.072**
	(0.056)	(2.131)
Dual class	-0.103	-0.168**
	(-1.209)	(-2.357)
CEO-chair duality	-0.000	0.057**
	(-0.018)	(2.043)
Institutional ownership	0.037	0.071
	(0.721)	(1.220)
Firm size	0.061***	0.045***
	(5.367)	(3.012)
Market-to-book	-0.019	0.006
	(-1.110)	(0.310)
ROA	0.193	-0.040
	(1.119)	(-0.234)
Stock return	-0.056**	-0.015
	(-2.204)	(-0.523)
Stock return volatility	0.342	0.404
	(1.499)	(1.605)
R&D	-0.897**	0.090
	(-2.224)	(0.218)
Observations	3,600	3,600
Year & Industry Fixed Effects	Yes	Yes
Adjusted R-squared	0.360	0.198

Panel B: Industry-related forms of expertise

	Dependent Variable:				
	Investments	Scientific	Consumer Oriented	E&S	Regulatory
	Model 1	Model 2	Model 3	Model 4	Model 5
Financials	0.158***	-0.001	-0.097	-0.010	0.002
	(2.957)	(-0.032)	(-1.537)	(-0.229)	(0.030)
Health	-0.001	0.595***	-0.286***	-0.084*	-0.243***
	(-0.010)	(7.782)	(-3.621)	(-1.925)	(-3.094)
Business Equipment	-0.059	-0.031	-0.090	-0.076*	-0.254***
	(-1.186)	(-0.804)	(-1.253)	(-1.842)	(-3.892)
Telecom	0.074	-0.070*	-0.155	0.011	-0.070
	(0.645)	(-1.739)	(-1.331)	(0.094)	(-0.542)
Consumer Nondurables	-0.111**	0.032	0.220***	0.004	-0.255***
	(-2.206)	(0.532)	(2.621)	(0.078)	(-3.158)
Consumer Durables	-0.052	0.067	0.126	-0.108**	-0.222**
	(-0.654)	(1.058)	(1.145)	(-2.559)	(-2.450)
Retail	-0.035	0.017	0.201***	-0.035	-0.192***
	(-0.632)	(0.396)	(2.689)	(-0.846)	(-2.889)
Energy	-0.086	0.167**	-0.372***	0.260***	-0.084
	(-1.429)	(2.447)	(-5.422)	(3.151)	(-1.010)
Utilities	0.027	0.126*	0.006	0.293***	0.309***
	(0.390)	(1.896)	(0.067)	(3.950)	(5.261)
Manufacturing	-0.061	0.071	-0.080	0.021	-0.151**
	(-1.189)	(1.575)	(-1.151)	(0.391)	(-2.210)
Chemicals	-0.087	-0.029	-0.054	0.057	0.042
	(-1.434)	(-0.601)	(-0.466)	(0.818)	(0.363)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	3,600	3,600	3,600	3,600	3,600
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.060	0.186	0.130	0.148	0.178

Table 3: Information content of matrices relative to director bios

For a random sample of 1,178 firms (representing 67% of firm-years with skills matrices), we collect all directors' bios from the proxy statement. For each of the 11,725 directors across these firm-years, we employ two approaches toward assessing whether skills listed in the matrix are also listed in the bio. Under both approaches, for each skill that the director is listed as having in the matrix, we search for whether the skill is also listed in the bio. Under the *narrow matching approach*, we search for the listed skill (or relevant portion thereof) that is denoted in the matrix. For example, for the skill 'brand management & marketing' we code the director as having the 'brand management & marketing' skill if either 'brand management' or 'marketing' is listed in the bio. Under the *broader matching approach*, we additionally search for the main skill category and any related other sub-categories, as listed in Appendix A. For example, for the skill 'brand management & marketing', we additionally search for 'consumer oriented', 'public relations', 'communications, 'sales', and 'retail'. Under both approaches, we focus on root words and account for common abbreviations. In Panel A, across the 11,725 directors we show the average percent of matrix skills that are listed in the bio, as well as the 25th, 50th, and 75th percentiles. In Panel B, we detail the percent of directors for whom no or all skills match. In Panel C, we report the number of directors within each of the 20 skill categories (as shown in Appendix A) denoted in the matrix (column 1), and the percent of which are listed in the bio according to the narrow matching approach (column 2) and the broader matching approach (column 3).

Panel A: Distribution across directors

	% matrix skills listed in director's bio			
	Average	Q1	Median	Q3
Narrow matching	51%	25%	50%	75%
Broader matching	62%	40%	67%	100%

Panel B: Frequency with which no (all) skills reported in matrices are reflected in bio

	% Directors for whom:		% Firms in which:	
	No skills match	All skills match	No skills match	All skills match
Narrow matching	14%	20%	1%	6%
Broader matching	8%	27%	0%	7%

Panel C: Distribution across skills

Skill	# Directors with skill reported in Matrix	% Cases where skill is also listed in bio: *Narrow matching approach*	*Broader matching approach*
Corporate Governance	6,234	57.09%	61.65%
Leadership	5,895	60.54%	75.12%
Finance	5,091	62.58%	73.33%
Strategy / M&A	3,675	37.06%	58.34%
International	3,653	60.22%	69.67%
Industry	3,322	48.28%	60.30%
Technology	2,694	53.56%	67.08%
Operations	2,675	47.10%	73.16%
Regulatory	2,581	36.42%	42.97%
Risk	2,493	35.46%	41.80%
Consumer Oriented	2,287	47.97%	53.13%
CEO	2,031	66.81%	86.36%
Diversity	1,523	8.54%	10.83%
HR	1,170	37.27%	60.00%
Investments	1,149	46.48%	50.91%
Environmental & Social	1,052	37.74%	40.11%
Accounting	941	40.70%	49.42%
Scientific	811	53.88%	70.04%
Real Estate	607	60.46%	67.05%
Academia	283	34.98%	34.98%

Table 4: Effects of Director Skills Matrix Disclosure on Shareholder Disagreement with ISS

The table reports OLS regressions estimating the effects of skills matrix disclosure on an investor's voting. The first year a firm discloses a matrix (treatment firm) is considered the event year. Firms that do not disclose a matrix (control firms) are matched with replacement to treatment firms in a given event year based on Fama-French 12 industry classification and a 10% firm size bandwidth (expanded to 25% if no initial match). We require both treatment and control firms to have at least one firm-year before matrix disclosure and one following matrix disclosure. We also limit the sample to the (-3,+3) firm-year window around disclosure. The dependent variable in both models is an indicator equal to one if the fund votes 'for' an individual director. Model 1 (2) includes observations where ISS recommends 'against' ('for') an individual director. Disclosure is an indicator equal to one for treatment firms in the post-disclosure period. Active voter is an indicator equal to one if the fund's predicted active voter score calculated following Iliev and Lowry (2015) is greater than zero. Each regression includes cohort by firm and cohort by year fixed effects. A cohort is defined as a matched treatment firm to control firm(s) group. t-statistics based on standard error clustered by fund are reported in parentheses. All observations are at the fund by director by meeting level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable = Fund 'for'	
	ISS 'against' subsample	ISS 'for' subsample
	Model 1	Model 2
Skills matrix x Active voter	0.050***	-0.001
	(3.265)	(-0.661)
Active voter	0.115***	0.001
	(3.676)	(0.362)
Skills matrix	-0.058	0.003***
(Treatment x Post)	(-1.357)	(2.833)
Treatment x Active voter	-0.010	0.001
	(-0.926)	(0.987)
Post x Active voter	-0.025*	-0.001
	(-1.828)	(-0.764)
Independent director	0.018***	0.001**
	(3.084)	(2.025)
Ln(Age)	-0.052***	0.007***
	(-5.900)	(7.352)
Ln(Tenure)	-0.010***	-0.004***
	(-4.541)	(-17.395)
Female	-0.018***	0.002***
	(-7.877)	(12.847)
Number of other directorships	-0.024***	-0.007***
	(-13.915)	(-18.184)
Director ownership	0.178	0.104***
	(1.477)	(7.947)
Audit committee	-0.018***	0.001***
	(-5.897)	(3.356)
Audit committee chair	-0.015***	0.000
	(-4.512)	(1.433)
Compensation committee	-0.074***	-0.003***
	(-16.880)	(-9.797)

Compensation committee chair	-0.029***	0.001**
	(-9.050)	(2.208)
Nominating committee	-0.031***	-0.005***
	(-5.814)	(-9.219)
Nominating committee chair	-0.020***	-0.010***
	(-4.827)	(-13.815)
Attendance problems	-0.208***	-0.020***
	(-11.207)	(-8.153)
Board independence	0.022	0.004**
	(0.404)	(2.444)
Board size	0.102*	-0.001
	(1.659)	(-0.863)
CEO-Chair duality	1.357***	-0.008
	(5.718)	(-1.454)
Institutional ownership	0.015	-0.000
	(0.341)	(-0.055)
Firm size	-0.159	-0.029***
	(-0.496)	(-2.800)
Market-to-book	0.778	0.000
	(0.865)	(0.010)
ROA	-0.049	-0.004**
	(-0.815)	(-2.036)
Abnormal stock return	-0.038***	-0.000*
	(-3.530)	(-1.845)
Stock return volatility	0.002	0.000***
	(1.254)	(5.779)
R&D	0.086**	-0.001
	(2.297)	(-0.913)
Fund size	0.025***	-0.000
	(5.211)	(-0.467)
Family size	0.011*	0.004***
	(1.814)	(3.257)
Fund turnover	-0.009	0.003***
	(-1.453)	(4.224)
Top 5 MSA	0.181***	-0.010**
	(6.373)	(-2.424)
Director-Fund-Year Obs.	218,546	7,175,703
Cohort-firm Fixed Effects	Yes	Yes
Cohort-year Fixed Effects	Yes	Yes
Adjusted R-squared	0.216	0.031

Table 5: Disagreement with ISS, heterogeneity analysis

The table reports OLS regressions estimating the effects of skills matrix disclosure on an investor's voting. The first year a firm discloses a matrix (treatment firm) is considered the event year. Firms that do not disclose a matrix (control firms) are matched with replacement to treatment firms in a given event year based on Fama-French 12 industry classification and a 10% firm size bandwidth (expanded to 25% if no initial match). We require both treatment and control firms to have at least one firm-year before matrix disclosure and one following matrix disclosure. We also limit the sample to the (-3,+3) firm-year window around disclosure. The dependent variable is an indicator equal to one if the fund votes 'for' an individual director. Panel A provides heterogeneity analysis across firm and director type. In columns 1 – 6 (columns 7 - 9), the sample is restricted to directors on which ISS recommends against (for). In columns 1 – 3 (columns 4 – 6), the sample is further restricted to active voter mutual funds (non-active voter funds), as described further in the text. In each model, skills matrix is interacted with a proxy for a *less precise ISS recommendation*. In columns 1, 4, and 7, this proxy equals affiliated director, defined using the ISS US Directors database as an outside director with a material relationship with the firm. In columns 2, 5, and 8, this proxy equals overboarded director, defined as a director that holds four or more public directorships. In columns 3, 6, and 9, this proxy equals high absolute abnormal return at earnings announcement, defined as an indicator equal to one if the firm-year observation falls in the top quartile of this AR for a given sample year. Panel B provides heterogeneity analysis across active investor type. Low (High) active voter is an indicator equal to one if the fund's predicted active voter score calculated following Iliev and Lowry (2015) is in the third (fourth) quartile. Post is an indicator equal to one for treatment firms in the post-disclosure period. All models suppress the director, firm and fund control variables for brevity. Each regression includes cohort by firm and cohort by year fixed effects. A cohort is defined as a matched treatment firm to control firm(s) group. t-statistics based on standard error clustered by fund are reported in parentheses. All observations are at the fund by director by meeting level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Heterogeneity among firms

	ISS Against Recommendations						*ISS For Recommendations*		
	Active voter funds			Non-active voter funds			All funds		
Measure of 'Less precise ISS Rec'	Affiliated Director	Over-Boarded Dir	High |AR| at Earn. annt	Affiliated Director	Over-Boarded Dir	High |AR| at Earn. annt	Affiliated Director	Over-Boarded Dir	High |AR| at Earn. annt
Skills matrix x *Less precise ISS Rec*	0.054***	0.062**	0.488***	0.037	0.034**	0.225	-0.002	-0.002**	-0.002*
	(2.645)	(2.398)	(3.607)	(1.323)	(2.082)	(1.217)	(-1.456)	(-2.112)	(-1.720)
Skills matrix (Treatment x Post)	-0.038	-0.071	-0.208***	-0.103	-0.103	-0.192*	0.002***	0.002***	0.003***
	(-0.807)	(-1.621)	(-2.873)	(-1.510)	(-1.591)	(-1.949)	(3.591)	(3.793)	(4.189)
Less precise ISS Rec	0.010	0.005	-0.054	-0.021***	-0.011	-0.076	-0.008***	-0.009***	-0.002***
	(0.760)	(0.393)	(-1.435)	(-2.803)	(-1.229)	(-1.641)	(-6.815)	(-8.593)	(-3.021)
Treatment x *Less precise ISS Rec*	0.018	-0.034**	-0.342***	0.009	0.023**	-0.274*	-0.004***	0.006***	0.005***
	(1.211)	(-2.127)	(-3.122)	(0.739)	(2.141)	(-1.746)	(-3.806)	(7.300)	(4.722)
Post x *Less precise ISS Rec*	-0.027**	0.015	0.114*	-0.047***	-0.008	0.076	0.003***	0.001	0.004***
	(-2.064)	(1.514)	(1.719)	(-3.780)	(-1.162)	(0.986)	(4.399)	(1.644)	(4.858)
Director-Fund-Year Obs.	105,492	105,492	105,492	113,052	113,052	113,052	7,175,703	7,175,703	7,175,703
Director, firm & fund controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.228	0.228	0.228	0.114	0.114	0.114	0.031	0.031	0.031

Panel B: Heterogeneity among active investors

	ISS 'against' recommendations			ISS 'for' recommendations		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Skills matrix x Low active voter	0.060***		0.072***	-0.001		-0.001
	(3.587)		(3.839)	(-1.205)		(-0.965)
Skills matrix x High active voter		0.002	0.023		0.001	0.001
		(0.109)	(1.297)		(1.142)	(0.538)
Skills matrix	-0.042	-0.033	-0.064	0.003***	0.002***	0.003***
	(-0.994)	(-0.787)	(-1.502)	(3.896)	(2.938)	(3.028)
Low active voter	0.042*		0.126***	-0.007**		-0.002
	(1.960)		(4.043)	(-2.421)		(-0.646)
High active voter		0.065**	0.166***		0.011***	0.011***
		(2.227)	(4.027)		(3.049)	(2.613)
Treatment x Low active voter	-0.050***		-0.043***	0.006***		0.005***
	(-4.273)		(-3.247)	(4.528)		(3.522)
Treatment x High active voter		0.037***	0.023*		-0.005***	-0.004***
		(3.463)	(1.945)		(-6.907)	(-4.443)
Post x Low active voter	-0.049***		-0.048***	0.002		0.001
	(-3.309)		(-2.956)	(1.609)		(0.743)
Post x High active voter		0.016	0.000		-0.003***	-0.003***
		(1.146)	(0.014)		(-4.037)	(-3.004)
Director-Fund-Year Obs.	218,546	218,546	218,546	7,175,703	7,175,703	7,175,703
Director, firm & fund controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.213	0.215	0.219	0.031	0.032	0.032

Table 6: ISS Recommendations

The table reports OLS regressions estimating the effects of skills matrix disclosure on ISS recommendations using the difference-in-difference framework as in Tables 4 and 5. The first year a firm discloses a matrix (treatment firm) is considered the event year. Firms that do not disclose a matrix (control firms) are matched with replacement to treatment firms in a given event year based on Fama-French 12 industry classification and a 10% firm size bandwidth (expanded to 25% if no initial match). We require both treatment and control firms to have at least one firm-year before matrix disclosure and one following matrix disclosure. We also limit the sample to the (-3,+3) firm-year window around disclosure. Regressions are based on director by meeting date observations where the dependent variable is an indicator equal to one if ISS recommends 'for' an individual director. Skills matrix is an indicator equal to one for treatment firms in the post-disclosure period. Each regression includes cohort by firm and cohort by year fixed effects. A cohort is defined as a matched treatment firm to control firm(s) group. Columns 1 – 3 (columns 4 – 6) include all (only 2019 – 2021) years of our sample. t-statistics based on standard error clustered by firm-meeting are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent variable: ISS 'for' recommendation (0/1)					
	All years: 2011 - 2021			*More recent years: 2019 - 2021*		
Measure of 'Blanket ISS Rec'		Affiliated Director	Over-Boarded Director		Affiliated Director	Over-Boarded Director
Skills matrix (Treatment x Post)	0.006	0.007	0.005	0.021***	0.022***	0.020***
	(1.601)	(1.754)	(1.394)	(2.895)	(2.708)	(2.726)
Skills matrix x *Blanket ISS Rec*		-0.019	0.070*		-0.028	0.154
		(-0.632)	(1.835)		(-0.417)	(1.436)
Blanket ISS Rec		-0.060***	-0.008		-0.066	-0.076
		(-3.951)	(-0.515)		(-1.339)	(-0.800)
Treatment x *Blanket ISS Rec*		-0.002	-0.022		0.006	-0.085
		(-0.096)	(-0.975)		(0.101)	(-1.059)
Post x *Blanket ISS Rec*		0.032*	-0.056**		0.051	-0.055
		(1.735)	(-2.243)		(1.000)	(-0.595)
Director-Year Obs.	56,701	56,701	56,701	19,669	19,669	19,669
Director & firm controls		Yes	Yes		Yes	Yes
Cohort-firm Fixed Effects		Yes	Yes		Yes	Yes
Cohort-year Fixed Effects		Yes	Yes		Yes	Yes
Adjusted R-squared	0.411	0.413	0.411	0.443	0.444	0.445

Table 7: Effects of Director Skills Matrix Disclosure on Shareholder Voting

The table reports OLS regressions estimating the effects of skills matrix disclosure on director support. Panel A reports results using the difference-in-difference framework as in Tables 4 and 5. The first year a firm discloses a matrix (treatment firm) is considered the event year. Firms that do not disclose a matrix (control firms) are matched with replacement to treatment firms in a given event year based on Fama-French 12 industry classification and a 10% firm size bandwidth (expanded to 25% if no initial match). We require both treatment and control firms to have at least one firm-year before matrix disclosure and one following matrix disclosure. We also limit the sample to the (-3,+3) firm-year window around disclosure. Regressions are based on director by fund by meeting date observations where the dependent variable is an indicator equal to one if the fund votes 'for' an individual director. A 'low' vote director is an indicator variable equal to one if the director falls in the bottom tercile of average percent 'for' votes in the pre-disclosure period for a given firm. Skills Matrix is an indicator equal to one for treatment firms in the post-disclosure period. Each regression includes cohort by firm and cohort by year fixed effects. A cohort is defined as a matched treatment firm to control firm(s) group. Panel B reports an instrumental variable analysis. Regressions are based on director by meeting date observations where the dependent variable in the first stage regression is an indicator equal to one if the firm discloses a skills matrix and in the second stage regression is the percent 'for' votes for an individual director. t-statistics based on standard error clustered by fund (Panel A) and by firm-meeting (Panel B) are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A:

	Dependent Variable = Fund 'for'	
	Model 1	Model 2
Skills Matrix	0.004***	0.002***
(Treatment x Post)	(5.991)	(2.956)
Skills Matrix x 'Low' vote director		0.010***
		(11.559)
'Low' vote director		-0.029**
		(23.803)
Treatment x 'Low' vote director		0.002**
		(2.413)
Post x 'Low' vote director		0.010***
		(13.283)
Residual of ISS 'for' recommendation	0.404***	0.395***
	(31.230)	(30.297)
Director-Fund-Year Obs.	7,394,249	7,394,249
Director, firm & fund controls	Yes	Yes
Cohort-firm Fixed Effects	Yes	Yes
Cohort-year Fixed Effects	Yes	Yes
Adjusted R-squared	0.198	0.204

Panel B: Instrumental Variable Approach

	Dependent Variable:	
	Skills Matrix	Percent 'for'
	1st stage	2nd stage
	Model 1	Model 2
Skills Matrix (instrumented)		0.027** (3.607)
Percentage of directors with other board seats at matrix firm (t-1)	0.381*** (9.825)	
Director-Year Obs.	98,324	98,324
Director & firm controls	Yes	Yes
Industry-year Fixed Effects	Yes	Yes
1st stage F-stat	96.50	
Adjusted R-squared	0.327	0.475

Table 8: Do Matrix Skills Predict Lawsuits?

The table reports linear probability models (OLS) estimating the likelihood of a civil litigation filing in a federal district court as disclosed to the SEC as material pending litigation. Regressions estimate the likelihood of a non-securities-related lawsuit, a cybersecurity-related lawsuit or an environmental-related lawsuit filed in the following three fiscal years. The sample is limited to firms that disclose a director skills matrix from 2011 through 2019. All models include year and industry fixed effects. t-statistics based on standard errors clustered by firm are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent variable =					
	Lawsuit	Cybersecurity lawsuit	Environmental lawsuit	Lawsuit	Cybersecurity lawsuit	Environmental lawsuit
	Presence of skill			*25% or more of Board has skill*		
Risk Management skill	-0.052**			-0.043*		
	(-2.164)			(-1.772)		
Cybersecurity skill		-0.020**			-0.018**	
		(-2.089)			(-2.156)	
Environmental skill			-0.025			0.051
			(-1.206)			(1.320)
Lawsuit in prior three years	0.123***	-0.057	0.090*	0.124***	-0.057	0.092*
	(3.736)	(-1.254)	(1.889)	(3.765)	(-1.254)	(1.899)
Board independence	0.007	-0.024	0.022	0.004	-0.025	0.024
	(0.141)	(-1.142)	(0.941)	(0.086)	(-1.206)	(1.014)
Board size	-0.004	-0.000	0.002	-0.004	-0.001	0.003
	(-0.688)	(-0.250)	(0.930)	(-0.756)	(-0.291)	(1.103)
Classified board	0.028	0.019	-0.024*	0.028	0.019	-0.022*
	(1.103)	(1.486)	(-1.899)	(1.083)	(1.444)	(-1.700)
Dual class	-0.016	0.011	0.018	-0.016	0.012	0.019
	(-0.241)	(0.396)	(0.437)	(-0.246)	(0.419)	(0.455)
CEO-chair duality	-0.036	0.002	0.005	-0.036	0.001	0.006
	(-1.483)	(0.185)	(0.321)	(-1.485)	(0.118)	(0.386)

Institutional ownership	-0.117**	-0.026	0.022	-0.115*	-0.026	0.017
	(-1.975)	(-0.724)	(0.838)	(-1.928)	(-0.715)	(0.651)
Firm Size	0.099***	0.015***	0.013**	0.099***	0.014***	0.013**
	(9.320)	(2.678)	(2.478)	(9.269)	(2.672)	(2.446)
Market-to-book	-0.038**	-0.004	-0.000	-0.039**	-0.003	0.001
	(-2.342)	(-0.515)	(-0.023)	(-2.411)	(-0.474)	(0.061)
ROA	-0.042	-0.005	-0.145	-0.039	-0.007	-0.149
	(-0.245)	(-0.070)	(-1.433)	(-0.223)	(-0.106)	(-1.457)
Abnormal stock return	-0.010	-0.002	0.004	-0.009	-0.002	0.004
	(-0.312)	(-0.269)	(0.253)	(-0.300)	(-0.262)	(0.231)
Return volatility	0.336	-0.139	-0.180	0.329	-0.139	-0.179
	(0.948)	(-1.353)	(-0.918)	(0.929)	(-1.348)	(-0.916)
R&D	0.131	0.115	-0.295	0.152	0.108	-0.327
	(0.353)	(0.913)	(-1.446)	(0.409)	(0.860)	(-1.451)
Constant	-0.777***	-0.083**	-0.210***	-0.772***	-0.080**	-0.201***
	(-6.042)	(-2.134)	(-3.302)	(-5.988)	(-2.091)	(-3.288)
Firm-Year Obs.	2,017	2,017	2,017	2,017	2,017	2,017
Adjusted R-squared	0.262	0.102	0.191	0.261	0.101	0.190

Table 9: Do Matrix Skills Predict Bad Deals?

The table reports linear probability models (OLS) estimating the likelihood of a negative acquisition outcome. The dependent variable in the regressions is an indicator equal to one if the firm announces an acquisition accompanied by a three-day announcement return (CAR) that is in the bottom decile of sample merger CARs in the following three fiscal years. The sample is limited to firm-years in which an acquisition is announced in the following three fiscal years. All models include year and industry fixed effects. t-statistics based on clustered standard errors at the firm-level are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent variable:	
	Deal with a CAR (-1,+1) in bottom decile in the following three fiscal years (0/1)	
	Model 1	Model 2
Strategy / M&A skill (0/1)	-0.100**	
	(-2.070)	
Strategy / M&A skill (%) > 25%		-0.082*
		(-1.743)
Board independence	-0.049	-0.044
	(-0.159)	(-0.143)
Board size	-0.003	-0.003
	(-0.317)	(-0.322)
Classified board	0.063	0.063
	(0.779)	(0.775)
Dual class	-0.137*	-0.143*
	(-1.778)	(-1.870)
CEO-chair duality	-0.067	-0.071
	(-1.313)	(-1.381)
Institutional ownership	0.054	0.067
	(0.589)	(0.739)
Firm size	0.001	0.004
	(0.077)	(0.211)
Market-to-book	0.043	0.044
	(1.060)	(1.078)
ROA	-0.411	-0.450
	(-1.101)	(-1.159)
Abnormal stock return	-0.175***	-0.179***
	(-2.912)	(-2.953)
Return volatility	0.959	0.908
	(1.310)	(1.224)
R&D	0.735	0.652
	(1.115)	(1.003)
Constant	0.024	-0.012
	(0.062)	(-0.031)
Firm-Year Obs.	446	446
Adjusted R-squared	0.070	0.062

Table 10: Window dressing

In Panel A, we limit the sample to the 2,719 director-years in which the director serves on multiple boards of matrix firms. Row 1 reports the average and median number of unique skills for each of these director-years, across all firms on which the director sits. Row 2 focuses on the subset of these unique skills that are listed in both the firms' matrices, i.e., both the firms on which the director serves, irrespective of whether directors is denoted as having the skill. Row 3 focuses on the subset of the row 2 skills that the director is denoted as having on both the firms' matrices (i.e., both the firms on which the director serves). In Panel B, for each of eight common skills, column 1 lists the number of director-years for which the skill is listed in the matrix. Columns 2 and 3 list the number of percent of these director-years for which the skill is listed in the focal firm only (and not the interlocked firms). In Panel C, we show regressions in which the dependent variable is a dummy variable equal to one if the fund voted for the director, zero otherwise. The sample similarly consists of director-years in which the director serves on multiple boards, and the observational level is director-firm-year-mutual fund. Independent variables include: Window dressing, which equals one if at least one of the firm's directors reports having a skill in the focal firm but not on the other firm's Board on which s/he serves; Active voter, which equals one if the fund is less likely to indiscriminately follow ISS, as defined in the text; Window dressing × Active voter; Number of skills listed in the matrix; Residual of ISS for recommendation, as defined in Table 7. The regressions also include other controls included in prior tables, director and year fixed effects. t-statistics based on standard error clustered by fund are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Skills reported by directors sitting on multiple boards

		Independent directors serving on multiple matrix boards in the same year (N=2,719 director × years)	
		Mean	Median
1	#Unique skills per director × year (across both firms on which s/he serves)	9.2	9.0
2	Subset of row 1 skills for which • Skill represents a matrix category in both a director's firms (i.e., both firms on which director serves)	4.1	4.0
3	Subset of row 1 skills for which: • Skill represents a matrix category in both a director's firms • Both firms report the director as possessing the skill	2.8	3.0

Panel B: Frequency with which a director reports possessing a skill on only one of her boards

Skill	# Director-years (where skill represents a matrix category in both of a director's firms)	# Director-years where director is listed as having skill for focal firm but not pair firm	% Director-years where director is listed as having skill for focal firm but not pair firm
Finance	2,285	618	27%
Leadership	1,717	259	15%
International	1,570	391	25%
Risk	1,114	164	15%
CEO	766	61	8%
HR	546	55	10%
Investments	478	30	6%
Real Estate	264	13	5%

Panel C: Shareholder voting

	Dependent variable = Fund 'for'	
	Model 1	Model 2
Window dressing (0/1)	0.007***	0.006***
	(10.501)	(7.633)
Window dressing x Active voter		0.002**
		(1.972)
Active voter (0/1)		0.003
		(1.073)
Number of skills listed	-0.000	-0.000
	(-1.254)	(-1.252)
Residual of ISS 'for' recommendation	0.308***	0.308***
	(18.068)	(18.070)
Director-fund-year observations	447,349	447,349
Director, firm & fund controls	Yes	Yes
Director and Year Fixed Effects	Yes	Yes
Adjusted R-squared	0.036	0.036

Table 11: Univariate analysis of firms with vs without window dressing

In Panel A, we limit the sample to the 2,491 firm-years in which the firm reports a skills matrix and the firm's Board includes at least one director who serves on at least one other firm who also reports a skills matrix. Column 1 shows average firm characteristics across the 1,151 firm-years with window dressing, where window dressing is defined in Table 10. Column 2 shows average firm characteristics across the 1,340 firm-years without window dressing. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, between the means of the two samples. In Panel B, we limit the sample to the 358 firm-years in which a firm first engages in window dressing, and we report abnormal stock returns for the fiscal year prior and the first fiscal year of such window dressing. In the bottom row of Panel B, we further restrict the sample to eliminate firm-years for which the first instance of window dressing coincided with the first year of reporting a skills matrix.

Panel A: Among firm-year with matrices, full sample of firms where we can identify window dressing

	Firm-years with window dressing (N = 1,071)	Firm-years without window dressing (N = 1,278)
Matrix Skill Characteristics		
Avg. number of skills per director	6.1	5.3***
Avg. percent of directors with skill	68%	62%***
Governance Characteristics		
Board size	10.5	10.2***
Board independence	85%	84%***
Classified board (0/1)	20%	19%
Dual class (0/1)	4%	5%
CEO-Chair duality (0/1)	41%	40%
Institutional ownership	74%	78%***
Firm Characteristics		
Firm size	9.47	9.07***
Market-to-book	1.10	1.00**
R&D	0.017	0.014*
Stock return volatility	9.8%	9.7%

Panel B: Among firm-years with matrices, first year in which firm engages in window dressing,

	Fiscal Year prior to matrix adoption	Fiscal Year of matrix adoption	Difference
Full sample (N=358)			
Abnormal stock returns	-0.70%	-5.43%	-4.70%**
Subset of firms-years for which first instance of window dressing did not coincide with matrix adoption (N=178)			
Abnormal stock returns	-1.60%	-8.00%	-6.40%**

Internet Appendix

The changing landscape of corporate governance disclosure: Impact on shareholder voting

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Table A1: Determinants of Director Skills Matrix Disclosure

The table reports OLS models estimating the likelihood of disclosing a director skills matrix in a given firm year. All independent variables are as of the fiscal year end prior to the board matrix disclosure in the annual proxy. Definitions are in Appendix B. Firms are included until they report a matrix or if they do not report one until the earlier of delisting or the end of the sample. t-statistics based on standard errors clustered by industry (Models 1 and 2) and by firm (Model 3) are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Var = Disclose Skills Matrix (0/1)		
	Model 1	Model 2	Model 3
Governance Factors:			
Board independence	0.021**	0.013	0.017
	(2.569)	(1.537)	(1.268)
Board size	0.004***	0.002**	0.003
	(2.946)	(2.223)	(0.990)
Classified board	-0.001	-0.000	-0.039**
	(-0.318)	(-0.097)	(-2.383)
Dual class	-0.025***	-0.029***	0.046
	(-2.912)	(-3.846)	(0.975)
CEO-Chair duality	0.008*	0.006	0.012
	(1.866)	(1.377)	(1.392)
Institutional ownership	-0.004	0.001	-0.053***
	(-0.498)	(0.120)	(-2.824)
External Factors:			
Board-related activism		0.031*	0.037**
		(1.791)	(2.279)
Non-board-related activism		-0.008	-0.001
		(-0.842)	(-0.041)
Percentage of industry peers with matrix		0.130**	0.276***
		(2.351)	(2.646)
Percentage of industry peers with matrix^2		-0.194**	-0.233
		(-2.003)	(-1.645)
Percentage of directors with other board seat at matrix firm		0.209***	0.271***
		(5.722)	(5.468)
Firm Financials:			
Firm size	0.020***	0.017***	0.003
	(7.167)	(7.450)	(0.412)
Market-to-book	-0.005	-0.006	0.003
	(-1.436)	(-1.667)	(0.349)
ROA	-0.015	-0.018	0.075
	(-0.571)	(-0.610)	(1.439)
Stock return	-0.004	-0.003	-0.003
	(-0.657)	(-0.563)	(-0.393)
Stock return volatility	0.119	0.101	0.023
	(1.340)	(1.505)	(0.267)
R&D	-0.049	-0.049	0.012
	(-0.720)	(-0.839)	(0.061)
Firm-Year Observations	12,434	12,434	12,434
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	No	No
Firm Fixed Effects	No	No	Yes
Adjusted R-squared	0.104	0.111	0.169

Table A2: Disagreement with ISS regressions, fixed effects robustness

The table reports OLS regressions estimating the effects of skills matrix disclosure on an investor's voting. The first year a firm discloses a matrix (treatment firm) is considered the event year. Firms that do not disclose a matrix (control firms) are matched with replacement to treatment firms in a given event year based on Fama-French 12 industry classification and a 10% firm size bandwidth (expanded to 25% if no initial match). We require both treatment and control firms to have at least one firm-year before matrix disclosure and one following matrix disclosure. We also limit the sample to the (-3,+3) firm-year window around disclosure. The dependent variable in all models is an indicator equal to one if the fund votes 'for' an individual director. Models 1 (2), 3 (4) and 5 (6) includes observations where ISS recommends 'against' ('for') an individual director. Disclosure is an indicator equal to one for treatment firms in the post-disclosure period. Active voter is an indicator equal to one if the fund's predicted active voter score calculated following Iliev and Lowry (2015) is greater than zero. Models 1 and 2 include firm and year fixed effects. Models 3 and 4 include firm, year and mutual fund fixed effects. Models 5 and 6 include cohort by firm and cohort by year fixed effects. A cohort is defined as a matched treatment firm to control firm(s) group. All models suppress the director, firm and fund control variables for brevity. t-statistics based on standard error clustered by fund are reported in parentheses. All observations are at the fund by director by meeting level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable = Fund 'for'					
	ISS 'against' subsample	ISS 'for' subsample	ISS 'against' subsample	ISS 'for' subsample	ISS 'against' subsample	ISS 'for' subsample
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Skills matrix x Active voter	0.054***	-0.001	0.030***	-0.000	0.027***	-0.000
	(3.492)	(-0.941)	(2.940)	(-0.246)	(2.587)	(-0.013)
Active voter	0.115***	0.001	-0.054**	0.004	-0.056**	0.004
	(3.653)	(0.373)	(-2.146)	(1.456)	(-2.227)	(1.474)
Skills matrix	-0.022	0.003***	-0.012	0.003***	-0.007	0.002***
(Treatment x Post)	(-1.600)	(4.254)	(-1.312)	(4.150)	(-0.220)	(2.734)
Treatment x Active voter	-0.011	0.001	0.019***	0.000	0.021***	0.000
	(-1.043)	(1.074)	(2.864)	(0.200)	(3.165)	(0.135)
Post x Active voter	-0.024*	-0.001	0.014*	-0.001	0.015*	-0.001
	(-1.785)	(-0.695)	(1.795)	(-1.107)	(1.880)	(-1.275)
Treatment	0.011*	-0.002***	-0.004	-0.001*		
	(1.736)	(-2.689)	(-0.952)	(-1.732)		
Post	0.005	-0.001*	-0.015***	-0.001		
	(0.712)	(-1.696)	(-3.727)	(-1.577)		
Director-Fund-Year Obs.	218,546	7,175,703	218,546	7,175,703	218,546	7,175,703
Director, Firm & Fund Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm & Year Fixed Effects	Yes	Yes	Yes	Yes	No	No
Mutual Fund Fixed Effects	No	No	Yes	Yes	Yes	Yes
Cohort-firm & Cohort-year Fixed Effects	No	No	No	No	Yes	Yes
Adjusted R-squared	0.208	0.025	0.549	0.155	0.557	0.161

Table A3: Disagreement with ISS, heterogeneity analysis using alternative proxies of 'Less informative ISS Rec'

The table reports OLS regressions estimating the effects of skills matrix disclosure on an investor's voting. The first year a firm discloses a matrix (treatment firm) is considered the event year. Firms that do not disclose a matrix (control firms) are matched with replacement to treatment firms in a given event year based on Fama-French 12 industry classification and a 10% firm size bandwidth (expanded to 25% if no initial match). We require both treatment and control firms to have at least one firm-year before matrix disclosure and one following matrix disclosure. We also limit the sample to the (-3,+3) firm-year window around disclosure. The dependent variable is an indicator equal to one if the fund votes 'for' an individual director. In columns 1 – 4 (columns 5 - 6), the sample is restricted to directors on which ISS recommends against (for). In columns 1 – 2 (columns 3 – 4), the sample is further restricted to active voter mutual funds (non-active voter funds), as described further in the text. Post is an indicator equal to one for treatment firms in the post-disclosure period. All models suppress the director, firm and fund control variables for brevity. In each model, skills matrix is interacted with a proxy for a *less precise ISS recommendation*. In columns 1, 3, and 5, this proxy equals high bid-ask spread, defined as an indicator equal to one if the firm-year observation falls in the top quartile of the bid-ask spread for a given sample year.. In columns 2, 4, and 6, this proxy equals high firm volatility, defined as an indicator equal to one if the firm-year observation falls in the top quartile of volatility for a given sample year. Each regression includes cohort by firm and cohort by year fixed effects. A cohort is defined as a matched treatment firm to control firm(s) group. t-statistics based on standard error clustered by fund are reported in parentheses. All observations are at the fund by director by meeting level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	ISS Against Recommendations				ISS For Recommendations	
	Active funds		Non-active funds		All funds	
Measure of 'Less Informative ISS Rec'	High Bid-Ask Spread	High Firm Volatility	High Bid-Ask Spread	High Firm Volatility	High Bid-Ask Spread	High Firm Volatility
Skills matrix x Less Informative ISS Rec	0.054***	0.364***	0.037	0.302**	-0.002	0.006***
	(2.645)	(4.144)	(1.323)	(2.092)	(-1.456)	(3.178)
Skills matrix (Treatment x Post)	-0.038	-0.215***	-0.103	-0.232**	0.002***	0.001**
	(-0.807)	(-4.578)	(-1.510)	(-2.424)	(3.591)	(2.137)
Informative ISS Rec	0.010	0.047	-0.021***	0.028	-0.008***	-0.002*
	(0.760)	(1.116)	(-2.803)	(0.511)	(-6.815)	(-1.893)
Treatment x Less Informative ISS Rec	0.018	-0.185**	0.009	-0.170*	-0.004***	-0.002
	(1.211)	(-2.417)	(0.739)	(-1.801)	(-3.806)	(-1.355)
Post x Less Informative ISS Rec	-0.027**	-0.545***	-0.047***	-0.215**	0.003***	-0.002
	(-2.064)	(-7.620)	(-3.780)	(-2.253)	(4.399)	(-1.474)
Director-Fund-Year Obs.	105,492	105,492	113,052	113,052	7,175,703	7,175,703
Director, firm & fund controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.228	0.228	0.114	0.114	0.031	0.031

Table A4: Does Disclosure of Matrix Skills Predict Negative Say-on-Pay Votes?

The table reports linear probability models (OLS) estimating the likelihood of a negative say-on-pay (SOP) vote. The dependent variable in each regression is an indicator equal to one if the firm receives a SOP vote in the bottom quintile of percent 'for' votes in any of the following three years. The sample is limited to firms that disclose a director skills matrix from 2011 through 2020 and with data on Say-on-Pay votes. All models include year and industry fixed effects. t-statistics based on clustered standard errors at the firm-level are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent variable:	
	Percent votes 'for' in lowest quintile in any of following three years (0/1)	
	Model 1	Model 2
Compensation skill (0/1)	-0.052*	
	(-1.663)	
Compensation skill (%) > 25%		-0.061*
		(-1.947)
ISS recommends against (0/1)	0.717***	0.716***
	(35.383)	(35.227)
Board independence	-0.055	-0.055
	(-0.990)	(-0.995)
Board size	-0.012***	-0.012***
	(-3.103)	(-3.087)
Classified board	-0.028	-0.028
	(-1.317)	(-1.323)
Dual class	0.037	0.036
	(0.668)	(0.647)
CEO-chair duality	0.007	0.008
	(0.387)	(0.405)
Institutional ownership	0.033	0.033
	(0.765)	(0.758)
Firm Size	0.024***	0.024***
	(2.911)	(2.919)
Market-to-Book	-0.021*	-0.021*
	(-1.812)	(-1.830)
ROA	-0.171	-0.171
	(-1.260)	(-1.256)
Stock Return	-0.075***	-0.075***
	(-2.906)	(-2.899)
Return Volatility	0.312	0.307
	(1.211)	(1.192)
R&D	-0.156	-0.149
	(-0.597)	(-0.568)
Firm-Year Obs.	2,665	2,665
Adjusted R-squared	0.303	0.303