The Changing Landscape of Corporate Governance Disclosure: Impact on Shareholder Voting

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August 2025

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Keywords: shareholder voting, boards of directors, skills matrices, corporate governance disclosure

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1. Introduction

Shareholder voting represents a direct channel through which firm owners influence the firm's governance structure. Amongst the various issues up for vote, director elections represent the largest category, over 70% of agenda items in the typical firm. Moreover, the identity of a firm's directors is of paramount importance: Burt et al. (2020) conclude that directors influence up to 1% of firm value, and Fischer et al. (2009) and Cai et al. (2009) find that lower director vote support increases firms' likelihood of implementing major governance reforms. The implication is that shareholders have strong incentives to evaluate directors up for vote.

Critically however, informed voting is limited by a lack of information on each director's capacity to advise and monitor. While mutual funds are required to vote on every director in every portfolio firm, the costs of doing so are prohibitive.[1] Funds often overcome these costs by relying on proxy advisory service firms' recommendations such as ISS; however, academics, practitioners, and regulators have questioned the accuracy of these recommendations. A rational response to such frictions is for firms to decrease the costs of evaluating directors; for example, by highlighting their expertise in a more transparent fashion. Analogously, investors should also push firms to make such changes.[2] 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. This trend is similar to the increase in infographics within 10-K filings (Christensen et al., 2024). Image-based representations can attract investor attention (Nekrasov et al., 2021) and significantly affect investors' evaluations (Hartzmark and Sussman, 2019; Ben-Rephael et al., 2025). In 2014, the Council of Institutional

[1] See Blankespoor et al.'s (2020) review paper, for an overview of investors' costs associated with interpreting firm disclosures.

[2] The increasing influence of shareholder votes suggests that these factors play a greater role in more recent years. Relevant changes include increases in majority voting provisions and the SEC's adoption of the universal proxy.

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.[3]

Our empirical analyses are based on detailed data collected from the proxy statements of S&P1500 firms from 2011 to 2021. For each firm-year, we determine whether the proxy statement includes a director skills matrix, which is typically a tabular description where directors are listed in each row and skills are listed across the columns. 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.

Skills matrices highlight information in ways that cannot be readily identified from director biographies (bios). 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 firm-year level, we are only able to match the skills of *all* directors serving on a firm's board for 5% of firm-years. Thus, there is much heterogeneity in the overlap between the bio and the matrix. In sum, skills matrices offer two advantages over director bios: they enable quick visual identification of key skills, and they highlight capabilities that may not be readily apparent from traditional biographical text.

Our main hypothesis is that firms voluntarily adopt skills matrices because they increase investors' ability to evaluate directors' expertise in ways that benefit both firms and shareholders. We begin with descriptive evidence on the types of firms with skills matrices. First, matrices are more common among better governed firms, consistent with these firms recognizing the value of this disclosure format. Second, consistent with investors pressuring firms to adopt a disclosure format they perceive as beneficial, firms with board-related activism in the prior year are more

[3] *'Best disclosure: director qualifications & skills'*, Council of Institutional Investors, Feb 2014; and '*"Best practices" in board matrices'*, New York City Pension Funds, New York City Comptroller Scott M. Stringer, Aug 2018.

likely to adopt skills matrices. Third, firms are more likely to adopt skills matrices when their directors serve on other boards that utilize this disclosure format, suggesting a learning channel.

To directly test our main hypothesis, we analyze shareholder voting. We predict that matrices increase directors' voting support. We employ two approaches to test this prediction. First, we follow the difference-in-difference approach of Baker et al. (2022) with a matched sample to overcome endogeneity concerns. Second, we employ an instrumental variables analysis, using director overlap at other firms with a skills matrix as an instrument. Both approaches indicate that skills matrices lead to increased voting support. Heterogeneity analyses demonstrate that effects are strongest where directors' contribution to the firm was less clear. First, the increase in voting support is higher among directors whose bios do not highlight key skills reported in the matrix explicitly. Second, the effects are significantly larger among smaller firms, which tend to have more opaque information environments.

In the next portion of the paper, we examine two potential channels underlying this higher voting support. First, we examine ISS recommendations. Like investors, ISS must evaluate an enormous number of directors, constraining the amount of time it can devote to each director (Iliev et al., 2021). If a director's capacity to monitor and advise the firm is not clear, ISS is more likely to recommend against the director. We find that when matrices highlight director skills that are not explicitly discussed in the bio, they lead to more positive ISS recommendations.

The second channel we examine is investors' propensity to independently vote, rather than passively following ISS's recommendation. Malenko and Shen (2015), Iliev and Lowry (2015), and Hayne and Vance (2019) conclude that ISS fails to sufficiently assess the unique governance demands of each firm; ISS's recommendations are susceptible to conflicts of interest and are not always focused on shareholder value. If skills matrices decrease investors' costs of evaluating

directors up for vote, then these image-based representations should diminish reliance on ISS. Our findings indicate that this channel also plays a significant role.

In the third part of the paper, we investigate the economic forces that cause skills matrices to increase voting support. Our main hypothesis is that these image-based formats decrease investors' information costs. However, it is also possible that they incentivize window-dressing, which investors do not see through. While bios describe directors' backgrounds in ways that depict the depth of experience, matrices limit such nuance. Matrices may enable firms to exaggerate a director's skills, for example by indicating that a director has a given skill even if the relevant experiences are limited. Ex ante, it is not clear whether the window dressing channel is influential. The repeated game-nature of shareholder voting, where the same investors tend to own shares and vote for multiple years, should represent a constraint on a firm's ability to exaggerate skills.

To examine window dressing, we take two approaches. The *Skill added* approach focuses on the subsample of firm-years in which a matrix is reported both in the current and prior year. A director-firm-year is categorized as window dressing if: the firm has limited expertise in an area relative to its peers, and a director reports adding this skill in year t (after not reporting it in year t-1). In the *Multiple matrix directorships* approach, we focus on directors who simultaneously sit on two or more boards that report matrices. We define window dressing as cases in which both the director's firms denote a skill as being relevant (defined as being one of the firm's matrix categories), but the director is reported as possessing the skill in only one of the firms. Using these alternative proxies, we find that 9 – 10% of director-firm-years (and 19 – 23% of firm-years) are classified as window dressing. We further find that firms' propensity to engage in window dressing is not random. Firms are more likely to window dress if they are the target of shareholder activism or if they have lower return on assets (ROA) or stock returns in the prior year.

An analysis of voting indicates that more attentive investors, defined as investors that are less likely to indiscriminately follow ISS (Iliev and Lowry, 2015; Ertimur et al., 2013), are more likely to see through window dressing. However, our findings suggest that both ISS and investors who are more likely to follow ISS are fooled by this window dressing behavior. Among these entities, matrices have a similar effect on voting behavior, irrespective of whether director skills are inflated via window dressing. Our results are robust across both measures of window dressing.

In the final part, we examine the benefits of matrices in terms of director labor markets. First, we analyze director turnover. Directors who receive low vote support are significantly less likely to remain on the board, particularly if they receive low support for two consecutive years. We find that the implementation of a skills matrix increases the probability of retention, consistent with matrices clarifying the contribution of directors - particularly for directors who had previously received low support. Second, we also find that the implementation of a skills matrix is associated with an increased probability of a director obtaining additional board seats, consistent with these image-based representations highlighting directors' value in more transparent ways.

Our paper contributes to several streams of literature. First, we contribute to the literature on director skills. Boards of directors are tasked with monitoring and advising management. However, it can be difficult for shareholders to assess directors' capacity to fulfill these roles. Adams et al. (2018) employ textual analysis of director descriptions provided in proxy statements to infer director skills, and they conclude that greater commonality of director skills within the Board contributes to higher firm value. In contrast, we focus on changes in how firms convey directors' skills to time-constrained investors. We examine outcomes ranging from director vote support, which arguably represents the first point an effect would be observed, to broader director labor market outcomes such as firms' abilities to choose and retain optimal directors.

Second, our findings contribute to the literature showing that images represent a more effective means of communication than text (Ben-Rephael et al, 2025; Hartzmark and Sussman, 2019). Incremental to this prior work on image-based disclosures, our setting is somewhat unique in the sense that matrices can both decrease information processing costs and facilitate window dressing. Our findings suggest that the repeated game nature of shareholder voting largely constrains window dressing, but firms under greater pressure due to poor performance or shareholder activists do engage in such behavior. While independent voters see through this window dressing, ISS and less independent voters do not.

Third, our paper contributes to literature on shareholder voting. A large body of literature focuses on firm and investor attributes that influence voting (see, e.g., Cai et al., 2009; Fischer et al., 2009; Ertimur et al., 2018; Aggarwal et al., 2019; Iliev et al., 2021, among others). In contrast, our findings provide evidence on firms' efforts to influence voting, holding constant governance characteristics. Babenko et al. (2023) conclude that management influences outcomes of close votes through obfuscation tactics, for example adjourning meetings and selective campaigning. In contrast, we show that management can influence outcomes through increased transparency.

Fourth, our paper contributes to literature on disclosure. A broad body of literature shows more transparent financial disclosure contributes to better firm outcomes, including a lower cost of capital, higher liquidity, more accurate analyst recommendations, and better investment allocation.[4] However, academic evidence on the value of corporate-governance-related disclosure is mixed. Hermalin and Weisbach (2012) find that more disclosure contributes to better quality decisions but can also lead to increased agency costs. Iliev (2010) and Chhaochharia and Grinstein (2007) show that while the added disclosure mandated by SOX might be value-increasing for large

[4] See review papers by Roychowdhury et al. (2019), Healy and Palepu (2001), and Blankespoor et al. (2020).

firms, it is value-decreasing for small ones. Given these costs and benefits, our finding that many firms voluntarily adopt this enhanced form of disclosure via 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

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. However, the regulation did not specify the format of these disclosures. In the years following this change, most firms complied by providing free-form paragraph descriptions about director qualifications under the directors' bios. In more recent years, an increasing percentage of firms have supplemented these textual descriptions with image-based representations, that is, with director skills matrices.

Our sample includes S&P 1500 companies from 2011 to 2021, 16,732 firm-years with 2,007 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 skills matrices are distinct from the textual director bios, which are provided separately in the proxy statement.

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).[5] Across our sample of 16,732 firm-years, 10.5% include a matrix with this tabular format. A smaller portion of firms (8.0% of firm-years in our sample) use

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

a similar image-based approach of check marks or icons to denote each director's skill, but instead of summarizing all skills within one table they include either a set of icons or a bulleted list of skills next to each director's bio (see Figure 1 Panel B for an example). Finally, across 3.0% of firm-years, the proxy simply includes a summary image-based 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 to the director bios (see Figure 1 Panel C for an example).[6]

We categorize all these cases as representing director skills matrices, a total of 3,600 firm-years (21.5% of firm-years in our sample) representing 950 unique firms (47.3% of our sample firms). For this set of firms, we use a combination of Python and manual collection to extract detailed skills information, as reported in the matrices. We standardize each reported skill into 20 main categories using Adams et al. (2018) as a basis for the classification. Appendix A provides the list of skill categories with examples of the sub-categories reported. Finally, we collect each director's bio for all firm-years with a skills matrix (see Figure 1, Panel D for an example).

We merge our matrix disclosure data with Compustat to obtain firm-level accounting data, with the Center for Research in Security 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, and the CRSP Mutual Funds database for fund characteristics.

2.2 Summary Statistics

To begin our investigation of director skills matrices, Figure 2 shows the time series trend

[6] In a small 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 firm-years in which each director is not explicitly matched to his/her skill and obtain qualitatively similar results.

in disclosure, across each of the Fama-French 12 industry groups. On average across all firms, less than five percent (66 firms) of our sample voluntarily disclosed a skills matrix in 2011, compared to nearly 65% (837 firms) by 2021. This trend is similar across all industries. The rate of increase is striking, given the absence of any changes in regulatory requirements over this period.

Panel A of Table 1 provides summary statistics of firm characteristics, as of the fiscal year end prior to the annual shareholder meeting, for our entire sample and conditional on a matrix. The top portion provides some evidence that skills matrices are more common among firms with stronger governance: boards are more independent and less likely to be classified, share structures are less likely to be dual class, and the CEO is less likely to also be chair of the board. Turning to financial characteristics, the most striking difference is firm size: matrices are more common among larger firms. As shown in Internet Appendix Figure A1, the relation between firm size decile and matrix adoption is nearly monotonic, increasing from an average of 11% among the smallest firms to 40% for the largest ones. This nearly four-fold increase in matrix disclosure across firm size deciles is consistent with Hermalin and Weisbach's (2012) conclusion that larger firms tend to optimally adopt stricter disclosure policies. Evidence on other firm characteristics is more mixed, for example with matrices being more common among firms with higher market-to-book ratios and higher volatility, but also among firms with lower R&D expenditures.

Panel B focuses on factors that potentially affect matrix adoption, and thus it compares the first year of matrix adoption (column 1) with all non-matrix firm-years (column 2).[7] Evidence suggests that external pressures and learning both contribute to adoption. Regarding external pressure, a firm is more likely to adopt a matrix if it experienced activism in the prior year,

[7] This represents a comparison of firm-years that decided not to adopt a matrix (the non-matrix firm-years) with firm-years in which the decision to adopt the matrix is made (matrix firm-years). Within our sample, no firm that adopts a matrix subsequently reverses this decision and stops disclosing a matrix.

irrespective of whether the activist focused on the board or more general objectives. Firms are also significantly more likely to adopt matrices after lower ROA and stock returns. Given that activism often follows poor performance, these differences may reflect similar underlying dynamics.

Panel B also shows that firms are more likely to adopt a matrix if a greater number of other firms in the same industry have a matrix. This may reflect external pressure, for example if investors place more pressure on a firm if its competitors provide this disclosure format. However, it may also reflect learning, for example if the firm learns about the benefits of matrices from other similar firms. As more direct evidence of a learning channel, we also find that firms are more likely to adopt a matrix if more of its directors sit on the board of another firm that utilizes a matrix. As shown in Internet Appendix Table A1, regressions examining all these characteristics together provide consistent evidence: matrices are largely driven by firm governance, size, and learning.

Finally, average director voting support is 96% in the first year of matrix adoption, compared to 95% in non-matrix firm years. We find a similar magnitude difference in ISS recommendations across the two samples. The higher voting support in univariate comparisons is striking given other differences between the two samples. As shown above, matrix firms also have poorer performance and face more shareholder activism. 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. Firms most commonly report seven to nine skills in their matrix, and each director typically lists 3 to 6 skills (see Internet Appendix Figure A2). In Figure 3, we detail the frequency with which individual director skills are disclosed, among firms 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 *Corporate Governance* and *Leadership*. In contrast, some skills are quite specialized and are reported relatively infrequently (e.g., approximately 10% report *Real Estate* and *Academia*). Panel B of Figure 3 details the time series trends among the five skills that exhibit the largest changes across our sample period: *Human Resources*, *Diversity,* and *Environmental & Social (E&S)* skills increase 250%, 200%, and 175%, respectively. The increase in both *Diversity* and *E&S* skills is consistent with demand for disclosures pertaining to such issues increase in recent years (Baloria et al., 2019). Other skills remain relatively stable over the sample period (among firm-years with a matrix).

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 matrices including certain skills, each of which has strong firm-specific or industry components. The sample is limited to the subset of 3,600 firm-years that report a matrix. Panel A of Table 2 focuses on two skills that relate broadly to the operational structure of firms in multiple industries: *International* and *Technology*. In column 1 we find that firms with more international operations, proxied by an international segment reported in the Compustat segment data, are significantly more likely to report a director with international expertise. Column 2 shows that firms whose operations are more innovation-oriented, proxied by number of patents, are significantly more likely to report a director with technology expertise.

Panel B examines five skills generally related to industry expertise: *Investments, Scientific*, *Consumer-oriented*, *E&S*, and *Regulatory*. Results 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* skills are greater in the utility industry. Collectively these findings suggest that the skills reported in matrices are directly tied to a firm's governance demands.

2.4 Comparison of directors' skills as reported in skills matrix versus in bio

Firms have discretion regarding both directors' descriptions in bios and directors' skills listed in matrices. In this subsection, we seek to understand whether matrices simply summarize the bios or whether they provide incremental information. As a first step, we examine the extent to which firms change the content of the director bios when they adopt a matrix. For each matrix firm, we define year 0 as the year of matrix adoption and calculate the average cosine similarity between a director's bio in year t and year t-1, for years 0 to 5. As shown in Panel A of Figure 4, this cosine similarity is close to one in the year of matrix adoption, indicating no abnormal change in directors' bios. Similarly, it is also close to one in subsequent years.[8]

Panel B of Figure 4 depicts the median change in director bio length each year, from year 0 through year 5. Each year, we plot the percentage difference relative to the prior year. We find that percentage changes each year are close to zero, indicating no abnormal increase or decrease in bio length around the time of matrix adoption or in the subsequent years. Collectively, evidence in Figure 4 suggests that matrices do not substitute for director bios.

We next compare the information provided in matrices versus director bios. For each director × firm × year, we employ two approaches to compare the skills listed in the matrix with

[8] Internet Appendix Figure A3 shows that conclusions are similar using alternative similarity scores, including for example the *Jaccard Similarity* score and the *Levenshtein Distance* score. See Loughran and McDonald (2016) for a survey of alternative textual analysis approaches.

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 this 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 listed skill belongs and any other related sub-categories, as listed in Appendix A. Continuing with the same example, because the skills '*Brand Management*' and '*Marketing*' belong to the '*Consumer Oriented*' skill category, we additionally search for '*consumer oriented*' and for all the associated subcategories: '*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. For example, for directors at the 25th (75th) 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 36% of directors have all matrix skills readily discernible. Turning to columns 3 and 4, there are extremely few firm-years with a zero match rate, but only 5% of firm-years in which all skills match.

Panel C shows the heterogeneity across skills. Some skills are more frequently discernible from the bio, for example *CEO* (87% of directors with this matrix skill also specify it in the bio,

based on the broader matching procedure),[9] *Leadership* (75%), and *Operations* (77%). In contrast, the *E&S, Risk Management*, and *Regulatory* skills tend to be less identifiable from the bio, as evidenced by matching rates of 40% – 50% based on the broader matching procedure. Other skills, such as *Academia* and *Diversity,* also have low matching rates. Conclusions are similar using the narrow matching procedure, albeit with lower matching percentages.

3. Influence of Director Skills Matrices on Investor Voting

In this section, we focus on our first main research question: do image-based representations of director skills decrease investors' costs of evaluating directors up for vote, in ways that increase voting support. While directors can significantly affect firm value (Burt et al., 2020), Bebchuk and Hirst's (2019) findings suggest that investors devote a fraction of a person-hour towards evaluation of each director. They show that the average employee in the stewardship department of the Big Three mutual funds (Blackrock, State Street, and Vanguard) is responsible for 250 to 2,016 portfolio companies. As such, when a director's value to the firm is unclear, investors are likely to vote against that director. If matrices decrease the amount of time required to assess the expertise of each director, then they should contribute to higher vote support.

We employ two alternative specifications to test the effects of skills matrices on voting support, a difference-in-difference framework and an instrumental variables analysis. We begin our discussion with the difference-in-difference analysis, which is shown in Table 4.

We follow the approach recommended by Baker et al. (2022) and similar to 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 equal to one if the fund

[9]Cases in which the CEO skill is not discernible from the bio generally fall into one of two categories: the classification is correct (the bio does not mention CEO experience), or ambiguity (the firm reports the matrix skill as 'CEO/president' and a reader cannot discern which of these skills the director possesses).

voted 'for' the director, zero otherwise. The treatment sample represents firms that disclose a matrix, where the first year of disclosure is considered the event year (year 0). For each treatment firm, we select one matched control firm that does not disclose a matrix; matching is without replacement in a given event year, based on 2-digit SIC code and closest firm size within a 25% firm size bandwidth. 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 disclosure). Finally, we limit the sample to the three years before and after matrix adoption. *Treatment* equals one for firms in the treatment sample, and *Post* equals one for the (0, +2) window.

The independent variable of interest is *Skills matrix,* which equals one for firm-years that disclose a matrix. Within our difference-in-difference setup, this equates to *Treatment* × *Post*. We include *cohort* × *firm* and *cohort* × *year* fixed effects, where a cohort is defined as all firms that adopt a matrix within a given year combined with matched control firms.[10] As Baker et al. (2022) discuss, when treatment is staggered in time (in our setting, firms adopt matrices at different points) and treatment effects can be heterogeneous (the influence of matrices on voting varies across firms), conventional staggered difference-in-difference estimators can be biased. *Cohort* × *firm* fixed effects control for this potential bias. Additionally, *Cohort* × *year* fixed effects allow for time trends that vary by cohort. We also include a wide array of control variables related to voting: director characteristics, firm-level governance factors, and firm financial characteristics. For brevity, we suppress these controls in Table 4, but the tabulated regression with all control variables is shown in Internet Appendix Table A2. Standard errors are clustered by fund.

Results in Panel A show that these image-based disclosures significantly increase voting support. The adoption of a matrix leads to a 0.6 percentage point increase in voting support. This

[10] These fixed effects soak up the individual *Treatment* and *Post* terms in our specifications.

is similar in magnitude to female director (coefficient = 0.005), and greater in magnitude than most board committee memberships/chairs, and CEO-Chair duality, all of which have been shown to be important forms of governance. Cai et al. (2009) find that even small changes in voting support lead to statistically significant effects on outcomes, including CEO turnover, CEO compensation, and governance structures, among others.[11] We analyze the real effects of matrices in Section 6.

Figure 5 shows that the parallel trends requirement of the difference-in-difference analysis is plausibly satisfied. The figure plots event time coefficients estimating the difference in director-level vote support between treatment and control samples in each event year. The treatment and control groups show similar trends in voting support prior to time t, the adoption of the matrix. Following year t, the difference between the two groups widens.

We conduct heterogeneity analyses to better understand the factors that drive this higher voting support. First, we evaluate the role of information frictions: matrices enable investors to more quickly assess key director qualifications. We posit that alleviating information frictions has more value among firms with more opaque information environments. To test this, we divide firms into two subsamples based on firm size, based on evidence that small firms tend to be characterized by higher information asymmetry. We estimate a difference-in-difference regression similar to that in column 1, except we now interact *Skills matrix* with *Small firm*, which represents an indicator variable equal to one if firm market capitalization in year t is in the bottom tercile, zero otherwise.[12] Consistent with predictions, the coefficient on *Skills matrix* × *Small firm* is significantly positive. The coefficient on *Skills matrix* also continues to be significantly positive. In economic terms, the magnitude of the effect for small firms is nearly double that of larger firms.

[11] Cai et al. (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.
[12] Because *Skills matrix* actually represents *Treatment*×*Post*, we also include all of the associated interaction terms: *Treatment*×*Small firm* and *Post*×*Small firm*.

Second, we examine if the value of matrices is higher when they contain more incremental information, which is not readily evident from director bios. For each director × firm × year, we use the broad matching technique (as described previously) to calculate the percentage of each director's matrix skills that are also listed in the bio. We calculate the average across each firm-year and categorize firm-years into those with above- versus below-median match rates. We again estimate difference-in-difference regressions, but now the independent variables of interest include two indicators: (i) S*kills matrix with low bio match rate* and (ii) S*kills matrix with high bio match rate*.[13] Among matrices with less incremental information, a matrix contributes to 0.5 percentage point higher voting support. In contrast, among matrices with greater incremental information, a matrix contributes to 0.7 percentage point higher voting support. The difference in the coefficients is significant at the 1% level.

The strict set of fixed effects in the difference-in-difference specification 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 may also alter investors' perception of the board. To address such concerns, we estimate a 2SLS analysis.[14] To instrument for matrix adoption, we use *Director overlap at other matrix boards*, defined as the percentage of directors (at the focal firm) with at least one board seat at another 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; Seo, 2021), suggesting that the relevance condition is plausibly

[13] For this matching analysis, to avoid a mechanical relation, we exclude firm-years that have both the matrix format of Example #2 from Figure 1 (where skills are less clearly separable from the text portion) and a match rate under the *broader matching approach* greater than 98%. This exclusion represents less than 8% of the overall sample.

[14] The number of observations differ between our difference-in-difference and 2SLS approaches due to the construction of the matching sample process.

satisfied. The exclusion condition requires that this instrument does not directly affect shareholder voting, except through the influence of the matrix. This condition is also plausibly satisfied.

We again estimate regressions at the firm × year × director × mutual fund vote level. As shown in column 1 of Table 5, this instrument is highly significant in explaining matrix adoption, and the first stage F-statistic is over 1,000. The second stage results, reported in column 2, indicate that instrumented matrix adoption is significantly positively related to director support.[15] In economic terms, the marginal effect of going from the 10th percentile to the 90th percentile (0.131) of matrix probability is associated with voting support that is 0.5 percentage points higher. This is a similar magnitude to that of a one standard deviation change based on the difference-in-difference analysis (as shown in Table 4).

In column 3 of Table 5, we examine whether the 2SLS specification similarly indicates that matrix value is greater among more informationally opaque firms, as proxied by firm size. The second stage regression includes two independent variables of interest: *Skills matrix* (instrumented) and *Skills matrix* × *Small firm* (instrumented).[16] Consistent with results from the difference-in-difference specification, we again find that the positive effects of matrices on voting support are significantly greater among smaller firms.

In sum, the findings in Tables 4 and 5 are consistent with image-based formats decreasing information costs, benefiting both investors and firms. These results help explain why firms have voluntarily adopted this image-based format, even in the absence of any regulatory requirement.

[15] We are unable to estimate 2SLS regressions analogous to column 3 of Panel A, which focus on the bio match rate. This is because we lack an instrument that captures the specifics of matrices, i.e., whether it has a low or high match rate with the bio. The first stage for the 2SLS analyses represents a prediction of which firms have matrices.

[16] As is standard in these specifications, two first stage regressions underly this second stage regression. In one, the dependent variable is *Skills matrix* and the instrument is *Director overlap at other matrix firms*. In the second, the dependent variable is *Skills matrix*×*Small firm* and the instrument is *Director overlap at other matrix firms*×*Small firm.* The F-statistic is over 3,700 in both these first stage regressions.

4. Channels underlying higher voting support

We posit two channels that potentially underly the positive influence of skills matrices on voting support. First, skills matrices may contribute to higher ISS recommendations. Second, skills matrices may contribute to more independent voting and less reliance on ISS.

4.1 Influence of skills matrices on ISS recommendations

In Table 6, we examine the effects of skills matrices on ISS recommendations. If skills matrices decrease the costs of evaluating directors, and if ISS takes advantage of this new disclosure format, then these matrices should also contribute to more positive ISS recommendations. We evaluate this prediction in Table 6. Specifications are similar to those in Table 4, with the exception that the observational level is director × firm × year and the dependent variable is a dummy equal to one if ISS recommended 'for' the director. In Panel A, we show difference-in-difference regressions. Consistent with expectations, the coefficient on *Skills matrix* is positive, however it is insignificant at conventional levels. We also find a positive coefficient on *Skills matrix* × *Small firm*, however it is similarly insignificant at conventional levels (Column 2). Conclusions are similar using 2SLS specifications, as shown in Panel B.

The finding that matrices do not contribute to significantly higher ISS support contrasts with the positive effects of matrices on mutual fund support. One possible explanation is that ISS only finds matrices to be informative when they contain more incremental information, relative to the bio. Findings are consistent with this conjecture. As shown in column 3 of Panel A, the coefficient on *Skills matrix* × *Low bio match rate* is significantly positive; in economic terms, a skills matrix increases the likelihood ISS recommends 'for' by 1.6 percentage points within this subsample. In contrast, the coefficient on *Skills matrix* × *High bio match rate* is insignificant at conventional levels.

In aggregate, results are consistent with ISS relying less on skills matrices than investors, potentially because their business model requires evaluating all directors, and they have built an information structure to achieve that. Skills matrices only influence ISS recommendations in firms where the matrix contains more incremental information relative to the bio. The differing impact of matrices on investor voting compared to ISS recommendations is intriguing. This pattern implies that various investor types may rely differently on ISS, director bios, and matrix disclosures; we examine this directly in Section 5.

4.2 Influence of skills matrices on independent voting

If image-based representations of director skills decrease investors' costs of evaluating directors up for vote, then they should diminish reliance on proxy advisory service companies. As discussed by Iliev and Lowry (2015), investors 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 fulfill their fiduciary duty to vote by relying on the recommendations of a proxy advisory service company such as ISS. In Table 7, we examine the extent to which skills matrices contribute to more independent voting, i.e., less reliance on ISS.

We estimate both difference-in-difference and 2SLS regressions, similar to prior tables. The dependent variable is *Fund 'for'*, and the independent variables of interest include both *Skills matrix* and *Skills matrix* × *ISS against*. If skills matrices decrease reliance on ISS, then skills matrices should increase investors' propensity to come to a different conclusion than ISS. That is, investors should be particularly likely to vote 'for' when ISS recommends 'against'. Results are consistent with this prediction. Looking first at the difference-in-difference specification shown in column 1, *Skills matrix* × *ISS against* is significant at the 1% level. In economic terms, matrices cause a 3.7 percentage point increase in voting support among directors that ISS recommended

against. Column 2 reports the analogous 2SLS regressions; the coefficient on the interaction terms is similarly positive and highly significant.

Results throughout this section demonstrate that skills matrices increase voting support, and both more positive recommendations from ISS and increases in investors' propensity to independently vote rather than follow ISS 'against' recommendations contribute to this effect.

5. Economic factors underlying higher voting support

Our results suggest that investors deem skills matrices to be informative. However, it is also possible that some firms employ matrices as a means of window dressing. Gow et al. (2018) find that firms strategically omit certain information from director bios, for example directorships on firms that have experienced an adverse event. Relative to bios, matrices facilitate not only strategic disclosure but also the exaggeration of director expertise. Whereas bios represent descriptions of directors' expertise, matrices typically allow directors to just 'check a box', indicating whether they possess a certain skill. As such, matrices could facilitate the exaggeration of director skills. Firms could elect to 'check the box' for a given director, even if the director's expertise and experience were relatively small or inconsequential.

Ex ante, it is not clear whether investors would see through this window dressing behavior. On the one hand, prior literature finds that investors focus on image-based disclosures that are easy to interpret, and ignore the underlying details (Ben-Rephael et al., 2025). This suggests that investors would simply focus on the skills listed in the matrix, as the depth of skills is costlier to ascertain. Alternatively, the repeated game nature of investor-firm relations suggests that any gains to window dressing might be limited or even detrimental. Investors, and particularly large investors, typically own firms and thus vote on the same directors for many years.

5.1 Measurement of window dressing

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 employ two approaches. First, we focus on the subset of firm-years with a matrix in both year t and year t-1, and form a proxy based on the premise that a director is more likely to exaggerate a skill when the overall board lacks expertise in that area, particularly relative to its peers. We classify cases where the percentage of directors with a certain skill (relative to the overall industry-year) is below the 25th percentile as limited expertise. If a director adds a skill in year t (after reporting not possessing it in year t-1), and the board had limited expertise in that area, we classify this as window dressing. We refer to this as the *Skill added* approach.

Panel A of Figure 6 provides an example, based on Hewlett Packard (HP). In 2017, HP lists 38% of its directors as having finance experience, which is below the 25th percentile of the overall industry (which equals 50%). In 2018, HP newly designates two existing directors, Patricia Russo and Margaret Whitman, as having the finance skill, after reporting that they did not in 2017; this raises the total percent of directors with finance expertise to 54%. We categorize Patricia F. Russo × HP × 2018 and Margaret Whitman × HP × 2018 as window dressing the finance skill.

Our second approach focuses directors that sit on multiple boards of matrix firms, a total of 5,205 director × firm × year observations. We compare the skills listed for each director, across his/her firms. In order to facilitate comparisons across firms, we impose two additional filters: we focus only on the skills that both firms include in the skills matrix, and we exclude skills that would reasonably be interpreted differently across firms (e.g., industry, consumer oriented) and skills with many subcategories (e.g., operations) because the relevant subcategory would be more likely

to differ across firms.[17] We refer to this as the *Multiple matrix directorships* approach.

Panel B of Figure 6 provides an illustrative example. The 2020 boards of Kennemetal Inc and Sherwin-Williams Co are shown. There is one director, Steven Wunning, who sits on both boards. We summarize Wunnning's skills within each firm, using the classifications employed throughout the paper (as described in section 2.1). Wunning lists three comparable skills across the two firms: international, leadership, and finance. Across these skills, both firms list Wunning as having international and leadership skills, but only Sherwin Williams denotes him as possessing finance skills. Thus, we categorize Wunning × Sherwin Williams × 2020 as window dressing the finance skill. Anecdotal evidence further supports this conclusion: looking at Wunning's Sherwin-Williams bio in Figure 6, there is nothing that specifically conveys finance expertise.

Based on these two measures, Panel A of Table 8 provides descriptive statistics on the propensity of window dressing. Estimated rates are similar across both approaches: 9 – 10% of director × firm × years and 19 - 23% of firm × years. In sum, window dressing is not pervasive, but it is not extremely rare either. In Panel B of Table 8, we tabulate the rate of window dressing for each individual skill. We show the percent of director × firm × years in which the director is classified as window dressing each skill, using each approach. Across all firms, we find that the *Finance* skill is more likely than other skills to be subject to window dressing. Other skills with relatively high rates include *International* and *Risk*. In contrast, more clearly definable skills such as *CEO*, *Real Estate*, and *Academia* have much lower rates.

5.2 Types of firms engaging in window dressing

We posit that firms are more likely to camouflage weaknesses when there are other causes for concern. This suggests that firms would be more likely to engage in window dressing when

[17] Our final set of eleven skills includes: Academia, Accounting, CEO, Diversity, Finance, HR, International, Investments, Leadership, Real estate, and Risk.

firm performance is weak or when management is facing external pressure for change. We examine these predictions in Panel A of Table 9, using both the S*kill added* (columns 1 and 2) and the *Multiple matrix directorships* (columns 3 and 4) approaches. To separate the decision to window dress from the decision to adopt a matrix, we limit our sample to firms that have had a matrix for at least three years. We compare the first year in which a firm engages in window dressing (columns 1 and 3) with the three years prior to such window dressing (columns 2 and 4).

Findings are consistent with our predictions. Looking first at the top of the panel, firm-years with window dressing are characterized by significantly higher rates of activism. The difference is 26% versus 21% using the *Skill added* measure, and 30% vs 24% using the *Multiple matrix directorships* measure. That is, activism is associated with an approximately 25% increase in window dressing, suggesting that in many cases firms respond to activists by exaggerating the skills of current directors rather than (or in addition to) adding new directors. Subsequent rows in Panel A focus on firm performance, and they yield similar conclusions. Firm-years with window dressing tend to have lower *ROA* and lower *Excess stock returns*. [18]

In Panel B, we additionally examine the extent to which firm governance varies between firms that window dress versus those that do not. Because firm governance is relatively constant over time, we compare firms with window dressing to those without. Specifically, we first form a sample of firm-years with window dressing, limiting the sample to the first year in which each firm engaged in such behavior (similar to the samples in columns 1 and 3 of Panel A). We compare these firm-years to a matched sample, where for each window dressing firm-year, we match to another firm in the same industry, same year, and similar size, but which has not engaged in

[18] Adams et al. (2018) find no evidence that poorly performing firms have longer bios, which they interpret as evidence against window dressing. Our findings of significant window dressing in matrices is consistent with such behavior being easier in the matrix format, compared to the textual bio format.

window dressing. We employ the same matching procedure as used in the difference-in-difference specifications, as explained previously in section 3.1. Results show little evidence of significant differences in governance. While Ajinkya et al. (2005) conclude that governance affects disclosure decisions related to earnings forecasts, our findings indicate that governance does not affect the decision to window dress the skills of the firm's directors.

5.3 Effects of window dressing on voting support

In Table 10, we examine whether window dressing contributes to higher voting support. We estimate regressions at the director × firm × year × fund level, in which the dependent variable equals one if the mutual fund voted 'for' the director, zero otherwise. Looking first at Panel A, we use the cohort-based set of fixed effects, as employed in prior tables. The key independent variables are $Skills\ matrix_{Non\text{-}window\ dressing}$ and $Skills\ matrix_{Window\ Dressing}$, defined as the firm having a skills matrix and no directors with exaggerated skills or at least one director with a skill classified as window dressing, respectively. In columns 1 – 3, we use the *Skill added* approach to identify window dressing, and in columns 4 – 6, we use the *Multiple matrix directorships* approach.

In columns 1 and 4, we include the entire set of mutual funds. If funds see through window dressing, then the coefficient on $Skills\ matrix_{non\text{-}window\ dressing}$ should be significantly greater than that on $Skills\ matrix_{window\ dressing}$. On average across all mutual funds, we find only weak evidence consistent with this prediction. The coefficients are only significant from each other in the expected direction using the *Multiple matrix directorships* measure of window dressing.

In columns 2 – 3 and 5 – 6 we divide the sample based on differences in investors' voting strategies. Some mutual funds rely heavily (sometimes exclusively) on the recommendations of proxy advisory firms such as ISS. In these cases, the investors may not notice the window dressing as they are less likely to review the matrix. In contrast, other funds assess directors up for vote

more independently: they employ ISS recommendations as one source of information, and they complement this with independent research.

Following Iliev and Lowry (2015), we define independent voters based on the first principal component of four fund characteristics: fund assets under management, fund family assets under management, fund turnover, and location in an area of high fund concentration. Each of these factors relate to the net benefits of independently voting as opposed to indiscriminately following ISS. Fund and family size capture economies of scale in research: when assets under management are greater, research costs can be spread over a wider base. In a similar vein, funds with lower turnover can spread research costs over a longer time period. 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 (Hong et al., 2005). The net benefits of independently voting are positively related to fund size, family size, and fund geographical concentration, and negatively related to fund turnover. 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 (approximately equal to above median) to be independent voters, that is, mutual funds who are less likely to outsource all voting to a proxy advisory company such as ISS.

Regressions focusing on independent voter mutual funds are shown in columns 2 and 5. To the extent that independent voter mutual funds research directors up for vote more intensely, we would expect these investors to be more likely to see through window dressing. Findings are consistent with this prediction. The coefficient on $Skills\ matrix_{non\text{-}window\ dressing}$ is significantly greater than that on $Skills\ matrix_{window\ dressing}$, using both measures of window dressing.

In contrast, we find no evidence that non-independent voter mutual funds see through window dressing, as shown in columns 3 and 6. Using the *Skill added* measure of window dressing,

results are opposite to predictions, with the coefficient on *Skills matrix*$_{window\ dressing}$ being significantly greater than that on *Skills matrix*$_{non\text{-}window\ dressing}$. Using the *Multiple matrix directorships* measure, the two coefficients are equivalent.

In Panel B, we employ an alternative specification, which more completely controls for 'true' director expertise, while continuing to focus on differences in how firms report this expertise. Specifically, we continue to use the *Multiple matrix directorships* approach toward identifying window dressing (similar to right-hand columns of Panel A), but we limit the sample to firm-years with matrices and we hold director quality constant via the inclusion of director fixed effects. Our key independent variables are *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), and its interaction with our measure of independent voting from ISS, *Window dressing* × *Independent voter*. We also include year fixed effects and control variables used in prior tables, and standard errors are clustered by fund.

In column 1, the significantly negative coefficient on *Window dressing* indicates that the presence of window dressing significantly lessens voting support. In column 2, the coefficient on *Window dressing x Independent voter* is significantly negative while the coefficient on *Window dressing* is no longer significant. This finding indicates that this lower voting support is concentrated among more independent voters.

Finally, we examine whether ISS recognizes window dressing. As mentioned previously, ISS's business model requires it to evaluate every item up for vote in every publicly traded firm. On the one hand, given that this is the focus of its business, ISS should be skilled at accurately identifying director expertise, and it should not be fooled by window dressing behavior. On the other hand, time constraints may limit ISS's ability to conduct in-depth evaluations of each firm.

Consistent with this, Field and Lowry (2022) conclude that ISS does not recognize firm-specific governance demands, when these demands differ from other firms in the industry. Our findings are more in line with the second explanation. As reported in Internet Appendix Table A5, our findings indicate that ISS is fooled by firms' window dressing. ISS is equally likely to recommend for a director that window dresses a skill versus one that does not.

In sum, the findings suggest that 19 – 23% of firms employ matrices to engage in window dressing, and both ISS and less diligent voters are fooled by this window dressing. In contrast, the more independent voters, who expend the time and resources to compare a director's reported skills across firms, appear to see through window dressing behavior. Among these voters, the effect of a skills matrix on voting support is 50 – 67% greater if there is no window dressing.

6. Effects of skill matrices on director labor markets

From the perspective of firms, a key benefit of skills matrices is that they more effectively highlight firms' motivations for each director, that is, the expertise of each director that enables him or her to contribute positively to the firm. Results to this point regarding matrices' positive effects on voting support are consistent with this. Given that matrices highlight the qualities of directors, we examine director labor market outcomes tied to matrices. In section 6.1, we examine further predictions regarding firm-level outcomes, in particular, the retention of directors who might have otherwise left the Board. In section 6.2, we examine if directors also personally benefit from the transparent demonstration of their expertise, specifically through additional board seats.

6.1 Director retention

Firm management generally gives considerable thought to the composition of the board. Directors with key experience and expertise can offer valuable advice, which contributes positively to firm performance. Directors are also responsible for monitoring management and for ensuring

that management are working to maximize shareholder value.

Findings to this point illustrate that firms that adopt matrices tend to be well-governed, and that in most cases the matrices accurately convey director skills. On average, well-governed firms should strive to appoint directors who add value to the firm. However, if external shareholders do not understand the ways in which these directors add value, they will vote against them and ultimately the firm will be pressured into replacing these directors. In fact, a director with below-median vote support has a 10% probability of leaving the board the following year, which increases to 12% following two years of below-median vote support. This compares to only 6% among directors with above-median vote support.

In Table 11, we examine whether the implementation of skills matrices enables firms to retain directors who otherwise would have left, for example due to pressure from ISS, activists, or other shareholders following low vote support. We estimate staggered diff-in-diff regressions, following the approach described in section 3.1. We estimate regressions in which the dependent variable is *Director retention* in year t+1, equal to one if the director is on the board in year t+1, zero otherwise. Key independent variables include *Low Vote Director* and *Low vote director* × *Skills matrix. Low vote director* equals one if a director received below-median vote support, where the median is calculated across all directors in that firm-year. We examine whether the adoption of a skills matrix enables firms to retain directors who otherwise would have left. Thus, for the year t observation (year treatment firms adopt a matrix), *Low vote director* is defined in year t-1. More generally, we define *Low vote director* one year prior to other independent variables.

Looking first at column 1, the significantly negative coefficient on *Low vote director* indicates that these directors are less likely to stay on the board, consistent with univariate evidence presented earlier. In column 2, the coefficient on *Low vote director* × *Skills matrix* is significantly

positive, indicating that the adoption of a skills matrix increases the retention of these directors. In economic terms among the types of firms that adopt matrices, low vote directors are 3.3 percentage points less likely to stay on the board.[19] However, after adopting matrices, this decreases to only a 0.9 percentage point lower likelihood of remaining on the board (that is, it decreases by 2.4 percentage points, as evidenced by the coefficient on *Skills matrix* × *Low vote director*).

In columns 3 and 4, we examine whether these effects vary as a function of the information content of the matrix. We consider two proxies for matrices with high information content. First, we measure *Skills matrix*$_{High\ Info}$ as those with low bio match rates, as previously employed in Table 6. Regressions using this proxy are shown in column 3. Consistent with predictions, the coefficient on *Skills matrix*$_{High\ Info}$ × *Low vote director* is significantly positive; a matrix significantly increases the probability that a low vote director remains on the board when the matrix contains more information that was not readily available from the bio. In contrast, the coefficient on *Skills matrix*$_{Low\ Info}$ × *Low vote director* is closer to zero and insignificant at conventional levels.

Second, we measure *Skills matrix*$_{High\ Info}$ as matrices with no window dressing, using the *Skill added* measure of window dressing as previously employed in Table 10. Here, we do not find any difference between matrices with versus without window dressing. We note that the lack of a difference is consistent with the fact that many voters do not differentiate between instances with versus without window dressing (as shown in Table 10).

In sum, results in this subsection indicate that matrices provide real benefits, enabling firms to retain directors who otherwise would have left the board. These findings are stronger among matrices that provide more information relative to the bio. However, the fact that retention does not vary among instances with versus without window dressing is potentially concerning.

[19]Coefficient on *Low vote director*, 0.013 + Coefficient on *Treatment* × *Low vote director,* 0.020, the coefficient on *Treatment* × *Low vote director*.

In aggregate, our findings suggest that a subset of firms employ matrices to window dress the skills of low-quality directors, typical voters don't see through this window dressing, and these firms are able to retain these low-quality directors as a result. Reassuringly, the percentage of firms employing matrices to window dress director skills is relatively low (approximately 20% of matrix firm-years, see Table 9). Nevertheless, our findings call attention to a potential downside of matrices. The value of matrices as a disclosure format will deteriorate if institutional investors and proxy advisory service firms do not pay sufficient attention to these issues.

6.2 Additional directorships

The fact that matrices highlight director expertise in a more transparent fashion suggests that they might also provide benefits to the individual directors. We examine if skills matrices increase the probability of directors obtaining additional board seats. We note that extra board seats may provide both advantages and disadvantages to the focal firm, for example in the form of extra insights gained from these engagements but also less time to devote attention to the firm.

We again estimate difference-in-difference regressions at the director-firm-year level, using the same format as Table 11. In Table 12, the dependent variable is an indicator equal to one if the director gains an additional board seat in year t+1, measured as the 365 days following the year t annual meeting. Independent variables include *Skills matrix* (column 1), *Skills matrix with high versus low bio match rates* (column 2), and *Skills matrix with versus without window dressing* (column 3). Looking first at column 1, consistent with predictions we find that skills matrices significantly increase the likelihood of a director obtaining an additional board seat in the following year.

Results in column 2 and 3 provide further evidence regarding the influence of incremental information in the matrix relative to the bio and the influence of window dressing. The increased

probability of a director obtaining an additional board seat is entirely concentrated among those matrices with higher information content, defined as either matrices with a lower bio match rate (column 2) or matrices without window dressing (column 3).

The differential effects of window dressing observed across Tables 11 and 12 are consistent with other patterns observed throughout the paper. In Table 11, we see that the positive effects of matrices on director retention are unaffected by window dressing.[20] In contrast, Table 12 shows that the effects on additional board seats are concentrated in the non-window dressing subsample. This contrast is consistent with only more informed market participants paying attention to window dressing. Additional board seats arise from a lengthy process whereby firms evaluate potential new directors; these firms devote considerable time to evaluating these individuals and are less likely to be fooled by window dressing. In a similar vein, mutual funds who devote more resources to voting, i.e., independent voters, are also less fooled by window dressing (Table 10).

7. Conclusion

The proportion of firms voluntarily providing director skills matrices has increased markedly over the past decade. This has occurred in the absence of any changes in regulatory requirements, suggesting 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 only the most attentive investors see through.

We find that director skills matrices lead to increased voting support. These effects are concentrated in cases where directors' contribution was previously least clear, for example smaller firms which tend to have more opaque information environments and firms in which the bio was

[20] This is consistent with many voters not differentiating between window dressing, as discussed in section 6.1.

less clear on director expertise (relative to the matrix). We examine two channels underlying this increased shareholder support: higher ISS recommendations and decreased investor reliance on ISS 'against' recommendations. Both these channels play a role in contributing toward higher vote support. These skills matrices also contribute to real benefits for both firms and directors. At the firm level, matrices enable firms to retain directors who otherwise would have left the firm. At the director level, matrices increase the probability of obtaining additional board seats.

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 strengths and 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. On the other hand, the finding that matrices facilitate window dressing suggests that this disclosure format 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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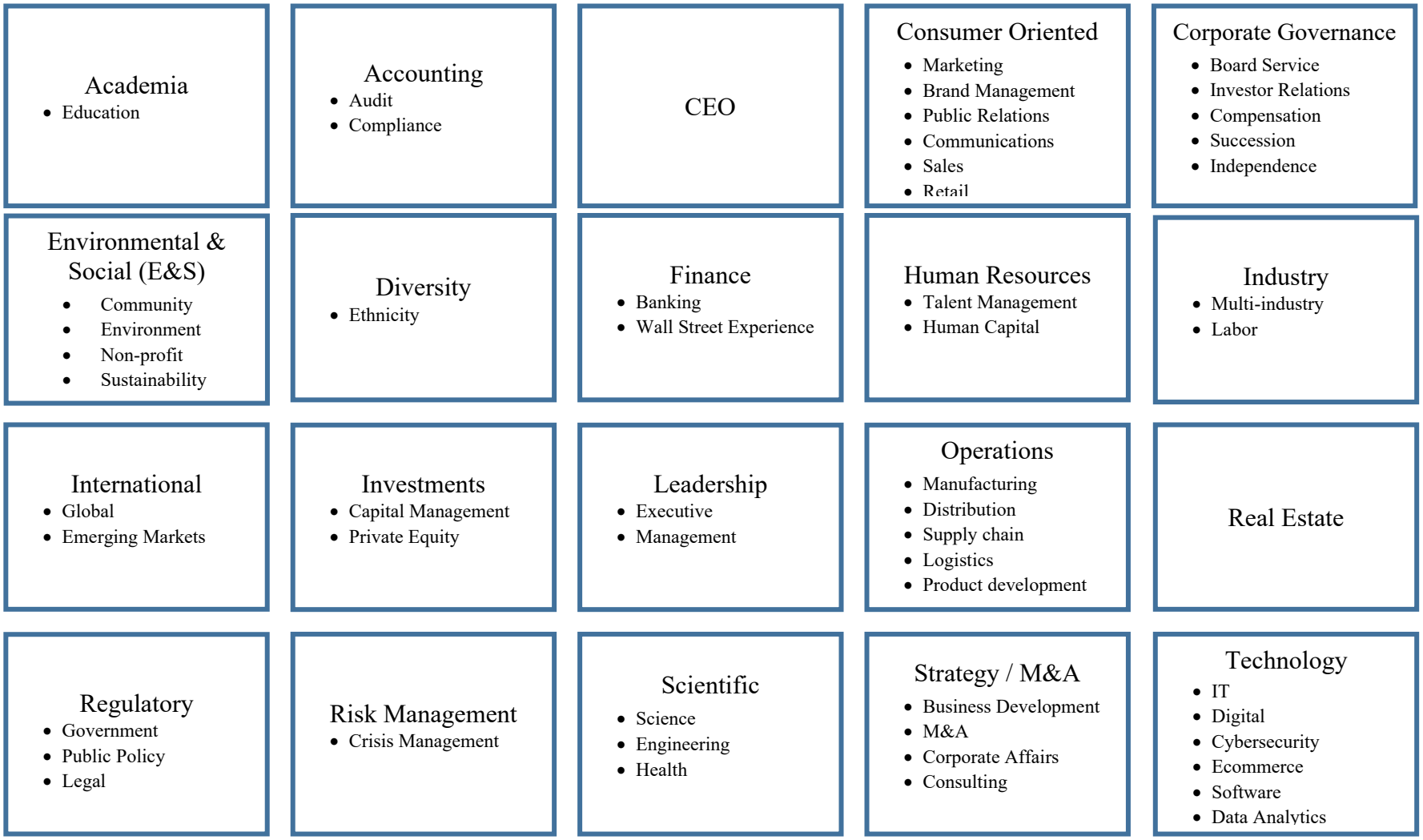
Appendix A: Matrix Skills Categories

We organize each skill reported in a firm-year skills matrices into one of 20 categories, following the classification of Adams et al. (2018). The main categories are depicted in boxes, and the subcategories are depicted with bullet points.



Appendix B: Variable Definitions

	Source	Variable Definition
Panel A: Governance Characteristics		
Board independence	ISS	Percentage of the board that is independent
Board size	ISS	Number of directors
Classified board	ISS	Indicator equal to one if directors are assembled into distinct classes with successive annual elections for a single class of directors
Dual class	ISS	Indicator equal to one if the firm a dual class shareholder structure
CEO-Chair duality	ISS	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
Excess stock return	CRSP	Firm stock return in fiscal year minus the return on the value-weighted market index over the corresponding period
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 logarithm of one plus the number of patents filed in the prior fiscal year
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		
Average percent 'for' votes	ISS	Average percent 'for' votes cast for directors up for election at annual meeting
Average percent ISS 'for' recommendation	ISS	Average percent ISS 'for' recommendations for directors up for election at annual meeting

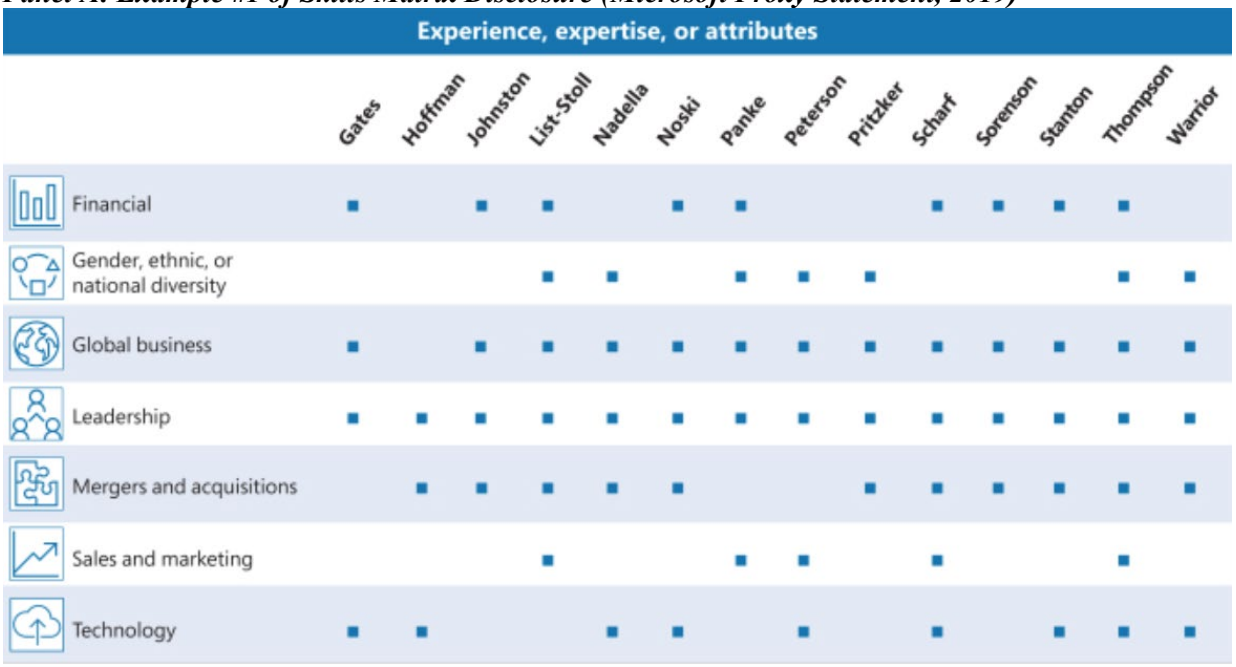
Appendix B: Variable Definitions (continued)

	Source	Variable Definition
Panel D: Director Voting Characteristics		
Fund 'for'	ISS	Indicator equal to one if mutual fund votes 'for' an individual director
ISS 'for'	ISS	Indicator equal to one if ISS recommends 'for' an individual director
Residual of ISS 'for' recommendation	ISS	Residual estimate from a regression model of the ISS 'for' recommendation based on director, firm and governance characteristics
Independent director	ISS	Indicator equal to one if the director is defined as independent
Log(Age)	ISS	Natural logarithm of director age
Log(Tenure)	ISS	Natural logarithm of director tenure
Female	ISS	Indicator equal to one if the director if female
Number of other directorships	ISS	Number of board seats held at other publicly traded firms
Director ownership	ISS	Shares held by director scaled by total shares outstanding
Audit committee	ISS	Indicator equal to one if director is on audit committee
Audit committee chair	ISS	Indicator equal to one if director is audit committee chair
Compensation committee	ISS	Indicator equal to one if director is on compensation committee
Compensation committee chair	ISS	Indicator equal to one if director is compensation committee chair
Nominating committee	ISS	Indicator equal to one if director is on nominating committee
Nominating committee chair	ISS	Indicator equal to one if director is nominating committee chair
Attendance problem	ISS	Indicator equal to one if director's board meeting attendance is less than 75%
Panel E: Fund Voting Characteristics		
Independent voter MF		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	CRSP	Fund total net assets
Family size	CRSP	Fund family total net assets
Fund turnover	CRSP	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	CRSP	Indicator equal to one if the fund management company is located in one of the top-five MSAs based on number of mutual funds

Figure 1: Examples of Director Skills Matrix Disclosure

The figure depicts examples of director skills matrices and text-based director biographies (bios). 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 bios provided by Stryker Corporation from its 2019 proxy statement.

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



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.

Figure 1: Examples of Director Skills Matrix Disclosure (continued)

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 Firms with Skills Matrix, by Year

The figure reports the time series trend in director skills matrix disclosure, for each of the Fama-French 12 industry classifications, from 2011 through 2021.

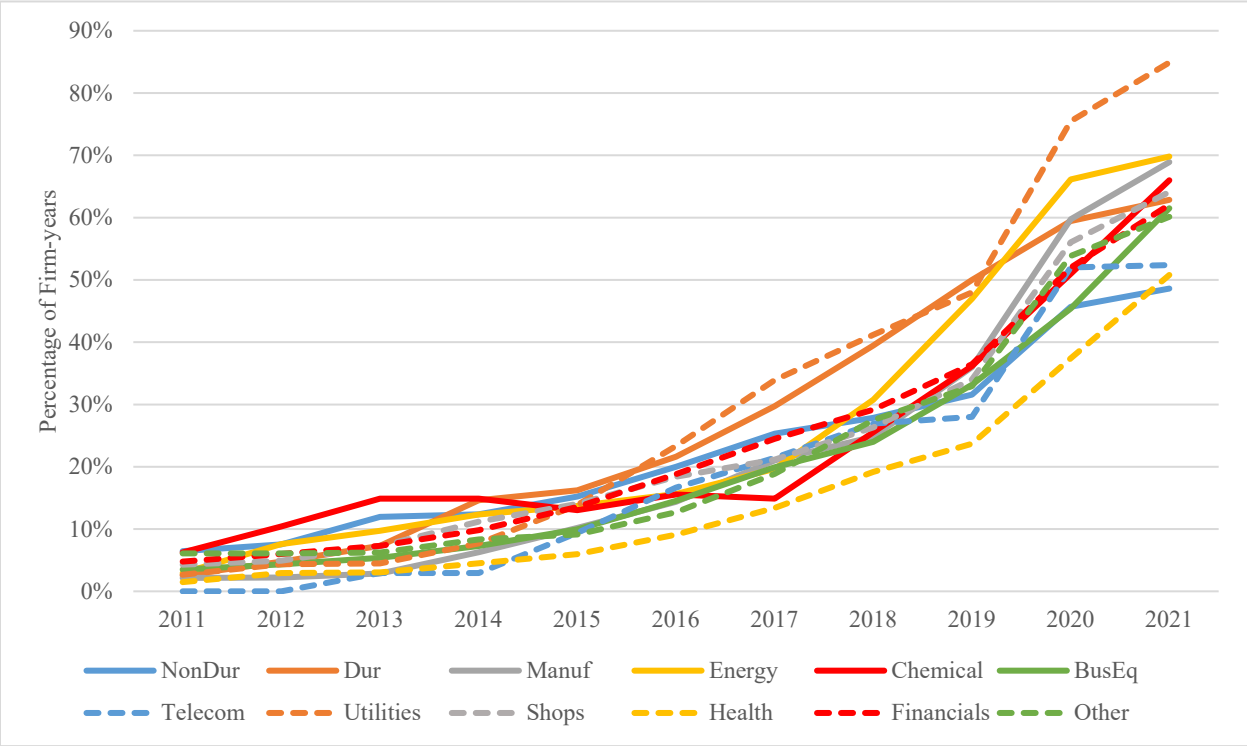
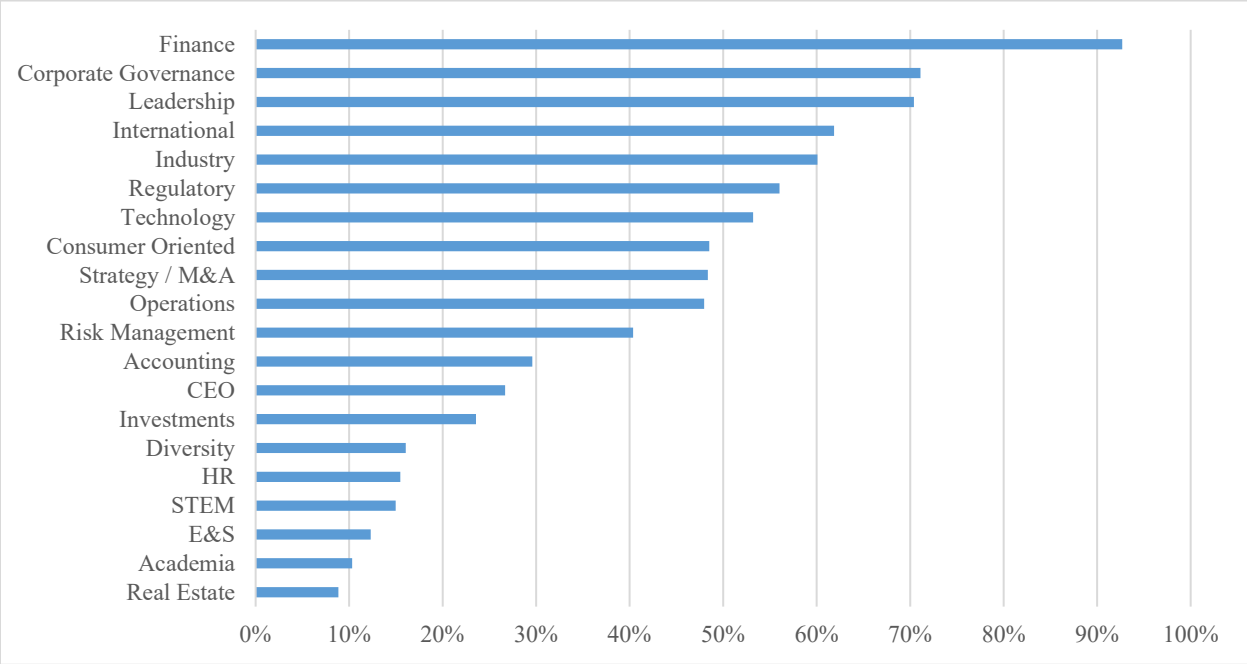


Figure 3: Frequency of Individual Director Skills Disclosed

This figure reports skills listed in firm-year director skills matrices, 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 of the percentage of firm-years in which a particular director skill is listed. For example, 41% of firm-years that disclose 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 with the greatest increases over the sample period. The frequency of all other disclosed director skills (as listed in Panel A) remain relatively stable throughout the sample period.

Panel A: Percentage of matrix firm-years with skill listed



Panel B: Time series trend for select skills

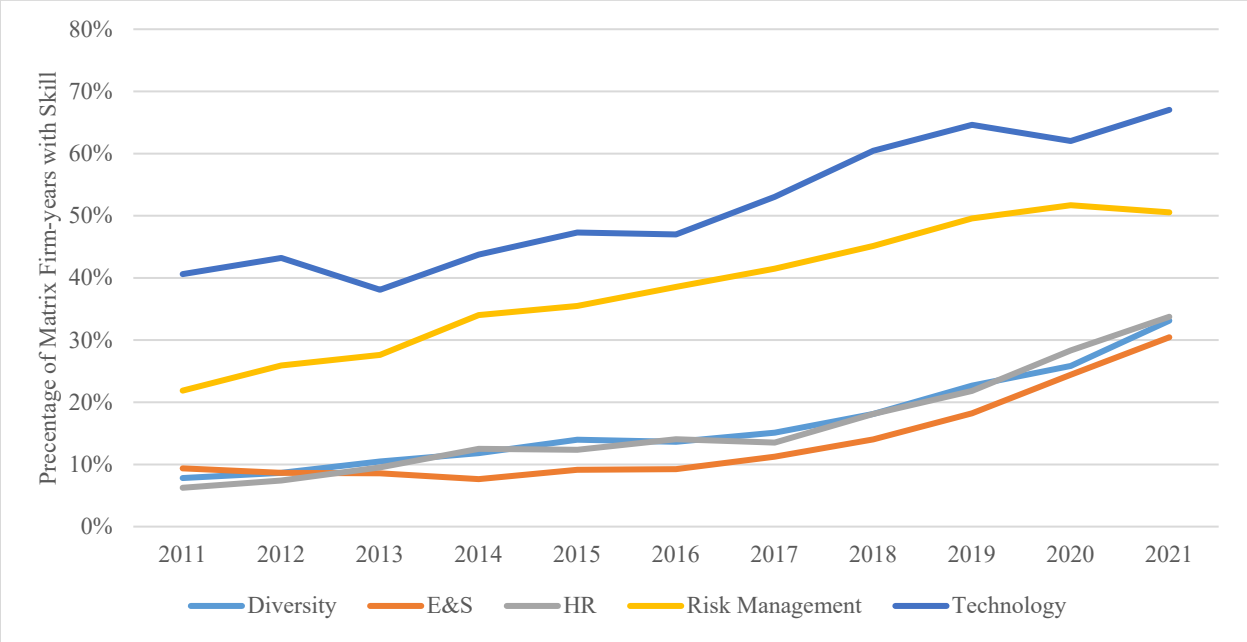
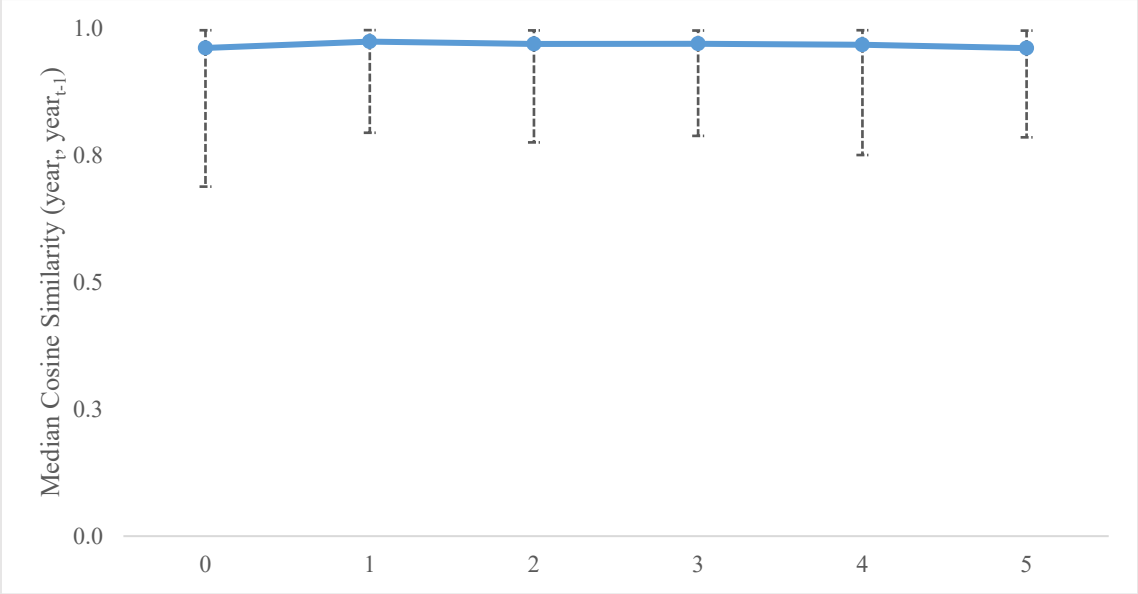


Figure 4: Do Firms Alter Information in Director Bios When Disclosing a Skills Matrix?

In each panel, the x-axis depicts the year relative to matrix adoption, with year 0 being the year of adoption. For each year t, we plot the median similarity score (across firm-years in the sample) between a firm's bio in year t and the firm's bio in year t-1. In Panel A, the y-axis depicts similarity as measured by the cosine similarity score, which accounts for word frequency and presence, but not word order. In Panel B, the y-axis depicts similarity based on the percentage change in the length of the firm's bio across the same year convention. Both figures include the 95% confidence intervals.

Panel A: Similarity in text of bios, year t vs year t-1



Panel B: Similarity in length of bios, year t vs year t-1

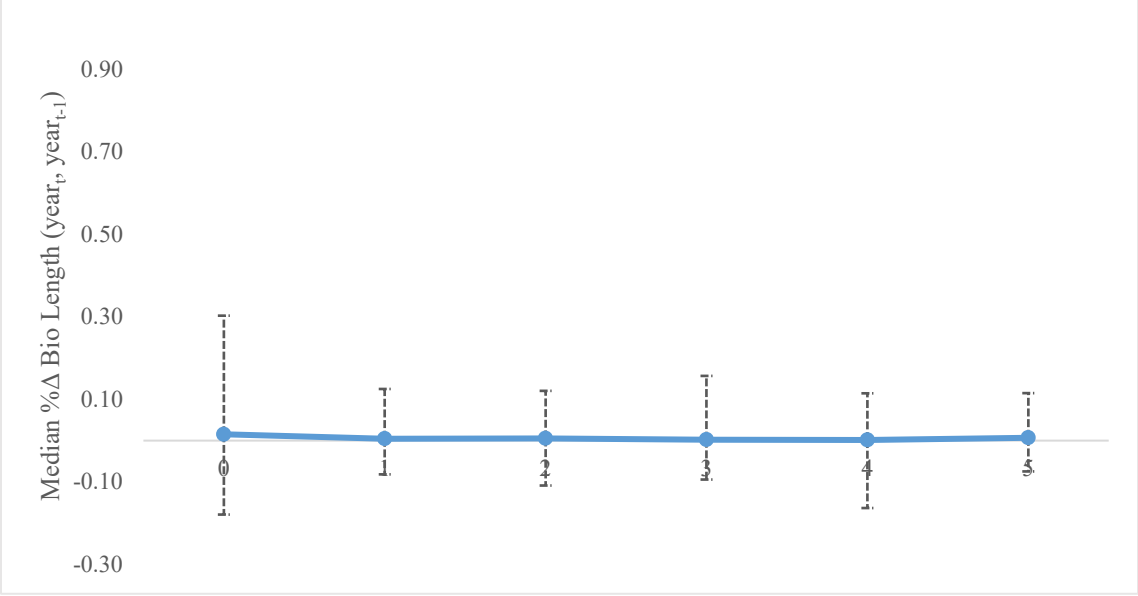


Figure 5: Change in Director Vote Support Around Matrix Disclosure

The figure plots event time coefficients estimating the difference in director-level vote support between treatment and control samples in each year surrounding the disclosure of a director skills matrix in year *t* (event year). Regression estimates are shown in Internet Appendix Table A3. The first year a firm discloses a matrix (treatment firm) is considered the event year (year *t*). Firms that do not disclose a matrix (control firms) are matched without replacement to treatment firms in a given event year based on 2-digit SIC code and the closest-size within a 25% firm size bandwidth. 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 figure includes the 95% confidence intervals.

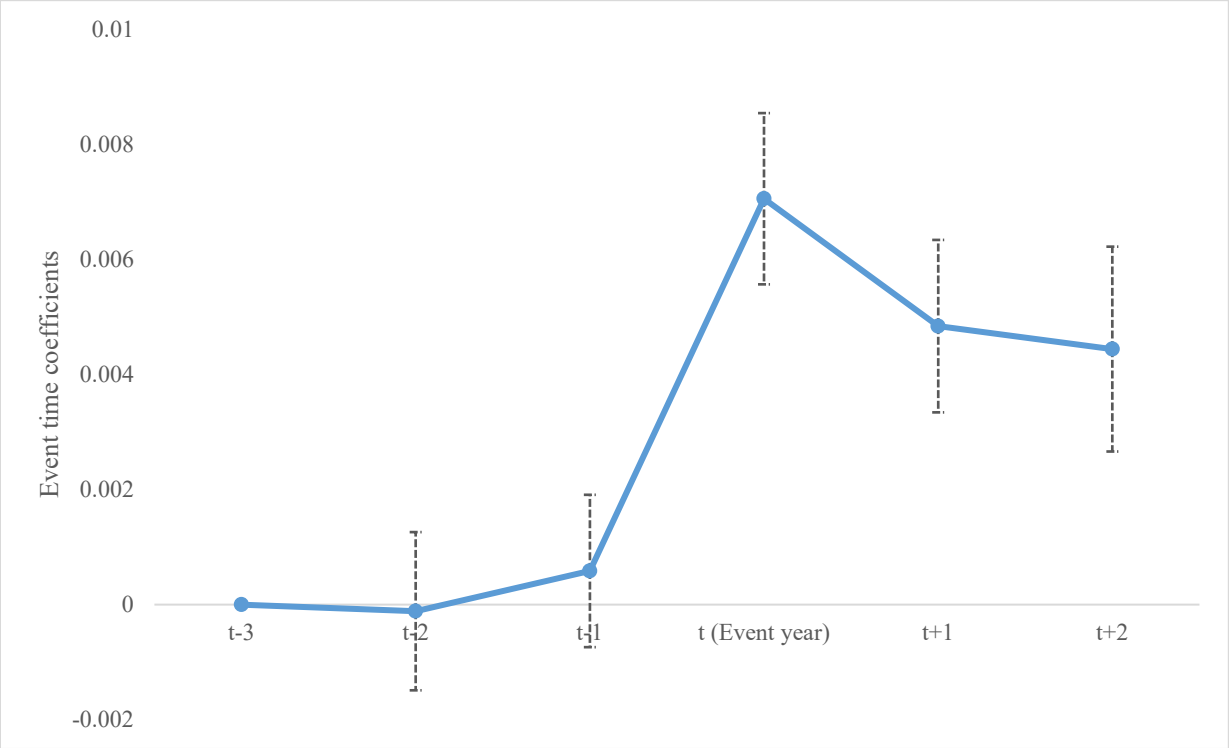


Figure 6: Identifying Potential Window Dressing

The figure provides examples of window dressing. Panel A focuses on the *Skill added* approach of measuring window dressing. Directors Patricia Russo and Margaret Whitman sit on the board of Hewlett Packard Enterprise (HP) in 2017 and 2018, and HP reports skills matrices that include the *Finance* skill in both years. Neither director reports having the *Finance* skill in the 2017 matrix, and the percent of the board with this skill in 2017 is below the 25th percentile of industry peers (not observable in figure). Both directors add this skill in the 2018 matrix, leading us to classify HP as window dressing the *Finance* skill in 2018. Panel B focuses on the *Multiple matrix directorships* approach of measuring window dressing. 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. 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. Based on these two conditions, we classify Sherwin-Williams' reporting of *Finance* skill for Wunning as window dressing. As shown in the bottom of the figure, Sherwin-Williams does <u>not</u> list finance skill anywhere in Wunning's bio.

Panel A: Skill added approach of measuring window dressing

Hewlett Packard Enterprise	*Finance* Skill	
Director Name:	2017 Matrix	2018 Matrix
Daniel Ammann	✓	✓
Marc L. Andreessen		
Michael J. Angelakis	✓	✓
Leslie A. Brun	✓	✓
Panela L. Carter	✓	✓
Raymond J. Lane		
Ann M. Livermore		
Raymond E. Ozzie		
Gary M. Reiner		
Patricia F. Russo		✓
Lip-Bu Tan		
Margaret C. Whitman		✓
Mary Agnes Wilderotter	✓	✓
Percent of board with skill:	38%	54%
Industry 25th percentile: Percent of board with skill (2017)	50%	

Director Bio for Patricia Russo in 2017 - (excerpt from Hewlett Packard Enterprise proxy statement):

- Key Skills and Qualifications: extensive global business experience, broad understanding of the technology industry, strong management skills and operations expertise, executive experience with a wide range of issues including mergers and acquisitions and business restructuring as she led Lucent's recovery through a severe industry downturn and later a merger with Alcatel, strong leadership and corporate governance experience from robust service on other public company boards.

Director Bio for Patricia Russo in 2018 - (excerpt from Hewlett Packard Enterprise proxy statement):

- Key Skills and Qualifications: extensive global business experience, broad understanding of the technology industry, strong management skills and operations expertise, executive experience with a wide range of issues including mergers and acquisitions and business restructuring as she led Lucent's recovery through a severe industry downturn and later a merger with Alcatel, strong leadership and corporate governance experience from robust service on other public company boards.

Figure 6: Identifying Potential Window Dressing (continued)

Panel B: Multiple Matrix Directorships approach of measuring window dressing

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-year level variables, for our 2011 to 2021 sample period. Panel A contains summary statistics for all firm-years and those firm-years with and without a director skills matrix. Panel B compares firm-years in the first year of matrix adoption with all non-matrix firm-years. All variables are measured as of the fiscal year prior to the annual shareholder meeting date. In Panel B, our summary stats begin in 2012, since we require information on whether industry peers have a skills matrix and whether directors sit on other boards with a skills matrix. 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.

Panel A: All firm-years

	All firm-years (N = 16,732)	Matrix firm-years (N = 3,600)	Non-matrix firm-years (N = 13,132)
Governance Characteristics			
Board independence	73%	82%	70%***
Board size	9.3	10.0	9.1***
Classified board (0/1)	36%	26%	39%***
Dual class (0/1)	6%	4%	6%***
CEO-Chair duality (0/1)	41%	39%	42%**
Institutional ownership	77%	77%	77%
Financial Characteristics			
Firm size	$11,926	$24,273	$8,541***
Market-to-book	3.67	4.59	3.42***
Stock return volatility	9.2%	9.7%	9.1%***
R&D	0.022	0.018	0.024***

Panel B: First year of matrix adoption

	First year of adoption (N = 885)	Non-matrix firm-years (N = 11,533)
External Effects		
Board-related activism	7%	4%***
Non-board-related activism	12%	7%***
Percentage of industry peers with matrix	28%	14%***
Percentage of directors with other board seat at matrix firm	12%	5%***
Financial Performance		
ROA	0.107	0.112*
Excess stock return	0.6%	1.3%
Director Voting Characteristics		
Average percent 'for' votes	96%	95%*
Average percent ISS 'for' rec.	94%	93%

Table 2: Relation between Matrix Skills and Firm Characteristics

The table reports OLS regressions 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 focuses on skills with strong firm-specific components to disclosure. *International operations* is an indicator variable equal to one if the firm has an international segment reported within Compustat segment data, zero otherwise. *Log(1 + # patents)* is based on the number of patents filed in the prior fiscal year. Panel B focuses on skills with a strong industry component. Each independent variable is an indicator variable equal to one if the firm belongs to the designated industry, where industries are defined based on Fama-French 12 industry classifications. Firm controls in Panel A are also included in Panel B regressions, but they are suppressed for brevity. All regressions include year fixed effects, and Panel A also includes industry fixed effects. 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 clustered 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
International operations	0.383***	
	(9.96)	
Log (1+ # of patents)		0.027***
		(2.83)
Board independence	0.001*	0.002**
	(1.81)	(2.30)
Board size	0.005	0.024**
	(0.76)	(2.22)
Classified board	0.002	0.072**
	(0.06)	(2.13)
Dual class	-0.103	-0.168**
	(-1.21)	(-2.36)
CEO-chair duality	-0.000	0.057**
	(-0.02)	(2.04)
Institutional ownership	0.037	0.071
	(0.72)	(1.22)
Firm size	0.061***	0.045***
	(5.37)	(3.01)
Market-to-book	-0.019	0.006
	(-1.11)	(0.31)
ROA	0.193	-0.040
	(1.12)	(-0.23)
Excess stock return	-0.056**	-0.015
	(-2.20)	(-0.52)
Stock return volatility	0.342	0.404
	(1.50)	(1.61)
R&D	-0.897**	0.090
	(-2.22)	(0.22)
Firm-year Observations	3,600	3,600
Year & Industry Fixed Effects	Yes	Yes
Adjusted R-squared	0.360	0.198

Table 2: Relation between Matrix Skills and Firm Characteristics (continued)

Panel B: Industry-related forms of expertise

	Dependent Variable:				
	Investments	Scientific	Consumer Oriented	E&S	Regulatory
Financials	0.158***	-0.001	-0.097	-0.010	0.002
	(2.96)	(-0.03)	(-1.54)	(-0.23)	(0.03)
Health	-0.001	0.595***	-0.286***	-0.084*	-0.243***
	(-0.01)	(7.78)	(-3.62)	(-1.93)	(-3.09)
Business Equipment	-0.059	-0.031	-0.090	-0.076*	-0.254***
	(-1.19)	(-0.80)	(-1.25)	(-1.84)	(-3.89)
Telecom	0.074	-0.070*	-0.155	0.011	-0.070
	(0.65)	(-1.74)	(-1.33)	(0.09)	(-0.54)
Consumer Nondurables	-0.111**	0.032	0.220***	0.004	-0.255***
	(-2.21)	(0.53)	(2.62)	(0.08)	(-3.16)
Consumer Durables	-0.052	0.067	0.126	-0.108**	-0.222**
	(-0.65)	(1.06)	(1.15)	(-2.56)	(-2.45)
Retail	-0.035	0.017	0.201***	-0.035	-0.192***
	(-0.63)	(0.40)	(2.69)	(-0.85)	(-2.89)
Energy	-0.086	0.167**	-0.372***	0.260***	-0.084
	(-1.43)	(2.45)	(-5.42)	(3.15)	(-1.01)
Utilities	0.027	0.126*	0.006	0.293***	0.309***
	(0.39)	(1.90)	(0.07)	(3.95)	(5.26)
Manufacturing	-0.061	0.071	-0.080	0.021	-0.151**
	(-1.19)	(1.58)	(-1.15)	(0.39)	(-2.21)
Chemicals	-0.087	-0.029	-0.054	0.057	0.042
	(-1.43)	(-0.60)	(-0.47)	(0.82)	(0.36)
Firm-year Observations	3,600	3,600	3,600	3,600	3,600
Firm Controls	Yes	Yes	Yes	Yes	Yes
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 each director, we employ two approaches to assess whether the skills listed in the matrix are 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. Under the *broader matching approach*, we additionally search for the main skill category and any related sub-categories, as listed in Appendix A. Under both approaches, we focus on root words and account for common abbreviations. We exclude firm-years with matrices like that of Example #2 from Figure 1 and have a match rate under the *broader matching approach* greater than 98%. This is done to reduce the possibility of a mechanical relationship between skills listed in the matrix portion and text portion of the director bio. This limits the sample to 29,707 directors within 3,041 firm-years. In Panel A, we tabulate the average (measured across all directors) percent of matrix skills that are listed in the bio, as well as the 25th, 50th, and 75th percentiles. In Panel B, we show 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 biography			
	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 matrix skills reported in bio	All matrix skills reported in bio	No matrix skills reported in bio	All matrix skills reported in bio
Narrow matching	14%	25%	1%	4%
Broader matching	8%	36%	0.3%	5%

Panel C: Distribution across skills

	# Directors with skill reported in	% Cases where skill is also listed in bio:	
Skill	matrix	*Narrow matching approach*	*Broader matching approach*
Leadership	14,488	61%	75%
Corporate Governance	12,899	60%	66%
Finance	11,409	62%	78%
Strategy / M&A	8,488	41%	65%
Industry	8,474	52%	63%
International	7,482	63%	72%
Operations	6,008	50%	77%
Technology	5,929	55%	71%
Regulatory	5,177	41%	50%
Risk Management	4,981	44%	48%
CEO	4,837	77%	87%
Consumer Oriented	4,776	52%	57%
Diversity	2,404	11%	13%
Accounting	2,313	48%	55%
Human Resources	2,302	36%	61%
Investments	2,232	46%	52%
E&S	2,190	40%	42%
Scientific	1,697	58%	75%
Real Estate	1,413	64%	73%
Academia	505	36%	37%

Table 4: Effects of Director Skills Matrix on Shareholder Voting, dif-in-dif analysis

The table reports regressions estimating the effects of skills matrix disclosure on director vote support. Regressions are based on director × fund × meeting date observations. We estimate staggered difference-in-difference analyses. 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 without replacement to treatment firms in a given event year based on 2-digit SIC code and closest firm size within a 25% firm size bandwidth (one-to-one matching). We require both treatment and control firms to have at least one firm-year before matrix disclosure and one following matrix disclosure, and we limit the sample to the three years prior to and following matrix disclosure. The dependent variable is *Fund For*, an indicator equal to one if the fund votes 'for' an individual director. *Skills matrix (Treatment x Post)* is an indicator equal to one for treatment firms in the post-disclosure period. Each regression includes cohort × firm and cohort × year fixed effects. A cohort is defined as matched treatment and control firms in a given event year. In column 2, *Small firm* is an indicator equal to one if firm size is in the bottom tercile in a given year. In column 3, *Skills matrix with low (high) bio match rate* is an indicator equal to one for treatment firms with below (above) median bio matrix rates in the post-disclosure period; we exclude firm-years that have both the matrix format of Example #2 from Figure 1 and a match rate under the *broader matching approach* greater than 98%, to reduce the possibility of a mechanical relationship between skills listed in the matrix portion and text portion of the director bio. For brevity, director, firm and fund controls are included in models but are unreported. A regression detailing all controls for column 1 is reported in Internet Appendix Table A2. t-statistics based on standard errors clustered by fund are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent variable = Fund 'for'		
Skills matrix (Treatment × Post)	0.006***	0.005***	
	(11.50)	(8.70)	
Skills matrix x Small firm		0.004***	
		(3.52)	
Skills matrix with low bio match rate			0.007***
			(10.83)
Skills matrix with high bio match rate			0.005***
			(8.42)
Treatment x Small firm		-0.001	
		(-1.14)	
Post x Small firm		-0.001	
		(-0.69)	
Small firm		0.002	
		(1.17)	
Dif b/w low and high category: p-value			0.01
Director-Fund-Year Obs.	9,612,597	9,612,597	8,902,392
Director, firm & fund controls	Yes	Yes	Yes
Cohort-firm Fixed Effects	Yes	Yes	Yes
Cohort-year Fixed Effects	Yes	Yes	Yes
Adjusted R-squared	0.180	0.180	0.179

Table 5: Effects of Director Skills Matrix on Shareholder Voting, IV analysis

The table reports regressions estimating the effects of skills matrix disclosure on director vote support. Regressions are based on director × fund × meeting date observations. We estimate an instrumental variables (IV) analysis. The dependent variable in Column 1 is *Skills matrix*, an indicator equal to one if the firm discloses a skills matrix. Director overlap at other matrix boards is the percentage of directors that hold a directorship at a different S&P 1500 firm that reports a skills matrix in the prior year. The dependent variable in Columns 2 and 3 is *Fund For*, an indicator equal to one if the fund votes 'for' an individual director. In column 2, *Skills matrix (Instrumented)* is the fitted value from the reported first stage regression. In column 3, *Skills matrix (Instrumented)* and *Skills matrix x Small firm (Instrumented)* represent the fitted values from first stage regressions that additionally instrument for the interaction term (results reported in Models 1 and 2 of Internet Appendix Table A4). For brevity, director, firm and fund controls are included in regressions but are unreported. t-statistics based on standard errors clustered by fund are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent variable:		
	Skills matrix	Fund 'for'	
	1st stage	2nd stage	2nd stage
Director overlap at other matrix boards	0.257***		
	(60.62)		
Skills matrix (Instrumented)		0.035***	0.045***
		(4.37)	(5.19)
Skills matrix x Small firm (Instrumented)			0.015***
			(2.51)
Small firm			-0.001
			(-0.37)
Director-Fund-Year Obs.	22,661,521	22,661,521	22,661,521
Director, firm & fund controls	Yes	Yes	Yes
Firm and Year Fixed Effects	Yes	Yes	Yes
First-stage F-statistic	3,674.6		
Adjusted R-squared	0.680	0.200	0.200

Table 6: Effects of Skills Matrix on ISS Recommendations

The table reports OLS regressions estimating the effects of skills matrix disclosure on ISS recommendations. Regressions are based on director × meeting date observations. Panel A uses the staggered difference-in-difference analysis described in Table 4. The dependent variable is *ISS For*, an indicator equal to one if ISS recommends 'for' an individual director. *Skills matrix (Treatment x Post)* is an indicator equal to one for treatment firms in the post-disclosure period. In column 2, *Small firm* is an indicator equal to one if firm size is in the bottom tercile in a given year. In column 3, *Skills matrix with low (high) bio matrix rate (Treatment x Post)* is an indicator equal to one for treatment firms with below (above) median bio matrix rates in the post-disclosure period; in this specification, we exclude firm-years that have both the matrix format of Example #2 from Figure 1 and a match rate under the *boarder matching approach* greater than 98%. This is done to reduce the possibility of a mechanical relationship between skills listed in the matrix portion and text portion of the director bio. Panel B reports an instrumental variables (IV) analysis. The dependent variable in Column 1 is an indicator equal to one if the firm discloses a skills matrix. *Director overlap at other matrix boards* is the percentage of directors that hold a directorship at a different S&P 1500 firm that reports a skills matrix in the prior year. The dependent variable in Columns 2 and 3 is *ISS For*, an indicator equal to one if ISS recommends 'for' an individual director. In column 2, *Skills matrix (Instrumented)* is the fitted value from the reported first stage regression. In column 3, *Skills matrix (Instrumented)* and *Skills matrix x Small firm (Instrumented)* represent the fitted values from first stage regressions that additionally instrument for the interaction term (results reported in Models 3 and 4 of Internet Appendix Table A4). For brevity, director and firm controls are included in models but are unreported. All regressions include a constant (unreported). t-statistics based on standard error clustered by firm are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Diff-in-diff specifications

	Dependent variable = ISS 'for'		
Skills matrix	0.007	0.004	
	(1.16)	(0.63)	
Skills matrix x Small firm		0.009	
		(0.65)	
Skills matrix with low bio match rate			0.016**
			(2.02)
Skills matrix with high bio match rate			-0.004
			(-0.51)
Treatment x Small firm		0.003	
		(0.26)	
Post x Small firm		-0.002	
		(-0.18)	
Small firm		-0.010	
		(-1.13)	
Dif b/w low and high category: p-value			0.02
Director-Year Obs.	38,341	38,341	35,696
Director & firm controls	Yes	Yes	Yes
Cohort-firm Fixed Effects	Yes	Yes	Yes
Cohort-year Fixed Effects	Yes	Yes	Yes
Adjusted R-squared	0.365	0.365	0.368

Table 6: Effects of Skills Matrix on ISS Recommendations (continued)

Panel B: IV specifications

	Dependent variable:		
	Skills matrix	ISS 'for'	
	1st stage	2nd stage	2nd stage
Director overlap at other matrix boards	0.283***		
	(4.92)		
Skills matrix (Instrumented)		-0.024	-0.014
		(-0.49)	(-0.21)
Skills matrix x Small firm (Instrumented)			0.009
			(0.19)
Small firm			-0.010
			(-0.85)
Director-Year Obs.	97,557	97,557	97,557
Director & firm controls	Yes	Yes	Yes
Firm and Year Fixed Effects	Yes	Yes	Yes
First-stage F-statistic	24.16		
Adjusted R-squared	0.672	0.357	0.357

Table 7: Effects of Skills Matrix on Shareholder Reliance on ISS

The table reports OLS regressions estimating the effects of skills matrix disclosure on director vote support, conditional on ISS recommendations. Regressions are based on director × fund × meeting date observations, and the dependent variable is *Fund for*, an indicator equal to one if the fund votes 'for' an individual director. Column 1 reports specifications that use the staggered difference-in-difference analysis described in Table 4. In column 1, *Skills matrix* is an indicator equal to one for treatment firms in the post-disclosure period, we also include the interaction term *Skills matrix× ISS against*, and each regression includes cohort by firm and cohort by year fixed effects. Column 2 reports the second stage regression from an instrumental variables (IV) analysis, similar to Table 5. In column 2, *Skills matrix* and *Skills matrix× ISS against* are both instrumented (the first stage regressions are reported in Models 5 and 6 of Internet Appendix Table A4). For brevity, director, firm and fund controls are included in regressions but are unreported. 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'	
	Diff-in-Diff	IV (2nd stage)
Skills matrix x ISS against	0.032***	0.076***
	(4.94)	(4.28)
Skills matrix	0.005***	0.035***
	(10.43)	(4.37)
ISS against	-0.428***	-0.460***
	(-38.20)	(-36.76)
Treatment x ISS against	-0.006	
	(-1.36)	
Post x ISS against	-0.022***	
	(-3.81)	
Director overlap at other matrix boards		
Director-Fund-Year Obs.	9,612,597	22,661,521
Director, firm & fund controls	Yes	Yes
Cohort-firm Fixed Effects	Yes	No
Cohort-year Fixed Effects	Yes	No
Firm and Year Fixed Effects	No	Yes
First-stage F-statistic		
Adjusted R-squared	0.180	0.200

Table 8: Window Dressing Matrix Skills

The table reports the prevalence of window dressing behavior of matrix skills. Panel A reports the percent of director-firm-years and firm-years with at least one window-dressed skill, using our two approaches to identifying potential window dressing as described in Figure 6. The *Skill added* (*Multiple matrix directorships)* approach of measuring window dressing is limited to sample of firm-years where we can observe a skills matrix in the prior year (with at least one director that sits on multiple matrix boards). Panel B reports the frequency of window dressing behavior by matrix skill category. The sample is limited to director-firm-years with at least one window-dressed skill. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Prevalence of window dressing

Window dressing definition based on:	# of director-firm-years	% of director-firm-years with at least one window-dressed skill	# of firm-years	% of firm-years with at least one window-dressed skill
Existing matrix skill additions	23,256	9%	2,577	23%
Multiple matrix directorships (11 comparable skills)	5,205	10%	2,310	19%

Panel B: Window dressing by skill

Window-dressing definition based on:	Existing matrix skill added	Multiple matrix directorships (11 comparable skills)
Window-dressed skill	% of window-dressing director-firm-years:	
Academia	1%	0%
Accounting	6%	14%
CEO	3%	5%
Consumer Oriented	7%	
Corporate Governance	19%	
Diversity	2%	3%
ESG	4%	
Finance	17%	41%
HR	4%	8%
Industry	11%	
International	12%	16%
Investments	3%	3%
Leadership	12%	2%
Operations	7%	
Real Estate	0%	1%
Regulatory	6%	
Risk	11%	20%
STEM	1%	
Strategy	11%	
Technology	2%	

Table 9: Types of firms engaging in window dressing

This table shows a univariate analysis of firm characteristics across firm-years with versus without window-dressing. Columns 1 and 2 (3 and 4) focus on the *Skill added* (*Multiple matrix directorships*) approach toward measuring window dressing. In Panel A, Column 1 (3) of Panel A shows the first year a firm engaged in window dressing, a total of (178) firm-years (excluding any firm-years that represent the first year a firm discloses a matrix). Column 2 (4) represent the 718 (372) matrix firm-years prior to the first firm-year of window dressing. In Panel B, for each window dressing firm-year, we identify to a matched firm in the same industry, same year, and similar size (using the same matching procedure as used in the difference-in-difference specifications, as described in Table 4). Column 1 (3) of Panel B includes 162 (196) firm-years that are the first year of window dressing (excluding any firm-years that are the first year a firm discloses a matrix). Column 2 (4) of Panel B includes 213 (247) matched non-window dressing matrix firm-years. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A

Window-dressing definition based on:	*Skill added*		*Multiple matrix directorships*	
	First firm-year of window-dressing	Matrix firm-years prior to window dressing	First firm-year of window-dressing	Matrix firm-years prior to window dressing
External Effects				
Activism	26%	21%**	30%	24%*
Financial Performance				
ROA	0.109	0.119**	0.111	0.117
Excess stock return	-1.8%	0.6%	-4.7%	0.7%**

Panel B

Window-dressing definition based on:	*Skill added*		*Multiple matrix directorships*	
	First firm-year of window-dressing	Matched non-window dressing firm-years	First firm-year of window-dressing	Matched non-window dressing firm-years
Firm Governance				
Board independence	86%	84%**	84%	85%
Board size	10.4	10.0*	10.2	9.8*
Classified board (0/1)	23%	21%	21%	24%
Dual class (0/1)	5%	4%	3%	2%
CEO-Chair duality (0/1)	39%	43%	35%	38%
Institutional ownership	73%	69%	75%	77%

Table 10: Effects of window dressing on shareholder voting

This table reports OLS regressions estimating the effects of window dressing on the relation between skills matrix disclosure and director vote support. Specifications in Panel A mirror the staggered difference-in-difference analysis used in Table 4. Window dressing is defined according the *Skill added* approach in columns 1-3 and the *Multiple matrix directorship* approach in columns 4-6, respectively, as defined in the text. *Skills matrix*$_{non\text{-}window\ dressing}$ and *Skills matrix*$_{non\text{-}window\ dressing}$ (each of which represent *treatment x post*) are indicator variables equal to one for treatment firms in the specified group (window dressing or non-window dressing, respectively) in the post-disclosure period. Observations in the independent voter (non-independent voter) MF columns include funds with predicted active voter scores calculated following Iliev and Lowry (2015) that are greater than (less than or equal to) zero. In Panel B, the sample continues to represent firm x director x year x fund observations, but the sample is restricted to director-fund-years at matrix firms of directors that hold directorships on multiple boards with matrices; the independent variables of interest are *Window dressing* and *Window dressing* × *Independent voter*. For brevity, director, firm and fund controls are included in models but are unreported. t-statistics based on standard error clustered by fund are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A

	Dependent Variable = Fund 'for'					
	All MFs	Independent Voter MFs	Non-Independent Voter MFs	All MFs	Independent Voter MFs	Non-Independent Voter MFs
Window-dressing definition based on:	*Skill added*			*Multiple matrix directorships*		
Skills matrix$_{non\text{-}window\ dressing}$	0.005***	0.005***	0.004***	0.006***	0.006***	0.006***
	(8.06)	(8.32)	(4.42)	(10.41)	(9.45)	(6.20)
Skills matrix$_{window\ dressing}$	0.005***	0.003***	0.007***	0.004***	0.004***	0.006***
	(6.60)	(4.04)	(5.56)	(4.92)	(4.92)	(5.35)
Dif b/w 1st and 2nd category: p-value	0.57	0.03	0.05	0.01	<0.01	0.99
Director-Fund-Year Obs.	8,352,514	4,160,897	4,191,617	7,935,632	3,965,669	3,696,963
Baseline category	Firms w/o skills matrix	Firms w/o skills matrix	Firms w/o skills matrix	Firms w/o skills matrix	Firms w/o skills matrix	Firms w/o skills matrix
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	0.183	0.155	0.220	0.177	0.155	0.209

Table 10: Effects of window dressing on shareholder voting (continued)

Panel B	Dependent Variable = Fund 'for'	
	Sample = Director-Fund-Year Obs of Multiple Matrix Board Directors	
Window-dressing definition based on:	*Multiple matrix directorships*	
Window dressing	-0.003*	0.002
	(-1.93)	(1.02)
Window dressing x Independent voter		-0.007***
		(-2.90)
Independent voter	-0.040***	-0.039***
	(-22.17)	(-21.32)
Director-Fund-Year Obs.	1,370,580	1,370,580
Baseline category	Skills matrix firms w/o window dressing	Skills matrix firms w/o window dressing
Director, firm & fund controls	Yes	Yes
Director and Year Fixed Effects	Yes	Yes
Adjusted R-squared	0.111	0.111

Table 11: Effects of Director Skills Matrix on Director Retention

The table reports regressions estimating the effects of skills matrix disclosure on director retention. Regressions are based on director × meeting date observations. We estimate staggered difference-in-difference analyses. The event year represents the first year a firm discloses a matrix (treatment firms). We require both treatment and control firms (firms that do not disclose a matrix) to have at least one firm-year before and after matrix disclosure, and we limit the sample to the three years prior to and following matrix disclosure. The dependent variable is *Director retention*, an indicator equal to one if the director remains on the board in the year following. *Low vote director* is an indicator equal to one if the director has vote support below the median relative to other directors at the same board in the prior year. In column 3, *Skills matrix*$_{High\ Info}$ *(Skills matrix*$_{Low\ Info}$*)* is an indicator equal to one for treatment firms with below (above) median bio matrix rates in the post-disclosure period. In column 4, these variables equal one for treatment firms that engage in (do not engage in) window dressing in the post-disclosure period. For brevity, director and firm controls are included in models but are unreported. Other variables are defined in prior tables. 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.

			Measure of Skills Matrix$_{High\ Information}$	
			Low Bio Match Rate	*No Window Dressing*
Low vote director	-0.016***	-0.013**	-0.013**	-0.013**
	(-4.67)	(-2.10)	(-2.04)	(-2.04)
Skills matrix x Low vote director		0.024*		
		(1.83)		
Skills matrix$_{High\ Info}$ x Low vote director			0.035**	0.029*
			(2.14)	(1.76)
Skills matrix$_{Low\ Info}$ x Low vote director			0.008	0.031*
			(0.51)	(1.71)
Skills matrix (Treatment × Post)	0.000	-0.014		
	(0.01)	(-1.49)		
Skills matrix$_{High\ Info}$			-0.018	-0.004
			(-1.56)	(-0.38)
Skills matrix$_{High\ Info}$			-0.012	-0.028**
			(-0.98)	(-2.19)
Treatment x Low vote director		-0.020**		
		(-2.15)		
Treatment$_{High\ Info}$ x Low vote director			-0.020*	-0.021*
			(-1.81)	(-1.77)
Treatment$_{Low\ Info}$ x Low vote director			-0.019*	-0.026**
			(-1.67)	(-2.01)
Post x Low vote director		0.001	0.001	0.001
		(0.10)	(0.10)	(0.11)
ISS against	-0.020	-0.021	-0.018	-0.024*
	(-1.54)	(-1.56)	(-1.35)	(-1.82)
Director-Year Obs.	28,601	28,601	27,908	26,732
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	0.057	0.057	0.057	0.056

Table 12: Effects of Director Skills Matrix on Future Board Seats

The table reports regressions estimating the effects of skills matrix disclosure on new board seats gained by directors. Regressions are based on director × meeting date observations. We estimate staggered difference-in-difference analyses. 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 without replacement to treatment firms in a given event year based on 2-digit SIC code and closest firm size within a 25% firm size bandwidth (one-to-one matching). We require both treatment and control firms to have at least one firm-year before matrix disclosure and one following matrix disclosure, and we limit the sample to the three years prior to and following matrix disclosure. The dependent variable is *Gain new board seat in following year*, an indicator equal to one if the director gains a new board seat at a publicly traded firm in following year. *Skills matrix (Treatment x Post)* is an indicator equal to one for treatment firms in the post-disclosure period. Each regression includes cohort × firm and cohort × year fixed effects. A cohort is defined as matched treatment and control firms in a given event year. *Skills matrix with low (high) bio match rate* is an indicator equal to one for treatment firms with below (above) median bio matrix rates in the post-disclosure period; we exclude firm-years that have both the matrix format of Example #2 from Figure 1 and a match rate under the *broader matching approach* greater than 98%, to reduce the possibility of a mechanical relationship between skills listed in the matrix portion and text portion of the director bio. *Skills matrix with(out) window dressing* is an indicator equal to one for treatment firms that engage in (do not engage in) window dressing in the post-disclosure period. For brevity, director and firm controls are included in models but are unreported. 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 = Gain new board seat in following year		
Skills matrix (Treatment x Post)	0.008***		
	(2.87)		
Skills matrix with low bio match rate		0.012***	
		(3.73)	
Skills matrix with high bio match rate		0.002	
		(0.62)	
Skills matrix without window dressing			0.013***
			(3.72)
Skills matrix with window dressing			0.004
			(1.08)
Dif b/w matrix categories: p-value		0.01	0.04
Director-Year Obs.	48,097	47,281	44,221
Director & firm controls	Yes	Yes	Yes
Cohort-firm Fixed Effects	Yes	Yes	Yes
Cohort-year Fixed Effects	Yes	Yes	Yes
Adjusted R-squared	0.021	0.021	0.021

Internet Appendix

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

David Becher
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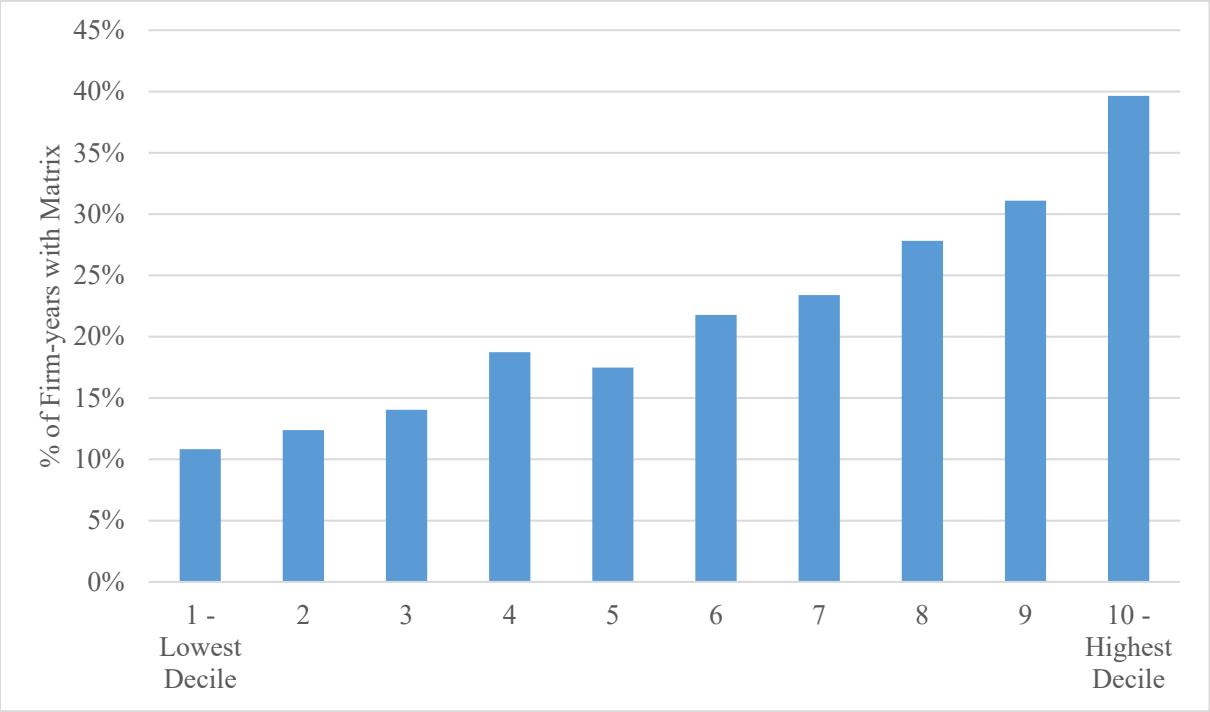
Internet Appendix Figure A1: Percentage of Firms with Skills Matrix, by Firm Size

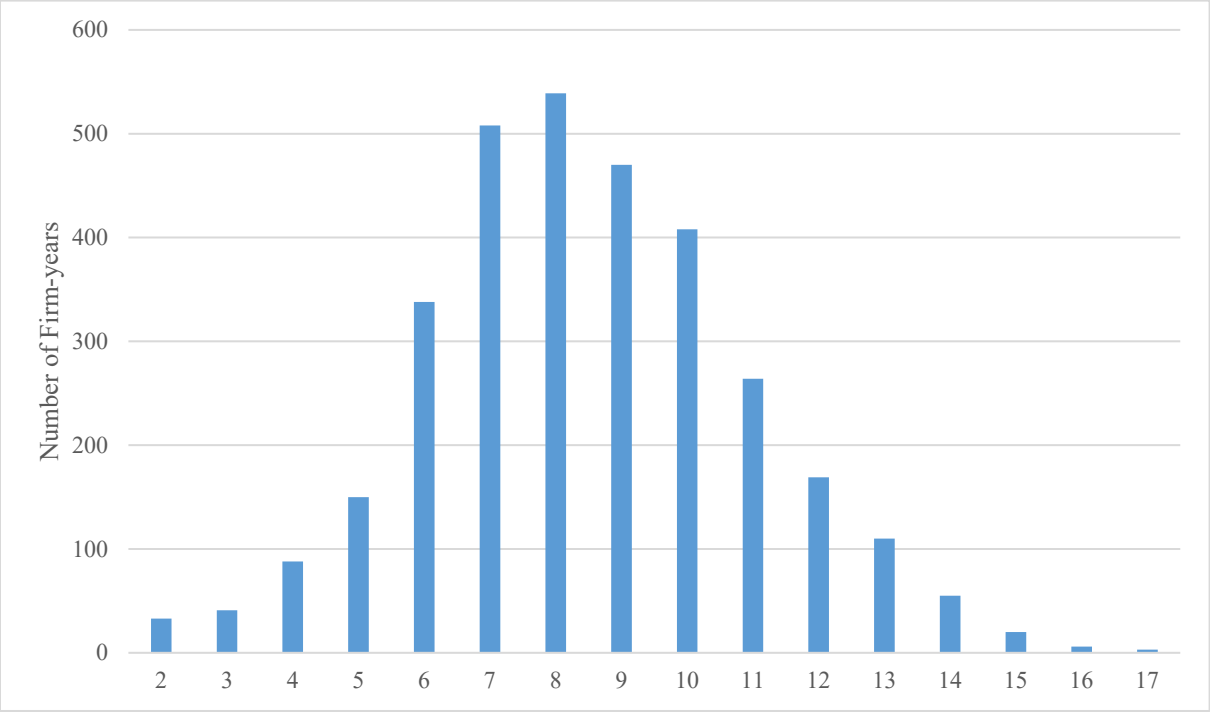
This figure reports the distribution of director skills matrices, based on market capitalization deciles.



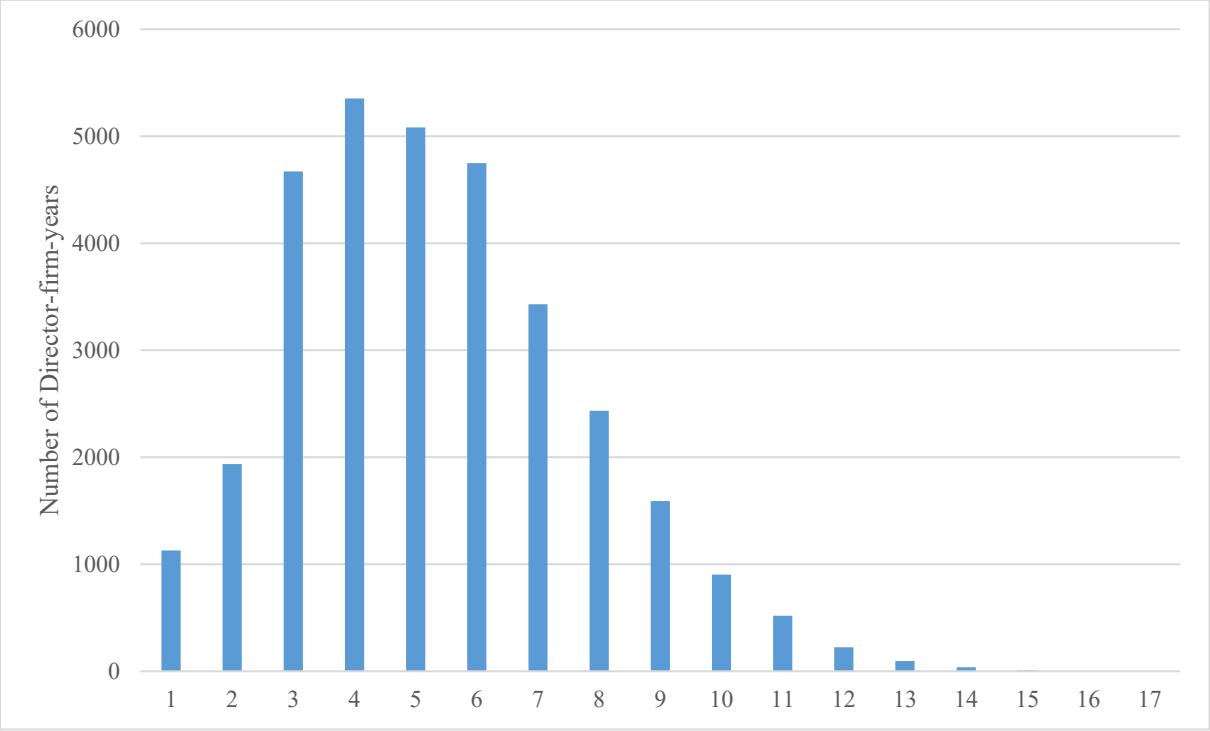
Internet Appendix Figure A2: Average Number of Skills Reported by Firm and Director

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 matrix firm-years list eight skills in their matrix and 5,353 director-firm-years have four matrix skills.

Panel A: Number of skills reported by firm



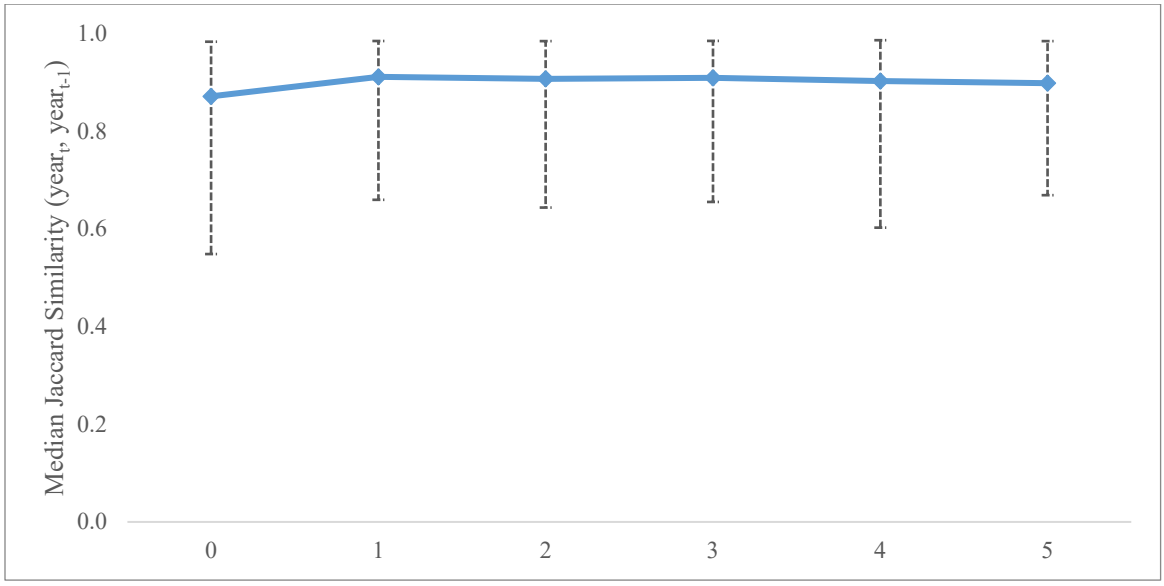
Panel B: Number of skills held by directors



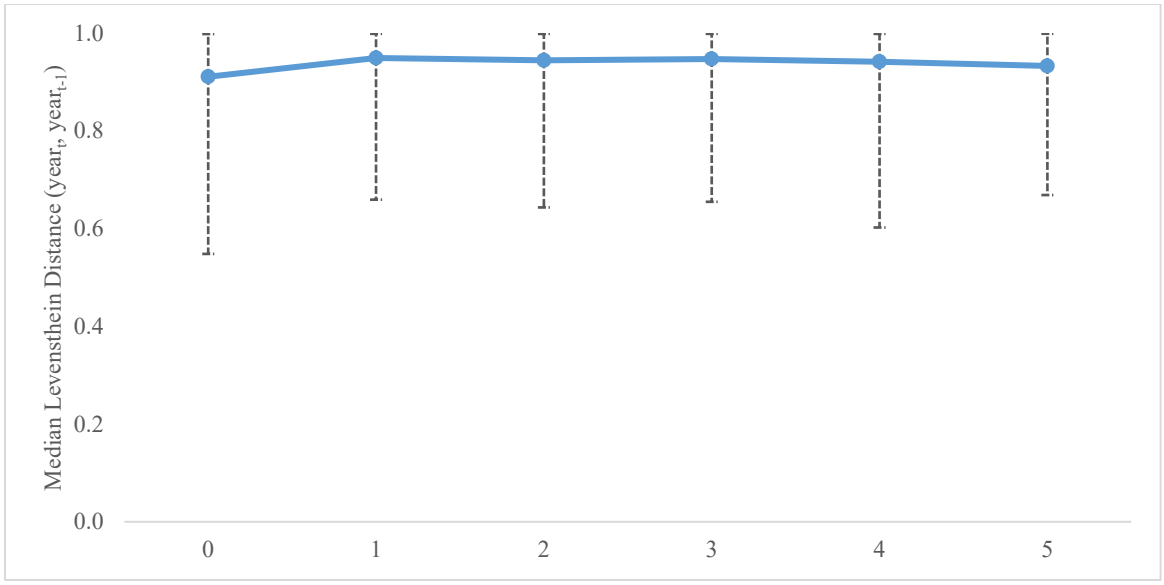
Internet Appendix Figure A3: Do Firms Alter Information in Director Bios When Disclosing a Skills Matrix? Alternative Similarity Scores

This figure details two similarity score measures, each of which represents an alternative to the *Cosine* measure reported in Figure 4. In each panel, the x-axis depicts the year relative to matrix adoption, with year 0 being the year of adoption. For each year t, we plot the median similarity score (across firm-years in the sample) between a firm's bio in year t and the firm's bio in year t-1. Similarity is measured using: Panel A, the *Jaccard Similarity* score, which captures the intersection of unique words in each text divided by the union of unique words across the two texts; Panel B, the *Levenshtein Distance* score, which measures the minimum number of single-character edits (insertions, deletions, or substitutions) required to change one word into the other. All measures vary between 0 and 1, with higher values depicting higher levels of similarity. Both Panel A and B include the 95% confidence intervals.

Panel A



Panel B



Internet Appendix 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
	(2.57)	(1.54)	(1.27)
Board size	0.004***	0.002**	0.003
	(2.95)	(2.22)	(0.99)
Classified board	-0.001	-0.000	-0.039**
	(-0.32)	(-0.10)	(-2.38)
Dual class	-0.025***	-0.029***	0.046
	(-2.91)	(-3.85)	(0.98)
CEO-Chair duality	0.008*	0.006	0.012
	(1.87)	(1.38)	(1.39)
Institutional ownership	-0.004	0.001	-0.053***
	(-0.50)	(0.12)	(-2.82)
External Factors:			
Board-related activism		0.031*	0.037**
		(1.79)	(2.28)
Non-board-related activism		-0.008	-0.001
		(-0.84)	(-0.04)
Percentage of industry peers with matrix		0.130**	0.276***
		(2.35)	(2.65)
Percentage of industry peers with matrix^2		-0.194**	-0.233
		(-2.00)	(-1.65)
Percentage of directors with other board seat at matrix firm		0.209***	0.271***
		(5.72)	(5.47)
Firm Financials:			
Firm size	0.020***	0.017***	0.003
	(7.17)	(7.45)	(0.41)
Market-to-book	-0.005	-0.006	0.003
	(-1.44)	(-1.67)	(0.35)
ROA	-0.015	-0.018	0.075
	(-0.57)	(-0.61)	(1.44)
Excess stock return	-0.004	-0.003	-0.003
	(-0.66)	(-0.56)	(-0.39)
Stock return volatility	0.119	0.101	0.023
	(1.34)	(1.51)	(0.27)
R&D	-0.049	-0.049	0.012
	(-0.72)	(-0.84)	(0.06)
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

Internet Appendix Table A2: Effects of Director Skills Matrix Disclosure on Shareholder Voting

This tables reports the regressions shown in column 1 of Table 4 and in columns 1 and 2 of Table 5. While those tables suppress control variables, coefficients on all controls are tabulated here. Definitions are in Appendix B.

	OLS analysis	IV analysis	OLS analysis
		1st stage	2nd stage
	Dependent variable:	Dependent variable:	
	Fund 'for'	Skills matrix	Fund 'for'
	Model 1	Model 2	Model 3
Skills matrix (Treatment x Post)	0.006***		
	(11.50)		
Skills matrix (Instrumented)			0.035***
			(4.37)
Director overlap at other matrix boards		0.257***	
		(60.62)	
Residual of ISS 'for' recommendation	0.433***	0.006***	0.441***
	(42.77)	(11.84)	(43.06)
Independent director	0.001**	-0.004***	0.001**
	(2.20)	(-28.66)	(1.96)
Ln(Age)	0.001	-0.018***	-0.002***
	(0.68)	(-44.75)	(-2.71)
Ln(Tenure)	-0.005***	-0.001***	-0.006***
	(-12.16)	(-10.04)	(-14.62)
Female	0.005***	0.001***	0.004***
	(21.15)	(11.28)	(20.00)
Number of other directorships	-0.008***	0.000***	-0.007***
	(-25.82)	(3.03)	(-27.53)
Director ownership	0.013	0.074***	0.029***
	(1.51)	(40.97)	(4.34)
Audit committee	0.002***	0.005***	0.002***
	(8.81)	(37.37)	(8.72)
Audit committee chair	0.002***	0.003***	0.001***
	(11.37)	(31.65)	(5.73)
Compensation committee	-0.003***	0.005***	-0.004***
	(-9.45)	(47.55)	(-11.03)
Compensation committee chair	-0.000	0.004***	-0.001***
	(-0.43)	(41.48)	(-3.96)
Nominating committee	-0.003***	0.002***	-0.003***
	(-6.28)	(16.41)	(-7.87)
Nominating committee chair	-0.013***	0.004***	-0.012***
	(-18.23)	(34.85)	(-19.22)
Attendance problems	-0.090***	-0.020***	-0.090***
	(-27.03)	(-26.93)	(-27.97)
Board independence	0.047***	0.003***	0.000***
	(12.07)	(57.15)	(12.09)
Board size	0.000	-0.001***	-0.000**

	(0.60)	(-4.47)	(-2.28)
CEO-Chair duality	-0.001*	0.019***	-0.001***
	(-1.66)	(28.96)	(-4.27)
Institutional ownership	0.005***	-0.078***	0.008***
	(6.31)	(-64.57)	(10.89)
Firm size	0.003***	-0.015***	0.004***
	(3.68)	(-21.84)	(5.79)
Market-to-book	0.001***	-0.005***	0.000
	(2.66)	(-6.87)	(1.16)
ROA	0.006	0.218***	0.000
	(1.48)	(47.26)	(0.10)
Excess stock return	0.001*	0.000	0.001
	(1.67)	(0.01)	(1.64)
Stock return volatility	-0.002	0.177***	-0.004
	(-0.39)	(17.08)	(-0.78)
R&D	0.050***	0.102***	0.074***
	(2.58)	(4.68)	(7.27)
Fund size	0.003***	-0.000	0.003***
	(3.74)	(-1.02)	(3.47)
Family size	0.005***	-0.000	0.005***
	(4.71)	(-0.48)	(5.01)
Fund turnover	0.003***	-0.000	0.003***
	(4.14)	(-0.01)	(3.63)
Top 5 MSA	-0.003	-0.000	-0.003
	(-0.94)	(-0.48)	(-0.88)
Director-Fund-Year Obs.	9,612,597	22,661,521	22,661,521
Cohort-firm Fixed Effects	Yes		
Cohort-year Fixed Effects	Yes		
Firm and Year Fixed Effects		Yes	Yes
First-stage F-statistic		3,674.55	
Adjusted R-squared	0.180	0.680	0.200

Internet Appendix Table A3: Effects of Director Skills Matrix Disclosure on Shareholder Voting (Event Time Coefficients)

The table reports OLS regressions estimating the effects of skills matrix disclosure on director vote support. Regressions are based on director × fund × meeting date observations. Model 1 provides results for the staggered difference-in-difference analysis. The first year a firm discloses a matrix (treatment firm) is considered the event year (year *t*). Firms that do not disclose a matrix (control firms) are matched without replacement to treatment firms in a given event year based on 2-digit SIC code and closest firm size within a 25% firm size bandwidth. 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. Treatment is interacted with each event year: *Treatment x* $Year_{t-2}$ represents a firm two years prior to matrix adoption, *Treatment x* $Year_t$ represents a firm in the year of matrix adoption, etc. Each regression includes cohort by firm and cohort by year fixed effects. A cohort is defined as matched treatment and control firms in a given event year. For brevity, director, firm and fund controls are included in models but are unreported. All regressions include a constant (unreported). t-statistics based on standard error clustered by fund are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent variable:
	Fund 'for'
	Model 1
Treatment x $Year_{t-2}$	-0.000
	(-0.16)
Treatment x $Year_{t-1}$	0.001
	(1.37)
Treatment x $Year_t$	0.007***
	(9.29)
Treatment x $Year_{t+1}$	0.005***
	(6.33)
Treatment x $Year_{t+2}$	0.004***
	(4.89)
Director-Fund-Year Obs.	9,612,597
Director, firm & fund controls	Yes
Cohort-firm Fixed Effects	Yes
Cohort-year Fixed Effects	Yes
Adjusted R-squared	0.180

Internet Appendix Table A4: Effects of Director Skills Matrix on Shareholder Voting, IV analysis – First stage results

The table reports first stage OLS regressions for the instrumental variables (IV) analyses estimating the effects of skills matrix disclosure on director vote support and ISS recommendations. Models 1-2 (which underly the second stage regression in Table 5, column 2) and 5-6 (which underly the second stage regression in Table 7, column 2) are based on director × fund × meeting date observations. Models 3-4 (which underly the second stage regression in Table 6, column 2) are based on director × meeting date observations. The dependent variable in Models 1, 3 and 5 is an indicator equal to one if the firm discloses a skills matrix. The dependent variable in Models 2 and 4 is the interaction between an indicator equal to one if the firm discloses a skills matrix and an indicator if the firm is in the bottom tercile of firm size in a given year (*Small firm*). The dependent variable in Model 6 is the interaction between an indicator equal to one if the firm discloses a skills matrix and an indicator if ISS makes an 'against' recommendation for an individual director (*ISS against*). *Director overlap at other matrix boards* is the percentage of directors that hold a directorship at a different S&P 1500 firm that report a skills matrix in the prior year. For brevity, director, firm and fund controls are included in models but are unreported. All regressions include a constant (unreported). t-statistics based on standard error clustered by fund are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Dependent variable:					
	Skills matrix	Skills matrix x Small firm	Skills matrix	Skills matrix x Small firm	Skills matrix	Skills matrix x ISS against
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Director overlap at other matrix boards	0.310*** (51.84)	-0.300*** (-42.83)	0.356*** (5.61)	-0.317*** (-11.77)	0.257*** (60.06)	-0.027*** (-90.97)
Director overlap x Small firm	-0.392*** (-69.11)	0.997*** (136.18)	-0.434*** (-4.69)	0.936*** (10.90)		
Small firm	0.055*** (54.03)	0.201*** (86.49)	0.050*** (2.82)	0.161*** (9.63)		
Director overlap x ISS against					0.001 (0.20)	1.344*** (151.21)
ISS against					-0.006*** (-10.28)	0.136*** (62.56)
Director-Fund-Year Obs.	22,661,521	22,661,521			22,661,521	22,661,521
Director, firm & fund controls	Yes	Yes			Yes	Yes
Director-Year Obs.			97,557	97,557		
Director & firm controls			Yes	Yes		
Firm and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic	3,775.30	4,945.08	31.42	118.82	3,606,6	22,865.60
Adjusted R-squared	0.680	0.599	0.674	0.620	0.680	0.494

Internet Appendix Table A5: Effects of window dressing on ISS recommendations

This table reports OLS regressions estimating the effects of window dressing on the relation between skills matrix disclosure and ISS recommendations. Regressions are based on director × meeting date observations. The dependent variable is an indicator equal to one if ISS recommends 'for' an individual director. Specifications mirror the staggered difference-in-difference analysis used in Table 4. Window dressing is defined according to the *Skill added* approach in the first column and and the *Multiple matrix directorships* approach in the second column, respectively, as defined in the text. *Skills matrix*$_{non\text{-}window\ dressing}$ and *Skills matrix*$_{non\text{-}window\ dressing}$ (each of which represent *treatment x post*) are indicator variables equal to one for treatment firms in the specified group (window dressing or non-window dressing, respectively) in the post-disclosure period. For brevity, director and firm controls are included in models but are unreported. All regressions include a constant (unreported). t-statistics based on standard error clustered by firm are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

	Dependent Variable = ISS For	
Window-dressing definition based on:	*Skill added*	*Multiple matrix directorships*
Skills matrix$_{\text{non-window dressing}}$	0.004	0.006
	(0.59)	(0.82)
Skills matrix$_{\text{window dressing}}$	0.008	-0.004
	(0.80)	(-0.37)
Director-Year Obs.	32,526	29,958
Director & firm controls	Yes	Yes
Cohort-firm Fixed Effects	Yes	Yes
Cohort-year Fixed Effects	Yes	Yes
Adjusted R-squared	0.366	0.381

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