Bridging the Gap: The Impact of Board-Management Commonality on Firm Value and Board Decision-making Effectiveness

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Abstract

We examine the impact of board-management commonality on firm value and board effectiveness. Using the classification properties of a support vector machine (SVM) to measure board-management commonality, we find a positive effect of commonality on firm value. The result is robust to an instrumental approach, analyses that exploits the 2019 enactment of Illinois Public Act 101-0589 as a quasi-exogenous shock and unexpected deaths of directors and managers, and a placebo test. The positive effect is particularly pronounced in firms with diverse leadership and those facing high industry and market uncertainties. Additionally, commonality enhances board decision-making effectiveness and innovation outputs.

Keywords: Board diversity, management diversity, board-management commonality, support vector machine (SVM), firm value, board effectiveness, ChatGPT

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1. Introduction

The importance of board diversity has been extensively emphasized by regulatory bodies, institutional investors, and prior research (e.g., Baranchuk and Dybvig, 2008; Bernile, Bhagwat, and Yonker, 2018; Kang, Kim, and Oh, 2022; Gormley et al., 2023). In response, firms have increasingly diversified their boards to meet shareholder and societal pressures. However, the significance of management diversity and the impact of shared characteristics between management and board members on firm value and board effectiveness have received limited attention. Given the pivotal role of independent directors, executive directors (e.g., CEOs), and non-board senior managers in governance and firm decision-making, it is crucial to understand how their differing characteristics influence interaction and communication dynamics.

This study addresses this gap by examining how various characteristics of the overall leadership team—including both the board (independent directors) and the management team (executive directors and senior managers)—affect firm value and board effectiveness. We focus on shared characteristics, values, experiences, and perspectives between boards and management teams ("board-management commonality") as our key measure, incorporating a range of demographic and cognitive variables to capture this concept.[1]

Diverse leadership teams may face challenges in reaching consensus, leading to slower decision-making and potential conflicts that hinder strategic implementation and board effectiveness. If not managed effectively, the friction and inefficiencies from leadership diversity may outweigh its benefits. To fully leverage diverse perspectives, firms need mechanisms to manage conflict and communication barriers, requiring enhanced collaboration and conflict-

[1] Edmans, Flammer, and Glossner (2023) stress the importance of a holistic approach to assessing the impact of diversity, which is often limited to a single dimension, notably gender. They advocate for measuring diversity, equity, and inclusion beyond demographics, emphasizing the need for inclusive environments to fully realize the benefits of diversity.

resolution frameworks. Board-management commonality plays a critical role in influencing interactions between boards and management, affecting conflict resolution, communication, and mutual understanding—key components of effective decision-making. Despite limited empirical evidence, anecdotal accounts suggest that firms prioritize communication and engagement between directors and management during the nomination process.[2] This finding indicates that board-management commonality likely shapes interactions within leadership teams and impacts governance and firm performance.

Measuring commonality poses a significant empirical challenge. To address this, we employ a support vector machine (SVM). Unlike standard SVM applications that create a universal classification rule for optimal group separation (e.g., Boudoukh et al., 2018; Chen, Wu, and Yang, 2019; Fedyk and Hodson, 2023), our approach identifies "misclassified" members within each group of a firm in a given year. This method captures subtle overlaps between independent directors and management across various dimensions. By utilizing SVM, we aim to offer new insights into board-management commonality, providing a more comprehensive assessment of leadership team dynamics beyond traditional measures of board or management diversity.

To illustrate how an SVM assesses the overlap between two groups in a specific dimension, we use the following example. Directors are classified into Group 1 if they share characteristics with other board members and Group 2 if they are more similar to managers. Similarly, managers are classified into Group 3 if they share characteristics with other managers and Group 4 if they are more similar to directors. The SVM categorizes directors in Group 1 and managers in Group 3

[2] For example, UnitedHealth Group Inc.'s 2015 proxy statement emphasizes the need for directors to "work collegially and collaboratively with other directors and management." Similarly, Bristow Group Inc.'s 2016 proxy statement highlights the importance of director nominees "engaging management and each other in a constructive and collaborative fashion." These examples underscore the crucial role that communication and engagement play in ensuring a board's effectiveness.

as correctly classified, while directors in Group 2 and managers in Group 4 are incorrectly classified. We label directors in Group 2 as "manager-like directors" and managers in Group 4 as "director-like managers" because they share similarities with individuals in the other group.

Expanding on this concept, we use SVM classification to categorize board and top management team members by identifying the hyperplane that best separates director-like managers and manager-like directors from others across multiple characteristics (Hastie, Tibshirani, and Friedman, 2009). We consider traits such as demographics (age and gender), cultural backgrounds (Hofstede's six dimensions of culture, 2001), and the educational and functional backgrounds of directors and managers. These factors, identified in prior studies as important demographic and cognitive variables (e.g., Adams, Akyol, and Verwijmeren, 2018; Bernile, Bhagwat, and Yonker, 2018; Kang, Kim, and Oh, 2022), are discussed along with the variable construction process in Section 2.2. This novel approach highlights individuals who diverge from their group's norms and provides insights into the dynamic overlaps between the two groups, which are crucial for understanding the functionality of boards and management teams.

The impact of board-management commonality on firm value and policy remains ambiguous. Shared characteristics between board members and management can accelerate consensus-building and improve decision-making efficiency (e.g., Baranchuk and Dybvig, 2008; Malenko, 2013; Donaldson, Malenko, and Piacentino, 2020). Similar backgrounds foster a mutual understanding of strategic goals, facilitating quicker agreement on strategy and execution. Manager-like directors, who understand operational realities, ensure that board directives are feasible and effective.[3] Additionally, commonality reduces "dissent costs," facilitating open

[3] Boards play important roles in identifying and assessing projects, overseeing key strategies proposed by management, and monitoring managerial performance, while management initiates and implements these decisions (e.g., Hermalin and Weisbach, 1998; Donaldson, Malenko, and Piacentino, 2020).

communication and dissent without negative repercussions (Chemmanur and Fedaseyeu, 2018). This alleviates coordination issues and prevents the passive acceptance of ineffective policies. Commonality between directors and managers also promotes communication, cooperation, and consensus, which are essential for informed board decisions (Baranchuk and Dybvig, 2008). Director-like managers bridge the informational gap between the board and operations by clearly articulating the operational impacts of board decisions and conveying on-the-ground realities back to the board. Collectively, these factors suggest that board-management commonality positively affects firm value and board decision-making.

However, shared views between the board and management can lead to excessive harmony, weakening the board's independent oversight. High commonality creates pressure to conform, making board members less likely to present alternative views or question prevailing wisdom. This limits the board's ability to explore diverse strategic options or respond to external threats and opportunities. Bikhchandani, Hirshleifer, and Welch (1998) suggest that conformity can trigger informational cascades within decision-making bodies, such as corporate boards. When board members align with management's initial preferences, they may forgo independent analysis, leading to unanimous board decisions based on partial or erroneous information. Consequently, the board's ability to check management proposals is compromised, and new business opportunities may be missed. Boards with high commonality with management are more likely to endorse management's strategies without adequate scrutiny, ignoring alternative viewpoints or potential pitfalls. This conformity hinders innovation and creativity, making it difficult to identify emerging opportunities and develop new ideas, products, and services. These arguments suggest that board-management commonality negatively affects firm value and board decision-making.

We examine these two competing views and find evidence supporting the positive impact of board-management commonality on firm value. Higher commonality is significantly associated with increased firm value, as measured by Tobin's *q*. Further analysis indicates a curvilinear relationship between commonality and firm value: initial increases in commonality positively affect firm value, but the effect diminishes as commonality continues to increase.

We conduct several tests to address concerns regarding the endogenous determination of board and management composition. First, we use two-stage least squares (2SLS) regression with an entropy-based index of regional labor market diversity as an instrument for *Board-management commonality*. This index, detailed in Section 3, captures the diversity in each company's headquarters county across age, race, education, and occupation by gender. Firms in counties with more diverse labor pools tend to appoint directors and managers from varied backgrounds, increasing board-management commonality. This suggests that our entropy-based index satisfies the relevance requirements for an instrument. This index is unlikely to influence firm value except through its impact on commonality, satisfying the instrument's exclusion condition. Second, we exploit the 2019 enactment of Illinois Public Act 101-0589, which introduced new diversity requirements as a quasi-exogenous shock to board and management selection and commonality. Our analysis shows that announcement returns for Illinois treatment firms, which experience increased commonality due to new diversity mandates, are significantly higher than those for non-Illinois control firms. Moreover, Illinois treatment firms with lower pre-enactment commonality, which are expected to experience a substantial increase in commonality following the legislation, exhibit a long-term increase in firm value, as measured by Tobin's *q*. Third, we examine the impact of unexpected director and manager deaths, which can change board and management composition and commonality, regardless of prior firm conditions (e.g., Fracassi and Tate, 2012). We find that

stock prices decline more following the deaths of directors or managers with commonality, reflecting their incremental value. These findings enhance the credibility of causal inferences by demonstrating the direct effect of changes in board-management commonality on firm value. Finally, placebo tests confirm that the positive impact of directors and managers with commonality arises from their shared similarities with other groups rather than from specific individual traits.

Next, we examine whether the impact of commonality varies with a firm's overall diversity by dividing the sample into subgroups based on leadership team diversity. Unlike prior studies that focus separately on board and management diversity, we explore how, as leadership teams become increasingly diverse, shared characteristics streamline coordination and reduce friction and inefficiency arising from such teams. Diverse leadership teams often face challenges in reaching consensus, which can slow decision-making and lead to conflicts, potentially undermining governance effectiveness. If not managed effectively, the friction and inefficiencies from diversity might outweigh its benefits. Board-management commonality can help address these challenges. Our results show that the positive impact of commonality on firm value is more pronounced in highly diverse leadership teams, underscoring its role in enhancing decision-making efficiency.[4]

We then examine the circumstances under which commonality is more beneficial for shareholders. Board-management commonality helps mitigate conflicts from divergent perspectives, facilitating swift decision-making, particularly in uncertain industries and markets where timely responses are critical. In such environments, shared perspectives and collaboration between the board and management facilitate decisive actions, allowing firms to quickly adapt to unexpected changes. Enhanced information processing and decision-making efficiency from

[4] In untabulated tests, we also explore variations in the impact of commonality across different levels of board diversity, management diversity, board size, and leadership team size. While commonality enhances firm performance in less diverse boardrooms, we find no evidence that its effect is influenced by management diversity or size.

commonality are particularly valuable for firms facing external uncertainty, such as industry shocks or economic policy changes. Our findings corroborate the argument that the positive impact of commonality is most pronounced in firms facing industry shocks and high policy uncertainty.

To assess whether commonality indeed eases friction in board decision-making, we analyze three measures of board decision-making efficiency from prior studies (e.g., Fahlenbrach, Low, and Stulz, 2017; Giannetti and Zhao, 2019). These studies indicate that decision-making efficiency is negatively associated with non-executive director meetings, director turnover, and 8-K filings regarding material changes, which often result from erratic decision-making. We expect firms with higher commonality to have fewer board meetings, particularly non-executive director meetings, where consensus among directors is reached without undue influence from the management, due to reduced conflict. Greater alignment between the board and management fosters trust and effective communication, reducing the need for frequent meetings. Additionally, we anticipate lower director turnover in firms with higher commonality, as disagreements are more effectively resolved. If commonality reduces friction in consensus-building, it should lead to fewer unpredictable decisions and strategic shifts, decreasing the need for 8-K filings. Supporting these predictions, we find that firms with higher commonality exhibit more efficient board decision-making, as measured by these variables.

In addition, we examine how board-management commonality affects corporate policies and board decision-making. First, we investigate how commonality affects innovation output and success. Corporate innovation is risky, multistage, and often requires long-term efforts for positive outcomes (e.g., Balsmeier, Fleming, and Manso, 2017; Hirshleifer, Hsu, and Li, 2017). If commonality particularly fosters consensus for these risky, long-term projects by promoting communication and cooperation, we expect firms with higher commonality to experience

increased innovation output and productivity, as evidenced by more patents and citations. Our results support this expectation. Next, we examine whether commonality aids timely decision-making in situations that require prompt responses, such as capital expenditure (capex) investment decisions. We find that firms with higher commonality respond more effectively to market feedback on capex forecasts, leading to subsequent investment adjustments.

We conduct several additional tests. First, we assess whether specific components of shared characteristics drive the relation between commonality and firm value. The positive and significant impact on firm value persists even when individual components, such as demographic, cultural, educational, or functional traits, are excluded. These findings imply that the decision-making dynamics between the board and management are influenced by the collective effects of shared traits. Second, the analysis of director biographies indicates that manager-like directors focus more on community engagement and social responsibility, emphasizing their role in communication, consensus-building, and informed decision-making. Third, we examine how firms with higher commonality differ in their director-selection policies and the values emphasized during this process. Our textual analysis of firms' proxy statements shows that firms with higher commonality emphasize values such as "integrity" and "teamwork" in director-selection criteria.

Our study contributes to the literature in three ways. First, it advances the understanding of board and top management team composition. In today's governance landscape, where CEOs often dominate as sole insiders, firms must adapt their management teams to align with increasing board diversity. Surprisingly, little attention has been paid to the diversity within the overall leadership teams and interactions between boards and management. Prior research has focused mainly on the board-CEO relationship and its impact on boards' monitoring and advising roles (e.g., Fracassi and

Tate, 2012; Berger, Cai, and Qiu, 2023). Our study highlights the importance of commonality between independent directors and executives beyond the CEO across various dimensions.

Second, our study extends the literature on board diversity and its effects on board effectiveness and firm value (Bernile, Bhagwat, and Yonker, 2018; Giannetti and Zhao, 2019; Kang, Kim, and Oh, 2022; Gormley et al., 2023). While regulatory mandates and institutional investor initiatives focus on board diversity, the broader impact should consider both board and management composition. Unlike studies that examine diversity within singular groups and its effects on decision-making, such as directors' voting behavior (Kang, Kim, and Oh, 2022), our research explores how commonality—shared attributes between board members and management—affects alignment between these groups and firm decision-making.

Third, our use of an SVM classification algorithm to measure board-management commonality contributes to the literature on machine learning in finance and economics. Previous studies (Boudoukh et al., 2018; Chen, Wu, and Yang, 2019; Fedyk and Hodson, 2023) typically use SVMs to find universal rules for classifying data points, such as patent filings and news articles. Our study departs from this conventional approach by focusing on misclassified data points. These misclassifications serve as insightful indicators to gauge the level of commonality between the two groups across multiple dimensions.[5]

The remainder of the paper is organized as follows. Section 2 describes the sample and key variables. Section 3 examines the impact of board-management commonality on firm value, including an instrumental variable (IV) approach, tests that exploit the 2019 enactment of new diversity requirements in Illinois as an arguably exogenous shock, an event analysis around

[5] The SVM, a supervised machine learning algorithm, is trained on a dataset of news articles to learn patterns and classify them into different categories or event types (Boudoukh et al., 2018; Fedyk and Hodson, 2023). Similarly, Chen, Wu, and Yang (2019) use textual data from filings to classify patent filings into categories of FinTech innovation.

director and manager deaths, and a placebo test. It also includes subsample analyses based on leadership team diversity, industry and market uncertainty, and board decision-making efficiency. Section 4 explores the effects of commonality on innovation activities and capital investment decisions. Section 5 presents the results from additional tests, including the effect of each component of board-management commonality on firm value, the role of manager-like directors and director-like managers, and textual analyses of the characteristics of firms with high board-management commonality. Finally, Section 6 concludes the study.

2. Data and variable definitions

2.1 Sample and variable definitions

We match BoardEx firms with those covered in Compustat and the Center for Research in Security Prices (CRSP) to create the BoardEx-Compustat-CRSP database, covering the period from 2003 to 2021. We begin the sample period in 2003 to mitigate the confounding effects of the 2002 Sarbanes-Oxley Act on board composition and the role of independent directors (e.g., Duchin, Matsusaka, and Ozbas, 2010).[6] Financial and stock return data are obtained from Compustat and the CRSP, respectively. We exclude firms in financial industries (Standard Industry Code (SIC) 6000-6999) and those with missing values for the key variables. The final sample consists of 44,115 firm-year observations from 5,213 firms with complete data on the key variables.

2.2 Measurement of board-management commonality

Our key explanatory variable, *Board-management commonality*, measures the overlap of demographic, cultural, educational, and functional attributes between the board and management —characteristics identified as key demographic and cognitive factors in prior studies (e.g., Adams,

[6] The BoardEx database of U.S. firms also becomes more comprehensive starting in 2003 (Fracassi and Tate, 2012). We identify independent directors as non-executive directors (BoardEx variable: NED) whose individual role names (BoardEx variable: rolename) contain the keyword "independent."

Ali, and Patrick, 2018; Bernile, Bhagwat, and Yonker, 2018). Appendix A provides detailed descriptions of each component. While overlapping members can be visually identified on a two-dimensional plane with only two characteristics, this graphical method becomes impractical for multiple characteristics due to time-intensive nature of manual inspection for each firm annually.

To address this limitation, we utilize the SVM algorithm. The SVM separates the two groups based on their various attributes by constructing an optimal hyperplane. This automated approach identifies overlapping members between the board and management. Although the SVM effectively divides groups, it imperfectly separates those with partially overlapping values, resulting in misclassified members. The number of misclassified members indicates the extent of overlap between the board and management. We measure this overlap using the proportion of misclassified members as a metric of board-management commonality, leveraging SVM properties. To mitigate overfitting, we use a rigid linear kernel. This approach departs from conventional SVM applications that aim for a universal rule for group identification across cases. Instead, we conduct separate SVM analyses for each firm in a given year to classify board members and management and identify misclassified individuals.[7]

We obtain data on the demographic, educational, and functional characteristics of the board members and management from the BoardEx database. For the cultural background, we utilize OnoGraph and identify the country of origin for directors and managers based on their first and last names (Mateos, 2007; Giannetti and Zhao, 2019; Berger, Cai, and Qiu, 2023). Their cultural values are derived from Hofstede's (2001) national culture model, which includes six dimensions: power distance, individualism, muscularity, uncertainty avoidance, long-term orientation, and

[7] Since our objective is not to establish a universal rule applicable across different firms and periods, distinguishing between training and test samples is unnecessary.

indulgence.[8] To ensure comparability across units, we standardize continuous variables, such as tenure, age, and Hofstede's cultural values, to range from zero to one. We demean all 20 characteristic variables by industry (SIC two-digit codes) and year to adjust for industry-specific and annual trends. This enhances data compatibility, allowing classification based on the intrinsic characteristics of board members and management rather than external industry or temporal factors. We use the SVM classifier for each attribute to classify board members (i.e., independent directors) and management. The overlap between board and management attributes is measured by the fraction of "misclassified" directors (i.e., manager-like directors) and "misclassified" managers (i.e., director-like managers), which is one minus the accuracy (fraction of "correctly classified" members) of the SVM classification, as shown in Figure 1.

$$\text{Commonality} = \frac{\text{No.of director}-\text{like managers} + \text{No.of manager}-\text{like directors}}{\text{Total no.of management team mebers} + \text{Total no.of directors}}$$

After measuring the commonality of each attribute, we compute the first principal component to create a comprehensive *Board-management commonality* index. This index reflects the overlap between board members and management across multiple dimensions. A higher index indicates a greater degree of commonality in shared characteristics, values, experiences, or perspectives.

The SVM classification-based measure offers advantages over conventional methods such as centroid-based distance measures. While centroid-based distance classification is appealing for its simplicity, it inadequately captures within-group diversity. As illustrated in Figure 2, centroid-based measures are inadequate in the presence of high within-group diversity and significant overlap, as they focus solely on distance to the group centroid, neglecting individual dispersion. In contrast, SVM better handles diverse attributes among directors and managers by accounting

[8] We obtain the six-dimension data from Hofstede's website (https://geerthofstede.com/research-and-vsm/dimension-data-matrix/).

for overlap and individual distribution, effectively distinguishing individuals rather than grouping them based on average characteristics.

Our SVM-based commonality measure does not rely solely on group diversity levels. Unlike traditional methods that use aggregated metrics, SVMs classify individuals based on specific characteristics. This granularity accurately identifies overlap between directors and managers by evaluating their unique traits. By calculating a *Board-management commonality* index using the first principal component of commonality for each attribute, SVM provides a comprehensive measure of overlap across multiple dimensions, regardless of group diversity. Appendix B provides a detailed technical description of the SVM-based commonality measure.

2.3 Summary statistics

Table 1 presents the summary statistics of the main variables and characteristics of the sample firms in the BoardEx-Compustat-CRSP database. The mean (median) *Board-management commonality* is 1.63 (1.68). The median (mean) board size is six (6.55), and the management size is nine (9.76).[9] All continuous variables are winsorized at the 1st and 99th percentiles. As depicted in Figure 3, *Board-management commonality* declines until 2013, reaching its lowest value of 1.59, before steadily increasing to 1.7 by 2021. Figure 4-1 illustrates a nearly 30% increase in the diversity index of the leadership team (including both board members and management) from 0.94 in 2003 to 1.21 in 2021. A granular analysis of the subindices reveals that functional diversity within the leadership team is the highest, whereas demographic, cultural, and educational diversity remain relatively low, exhibiting minimal fluctuation or a slight upward trend (as reported in the

[9] As the number of data points increases, the SVM improves its ability to differentiate between classes (Hastie, Tibshirani, and Friedman, 2009). To address potential concerns about the relatively small size of directors and managers in the analysis, we conduct a sensitivity analysis by excluding cases where the board and management have fewer than four members, representing the bottom tenth percentile of the sample. Our findings remain consistent.

Internet Appendix Figure 1).[10] Directors and managers with different functional backgrounds often use distinct professional terminology and perspectives, which complicates conflict resolution and consensus-building (Cronin and Weingart, 2007). Figure 4-2 shows that although both management diversity and board diversity decline noticeably throughout the study period, management diversity consistently surpasses board diversity.[11]

3. Board-management commonality and firm value

3.1 OLS analyses

We use ordinary least squares (OLS) regressions to examine the impact of board-management commonality on firm value. When board members share similar experiences and backgrounds with management, it can foster clearer communication and better understanding, which allows for more effective oversight and faster decision-making. This shared perspective can enhance the board's ability to evaluate management proposals and the management's ability to execute strategic plans. However, shared views between boards and management may diminish critical evaluation, potentially leading to a decrease in director dissent from management proposals. This could compromise the board's role in providing checks and balances and exploring new business opportunities. Therefore, while shared views may positively impact firm value by fostering alignment, they may also negatively impact it by limiting critical oversight.

[10] *Leadership team diversity* is computed using PCA applied to the same demographic, cultural, educational, and functional attributes used to construct *Board-management commonality*.

[11] In Internet Appendix Figure A.2-1, we examine time trends in board diversity across individual attributes. Functional diversity shows the highest values and has steadily increased over the sample period, while cultural and educational diversity remain low with minimal variation. Demographic diversity among boards has declined over time, indicating an aging group of independent directors, although gender diversity has significantly increased, especially post-2017, likely due to regulatory and social pressures (Gormley et al., 2023). Internet Appendix Figure A.2-2 shows that management teams exhibit high educational diversity but lower levels of cultural, demographic, and functional diversity. Similar to boards, demographic diversity within management teams has also decreased. The average age of management teams has risen, while gender diversity has steadily improved. Notably, functional diversity in management has decreased throughout the study period.

Table 2 presents the results from the OLS regression analysis. The dependent variable is Tobin's *q*. The regressions control for various firm characteristics that influence board and management composition and firm value, including firm size, past performance (stock returns and ROA), return volatility, leverage, research and development (R&D) intensity, and governance characteristics (proportion of independent directors, institutional ownership, log (board size) and log (management size)). We also control for board diversity, management diversity, and board-management social networks (Fracassi and Tate, 2012). In column (1), controlling for industry and year fixed effects and various firm-level characteristics, we find that the coefficient on *Board-management commonality* is positive and significant at the 1% level. This result remains consistent when we replace industry fixed effects with firm fixed effects in column (2) and year fixed effects with industry-year fixed effects in column (3). The coefficient estimates, ranging from 0.147 to 0.196, indicate that a one-standard-deviation increase in *Board-management commonality* leads to a 1.93% to 2.57% increase in firm value. This increase is economically and statistically significant.[12] In untabulated tests, we explore the curvilinear relationship between commonality and firm value by including the square term of commonality as an additional variable in the regressions. We find that the coefficients on *Board-management commonality* are positive, whereas those on *Board-management commonality*^{2} are negative across all regressions. These coefficients are significant, except in column (1). The findings suggest a nonlinear association between commonality and firm value: Tobin's *q* initially increases with higher commonality but decreases as commonality increases further. Firm value reaches its maximum when the

[12] For example, given that the mean value of Tobin's *q* is 2.106, the change from the 25th to the 75th percentile of *Board-management commonality* corresponds to about a 2.79% increase in Tobin's *q* (0.147 × (1.851 - 1.451) / 2.106).

commonality is 2.04 (1.91) in column (2) (column (3)), indicating the nuanced impact of commonality on firm value.

3.2 Identification tests

A key concern regarding OLS analysis is that a firm's decision to select directors and management may be endogenously determined. Unobservable firm characteristics, such as corporate culture and strategic priorities, can influence a firm's commonality and value. For example, firms with a collaborative culture and strong communication may naturally align their boards and management, leading to higher commonality and increased firm value through better strategic outcomes. Well-performing firms may also have more resources and motivation to foster harmonious board-management relationships, resulting in a positive relation between commonality and firm value. To mitigate these concerns, we conduct several analyses, including an IV approach, a test exploiting a shock to board and management selection, a valuation analysis around unexpected deaths of directors and managers, and a placebo test.

3.2.1 2SLS analysis: Using regional labor market diversity as an instrument

First, we use an IV approach to address endogeneity concerns. We employ *Regional labor market diversity*, calculated as the sum of the standardized values across the four entropy indices as an instrument for *Board-management commonality*. Specifically, we compute an entropy index (Massey and Denton, 1988) to measure labor market diversity in the counties in which firms are headquartered, considering four dimensions: age, race, education, and occupation by gender.[13] Appendix C details the construction of our IV.[14] Higher *Regional labor market diversity* indicates

[13] In untabulated tests, we use an alternative measure of regional labor market diversity based on the Blau index, calculated as one minus the Herfindahl Hirschman Index. The results using this alternative IV measure are consistent with our main findings.

[14] Data to compute *Regional labor market diversity* are unavailable for the years 2003 to 2009. We interpolate values for this period using data from 2000, a common method for estimating regional characteristics. In Internet Appendix A.1, we address the missing data issue using two alternative approaches and find that the results are consistent.

a more diverse local workforce. Consequently, firms in these regions are more likely to appoint directors and managers from various backgrounds, thereby enhancing board-management commonality and meeting the relevance requirements of the IV. *Regional labor market diversity* is relatively exogenous since it is based on long-established population data from the state of residence. Therefore, it is unlikely to correlate with current labor market changes (Modestino, Shoag, and Ballance, 2020) and is thus unlikely to directly influence firm value, except through its impact on *Board-management commonality*, which satisfies the exclusion criteria of the IV.

Table 3 presents the results.[15] Column (1) shows that, consistent with expectations, *Regional labor market diversity* is positively and significantly associated with *Board-management commonality* at the 1% level. In column (2), we estimate the second-stage regression by regressing Tobin's *q* on instrumented *Board-management commonality* and control variables. The coefficient on instrumented *Board-management commonality* is positive and significant at the 5% level, indicating higher firm value when board members share commonality with management. The first-stage Cragg-Donald *F*-statistic is 13.77, rejecting the null hypothesis of weak identification. In columns (3) and (4), the results remain similar when year fixed effects are replaced with industry-year fixed effects. To address concerns that our IV, which measures access to a diverse workforce, is related to regional economic or demographic conditions, we include three additional control variables in columns (5) to (8): the county unemployment rate, the total county population, and the state economic condition index (Baumeister, Leiva-Leon, and Sims, 2024).[16] The inclusion of these variables does not alter the results.

3.2.2 Test using the 2019 Illinois diversity requirements as a quasi-exogenous shock

[15] We end the sample period in 2020 because the race data is available only until that year.
[16] We use the annual average of the weekly index. We thank Baumeister, Leiva-Leon, and Sims for making the state-level economic condition indices publicly available (https://sites.google.com/view/weeklystateindexes/dashboard).

To further address concerns about the non-random selection of management teams and board members, we use the enactment of Illinois Public Act 101-0589 as a quasi-exogenous shock (e.g., Ahern and Dittmar, 2012; von Meyerinck et al., 2024). In August 2019, Illinois implemented a board diversity disclosure law, which targeted publicly held corporations with their principal executive office in the state. Unlike other states' gender diversity-related policies, the Illinois statute mandates racial and ethnic diversity, in addition to gender diversity. Furthermore, the Illinois law requires detailed disclosures regarding board and executive qualifications, the nomination and selection process, and policies promoting diversity and inclusion.[17] This enactment serves as a quasi-exogenous shock to the selection of both board members and executive teams, thereby affecting board-management commonality. Compared with other state policies that focus solely on board gender diversity, Illinois's mandates are better suited to our empirical setting. If commonality enhances firm value, we expect to see positive market reaction for Illinois firms that increase commonality around the new diversity requirements.

Table 4 presents the results. In Panel A, we analyze announcement returns around the enactment date. The dependent variable is the cumulative abnormal return (CAR) surrounding the event date ($t = 0$), August 27, 2019, when Illinois enacted Public Act 101-0589. Abnormal returns, reflecting changes in shareholder value, are calculated using the Fama-French-Carhart four-factor model (Carhart, 1997) across three different event windows.[18] There are 91 treatment firms headquartered in Illinois and 133 control firms headquartered in neighboring states (Wisconsin,

[17] There are four states that have adopted board gender diversity-related policies: California with Senate Bill 826 (September 30, 2018), New York with the State Business Corporation Law-Board Diversity Disclosure Requirements (December 20, 2019), Washington with the Women on Corporate Boards Act (June 11, 2020), and Maryland with SB 911 (May 13, 2019)

[18] In untabulated tests, we find evidence supporting the parallel trends assumption, which is essential for a causal interpretation of the analysis, similar to difference-in-differences. Abnormal returns estimated over five different pre-event windows (CAR(-250, -1), CAR(-200, -1), CAR(-150, -1), CAR(-100, -1), CAR(-50, -1)) are not significantly different between Illinois and non-Illinois firms.

Iowa, Missouri, Kentucky, Indiana, and Michigan). These neighboring state firms serve as ideal control groups because they share similar economic conditions with the treatment firms but have not implemented comparable regulatory changes, unlike many other states that have already adopted or are considering diversity mandates. We include *Firms headquartered in IL*, an indicator equal to one for treatment firms (i.e., firms headquartered in Illinois), and zero for control firms and Δ *Board-management commonality* *from 2018* to 2020, which captures the change in commonality over that period to reflect the impact of the regulatory change. We also include the interaction term between these two variables and the control variables from Table 2. The coefficients on the interaction term are positive and significant across all regressions.

In Panel B, we examine whether treatment firms with lower pre-enactment commonality also experience a long-term increase in firm value, as measured by Tobin's *q*, following the enactment, as they have the greatest potential to benefit from the legislation. In columns (1) and (2), the key variable of interest is the triple interaction among *Firms headquartered in IL (indicator), Post (indicator),* and *Low board-management commonality (indicator). Post* is an indicator equal to one for 2019, 2020, and 2021, and zero for 2016, 2017, and 2018. *Low board-management commonality* is an *indicator* equal to one if a firm's board-management commonality falls within the bottom quartile of the industry in 2018. This indicator captures firms that are more likely to substantially increase commonality following the diversity mandate. Coefficients on other variables and interaction terms are omitted for brevity. We find that the coefficients on the triple interaction terms are positive and significant in both columns. The results in columns (3) and (4), where *Post (indicator)* is replaced with year indicators confirm that there are no pre-trends before the enactment.

These findings suggest that in response to unexpected regulatory changes, investors not only positively assess an increase in commonality, but firms also experience a long-term firm value, supporting the causal impact of commonality on firm value.

3.2.3 Valuation analysis around the deaths of directors and management

Director and manager deaths can alter the composition of both the board and management as well as their commonality, independent of firm conditions (e.g., Fracassi and Tate, 2012). If director-like managers and manager-like directors play a value-enhancing role, stock prices should decline after their deaths. We identify 815 deaths through BoardEx, news reports, SEC filings, and other sources. Our SVM approach classifies directors and managers based on their contributions to commonality before their unexpected demise, allowing for a nuanced analysis. This method isolates the effects of commonality from the shocks caused by the loss of key personnel, enhancing the credibility of our causal inferences and mitigating potential endogeneity concerns by showing the direct impact of changes in board-management dynamics on firm value.

Table 5 presents the results. In column (1), the key variable is *Manager-like director/director-like manager (indicator)*, which equals one for the death of directors or managers who share similarities across four dimensions. Along with the firm-level controls in Table 2, we include individual-level controls: *CEO (indicator)*, *board chair (indicator)*, *age*, and *tenure*. We find that the coefficient on *Manager-like director/director-like manager (indicator)* is negative and significant at the 5% level, suggesting that outside investors value these individuals. In column (2), when we replace *Manager-like director/director-like manager (indicator)* with *Manager-like director (indicator)* and *Director-like manager (indicator)*, we find that both coefficients are negative and significant, indicating the incremental values of managers and directors who share similar traits. In columns (3) to (6), we further focus on deaths largely unanticipated by the stock

market by excluding suicides, cancer, and deaths of individuals older than 75 years. The results remain similar, although the coefficient on *Director-like manager (indicator)* loses its significance in column (6). These findings are generally consistent with our earlier firm-level analyses, suggesting that manager-like directors and director-like managers perform value-enhancing roles.

3.2.4 Placebo tests

Manager-like directors and director-like managers could play value-enhancing roles because of their unique traits rather than their shared characteristics with individuals in other groups. To address this alternative explanation, we conduct placebo tests using "*Placebo*" *board-management commonality*, computed as the ratio of placebo manager-like directors and director-like managers to the total number of directors and managers. Placebo manager-like directors and director-like managers are those identified as such in other firms during a given year but not in the focal firm. We then repeat all our analyses using this *Placebo board-management commonality*. Our untabulated findings show that none of the coefficients on *Placebo board-management commonality* are significant. This finding indicates that the positive impact of manager-like directors and director-like managers in our earlier analysis is due to their shared similarities with individuals in other groups, rather than their specific traits.

3.3 Board-management commonality and leadership team diversity

We investigate whether the impact of commonality on firm value varies across firms with different levels of leadership team diversity. Since board-management commonality is measured by the alignment of views between the board and management, we assess how its impact varies with leadership team diversity. This approach allows us to evaluate how shared characteristics within a leadership team can streamline coordination, reduce friction, and enhance decision-making efficiency. As noted in prior studies (Pelled, Eisenhardt, and Xin, 1999; Cronin and

Weingart, 2007), diverse backgrounds within a leadership team may increase conflict due to differing viewpoints and problem-solving approaches. If not managed effectively, this friction can hinder board effectiveness and cohesion, resulting in longer discussions and more complex decision-making. If commonality mitigates conflicts and facilitates consensus-building, its value-enhancing role should be more pronounced in firms with highly diverse leadership teams.

Table 6 presents the results. We divide the sample into two subgroups based on the industry-year median of leadership team diversity, The coefficients on *Board-management commonality* are positive and significant at the 1% level for firms with higher leadership team diversity and insignificant for firms with lower leadership team diversity. The coefficients for the former are larger than those for the latter, although their differences are not significant. These findings suggest that commonality plays a crucial role in firms with more diverse leadership teams, where conflicts and friction are more likely due to varied backgrounds. A shared understanding ensures that diverse insights are integrated into decision-making, enhancing governance and strategic execution. By aligning diverse viewpoints, commonality leverages the strengths of diversity while mitigating conflicts, ultimately increasing firm value.[19]

3.4 Board-management commonality and industry- and market-level uncertainty

Board-management commonality helps mitigate conflicts arising from divergent perspectives, facilitating swift decision-making. This effect is particularly pronounced in uncertain industries and markets, where prompt responses to evolving risks are crucial. During periods of high industry

[19] In Internet Appendix A.2, we examine whether the impact of commonality varies across firms with different levels of board or management diversity. We divide the sample based on the industry-year median of board and management diversity and repeat the subgroup analyses. While commonality positively affects firm performance in less diverse boardrooms, we find little evidence that the positive impact of commonality is affected by management diversity. The results suggest that low board diversity might limit the range of viewpoints considered at the strategic level, but commonality helps the board understand and incorporate diverse management inputs. In untabulated tests, we examine whether the positive impact of commonality is affected by board or leadership team size and find little evidence that group size affects the relationship.

and market uncertainty, shared commonality and collaboration between the board and management enable the board to support decisive actions. Consequently, we expect the positive impact of commonality on firm value to be more significant when firms face high uncertainty from external factors such as industry shocks and policy changes. To examine this, we consider industry shocks (Custódio, Ferreira, and Matos, 2013) and policy uncertainty (Baker, David, and Levy, 2022) as measures of industry and market uncertainty, respectively. We measure industry shocks by calculating the difference between industry sales growth and average sales growth across all industries. Economic policy uncertainty is measured using local and national economic policy uncertainty indices ($EPU_{composite}$ indices).[20] We then divide the sample into bottom and top quartiles based on each variable and separately estimate the regression in column (2) of Table 2.

Table 7 presents the results. The coefficients on *Board-management commonality* are positive and significant at the 5% level or better among firms facing high industry shocks and in environments with higher economic policy uncertainty. These findings suggest that timely decision-making and swift implementation of business strategies from a shared perspective are crucial for effectively navigating crises during periods of industry and market uncertainty.

3.5 Board-management commonality and board decision-making efficiency

Thus far, we have argued that commonality accelerates consensus-building, enhances boardroom decision-making efficiency, and positively affects firm value. To assess whether commonality reduces friction in board decision-making, we analyze three measures of board decision-making efficiency from prior studies (e.g., Fahlenbrach, Low, and Stulz, 2017; Giannetti and Zhao, 2019). The first measure is the frequency of board meetings, which tends to increase

[20] We compute local and national economic policy uncertainty using the annual average of the monthly $EPU_{Composite}$ index, derived from the state where firms are headquartered. This index is based on articles featuring terms related to the economy and uncertainty, as well as state-specific and national policy terms (Baker, David, and Levy, 2022). We thank Baker, David, and Levy for providing access to the dataset (https://www.policyuncertainty.com/state_epu.html).

when firms face significant decision-making challenges. We expect firms with higher commonality to have fewer board meetings, particularly non-executive director meetings, due to reduced conflicts. Greater alignment between the board and management fosters trust and effective communication, reducing the need for such meetings. The second measure is director turnover, which often results from disagreements between directors and management and is typically associated with idiosyncratic factors (Fahlenbrach, Low, and Stulz, 2017). We expect lower director turnover in firms with higher commonality because disagreements are resolved more effectively. The third measure is the number of material events requiring 8-K filings, which indicates erratic decision-making. If commonality reduces friction in consensus-building, it should lead to fewer unpredictable decisions, thus decreasing the need for 8-K filings.

Table 8 presents the results. Firms with higher commonality exhibit fewer non-executive board meetings, lower director turnover unrelated to firm performance, and fewer 8-K filings on material changes.

4. Board-management commonality and corporate policies

4.1 Innovation activity

To understand how commonality improves firm value, we examine its impact on innovation policies that require multistage, long-term efforts to yield positive outcomes (Balsmeier, Fleming, and Manso, 2017). Board-management commonality can align shared goals, enhancing tolerance for failure and fostering innovation with a greater likelihood of success.

We measure a firm's innovation activity using patent-related data from Kogan et al. (2017).[21] Table 9 presents the results. The dependent variables are the natural logarithm of one plus the number of patents issued to a firm, scaled by the firm's total assets, in columns (1) and (2), and

[21] We thank Kogan, Papanikolaou, Seru, and Stoffman for granting access to the patent data, which is available on Noah Stoffman's website (https://kelley.iu.edu/nstoffma/).

the natural logarithm of one plus the number of citations received by patents granted to a firm, scaled by the firm's total assets, in columns (3) and (4). The former measures a firm's innovation output, while the latter measures citation-based innovation efficiency (Hirshleifer, Hsu, and Li, 2017). In addition to the control variables in Table 2, we include firm-level variables that may affect corporate innovation, such as firm age, book-to-market ratio, cash/assets, and investment intensity (R&D/assets, PPE/assets, and Capex/assets), as suggested by prior research (Balsmeier, Fleming, and Manso, 2017; Hirshleifer, Hsu, and Li, 2017). Our findings indicate that the coefficients on *Board-management commonality* are positive and significant at the 5% level in all four columns. This suggests that directors and managers who share risk tolerance and acceptance of failure foster a more efficient innovation process through effective communication and consensus-building, leading to increased innovation output and productivity.

4.2 Capex investment adjustment

Models of board decision-making (e.g., Chemmanur and Fedaseyue, 2018) suggest that commonality between board members and management enhances the flow of quality information. Aligned board members are likely to access more detailed and timely information, which is crucial for informed decisions and prompt corrective actions. We focus on capex investment decisions to assess firms' timely corrective actions, following prior studies (Jayaraman and Wu, 2019; Bae, Biddle, and Park, 2022). Since commonality facilitates consensus-building and efficient information flow, we expect firms with higher commonality to adjust annual capex investment upward (downward) in response to positive (negative) market reactions to their forecasts. We obtain annual capex forecast data from the I/B/E/S Guidance database. Using the first analyst capex forecasts in the fiscal year ensures minimal influence from management-disclosed information.

Table 10 presents the results. In columns (1) and (2), the key independent variable is the interaction term between *CAR (-1, 1)* around a firm's capex forecast announcement date and *Board-management commonality*. In addition to the controls used in Table 2, we further control for *Asset tangibility*, *Cash/assets*, and *Capex/assets*, which are identified as important factors affecting firms' capital investment decisions. We also control for *Earnings surprise*, the difference between the quarter's earnings-per-share and that of the same quarter of the previous year, and *Earnings announcement (indicator),* which equals one if a firm's capex announcements are accompanied by earnings announcements, and zero otherwise. Controlling for *Earnings announcement* mitigates concerns regarding confounding events in the regressions. The coefficients on the interaction terms between *CAR (-1, 1)* and *Board-management commonality* are all positive and significant, indicating that firms with higher commonality are more likely to adjust their annual capex based on market feedback on their investment plans.[22] These findings suggest that board-management commonality fosters a firm's agility and responsiveness to market signals, enabling timely actions based on market reactions. The adaptability of investment strategies aligned with external feedback enhances financial performance and shareholder value.

5. Additional tests

5.1 Effect of each component of board-management commonality on firm value

As a firm's board-management commonality is measured across different dimensions, we assess the impact of each component on the baseline results by excluding each dimension from the measure. The results in Table 11 suggest that no single dimension significantly influences our main results. This implies that the combined variation in board-management commonality affects decision-making rather than any single dimension of commonality.

[22] The results are similar when using CARs for the five days surrounding the forecast date as an alternative window.

5.2 Roles of manager-like directors and director-like managers

To understand the roles of manager-like directors and director-like managers in board-management dynamics, we explore the characteristics of these directors and managers. First, we examine the board committees on which manager-like directors serve and the positions held by director-like managers. As shown in Internet Appendix A.3, manager-like directors are actively engaged in major board committees, with more than half serving as board or committee chairs.[23] Similarly, director-like managers are involved in high-level operational decisions, often holding positions, such as president or vice president (36.9%), CEO (26.72%), CFO (13.42%), and COO (4.91%). These findings highlight the significant roles of manager-like directors and director-like managers in facilitating the communication and sharing of firm-specific information. Second, we conduct a text-based analysis of director biographies to explore differences between manager-like directors and other directors. The regression results in Internet Appendix A.4 indicate that, compared with other directors, manager-like directors are more likely to emphasize community engagement and social responsibility and less likely to emphasize strategic leadership competence. Prior studies highlight the importance of stakeholder influence in achieving consensus and fostering shared values through better communication (e.g., Freeman, Wicks, and Parmar, 2004; Barnett and Salomon, 2012). Therefore, manager-like directors who prioritize community engagement and social responsibility play crucial roles in enhancing communication, building consensus, and facilitating informed decision-making. These insights underscore the importance of understanding the shared traits of board members and managers, which contributes to the dynamics and effectiveness of corporate governance.

5.3 Textual analysis of the characteristics of firms with higher board-management commonality

[23] They commonly serve on audit committees (39.14%), compensation committees (31.86%), and nomination committees (29%).

To understand how firms with higher commonality differ, we analyze proxy statements. Regulation S-K's Item 401(e) requires U.S. public firms to describe the skills of each nominated director. This discussion reveals distinct characteristics in firms with higher commonality. We extract sentences containing the keyword "director" and one of the keywords "governance," "nomination," or "nominating" to identify relevant discussions on director selection and nomination policy. We focus on three years—2010, 2015, and 2020—due to data processing costs.

Using ChatGPT, we analyze the text to determine whether it pertains to director-selection policies, including criteria such as qualifications, skills, experience, and other relevant attributes. If the text is relevant, we search for keywords from the 30 most representative words for each cultural value (i.e., integrity, teamwork, innovation, quality, and respect) in the culture dictionary defined by Li et al. (2020).[24] We then extract and categorize the relevant keywords using ChatGPT. In Internet Appendix A.5, we estimate a linear probability model where the dependent variable is an indicator equal to one if a firm's proxy statement includes the 30 most representative words for each cultural value—integrity, teamwork, innovation, quality, and respect—in the director selection and nomination section. We find that firms with high commonality are more likely to mention "integrity" or "teamwork" related terms, although the likelihood of mentioning "teamwork" is slightly weaker. For example, a one standard deviation increase in *Board-management commonality* (0.276) translates into a 1.41 percentage point increase in the likelihood of mentioning "integrity" related words. This increase corresponds to an unconditional probability of about 19.12%, indicating a substantial economic impact. The findings indicate that firms with higher commonality place greater emphasis on values such as "integrity" and "teamwork" in the

[24] Common words, such as "expertise," "governance," "corporate governance," "independence," "skill," and "executive" are excluded.

director selection section, highlighting a focus on ethical practices and collaboration, which can reduce friction and enhance decision-making.

5.4 Impacts of commonality among more diverse leadership teams

As discussed in Section 3.3, our findings highlight the critical role of alignment and shared understanding between the board and management, particularly in firms with diverse leadership teams. In untabulated tests, we divide the sample by the industry-year median of leadership team diversity and examine whether the positive impact of commonality on firm value is more pronounced in firms with higher diversity, particularly under uncertain business conditions (Table 7), board decision-making efficiency (Table 8), innovation (Table 9), and capital investment adjustments (Table 10). The coefficients on *Board-management commonality* are generally positive and significant for firms with higher leadership team diversity but insignificant for those with lower diversity. These results underscore the value of fostering commonality in diverse leadership teams to effectively integrate various insights into decision-making.

6. Conclusion

We investigate how the commonality between boards and management ("board-management commonality") influences firm value and board effectiveness. To measure board-management commonality, we use the SVM algorithm to identify overlapping individuals by separating the two groups based on demographic, cultural, educational, and functional characteristics.

We find that commonality significantly increases firm value, as measured by Tobin's *q*, potentially through enhanced communication, accelerated consensus-building, and more effective decision-making. Further analysis reveals a curvilinear relation between commonality and firm value. To address endogeneity concerns, we conduct several additional tests: an instrumental variable approach using an entropy-based regional labor market diversity index as an instrument

for board-management commonality, two empirical settings that exogenously change board and management composition and thus commonality, namely Illinois's new diversity requirements and unexpected director and manager deaths, and a placebo test. All these analyses consistently support the value-enhancing role of commonality. We also find that firms with higher commonality exhibit fewer non-executive director meetings, lower director turnover, and fewer 8-K filings, indicating more effective resolution of disagreements and consensus-building. Additionally, the positive impact of commonality on firm value is especially pronounced in firms with diverse leadership teams and those operating in uncertain business environments. High commonality also fosters innovation outputs and enhances firms' responsiveness to market feedback on capex forecasts, facilitating timely investment decisions.

Overall, our results suggest that shared characteristics, values, experiences, and perspectives between boards and management—measured by various demographic and cognitive variables—significantly impact firm value and board effectiveness. While diverse boards can enhance effectiveness, they may also introduce conflicts and friction due to differing perspectives and problem-solving approaches, complicating decision-making. The current focus on gender diversity often overlooks other important dimensions. As Edmans, Flammer, and Glossner (2023) suggest, a more balanced approach is needed to fully assess the impact of diversity and the role of commonality. Our study highlights the importance of understanding board and top management composition across various dimensions to better align them and improve board decision-making.

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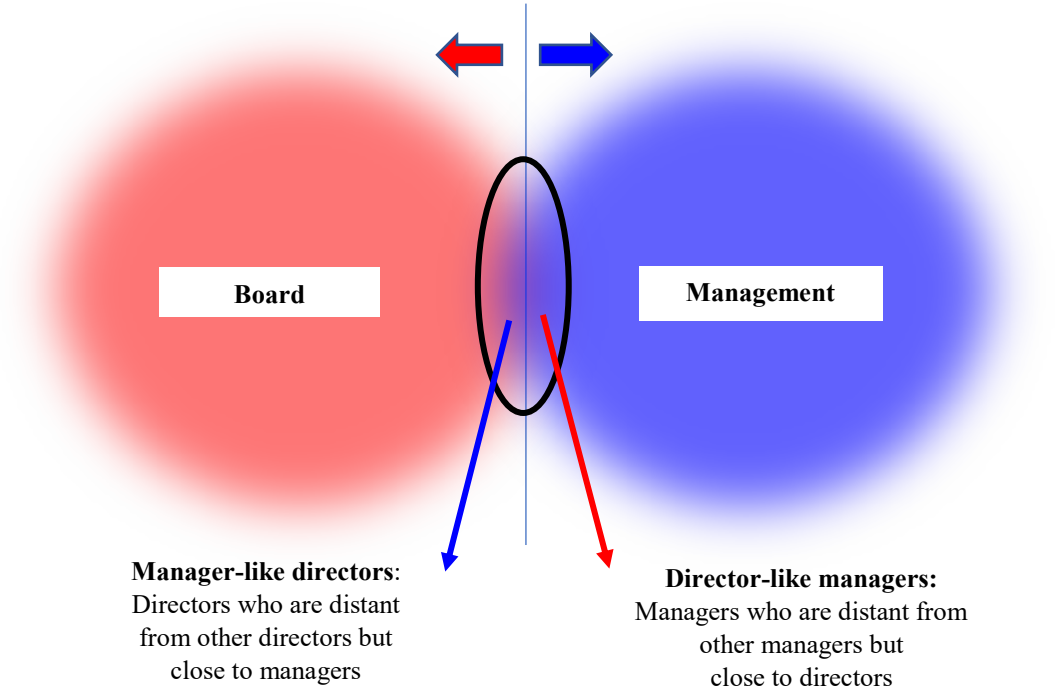
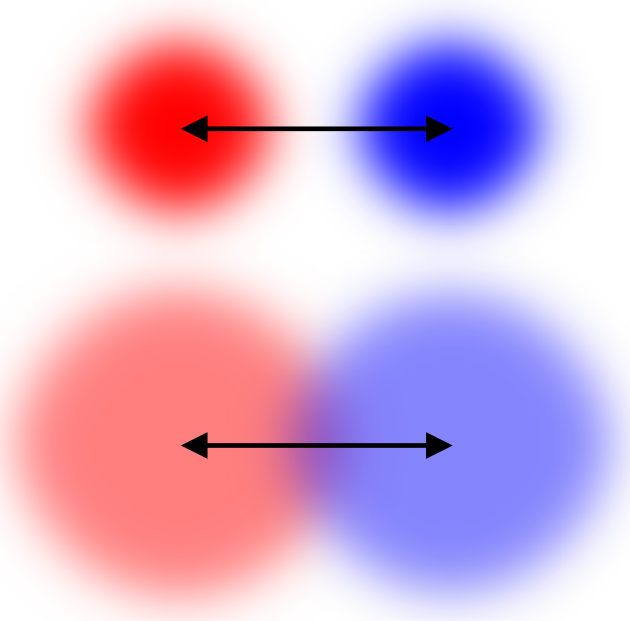
Figure 1. Support Vector Machine-based Board-management commonality



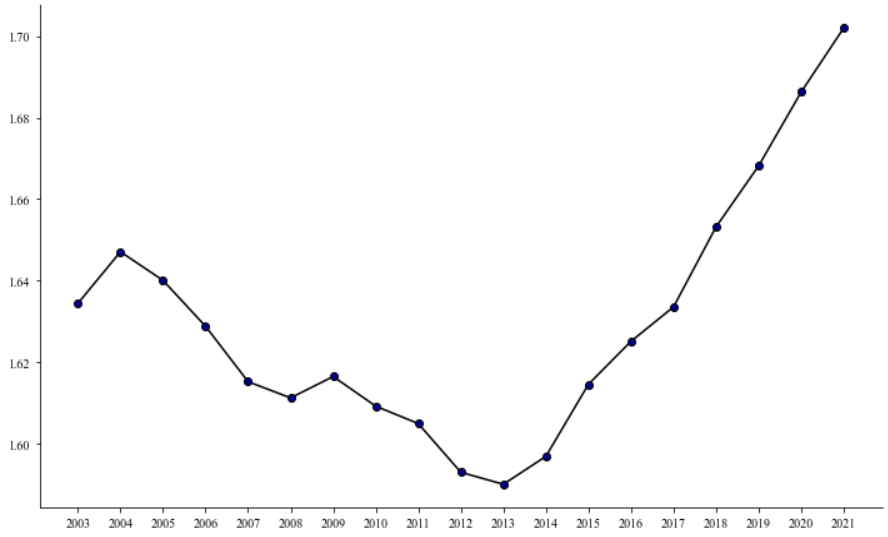
This figure illustrates the overlap between board members and the management team using an SVM classifier. The area on the left represents directors, and the area on the right represents managers. The central overlap indicates "misclassified" individuals—manager-like directors and director-like managers—who share attributes more closely with the opposite group.

Figure 2. Limitations of centroid-based distance classification



This figure demonstrates the limitations of centroid-based distance classification in capturing within-group diversity. The top panel shows a scenario with less overlap between the board (left) and management (right), indicating lower diversity. The bottom panel, with larger circles and greater overlap, represents higher diversity within each group, highlighting the reduced effectiveness of centroid-based classification in such cases

Figure 3. Time trends of board-management commonality (average), 2003-2021



The figure shows the time trend in the average *Board-management commonality* index from 2003 to 2021.

Figure 4-1. Time trends of leadership team diversity index (average), 2003-2021

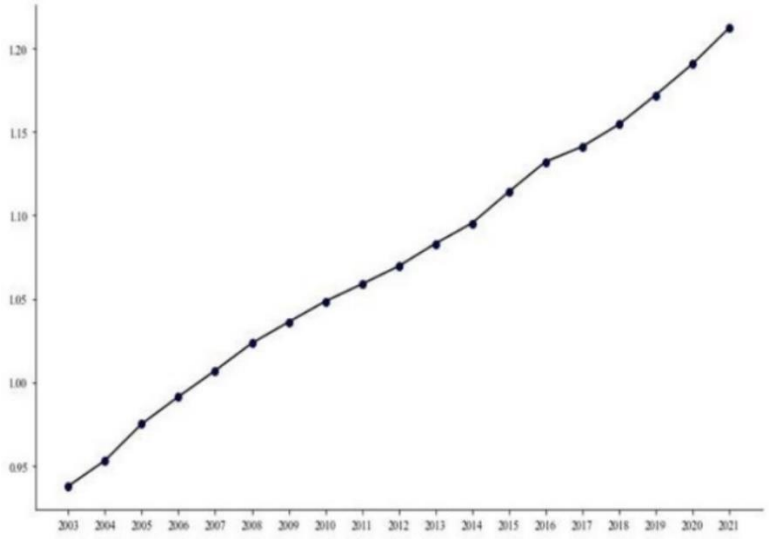
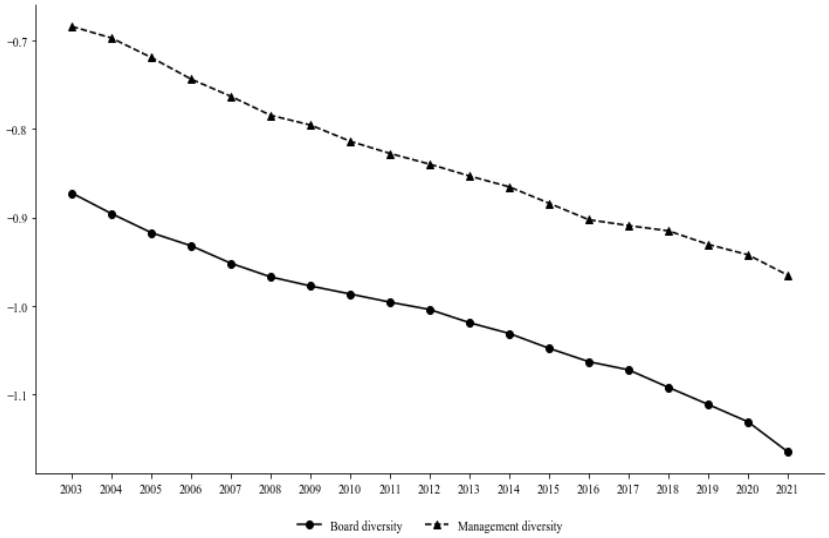


Figure 4-2. Time trends of board/management diversity index (average), 2003-2021



The figure shows time trends in diversity indexes from 2003 to 2021. Figure 4-1 plots the average *Leadership team diversity* index, while Figure 4-2 plots the average *Board diversity* and *Management diversity* indexes.

Table 1
Summary statistics

This table presents summary statistics for firm characteristics. The sample consists of 44,115 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2021. *Board-management commonality* is the ratio of independent directors and managers who share similarities in demographic, cultural, educational, and functional characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. Appendix A provides a detailed description of the construction of the other variables.

	Mean	SD	P10	Median	P90
Board-management commonality	1.629	0.276	1.227	1.683	1.945
Market capitalization (US$ billion)	4.466	23.667	0.043	0.669	9.013
Stock return	0.299	1.113	-0.528	0.083	1.074
Return volatility	0.032	0.016	0.015	0.028	0.054
ROA	0.005	0.225	-0.231	0.061	0.17
Leverage	0.227	0.22	0	0.190	0.521
R&D	0.061	0.122	0	0.004	0.187
Board size	6.552	2.117	4	6	9
Management size	9.758	5.366	4	9	17
Board and management diversity	1.064	0.202	0.792	1.093	1.296
Board diversity	-1.003	0.254	-1.302	-1.038	-0.653
Management diversity	-0.824	0.250	-1.128	-0.853	-0.483
Proportion of independent directors	0.765	0.131	0.571	0.800	0.9
Board-management social networks	0.307	0.265	0	0.250	0.714
Institutional ownership	0.572	0.352	0	0.667	0.967

Table 2
Board-management commonality and firm value

The table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is Tobin's *q* ((total assets – book equity + market value of equity) / total assets). The sample consists of 44,115 firm-year observations covered in BoardEx-Compustat-CRSP universe nonfinancial firms over the period 2003 to 2021. *Board-management commonality* is the ratio of independent directors and managers who share similarities in four dimensions (i.e., demographic, cultural, educational, and functional characteristics) to the total number of independent directors and managers, using the support vector machine (SVM) classification approach. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Tobin's *q*		
Independent variable	(1)	(2)	(3)
Board-management commonality	0.196***	0.147***	0.158***
	(0.001)	(0.000)	(0.000)
Firm size	0.411***	0.345***	0.335***
	(0.000)	(0.000)	(0.000)
Stock return	0.066***	0.031***	0.032***
	(0.000)	(0.000)	(0.000)
Return volatility	6.396***	4.730***	5.121***
	(0.000)	(0.000)	(0.000)
ROA	-0.127	0.052	0.055
	(0.468)	(0.650)	(0.643)
Leverage	0.084	0.327***	0.338***
	(0.336)	(0.000)	(0.000)
R&D/assets	4.613***	2.774***	2.703***
	(0.000)	(0.000)	(0.000)
Log (board size)	-0.598***	-0.267***	-0.248***
	(0.000)	(0.000)	(0.000)
Log (management size)	-0.390***	-0.239***	-0.228***
	(0.000)	(0.000)	(0.000)
Board diversity	0.141*	0.117*	0.143**
	(0.057)	(0.071)	(0.029)
Management diversity	0.294***	0.263***	0.275***
	(0.000)	(0.000)	(0.000)
Proportion of independent directors	-0.152	-0.192*	-0.144
	(0.163)	(0.059)	(0.162)
Board-management social networks	-0.060	-0.032	-0.052
	(0.302)	(0.639)	(0.456)
Institutional ownership	-0.269***	-0.170***	-0.183***
	(0.000)	(0.001)	(0.000)
Year fixed effects	Yes	Yes	No
Industry fixed effects	Yes	No	No
Firm fixed effects	No	Yes	Yes
Industry-year fixed effects	No	No	Yes
Observations	44,115	44,115	44,115
Adjusted R^2	0.311	0.651	0.657

Table 3
Board-management commonality and firm value: An instrumental variable approach

The table presents estimates of two-stage least squares (2SLS) regressions using *Regional labor market diversity* as the instrumental variable (IV) for *Board-management commonality*. The details of the construction of the IV are discussed in Appendix C. The dependent variables are *Board-management commonality* in columns (1), (3), (5), and (7), and Tobin's *q* ((total assets – book equity + market value of equity) / total assets) in columns (2), (4), (6), and (8). The sample consists of 40,883 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2020. *Board-management commonality* is the ratio of independent directors and managers who share similarities in demographic, cultural, educational, and functional characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. *Unemployment* is the unemployment rate of the county in which the firm is headquartered. *Log (population)* is the natural logarithm of the population of the county in which the firm is headquartered. *State-level economic condition index* is computed based on nonfarm payroll employment, average hours worked in manufacturing, unemployment rate, and wage and salary disbursements deflated by the Consumer Price Index (U.S. city average) (Baumeister, Leiva-Leon, and Sims, 2021). We obtain unemployment and population data from the U.S. Bureau of Labor Statistics and the U.S. Census Bureau, respectively. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted at the county-by-year level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
	Board-management commonality	Tobin's *q*	Board-management commonality	Tobin's *q*	Board-management commonality	Tobin's *q*	Board-management commonality	Tobin's *q*
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regional labor market diversity	0.006***		0.006***		0.007***		0.006***	
	(0.000)		(0.001)		(0.000)		(0.000)	
Instrumented: Board-management commonality		5.492**		4.121*		4.820**		3.344*
		(0.021)		(0.060)		(0.025)		(0.087)
Unemployment					0.056	-1.092	0.064	-1.105
					(0.614)	(0.225)	(0.578)	(0.161)
Log (population)					-0.006**	0.021	-0.006**	0.025
					(0.039)	(0.357)	(0.029)	(0.230)
State-level economic condition index					0.004**	-0.017	0.005***	-0.013
					(0.041)	(0.272)	(0.007)	(0.378)
~~Other c~~Control variables (as in Table 2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	No	No	Yes	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Observations	40,883	40,405	40,883	40,324	40,549	40,075	40,549	39,994
Adjusted R^2	0.700	--	0.703	--	0.699	--	0.702	--
Cragg-Donald F-statistic		13.769		11.851		15.228		13.500
Kleibergen-Paap Wald		12.612		11.190		13.752		12.519
10% maximal IV size		16.38		16.38		16.38		16.38
15% maximal IV size		8.96		8.96		8.96		8.96

Table 4
Board-management commonality and firm value: Evidence from the enactment of Illinois' Public Act 101-0589

Panel A of the table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is cumulative abnormal returns (CARs) around the event date (t = 0), August 27, 2019, when Illinois enacted Public Act 101-0589. Abnormal returns are calculated using the Fama-French-Carhart four-factor model (Carhart, 1997). The sample consists of 91 firms headquartered in Illinois (treatment firms) and 133 control firms headquartered in neighboring states (Wisconsin, Iowa, Missouri, Kentucky, Indiana, and Michigan). Both groups are covered in BoardEx-Compustat-CRSP universe nonfinancial firms. *Firms headquartered in IL (indicator)* equals one for treatment firms, and zero for control firms. Δ *Board-management commonality from 2018 to 2020* is the change in *Board-management commonality* from 2018 to 2020. *Board-management commonality* is the ratio of independent directors and managers who share similarities in four dimensions (i.e., demographic, cultural, educational, and functional characteristics) to the total number of independent directors and managers, using the support vector machine (SVM) classification approach. Panel B presents estimates of OLS regressions in which the dependent variable is Tobin's q ((total assets – book equity + market value of equity) / total assets). The sample consists of 1,267 firm-year observations of treatment and control firms from 2016 to 2021. *Post (indicator)* equals one for 2019, 2020, and 2021, and zero for 2016, 2017, and 2018. *Low board-management commonality (indicator)* equals one if a firm's board-management commonality falls into the bottom 25th percentile of the industry in 2018. coefficients on other variables and interaction terms are omitted for brevity. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the state (firm) level in Panel A (Panel B). ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Announcement returns around the enactment date

	CAR (-2, 2)	CAR (-1, 1)	CAR (0, 1)
Independent variable	(1)	(2)	(3)
Firms headquartered in IL (indicator): a	0.003	0.000	0.001
	(0.337)	(0.958)	(0.586)
Δ Board-management commonality from *2018* to *2020*: b	-0.006	-0.009	-0.012
	(0.593)	(0.532)	(0.527)
a × b	0.047**	0.039**	0.035*
	(0.013)	(0.046)	(0.099)
Control variables (as in Table 2)	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Observations	224	224	224
Adjusted R^2	0.338	0.147	0.169

Panel B. Long-term firm value before and after the enactment

	Tobin's q			
Independent variable	(1)	(2)	(3)	(4)
Firms headquartered in IL (indicator)× Post (indicator)	0.307**	0.376*		
× Low board-management commonality (indicator)	(0.041)	(0.064)		
Firms headquartered in IL (indicator)× Year *2017* (indicator)			-0.026	0.069
× Low board-management commonality (indicator)			(0.889)	(0.731)
Firms headquartered in IL (indicator)× Year *2018* (indicator)			0.173	0.341
× Low board-management commonality (indicator)			(0.339)	(0.124)
Firms headquartered in IL (indicator)× Year *2019* (indicator)			0.346*	0.450
× Low board-management commonality (indicator)			(0.095)	(0.107)
Firms headquartered in IL (indicator)× Year *2020* (indicator)			0.439	0.619
× Low board-management commonality (indicator)			(0.140)	(0.102)
Firms headquartered in IL (indicator)× Year *2021* (indicator)			0.284	0.502*
× Low board-management commonality (indicator)			(0.234)	(0.084)
Control variables (as in Table 2)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	Yes	No	Yes
Observations	1,267	1,267	1,267	1,267
Adjusted R^2	0.832	0.814	0.831	0.812

Table 5
Board-management commonality and firm value: Evidence from the deaths of manager-like directors and director-like managers

The table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is *CAR (-1, 1)*, the cumulative abnormal returns from one day before to one day after the sudden death date of directors and management team members. The sample consists of 815 deaths involving 283 directors and 532 management team members over the period 2003 to 2021. Abnormal stock returns are calculated using the Fama-French-Carhart four-factor model (Carhart, 1997). The four factors are the CRSP value-weighted index, SMB, HML, and UMD (daily return difference between high and low prior return portfolios). *Manager-like director (indicator)* equals one for directors who share similarities in demographic, cultural, educational, and functional characteristics with managers, and zero otherwise. *Director-like manager (indicator)* equals one for managers who share similarities in the four characteristics with directors, and zero otherwise. Both are measured using support vector machine (SVM) classification. *CEO (indicator)* equals one for CEOs, and zero otherwise. *Board chair (indicator)* equals one for the chair of the board of directors, and zero otherwise. *Age* is the age of a director/management team member in years. *Tenure* is the years a director (manager) has served on the board (the company). All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	CAR (-1, 1)					
	Full sample		Subsample			
			Excluding deaths from suicide and cancer		Excluding suicides, cancer, and individuals over 75	
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
Manager-like director/director-like manager (indicator)	-0.013**		-0.017**		-0.026***	
	(0.033)		(0.014)		(0.010)	
Manager-like director (indicator)		-0.011*		-0.015**		-0.027**
		(0.063)		(0.034)		(0.012)
Director-like manager (indicator)		-0.027*		-0.038**		-0.024
		(0.098)		(0.031)		(0.245)
CEO (indicator)	-0.002	-0.001	-0.001	-0.000	-0.000	-0.000
	(0.845)	(0.927)	(0.893)	(0.974)	(0.986)	(0.978)
Board chair (indicator)	0.001	0.001	0.001	0.001	0.005	0.005
	(0.784)	(0.800)	(0.868)	(0.883)	(0.407)	(0.410)
Age	0.000	0.000	0.000	0.000	0.000	0.000
	(0.292)	(0.302)	(0.192)	(0.206)	(0.622)	(0.622)
Tenure	0.001***	0.001***	0.001***	0.001***	0.001*	0.001*
	(0.002)	(0.002)	(0.006)	(0.006)	(0.085)	(0.087)
Other control variables (as in Table 2)	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	815	815	675	675	474	474
Adjusted R^2	-0.002	-0.003	-0.015	-0.016	0.002	-0.001

Table 6
Board-management commonality and leadership team diversity

The table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is Tobin's *q* ((total assets – book equity + market value of equity) / total assets). The sample consists of 43,446 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2021. The sample is divided into low and high diversity groups according to the industry-year median *Leadership team diversity*, which is the diversity index of the leadership team that includes both independent directors and managers. It is measured using principal components analysis (PCA) across four dimensions: demographic, cultural, educational, and functional characteristics. *Board-management commonality* is the ratio of independent directors and managers who share similarities in the four characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Tobin's *q*			
	Low diversity	High diversity	Low diversity	High diversity
Independent variable	(1)	(2)	(3)	(4)
Board-management commonality	0.069	0.217***	0.081	0.196***
	(0.177)	(0.002)	(0.135)	(0.006)
Control variables (as in Table 2)	Yes	Yes	Yes	Yes
F-test for coefficient equality (*p*-value)	0.152		0.307	
Year fixed effects	Yes	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	No	Yes	Yes
Observations	21,723	21,723	21,723	21,723
Adjusted R^2	0.679	0.649	0.677	0.657

Table 7
Board-management commonality and industry and market uncertainty

The table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is Tobin's *q* ((total assets – book equity + market value of equity) / total assets). In columns (1) and (2) ((3) and (4)), the sample consists of 20,004 (26,199) firm-year observations of nonfinancial firms from BoardEx-Compustat-CRSP universe over the period 2003 to 2021. In columns (1) and (2), the sample is divided into firms with low and high industry shock. Firms with low (high) industry shock is those in the bottom (top) quartile of the difference between industry sales growth and average sales growth). In columns (3) and (4), the sample is divided into firms with low and high economic policy uncertainty. Firms with low (high) economic policy uncertainty is those in the bottom (top) quartile of the annual average $EPU_{composite}$ index (Baker, David, and Levy, 2022) for the state of the firm's headquarters. *Board-management commonality* is the ratio of independent directors and managers who share similarities in demographic, cultural, educational, and functional characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Tobin's *q*			
	Industry shock		$EPU_{composite}$ index	
	Low	High	Low	High
Independent variable	(1)	(2)	(3)	(4)
Board-management commonality	0.071	0.207**	0.024	0.235***
	(0.208)	(0.014)	(0.709)	(0.006)
Control variables (as in Table 2)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	10,657	9,347	12,444	13,755
Adjusted R^2	0.697	0.658	0.682	0.641

Table 8
Board-management commonality and board decision-making efficiency

Panel A of the table presents estimates of ordinary least squares (OLS) and Poisson regressions in which the dependent variable is the number of full board meetings in columns (1), (2), (5), and (6) and the number of nonexecutive board meetings in columns (3), (4), (7), and (8). *No. of full board meetings* is the number of meetings held for a firm's entire board of directors during a year, as reported in its proxy filing. *No. of nonexecutive board meetings* is the number of meetings held exclusively for nonexecutive board members during a year. We obtain the data on firms' board meetings from MSCI GMI. The sample consists of 22,738 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2018. Panel B presents estimates of Linear Probability Model (LPM) in which the dependent variable is *Departure of independent director (indicator)*, which equals one if at least one independent director leaves the firm during a given year, and zero otherwise. A director is considered to have left the board if she is not listed in subsequent proxy statements (Fahlenbrach, Low, and Stulz, 2017). The sample consists of 40,586 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2020. Panel C presents estimates of OLS and Poisson regressions in which the dependent variable is the number of 8-K filings. The sample consists of 26,386 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database, with 8-K filing information available from the SEC Analytics Suite database, covering the period 2003 to 2021. *Board-management commonality* is the ratio of independent directors and managers who share similarities in demographic, cultural, educational, and functional characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. *Book-to-market* is the ratio of the book value of equity divided by the market value of equity. *CEO-chair duality (indicator)* equals one if the CEO is also the chair of the board, and zero otherwise. *CEO only insider (indicator)* equals one if the CEO is the only insider on the board, and zero otherwise. *Firm age* is the natural logarithm of one plus the years since Compustat first covered a firm. *No. of independent directors close to retirement* is the natural logarithm of one plus the number of independent directors aged 70 years or older. *CEO's departure (indicator)* equals one if the CEO leaves during a given year, and zero otherwise. *Log (1 + No. of analyst coverage)* is the natural logarithm of one plus the number of analysts following the company, reported in the IBES database. *Analysts forecast dispersion* is the standard deviation of forecasts provided by analysts who follow the firm, as reported in the IBES database. *No. of business segments* is the natural logarithm of one plus the number of business segments reported in Compustat Historical Business segment data. *External financing dependence (indicator)* equals one if the ratio of the total amount from sales of common and preferred stocks and long-term debt issuance to total assets exceeds 10% in a given year, and zero otherwise. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Board meeting frequency as a measure of board decision-making efficiency

	OLS				Poisson			
	Log (No. of full board meetings)		Log (No. of nonexecutive board meetings)		No. of full board meetings		No. of nonexecutive board meetings	
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Board-management	-0.018	-0.023	-0.116**	-0.129***	-0.044	-0.050*	-0.121*	-0.122**
commonality	(0.400)	(0.279)	(0.018)	(0.009)	(0.118)	(0.068)	(0.057)	(0.048)
No. of business segments	0.010	0.009	0.011	0.019	0.001	-0.002	-0.004	-0.001
	(0.313)	(0.408)	(0.684)	(0.483)	(0.940)	(0.898)	(0.884)	(0.976)
Book-to-market	0.047***	0.050***	-0.002	-0.009	0.053***	0.059***	0.023	0.012
	(0.000)	(0.000)	(0.943)	(0.761)	(0.000)	(0.000)	(0.463)	(0.711)
CEO-chair duality (indicator)	-0.055***	-0.058***	-0.026	-0.026	-0.070***	-0.075***	-0.019	-0.013
	(0.000)	(0.000)	(0.220)	(0.245)	(0.000)	(0.000)	(0.450)	(0.611)
CEO only insider (indicator)	-0.015*	-0.013	0.018	0.021	-0.031**	-0.028**	0.038	0.042
	(0.085)	(0.150)	(0.406)	(0.339)	(0.010)	(0.019)	(0.154)	(0.120)
Log (No. of full board meetings)			0.190***	0.191***			0.590***	0.573***
			(0.000)	(0.000)			(0.000)	(0.000)
Control variables (as in Table 2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No	Yes	No	Yes	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	22,738	22,738	19,716	19,716	22,737	22,737	17,196	17,140
Adjusted R^2/Pseudo R^2	0.476	0.474	0.552	0.549	0.162	0.169	0.290	0.301

Panel B. Independent director departure as a measure of board decision-making efficiency

	LPM			
	Departure of independent director (indicator)			
Independent variable	(1)	(2)	(3)	(4)
Board-management commonality: a	-0.025*	-0.027*	-0.025*	-0.027*
	(0.095)	(0.087)	(0.095)	(0.087)
ROA: b	-0.044*	-0.029	-0.052	-0.019
	(0.087)	(0.276)	(0.649)	(0.867)
a × b			0.005	-0.006
			(0.941)	(0.931)
Firm age	-0.019	-0.021	-0.019	-0.021
	(0.202)	(0.194)	(0.203)	(0.193)
No. of business segments	0.003	0.007	0.003	0.007
	(0.734)	(0.443)	(0.734)	(0.443)
No. of independent directors close to retirement	0.060***	0.060***	0.060***	0.060***
	(0.000)	(0.000)	(0.000)	(0.000)
CEO-chair duality (indicator)	-0.000	-0.001	-0.000	-0.001
	(0.950)	(0.916)	(0.950)	(0.916)
CEO's departure (indicator)	0.007	0.005	0.007	0.005
	(0.418)	(0.542)	(0.418)	(0.543)
Control variables (as in Table 2)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	Yes	No	Yes
Observations	40,586	40,586	40,586	40,586
Adjusted R^2	0.123	0.121	0.123	0.121

Panel C. Material event frequency requiring 8-K filings as a measure of board decision-making efficiency

	OLS		Poisson	
	Log (No. of 8-K reported items)		No. of 8-K reported items	
Independent variable	(1)	(2)	(3)	(4)
Board-management commonality	-0.027*	-0.022	-0.036**	-0.032**
	(0.096)	(0.187)	(0.025)	(0.048)
Log (1 + No. of analyst coverage)	-0.011	-0.007	-0.018**	-0.016*
	(0.184)	(0.414)	(0.027)	(0.060)
Analysts forecast dispersion	0.184*	0.174*	0.136	0.125
	(0.087)	(0.096)	(0.113)	(0.111)
No. of business segments	0.001	0.001	-0.000	-0.000
	(0.876)	(0.884)	(0.960)	(0.989)
External financing dependence (indicator)	0.105***	0.104***	0.105***	0.105***
	(0.000)	(0.000)	(0.000)	(0.000)
Control variables (as in Table 2)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	Yes	No	Yes
Observations	26,386	26,386	26,386	26,386
Adjusted R^2/Pseudo R^2	0.490	0.492	0.161	0.168

Table 9
Board-management commonality and innovation activity

The table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is the natural logarithm of one plus the number of patents (columns (1) and (2)) and the number of citations received by patents (columns (3) and (4)), both scaled by total assets. The sample consists of 44,088 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2021. *Board-management commonality* is the ratio of independent directors and managers who share similarities in demographic, cultural, educational, and functional characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. *Firm age* is the natural logarithm of one plus the years since Compustat first covered a firm. *Book-to-market* is the ratio of the book value of equity to the market value of equity. *Cash/assets* is the ratio of cash and short-term investments to total assets. *PPE/assets* is the ratio of property, plant, and equipment to total assets. *Capex/assets* is the ratio of capital expenditure to total assets. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Log (1+ no. of patents/assets)		Log (1+ no. of citations/assets)	
Independent variable	(1)	(2)	(3)	(4)
Board-management commonality	0.002**	0.001**	0.014**	0.013**
	(0.014)	(0.024)	(0.011)	(0.019)
Firm age	-0.006***	-0.005***	-0.063***	-0.055***
	(0.000)	(0.000)	(0.000)	(0.000)
Book-to-market	-0.001***	-0.001***	-0.004*	-0.006***
	(0.003)	(0.001)	(0.057)	(0.008)
Cash/assets	0.007***	0.006***	0.047***	0.033***
	(0.000)	(0.000)	(0.000)	(0.007)
PPE/assets	0.006***	0.002	0.044***	-0.003
	(0.001)	(0.411)	(0.001)	(0.829)
Capex/assets	-0.002	0.003	-0.017	0.034
	(0.380)	(0.259)	(0.473)	(0.153)
~~Other c~~Control variables (as in Table 2)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	Yes	No	Yes
Observations	44,088	44,088	44,088	44,088
Adjusted R^2	0.581	0.589	0.466	0.498

Table 10
Board-management commonality and capital expenditure (capex) adjustments

The table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is the percentage deviation between annual capex and the forecasted amount (*Capex adjustment*). Forecast announcement dates are obtained from the IBES Guidance database and matched with nonfinancial firms from BoardEx-Compustat-CRSP database. The sample consists of 10,295 firm-year observations over the period 2003 to 2021. *CAR (-2, 2)* is the cumulative abnormal returns from two days before to two days after a firm's capex forecast announcement date. Abnormal stock returns are calculated using the Fama-French-Carhart four-factor model (Carhart, 1997). *Board-management commonality* is the ratio of independent directors and managers who share similarities in demographic, cultural, educational, and functional characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. *Asset tangibility* is (0.715 × total receivables + 0.547 × inventories + 0.535 × net property plant and equipment + cash and short-term investments) / total assets. *Cash/assets* is the ratio of cash and short-term investments to total assets. *Capex/assets* is the ratio of capital expenditure to total assets. *Earnings surprise* is the difference between the quarter's earnings-per-share and that of the same quarter of the previous year. *Earnings announcement (indicator)* equals one if a firm's capex announcements are accompanied by earnings announcements, and zero otherwise. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Capex adjustment	
Independent variable	(1)	(2)
Board-management commonality: a	-0.019	-0.018
	(0.441)	(0.500)
CAR (-2, 2): b	-0.170*	-0.212**
	(0.094)	(0.034)
a × b	0.139**	0.172**
	(0.039)	(0.010)
Asset tangibility	0.227***	0.260***
	(0.005)	(0.002)
Cash/assets	-0.354***	-0.367***
	(0.000)	(0.000)
Capex/assets	-0.328***	-0.364***
	(0.002)	(0.002)
Earnings surprise	0.010***	0.007***
	(0.000)	(0.000)
Earnings announcement (indicator)	-0.017**	-0.017*
	(0.045)	(0.054)
Other control variables (as in Table 2)	Yes	Yes
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	No
Industry-year fixed effects	No	Yes
Observations	10,295	10,295
Adjusted R^2	0.242	0.244

Table 11
Board-management commonality excluding each component

The table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is Tobin's *q* ((total assets – book equity + market value of equity) / total assets). The sample consists of 44,115 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2021. *Board-management commonality, excluding demographics* is the ratio of independent directors and managers who share similarities in cultural, educational, and functional characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. *Board-management commonality, excluding cultural background* is the ratio of independent directors and managers who share similarities in demographic, educational, and functional characteristics to the total number of independent directors and managers, calculated using the SVM classification. *Board-management commonality, excluding education* is the ratio of independent directors and managers who share similarities in demographic, cultural, and functional characteristics to the total number of independent directors and managers, calculated using the SVM classification. *Board-management commonality, excluding functional background* is the ratio of independent directors and managers who share similarities in demographic, cultural, and educational characteristics to the total number of independent directors and managers, calculated using the SVM classification. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Tobin's *q*							
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Board-management commonality, excluding demographics	0.163*** (0.000)	0.174*** (0.000)						
Board-management commonality, excluding cultural background			0.180*** (0.000)	0.195*** (0.000)				
Board-management commonality, excluding education					0.148*** (0.001)	0.161*** (0.000)		
Board-management commonality, excluding functional background							0.148*** (0.003)	0.160*** (0.002)
Control variables (as in Table 2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No	Yes	No	Yes	No
Industry fixed effects	No	No	No	No	No	No	No	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	44,115	44,115	44,115	44,115	44,115	44,115	44,115	44,115
Adjusted R^2	0.651	0.657	0.651	0.657	0.650	0.657	0.650	0.657

Appendix A
Variable Definitions

This appendix provides detailed descriptions of all variables used in the tables.

Variable name	Definition	Source
Board (Management) diversity	The diversity of independent directors (management teams) is measured using principal components analysis (PCA) across four dimensions: demographics (age and gender), cultural background (Hofstede's measures: power distance, individualism, muscularity, uncertainty avoidance, long-term orientation, indulgence) (Hofstede, 2001), education (college, Ph.D., MBA, and Ivy League), and functional characteristics (financial expertise, industry-specific experience (i.e., experience in the same industry as the current company), non-industry experience (NGO, academia), tenure, CEO experience, technology experience, foreign experience, and legal expertise) (e.g., Adams, Akyol, and Verwijmeren, 2018). Management teams include senior executives (e.g., CEO, CFO, CIO, COO), division executives (e.g., division CEO, CFO, COO, president), and regional executives (e.g., regional CEO, CFO, COO, and president), as reported in the BoardEx database (e.g., Custódio and Metzger, 2013)	BoardEx, Hofstede website, OnoGraph
Board-management social networks	Ratio of the number of management team members connected to independent directors through past employment, same educational institutions, or social activities to the total number of board members and management team members (Fracassi and Tate, 2012)	BoardEx
Firm size	Natural logarithm of market capitalization	Compustat
Institutional ownership	Ratio of the number of shares held by all institutional investors to the total number of common shares outstanding	Thomson/Refinitiv 13F
Leverage	Ratio of the sum of long-term debt and debt in current liabilities to total assets	Compustat
Log (board size)	Natural logarithm of the number of directors	BoardEx
Log (management size)	Natural logarithm of the number of the top management team	BoardEx
Proportion of independent directors	Ratio of the number of independent directors to the total number of directors	BoardEx
R&D/assets	Ratio of R&D expenses to total assets	Compustat
Return volatility	Standard deviation of daily excess stock returns over the fiscal year	CRSP
ROA	Ratio of operating income after depreciation to total assets	Compustat
Stock return	Market-adjusted annual stock return, where market index is CRSP value-weighted return	CRSP

Appendix B

Measuring Board-Management Commonality Using Support Vector Machine (SVM)

Problem setup for SVM

Consider a $n \times p$ data matrix X, consisting of n members from the board and management, each with p characteristics (p-dimensional space),

$$x_1 = \begin{pmatrix} x_{11} \\ \vdots \\ x_{1p} \end{pmatrix}, \cdots, x_n = \begin{pmatrix} x_{n1} \\ \vdots \\ x_{np} \end{pmatrix}.$$

Each member is categorized into two classes, $y_1, \cdots, y_n \in \{-1,1\}$, where -1 represents one class (e.g., board) and 1 represents the other class (e.g., management). The separating hyperplane is defined by the following equation:

$$f(x_{i1}, \cdots, x_{ip}) = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip} = 0.$$

When the hyperplane coefficients are normalized (i.e., $\sum_{j=1}^{p} \beta_j^2 = 1$), the value of $f(x_{i1}, \cdots, x_{ip}) = M$ represents the shortest distance from the hyperplane to the corresponding data point. The SVM algorithm aims to find the hyperplane that optimally separates these two groups.

Hyperplane and shortest distance from a data point: A two-dimensional example

In a two-dimensional space defined by (x_1, x_2), a hyperplane can be represented by

$$f(x_1, x_2) = \frac{-1}{\sqrt{2}} + \frac{1}{\sqrt{2}} x_1 + \frac{1}{\sqrt{2}} x_2 = 0.$$

For the point $(\frac{1}{2}, \frac{1}{2})$,

$$f(0,0) = \frac{-1}{\sqrt{2}} + \frac{1}{\sqrt{2}} \frac{1}{2} + \frac{1}{\sqrt{2}} \frac{1}{2} = 0,$$

indicating that it lies on the hyperplane.

For the point (0,0),

$$f(0,0) = \frac{-1}{\sqrt{2}} + \frac{1}{\sqrt{2}} 0 + \frac{1}{\sqrt{2}} 0 = \frac{-1}{\sqrt{2}} < 0,$$

showing that it lies below the hyperplane, and the shortest distance to the hyperplane is $\frac{-1}{\sqrt{2}}$.

For point (1,1),

$$f(1,1) = \frac{-1}{\sqrt{2}} + \frac{1}{\sqrt{2}}1 + \frac{1}{\sqrt{2}}1 = \frac{1}{\sqrt{2}} > 0,$$

indicating that it lies above the hyperplane, and the shortest distance to the hyperplane is $\frac{1}{\sqrt{2}}$. Thus, for a point (x_{i1}, x_{i2}), the function $f(x_{i1}, x_{i2}) = \frac{-1}{\sqrt{2}} + \frac{1}{\sqrt{2}}x_{i1} + \frac{1}{\sqrt{2}}x_{i2} = M$ calculates the shortest distance from the point to the hyperplane when the hyperplane equation is normalized. The sign of M indicates the position of the point relative to the hyperplane: if $M > 0$, the point lies above the hyperplane; if $M < 0$, it lies below the hyperplane.

Step 1. Optimally dividing the sample using SVM

i) The fully separable case

If the data representing board members and management can be perfectly separated by a hyperplane, an infinite selection of possible hyperplanes exists. The optimal hyperplane possesses the largest margin, implying that it is positioned at the maximum distance from all the data points. This is determined by computing the perpendicular distance from each data point to the hyperplane and selecting the hyperplane that maximizes this minimum distance. This process can be formally described as finding the solution to the optimization problem:

$$\max_{\beta_0,\cdots,\beta_p,M} M$$

$$Subject\ to \sum_{j=1}^{p} \beta_j^2 = 1,$$

$$y_i(\beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip}) \geq M, \forall i = 1, \cdots, n.$$

In optimizing for a hyperplane, the first constraint, $\sum_{j=1}^{p} \beta_j^2 = 1$, serves to normalize the coefficients, thus ensuring that M represents the shortest distance from the hyperplane to any given point. The second constraint $y_i(\beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip}) \geq M$ ensures that every data point not only resides on its correct side of the hyperplane but also maintains a distance from it that is no less than M.

ii) The non-separable case

Often, a hyperplane that perfectly separates all points does not exist. In such scenarios, one cannot find a solution where $M > 0$ for the optimization problem as defined previously. To address this, the model's concept of a separating hyperplane is expanded to include a 'soft margin,' which allows for some misclassifications. This approach is formally defined as the optimization problem:

$$\max_{\beta_0,\cdots,\beta_p,\epsilon_1,\cdots,\epsilon_p,M} M$$

$$Subject\ to \sum_{j=1}^{p} \beta_j^2 = 1,$$

$$y_i(\beta_0 + \beta_1 x_{i1} + \cdots + \beta_p x_{ip}) \geq M(1 - \epsilon_i), \forall i = 1, \cdots, n,$$

$$\epsilon_i \geq 0,$$

$$\sum_{i=1}^{n} \epsilon_i \leq C,$$

where C is a nonnegative tuning parameter, and similar to the previously discussed case of perfect separability, M represents the width of the margin. ϵ_i denotes a slack variable, allowing individual data points to be positioned on the incorrect side of the margin or the hyperplane. If $\epsilon_i = 0$, then the i-th data point is on the correct side of the margin. This means that it is correctly classified. If $0 < \epsilon_i \leq 1$, then the i-th data point is on the incorrect side of the margin but has not crossed the hyperplane. This is a soft violation of the ideal conditions the SVM algorithm sets for classifying data points with a margin. This is not a misclassification. If $\epsilon_i > 1$, then the i-th data point has crossed the hyperplane and is on the side of the opposite class. This is a misclassification. C controls the sum of the slack variables ϵ_i, thus determining the number and extent of acceptable margin violations and hyperplane crossings.

In summary, the SVM algorithm is designed to identify a hyperplane that either perfectly separates board members and management with complete accuracy or, in instances where perfect separation is unachievable, finds a hyperplane that accomplishes separation with the fewest possible violations, such as the misclassification of board members and management.

Step 2. Measuring *Board-management commonality*

Following the optimal separation of board members and management by the SVM based on specified characteristics, commonality is measured by calculating the proportion of 'misclassified' independent directors (i.e., manager-like directors) and 'misclassified' managers (i.e., director-like managers) to the total number of independent directors and managers:

$$\text{Commonality} = \frac{\text{No.of director}-\text{like managers} + \text{No.of manager}-\text{like directors}}{\text{Total No.of management team mebers} + \text{Total No.of directors}}$$

While the preceding section described the SVM algorithm in the context of p-dimensional spaces, this study tailors the SVM approach to assess each characteristic of board members and management independently. This approach yields p-commonality measures, corresponding to the respective dimensions. To aggregate individual p-commonality measures, dimensionality reduction is conducted using principal component analysis (PCA). To derive a *Board-management commonality* index, we calculate the first principal component of commonalities for p characteristics for all firm-years. This index reflects the level of overlap between board members and management across multiple dimensions.

Appendix C

Instrument construction

We obtain county-level data on age, race, education, and occupation by gender from the U.S. Census Bureau for the years 2000 and 2010 to 2021. The population is categorized into six age groups: 1) 24 years and younger, 2) 25 to 34 years, 3) 35 to 44 years, 4) 45 to 54 years, 5) 55 to 64 years, and 6) 65 years and older. The race groups include: 1) White, 2) Black or African American, 3) American Indian and Alaskan Native, and 4) Asian and other races. Educational attainment is divided into five subgroups: 1) less than a high school graduate, 2) a high school graduate, 3) a college or associate degree, 4) a bachelor's degree, and 5) a graduate or professional degree. The female labor workforce in the region (civilian employed population 16 years and over) is categorized into five occupation subgroups: 1) management, 2) service, 3) sales, 4) nature (natural resources, construction, and maintenance occupations), and 5) production-related (production, transportation, and material moving occupations).

For our sample period from 2003 to 2009, we use 2000 data and estimate values by linear interpolation, a widely accepted method for estimating regional characteristics (e.g., Hilary and Hui, 2009; Shu et al., 2012). We include only data pertaining to individuals born in the state of residence for all variables except those from 2000. Each component is then normalized using its mean and standard deviation to ensure that its scale is comparable. For each variable, we compute the entropy-based index (Massey and Denton, 1988), calculated as the sum $[p(x) \times \log(1/p(x))]$, where if $p(x)=0$, then $\log(1/p(x)) = 0$. Our instrumental variable, *Regional labor market diversity*, is derived as the sum of the standardized values of the four entropy indices.

Internet Appendix

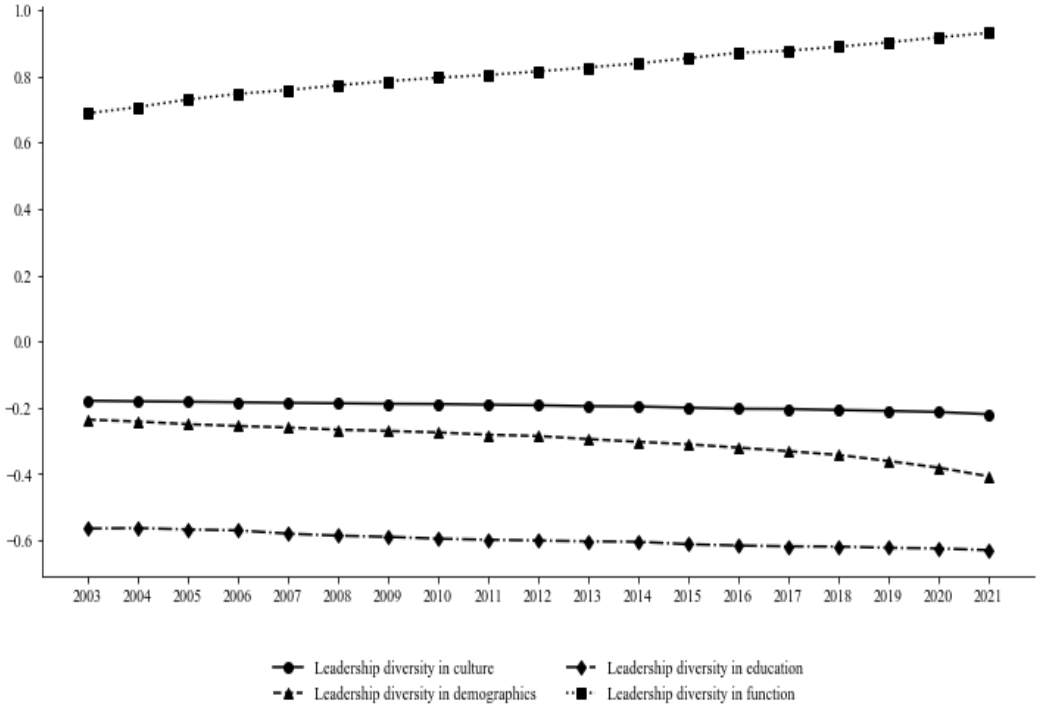
Bridging the Gap: The Impact of Board-Management Commonality on Firm Value and Board Decision-making Effectiveness

September 2024

This appendix presents tables for additional analyses discussed but not reported in the paper. Specifically, the appendix includes the following:

- Figure A.1 Time trends of leadership diversity index components, 2003-2021
- Figure A.2-1 Time trends of board diversity index components, 2003-2021
- Figure A.2-2 Time trends of management diversity index components, 2003-2021
- Table A.1 Robustness test for missing census data
- Table A.2 Board-management commonality and board (management) diversity
- Table A.3 Roles of manager-like directors and director-like managers
- Table A.4 Characteristics of manager-like directors: Biographical analysis using ChatGPT
- Table A.5 Board-management commonality and corporate culture: Analysis of director selection and nomination discussions in proxy statements

Figure A.1 Time trends of leadership diversity index components, 2003-2021



The figure shows the time trend in the average *Leadership diversity* index by component from 2003 to 2021.

Figure A.2-1 Time trends of board diversity index components, 2003-2021

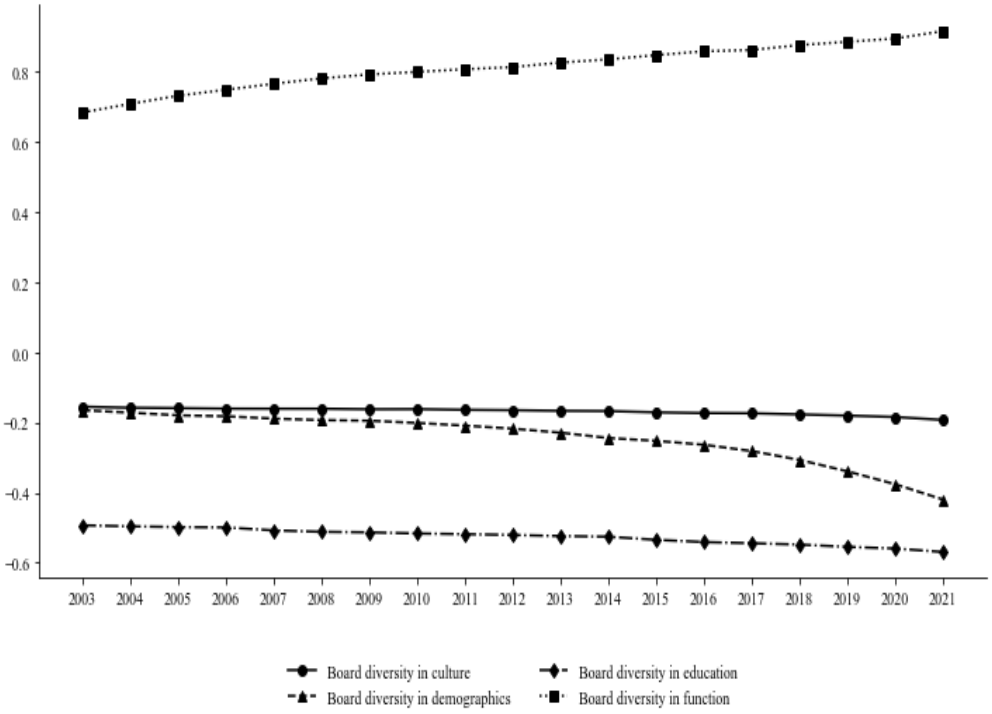
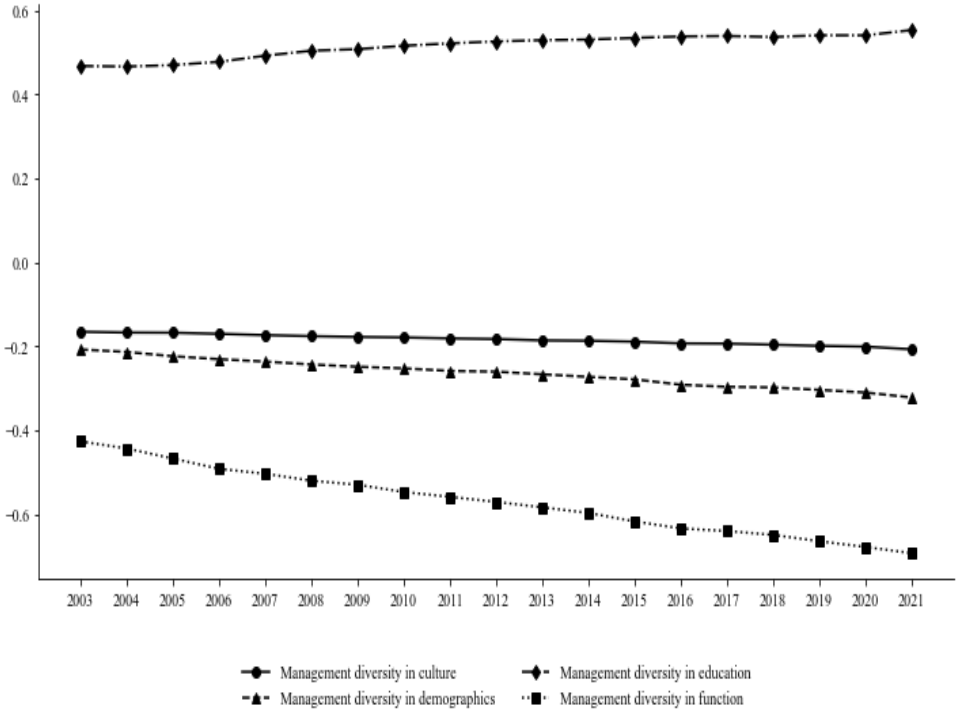


Figure A.2-2 Time trends of management diversity index components, 2003-2021



The figure shows the time trends in diversity indexes by component from 2003 to 2021. Figure A.2-1 plots the average *Board diversity* index, while Figure A.2-2 plots the average *Management diversity* index.

Appendix A.1
Robustness test for missing census data

The table presents estimates of two-stage least squares (2SLS) regressions in which we use *Regional labor market diversity* as the instrumental variable for *Board-management commonality*. The dependent variables are *Board-management commonality* in columns (1) and (2) and Tobin's *q* ((total assets – book equity + market value of equity) / total assets) in columns (3) and (4). The sample consists of 40,549 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2020. We obtain county-level data on age, race, education, and occupation by gender from the U.S. Census Bureau for the years 2000 and 2010 to 2021. In Panel A, missing values are replaced with data from 2010. In Panel B, missing values from 2003 to 2005 are replaced with data from 2000, while those from 2006 to 2009 are replaced with data from 2010. *Board-management commonality* is the ratio of independent directors and managers who share similarities in demographic, cultural, educational, and functional characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted at the county-by-year level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Replacing missing values with data from 2010

	1st stage		2nd stage	
	Board-management commonality		Tobin's *q*	
Independent variable	(1)	(2)	(3)	(4)
Regional labor market diversity	0.006***	0.006***		
	(0.000)	(0.001)		
Instrumented: Board-management commonality			4.814**	3.257*
			(0.029)	(0.098)
Control variables (as in Table 3, column (5))	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	Yes	No	Yes
Observations	40,549	40,549	40,075	39,994
Adjusted R^2	0.699	0.702	--	--

Panel B. Replacing missing values from 2003 to 2005 with data from 2000 and missing values from 2006 to 2009 with data from 2010

Regional labor market diversity	0.007***	0.007***		
	(0.000)	(0.000)		
Instrumented: Board-management commonality			4.814**	3.257*
			(0.029)	(0.098)
Control variables (as in Table 3, column (5))	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	Yes	No	Yes
Observations	40,549	40,549	40,075	39,994
Adjusted R^2	0.699	0.702	--	--

Appendix A.2
Board-management commonality and board (management) diversity

The table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is Tobin's *q* ((total assets – book equity + market value of equity) / total assets). The sample consists of 43,446 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2021. In Panel A (B), the sample is divided based on the industry-year median *Board* (*Management*) *diversity* is the diversity index of independent directors (management teams) measured using principal components analysis (PCA) across four dimensions: demographics (age and gender), cultural background (Hofstede's measures: power distance, individualism, muscularity, uncertainty avoidance, long-term orientation, indulgence), education (college, Ph.D., MBA, and Ivy League), and functional characteristics (financial expertise, industry-specific experience (i.e., experience in the same industry as the current company), non-industry experience (NGO, academia), tenure, CEO experience, technology experience, foreign experience, and legal expertise)). Management teams include senior executives (e.g., CEO, CFO, CIO, COO), division executives (e.g., division CEO, CFO, COO, president), and regional executives (e.g., regional CEO, CFO, COO, and president), as reported in the BoardEx database (e.g., Custódio and Metzger, 2013). *Board-management commonality* is the ratio of independent directors and managers who share similarities in the four characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Subsample analysis using board diversity

	Tobin's *q*			
	Low	High	Low	High
Independent variable	(1)	(2)	(3)	(4)
Board-management commonality	0.241***	0.076	0.231***	0.100*
	(0.001)	(0.134)	(0.002)	(0.061)
Control variables (as in Table 2, except *board diversity*)	Yes	Yes	Yes	Yes
F-test for coefficient equality (*p*-value)	0.661		0.839	
Year fixed effects	Yes	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	No	Yes	Yes
Observations	21,723	21,723	21,723	21,723
Adjusted R^2	0.663	0.670	0.669	0.669

Panel B. Subsample analysis using management diversity

	Tobin's *q*			
	Low	High	Low	High
Independent variable	(1)	(2)	(3)	(4)
Board-management commonality	0.087	0.047	0.041	0.069
	(0.302)	(0.352)	(0.646)	(0.199)
Control variables (as in Table 2, except *management diversity*)	Yes	Yes	Yes	Yes
F-test for coefficient equality (*p*-value)	0.025		0.092	
Year fixed effects	Yes	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	No	Yes	Yes
Observations	21,723	21,723	21,723	21,723
Adjusted R^2	0.654	0.677	0.662	0.675

Appendix A.3
Roles of manager-like directors and director-like managers

This table presents descriptive statistics regarding the roles of manager-like directors and director-like managers in our sample over the period 2003-2021. *Manager-like directors* are independent directors who share similarities in demographic, cultural, educational, and functional characteristics with managers. *Director-like managers* are managers who share similarities in demographic, cultural, educational, and functional characteristics with independent directors. *Manager-like directors* and *Director-like managers* are identified using support vector machine (SVM) classification.

Position	Percentage
Manager-like directors' positions on the board	
Chairperson (including committee chair)	50.30
Audit committee member	39.14
Compensation committee member	31.86
Nominating committee member	29.00
Director-like managers' positions in the management team	
CEO	26.72
CFO	13.42
COO	4.91
President, Vice President	36.90
Other	18.06

Appendix A.4
Characteristics of manager-like directors: Biographical analysis using ChatGPT

The table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is an indicator equal to one if a director's biography includes any of the six categories specified in each column. In columns (1) and (2), *Career trajectory & expertise* reflects an independent director's accumulated knowledge, skills, and professional milestones (e.g., business acumen, extensive industry knowledge, board directorship experience). In columns (3) and (4), *Community engagement and social responsibility* reflects an independent director's involvement in social and community-focused initiatives (e.g., active community involvement, community leadership experience, philanthropic mindset). In columns (5) and (6), *Core personal attributes* is an independent director's intrinsic characteristics, such as integrity, resilience, and ethics (e.g., ethical integrity, relationship building skills, standing commitment). In columns (7) and (8), *Innovative leadership & entrepreneurial spirit* encapsulates an independent director's creative thinking and risk-taking essential in entrepreneurial roles (e.g., entrepreneurship, entrepreneurship vision, startup experience). In columns (9) and (10), *Strategic advisory expertise* denotes an independent director's ability to offer crucial guidance and advice (e.g., advisory background, aboard advisory experience, strategic advisory skills). In columns (11) and (12), *Strategic leadership competence* captures an independent director's direct leadership roles and decision-making responsibilities at the executive level (e.g., business leadership skills, senior executive experience, strategic management experience). The sample consists of 35,358 firm-year-director observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2021. We obtain the latest editions of biographies from S&P Capital IQ's (CIQ) database. *Manager-like director (indicator)* equals one for independent directors who share similarities in demographic, cultural, educational, and functional characteristics with managers, and zero otherwise. *Board chair (indicator)* equals one for the chair of the board of directors, and zero otherwise. *Age* is the age of an independent director in years. *Tenure* is the number of years an independent director has served on the board as a director. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Career trajectory & expertise (indicator)		Community engagement & social responsibility (indicator)		Core personal attributes (indicator)		Innovative leadership & entrepreneurial spirit (indicator)		Strategic advisory expertise (indicator)		Strategic leadership competence (indicator)	
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Manager-like director	0.004	0.003	0.009*	0.010*	0.005	0.005	-0.006	-0.006	-0.005	-0.006	-0.052***	-0.052***
(indicator)	(0.576)	(0.622)	(0.072)	(0.057)	(0.260)	(0.252)	(0.150)	(0.182)	(0.276)	(0.151)	(0.000)	(0.000)
Board chair (indicator)	0.027***	0.026***	-0.012***	-0.011***	-0.006***	-0.007***	-0.020***	-0.020***	0.004*	0.004	-0.000	-0.002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.003)	(0.000)	(0.000)	(0.096)	(0.116)	(0.992)	(0.754)
Age	-0.001***	-0.001***	0.001***	0.001***	0.000***	0.000***	-0.001***	-0.001***	0.001***	0.001***	0.003***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tenure	-0.001	-0.000	0.000	0.000	0.001***	0.001***	0.002***	0.002***	-0.000**	-0.000**	-0.004***	-0.004***
	(0.121)	(0.190)	(0.719)	(0.869)	(0.001)	(0.001)	(0.000)	(0.000)	(0.020)	(0.037)	(0.000)	(0.000)
Control variables (as in Table 2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Industry fixed effects	No	No	No	No	No	No	No	No	No	No	No	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	35,358	35,358	35,358	35,358	35,358	35,358	35,358	35,358	35,358	35,358	35,358	35,358
Adjusted R^2	0.004	0.002	0.018	0.030	0.003	0.008	0.063	0.057	0.001	-0.003	0.031	0.030

Appendix A.5
Board-management commonality and corporate culture: Analysis of director selection and nomination discussions in proxy statements

The table presents estimates of ordinary least squares (OLS) regressions in which the dependent variable is an indicator equal to one if the proxy statement of the firm includes any of the thirty most representative words for each cultural value in its director selection and nomination section (i.e., integrity, teamwork, innovation, quality, and respect) from the culture dictionary (Li et al., 2020). The sample consists of 6,186 firm-year observations of nonfinancial firms from the BoardEx-Compustat-CRSP database over the period 2003 to 2021. We match the dataset with each firm's 2010, 2015, and 2020 proxy statements. *Board-management commonality* is the ratio of independent directors and managers who share similarities in demographic, cultural, educational, and functional characteristics to the total number of independent directors and managers, calculated using the support vector machine (SVM) classification. All other variables are defined in Appendix A. *P*-values reported in parentheses are based on standard errors adjusted for heteroscedasticity and clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Use of words in integrity (indicator)			Use words in teamwork (indicator)			Use of words in innovation (indicator)			Use words in quality (indicator)			Use words in respect (indicator)		
Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Board-management commonality	0.002	0.051**	0.051**	0.018*	0.008	0.008	0.005	0.009	0.007	0.008	0.011	0.006	-0.001	0.005	-0.000
	(0.896)	(0.020)	(0.023)	(0.096)	(0.650)	(0.668)	(0.557)	(0.581)	(0.676)	(0.298)	(0.441)	(0.657)	(0.950)	(0.842)	(0.998)
Control variables (as in Table 2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Industry fixed effects	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No
Firm fixed effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Industry-year fixed effects	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	6,186	6,186	6,186	6,186	6,186	6,186	6,186	6,186	6,186	6,186	6,186	6,186	6,186	6,186	6,186
Adjusted R^2	0.005	0.354	0.335	0.003	0.211	0.187	0.006	0.098	0.061	0.004	0.079	0.059	0.005	0.198	0.184