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Board Tenure Diversity, Culture and Firm Risk: Cross-Country Evidence

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Abstract

We examine the impact of board tenure diversity on firm risk in 37 countries. Using a difference-in-differences design facilitated by corporate board reforms across the world, we find that board tenure diversity leads to lower stock return volatility. This effect is more pronounced among firms with longer board tenures, which are more likely to result in board weak monitoring. The positive impact of board tenure diversity on reducing firm risk is weakened in higher individualistic and power distance cultures, due to the balancing act between group independence and cohesiveness. Further tests suggest that the lower risk levels are likely due to tenure-diverse boards tend to adopt less risky investment policies.

Keywords: Board tenure diversity, firm risk, culture, individualism, power distance
JEL classification: G34, G32, G15

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1 Introduction

There is an increasing debate about the optimal board tenure length and board refreshment among both practitioners and academics. The main dispute lies in boards with long-tenured directors are subject to alignment with the management, in contrast, a straightforward shortening of directors' tenures may result in their insufficient experience to understand corporate business and history, and thus failing to fulfill their advisory and monitoring roles.[1] As such, an alternative proposed way of tackling the issue of the optimal tenure length is to consider the diversity in the length of directors' tenure, rather than fixing term limits on each directorship (Li and Wahid, 2018).[2]

Tenure length diversity emphasizes that, as long as a firm retains diversity in terms of both long and short-tenured directors, it may benefit from both knowledge continuity and independence, which are crucial to high-quality corporate decision-making.[3] In this study, we aim to examine the impact of board tenure diversity on firm risk. Our focus on risk-related corporate outcomes stems from economic and social psychology studies that suggest team diversity affects group decisions, which in turn affects the uncertainty of decisions. Board diversity may affect firm risk due to the uncertainty it introduces to the board's decisions. Furthermore, boards of directors now face more demanding expectations regarding their role in risk oversight.[4]

Board tenure diversity, like other forms of diversity (e.g., gender, background, and experience), is often deemed to be a double-edged sword (Milliken and Martins, 1996). On the one hand, boards with diverse director tenure lengths may benefit from having both senior and junior directors, who may carry out checks and balances on each other, enhancing the monitoring of firm decisions. It is unlikely for such heterogeneous and independent groups to reach idiosyncratic decisions which would result in extreme outcomes and induce higher firm risk (Kogan and Wallach, 1966; Bernile et al., 2018). On the other

[1] See for example, ISS 2013-2014 Policy Survey; Beasley (1996); Anderson et al. (2004); Huang and Hilary (2018).

[2] Prior studies have shown that both the traits and diversity of team members' cognitive resources are important in understanding team performance (Hoffman, 1959; Hoffman and Maier, 1961).

[3] Also, regulations on tenure length diversity, rather than just fixing a maximum tenure for each directorship, can provide firms with more flexibility to determine the timing of director replacement.

[4] For example, see Securities and Exchange Commission's Regulation S-K 407(h).

hand, as board members with different tenures can have heterogeneous knowledge, opinions and views, diversity can exacerbate internal conflict and divisiveness (Simons and Peterson, 2000), and obstruct coordination and communication (Van den Steen, 2010) during the decision-making process. In such circumstances, the decision outcomes can be even more uncertain and risky due to the difficulty of attaining consensus (Arrow, 1951).

Our empirical analysis examines how board tenure diversity impacts on firms' stock return volatility in 37 countries between 1999 and 2017. The baseline results suggest that the negative relationship between board tenure diversity and volatility is robust when controlling for a set of control variables, fixed effects (e.g., country, industry, year, and firm), and applying alternative model specifications. Further, a worldwide explosion of corporate board reforms enables a shock-based research design (Atanasov and Black, 2016) that mitigates the endogeneity concerns inherent in examining cross sectional relations between board composition and firm outcomes (Dahya and McConnell, 2007).[5] Using the country-level staggered board reforms across the world, we employ a difference-in-differences (DID) research design to estimate the effect of board composition changes on firm risk. Consistent with our baseline approach, the DID results show that board tenure diversity can lower the stock return volatility.

Board tenure diversity, however, may not be equally effective in reducing firm risk across different institutional features. We propose that cultural difference, despite at an institutional level, is an important moderator of the relationship between board tenure diversity and firm risk, which requires cross-country analysis (Stulz and Williamson, 2003; Kwok and Tadesse, 2006; Aggarwal and Goodell, 2009; Gorodnichenko and Roland, 2011). Extant studies suggest that culture can help explain firms' financial decisions, and applying it to the board decision context can generate insights that might not be seen using the traditional lens of corporate governance (e.g., Minichilli et al., 2012; Carter

[5]Following the issuance of the Cadbury report in the UK in 1992, the rest of the world has realized the importance of corporate governance and many countries have launched corporate board reforms. One of the aims of board reform is to increase the independence of boards of directors. To comply with such reforms, listed companies have to replace some of their non-executive directors to meet the newly launched corporate governance codes in their countries. Accordingly, the tenure composition of their boards will alter exogenously, leading to different levels of diversity. We take advantage of the exogenous changes in tenure diversity due to the board reforms and apply a DID strategy to mitigate the endogeneity issues.

et al., 2003; Haniffa and Cooke, 2005). Culture affects perceptions, preferences, and behaviors, and therefore the action outcomes and perceived utilities of financial decision makers (such as boards of directors).

Specifically, the tenure diversity effect on firm risk can be significantly heterogeneous between countries with the collectivistic culture and those with the individualistic culture. As diversity increases the independence of a group, individualism makes it more difficult for boards to reach effective decisions, thus manifesting risk (e.g., Gundlach et al., 2006). Also, as tenure diversity means that the board is comprised of both senior and junior members, the diversity effect might be weakened for those countries whose culture accepts a higher degree of unequally distributed power. In those countries, it is more likely that compromises will be made for power and seniority due to people's obedience and respect for authority (e.g., Hofstede, 2001; Hofstede et al., 2010). In line with this intuition, our empirical evidence suggests that the positive impact of board tenure diversity in reducing firm risk is weakened in countries with higher individualism and power distance cultures, due to the balancing act that occurs between group independence and cohesiveness.

Further, to shed light on the potential mechanisms through which board tenure diversity affects firm risk, we first subgroup firms depending on their average board tenure. Both governance experts and market participants suspect that boards with many long-tenured directors are aligned with CEOs, leading to a culture of undue deference to management when making decisions (e.g., ISS 2013-2014 Policy Survey; Huang and Hilary, 2018). Therefore, we argue that the diversity effect on firm risk should be more pronounced among firms with longer average board tenures, which are more likely to suffer board weak monitoring. Our empirical results support this argument. Next, we investigate whether board diversity affects firms' investment decisions that determine the level of firm risk. The empirical evidence suggests that firms with greater board diversity reduce their increases in investments in total assets, and also their level of investment in capital expenditure, suggesting that a tenure-diverse board tends to adopt persistent and cautious investment policies.

Our paper makes the following contributions to the literature. First, we extend the

literature that investigates the link between tenure diversity and board monitoring effectiveness (Li and Wahid, 2018) by providing the first study to examine the link between tenure diversity and firm risk. We also contribute to a broader literature that has documented the relations between firm risk and other corporate governance characteristics, including CEO gender, financial expertise, ownership, compensation and the presence of institutional investors (e.g., Coles et al., 2006; Faccio et al., 2016; Kim and Lu, 2011; Minton et al., 2014; Wahal and McConnell, 2000).

Second, a common challenge in research on culture and finance is that it is difficult to distinguish between the direct and indirect effects of culture. Most empirical research reflects the direct effect of a given cultural measure on financial decision outcomes, by controlling for other firm- and/or country-level determinants (Li et al., 2013; El Ghoul et al., 2016). However very few studies report findings on the mechanisms and intermediate channels through which culture affects financial decisions, that is, the indirect effects of culture. We exploit the indirect effect of culture on corporate decisions by examining its moderating role on the link between tenure diversity and firm risk, given the advantage of the cross-country research context.

Third, although many studies have investigated the impact of other types of board diversity on firm risk, they yield mixed evidence and focus mainly on the US market. For example, Giannetti and Zhao (2019) find that directors' ancestral origins diversity, as a proxy for board opinion and value diversity, increases the volatility of firm performance. In contrast, Bernile et al. (2018) use a multidimensional diversity index (including diversity in gender, age, board seats, ethnicity, education, and financial work experience) and find that board diversity leads to lower stock volatility. Our cross-country analysis allows us to utilize the corporate board reforms as exogenous shocks to board composition, and it reconciles the mixed findings in prior single-country diversity studies.

The rest of the paper proceeds as follows. Section 2 introduces the literature review and hypothesis development. Section 3 provides the data and methodology. Section 4 presents the empirical results. Section 5 discusses how culture moderates the baseline relationship. Section 6 discusses the potential mechanisms. Section 7 concludes.

2 Literature review and hypothesis development

2.1 Board diversity and firm risk

Board diversity, i.e., heterogeneity among board members, encompasses a wide range of dimensions, such as age, nationality, religion, gender, work experience, beliefs, and preferences. The theoretical underpinning for board diversity studies stems from social psychology studies and organization research on the effects of team diversity on group decisions.

Previous research typically focuses on the link between board diversity and firm performance (e.g., Carter et al., 2003; Minton et al., 2014; Anderson et al., 2011). More recent studies have investigated the impact of board diversity on firm risk, but with mixed evidence and mainly in the US market. For example, Sila et al. (2016) fail to document a relationship between board gender diversity and firm risk.Giannetti and Zhao (2019) proxy for board members' opinions and values using directors' ancestral origins and show that diversity has costs and benefits, leading to higher performance volatility. Specifically, firms with greater ancestral diversity have more board meetings and make less predictable decisions. Bernile et al. (2018) use a multidimensional diversity index with diversities of gender, age, board seats, ethnicity, education, and financial work experience) and find that board diversity leads to lower stock volatility. They also suggest that the lower risk level is due to less risky financial policies and more efficient investments in innovation adopted by diverse boards.

2.2 Board tenure diversity and firm risk

Despite the extensive media and political attention to multidimensional board diversity, most empirical literature focuses on gender diversity, while there is far less studying other dimensions (Bernile et al., 2018). More recently, some practitioners and regulators have begun to put increasing attention on issues of board tenure. Director tenure is the length of time a director has served on the corporate board. It signifies a director's commitment, experience, and competence in understanding firm-specific issues. It also influences the

oversight of directors on CEOs, since extended service time may also make a director more likely to be friends with the management at the cost of shareholders (Vafeas, 2003).

A limited number of studies have established links between board tenure diversity and firm outcomes and policies. Among those, Vafeas (2003) finds that senior directors who have served for twenty or more years are more likely to be on the firm's nomination and compensation committees, and lessen boards' oversight of affiliated CEOs, which highlights the limitations of longer director tenure. Huang and Hilary (2018) document an inverted U-shaped relationship between the average board tenure and firm performance. This relationship also holds between board tenure and other corporate decisions such as M&As, CEO compensation, and the quality of financial reporting. Li and Wahid (2018) show that board tenure diversity is positively related to CEO turnover-performance sensitivity, while the tenure diversity of the audit committee (compensation committee) is negatively related to accounting restatement (overcompensation). They support the idea that board diversity could enhance the board's monitoring performance, but do not find strong evidence that board diversity contributes to a firm's financial performance. All these studies focus on the US market and show different impacts of board tenure diversity on firm outcomes.

Board tenure diversity, like other diversity, could have both costs and benefits. Firm risk increases with CEO power: powerful CEOs are capable of making unchecked decisions, leading to more idiosyncratic choices that may result in extreme outcomes and higher risk (Adams et al., 2005). Board of directors is the most important internal corporate governance mechanism to oversee the CEO decisions.

On the one hand, the oversight function of long-tenured directors is more likely to be problematic due to the 'friendship' built up between the CEO and directors. Specifically, both executive and non-executive directors dislike haggling with or being 'disloyal' to the CEO in case they need a number of favors from the CEO in the future. Bebchuk and Fried (2004) provide a portrait of a director's behavior: "*the CEO can place them on the company's slate, increasing seriously their chance of re-election, give them perks, business deals (perhaps after they have been nominated on the board, so that they are formally*

"independent"), extra compensation on top of the director fee, and charitable contributions to nonprofit organizations headed by directors, or reciprocate the lenient oversight in case of interlocking directorates". Furthermore, a tenure-homogeneous team are more socially cohesive (O'Reilly III et al., 1989), which may reduce the board's monitoring effectiveness due to compliancy and groupthink (Herman et al., 1982). We argue that homogeneity of directors' tenure lengths results in less scrutiny from the board in monitoring CEO's idiosyncratic decisions. The weakness of governance ultimately gives rise to more volatile corporate outcomes. Thus, from this perspective, board tenure diversity reduces firm risk.

On the other hand, as board members with different tenures can have heterogeneous knowledge, opinions and views, issues such as conflict, lack of cooperation, and insufficient communication can be common among the directors during the decision-making process (Simons and Peterson, 2000; Van den Steen, 2010). In such circumstances, the decision outcomes from directors can be even more uncertain and risky due to the difficulty of attaining consensus (Arrow, 1951). This alternative view indicates that board diversity yields higher rather than lower outcome volatility. Thus, we hypothesize the following:

Hypothesis 1a: board tenure diversity reduces firm risk.

Hypothesis 1b: board tenure diversity increases firm risk.

2.3 Culture, board tenure diversity and firm risk

In the economic and finance literature, culture has often been defined as "those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation" (Guiso et al., 2006). Due to the persistent feature of culture, it is feasible to identify a causal effect from culture to economic outcomes. Previous research mainly shows that cultural differences have strong power to explain the broad systemic or structural economic differences across countries, such as credit rights and investor protection (Stulz and Williamson, 2003), judicial efficiency (Radebaugh et al., 2006), and corporate governance (Doidge et al., 2007). A growing body of finance research also shows that culture matters for micro-level firm outcomes. Specifically, national

culture impacts on a range of corporate and capital market behaviors, for example, liquid asset holdings (Chang and Noorbakhsh, 2009), capital structure (Chui et al., 2002), and earnings management (Han et al., 2010).

In particular, national culture could influence firm risk through the risk-oversight role of the board of directors. To protect the interests of the shareholders/stakeholders, the board of directors is introduced to monitor CEO power and moderate firm decisions (Fama and Jensen, 1983). The structure of the board, like any organizational structure, can be influenced by national culture. Institutional theory (Meyer and Rowan, 1977; DiMaggio and Powell, 1983; Scott, 1987) views organizations as seeking legitimacy, resources, and ultimately survival by conforming their structures to institutional norms. In turn, the psychological and organizational literature (Hofstede, 1980; House et al., 2004) documents that social and cultural norms, as a part of institutional norms, have an important impact on governance structure. For example, in the UK corporate governance system, the shareholders (the board of directors) are the only controlling parties. However in Germany, banks and employee representatives play a significant role in decision-making for public firms because German companies are seen as a coordinating vehicle between national interest groups (Cromme, 2005). In addition to the impact of regulatory design, empirical evidence shows that national culture explains variations in board structure across countries. Li and Harrison (2008) find that national culture can influence board composition and leadership structure. Firms in countries that place a higher value on individualism or have a higher power distance tend to have a higher proportion of non-executive directors, and also CEO duality. Carrasco et al. (2015) show that countries with a greater tolerance for inequalities in the distribution of power and that value the role of men more highly, generally present lower proportions of female directors on their board. Thus, national culture could explain variations in board diversity in different dimensions.

Besides, national culture has a direct impact on the decision-making process of boards of directors. Culture provides a "framework for encoding and interpreting the information that the senses are presenting to the brain" (North, 1990). According to psychological

studies, culture shapes individual behaviors in everyday life and may help us to understand these behaviors (Hofstede, 1980). It also shapes the majority of social practices and processes (House et al., 2004). Members of a board will often live in the same country, thus sharing common values, beliefs, principles, and attitudes. Some dimensions of national culture could, therefore, impact the directors' behaviors and further smooth (disturb) the decision process of boards, resulting in high (low) board effectiveness. Minichilli et al. (2012) find that national culture moderates the links between the board decision process and board monitoring performance, by comparing survey-based firm data from Norway (representing Scandinavian countries) and Italy (representing Latin countries). Building on these strands of literature, we aim to investigate whether and to what extent the culture of a country moderates the impact that board tenure diversity has on firm risk.

In most empirical studies, researchers make theoretical claims as to how certain cultural values influence the financial decisions of individuals (Delis and Mylonidis, 2015), firm managers (Jiang et al., 2015), or government officials (Carpenter and Feroz, 2001). However, empirical results simply reflect the direct effect of a given cultural measure on the financial decision outcome of interest, controlling for other firm- and/or country-level determinants. Few studies report findings on the mechanisms and intermediate channels through which culture affects financial decisions, that is, the indirect effects of culture. By testing the theorized links between group (board) diversity and national culture, our study provides more evidence on these channels and indirect impact on firm outcomes.

In cross-country studies on culture and finance, most scholars utilize the datasets developed by Hofstede, Schwartz, GLOBE, and the World Values Survey (WVS). Among these four datasets, Hofstede's is the earliest and most widely cited, which has been adopted in this study. Following psychology literature, we argue that two dimensions of culture from Hofstede's index (2010), individualism/collectivism and power distance,

may influence board/group work efficiency.[6]

Individualism/Collectivism. Individualism/collectivism is the degree to which people in a society are integrated into groups (Hofstede, 1980, 2001; Hofstede et al., 2010). On the individualistic side, where the ties between people are loose, individuals are expected to care for themselves and their immediate family, thus tending to place personal interests over shared group goals (Wagner III, 1995). On the collectivist side, where people are integrated into strong, cohesive in-groups from birth onwards, individuals are expected to care for group welfare, equality, and loyalty (Hofstede, 2001; Schuler and Rogovsky, 1998). Empirical research often shows that individualistic team members exert a negative influence on team performance (Gundlach et al., 2006). The social identity theory (Ashforth and Mael, 1989) argues that a team of individualistic members will barely develop team identification in attempting to achieve group goals. The social relation model (Kenny, 1994) explains that the negative relationship between individualism and team performance is due to the high communication costs based on inaccurate meta-perceptions in individualistic societies. Wendt et al. (2009) suggest that the individualistic culture has an indirect impact on team cohesiveness. In a country with higher individualism, board members are more likely to consider their values and positions within the group, rather than taking care of the group's interests. Thus, the conflicts between junior and senior board directors will be exacerbated in individualistic culture such that tenure diversity will increase the communication costs of boards, then make it more challenging to achieve predictable team decisions and outcomes. Therefore, we propose the following hypotheses:

Hypothesis 2a: If Hypothesis 1a holds, the individualistic culture could reduce the impact of board tenure diversity on firm risk.

Hypothesis 2b: If Hypothesis 1b holds, the individualistic culture could increase the impact of board tenure diversity on firm risk.

[6]The other four dimensions of culture are uncertainty avoidance (the level of stress in a society in the face of an unknown future), masculinity versus femininity (the division of emotional roles between women and men), long-term versus short-term orientation (the choice of focus for people's efforts: the future or the present and past), and indulgence versus restraint (the gratification versus control of basic human desires related to enjoying life). We did not consider these four dimensions of culture since it is not clear how they might be linked to board diversity.

Power distance. Power distance means "the extent to which the less powerful members of institutions and organizations expect and accept that power is distributed unequally" (Hofstede, 2001). It implies the extent to which team leaders and followers endorse inequality in a team. In high-power-distance cultures, organizations tend to be centralized with power concentrated in a few hands; and large differences in authority, salary, and privileges are exhibited between those at the top and the bottom. In low-power-distance cultures, organizations are more decentralized; there is more consultation in decision-making; independent action by less powerful actors is valued and encouraged (Hodgetts and Luthans, 1993). Building on evidence from strategic decision making, it is possible that power inequality within the board may either have either negative or positive effects on organizational outcomes. In terms of negative consequences, board power inequality can reduce information sharing within the team, reducing the creativity of ideas generated and quality of choices made, and can hurt the ability to implement decisions. In terms of positive consequences, powerful members can create decision-making processes that are efficient, informed, fair, and that lead to quality decisions that enhance a firm's performance. In line with the positive effect, Smith et al. (2006) use survey data from 51 US hospitals and find that the CEO is the most powerful leader in the top management teams (TMTs), and that power distance within the TMTs is positively related to firm performance. They argue that unequal power distribution among TMT members may lead to efficient and fair decision-making processes. In contrast, using data from Chinese listed firms, Zhu et al. (2016) suggest that increasing the power of independent directors leads to more effective monitoring and higher firm value. In countries with higher power distance, the long-tenured directors in a firm are more likely to be the power center, and their ideas will be valued more highly by the board. Thus, a diverse board's decisions will be influenced by the longer-tenured directors. Therefore, we propose the following hypotheses:

Hypothesis 3a: If Hypothesis 1a holds, the high power distance culture could reduce the impact of board tenure diversity on firm risk.

Hypothesis 3b: If Hypothesis 1b holds, the high power distance culture could increase

the impact of board tenure diversity on firm risk.

3 Sample, data, and research design

3.1 Sample and data

We start by collecting financial and accounting information for listed firms across the world from 1999 to 2017. The data are downloaded from the Worldscope data in Datastream, Thomson Reuters. Then we obtain board and corporate governance data from BoardEx. Country-level characteristics are downloaded from the World Development Index by the World Bank. Financial and utility firms are excluded from the sample, since regulations in these industries are different from those in other sectors. Furthermore, countries with less than twenty firms are dropped from the sample. Our analysis are less likely to suffer from survivorship bias because Worldscope provide datasets that include acquired and delisted firms. We construct a large global panel of approximately 86,696 firm-year observations of 12,935 firms across 37 countries. All continuous variables are winsorized at the top and bottom one percent.

3.2 Measures of firm risk, board tenure diversity and national culture

Following previous literature on firm risk (e.g., Bernile et al., 2018; Sila et al., 2016), we use *Volatility*, measured by the standard deviation of daily stock returns in the given year, as the main proxy for firm risk.[7]

Following prior organization studies (e.g., Harrison and Klein, 2007), we use the coefficient of variation (the standard deviation over the mean) of board member tenure

[7]Following Favara et al. (2017), we further measure the firm's idiosyncratic risk as annualized standard deviation of the residuals from the regression of the firm's weekly stock returns in year t on the world market index (lag, lead, and contemporaneous). For every firm in the sample, we regress a firm's weekly stock returns in year t on the lagged, contemporaneous, and lead world market index return and compute idiosyncratic risk as the annualized standard deviation of the residuals. Appendix B reports summary statistics of idiosyncratic risk and provides the regression results for the relationship between board tenure diversity and firm idiosyncratic risk. The coefficient on board tenure diversity is similar to the ones using total risk. We use MSCI world equity index as the market index to decompose the total risk.

lengths to measure board tenure diversity throughout our study.[8] Following the literature looking at national culture in finance studies (see Karolyi, 2016), we adopt Hofstede's framework for measuring national culture, specifically focusing on *individualism/collectivism* and *power distance* (Hofstede, 1980, 2001; Hofstede et al., 2010). A higher score for *individualism/collectivism* indicates that the country's culture is more individualistic, and a higher score for *power distance* indicates that the country values authority more.

Table 1 presents the distribution of firms, observations, cultural measures and board reform years across countries. The overall sample distribution is similar to those in previous studies using the BoardEx and Worldscope databases (Dong et al., 2019). Table 1 also provides the scores of *individualism/collectivism* and *power distance* from Hofstede et al. (2010) for our sample countries. We group the sample countries into two categories, based on the median score for *individualism/collectivism*. Countries with a score above 60 are defined as high individualism countries, and the rest as low individualism countries. We similarly divide the countries into two groups based on their *power distance* scores: high power distance countries are those with a score above the median value of 54, and the rest are low power distance countries. The distribution of board reform years on country-level is based on Fauver et al. (2017).

[Table 1 about here.]

3.3 Model specification

To test the relation between board tenure diversity and firm risk, we use panel data regression analysis. The baseline model is as follows:

$$Firm\ risk_{i,t} = \alpha + \beta_1 Board\ tenure\ diversity_{i,t} + \sum \beta_m Controls + \sum \beta_n FE + \epsilon \quad (1)$$

where i denotes firm and t denotes year. As discussed above, we use *Volatility*, defined as the standard deviation of daily returns in a year, as our measure of firm risk. The

[8] We also use the standard deviation of director tenure lengths as an alternative measure for robustness purposes. The results are qualitatively the same.

coefficient of variation of board tenure lengths is our primary measure of *Board tenure diversity*. The acceptance of Hypothesis 1a (1b) requires the coefficient on *Board tenure diversity*, β_1, to be negative (positive). All regressions include year, country, and two-digit SIC industry fixed effects with robust standard errors.[9]

For the control variables, we include other board-level, firm-level, and country-level variables that have been documented to affect firm risk in prior studies (e.g., Bernile et al., 2018; Sila et al., 2016). To control for other board characteristics, we include the average tenure length of the directors (*Board tenure*), the natural logarithm of total number of directors on the board (*Board size*), the proportion of non-executive directors on the board (*Board independence*), the proportion of female directors (*Gender diversity*), the proportion of foreign directors (*Ethnic diversity*), the standard deviation of the number of directorships in other listed firms, held by the directors (*Board experience diversity*), the standard deviation of directors' ages (*Board age diversity*), and an indicator of whether the CEO chairs the board (*CEO duality*) in the regressions. To control for the influence of firm-level factors, we include firm accounting performance (*ROA*), the natural logarithm of the book value of total assets (*Firm size*), tangible assets over total assets (*Tangibility*), the increase in sales over the previous year's sales (*Sales growth*), financial inflow stability proxied by the ratio of funds from operations to net sales (*Cash flow*), and the market-to-book value of total assets (*MB*), following Sila et al. (2016). To control for country-level factors that influence firm risk, we include ability to access finance in a country, i.e. the stock market value over GDP (*Stock market value*), the natural logarithm of GDP per capita (*Log(GDP)*), and government consumption as percentage of GDP (*Government stability*), following Gu et al. (2019). Appendix A provides detailed variable definitions.

To examine whether national culture affects the sensitivity of firm risk to board tenure diversity, we expand our regression model as below:

[9]We also re-categorize the SIC industry into the Fama-French 49 industry, then control for Fama-French 49 industry fixed effects in the baseline regression. Further, we add country-by-industry fixed effects in the baseline model to consider different industrial policies within a country. The results are robust with the ones using SIC two-digit industry fixed effects. See Appendix C for the results.

$$
\begin{aligned}
Firm\ risk_{i,t} =& \alpha + \beta_1 Board\ tenure\ diversity_{i,t} + \beta_2 Culture\ dummy_{i,t} \\
& \beta_3 (Board\ tenure\ diversity \times Culture\ dummy)_{i,t} \\
& + \sum \beta_m Controls + \sum \beta_n FE + \epsilon
\end{aligned} \tag{2}
$$

where i denote firm and t denotes year. The culture dummy takes two different definitions, in two separate regressions: the *Individualism dummy* equals one when people in a country tend to be less likely to give up their ideas to aid group coherence (these countries have been tagged with "H" in Table 1 column (5)), and zero otherwise. The *Power distance dummy* takes the value one when the country has a higher tolerance for inequality of power, indicating that the voices of less powerful members may not be valued (these countries have been tagged with "H" in Table 1 column (6)), and zero otherwise. Throughout all model specifications, we include the same set of control variables as in Eq. (1).

The coefficient of the interaction term, *Board tenure diversity* $\times$ *Culture dummy*, β_3, indicates how national culture moderates the effect of board tenure diversity on firm risk. The interpretation of β_3 largely depends on whether Hypothesis 1a or 1b is accepted in Eq. (1) and we will discuss it in later sections.

Table 2 provides descriptive statistics for variables used in the analysis. It shows that the mean (median) firm risk, measured as the standard deviation of daily stock returns (Volatility (%)), is 34.091% (32.241%). We are aware that our sample comprises relatively large listed companies (the average value of assets is 1,102 million US dollars; the median is 982 million US dollars).[10] The average value of *Board tenure diversity* is 0.651 and the standard deviation is 0.260, suggesting the variation in the tenures of board members is not negligible. The standard deviation of directors' tenure lengths (*Board tenure diversity_std*) also display large firm-level variations with a means of 4.872 and a standard deviation 3.260. Table 2 also shows the summary statistics for other board-level, firm-level, and country-level controls, which are largely consistent with the

[10]We obtain the data for total assets (Field 07230 Total Assets (US$)) from Worldscope. According to Worldscope's Data Definitions Guide, Total Assets (US$) represent the total assets of the company converted to US dollars using the fiscal year end exchange rate. Thus, the total assets across different countries are all nominated in US dollars.

cross-country research. For example, using a large sample from 71 countries, Dong et al. (2019) document that average values of board size and board independence are 8.68 and 0.76, which are quantitatively the same as ours (In Table 2, the average values of the natural logarithm of board size and board independence are 2.163 and 0.702).

[Table 2 about here.]

Table 3 reports the correlations between the variables. It shows that firm risk is negatively associated with the board tenure diversity measures. In line with the literature, firm risk is also negatively related to the other diversity measures of gender diversity, ethnic diversity, and experience diversity, but not to age diversity. Table 3 indicates that our study is less likely to be plagued with multicollinearity problem.

[Table 3 about here.]

4 Empirical Results

4.1 Board tenure diversity and firm risk: baseline regressions

In the main analysis, we examine the relationship between board tenure diversity and firm risk. Table 4 reports the baseline regression results. Column (1) reports the regression results for our key independent variable, i.e., board tenure diversity, other board characteristics, i.e., board tenure, size, board independence, CEO duality, and firm-level controls, are regressed on firm risk. In column (2), we further include other types of board diversity that influence firm risk: gender, ethnicity, experience, and age diversities. Institutional environments, such as economic growth, ability to access financing, and government policies, may affect firm risk at a country level. In column (3), we include *GDP per capita*, *Stock market value*, and *Government stability* to capture the differences in institutional environments across countries. Across all the columns of Table 4, the estimated coefficients on *Board tenure diversity* are negatively related to stock volatility at the 1% significance level. Our empirical evidence suggests that board tenure diversity can lower firm risk.

We also find that the coefficients of *Board size* are significantly negative at the 1% level, across all specifications. It is consistent with Wang (2012), who uses US data, and suggests that smaller boards motivate CEOs to take on a more risky investment, eventually causing the overall firm risk to rise. The coefficient on *Board independence* is significantly negative as well, in line with the findings of Minton et al. (2010) using US data.

With regard to the firm-level control variables, firm risk is negatively correlated to firm size, performance, cash flow, and tangibility, while it is positively associated with leverage and sales growth. These results are generally in line with the literature (Bernile et al., 2018; Faccio et al., 2016; Minton et al., 2014; Sila et al., 2016).

Overall, the evidence discussed in this section indicates that board tenure diversity has a negative effect on firm risk, supporting the idea that tenure-diverse boards will make more moderate firm decisions, resulting in lower volatility. The empirical evidence indicates that we should accept Hypothesis 1a that board tenure diversity reduces firm risk.

[Table 4 about here.]

4.2 Robustness tests

We are aware that our main results may suffer from the following potential issues. First, the relation between board tenure diversity and firm risk may be spurious because both factors may be correlated with time-invariant firm factors, such as CEO management style and corporate culture. Second, according to the summary statistics, the US data account for around 45% of the full sample, raising the concern that the US data may drive our results.

Table 5 provides regressions results with firm fixed effects, as an alternative model specification, and for a sample excluding the US data, respectively. With the firm fixed effects model, we repeat the regressions in Table 4 for the full sample and the sample excluding the US data, and the results are presented in columns (1) and (3) respectively. Columns (2) and (4) show the regression results when we use the standard deviation

of director tenure lengths (*Board tenure diversity_std*) as the key independent variable, for the two samples. Standard deviation is a measure of the separation of observations from the mean, emphasizing the combination of senior and young directors on a board, regardless of the average board tenure, and is also used to measure diversity (Harrison and Klein, 2007). We continue to find that board tenure diversity is negatively correlated with stock return volatility for both samples, after controlling for the firm fixed effects. Therefore, the negative association between tenure diversity and firm risk is not due to the correlation between time-invariant components of the board and corporate characteristics, or not due to a large amount of US data in our sample.

[Table 5 about here.]

For other types of board diversity, the results are mixed across specifications and samples compared to Table 4. After controlling for firm-level time-invariant factors with firm fixed effects, the relationship between gender diversity and firm risk is not significant in either the full sample or the sample excluding the US data, consistent with Sila et al. (2016)'s findings using US data. Table 5 also shows that the coefficients on Board experience diversity are not significant for the non-US sample. These results are similar to the findings of Bernile et al. (2018) for the US market.

4.3 Endogeneity issue: difference-in-differences design

The results in Table 4 and Table 5 are still subject to endogeneity issues between board structure and firm outcomes. Precisely, omitted time-varying factors could determine both board composition and firm risk simultaneously. We further mitigate the endogeneity concerns with a difference-in-differences (DID) design in this section. A worldwide explosion of corporate board reforms in recent years allows us to apply a shock-based research design (Atanasov and Black, 2016) that mitigates the endogeneity concerns inherent in examining cross-sectional relations between board composition and firm outcomes (Dahya and McConnell, 2007). Using the country-level board reforms across the world, we employ a DID research design to estimate the effect of board composition changes on firm risk.

Following the issuing of the Cadbury report in the UK in 1992, the rest of the world realized the importance of corporate governance, and many countries have launched corporate board reforms (Dahya and McConnell, 2007). One of the key aims of board reform is to increase the independence of the board of directors.[11] Listed companies have to replace some of their non-executive directors to meet the newly launched corporate governance codes in their countries following such reforms. Thus, the tenure diversity of a board will alter accordingly, and the changes in tenure diversity are exogenous. Therefore, we use a DID design to examine how the board reforms affect firm risk.

Post is an indicator taking the value one when the year is later than the board reform year occurred in a given country, and zero otherwise, which captures the exogenous shocks of corporate board reforms. Because different countries have conducted reforms at different times, our setting contains multiple treatment groups (Imbens and Wooldridge, 2009). Then, we interact *Board tenure diversity* with *Post*, and the coefficient on the interaction term captures the effect on the firm risk of the sudden increase in board tenure diversity due to the regulation change. We include country and year fixed effects to identify the within-firm and within-year changes in firm risk between treatment and benchmark firms. Industry dummies are included to control for industrial characteristics. The benchmark group consists solely of firms from countries that have not experienced reforms as of a particular time. To mitigate concerns about confounding events, we restrict our sample period to windows spanning from 3 (or 6) years before to 3 (or 6) years after the reforms. This approach is commonly used in previous literature (Bertrand and Mullainathan, 2003). We obtain 24,380 firm-year observations for the [-3, 3] window and 39,341 for the [-6, 6] window.

Table 6 presents the results of the DID analysis of how the board reforms and consequent increases in board tenure diversity affect firm risk. Columns (1) and (2) present the results using the [-3, 3] and [-6, 6] windows, respectively. We find that the coefficient on Post is positively significant in the short [-3, 3] window (column (1)), while it is not significant in the long [-6, 6] window (column (2)). These results imply that the board reform,

[11] Using data from 41 countries and a DID design,Fauver et al. (2017) find that board reforms have a positive impact on firm value.

itself, may increase firm risk in the short run but not in the long run because investors or firms will need time to adjust to the exogenous policy change. More importantly, the coefficients on the interaction term, *Board tenure diversity* × *Post*, are negatively significant. It indicates that, when compared to the benchmark firms, the increase in tenure diversity due to the policy change could reduce firm risk in the treatment firms. Overall, the results of the DID design are consistent with our results in Tables 4 and 5, suggesting that the board tenure diversity has a negative effect on firm risk.

[Table 6 about here.]

We further use propensity score matching (PSM) to reduce the differences in observable characteristics between treatment and control groups. For each treatment firm, we follow recent literature to match it with the benchmark firm annually (e.g., Faulkender and Yang, 2013; Jaravel et al., 2018). We include all firm level characteristics and country level characteristics for matching, including *ROA*, *Firm size*, *Sales growth*, *Cash flow*, *MB*, *Tangibility*, *Leverage*, *Log(GDP)*, *Stock market value*, and *Government stability* to capture the firm and country heterogeneity. We apply a strict caliper distance (0.001) to ensure that all differences in matching dimensions are erased. Nonetheless, because of our international setting, it is relatively more difficult to find cross-country benchmark firms, which results in a loss of observations. Consequently, the PSM sample in [-3, 3] window is 15,784 observations, and the sample in [-6, 6] window is 18,030 observations. We perform a difference-in-differences test using the PSM samples. Appendix D shows the results. The interactions between board tenure diversity and post are still significant and negative, which indicates that our results are consistent with those without matching in Table 6.

5 Culture, board tenure diversity, and firm risk

This section reports the results of whether and how national culture moderates the negative relationship between board tenure diversity and firm risk. From the institutional perspective, human and social behaviors are driven by country-level institutions, such as

norms, routines, and historical patterns, which determine isomorphism among individuals and organizations (DiMaggio and Powell, 1983). Thus, national culture could explain variations in group dynamics, which further impact on the board decision-making process, specifically the effectiveness of the board in risk oversight, and thus on firm risk. Based on our main results that board tenure diversity can reduce firm risk, we expect that some national culture dimensions could reduce the sensitivity of firm risk to board diversity if the culture negatively impacted the board's effectiveness in monitoring, which could be the case in cultures with high individualism and respect for power.

Table 7 reports the regression results for culture, board tenure diversity and firm risk, with the *Individualism dummy* and *Power distance dummy* as the culture dummies in columns (1) and (2) respectively. First, the coefficient on *Individualism dummy* is negatively significant, while the coefficient on *Power distance dummy* is positively significant. This indicates that countries' cultural differences in terms of individualism and power distance may have direct effects on firm risk, after controlling for country-level determinants. The extant literature has briefly studied the relation between culture and firm risk taking, but has mostly focused on firms in the banking and the financial sectors (Houston et al., 2010; Kanagaretnam et al., 2011; Li and Zahra, 2012). For example, Kanagaretnam et al. (2011) show that aggressive risk-taking activities by banks are more likely in societies with high individualism. In a similar vein, Li et al. (2013) show that individualism is positively associated with firm-level riskiness in the nonfinancial sector (in the manufacturing sector). Their results are largely consistent with our findings.

[Table 7 about here.]

More importantly, the coefficient on the interaction term between *Board tenure diversity* and *Individualism dummy* is significantly positive, as is that on the interaction term between *Board tenure diversity* and *Power distance dummy*. These results suggest that the negative effect of board tenure diversity on firm risk is attenuated when a country's culture is more individualistic or power distance oriented, which are consistent with Hypothesis 2a and 3a that if Hypothesis 1a holds, the individualistic and high power culture could both reduce the impact of board tenure diversity on firm risk.

Further, this set of results helps alleviate a few endogeneity concerns. First, the nature of culture is persistent at the country level, making it unlikely that the relationship between firm risk and culture is driven by reverse causality or a latent variable. Second, it is less likely that our results are driven by unspecified omitted variables, given that we have controlled for firm, industry, and country fixed effects to mitigate the omitted variable bias in all regressions, as is common in cross-country studies. The findings support our hypothesis that culture is an important moderator of the relationship between firm risk and board tenure diversity.

6 Possible mechanisms

6.1 Board tenure diversity and firm risk: does the average tenure matter?

Both governance experts and market participants suspect that boards with many long-tenured directors are not independent from the management, leading to a culture of undue deference to management when making decisions (e.g., ISS 2013-2014 Policy Survey; Huang and Hilary, 2018). For example, senior directors who have been serving a company for over twenty years are more likely to be on the firm's nominating and compensation committees (Vafeas, 2003). However, the long board service time helps directors obtain corporate-specific information, signifying their commitment to, experience in, and competence at serving the company. These competing arguments raise an important question regarding board governance: how might a board's independence and knowledge be balanced through a particular composition of board tenures?

A potential answer to the question might be obtained by focusing on board tenure diversity, allowing the long-tenured directors to provide business-specific information and the short-tenured to play a more restrictive role in monitoring the CEO. Huang and Hilary (2018) show that board tenure exhibits an inverted U-shaped relation with firm value and accounting performance. This is consistent with the interpretation that directors' on-the-job learning improves firm value up to a threshold point, beyond which weak monitoring

dominates and firm performance is damaged. Thus, we expect that the relationship between board tenure diversity and firm risk is not linear, and the diversity effect on firm risk should be more pronounced among firms with longer average board tenures, which are more likely to suffer from board weak monitoring.

Table 8 presents the regression results from examining whether the effect of board tenure diversity is stronger when the average board member tenure is longer. We first calculate three median values: (1) the median of board tenure by industry and year, (2) the median by year, (3) the median by country and year, and (4) the median by country, industry and year at the same time. We define long-tenure dummies taking the value one when the board tenure is above each of these respective medians, and zero otherwise: (1) *Long tenure dummy* (industry & year), (2) *Long tenure dummy* (year), (3) *Long tenure dummy* (country & year), and (4) *Long tenure dummy* (country & industry & year). Then, we conduct the analysis by interacting the board tenure diversity with the long-tenure dummies, with the results presented in columns (1), (2), (3), and (4) respectively. As shown in Table 8, the coefficients on board tenure diversity are still negative, consistent with the baseline results. The coefficients on *Long tenure dummy* (industry & year), *Long tenure dummy* (year) and *Long tenure dummy* (country & industry & year)are positively significant, whereas that on *Long tenure dummy* (country & year) is not significant. More importantly, the coefficients on all the interaction terms between board tenure diversity and the long tenure dummies are significantly negative, suggesting that the effect of board tenure diversity on firm risk is stronger in firms with longer average board tenure, which are more likely to suffer from board weak monitoring.

[Table 8 about here.]

6.2 Board tenure diversity and corporate policies

Overall, our results suggest that board tenure diversity could enhance board monitoring of firm risk. Next, we investigate the channel through which firm risk is reduced by examining whether board tenure diversity affects a firm's policies. We focus on two types of corporate policies, i.e., investment and financial policies. The *Investment*, defined as

the increase in total investment over last year's value, and *CAPEX*, defined as the total capital expenditure over total assets, are used as proxies for investment policies. *Leverage*, measured by the ratio of total debt to total assets, is used as a proxy for financial policies.

Table 9 reports the results of regressing firms' policies on their boards' tenure diversity. The dependent variables are *Investment*, *CAPEX*, and *Leverage*, in columns (1)-(3) , respectively. The coefficients on Board tenure diversity with respect to *Investment* and *CAPEX* are significantly negative (columns (1) and (2)). This implies that board tenure diversity helps reduce firm risk through a decrease in the risk related to investment. In contrast, the coefficient on *Board tenure diversity* is not significant in the *Leverage* model (column (3)), suggesting that tenure diversity does not affect the financial policy significantly. Matsa and Miller (2013) show similar evidence when studying the impact of female quotas for corporate board seats, in that gender diversity is not related to financial risk either. Overall, our evidence suggests that board tenure diversity tends to lower firm risk by causing firms to be more cautious and less risky in their investment.

[Table 9 about here.]

7 Conclusion

A growing interest of researchers, practitioners and regulators is to promote board diversity in various forms, due to the belief that it enhances the oversight and monitoring of directors. We focus on the effect of board tenure diversity on firm risk, globally, which has yet to be examined in the board literature.

We explore the effect of board tenure diversity on firm risk using a panel of 86,696 firm-year observations from 12,935 firms across 37 countries from 1999 to 2017. Our results show that firm risk is negatively associated with board tenure diversity. The findings support the idea that board tenure diversity increases the board's effectiveness on risk oversight. This effect is more pronounced among firms with longer board tenures, which are more likely to suffer from board weak monitoring. We address the endogeneity issues with the DID approach, facilitated by the staggered corporate board reforms that

have been implemented across the world. By taking advantage of the cross-country data, we find that cultures with higher individualism and power distance weaken the effect of board tenure diversity, through their influence on the board decision-making process, in particular in reducing high-risk investment.

We are also aware that board diversity displays in many forms (e.g., gender, background, and experience, etc.). In some cases, it is difficult to disentangle the effect of any single diversity on firm decisions and outcomes apart from others. In future research, it is worth exploring more comprehensive measures of board diversity. Also, our study does not use the other four dimensions of culture because it is not clear how they might be linked to board diversity. The other four dimensions of culture include uncertainty avoidance (the level of stress in a society in the face of an unknown future), masculinity vs femininity (the division of emotional roles between women and men), long term vs short term orientation (the choice of focus for people's efforts: the future or the present and past), and indulgence vs restraint (the gratification versus control of basic human desires related to enjoying life). It is also interesting that we can connect other cultures with board diversity in the future.

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Table 1: Distribution of firms, observations, cultural measures and board reform years, by country

Country	Firms	Obs.	Percent	Individualism/Collectivism	Power distance	Board reform year
Australia	718	3,837	4.43	90(H)	36(L)	2004
Austria	36	281	0.32	55(L)	11(L)	2004
Belgium	88	730	0.84	75(H)	65(H)	2005
Brazil	94	547	0.63	38(L)	69(H)	NA
Canada	691	3,842	4.43	80(H)	39(L)	2004
China	351	1,748	2.02	20(L)	80(H)	2001
Denmark	39	353	0.41	74(H)	18(L)	2001
Finland	57	446	0.51	63(H)	33(L)	2004
France	435	3,656	4.22	71(H)	68(H)	2003
Germany	341	2,533	2.92	67(H)	35(L)	2002
Greece	49	375	0.43	35(L)	60(H)	2002
Hong Kong	415	1,796	2.07	25(L)	68(H)	2005
India	389	2,183	2.52	48(L)	77(H)	2002
Ireland	66	485	0.56	70(H)	28(L)	NA
Israel	110	772	0.89	54(L)	13(L)	2000
Italy	129	999	1.15	76(H)	50(L)	2006
Japan	273	1,088	1.25	46(L)	54(L)	2002
Luxembourg	25	174	0.20	60(L)	40(L)	NA
Malaysia	149	696	0.80	26(L)	104(H)	2001
Mexico	53	294	0.34	30(L)	81(H)	2001
Netherlands	137	1,097	1.27	80(H)	38(L)	2004
New Zealand	51	225	0.26	79(H)	22(L)	NA
Norway	115	829	0.96	69(H)	31(L)	2005
Philippines	29	175	0.20	32(H)	94(H)	2002
Poland	25	157	0.18	60(L)	68(H)	2002
Portugal	34	293	0.34	27(L)	63(H)	2001
Russia	54	248	0.29	39(L)	93(H)	NA
Singapore	218	1,099	1.27	20(L)	74(H)	2003
South Africa	173	1,057	1.22	65(H)	49(L)	NA
Spain	113	822	0.95	51(L)	57(H)	2006
Sweden	165	1,378	1.59	71(H)	31(L)	2006
Switzerland	138	1,061	1.22	68(H)	34(L)	2002
Thailand	36	154	0.18	20(L)	64(H)	2002
United Arab Emirates	22	81	0.09	38(L)	80(H)	NA
Turkey	25	143	0.16	37(L)	66(H)	2002
United Kingdom	1,880	11,985	13.83	89(H)	35(L)	1998
United States	5,212	39,057	45.05	91(H)	40(L)	2003

This table displays the distribution of firms, observations, cultural measures and board reform years across countries. Cultural measures include *individualism/collectivism* and *power distance* scores for each country based on Hofstede et al. (2010). H/L in parentheses indicates whether the respective value is higher or lower than the median value across the sample. Board reform year displays the year in which the board reform was adopted by each country, based on Fauver et al. (2017).

Table 2: Descriptive statistics

Variable	N	mean	std	p25	median	p75
Main variables						
Volatility (%)	86,696	34.091	12.458	24.482	32.241	42.252
Board tenure diversity	86,696	0.651	0.260	0.482	0.645	0.814
Board tenure diversity_std	86,696	4.872	3.260	2.500	4.200	6.500
Leverage	86,696	0.502	0.221	0.341	0.509	0.655
Investment	83,257	0.044	0.133	0.000	0.000	0.012
CAPEX	83,864	15.680	101.907	5.318	9.036	15.554
Board-level controls						
Board tenure	86,696	7.445	4.009	4.571	6.650	9.464
Board size	86,696	2.163	0.393	1.946	2.197	2.485
Board independence	86,696	0.702	0.175	0.600	0.714	0.857
Gender diversity	86,696	0.104	0.115	0.000	0.091	0.167
Ethnic diversity	86,696	0.143	0.219	0.000	0.000	0.300
Board experience diversity	86,696	0.956	0.695	0.500	0.900	1.300
Board age diversity	86,696	7.797	2.747	6.000	7.600	9.500
CEO duality	86,696	0.175	0.380	0.000	0.000	0.000
Firm-level controls						
ROA	86,696	0.027	0.136	0.010	0.050	0.088
Firm size	86,696	20.821	2.488	19.073	20.705	22.468
Tangibility	86,696	0.279	0.239	0.081	0.209	0.426
Sales growth	86,696	12.399	37.812	-1.791	6.671	17.609
Cash flow	86,696	8.744	30.730	4.296	9.849	17.611
MB	86,696	2.679	3.018	1.125	1.897	3.238
Country-level controls						
Log(GDP)	86,696	10.554	0.692	10.607	10.771	10.819
Stock market value	86,696	1.360	1.450	0.896	1.239	1.383
Government stability	86,696	17.190	3.511	15.083	16.855	19.540

This table provides the summary statistics for the dependent, independent and control variables. All variables are defined in Appendix A.

Table 3: Pearson correlation matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	Volatility (%)	1.00																						
2	Board tenure diversity	-0.11*	1.00																					
3	Board tenure diversity_std	-0.20*	0.57*	1.00																				
4	Leverage	-0.12*	0.04*	-0.07*	1.00																			
5	Investment	0.13*	-0.01*	0.02*	-0.20*	1.00																		
6	CAPEX	0.04*	-0.02*	-0.03*	-0.03*	0.00	1.00																	
7	Board tenure	-0.18*	0.03*	0.78*	-0.12*	0.03*	-0.03*	1.00																
8	Board size	-0.34*	0.24*	0.14*	0.22*	0.04*	-0.03*	-0.01*	1.00															
9	Board independence	-0.04*	0.01*	-0.04*	0.06*	-0.02*	-0.02*	-0.06*	0.02*	1.00														
10	Gender diversity	-0.23*	0.08*	0.02*	0.11*	-0.04*	-0.01*	-0.04*	0.19*	0.17*	1.00													
11	Ethnic diversity	-0.10*	0.02*	-0.11*	0.06*	-0.03*	-0.01*	-0.15*	0.16*	0.14*	0.08*	1.00												
12	Board experience diversity	-0.07*	0.01*	-0.06*	0.09*	0.03*	0.00	-0.09*	0.24*	0.10*	0.03*	0.19*	1.00											
13	Board age diversity	0.07*	0.05*	0.14*	-0.01*	0.00	0.00	0.11*	0.05*	0.01*	-0.03*	0.00	0.03*	1.00										
14	CEO duality	-0.03*	0.00	0.06*	0.05*	0.01*	0.01*	0.08*	0.12*	-0.06*	0.03*	-0.01*	-0.02*	0.03*	1.00									
15	ROA	-0.38*	0.02*	0.13*	-0.04*	-0.07*	-0.01*	0.14*	0.18*	-0.05*	0.08*	0.02*	0.05*	0.00	0.03*	1.00								
16	Firm size	-0.42*	0.11*	0.02*	0.29*	-0.03*	-0.02*	-0.05*	0.59*	0.07*	0.20*	0.20*	0.32*	-0.03*	0.04*	0.27*	1.00							
17	Tangibility	-0.14*	0.00	-0.01*	0.14*	-0.16*	-0.02*	-0.02*	0.10*	0.08*	-0.01*	0.01*	0.05*	-0.02*	-0.04*	0.05*	0.22*	1.00						
18	Sales growth	0.13*	-0.03*	-0.07*	-0.06*	0.04*	0.10*	-0.08*	-0.06*	-0.03*	-0.06*	0.00	0.02*	0.02*	-0.01	0.03*	-0.06*	-0.02*	1.00					
19	Cash flow	-0.26*	0.01*	0.06*	0.03*	-0.08*	-0.01*	0.07*	0.14*	0.01*	0.05*	0.03*	0.05*	-0.01*	0.01*	0.48*	0.25*	0.19*	-0.03*	1.00				
20	MB	-0.03*	-0.01*	-0.01*	0.06*	0.10*	0.02*	-0.01	0.07*	0.00	0.05*	0.04*	0.04*	-0.01*	0.01*	0.10*	-0.02*	-0.11*	0.09*	-0.01*	1.00			
21	Log(GDP)	-0.03*	0.02*	0.04*	-0.05*	-0.02*	-0.01*	0.04*	-0.05*	0.06*	0.04*	0.02*	-0.18*	-0.13*	0.07*	-0.09*	-0.33*	-0.06*	-0.01*	-0.04*	0.00	1.00		
22	Stock market value	0.01*	-0.04*	0.02*	-0.06*	-0.01*	0.00	0.07*	0.02*	-0.09*	0.00	0.02*	0.17*	0.04*	-0.03*	0.01*	0.11*	-0.02*	0.01*	0.01*	-0.01*	0.04*	1.00	
23	Government stability	-0.09*	0.04*	-0.10*	0.06*	-0.14*	0.00	-0.16*	-0.11*	0.05*	0.13*	0.13*	-0.10*	-0.04*	0.00	-0.02*	-0.14*	-0.03*	-0.01*	-0.03*	-0.06*	0.24*	-0.37*	1.00

This table shows the correlation matrix. * denotes that the correlation coefficient is statistically significant at the 10% level.

Table 4: Board tenure diversity and firm risk

	(1)	(2)	(3)
Board tenure diversity	-1.162***	-1.049***	-1.014***
	(0.128)	(0.128)	(0.128)
Board tenure	-0.604***	-0.616***	-0.617***
	(0.009)	(0.009)	(0.009)
Board size	-3.340***	-3.587***	-3.617***
	(0.124)	(0.124)	(0.124)
Board independence	-1.854***	-2.518***	-2.583***
	(0.229)	(0.232)	(0.232)
Gender diversity		-5.580***	-5.728***
		(0.318)	(0.319)
Ethnic diversity		2.232***	2.186***
		(0.156)	(0.156)
Board experience diversity		0.409***	0.409***
		(0.053)	(0.053)
Board age diversity		0.225***	0.225***
		(0.012)	(0.012)
CEO duality	0.516***	0.525***	0.524***
	(0.086)	(0.086)	(0.086)
ROA	-17.604***	-17.009***	-17.029***
	(0.313)	(0.313)	(0.313)
Firm size	-2.116***	-2.123***	-2.112***
	(0.024)	(0.025)	(0.025)
Sales growth	0.024***	0.023***	0.023***
	(0.001)	(0.001)	(0.001)
Cash flow	-0.015***	-0.015***	-0.015***
	(0.001)	(0.001)	(0.001)
MB	-0.104***	-0.106***	-0.106***
	(0.012)	(0.012)	(0.012)
Tangibility	-2.303***	-2.210***	-2.236***
	(0.174)	(0.173)	(0.172)
Leverage	4.164***	4.328***	4.327***
	(0.177)	(0.176)	(0.176)
Log(GDP)			-9.121***
			(0.807)
Stock market value			-0.652***
			(0.135)
Government stability			0.007
			(0.043)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Obs.	86,696	86,696	86,696
R^2	0.492	0.498	0.499

This table provides the baseline OLS regression results for the relationship between board tenure diversity and firm risk. The dependent variable is *firm risk*, defined as the standard deviation of daily stock returns in a year. *Board tenure diversity* is the coefficient of variation of directors' tenure lengths. *Board tenure* is the average tenure length of the directors. *Board size* is the natural logarithm of total number of directors on the board. *Board independence*, *Gender diversity*, and *Ethnic diversity* are the proportions of non-executive, female, and foreign directors on the board, respectively. *Board experience diversity* is the standard deviation of the number of directorships in any firm, held by directors in the listed firm. *Board age diversity* is the standard deviation of directors' ages. *CEO duality* is a binary variable that equals one if the CEO also chairs the board, and zero otherwise. *ROA* is the ratio of net income to total assets. *Firm size* is the natural logarithm of the book value of total assets. *Sales growth* is the natural logarithm of the current year's sales minus the natural logarithm of the previous year's sales. *Cash flow* is the ratio of funds from operations to net sales. *MB* is the market value of total assets divided by the book value of total assets. *Tangibility* is Net PPE divided by the value of total assets. *Leverage* is the ratio of the book value of debt to total assets. *Log(GDP)* is the natural logarithm of GDP per capita. *Stock market value* is the market capitalization of all the listed companies in the country, as a proportion of GDP. *Government Stability* is government consumption as a proportion of GDP. Robust standard errors are reported in parentheses. All regressions include industry, country, and year fixed effects. All variable definitions are defined in Appendix A. *, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively.

Table 5: Firm risk and board tenure diversity: firm fixed effects regression results

	Full sample		Non-US	
	(1)	(2)	(3)	(4)
Board tenure diversity	-0.429***		-0.251**	
	(0.095)		(0.116)	
Board tenure diversity_std		-0.082***		-0.049***
		(0.013)		(0.018)
Board tenure	-0.397***	-0.354***	-0.378***	-0.351***
	(0.009)	(0.010)	(0.013)	(0.015)
Board size	-1.400***	-1.370***	-1.151***	-1.139***
	(0.113)	(0.113)	(0.141)	(0.141)
Board independence	-1.718***	-1.695***	-0.859***	-0.853***
	(0.213)	(0.213)	(0.270)	(0.270)
Gender diversity	-0.262	-0.224	0.120	0.145
	(0.268)	(0.268)	(0.315)	(0.315)
Ethnic diversity	0.542***	0.533***	0.490***	0.485***
	(0.160)	(0.160)	(0.179)	(0.179)
Board experience diversity	0.093**	0.093**	0.057	0.058
	(0.044)	(0.044)	(0.053)	(0.053)
Board age diversity	0.032***	0.036***	0.033***	0.034***
	(0.010)	(0.010)	(0.013)	(0.013)
CEO duality	0.234***	0.234***	0.551***	0.552***
	(0.069)	(0.069)	(0.110)	(0.110)
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Obs.	86,696	86,696	47,639	47,639
R^2	0.138	0.139	0.093	0.094

This table provides regression results with firm fixed effects controlled in the models. Columns (1) and (2) are based on the full sample. Columns (3) and (4) are based on the data excluding the US data. The dependent variable is *firm risk*, defined as the standard deviation of daily stock returns in a year. *Board tenure diversity* is the coefficient of variation of directors' tenure lengths. *Board tenure diversity_ std* is the standard deviation of directors' tenure lengths. *Board tenure* is the average tenure length of the directors. *Board size* is the natural logarithm of total number of directors on the board. *Board independence*, *Gender diversity*, *Ethnic diversity* are the proportions of non-executive, female, and foreign directors on the board, respectively. *Board experience diversity* is the standard deviation of the number of directorships in any firms, held by the directors of the listed firm. *Board age diversity* is the standard deviation of directors' ages. *CEO duality* is a binary variable that equals one if the CEO also chairs the board, and zero otherwise. Robust standard errors are reported in parentheses. The same set of firm-level and country-level controls are included as in Table 4. All regressions include firm and year fixed effects. All variable definitions are defined in Appendix A. *, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively.

Table 6: Firm risk, board tenure diversity and board reforms: difference-in-differences approach

	(1) [-3, 3]	(2) [-6, 6]
Board tenure diversity	-0.030	-0.078**
	(0.043)	(0.040)
Board tenure diversity × Post	-0.130***	-0.083**
	(0.040)	(0.037)
Post	0.963**	0.361
	(0.422)	(0.347)
Board tenure	-0.650***	-0.614***
	(0.026)	(0.020)
Board size	-4.131***	-4.106***
	(0.252)	(0.196)
Board independence	-3.840***	-3.465***
	(0.476)	(0.369)
Gender diversity	-7.755***	-7.258***
	(0.704)	(0.536)
Ethnic diversity	3.449***	2.954***
	(0.342)	(0.260)
Board experience diversity	0.585***	0.470***
	(0.104)	(0.083)
Board age diversity	0.249***	0.249***
	(0.024)	(0.019)
CEO duality	0.475***	0.467***
	(0.140)	(0.117)
ROA	-18.374***	-16.727***
	(0.640)	(0.475)
Firm size	-2.311***	-2.253***
	(0.052)	(0.040)
Sales growth	0.029***	0.025***
	(0.002)	(0.001)
Cash flow	-0.001	-0.007***
	(0.003)	(0.002)
MB	0.082***	0.031*
	(0.021)	(0.018)
Tangibility	-6.375***	-4.866***
	(0.354)	(0.274)
Leverage	1.872***	3.129***
	(0.373)	(0.278)
Log(GDP)	6.022	7.714***
	(5.938)	(2.981)
Stock market value	0.057	-0.111
	(0.297)	(0.227)
Government stability	-0.309	-0.218*
	(0.195)	(0.112)
Country fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Obs.	24,380	39,341
R^2	0.569	0.526

This table provides the results of the DID test of how board reforms and the consequent increase in board tenure diversity affect firm risk. The dependent variable is *firm risk*, defined as the standard deviation of daily stock returns in a year. *Board tenure diversity* is the coefficient of variation of directors' tenure lengths. *Post* is a dummy variable that equals one when the year is after the board reform occurred in a country, and zero otherwise, which captures the exogenous shocks of corporate board reforms. *Board tenure* is the average tenure length of the directors. *Board size* is the natural logarithm of total number of directors on the board. *Board independence*, *Gender diversity*, *Ethnic diversity* are the proportions of non-executive, female, and foreign directors on the board, respectively. *Board experience diversity* is the standard deviation of the number of directorships in any firm held by the directors of the listed firm. *Board age diversity* is the standard deviation of directors' ages. *CEO duality* is a binary variable that equals one if the CEO also chairs the board, and zero otherwise. *ROA* is the ratio of net income to total assets. *Firm size* is the natural logarithm of the book value of total assets. *Sales growth* is the natural logarithm of the current year's sales minus the natural logarithm of the previous year's sales. *Cash flow* is the ratio of funds from operations to net sales. *MB* is the market value of total assets divided by the book value of total assets. *Tangibility* is net PPE divided by the value of total assets. *Leverage* is the ratio of the book value of debt to total assets. *Log(GDP)* is the natural logarithm of GDP per capita. *Stock market value* is the market capitalization of all the listed companies in the country as a proportion of GDP. *Government Stability* is government consumption as a proportion of GDP. Columns (1) and (2) present the results using a [-3, 3] and [-6, 6] window, respectively. All regressions include industry, country, and year fixed effects. Robust standard errors are reported in parentheses. All variable definitions are provided in Appendix A. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 7: Board tenure diversity and firm risk: does national culture matter?

	(1) Individualism	(2) Power distance
Board tenure diversity	-1.603***	-1.142***
	(0.277)	(0.145)
Board tenure diversity × Individualism dummy	0.677**	
	(0.308)	
Board tenure diversity × Power distance dummy		0.666**
		(0.290)
Individualism dummy	-14.750***	
	(2.565)	
Power distance dummy		15.581***
		(2.565)
Board tenure	-0.618***	-0.617***
	(0.009)	(0.009)
Board size	-3.595***	-3.617***
	(0.124)	(0.124)
Board independence	-2.601***	-2.614***
	(0.233)	(0.233)
Gender diversity	-5.832***	-5.710***
	(0.319)	(0.319)
Ethnic diversity	2.162***	2.190***
	(0.156)	(0.156)
Board experience diversity	0.407***	0.409***
	(0.053)	(0.053)
Board age diversity	0.223***	0.225***
	(0.012)	(0.012)
CEO duality	0.520***	0.523***
	(0.086)	(0.086)
ROA	-17.051***	-17.032***
	(0.313)	(0.313)
Firm size	-2.113***	-2.113***
	(0.025)	(0.025)
Sales growth	0.023***	0.023***
	(0.001)	(0.001)
Cash flow	-0.015***	-0.015***
	(0.001)	(0.001)
MB	-0.107***	-0.106***
	(0.012)	(0.012)
Tangibility	-2.251***	-2.235***
	(0.173)	(0.172)
Leverage	4.302***	4.326***
	(0.176)	(0.176)
Log(GDP)	-9.209***	-9.217***
	(0.807)	(0.808)
Stock market value	-0.726***	-0.656***
	(0.136)	(0.135)
Government stability	0.008	0.005
	(0.043)	(0.043)
Country fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Obs.	86,696	86,696
R^2	0.499	0.499

This table provides the results of the OLS regressions in which we examine how national culture moderates the relationship between board tenure diversity and firm risk. The dependent variable is *firm risk*, defined as the standard deviation of daily stock returns in a year. *Individualism dummy* equals one if the country has a higher *individualism/collectivism* value than the median, indicating that people in the country tend to be less likely to give up their ideas to benefit group coherence, and zero otherwise. *Power distance dummy* equals one if the country has a higher power distance value than the median, indicating its higher tolerance of power inequality, and zero otherwise. *Board tenure diversity* × *Individualism dummy* and *Board tenure diversity* × *Power distance dummy* are the interactions between board tenure diversity and the respective culture dummies. *Board tenure* is the average tenure length of the directors. *Board size* is the natural logarithm of total number of directors on the board. *Board independence*, *Gender diversity*, and *Ethnic diversity* are the proportions of non-executive, female, and foreign directors on the board, respectively. *Board experience diversity* is the standard deviation of the number of directorships in any firm held by the directors of the listed firm. *Board age diversity* is the standard deviation of directors' ages. *CEO duality* is a binary variable that equals one if the CEO also chairs the board, and zero otherwise. *ROA* is the ratio of net income to total assets. *Firm size* is the natural logarithm of the book value of total assets. *Sales growth* is the natural logarithm of the current year's sales minus the natural logarithm of the previous year's sales. *Cash flow* is the ratio of funds from operations to net sales. *MB* is the market value of total assets divided by the book value of total assets. *Tangibility* is net PPE divided by the value of total assets. *Leverage* is the ratio of the book value of debt to total assets. *Log(GDP)* is the natural logarithm of GDP per capita. *Stock market value* is the market capitalization of all the listed companies in the country as a proportion of GDP. *Government stability* is government consumption as a proportion of GDP. Robust standard errors are reported in parentheses. All regressions include industry, country, and year fixed effects. All variable definitions are provided in Appendix A. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Table 8: Board tenure diversity and firm risk: does average tenure length matter?

	(1)	(2)	(3)	(4)
Board tenure diversity	-0.354**	-0.315*	-0.605***	-0.540***
	(0.177)	(0.179)	(0.179)	(0.173)
Long tenure dummy	0.753***	0.436**	0.196	0.796***
	(0.188)	(0.187)	(0.188)	(0.186)
Board tenure diversity × Long tenure dummy	-1.488***	-1.521***	-0.900***	-1.130***
	(0.243)	(0.243)	(0.244)	(0.244)
Board tenure	-0.600***	-0.570***	-0.581***	-0.624***
	(0.012)	(0.012)	(0.012)	(0.011)
Board size	-3.597***	-3.590***	-3.599***	-3.609***
	(0.124)	(0.124)	(0.124)	(0.124)
Board independence	-2.602***	-2.617***	-2.582***	-2.580***
	(0.232)	(0.232)	(0.232)	(0.232)
Gender diversity	-5.691***	-5.695***	-5.733***	-5.703***
	(0.318)	(0.318)	(0.318)	(0.318)
Ethnic diversity	2.156***	2.138***	2.155***	2.170***
	(0.156)	(0.156)	(0.156)	(0.156)
Board experience diversity	0.412***	0.414***	0.412***	0.410***
	(0.053)	(0.053)	(0.053)	(0.053)
Board age diversity	0.229***	0.228***	0.227***	0.228***
	(0.012)	(0.012)	(0.012)	(0.012)
CEO duality	0.523***	0.521***	0.521***	0.522***
	(0.086)	(0.086)	(0.086)	(0.086)
ROA	-17.008***	-16.986***	-17.001***	-17.027***
	(0.313)	(0.312)	(0.313)	(0.313)
Firm size	-2.112***	-2.111***	-2.112***	-2.111***
	(0.025)	(0.025)	(0.025)	(0.025)
Sales growth	0.023***	0.023***	0.023***	0.023***
	(0.001)	(0.001)	(0.001)	(0.001)
Cash flow	-0.015***	-0.015***	-0.015***	-0.015***
	(0.001)	(0.001)	(0.001)	(0.001)
MB	-0.105***	-0.105***	-0.105***	-0.106***
	(0.012)	(0.012)	(0.012)	(0.012)
Tangibility	-2.221***	-2.212***	-2.221***	-2.226***
	(0.172)	(0.172)	(0.172)	(0.172)
Leverage	4.315***	4.308***	4.318***	4.322***
	(0.176)	(0.176)	(0.176)	(0.176)
Log(GDP)	-9.152***	-9.171***	-9.162***	-0.652***
	(0.807)	(0.807)	(0.807)	(0.134)
Stock market value	-0.644***	-0.646***	-0.643***	-9.164***
	(0.134)	(0.134)	(0.134)	(0.806)
Government stability	0.006	0.006	0.007	0.005***
	(0.043)	(0.043)	(0.043)	(0.043)
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Obs.	86,696	86,696	86,696	86,696
R^2	0.499	0.499	0.499	0.531

This table provides the results of OLS regressions in which we test whether the average tenure length impacts on the relation between board tenure diversity and firm risk. The dependent variable is *firm risk*, defined as the standard deviation of daily stock returns in a year. *Board tenure diversity* is the coefficient of variation of directors' tenure lengths. *Long tenure dummy* is an indicator that equals one if the board tenure length is longer than each of the following median values, and zero otherwise: the median by industry and year in column (1), the median by year in column (2), the median by country and year in column (3), and the median by country, year, and industry at the same time in column (4). *Board tenure diversity × Long tenure dummy* is the interaction between *Board tenure diversity* and *Long tenure dummy*. Controls include the following variables: *Board tenure* is the average tenure length of the directors. *Board size* is the natural logarithm of total number of directors on the board. *Board independence*, *Gender diversity*, *Ethnic diversity* are the proportions of non-executive, female, and foreign directors on the board, respectively. *Board experience diversity* is the standard deviation of the number of directorships in any firms held by the directors of the listed firm. *Board age diversity* is the standard deviation of directors' ages. *CEO duality* is a binary variable that equals one if the CEO also chairs the board, and zero otherwise. *ROA* is the ratio of net income to total assets. *Firm size* is the natural logarithm of the book value of total assets. *Sales growth* is the natural logarithm of the current year's sales minus the natural logarithm of the previous year's sales. *Cash flow* is the ratio of funds from operations to net sales. *MB* is the market value of total assets divided by the book value of total assets. *Tangibility* is net PPE divided by the value of total assets. *Leverage* is the ratio of the book value of debt to total assets. *Log(GDP)* is the natural logarithm of GDP per capita. *Stock market value* is the market capitalization of all the listed companies in the country as a proportion of GDP. *Government Stability* is government consumption as a proportion of GDP. Robust standard errors are reported in parentheses. All regressions include industry, country, and year fixed effects. All variable definitions are provided in Appendix A. *, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively.

Table 9: Board tenure diversity and corporate policies

	(1) Investment	(2) CAPEX	(3) Leverage
Board tenure diversity	-0.007***	-4.959***	-0.003
	(0.002)	(1.438)	(0.003)
Board tenure	-0.000*	-0.541***	-0.004***
	(0.000)	(0.069)	(0.000)
Board size	-0.001	-4.924***	-0.020***
	(0.002)	(1.516)	(0.003)
Board independence	-0.029***	-15.000***	0.048***
	(0.003)	(2.747)	(0.005)
Gender diversity	-0.013***	1.514	0.001
	(0.004)	(4.577)	(0.007)
Ethnic diversity	0.002	-2.902**	-0.056***
	(0.002)	(1.359)	(0.003)
Board experience diversity	0.008***	0.426	-0.007***
	(0.001)	(0.625)	(0.001)
Board age diversity	-0.000	0.231***	0.000
	(0.000)	(0.084)	(0.000)
CEO duality	-0.003***	2.917**	0.007***
	(0.001)	(1.294)	(0.002)
ROA	-0.066***	-4.825	-0.281***
	(0.006)	(5.476)	(0.008)
Firm size	0.006***	0.267	0.042***
	(0.000)	(0.443)	(0.001)
Sales growth	0.000***	0.252***	-0.000***
	(0.000)	(0.068)	(0.000)
Cash flow	-0.000***	-0.004	-0.000
	(0.000)	(0.021)	(0.000)
MB	0.003***	0.456***	0.008***
	(0.000)	(0.102)	(0.000)
Tangibility	-0.050***	-9.423***	0.056***
	(0.002)	(1.990)	(0.004)
Leverage	-0.115***	-8.992***	
	(0.003)	(1.634)	
Log(GDP)	0.013	-13.968*	-0.018
	(0.013)	(7.564)	(0.016)
Stock market value	-0.002	2.600**	0.008***
	(0.002)	(1.286)	(0.003)
Government stability	0.003***	-0.592	0.003***
	(0.000)	(0.376)	(0.001)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Obs.	83,256	83,863	86,696
R^2	0.156	0.014	0.253

This table provides the results of OLS regressions in which we test for the effect of board tenure diversity on corporate policies. The dependent variables are *Investment*, *CAPEX* and *Leverage*, respectively. *Investment* is the increase in investment over the value of the investment in the last year. *CAPEX* is capital expenditure on fixed assets over total assets. *Leverage* the ratio of the book value of debt to total assets. *Board tenure* is the average tenure length of the directors. *Board size* is the natural logarithm of total number of directors on the board. *Board independence*, *Gender diversity*, *Ethnic diversity* are the proportions of non-executive, female, and foreign directors on the board, respectively. *Board experience diversity* is the standard deviation of the number of directorships in any firm held by the directors of the listed firm. *Board age diversity* is the standard deviation of directors' ages. *CEO duality* is a binary variable that equals one if the CEO also chairs the board, and zero otherwise. *ROA* is the ratio of net income to total assets. *Firm size* is the natural logarithm of the book value of total assets. *Sales growth* is the natural logarithm of the current year's sales minus the natural logarithm of the previous year's sales. *Cash flow* is the ratio of funds from operations to net sales. *MB* is the market value of total assets divided by the book value of total assets. *Tangibility* is net PPE divided by the value of total assets. *Log(GDP)* is the natural logarithm of GDP per capita. *Stock market value* is the market capitalization of all the listed companies in the country as a proportion of GDP. *Government Stability* is government consumption as a proportion of GDP. Robust standard errors are reported in parentheses. All regressions include industry, country, and year fixed effects. All variable definitions are provided in Appendix A. *, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively.

Appendix A: Variable definition

Variable	Definition	Data Source
Main variables		
Volatility (%)	The standard deviation of daily stock returns in a year	Worldscope data in Thomson Reuters Datastream (hereafter WTRD)
Board tenure diversity	The coefficient of variation of directors' tenure lengths	BoardEx
Board tenure diversity_std	The standard deviation of directors' tenure lengths	BoardEx
Investment	The increase in investment over the value of investment in last year	WTRD
CAPEX	Capital expenditure on fixed assets over total assets	WTRD
Leverage	The ratio of the book value of debt to total assets	WTRD
Post	A dummy variable that equals one when the year is after the board reform occurred in a country, and zero otherwise, which captures the exogenous shock of corporate board reforms	Fauver et al. (2017)
Individualism dummy	A dummy variable that equals one if people in a country tend to be less likely to give up their ideas to benefit group coherence (a country's Individualism/Collectivism score is above the median score from Hofstede's framework), and zero otherwise	Hofstede et al. (2010)
Power distance dummy	A dummy variable that equals one if the country has a higher tolerance for power inequality (a country's power distance score is above the median score from Hofstede's framework), and zero otherwise	Hofstede et al. (2010)
Board-level controls		
Board tenure	The average tenure length of the directors	BoardEx
Board size	The natural logarithm of total number of directors on the board	BoardEx
Board independence	The proportion of non-executive directors on the board	BoardEx
Gender diversity	The proportion of female directors on the board	BoardEx
Ethnic diversity	The proportion of foreign directors on the board	BoardEx
Board experience diversity	The standard deviation of the number of directorships in any firm held by the directors of the listed firm	BoardEx
Board age diversity	The standard deviation of directors' ages	BoardEx
CEO duality	A binary variable that equals one if the CEO also chairs the board, and zero otherwise	BoardEx
Firm-level controls		
ROA	The ratio of net income to total assets	WTRD
Firm size	The natural logarithm of the book value of total assets	WTRD
Tangibility	Net Property, Plant and Equipment (PPE) divided by the value of total assets	WTRD
Sales growth	The natural logarithm of current year's sales minus the natural logarithm of previous year's sales	WTRD
Cash flow	The ratio of funds from operations to net sales	WTRD
MB	The market value of total assets divided by the book value of total assets	WTRD
Country-level controls		
Stock market value	The market capitalization of all the listed companies in the country as a proportion of GDP	World Development Index (hereafter WDI)
Log(GDP)	The natural logarithm of GDP per capita	WDI
Government stability	Government consumption as a proportion of GDP	WDI

Appendix B: Board tenure diversity and firm idiosyncratic risk

Panel A Descriptive statistics						
	N	Mean	Std	P25	Median	P75
Idiosyncratic risk	82,876	38.226	22.129	23.497	32.450	46.556

Panel B Board tenure diversity and firm idiosyncratic risk	
	DV = firm idiosyncratic risk
	(1)
Board tenure diversity	-0.772***
	(0.029)
Board tenure	-0.592***
	(0.025)
Board size	-4.767***
	(0.246)
Board independence	-2.207***
	(0.444)
Gender diversity	-5.537***
	(0.607)
Ethnic diversity	3.236***
	(0.301)
Board experience diversity	0.278***
	(0.105)
Board age diversity	0.261***
	(0.025)
CEO duality	0.610**
	(0.158)
ROA	-42.811***
	(0.832)
Firm size	-3.569***
	(0.052)
Sales growth	0.019***
	(0.002)
Cash flow	-0.022***
	(0.003)
MB	-0.400***
	(0.026)
Tangibility	0.106*
	(0.344)
Leverage	13.413***
	(0.408)
Log(GDP)	-9.523***
	(1.462)
Stock market value	-1.275***
	(0.295)
Government stability	0.639***
	(0.086)
Country fixed effects	Yes
Year fixed effects	Yes
Industry fixed effects	Yes
Obs.	82,875
R^2	0.401

This table provides the OLS regression results for the relationship between board tenure diversity and firm idiosyncratic risk. The dependent variable is firm *idiosyncratic risk*, which is defined as annualized standard deviation of the residuals from the regression of the firm's weekly stock returns in year t on the world market index (lag, lead, and contemporaneous). *Board tenure diversity* is the coefficient of variation of director tenures. Control variables are the same to the ones in the baseline regression, defined in Appendix A. All regressions include industry, country and year fixed effects. All variable definitions are defined in. *, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively.

Appendix C: Board tenure diversity and firm risk with Fama French 49 industry fixed effects and country-by-industry fixed effects

	(1)	(2)
Board tenure diversity	-0.753***	-0.870***
	(0.131)	(0.128)
Board tenure	-0.644***	-0.619***
	(0.009)	(0.009)
Board size	-3.966***	-3.700***
	(0.127)	(0.126)
Board independence	-3.254***	-2.806***
	(0.235)	(0.237)
Gender diversity	-7.594***	-5.364***
	(0.321)	(0.320)
Ethnic diversity	2.784***	2.068***
	(0.160)	(0.159)
Board experience diversity	0.453***	0.315***
	(0.054)	(0.054)
Board age diversity	0.201***	0.206***
	(0.012)	(0.012)
CEO duality	0.444***	0.487***
	(0.087)	(0.086)
ROA	-18.601***	-15.883***
	(0.316)	(0.312)
Firm size	-2.008***	-2.130***
	(0.025)	(0.026)
Sales growth	0.025***	0.021***
	(0.001)	(0.001)
Cash flow	-0.014***	-0.015***
	(0.001)	(0.001)
MB	-0.097***	-0.106***
	(0.012)	(0.012)
Tangibility	-1.945***	-2.808***
	(0.157)	(0.179)
Leverage	2.655***	4.832***
	(0.176)	(0.178)
Log(GDP)	-9.499***	-9.520***
	(0.814)	(0.759)
Stock market value	-0.589***	-0.681***
	(0.138)	(0.125)
Government stability	0.028	0.009
	(0.044)	(0.041)
Country fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Fama French 49 Industry fixed effects	Yes	No
Industry fixed effects	No	Yes
Country-by-industry fixed effects	No	Yes
Obs.	86,696	86,696
R^2	0.478	0.531

This table provides the OLS regression results for the relationship between board tenure diversity and firm risk with Fama French 49 industry fixed effects in column (1) and with country-by-industry fixed effects in column (2). The dependent variable is *firm risk*, which is defined as the daily volatility of stock prices. *Board tenure diversity* is the coefficient of variation of director tenures. Control variables are the same to the ones in the baseline regression, defined in Appendix A. All regressions include country and year fixed effects. All variable definitions are defined in. *, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively.

Appendix D: Firm risk, board tenure diversity and board reforms

	(1) [-3, 3]	(2) [-6, 6]
Board tenure diversity	-0.059	-0.052
	(0.046)	(0.044)
Board tenure diversity × Post	-0.208***	-0.215***
	(0.045)	(0.043)
Post	1.239**	1.451***
	(0.528)	(0.439)
Board tenure	-0.616***	-0.615***
	(0.033)	(0.031)
Board size	-3.731***	-3.501***
	(0.327)	(0.307)
Board independence	-4.189***	-2.721***
	(0.604)	(0.573)
Gender diversity	-9.061***	-8.265***
	(0.937)	(0.871)
Ethnic diversity	3.989***	4.266***
	(0.443)	(0.411)
Board experience diversity	0.603***	0.536***
	(0.126)	(0.118)
Board age diversity	0.268***	0.269***
	(0.030)	(0.029)
CEO duality	0.635***	0.607***
	(0.171)	(0.168)
ROA	-22.829***	-21.748***
	(0.883)	(0.831)
Firm size	-2.358***	-2.329***
	(0.067)	(0.062)
Sales growth	0.027***	0.025***
	(0.003)	(0.003)
Cash flow	0.006	0.002
	(0.004)	(0.004)
MB	0.105***	0.103***
	(0.025)	(0.024)
Tangibility	-7.253***	-7.468***
	(0.447)	(0.417)
Leverage	1.425***	1.227***
	(0.471)	(0.436)
Log(GDP)	12.251	8.417
	(8.900)	(7.703)
Stock market value	0.629	0.318
	(1.099)	(0.985)
Government stability	-0.796**	0.303
	(0.384)	(0.280)
Country fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Obs.	15,784	18,030
R^2	0.591	0.576

This table provides the results of how board reforms and the consequent increase in board tenure diversity affect firm risk using propensity scores matching in difference-in-differences models. The dependent variable is *firm risk*, defined as the standard deviation of daily stock returns in a year. *Board tenure diversity* is the coefficient of variation of directors' tenure lengths. *Post* is a dummy variable that equals one when the year is after the board reform occurred in a country, and zero otherwise, which captures the exogenous shock of corporate board reforms. *Board tenure* is the average tenure length of the directors. *Board size* is the natural logarithm of total number of directors on the board. *Board independence*, *Gender diversity*, *Ethnic diversity* are the proportions of non-executive, female, and foreign directors on the board, respectively. *Board experience diversity* is the standard deviation of the number of directorships in any firm held by the directors of the listed firm. *Board age diversity* is the standard deviation of directors' ages. *CEO duality* is a binary variable that equals one if the CEO also chairs the board, and zero otherwise. *ROA* is the ratio of net income to total assets. *Firm size* is the natural logarithm of the book value of total assets. *Sales growth* is the natural logarithm of the current year's sales minus the natural logarithm of the previous year's sales. *Cash flow* is the ratio of funds from operations to net sales. *MB* is the market value of total assets divided by the book value of total assets. *Tangibility* is net PPE divided by the value of total assets. *Leverage* is the ratio of the book value of debt to total assets. *Log(GDP)* is the natural logarithm of GDP per capita. *Stock market value* is the market capitalization of all the listed companies in the country as a proportion of GDP. *Government Stability* is government consumption as a proportion of GDP. Columns (1) and (2) present the results using a [-3, 3] and [-6, 6] window, respectively. All regressions include industry, country, and year fixed effects. Robust standard errors are reported in parentheses. All variable definitions are provided in Appendix A. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.