Board Ancestral Diversity and Firm Performance Volatility

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Abstract

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Keywords: Boards, Diversity, Culture, Genetics

JEL Classifications: Z1, G3, O4

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To be sure, it could be assumed that all were seeking to maximize profits; but suppose they had different expectations of the future? They would then have different preferences over investment projects. I first supposed that they would decide, as the legal framework would imply, by majority voting...It was immediately clear that majority voting did not necessarily lead to an ordering.

[pages 2-3, *Collected Papers of Kenneth J. Arrow*, Volume 1, 1984]

1. Introduction

The effects of diversity are studied in a variety of fields ranging from macroeconomics to social psychology (e.g., Alesina, Michalopoulos, and Papaioannou, 2016; Ashraf and Galor, 2013; Page, 2007). These studies typically conjecture that diversity may have costs and benefits. By widening the spectrum of individuals' abilities, cognitive approaches and preferences, diversity is expected to yield benefits in terms of more rapid knowledge accumulation, but it may also frustrate the decision-making process and decrease trust and interpersonal cooperation (Algan, Hemet, and Laitin, 2016). To date, there is little evidence on how diversity affects actual economic decisions.

This paper attempts to fill this gap using the board of directors as a laboratory. It starts by documenting that differences in directors' ancestries represent an aspect of board diversity of U.S. listed companies, which is not captured by common measures of board diversity. While a large fraction of the directors of U.S. listed companies has British origin, firms differ in the extent to which different ancestries are represented. Ancestry has been shown to affect the culture of immigrants even after several generations (Guiso, Sapienza and Zingales, 2006) not only because culture has a large component of intergenerational transmission, but also because genetic differences between individuals with different ancestries are related to differences in their values and preferences (Desmet, Ortuño-Ortín, Wacziarg, 2017).[1]

Controlling for other commonly used measures of diversity, such as gender diversity and diversity in industry experience, we show that ancestral diversity has costs and benefits, which result in greater stock return and fundamental volatility for firms with more diverse boards. The effects appear to be driven by cultural as well as genetic differences between the directors. Consistent with the idea that diverse groups are better at solving complex problems, we find that firms with diverse boards have more and more cited patents. The success in innovation of firms with ancestrally diverse boards may result from more experimentation as we show that firms with ancestrally diverse boards enact strategies that differ more from those of the industry peers and change them to a larger extent over time.

The downside of diverse preferences and perspectives is that diverse directors may disagree on which the pressing problems of the firm are and on which policies optimize the firm's objectives. To the extent that individual preferences fail to aggregate into collective preferences, as highlighted by Arrow (1951), individuals have incentives to misrepresent their preferences and manipulate the agenda. As a consequence, the voting results of rational individuals may be hard to predict and the decision-making process may be erratic. Also, conflict in the boardroom may arise.

Consistent with these conjectures, we find that director turnover is higher and unrelated to performance in firms with diverse boards. Firms with diverse boards also have more board meetings suggesting difficulties in the decision-making process. There is no evidence that more frequent meetings are associated with more intense monitoring

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[1] See also Algan, and Cahuc (2010), Fernandez (2011), Dohmen, Falk, Huffman, and Sunde (2012), and Alesina, Giuliano, and Nunn (2013).

as board ancestral diversity appears unrelated to the sensitivity of executives and CEOs' turnover to performance. There is instead evidence of bigger and more frequent announcements. Firms with ancestrally diverse boards make more frequent announcements concerning material changes in their financial conditions and operations. In addition, these firms have larger earnings announcement abnormal returns and analysts make larger forecast errors in predicting their performance.

Evoking Kenneth Arrows' intuition quoted at the beginning of the introduction, this evidence suggests that the diverse preferences of different board members prevail in different board meetings leading to hard to predict decisions and switches in strategies. The latter favor experimentation and innovation, but also increase firms' performance volatility.

It is typically hard to go beyond the association between board composition and firm strategies and performance because the characteristics of board members are chosen optimally. However, while directors' skills, such as industry experience, are likely to be optimally selected depending on a firm's challenges and investment opportunities, the ancestral composition of the board tends to reflect the ancestral composition of the location where the firms' headquarters are located. This is because independent directors are largely selected locally and the headquarters' locations are chosen early on in firms' lifecycles (Knyazeva, Knyazeva, and Masulis (2013); Alam, Chen, Ciccotello, and Ryan (2014)). Thus, concentrating on ancestral diversity allows us to focus on a dimension of board composition that is less likely to be the primary driver of the decision to hire a director, but rather depends on the local supply of potential directors.

We also exploit ancestral diversity in the counties where firms are headquartered as an instrument for board ancestral diversity. Our results are robust when we exploit the arguably exogenous component of board diversity reflecting the geographical composition of the counties where firms are headquartered. This finding supports a causal interpretation of our findings under the identifying assumption that county characteristics are not associated with firm performance volatility after the inclusion of a host of firm level controls. This identifying assumption appears to be supported by other tests, in which we exploit orthogonal sources of variation in the data, and show that our results are robust to the inclusion of firm fixed effects (which fully control for the location of firms' headquarters). Thus, there is no evidence that our results may be driven by firms with ancestrally diverse boards being different along some unobserved time-invariant dimension, such as the county in which they are headquartered.

To mitigate any lingering doubts about the interpretation of our findings, we consider firm performance following the announcements of mergers and acquisitions. Mergers and acquisitions are major corporate decisions, made by the board, which have a considerable impact on firm performance. Thus, an association between board ancestral diversity and the outcome of (subsequent) merger and acquisitions cannot be driven by reverse causality. Higher variability in the announcement returns of mergers and acquisitions would be consistent with our interpretation that ancestrally diverse boards are more likely to make both extremely good and extremely bad decisions. It is thus comforting that we find that acquisition announcement returns of firms with ancestrally diverse board are more volatile.

We also explore to what extent firms with diverse boards take more risk. Firms with ancestrally diverse boards do not have higher leverage, do not invest more, and, if anything, hold more cash than other firms. They are also as inclined as other firms to make diversifying acquisitions, which are commonly considered to aim to decrease firm risk (Gormley and Matsa, 2016). Thus, according to conventional proxies for risk taking, firms with ancestrally diverse boards do not take more risk. However, our results on patents and R&D indicate that firms with ancestrally diverse boards pursue and generate more ideas and experiment more by switching strategies. Also, the mergers they pursue have more variable performance. This behavior increases the performance volatility of firms with ancestrally diverse boards and makes harder to predict their future valuations.

Our paper is related to a body of research that explores how ancestral diversity affects cooperation and economic performance (Alesina and La Ferrara, 2005; Spolaore and Wacziarg, 2013). A number of influential papers show that genetic diversity, which depends on population ancestral origins, has a hump-shaped effect on macroeconomic performance (Ashraf and Galor, 2013; Ashraf, Galor and Klemp, 2015), a finding that we show to hold also at the firm level. Genetic differences across countries hampering communication also prevent the diffusion of economic development (Spolaore and Wacziarg, 2009). Genes are also known to affect financial decisions (Cesarini et al, 2010; Cronqvist and Siegel, 2015).

By studying how boards with different ancestral diversity run companies, this paper aims to provide microeconomic evidence on how diversity related to individuals' ancestral origins affects high-stake economic decisions. Since the identity of directors and the performance of listed companies are easily observed, boards provide an ideal laboratory to understand how ancestral diversity affects economic outcomes.

Our paper also contributes to the literature on boards of directors. A growing literature explores the effects of directors' skills and board structure on performance (e.g., Guner, Malmendier, and Tate, 2008; Ahern and Dittmar, 2012; Field, Lowry, and Mkrtchyan, 2013; Kim, Mauldin, and Patro, 2014). The quality of a board's decision-making is likely to depend not only on the characteristics of the directors but also on the interaction between the directors, an aspect that has been largely neglected in previous literature and that we investigate in this paper.[2] We highlight that diversity in culture and values has an effect on the decision-making process, which goes beyond the effect of the distance on foreign directors' ability to monitor (Masulis, Wang and Xie, 2012).

A number of papers explores the effects of diversity on firm performance using composite indexes of directors' skills, including industry experience, tenure, and age (Anderson, Reeb and Zhao, 2011; Bernile, Bhagwat, and Yonker, 2016; Gompers, Mukharlyamovc, Xuan, 2016). These papers show mixed results on the effects of diversity on firm performance and risk taking.[3] We focus on diversity in ancestral origins and explore its effects on the working of the board, while controlling for other aspects of board diversity. Ancestral diversity appears to increase firm performance volatility and makes performance less predictable, while other sources of diversity such as gender diversity appear to be associated with an increase in transparency and make stock prices more informative (Gul, Srinidhi, and Ng 2011). Our results highlight the necessity to distinguish between different types of diversity instead of relying on composite indexes.

[2] A notable exception is Schwartz-Ziv and Weisbach (2013) who analyze the minutes of boards of eleven Israeli companies.

[3] In contemporaneous work, Bernile, Bhagwat, and Yonker (2016) show that a composite index of board diversity has a negative effect on volatility. Our controls and especially the proxy for diversity in industry experience also tend to have a negative effect on performance volatility albeit not always significant.

Our work is also related to a strand of research exploring the effect of executives and directors' ancestries, established using surnames as we do. For instance, Ellahie, Tahoun, Tuna (2017) study how the ancestry of the CEO is related to the structure of pay. Pan, Siegel, and Wang (2014 and 2017) and Liu (2016), explore how cultural traits associated with different ancestries, such as risk tolerance, affect corporate policies. Instead of exploring specific cultural traits, we consider ancestral diversity.

Finally, our paper helps to understand the determinants of stock idiosyncratic volatility. Idiosyncratic stock-return volatility is a large component of stock total volatility (Campbell, Lettau, and Xu, 2001), which may be affected by corporate policies and characteristics. Existing studies have stressed the role of competition and uncertainty about managerial characteristics (Irvine and Pontiff, 2006; Pan, Wang and Weisbach, 2015; Stern, 2015). We highlight the role of board decision-making.

2. Data and main Variables

2.1 Sample Construction

Our board data are from Risk Metrics, which provides annual corporate governance information on S&P1,500 companies. From Risk Metrics, we extract data on directors' names, age, tenure, outside directorships, board size, board independence, whether the CEO is also the chairman of the board, whether the director is an insider, and gender from 1996 to 2014. As is common practice, we exclude firms in the financial industry (SIC codes in the 6000s). Our final dataset covers an unbalanced panel of 2,947 firms for a total of 23,970 firm-year observations. At the director level, we have information on 31,956 unique directors for a total number of 234,616 director-year observations.

We complement Risk Metrics with information on stock prices and returns from CRSP and financial statements from COMPUSTAT. In some tests, we merge our main dataset with information on analyst forecasts as well as earnings announcement dates from IBES, executive turnover from EXECUCOMP, and firms' patents from Kogan, Papanikolau, Seru and Stoffman (2015). Our merger data are from Thomson Reuters's SDC database. We also extract 8-K filings data from the SEC Analytics Suites. For part of the sample period (2001-2014), we obtain the number of board meetings from MSCI GMI Ratings (formerly, Board Analytics).

2.2 Measuring Board Ancestral Diversity

Ancestry is often established using last names, a practice, consolidated among demographers, geographers, geneticists and epidemiologists (Mateos, 2014), but also used by economists (e.g., Kerr, 2008; Liu, 2016; Pan, Siegel and Wang, 2017).[4]

We follow this practice and associate with each last name a country of origin using information from *Ancestry.com*. *Ancestry.com* provides information on the country of origin of passengers of ships arriving from foreign ports at the port of New York between 1820 and 1957. Since in a few instances the same last name may originate from several countries, in those cases, we associate each last name with equal probability to the

[4] Research in demography, health, and genetics makes increasing use of names to classify populations and establish their hereditary characters and group identities. The U.S. government has been a key player in the use of this approach to population classification. It commissioned such an analysis in the first decade of the twentieth century to inform migration policies and later on to ascribe ethnicity in the resident populations. The Census Bureau has been involved in the development and validation of these techniques over several decades, lending official support to the use of this method.

three most frequent country of origin of the ship passengers, similarly to Pan, Siegel and Wang (2014).

While using last names for classifying individual ancestral origins involves noise, the approach we take has proved useful to study hereditary characters in a number of disciplines. Moreover, we do not see any reasons why misclassifications should exhibit a systematic correlation with firm performance volatility and other corporate outcomes. Any noise should increase the standard errors of our estimates, thus biasing the estimates against finding any result.

Table 1 describes the ten most frequent ancestral origins of the 31,956 directors in our sample. A majority of directors has British origin, followed by individuals of German ancestry, and other predominantly Western European countries. We cannot identify the ancestral origin for 2.5% of the directors, which we exclude from the sample. In addition, for 17.55% of the sample, we obtain U.S. as the nationality of the passengers. This figure is similar to the one reported by Pan, Siegel and Wang (2016, Table 1) and refers to individuals with relatively rare last names (which we are unable to associate to other ancestries) and that do not enter the U.S. for the first time.[5]

We follow existing literature (Alesina and La Ferrara, 2005) and define *Fractionalization*, a measure of board diversity capturing the probability that two randomly selected directors have different countries of origin, using a Herfindahl-based index as follows:

$$Fractionalization_{f,t} = 1 - \sum_{1}^{n} s_{i,f,t}^{2},$$

[5] Using a different source to establish the origin of last names, Ellahie, Tahoun, Tuna (2017) find that 47% of the CEOs in their sample have U.S. ancestry.

where $s_{i,f,t}$ is the share of board members of ancestry i among all board members of firm f at time t.

In our empirical tests, we also compute the fractionalization index using an alternative source to classify ancestries, the *Oxford Dictionary of American Family Names*, and show that our results are robust.

Besides fractionalization, we consider other measures of diversity, which as we show below help to explain the mechanisms through which the fractionalization of directors' ancestries matters. A higher fractionalization of the directors' ancestries may be associated with higher genetic diversity. As Spolaore and Wacziarg (2009 and 2013) argue, genetic diversity is an excellent *summary statistic* capturing divergence in the whole set of implicit beliefs, customs, habits, biases, conventions, etc. that are transmitted across generations—biologically and/or culturally—with high persistence.

Widening the spectrum of individuals' skills, abilities and cognitive approaches, genetic diversity may stimulate productivity. However, genetic diversity may also reflect low level of trust and interpersonal cooperation (Spolaore and Wacziarg, 2009). For this reason, existing studies find a hump-shaped effect of genetic diversity on macroeconomic performance and country level productivity (Ashraf, Galor and Klemp, 2013 and 2015).

Following existing literature, we recognize that genetic diversity has two components. First, individuals within each ancestral group have different degrees of ancestral diversity. Population geneticists typically measure the extent of diversity in genetic material across individuals within a given population (such as within a country) using an index called "expected heterozygosity." Like most other measures of diversity, this index may be interpreted as the probability that two individuals, selected at random from the relevant population, differ genetically from one another with respect to a given spectrum of traits.

Second, there are genetic differences between individuals of different ancestries, which are typically captured using a measure of genetic distance (Spolaore and Wacziarg, 2009). For any subpopulation pair, the genetic distance between the two subpopulations captures the proportion of their combined genetic diversity that is unexplained by the weighted average of their respective (within-origin) genetic diversities (see Ashraf and Galor, 2013). Put differently, the overall diversity of a group of individuals from different ancestries is increasing in the weighted average of the genetic diversity within their different ancestries and in the genetic distance between their ancestries.

We obtain a firm level measure of genetic distance between the members of the board with different ancestries (*Genetic Distance*) by averaging the genetic distances between the ancestries of each pair of board members.

Given the definition of *Genetic Distance,* we control for the weighted average of the individuals' (within-origin) genetic diversities. We measure (within-origin) genetic diversity using the country level measure of (within-country) genetic differences constructed by Ashraf and Galor (2013). We average this measure of genetic differences across all board members' ancestries to obtain an average of the genetic diversity of the board members; we refer to these average within-ancestry genetic differences as *Genetic Diversity*.

Fractionalization may increase in within-group genetic diversity because diverse boards tend to have more individuals with ancestral origins that are associated with higher genetic differences. Since populations that are originally from areas closer to

Africa are more genetically diverse, it is typically the case that directors with non-British ancestries originate from populations with high heterozygosity. Desmet, Ortuño-Ortín, and Wacziarg (2017) provide evidence that both between- and within-ancestry genetic differences, that is, *Genetic Diversity* and *Genetic Distance*, are related to differences in culture and trust.

Since cultural differences between individuals with different ancestries are not necessarily fully captured by genetic differences, we also consider two alternative proxies for cultural differences. The first cultural differences measure exploits the World Value Survey, the largest investigation of attitudes, values and beliefs around the world (Inglehart and Baker 2000). The World Value Survey consists of a detailed questionnaire on concrete aspects of life (about 250 questions) and covers about 80 countries.

We base our measure of cultural distance on a commonly used procedure aiming to exploit in the most efficient way the full set of answers gathered in the survey. Inglehart (1997) and Inglehart and Baker (2000) show that answers to survey questions tend to cluster together in coherent patterns. Consequently, they use factor analysis to summarize the salient features of different cultures along two dimensions (values): (1) the extent to which a society emphasizes traditional as opposed to secular values; (2) the extent to which a society emphasizes values related to survival as opposed to self-expression. To measure cultural differences in heritage within the board, we use the Euclidean distance in these two dimensions between the countries of origin of any two pairs of directors of a company.

We also show that our results are robust when we measure cultural differences based on Hofstede's (2001) survey, another common source to measure differences in values and norms across the world. Answers to Hofstede's survey are typically summarized using three dimensions (power distance, uncertainty avoidance, and individualism versus collectivism).[6] For each pair of directors in a board, we compute cultural differences between their countries of origin using the Euclidean distance between these three dimensions.

Panel A of Table 2 summarizes the measures of board diversity. There appears to be large dispersion in the measures of diversity across the sample firms. This reflects that in some firms the majority of the directors has British origin, while in others there are a number of directors with different ancestries.

2.3 Measuring firm volatility and other firm characteristics

We use several proxies to capture firm performance volatility, which are summarized in Panel B of Table 2. First, the total stock return volatility, defined as the standard deviation of monthly stock returns over 12 months, starting from the most recent fiscal year end.

Since stock return volatility may reflect changes in both firms' expected cash flows and investors' discount rates, to focus on the volatility of cash flows, we define an alternative measure of fundamental volatility, which relies on earnings per share. Similarly to Irvine and Pontiff (2009), we measure the standard deviation of quarterly earnings shocks during months t to $t+12$. We assume that earnings follow a random walk, and measure an earnings shock as the difference between earnings per share in month t and month $t-12$. Measuring the shock over a one-year period controls for seasonality. If a firm reports its earnings on a quarterly basis, then the 12-months earnings volatility is the

[6] The Appendix provides a brief description of these three dimensions.

standard deviation of four earnings shocks. We use the natural logarithm of this volatility measure as dependent variable in the empirical analysis.

Finally, to capture that volatility resulting from the effect of diversity on decision-making is more likely to arise from firm idiosyncratic factors, rather than from exposure to systematic risk factors, we define a measure of idiosyncratic volatility. The 12-month idiosyncratic volatility is computed as the residual of a four-factor model including the three Fama and French (1993) factors and the momentum factor (Carhart, 1997) and estimated on monthly returns.

We also evaluate the volatility of the outcome of a major board decision, mergers and acquisitions (M&A). We extract all M&As made by U.S. public companies during the 1996–2014 period from the Securities Data Corporation's (SDC) U.S. Mergers and Acquisitions database. As is common in the literature, we require that (i) the acquisition is completed, (ii) the deal value disclosed in SDC is more than $1 million and is at least 1% of the acquirer's market value of total assets, measured at the fiscal year-end immediately before the acquisition announcement, (iii) the acquirer controls less than 50% of the target shares prior to the announcement and owns more than 50% of target shares after the transaction. For each acquisition, we compute the announcement returns for the acquirer as the market adjusted abnormal return on the announcement date. Our results are robust if we use the cumulative abnormal returns over a window of one or two days before the merger announcement date to one or two days after the announcement date. The abnormal return is calculated by subtracting from the raw return the value weighted return of the market portfolio from CRSP. We measure the volatility of the acquisition performance by using the absolute value of the announcement returnsand label this variable *Merger Return Volatility*.

2.4 Other Firms Characteristics

Throughout the analysis, we control for a variety of firm characteristics including other measures of board diversity, unrelated to ancestral diversity, which have been used in the literature, as summarized in Panel A of Table 2. The other measures of board diversity include the percentage of female directors in a board, director age heterogeneity, proxied by the coefficient of variation of the directors' ages, and a similarly defined measure of directors' tenure heterogeneity. In addition, we proxy for the directors' diverse industry experience using the Herfindahl index of the number of directorships that a firm's directors hold in other two-digit SIC code industries.

Panel C of Table 2 provides summary statistics for board characteristics and Panel D lists the remaining firm level controls. All the variables' definitions of are provided in the Appendix.

3. Determinants of Board Diversity

To what extent is ancestral diversity a salient characteristic of board diversity? Do cross-sectional differences in other features of the boards, such as diversity in industry experience, already capture the effects of board ancestral diversity? To answer these questions, we perform factor analysis for the different proxies for board diversity in our dataset. We find that three eigenvalues are larger than one, with the first largely dominating the other two, indicating that three factors capture the main dimensions of variation in board diversity. Panel A of Table 3 shows the factor loadings on the different diversity proxies associated with the three factors corresponding to the eigenvalues larger than one.

The first two factors (principal components) mostly load on the proxies for ancestral diversity as well as on the diversity of industry experience, while the third factor loads on diversity due to age and tenure. Overall, ancestral diversity does not seem to be subsumed by other measures of board diversity and, among the measure of diversity we use, it accounts for a large part of the variation in board diversity across U.S. listed companies. Thus, ancestral diversity may affect firm performance differently from other aspects of board diversity.

Panel B of Table 3 shows that average genetic differences, genetic distance and cultural differences between board members jointly contribute to explain ancestral fractionalization, our main firm-level measure of ancestral diversity in the board.

Panel C of Table 3 relates *Fractionalization* to predetermined firm characteristics and ancestral diversity in the county where a firm is headquartered. We proxy for county ancestral diversity using the 2000 U.S. Census Integrated Public Use Microdata Series (IPUMS) database at the University of Minnesota (Ruggles et al., 2010). The census provides information on the respondents' self-reported ancestry. Over 74% of the respondents trace their roots to a particular foreign country. Importantly for our purposes, IPUM reports each respondent Public Use Microdata Area (PUMA), which generally follows the boundaries of a county. Using these data, we can construct the fractionalization of the ancestries of the individuals in a county (*County diversity*), as we do for the board level fractionalization.

We double-cluster standard errors at the time and county levels because county ancestral diversity does not vary across firms with headquarters in a county. We also cluster at the time-level because in what follows we use the specifications in Panel C of Table 3 as a first stage in the instrumental variable estimation of effect of *Fractionalization* on firm performance volatility; firm performance volatility in turn may be correlated across firms at the same time.

Board ancestral diversity appears to be positively correlated to the extent of ancestral diversity in the county where a firm is headquartered. A one-standard-deviation increase in the county's ancestral diversity increases *Fractionalization* by over 5% of the standard deviation. This finding is consistent with previous literature indicating that directors, and independent directors in particular, are mostly selected locally and suggests a possible instrument for board diversity, capturing arguably exogenous variation in the supply of directors with different ancestries (Knyazeva, Knyazeva, and Masulis (2013); Alam, Chen, Ciccotello, and Ryan (2014); Giannetti, Liao, and Yu (2015)). In what follows, we provide evidence in support of the instrument's exclusion restriction.

A firm's Tobin Q also appears to be associated with board ancestral diversity. This is consistent with the notion that diversity benefits firms, which having strong growth opportunities are engaged in non-routine activities. Interestingly, in column 2, diversity in industry experience appears to be negatively related to board ancestral diversity. For this reason, we include controls for Tobin Q, other proxies for board diversity, and firm characteristics throughout the analysis.

Fractionalization appears to be largely unrelated to other firm characteristics, such as firm size, captured by the logarithm of the book value of assets, or the firm's leverage, mitigating concerns about selection problems.

4. Board Diversity and Firm Performance Volatility

In this section, we explore whether board ancestral diversity may increase firm performance volatility. Table 4 relates alternative proxies for firm performance volatility to *Fractionalization*. Throughout the analysis, we control for a host of board and firm characteristics. The controls include proxies for board diversity other than ancestral diversity, such as diversity in industry experience, age, and tenure, and percentage of female directors; controls for other board characteristics, such as average director tenure, average director age, board size, percentage of independent directors, average number of the directors' outside directorships, a dummy for whether the CEO is the only insider who is a member of the board, and a dummy capturing whether the CEO is also the chairman of the board; and controls for firm characteristics, such as Tobin Q, R&D to sales ratio, the number of firm segments, which is a measure of firm diversification and complexity, leverage, investment, and age. In addition, all specifications include year and either industry or firm fixed effects. We double-cluster standard errors at the firm and time level to account to account for the fact that, besides being correlated for the same firm, volatility tend to increase for all firms at the same time when there are economic shocks.[7]

[7] When the dependent variable is different from firm volatility we cluster at the firm level, as concerns of shocks affecting all firms at the same time can be addressed with the inclusion of time effects. We also note that none of our results depend on the specific assumption on clustering.

In Table 4, board diversity appears to be associated with higher firm performance volatility. Estimates in column 1 of Panel A suggest a small, but not economically irrelevant effect: A one-standard-deviation increase in the measure of diversity leads to over 2% of a standard deviation increase in total return volatility. This effect is present not only when we consider the total return volatility, but also if we concentrate on fundamental volatility (column 2) and we abstract from possible differences in exposure to systematic risk factors by considering a firm's idiosyncratic volatility (column 3).

Importantly, the effect of *Fractionalization* differs from the ones of other proxies for board diversity, such as diversity in industry experience, which have been used in previous literature, and have been found to have a negative effect on the volatility of stock returns (Bernile, Bhagwat and Yonker, 2016).

The effects of fractionalization on the different proxies for firm performance volatility are similar, qualitatively and quantitatively, when we include firm fixed effects in columns 4 to 6 indicating that differences in time-invariant firm characteristics do not drive our findings. In particular, our results cannot be driven by the fact that a firm's location is related to the firm's volatility as including firm fixed effects absorb location and any other time-invariant factors.

Therefore, to further mitigate any concerns about omitted factors driving the relation between volatility and fractionalization, we exploit cross-sectional differences in population fractionalization across counties. Since the fixed effects results demonstrate that time-invariant county-specific factors do not drive our findings, an instrument based on county diversity is expected to satisfy the exclusion restriction. We thus instrument the fractionalization variable with the county's ancestral diversity. The Kleibergen-Paap

Wald rk F statistics, reported in Panel B of Table 4, mitigates concerns that our instrument is weak. Our instrument satisfies the exclusion restriction as long as a firm's location is not associated with the firm's volatility, an identifying assumption, which is supported by the robustness of our results to the inclusion of firm fixed effects.

Thus, we can test whether board diversity continues to be associated with higher firm performance volatility once we use ancestral diversity in the county in which a firm is headquartered as instrument. In this way, we abstract from firm-specific factors that may lead firms to choose more or less diverse boards. In these tests, since county ancestral diversity does not vary between firms headquartered in the same county, we double-cluster standard at the county and time level.

Panel B shows that not only the direction of our estimates is invariant when we rely on two-stage least squares, but the magnitude of the estimates increases significantly. A one-standard-deviation increase in board diversity explains over 40% of the standard deviation of the total return volatility of a firm. The analogous effects for the firm's fundamental volatility and the firm's idiosyncratic volatility are 51% and 47%.

We recognize that the large increase in estimates may depend on a local average treatment effect. For instance, in counties with high ancestral diversity the effects of board ancestral diversity may be magnified by a more diverse workforce and executive team.[8] The large increase in the magnitude of the estimates may also depend on the fact that the instrumental variable estimates allow us to concentrate on the supply of directors. In counties where firms' choices are constrained by the supply of available directors, even the firms for which the costs of having a diverse board are highest may end up

[8] In Table 6, we show that our results are robust when we control for ancestral diversity of the executive team. Also, the fixed effects estimates demonstrate that our results do not merely derive from cross-sectional differences between firms arising from the counties in which they are headquartered.

having directors with different ancestries. Furthermore, firms with headquarters in highly diverse geographical areas are subject to pressure to increase diversity in their board. They may thus increase board diversity even if this increases their performance volatility to a larger extent than for other firms.

Overall, it is comforting that our measure of board diversity is associated with higher firm performance volatility when we exploit orthogonal sources of variation in the data (that is, within-firm variation in the firm fixed effects estimates and cross-county variation in the instrumental variable estimates) thus suggesting that our findings are unlikely to be driven by endogeneity problems.

Table 5 explores the robustness of our main result to alternative proxies for board ancestral diversity, which can help to shed light on why ancestral diversity matters. For brevity, we report the estimates only for the total return volatility proxy. In column 1, we compute a measure of *Executive Fractionalization* as we do for our main proxy of board ancestral diversity, *Fractionalization*, and include it as a control. The results appear to be driven by the *Fractionalization* of the board, as the estimates are qualitatively and quantitatively invariant when we control the ancestral diversity of the executive team.

In column 2, we test whether our results are robust when we use a different source, the *Oxford Dictionary of American Family Names*, to classify directors' ancestries. The estimates are broadly consistent with the ones reported in Table 4.

In columns 3, we consider the effect of *Genetic Diversity* and *Genetic Distance*, which we have shown to be positively correlated with a firm's *Fractionalization* in Table 3. Both *Genetic Diversity* and *Genetic Distance* increase total return volatility although the effect is statistically significant at conventional levels only for the measure of *Genetic*

Distance. A one-standard-deviation change in *Genetic Distance* explains almost 3% of the standard deviation of the dependent variable.

Differences in genes have been found to be associated with more cultural fractionalization and are thought to result in intergenerationally transmitted traits that hinder interaction and communication (Desmet, Ortuño-Ortín, and Wacziarg, 2017). It is therefore fully consistent with our hypothesis that the lack of (genetic) relatedness of the individuals sitting on the board of a firm is associated with higher performance volatility.

Literature on human evolution points out that a large part of the variance in intergenerationally transmitted traits among humans stems from cultural transmission, rather than genetic differences. For this reason, we also explore whether cultural differences between board members affect firm performance volatility. In columns 4 and 5, it is apparent that cultural differences between board members are associated with higher firm performance volatility. In column 4, a one-standard-deviation change in the *Cultural Differences* proxy constructed using the World Value Survey explains 2% of the standard deviation of the firm's total return volatility. The effect is similar in column 5, where the measure of cultural differences between board members is constructed using Hofstede's (2001) survey.

Table 6 explores the effects of board ancestral diversity on firm performance in a different way. In column 1, we find no evidence that board ancestral diversity is associated with firm profitability. In column 2, we consider whether board ancestral diversity has non-monotonic effects on profitability. The effects of diversity appear to be non-monotonic: in column 2, ancestral diversity seems to have a positive effect on performance for low levels of diversity and then to decrease performance. Overall, it appears that ancestral diversity between corporate decision makers has a hump-shaped effect on performance as population diversity does on countries' macroeconomic performance (Ashraf and Galor, 2013). This result suggests that ancestral diversity has costs and benefits. While in macroeconomic studies it is hard to provide systematic evidence on how diversity benefits and hampers economic performance, in what follows, we can provide detailed microeconomic evidence on the mechanisms through which ancestral diversity affects corporate boards.

5. Why Does Board Ancestral Diversity Affect Firm Performance Volatility?

5.1 Fractionalization and Risk Taking

This section provides evidence on the mechanisms through which board diversity leads to higher volatility of firm performance. We start by considering conventional proxies for corporate risk taking. Table 7 shows that firms with ancestrally diverse boards hold more cash (column 1) and have similar leverage (column 2) to other firms suggesting that they do not take more risk. These firms also have similar capital expenditures (column 3) and propensity to engage in mergers and acquisitions as other firms (column 4). In addition, they are equally prone to engage in diversifying acquisitions as other firms (column 5). Since diversifying acquisitions are often interpreted to aim to decrease firm risk (Gormley and Matsa, 2016), this result also suggests that firms with ancestrally diverse boards do not take more risk than other firms.

Thus, according to some conventional proxies for corporate risk taking, firms with ancestrally diverse boards do not appear to take more risk. We show that nevertheless the decision-making process and the propensity to experiment new strategies leads these firms to have more volatile performance.

5.2 Fractionalization and Frictions in Decision Making

If the decision-making process is indeed more cumbersome in firms with higher board ancestral diversity, we would expect the board of directors to have to meet more often to reach agreement. In column 1 of Table 8, board ancestral diversity is positively associated with the number of board meetings: A one-standard-deviation change in *Fractionalization* explains about 2% of the standard deviation of board meetings notwithstanding we control for a number of firm characteristics aiming to capture complexity in the decisions that directors have to take in different firms.

Difficulties in reaching decisions and the fact that, when individual preferences cannot be easily aggregated, some members may manipulate the outcomes of the decisions should increase disagreement between board members. This in turn may lead to higher board turnover in ancestrally diverse boards. This is precisely what we find in columns 2 and 3 of Table 8, where we estimate a linear probability model to have a more direct interpretation of the interaction terms. A marginal increase in board ancestral diversity increases director turnover by almost 20%. Importantly, this effect is unrelated to the firm's performance, as measured by the interaction between firm's profitability (ROA) and *Fractionalization*, indicating that idiosyncratic factors related to an erratic decision process may matter.

The rest of the table provides direct evidence on the volatility of ancestrally diverse boards' decisions. In column 4, the absolute value of the announcement returns of mergers is larger in firms with diverse boards. There is no evidence that the mean announcement returns are higher indicating that firms with diverse boards announce both good and bad mergers more frequently. This result is fully consistent with our earlier findings on firm performance volatility.

If indeed, as we argue, board diversity is associated with greater performance volatility because difficulties in aggregating the diverse preferences of board members make the decision-making process more erratic, we should observe more changes in corporate strategies as different opinions prevail in different meetings. We consider several indicators of strategy changes. First, when firms experience material changes in financial conditions or operations, they need to file SEC Form 8-K to inform shareholders. These filings capture companies' events such as entry or termination of agreements, acquisitions or disposals of activities and assets, amendments to corporate bylaws and the code of ethics, and indicate material changes in strategy. It is therefore supportive of our hypothesis, and consistent with our previous results, that firms with ancestrally diverse boards experience more often changes in financial conditions and operations and therefore file more frequently the SEC Form 8-K (column 5).

Second, following Finkelstein and Hambrick (1990), we proxy for the (lack of) persistence of a firm's strategy using the sum of the (standardized) variance between t and $t+4$ of each of the following indicators of corporate policies: (1) advertising intensity (advertising/sales), (2) research and development intensity (R&D/sales), (3) plant and equipment newness (net P&E/gross P&E), (4) nonproduction overhead (Selling, general and administrative expenses/sales), (5) inventory levels (inventories/sales), and (6) financial leverage (debt/equity). We standardize the variance of each indicator by subtracting the industry's mean of the indicator and dividing by its standard deviation. To have an indicator of strategy persistence (SP) we multiply this variable by minus one. The estimates in column 6 indicate that firms with diverse boards have less persistent strategies further supporting the idea that these firms have more erratic decision-making processes.

The coordination problems that lead to a more cumbersome and erratic decision process may also favor experimentation and more creative solution to the firms' problems. To start shedding light on this issue, in column 7, we consider how a firm's strategy conforms with the industry's strategy in year *t* using a proxy proposed by Finkelstein and Hambrick (1990). We first standardize each of the indicators of corporate policies, used to define strategy persistence, subtracting the industry mean and dividing by the industry standard deviation, and then take the absolute difference between a firm's value and the average value for all firms in the same two-digit SIC industry. We multiply the absolute differences by minus one to have an indicator of conformity. The results indicate that firms with more ancestrally diverse boards pursue strategies that are more different from the ones of the industry peers. Together with the evidence that they have less persistent strategies, this result suggests that firms with ancestrally diverse boards end up experimenting more. As we show in Subsection 5.3, this benefits their innovation output.

Our maintained hypothesis is that board ancestral diversity makes firms' decisions more erratic and unpredictable and for this reason increases firm performance volatility. Higher fundamental volatility in firms with diverse boards should imply that analysts find it more difficult to forecast firm performance (Dichev and Tang, 2009). This is precisely what we find in Table 9. Mean (median) earnings forecast errors are larger for firms with ancestrally diverse boards. Importantly, in column 3, we find no evidence that the standard deviation of analyst forecast errors is larger when board diversity increases. This indicates that our results on forecast errors are not driven by the fact that analysts disagree on the prospects of firms with diverse boards. It rather appears that analysts make larger forecast errors because these firms make less predictable decisions.[9]

The conjecture that firms with ancestrally diverse boards surprise their shareholders to a larger extent than other firms is also supported by the earnings announcement returns, which are consistently higher in absolute value for firms with higher *Fractionalization* (column 4).

Overall, these findings suggest that due to frequent strategies changes and experimentation, firms with ancestrally diverse boards surprise market participants more frequently and to a larger extent.

5.3 Fractionalization and Innovation

Frequent strategy changes and experimentation may become an advantage in performing complex, creative tasks. In this case, objectives may be imprecisely defined and discovered through experimentation.

Radical innovation is an example of complex task with imprecisely defined objectives. In Table 10, we measure the quantity and quality of innovation of a firm using the number of patents and the average number of yearly citations of the firm's patents, respectively. Not only firms with diverse boards have more patents, but diverse boards

[9] In unreported results, we also find no evidence that analysts exhibit systematic upward or downward biases.

are also associated with more patent citations indicating that more original innovation takes place in companies with ancestrally diverse boards.

Thus, erratic decision-making and experimentation appear to lead to more significant innovations, proxied by highly cited patents. To the extent that innovation has broad applications in society, ancestral diversity may create positive externalities further increasing the positive effects on economic performance.

5.4 Fractionalization and Monitoring

Since ancestrally diverse boards meet more often, one may wonder whether they are better a performing their monitoring function. To explore whether this is the case, we test whether CEO and executive turnovers are more sensitive to performance as fractionalization increases.

In Table 11, we estimate the probability of CEO (columns 1 and 2) and executive (columns 3 and 4) turnovers using linear probability models. We find no evidence that a drop in profitability is associated with a higher probability of turnover in firms with more ancestrally diverse boards. This suggests that these boards do not monitor more.

We also consider whether CEO compensation is sensitive to performance. Higher pay-performance sensitivity is often considered an indication of good corporate governance, but may also indicate that boards provide high-powered incentives instead of monitoring. Firms with ancestrally diverse boards however seem to be similar to other firms also along this dimension. Interestingly, CEO total compensation is higher in firms with ancestrally diverse boards, possibly because these firms having more volatile performance have to compensate the CEO for a riskier compensation profile.

Overall, this evidence suggests that ancestrally diverse boards do not perform differently their monitoring function, but that are special in the way they perform their advisory role.

6. Conclusions

We provide evidence on costs and benefits of board ancestral diversity. We conjecture that diversity may make the decision-making process more erratic not only because it increases communication costs but also because diverse preferences cannot be univocally aggregated. We take firm performance volatility as an indicator of erratic decision-making and provide evidence that board diversity increases firm idiosyncratic and fundamental volatility.

We argue that differences in opinions, values, and perspectives are likely to encourage experimentation in firms with ancestrally diverse boards. This in turn produces the costs and benefits, which we have highlighted in this paper. Firms with ancestrally diverse boards appear to have more board meetings and to experience higher director turnover unrelated to performance indicating frictions in the decision-making process.

When objectives are imprecisely defined and discovered through experimentation, however, erratic decision-making may become an advantage. Having less persistent and conforming strategies, firms with diverse boards experiment more. They thus end up innovating more and having more and more cited patents.

In summary, our evidence suggests that diverse groups have costs and benefits and that the development of decision rules aiming to make the decision process more efficient may improve the performance of diverse boards and diverse groups in general.

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Appendix

Variable	Definition and Data Source
Board Diversity	
Fractionalization	Herfindhal-based index of the ancestral countries of origin of a firm's directors. Countries of origin are based on the directors' last names. The index varies between 1 and 0. A value of the index closer to 1 indicates that directors' ancestries are less diverse. Source: Ancestry.com and Risk Metrics.
Fractionalization - Oxford	Herfindhal-based index of the ancestral countries of origin of a firm's directors. Countries of origin are based on the directors' last names. The index varies between 1 and 0. A value of the index closer to 1 indicates that directors' ancestries are less diverse. Source: Oxford Dictionary and Risk Metrics.
Genetic Diversity	The average of the genetic diversity in the ancestral country of origin of the directors based on Ashraf and Galor (2013). This measure captures the extent of diversity in genetic material across individuals within a given population (such as within a country) and it may be interpreted as the probability that two individuals, selected at random from the relevant population, differ genetically from one another with respect to a given spectrum of traits. Source: Ashraf and Galor (2013), Ancestry.com, and Risk Metrics.
Genetic Distance	A firm level measure of genetic distance between the members of the board obtained by averaging the genetic distances between the ancestral countries of origin of each pair of board members. Countries of origin are based on directors' last names. Source: Spolaore and Wacziarg (2009 and 2013), Ancestry.com, and Risk Metrics.
Cultural Differences - WVS	The Euclidean distance in cultural values between any two pairs of directors of a company. The cultural values are based on the World Value Survey. Source: World Value Survey, Ancestry.com, and Risk Metrics.
Cultural Differences - Hofstede	The Euclidean distance in cultural values between any two pairs of directors of a company. The cultural values are based on Hofstede (2001) Survey. The power distance index measures perceptions of equality in the distribution of power in a society. Uncertain avoidance measures

	a society's tolerance for ambiguity, in which people embrace or avert an event of something unexpected, unknown, or away from the status quo. The individualism measure captures the degree to which a society appreciates the individual versus the group. Source: Hofstede (2001) survey, Ancestry.com, and Risk Metrics.
% of Female Directors	The percentage of female directors on a firm's board. Source: Corporate Library's Board Analyst.
Tenure Dissimilarity	The average distance of tenure of each director in a firm from the mean number of outside directorships of the firm's directors, scaled by the mean number of outside directorships of the firm's directors. Source: Risk Metrics
Age Dissimilarity	The average distance of the age of each director in a firm from the mean age of the firm's directors, scaled by the mean age of the firm's directors. Source: Risk Metrics
Industry Experience Diversity	The diversity in industry experience of a firm's directors, defined as 1-sum(*square of xk*), where *xk* is the fraction of board seats that the firm's directors hold in firms in 2-digit SIC industry *k*, and *k* is different from the industry of the current firm. The variable is scaled by the total number of the board seats held by the firm's directors. Source: Corporate Library's Board Analyst.
County Diversity	Ancestral diversity of the county in which a firm's headquarters are located. It is the Herfindhal index of the dispersion of ancestral origins of the population of the county. Ancestral origins of the population in the county are based on the 2000 U.S. Census data, which provides information on the respondents' self-reported ancestry. Source: 2000 U.S. Census data.
Firm Volatility	
TotRetVol (12 mons)	The standard deviation of a firm's monthly stock returns over 12 months. Source: CRSP.
Log (EPS Vol) (12 mons)	The natural logarithm of the standard deviation of a firm's earnings per share shocks over 4 quarters. Earnings per share shocks are defined as in Irvine and Pontiff (2009). Source: CRSP and COMPUSTAT.
Idiovol (12 mons)	The standard deviation of the residuals of the regression of a firm's monthly returns on the four Fama French factors (including the Cahart's

	momentum factor) over a 12-month interval. Source: CRSP.
Board Characteristics	
Board Size	The number of board members. Source: Risk Metrics.
% Independent Directors	The percentage of independent directors in a firm in a given year. Source: Risk Metrics.
Chairman/CEO	A dummy variable that takes a value of one if the CEO is also the chairman of the board. Source: Risk Metrics.
CEO Only Insider	A dummy variable that takes a value of one if the CEO is the only insider on the board. Source: Risk Metrics.
Busy Director	The natural logarithm of the average number of the directors' outside directorships. Source: Risk Metrics.
Director Age	The average age of the directors. Source: Risk Metrics.
Director Tenure	The average tenure of the directors. Source: Risk Metrics
Director Turnover	A dummy variable equal to one if at least one director departs the board in a given year. Source: Risk Metrics.
Firm Characteristics	
Log(Assets)	The natural logarithm of a firm's book value of assets. Source: COMPUSTAT.
Log(q)	The natural logarithm of a firm's market-to-book ratio, defined as (price*shares outstanding+book value of assets-book value of equity)/book value of assets. Source: COMPUSTAT.
Log (# of Segments)	The natural logarithm of a firm's number of business 3-digit SIC code segments. Source: COMPUSTAT.
Log (FirmAge)	The natural logarithm of a firm's age, defined as the number of years since IPO. Source: Risk Metrics.
R&D/Sales	A firm's research and development expenditures, divided by the firm's sales. Source: COMPUSTAT.
Capex/Assets	A firm's ratio of capital expenditures to total assets. Source: COMPUSTAT.
Leverage	A firm's ratio of long-term debt to total assets. Source: COMPUSTAT.
ROA	A firm's income before extraordinary items, divided by the firm's total assets. Source: COMPUSTAT.

Executive Fractionalization	Herfindhal-based index of the ancestral countries of origin of a firm's top executives. Countries of origin are based on the executives' last names. The index varies between 1 and 0. A value of the index closer to 1 indicates that executives' ancestries are less diverse. Source: Ancestry.com and Execucomp.
Cash/Assets	A firm's cash savings divided by book value of assets. Source: COMPUSTAT.
M&A	A dummy variable equal to one if a firm is engaged in a merger or acquisition in a given year, zero otherwise. Source: Thomson Reuters' SDC.
Diversifying Acquisitions	A dummy variable equal to one if a firm is engaged in a diversifying acquisition in a given year, zero otherwise. A diversifying acquisition is defined as a merger or acquisition in which target and acquirer do not share the same four-digit SIC code. Source: Thomson Reuters' SDC.
Board Meetings	The natural logarithm of the number of board meetings. Source: Corporate Library's Board Analyst.
Merger Return Volatility	The absolute value of the acquiring firm's abnormal stock market reaction on the merger announcement date. The abnormal stock return is the firm's stock return adjusted by the return of the value-weighted total market index from CRSP. Source: SDC and CRSP.
8-K filings	The natural logarithm of the number of 8-K filings. Source: SEC Analytics Suites.
Strategy Persistence (SP)	Persistence of a firm's strategy defined using the sum of the standardized variance between t and $t+4$ of each of the following indicators of corporate policies: (1) advertising intensity (advertising/sales), (2) research and development intensity (R&D/sales), (3) plant and equipment newness (net P&E/gross P&E), (4) nonproduction overhead (Selling, general and administrative expenses/sales), (5) inventory levels (inventories/sales), and (6) financial leverage (debt/equity). The variance of each variable is standardized subtracting the mean and dividing by the standard deviation of the industry. We multiply this variable by minus one to have an indicator of strategy persistence. Source: COMPUSTAT.

Strategy Conformity (SC)	We standardize each of the indicators of corporate policies (listed in the definition of strategy persistence) by subtracting the industry mean and dividing by the industry standard deviation, and then take the absolute difference between a firm's value and the average value for all firms in the same two-digit SIC industry. We multiply the absolute differences by minus one to have an indicator of strategy conformity. Source: COMPUSTAT.
Median EPS Forecast Error (AFE_Median)	Absolute value of the difference between median analyst quarterly earnings per share forecasts and actual earnings per share, scaled by stock price. Source: IBES
Mean EPS Forecast Error (AFE_Mean)	Absolute value of the difference between mean analyst quarterly earnings per share forecasts and actual earnings per share, scaled by stock price. Source: IBES
Stdev EPS Forecast Error (STD(AFE))	Standard deviation of the analyst quarterly earnings per share forecasts. Source: IBES
EarningsCAR11	Absolute value of the firm's cumulative abnormal stock return from one day before the earnings announcement date to one day after the earnings announcement date. The abnormal stock return is the firm's stock return adjusted by the return of the value-weighted total stock market index from CRSP. Source: IBES and CRSP.
Log(1+patapp)	The natural logarithm of 1 plus the number of patent applications during a year. Source: Kogan, Papanikolau, Seru and Stoffman (2015).
Log(1+patcited)	The natural logarithm of 1 plus the number of citations of each patent granted to a firm in a year. Source: Kogan, Papanikolau, Seru and Stoffman (2015).
Director Turnover	A dummy variable equal to one if at least one director of the firm leaves the firm in a given year, zero otherwise. Source: Risk Metrics.
CEO Turnover	A dummy variable equal to one if there is CEO turnover in a given year. We define CEO turnover as an incumbent CEO departs when he/she is less than 65 year old, zero otherwise. Source: Execucomp.
Executive Turnover	A dummy variable equal to one if at least one top executive of the firm who is less than 65 year old leaves the firm in a given year, zero otherwise. Source: Execucomp.

Log of CEO Total Pay (in mil$)	Log of sum of CEO's annual salary, bonus, restricted stock grants, long-term incentive plan payouts, value of option grants, and other compensation. Source: Execucomp.

Table 1: Directors' Ancestral Origins (Top 10 origins)

This table reports the top 10 ancestral origins of the directors in our sample.

Origins	% of Sample Directors
United Kingdom	26.00%
Germany	11.89%
Ireland	7.79%
Italy	4.77%
Israel	2.42%
Spain	1.78%
Sweden	2.34%
France	2.31%
Netherlands	2.02%
Russian Federation	1.78%
United States	17.83%
Unidentified	2.55%
Total	31,956

Table 2: Summary statistics

This table reports summary statistics for different proxies for board diversity (Panel A), firm performance volatility (Panel B), board characteristics (Panel C), and firm characteristics (Panel D). The definitions of each variable are provided in the Appendix.

Panel A: Board Diversity	Mean	Median	SD	P25	P75	N
Fractionalization	0.725	0.739	0.075	0.685	0.779	24,050
Fractionalization-Oxford	0.561	0.583	0.144	0.490	0.664	24,022
Genetic Diversity	0.912	0.770	0.698	0.451	1.175	24,050
Genetic Distance	0.069	0.048	0.070	0.023	0.091	24,050
Cultural Differences	0.754	0.720	0.300	0.532	0.936	24,073
Cultural Differences-Hostfede	0.067	0.065	0.028	0.046	0.085	24,034
% Female Directors	0.096	0.100	0.097	0.000	0.154	21,809
Tenure Dissimilarity	0.737	0.723	0.271	0.565	0.893	19,448
Age Dissimilarity	0.133	0.127	0.048	0.101	0.159	21,806
Industry Experience Diversity	0.398	0.417	0.252	0.204	0.603	24,077
County Diversity	0.983	0.984	0.004	0.983	0.985	30,034

Panel B: Performance Volatility	Mean	Median	SD	P25	P75	N
TotRetVol (12 mons)	0.113	0.095	0.074	0.068	0.136	21,758
Log (EPS Vol) (12 mons)	-9.541	-9.884	3.036	-11.605	-7.774	22,285
Idiovol (12 mons)	0.073	0.061	0.051	0.042	0.090	22,032

Panel C: Board Characteristics	Mean	Median	SD	P25	P75	N
Board Size	9.086	9.000	2.363	7.000	11.000	21,809
% Independent Directors	0.698	0.727	0.174	0.600	0.833	21,809
Chairman/CEO	0.673	1.000	0.469	0.000	1.000	21,809
CEO Only Insider	0.539	1.000	0.498	0.000	1.000	21,809
Busy Director	0.559	0.560	0.300	0.336	0.773	19,462
Director Age	60	60	5	58	63	21,809
Director Tenure	8.677	8.125	3.981	5.923	10.800	19,458
Director Turnover	0.636	1.0	0.481	0	1.0	20,621
Board Meetings	2.154	2.079	0.395	1.946	2.398	24,891

Panel D: Firm Characteristics	Mean	Median	SD	P25	P75	N
Assets	7382.091	1593.897	26813.190	606.286	4959.337	23,585
Log(q)	0.540	0.443	0.490	0.186	0.800	23,529
# of Segments	1.732	1.000	1.136	1.000	2.000	24,077
Firm Age	26.085	20.000	19.937	11.000	36.000	23,578
R&D/Sales	0.058	0.000	0.348	0.000	0.040	23,576
Capex/Assets	0.065	0.044	0.071	0.024	0.079	23,406
Leverage	0.199	0.187	0.172	0.040	0.304	23,495
ROA	0.035	0.049	0.169	0.020	0.086	23,577
Executive Fractionalization	0.646	0.667	0.104	0.593	0.720	22,920
Cash/Assets	0.098	0.059	0.109	0.019	0.140	23,217
M&A	0.195	0	0.396	0	0	24,050
Diversifying Acquisitions	0.083	0	0.276	0	0	24,050
Merger Return Volatility	0.029	0.018	0.032	0.008	0.037	8,441
8-K Filings	1.994	2.303	1.001	1.386	2.708	24,520
SP	0.042	1.087	3.087	-0.456	1.677	11,978
SC	-3.972	-3.510	2.080	-4.746	-2.637	17,040
AFE Median	0.005	0.001	0.011	0.000	0.004	72,582
AFE Mean	0.005	0.001	0.011	0.000	0.004	72,582
STD(AFE)	0.317	0.020	12.171	0.010	0.040	68,579

EarningsCAR11	5.701	3.802	6.279	1.656	7.558	75,811
Log(1+patapp)	0.725	0.000	1.428	0.000	0.693	19,652
Log(1+patcited)	0.970	0.000	1.959	0.000	0.693	19,652
CEO Turnover	0.100	0	0.300	0	0	22,123
Executive turnover	0.589	1	0.492	0	1	18,531
Log of CEO total pay (in mil$)	2.075	2.088	0.141	1.990	2.170	18,190

Table 3: Board Diversity

Panel A. Factor Analysis

We extract the principal components of the proxies for diversity listed in the first column of the table. A total of three eigenvalues are larger than one, with values 2.36, 1.36, and 1.07, respectively. We list below the eigenvectors associated with these eigenvalues.

	First Factor	Second Factor	Third Factor
Fractionalization	0.432	0.394	-0.221
Genetic Diversity	0.513	-0.145	0.236
Genetic Distance	0.492	0.067	0.150
Cultural Differences	0.287	0.567	-0.330
Industry Experience Diversity	0.353	-0.430	-0.026
Tenure Dissimilarity	0.092	0.099	0.716
Age Dissimilarity	-0.129	0.437	0.501
% Female Directors	0.276	-0.334	0.009

Panel B. Fractionalization and Other Measures of Ancestral Diversity

This panel relates our main measure of board diversity to the other diversity measures. Detailed variable definitions are provided in the Appendix. We report t-statistics in parenthesis with standard errors clustered at firm level and corrected for heteroscedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Dependent Variable:	Fractionalization
Genetic Diversity	0.043***
	(17.58)
Genetic Distance	0.069***
	(4.05)
Cultural Differences	0.118***
	(33.09)
Constant	0.598***
	(164.74)
Observations	24,050
R-squared	0.34

Table 3: (Continued)

Panel C. Determinants of Board Ancestral Diversity

This table relates firm characteristics to our main measure of board diversity, fractionalization. Variable definitions are provided in the Appendix. We present ordinary least squares parameter estimates. We include industry and year fixed effects in all regressions whose coefficients are not reported. We report t-statistics in parenthesis. Standard errors are double-clustered at the county and year levels and corrected for heteroscedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Dependent Variable:	Fractionalization	
County Diversity	1.143***	1.118***
	(2.97)	(2.92)
Log(Assets)	-0.000	-0.001
	(-0.30)	(-0.45)
Logq	0.007**	0.007**
	(2.50)	(2.27)
Debt/Assets	-0.001	-0.001
	(-0.10)	(-0.12)
Capex/Assets	-0.027	-0.026
	(-1.67)	(-1.63)
Log(FirmAge)	-0.000	-0.000
	(-0.01)	(-0.03)
Log(#ofSegments)	-0.003	-0.003
	(-1.30)	(-1.33)
Board Size	0.012***	0.013***
	(16.54)	(15.97)
% Independent Directors	0.017*	0.015
	(2.04)	(1.73)
Tenure Dissimilarity	0.004	0.004
	(0.66)	(0.85)
Age Dissimilarity	-0.022	-0.020
	(-0.79)	(-0.72)
Industry Experience Diversity	-0.010	-0.015**
	(-1.52)	(-2.30)
% of Female Directors	0.022	0.022
	(1.45)	(1.48)
Average Age	-0.000	-0.000
	(-0.25)	(-0.25)
Average Tenure	-0.001	-0.001
	(-1.51)	(-1.41)
Chairman/CEO		0.004
		(1.59)
CEO Only Insider		-0.000
		(-0.03)
Busy Director		0.006
		(0.94)
ROA		-0.003
		(-0.50)
R&D/Sales		0.002
		(0.80)
Observations	18,164	18,163
R-squared	0.17	0.17

Table 4: Board Ancestral Diversity and Performance Volatility

This table relates several proxies for firm performance volatility to our main proxy for board ancestral diversity, fractionalization. The dependent variables are respectively the one-year total stock return volatility, the fundamental volatility and the idiosyncratic return volatility as indicated on top of each column. Variable definitions are provided in the Appendix. We present ordinary least squares parameter estimates in Panel A and instrumental variable estimates in Panel B. The instrumental variable for fractionalization is ancestral diversity in the county where the firm is headquartered and the first stage is presented in Panel C of Table 3. All models include fixed effects whose coefficients are not reported as indicated at the bottom of the table. We report t-statistics in parentheses. Standard errors are corrected for heteroscedasticity and double-clustered at the firm and time levels in Panel A and at the county and time levels in Panel B. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Panel A. OLS Estimates

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	TotRetVol	Log(VolEPS)	Idiovol	TotRetVol	Log(VolEPS)	Idiovol
Fractionalization	0.022**	0.806*	0.017**	0.016*	0.830**	0.012**
	(2.38)	(2.06)	(2.77)	(1.70)	(2.02)	(2.52)
Log(Assets)	-0.006***	-0.150***	-0.005***	-0.007***	-0.203*	-0.008***
	(-4.63)	(-2.99)	(-7.40)	(-2.62)	(-1.85)	(-5.19)
ROA	-0.099***	-4.496***	-0.051***	-0.054***	-3.774***	-0.025**
	(-5.91)	(-4.53)	(-3.04)	(-4.60)	(-4.81)	(-2.40)
Logq	-0.008	-2.574***	-0.007**	-0.004	-2.156***	-0.005*
	(-1.61)	(-17.21)	(-2.21)	(-0.97)	(-15.10)	(-1.94)
Debt/Assets	0.027***	1.618***	0.021***	0.037***	1.168***	0.028***
	(3.59)	(7.55)	(4.96)	(4.81)	(4.81)	(5.52)
Capex/Assets	0.089***	1.202	0.050***	0.041**	0.893*	0.017
	(3.66)	(1.42)	(3.30)	(2.03)	(1.76)	(1.40)
R&D/Sale	0.007***	0.141	0.006***	-0.001	-0.058	0.000
	(6.84)	(1.59)	(3.04)	(-0.27)	(-1.01)	(0.01)
Log(FirmAge)	-0.007***	-0.061	-0.004***	-0.028***	-0.139	-0.015***
	(-3.38)	(-0.87)	(-4.70)	(-4.06)	(-1.17)	(-4.03)
Log(#ofSegments)	-0.004***	-0.185**	-0.003***	0.000	0.086	0.001
	(-3.14)	(-2.56)	(-3.53)	(0.26)	(1.27)	(0.86)
Tenure Dissimilarity	0.008*	0.185	0.004**	-0.002	-0.044	-0.001
	(1.84)	(1.67)	(2.18)	(-0.51)	(-0.37)	(-0.35)
Age Dissimilarity	-0.002	1.143	0.012	-0.025*	-0.484	-0.005
	(-0.15)	(1.67)	(1.05)	(-1.68)	(-0.74)	(-0.45)
Industry Experience	-0.013**	-0.308	-0.010***	0.008	0.121	0.002
Diversity	(-2.69)	(-1.43)	(-3.72)	(1.39)	(0.67)	(0.50)
% of Female Directors	-0.020*	0.112	-0.009	0.000	0.588	0.007
	(-2.03)	(0.28)	(-1.50)	(0.04)	(1.44)	(1.16)
Average Age	-0.001***	-0.007	-0.000***	-0.001***	0.005	-0.001***
	(-3.51)	(-0.61)	(-3.15)	(-4.38)	(0.35)	(-3.40)
Average Tenure	-0.001**	-0.068***	-0.001***	0.001**	-0.029**	0.000
	(-2.75)	(-5.83)	(-3.20)	(2.57)	(-2.25)	(1.59)
Board Size	-0.002***	-0.048**	-0.001***	-0.001**	-0.004	-0.000*
	(-4.30)	(-2.83)	(-3.91)	(-2.06)	(-0.23)	(-1.94)
Chairman/CEO	0.001	-0.080	0.001	0.001	0.040	0.001
	(0.80)	(-1.35)	(1.39)	(1.18)	(0.74)	(0.67)
CEO Only Insider	0.001	0.153**	0.001	-0.001	0.075	0.000
	(1.10)	(2.72)	(1.59)	(-0.47)	(1.58)	(0.14)
Busy Director	0.007	0.536***	0.004	-0.008*	0.315**	-0.004
	(1.66)	(3.39)	(1.64)	(-1.80)	(2.34)	(-1.60)
% Independent Directors	-0.011*	-0.359	-0.012***	-0.002	-0.423**	-0.005
	(-1.99)	(-1.61)	(-3.26)	(-0.29)	(-2.32)	(-1.34)
Industry FE	Yes	Yes	Yes	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes	Yes	Yes

Observations	17,674	18,148	17,936	17,674	18,148	17,936
R-squared	0.41	0.41	0.38	0.56	0.63	0.58

Table 4: Board Ancestral Diversity and Performance Volatility (Continued)

Panel B. Instrumental Variable Estimates

	(1)	(2)	(3)
Dependent Variable:	TotRetVol	Log(VolEPS)	Idiovol
Fractionalization	0.411*	20.586**	0.317**
	(2.09)	(2.35)	(2.51)
Log(Assets)	-0.005***	-0.136*	-0.005***
	(-3.34)	(-2.11)	(-5.00)
ROA	-0.099***	-4.491***	-0.051***
	(-6.18)	(-4.67)	(-3.18)
Logq	-0.011*	-2.693***	-0.009**
	(-1.92)	(-14.87)	(-2.46)
Debt/Assets	0.026***	1.594***	0.020***
	(3.08)	(6.19)	(4.31)
Capex/Assets	0.101***	1.658	0.058***
	(3.64)	(1.65)	(3.44)
R&D/Sale	0.006***	0.077	0.005**
	(4.03)	(0.88)	(2.49)
Log(FirmAge)	-0.007**	-0.046	-0.004***
	(-2.66)	(-0.45)	(-3.00)
Log(#ofSegments)	-0.003*	-0.126	-0.002*
	(-1.87)	(-1.28)	(-1.83)
Tenure Dissimilarity	0.007	0.147	0.004
	(1.62)	(0.99)	(1.62)
Age Dissimilarity	0.011	1.830*	0.022
	(0.59)	(1.89)	(1.35)
Industry Experience	-0.005	0.086	-0.005
Diversity	(-0.67)	(0.26)	(-1.05)
% of Female Directors	-0.027*	-0.301	-0.015
	(-1.92)	(-0.56)	(-1.68)
Average Age	-0.001**	0.001	-0.000*
	(-2.82)	(0.05)	(-2.04)
Average Tenure	-0.001	-0.061***	-0.000**
	(-1.67)	(-3.95)	(-2.15)
Board Size	-0.007**	-0.307**	-0.005***
	(-2.66)	(-2.73)	(-3.08)
Chairman/CEO	-0.001	-0.165*	-0.000
	(-0.49)	(-1.98)	(-0.17)
CEO Only Insider	0.001	0.147*	0.001
	(0.76)	(1.94)	(1.04)
Busy Director	0.004	0.382	0.002
	(0.71)	(1.65)	(0.51)
% Independent Directors	-0.019*	-0.696**	-0.017**
	(-2.08)	(-2.32)	(-2.87)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Kleibergen-Paap Wald rk F-Stat	11.69	10.39	11.40
Observations	16,938	17,395	17,191
R-squared	0.14	0.05	0.09

Table 5: Genetic Diversity, Genetic Distance, and Culture Differences

This table relates firm performance volatility to alternative proxies for board ancestral diversity. In column 1, we control for Executive Fractionalization; in column 2, we compute Fractionalization using the Oxford Dictionary of American Family Names. In columns (3) to (5), we consider the following proxies for board ancestral diversity: Genetic Diversity and Genetic Distance, and two proxies for Culture Differences. The dependent variables are respectively the one-year total stock return volatility, the fundamental volatility and the idiosyncratic return volatility as indicated on top of each column. All variables are defined in the Appendix. All regressions include year and industry fixed effects whose coefficients are not reported. We report t-statistics in parentheses. Standard errors are corrected for heteroscedasticity and double-clustered at the firm and time levels. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Dependent Variable:			TotRetVol		
		Oxford Dictionary		Culture-WVS	Culture-Hostfede
Fractionalization	0.023**	0.011**			
	(2.43)	(2.33)			
Executive Fractionalization	0.002				
	(0.38)				
Genetic Diversity			0.007		
			(1.65)		
Genetic Distance			0.032**		
			(2.18)		
Cultural Differences				0.006**	0.074**
				(2.63)	(2.84)
Log(Assets)	-0.006***	-0.007**	-0.006***	-0.006***	-0.006***
	(-4.46)	(-2.38)	(-4.68)	(-4.73)	(-4.73)
ROA	-0.096***	-0.054***	-0.099***	-0.099***	-0.099***
	(-5.44)	(-3.58)	(-5.89)	(-5.90)	(-5.91)
Logq	-0.008	-0.004	-0.008	-0.008	-0.008
	(-1.56)	(-0.95)	(-1.60)	(-1.59)	(-1.60)
Debt/Assets	0.028***	0.037***	0.027***	0.027***	0.027***
	(3.67)	(4.33)	(3.62)	(3.62)	(3.64)
Capex/Assets	0.086***	0.040*	0.088***	0.089***	0.089***
	(3.49)	(1.87)	(3.62)	(3.65)	(3.67)
R&D/Sale	0.008***	-0.001	0.007***	0.007***	0.007***
	(7.24)	(-0.25)	(6.86)	(6.64)	(6.83)
Log(FirmAge)	-0.006***	-0.027***	-0.007***	-0.007***	-0.007***
	(-3.50)	(-3.67)	(-3.35)	(-3.35)	(-3.35)
Log(#ofSegments)	-0.004***	0.000	-0.004***	-0.004***	-0.004***
	(-3.13)	(0.19)	(-3.12)	(-3.14)	(-3.12)
Tenure Dissimilarity	0.005	-0.002	0.008*	0.008*	0.008*
	(1.62)	(-0.40)	(1.90)	(1.81)	(1.87)
Age Dissimilarity	0.013	-0.002	-0.002	-0.003	-0.003
	(1.09)	(-0.12)	(-0.20)	(-0.22)	(-0.27)
Industry Experience Diversity	-0.014**	0.008	-0.013**	-0.013**	-0.013**
	(-2.74)	(1.26)	(-2.71)	(-2.71)	(-2.73)
% of Female Directors	-0.018*	0.002	-0.018*	-0.020*	-0.021**
	(-1.93)	(0.20)	(-1.98)	(-2.05)	(-2.13)
Average Age	-0.001***	-0.001*	-0.001***	-0.001***	-0.001***
	(-3.06)	(-1.84)	(-3.56)	(-3.56)	(-3.60)
Average Tenure	-0.001**	0.000	-0.001***	-0.001**	-0.001**
	(-2.89)	(1.01)	(-2.93)	(-2.82)	(-2.81)
Board Size	-0.002***	-0.001*	-0.004***	-0.002***	-0.002***
	(-4.34)	(-2.00)	(-3.21)	(-3.98)	(-4.00)
Chairman/CEO	0.001	0.001	0.001	0.001	0.001
	(1.01)	(1.09)	(0.77)	(0.81)	(0.78)
CEO Only Insider	0.001	-0.001	0.001	0.001	0.001

	(0.76)	(-0.51)	(1.02)	(1.13)	(1.17)
Busy Director	0.007	-0.008	0.007	0.007	0.007
	(1.60)	(-1.68)	(1.60)	(1.69)	(1.67)
% Independent Directors	-0.010*	-0.003	-0.011*	-0.011*	-0.011*
	(-1.79)	(-0.43)	(-1.87)	(-1.90)	(-1.90)
Observations	17,450	17,341	17,694	17,692	17,683
R-squared	0.42	0.62	0.42	0.41	0.42

Table 6: Board Ancestral Diversity and Firm Performance

This table relates firm performance to our proxy for board diversity, fractionalization. Firm performance is measured as average ROAs between year t+1 and t+3. All variables are defined in the Appendix. We present ordinary least squares estimates. The relevant quintile is indicated on top of each column. All regressions include year and 2-digit SIC code industry fixed effects whose coefficients are not reported. We report t-statistics in parenthesis with standard errors clustered at firm level and corrected for heteroscedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Dependent Variable:	ROA	
Fractionalization	0.014	0.462*
	(0.54)	(1.74)
Fractionalization^2		-0.330*
		(-1.68)
Log(Assets)	0.009***	0.009***
	(2.99)	(3.01)
Sales Growth	0.045***	0.045***
	(3.25)	(3.25)
Debt/Assets	-0.039*	-0.039*
	(-1.82)	(-1.82)
Capex/Assets	-0.009	-0.010
	(-0.34)	(-0.37)
Log(FirmAge)	0.003	0.003
	(0.83)	(0.82)
Log(#ofSegments)	-0.007**	-0.008***
	(-2.54)	(-2.61)
Tenure Dissimilarity	-0.003	-0.003
	(-0.41)	(-0.43)
Age Dissimilarity	-0.019	-0.016
	(-0.45)	(-0.37)
Industry Experience	0.052***	0.052***
Diversity	(4.07)	(4.06)
% of Female Directors	0.044**	0.044**
	(2.31)	(2.32)
Average Age	-0.001	-0.001
	(-0.71)	(-0.73)
Average Tenure	0.002***	0.002***
	(3.55)	(3.56)
Board Size	0.001	0.001
	(0.98)	(1.14)
Chairman/CEO	-0.001	-0.001
	(-0.36)	(-0.35)
CEO Only Insider	-0.004	-0.004
	(-1.10)	(-1.15)
Busy Director	-0.036***	-0.036***
	(-3.39)	(-3.38)
% Independent Directors	0.019	0.019
	(1.21)	(1.20)
Observations	13,869	13,869
R-squared	0.12	0.12

Table 7: Board Ancestral Diversity and Conventional Proxies for Risk Taking

This table relates board ancestral diversity to several corporate policies. We present ordinary least squares estimates. All variables are defined in the Appendix. All regressions include year and 2-digit SIC code industry fixed effects, whose coefficients are not reported. We report t-statistics in parenthesis with standard errors clustered at firm level and corrected for heteroscedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Dependent Variable:	Cash/Assets	Leverage	Capex/Assets	M&A	Diversifying Acquisitions
Fractionalization	0.063***	0.001	-0.003	-0.216	-0.039
	(3.49)	(0.11)	(-0.79)	(-1.02)	(-0.86)
Log(Assets)	-0.009***	0.003***	-0.002***	0.239***	0.043***
	(-6.58)	(3.58)	(-4.98)	(14.36)	(11.20)
ROA	-0.032***	-0.024***	0.004***	0.494***	0.025**
	(-4.72)	(-2.58)	(2.60)	(3.62)	(2.27)
Logq	0.052***	-0.000	0.014***	0.230***	0.050***
	(13.91)	(-0.24)	(12.82)	(6.56)	(6.80)
Debt/Assets	-0.095***	0.838***	-0.007***	-0.229**	-0.072***
	(-9.48)	(98.00)	(-2.75)	(-2.52)	(-4.24)
Capex/Assets	-0.162***	0.054***	0.602***	-0.475*	-0.085**
	(-8.31)	(3.40)	(29.85)	(-1.89)	(-2.03)
R&D/Sale	0.021***	0.005	-0.002	-0.003	-0.003
	(2.76)	(1.59)	(-1.20)	(-0.07)	(-0.89)
Log(FirmAge)	-0.004*	0.001	0.001	-0.076***	-0.010*
	(-1.75)	(1.18)	(1.45)	(-2.76)	(-1.80)
Log(#ofSegments)	-0.011***	0.003**	0.000	0.012	0.030***
	(-3.94)	(2.06)	(0.57)	(0.36)	(4.11)
Tenure	0.011**	-0.006*	-0.000	0.080	0.017
	(2.41)	(-1.73)	(-0.23)	(1.39)	(1.40)
Age Dissimilarity	0.022	0.045**	0.019**	-0.061	-0.112*
	(0.83)	(2.48)	(2.06)	(-0.16)	(-1.71)
Industry Experience	-0.030***	-0.007	0.002	-0.272***	-0.016
Diversity	(-3.15)	(-1.22)	(0.66)	(-2.77)	(-0.80)
% of Female	-0.001	0.002	-0.003	-0.361*	-0.047
	(-0.06)	(0.15)	(-0.76)	(-1.91)	(-1.40)
Average Age	-0.001	0.000	0.000	-0.008	-0.001
	(-1.44)	(0.44)	(1.05)	(-1.54)	(-1.20)
Average Tenure	-0.001*	-0.000**	-0.000	0.001	-0.000
	(-1.83)	(-2.04)	(-0.42)	(0.10)	(-0.18)
Board Size	-0.003***	0.000	0.000	0.002	0.003
	(-4.42)	(0.25)	(1.34)	(0.17)	(1.61)
Chairman/CEO	0.002	-0.002	0.000	-0.016	-0.004
	(0.63)	(-1.16)	(0.31)	(-0.51)	(-0.65)
CEO Only Insider	0.000	0.002	-0.000	0.026	0.010
	(0.11)	(0.99)	(-0.12)	(0.76)	(1.49)
Busy Director	0.015**	0.006	-0.002	0.115	0.004
	(2.19)	(1.47)	(-0.82)	(1.53)	(0.26)
% Independent	0.013	0.003	0.004	0.268**	0.026
	(1.42)	(0.38)	(1.24)	(2.31)	(1.03)
Observations	18,909	17,271	17,262	16,909	19,164
R-squared	0.35	0.75	0.65	0.08	0.08

Table 8: Board Ancestral Diversity and the Decision-Making Process

This table relates board ancestral diversity to several corporate events, such as logarithm of the number of board meetings in a year (column 1), director turnover (columns 2 and 3), merger return volatility (column 4), number of extra-ordinary events from the 8-K filings (column 5), strategy persistence (SP) and strategy conformity (SC) in columns 6 and 7, respectively. We present ordinary least squares estimates. All variables are defined in the Appendix. All regressions include year and 2-digit SIC code industry fixed effects, whose coefficients are not reported. We report t-statistics in parenthesis with standard errors clustered at firm level and corrected for heteroscedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable:	Meetings	Turnover	Turnover	Merger Return Volatility	8-K Filings	SP	SC
Fractionalization	0.092*	0.224***	0.136	0.015*	0.208*	-1.728**	-0.958**
	(1.92)	(3.30)	(1.27)	(1.78)	(1.80)	(-2.35)	(-2.12)
Fractionalization *ROA			0.459				
			(0.88)				
Log(Assets)	0.031***	0.018***	0.048***	-0.006***	0.079***	0.262***	0.129***
	(9.59)	(3.89)	(3.43)	(-9.54)	(8.50)	(3.92)	(3.17)
ROA	-0.270***	0.024	-0.336	-0.028***	-0.172***	2.343***	1.347***
	(-5.85)	(0.67)	(-0.89)	(-3.59)	(-4.12)	(4.38)	(5.08)
Logq	-0.064***	-0.005	0.003	-0.004**	-0.015	-0.013	-0.147
	(-6.72)	(-0.41)	(0.17)	(-2.45)	(-0.64)	(-0.08)	(-1.62)
Debt/Assets	0.131***	-0.030	0.013	-0.004	0.174**	-2.265***	-2.430***
	(5.16)	(-0.92)	(0.28)	(-0.92)	(2.42)	(-4.40)	(-8.70)
Capex/Assets	-0.056	0.096	-0.058	0.030**	0.275*	-0.057	1.103
	(-0.83)	(1.17)	(-0.65)	(2.42)	(1.95)	(-0.05)	(1.25)
R&D/Sale	0.039*	-0.006	0.027	-0.010	0.032	-2.813***	-2.287***
	(1.76)	(-0.31)	(1.29)	(-1.58)	(1.50)	(-3.11)	(-5.21)
Log(FirmAge)	0.031***	0.016*	-0.240***	-0.002*	-0.008	0.064	0.142**
	(5.08)	(1.88)	(-6.91)	(-1.95)	(-0.45)	(0.62)	(2.24)
Log(#ofSegments)	0.011	0.030***	0.011	-0.005***	0.039*	-0.001	-0.073
	(1.58)	(3.20)	(0.68)	(-3.87)	(1.87)	(-0.01)	(-0.89)
Tenure Dissimilarity	0.029*	0.033*	-0.065***	0.002	-0.014	0.116	0.002
	(1.87)	(1.75)	(-2.61)	(1.01)	(-0.41)	(0.58)	(0.01)
Age Dissimilarity	0.072	0.304**	1.008***	0.020	-0.166	-2.133*	-1.272
	(0.75)	(2.40)	(6.18)	(1.08)	(-0.99)	(-1.69)	(-1.53)
Industry Experience Diversity	-0.093***	0.032	-0.076*	-0.000	-0.140***	0.638*	-0.248
	(-3.84)	(0.92)	(-1.75)	(-0.04)	(-2.61)	(1.65)	(-1.21)
% of Female Directors	-0.025	0.108*	0.036	0.004	-0.050	0.349	-0.547
	(-0.66)	(1.83)	(0.44)	(0.52)	(-0.54)	(0.52)	(-1.33)
Average Age	0.004***	0.006***	0.015***	-0.000	0.001	0.002	-0.002
	(3.63)	(3.61)	(5.13)	(-0.52)	(0.50)	(0.09)	(-0.20)
Average Tenure	-0.016***	-0.003*	0.016***	0.000	-0.014***	0.045**	0.014
	(-13.58)	(-1.87)	(5.20)	(0.62)	(-4.75)	(2.25)	(1.18)
Board Size	-0.006***	0.032***	0.044***	-0.001***	-0.003	0.082**	0.051***
	(-2.90)	(11.59)	(10.88)	(-3.20)	(-0.49)	(2.49)	(2.62)
Chairman/CEO	-0.070***	-0.008	0.024**	0.000	0.017	-0.087	-0.027
	(-9.51)	(-0.74)	(2.01)	(0.00)	(1.08)	(-0.71)	(-0.39)
CEO Only Insider	0.023***	-0.014	-0.024*	-0.000	-0.009	-0.127	0.080
	(2.73)	(-1.31)	(-1.95)	(-0.15)	(-0.55)	(-1.09)	(1.19)
Busy Director	-0.004	0.014	0.032	0.004	0.125***	-0.450	0.053
	(-0.19)	(0.52)	(0.98)	(1.26)	(2.88)	(-1.42)	(0.34)
%Independent Directors	0.099***	0.059	-0.014	0.000	0.027	-0.076	0.397*
	(2.74)	(1.49)	(-0.26)	(0.01)	(0.43)	(-0.19)	(1.69)
Deal Size				0.006***			
				(14.15)			

Stock				0.003**			
				(2.14)			
Observations	9,840	16,505	16,505	3,655	19,481	9,877	14,486
R-squared	0.15	0.21	0.44	0.17	0.54	0.15	0.19

Table 9: Board Ancestral Diversity, Analyst Forecasts, and Earnings Announcements

In columns 1 to 3, we relate analyst forecasts to our main proxy for board ancestral diversity, fractionalization. The dependent variables are respectively median (AFE_median), mean (AFE_mean) and standard deviation (STD(AFE)) of analysts' earnings forecast errors, computed using quarterly observations. In columns 4, the dependent variable is the absolute value of the firm's cumulative abnormal returns on a window [-1,1] around the earnings announcement date. Abnormal returns are computed as difference between firms' stock return and the return on value weighted total stock market index from CRSP. Variable definitions are provided in the Appendix. All regressions include year and 2-digit SIC code industry fixed effects whose coefficients are not reported. We present ordinary least squares estimates. We report t-statistics in parenthesis with standard errors clustered at firm level and corrected for heteroscedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent Variable:	AFE_Median	AFE_Mean	STD(AFE)	EarningsCAR11
Fractionalization	0.003**	0.003**	0.161	1.280**
	(2.15)	(2.07)	(0.57)	(2.22)
Log(Assets)	-0.000	-0.000	0.233	-0.532***
	(-1.35)	(-1.29)	(1.09)	(-11.26)
ROA	-0.008***	-0.008***	-0.239**	-4.121***
	(-5.62)	(-5.62)	(-2.31)	(-5.73)
Logq	-0.004***	-0.004***	0.105	0.092
	(-14.90)	(-14.94)	(0.89)	(0.78)
Debt/Assets	0.004***	0.004***	-0.385	0.426
	(5.08)	(5.01)	(-1.12)	(1.43)
Capex/Assets	0.008***	0.008***	-0.004	2.682***
	(3.96)	(3.96)	(-0.01)	(4.16)
R&D/Sales	0.001**	0.001**	0.083	-0.274
	(2.18)	(2.16)	(0.97)	(-1.64)
Log(FirmAge)	-0.000	-0.000	-0.173	-0.362***
	(-1.20)	(-1.16)	(-1.11)	(-4.87)
Log(#ofSegments)	-0.001***	-0.001***	0.087	-0.194**
	(-3.38)	(-3.43)	(0.65)	(-2.30)
Tenure Dissimilarity	0.001*	0.001	0.083	0.344**
	(1.67)	(1.60)	(0.60)	(2.31)
Age Dissimilarity	0.002	0.002	2.504	-0.462
	(0.83)	(0.88)	(1.01)	(-0.43)
Industry Experience	-0.001	-0.001	0.200	-0.309
Diversity	(-1.32)	(-1.33)	(1.16)	(-1.17)
% of Female Directors	-0.002	-0.002	-0.061	0.132
	(-1.57)	(-1.52)	(-0.24)	(0.25)
Average Age	-0.000	-0.000	0.012	-0.045***
	(-1.11)	(-1.09)	(0.75)	(-3.14)
Average Tenure	-0.000***	-0.000***	0.012	0.000
	(-2.71)	(-2.83)	(0.61)	(0.03)
Board Size	-0.000**	-0.000**	-0.023	-0.052**
	(-2.05)	(-2.15)	(-0.75)	(-2.30)
Chairman/CEO	0.000*	0.000*	0.055	-0.024
	(1.91)	(1.88)	(0.78)	(-0.26)
CEO Only Insider	0.000	0.000	-0.079	0.138
	(0.16)	(0.21)	(-0.78)	(1.51)
Busy Director	0.002***	0.002***	-0.050	-0.002
	(3.19)	(3.15)	(-0.47)	(-0.01)
% Independent	-0.001	-0.001	-0.176	-0.232

	(-1.06)	(-1.26)	(-0.46)	(-0.68)
Change in EPS	-0.000***	-0.000***	-0.002	
	(-5.29)	(-5.12)	(-0.56)	
Num of Analysts	-0.002***	-0.002***	-0.420	0.274***
	(-8.88)	(-9.12)	(-1.20)	(3.76)
Forecast Horizon	0.002***	0.002***	0.154	
	(10.23)	(10.30)	(1.56)	
Observations	63,457	63,457	60,426	54,709
R-squared	0.14	0.15	0.08	0.11

Table 10: Board Ancestral Diversity and Innovation

This table reports tobit regressions in which the dependent variables are the log of one plus the number of patent applications of a firm in a year (column 1) and the log of one plus the number of patent citations per patent in a given year (columns 2). We set the number of citations to zero if a firm has no patents. All variables are defined in the Appendix. We present tobit regression results to take into account that the the dependent variables are truncated at zero. All regressions include 2-digit SIC code industry and year fixed effects whose coefficients are not reported. We report t-statistics in parenthesis with standard errors clustered at firm level and corrected for heteroscedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Dependent Variable:	Log(1+ patapp)	Log(1+patcited)
Fractionalization	0.176***	0.457***
	(2.89)	(5.22)
Log(Assets)	0.811***	1.057***
	(140.16)	(127.01)
Logq	0.813***	1.261***
	(25.89)	(28.38)
Debt/Assets	-1.356***	-1.870***
	(-13.38)	(-12.97)
Capex/Assets	-0.890***	-1.169***
	(-3.14)	(-2.91)
R&D/Sale	0.223***	0.227***
	(9.90)	(7.24)
LagR&D/Sales	0.378***	0.589***
	(16.76)	(19.24)
Log(FirmAge)	0.156***	0.126***
	(11.27)	(6.35)
Log(#ofSegments)	-0.155***	-0.222***
	(-5.19)	(-5.19)
Tenure Dissimilarity	0.068	0.062
	(1.42)	(0.90)
Age Dissimilarity	-1.770***	-2.671***
	(-6.40)	(-6.77)
Industry Experience	-0.044	-0.054
Diversity	(-0.62)	(-0.53)
% of Female Directors	0.483**	0.526*
	(2.43)	(1.82)
Average Age	-0.029***	-0.041***
	(-38.13)	(-38.01)
Average Tenure	-0.016***	-0.012**
	(-4.04)	(-2.25)
Board Size	-0.008*	-0.020***
	(-1.79)	(-2.99)
Chairman/CEO	-0.033	-0.110*
	(-0.84)	(-1.95)
CEO Only Insider	0.015	-0.000
	(0.46)	(-0.00)
Busy Director	0.635***	1.032***
	(11.78)	(13.47)
% Independent Directors	1.290***	1.925***
	(21.21)	(21.98)
Observations	14,746	14,746
Adj. R-squared	0.30	0.28

Table 11: Board Ancestral Diversity and Monitoring

We relate board ancestral diversity to CEO turnover, executive turnover and the logarithm of the CEO's total compensation. Variable definitions are provided in the Appendix. All regressions include year and 2-digit SIC code industry fixed effects whose coefficients are not reported. We present ordinary least squares estimates. We report t-statistics in parenthesis with standard errors clustered at firm level and corrected for heteroscedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	CEO turnover		Executive turnover		Log of CEO total pay	
Fractionalization	0.006	-0.000	0.131*	0.116	0.046**	0.047**
	(0.18)	(-0.00)	(1.80)	(1.53)	(1.97)	(2.01)
Log(Assets)	-0.000	-0.000	0.010**	0.010**	0.052***	0.052***
	(-0.08)	(-0.10)	(2.06)	(2.02)	(24.33)	(24.35)
ROA	-0.103***	-0.265	-0.348***	-0.735	0.035**	0.061
	(-2.86)	(-1.17)	(-4.38)	(-1.46)	(1.98)	(0.67)
Diversity*ROA		0.223		0.535		-0.036
		(0.69)		(0.74)		(-0.30)
Logq	-0.026***	-0.026***	-0.001	-0.002	0.049***	0.049***
	(-4.01)	(-4.04)	(-0.10)	(-0.12)	(9.39)	(9.39)
Debt/Assets	-0.024	-0.025	-0.051	-0.052	0.002	0.002
	(-1.36)	(-1.39)	(-1.50)	(-1.53)	(0.16)	(0.17)
Capex/Assets	0.007	0.006	0.004	0.001	0.007	0.007
	(0.13)	(0.12)	(0.04)	(0.02)	(0.23)	(0.23)
R&D/Sale	-0.003	-0.002	-0.025**	-0.024*	0.008	0.007
	(-0.32)	(-0.28)	(-1.98)	(-1.77)	(1.55)	(1.54)
Log(FirmAge)	0.007	0.007	0.001	0.001	0.001	0.001
	(1.59)	(1.60)	(0.07)	(0.07)	(0.22)	(0.22)
Log(#ofSegments)	-0.007	-0.007	0.008	0.009	-0.001	-0.001
	(-1.36)	(-1.35)	(0.79)	(0.80)	(-0.34)	(-0.34)
Tenure Dissimilarity	0.024**	0.024**	0.072***	0.072***	-0.012**	-0.012**
	(2.29)	(2.30)	(3.74)	(3.75)	(-1.99)	(-1.99)
Age Dissimilarity	-0.201***	-0.201***	-0.258**	-0.257**	0.036	0.036
	(-3.09)	(-3.08)	(-2.06)	(-2.05)	(0.71)	(0.71)
Industry Experience	-0.018	-0.018	-0.005	-0.005	-0.004	-0.004
Diversity	(-0.96)	(-0.95)	(-0.16)	(-0.14)	(-0.40)	(-0.41)
% of Female Directors	0.012	0.012	0.071	0.070	0.008	0.008
	(0.40)	(0.39)	(1.19)	(1.18)	(0.41)	(0.42)
Average Age	0.000	0.000	-0.002	-0.002	0.002**	0.002**
	(0.04)	(0.07)	(-1.13)	(-1.10)	(2.39)	(2.39)
Average Tenure	-0.004***	-0.004***	-0.010***	-0.010***	-0.004***	-0.004***
	(-4.73)	(-4.72)	(-5.81)	(-5.81)	(-5.59)	(-5.59)
Board Size	0.002	0.002	0.001	0.001	0.001	0.001
	(1.42)	(1.44)	(0.35)	(0.37)	(0.78)	(0.77)
ChairmanCEO	0.009	0.009	-0.032***	-0.031***	0.007**	0.007**
	(1.51)	(1.53)	(-2.90)	(-2.86)	(2.39)	(2.38)

OnlyInsider	-0.041***	-0.041***	0.011	0.011	0.014***	0.014***
	(-6.13)	(-6.13)	(1.01)	(1.01)	(4.45)	(4.46)
DirBusyness	0.025	0.024	0.012	0.011	0.026***	0.026***
	(1.62)	(1.60)	(0.49)	(0.45)	(3.32)	(3.32)
%Independent Directors	0.007	0.007	0.025	0.024	0.021	0.021
	(0.32)	(0.31)	(0.60)	(0.59)	(1.62)	(1.62)
Observations	13,201	13,201	13,276	13,276	12,743	12,743
R-squared	0.02	0.02	0.07	0.07	0.47	0.47

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