Directors' Ancestry, Board Diversity, and Firm Performance Volatility*

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PRELIMINARY AND INCOMPLETE

We describe the ancestry of the directors of U.S. listed companies for the first time. We show that the directors of U.S. listed companies are predominantly white and of Anglo-Saxon origins. Board directors also appear to reflect the composition of the population in the MSA where a firm is headquartered. We show that an increase in the diversity of directors' ancestral origins is associated with higher firm performance volatility but not higher risk taking. Board diversity also appears to be associated with more and more influential patents.

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Directors with different backgrounds bring different experiences and perspectives to the boardroom and would be expected to enhance firm performance. Surprisingly, however, the evidence is mixed. A number of papers, for instance, find either no or a negative effect of gender diversity on performance (e.g., Ahern and Dittmar (2012); Adams and Ferreira (2009)). Results are similarly mixed and puzzling in studies that explore other dimensions of diversity, such as industry experience.[1]

Based on social psychology studies exploring the effects of group diversity (Page, 2007), we argue that diversity may affect a firm in different ways. Diverse individuals with different perspectives may allow companies to find more creative solutions and greatly enhance firm valuations. However, they may also hamper firm performance if different preferences, perspectives, or beliefs increase disagreement and slow down the firm's decision process. Put differently, a diverse board may increase a firm's performance volatility.

This paper attempts to provide evidence on this issue considering how the ancestry (or ethnic origin) of a firm's directors is related to the firm's performance volatility. We focus on ethnic origin for several reasons. First, empirical evidence shows that ancestry affects the culture of immigrants to the US even after several generations (e.g., Guiso, Sapienza and Zingales, 2006). Since culture is related to beliefs, preferences and decision-making heuristics, this implies that individuals with different ancestries are likely to have different perspectives, values, and preferences, which may be reflected in their contributions to the board. Importantly, ancestry is easy to categorize using studies of geographers and historians that have contributed to develop the history of last names and in particular their geographical origin.

[1] See, for instance, Adams, Akyol, and Verwijmeren (2013), Anderson, Reeb, Upadhyay, and Zhao (2011) and Knyazeva, Knyazeva and Raheja (2009).

Second, even though ethnic diversity is only one of the many features of a diverse board, focusing on this aspect may help us to mitigate endogeneity problems. While the directors' skills are likely to be optimally selected depending on a firm's challenges and investment opportunities, the ethnic composition of the board is likely to reflect the ethnic composition of the location where the firms' headquarters are located, as board of directors are largely selected locally and the headquarters' locations are chosen early on in firms' lifecycles (Knyazeva, Knyazeva, and Masulis (2013)). Thus, not only concentrating on ethnic 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 the director, but more importantly this allows us to construct instruments for board composition based on the geographical location of a firm's headquarters.

Third, a number of existing influential studies have explored the effects of ethnic diversity on cities' macroeconomic outcomes and the provision of public goods (Alesina and La Ferrara, 2005). Ethno-linguistic diversity has also been shown to lead to more diversity of opinion and trading (Chang, Hong, Tiedens, Zhao, 2013). To the best of our knowledge, however, there exist no micro-econometric evidence on how ethnic diversity affects interaction in small groups and firm decision processes. In turn, this is important not only for our understanding of corporate governance, but also to provide a micro-foundation to studies showing the effect of ethnic diversity on macroeconomic outcomes.

We use a practice, consolidated among demographers, geographers and geneticists (Mateos (2014)), but also used by economists, of establishing ancestry through names. Social norms and customs affecting naming conventions reflect culture and should be related to an individual's culture, because culture is expected to be transmitted between generations. Thus,

differences in ethnic composition of a board can reflect diversity of views, preferences and beliefs that may affect corporate decision-making and firm performance.

We document for the first time that the boards of listed companies are heavily dominated by white individuals of Anglo-Saxon origin. Firms with greater variety of ethnicities on the board experience greater stock return and fundamental volatility suggesting that diversity affects decision-making. Interestingly, it appears that firms with more diverse boards generate more and more highly cited patents.

This paper is related to a growing literature exploring the effects of board expertise and structure on performance (e.g., Coles, Daniel, and Naveen (2008), Klein (1998), Field, Lowry, and Mkrtchyan (2013)). Adams, Hermalin, and Weisbach (2010) provide a recent survey of this literature. Differently from earlier literature, we focus on differences between board members rather than on their expertise. We argue that directors' heterogeneity may be as important because it may decrease the efficiency of communication between board members both inside and outside the boardroom. Communication between directors is in turn known to be important for effective decision making (Malenko, 2013).

Our work is also related to a growing body of evidence documenting the effect of cultural differences on economic outcomes. Giannetti and Yafeh (2012) show in a large sample of international syndicated bank loans that the bigger are the cultural differences between the countries of the syndicate's lead bank and of the borrower, the less favorable are the loan terms for the borrower. Siegel, Licht, Schwartz (2011) explore the effects of national cultural differences on international investment. Ahern, Daminelli and Fracassi (2014) document that national cultural differences decrease the frequency of international mergers and mergers gains.

While most of the existing literature explores national cultural differences, we infer individual culture from the individuals' ancestry and focus on the effects of a diverse ethnic background.

1. Directors' Ancestry and Board Diversity

A number of recent papers show that culture has a large component of intergenerational transmission and that the attitudes of individuals are shaped by the attitudes of the parents (Algan, and Cahuc, 2010; Fernandez, 2011; Dohmen, Falk, Huffman, and Sunde, 2012). For instance, Alesina, Giuliano and Nunn (2013) show that deeply held beliefs, such as the role of women in society, are related to the form of agriculture practiced in the ancestral country in the pre-industrial period. When plough agriculture is practiced, men have an advantage in farming. Societies in which the soil made optimal plough agriculture, and the resulting gender-based division of labor, developed beliefs that the natural place of women is within home. Interestingly, plough use in the area of ancestral origin is still related to views on gender roles and actual labor force participation among the descendants of immigrants in the U.S. and in Europe.

For this reason, an individual's ancestry is expected to capture an individual's cultural values and, ultimately, the individual's preferences, beliefs and style of communication.

We argue that cultural differences between board members, as captured by the ancestral origins, may affect communication and ultimately corporate outcomes. For instance, in anthropology, culture is viewed to consist of decision-making heuristics or "rules of thumb" used in an uncertain or complex environment. These decision-making heuristics manifest themselves as "gut feelings" about the "right" or "wrong" thing to do in certain circumstances. Diversity

along any of these dimensions may hamper communication in the boardroom. It could however also help to find more innovative solutions to problems.

To answer this question and to describe the ancestry of the US directors, in what follows, we rely on methods that have been used in different disciplines to infer the ancestry of large populations. These methods involve the use of personal names to produce alternative categorizations of the ethnic origins of populations. Research in demography, health, and genetics makes increasing use of names to classify populations and establish their hereditary characters and group identities.

The US government has been a key player in the use of this approach to population classification as it commissioned such an analysis in the first decades 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.

We believe that using this approach to establish individual ancestry and culture is particularly appropriate in our context. Culture affects naming conventions. Since culture is transmitted across generations, an individual's name conveys information about the individual's preferences and beliefs or style of communication. This is precisely what we aim to capture to be able to explore the effects of diversity in the boardroom.

Before introducing the method through which we classify directors' names to establish their ancestry in Subsection 2.2, we describe our sample.

2. Data Sources and Sample Construction

2.1 The director sample

We obtain data from several sources. Our director data are from the Corporate Library's Board Analyst, commercialized by the GMI Ratings Company. This database provides annual corporate governance information on over 3,000 US companies starting from 2001. Coverage is increasing over time with only S&P1,500 companies being covered at the beginning of the sample period and all Russell 3,000 companies being included starting from 2006.

From Board Analyst, we extract data on director names, age, tenure, other directorships, board size, board independence, whether CEO is also the founder of the company, and gender diversity up to 2011. Thus, our final sample period is 2001-2011.We exclude firms in financial industries with SIC code in 6000s.

We complement Board Analyst with information on stock prices and returns from CRSP and financial statements from COMPUSTAT.

Our dataset covers an unbalanced sample of 3,056 firms for a total of 18,124 firm-year observations. At the director level, we have information on 33,706 unique directors for a total number of 309,324 director-year observations.

We complement our main dataset with information on firms' patent and patent citations, which we obtain from the NBER patent database up to 2006. Thus, when we present these tests our sample is reduced.

2.2. Measuring ancestry

To capture the consequences of diversity, we classify the full names of directors in our sample using an algorithm provided by geographers of the University College of London,

Onomap. Onomap provides a global classification of first names and last names into categories of cultural, ethnic, and linguistic origin. Such classification has been subject to extensive valuations and has been applied in published work in a variety of fields, including history, linguistic, geography, and population genetics.

Onomap relies on a very extensive database of 300 million people's names from 26 countries in four continents, assembled from publicly available telephone directories and electoral services for a project developed at the University College of London. It builds on earlier efforts to use names and last names in particular to classify the population ethnic origin, and it follows the same method of the Dictionary of American Family Names to classify names. However, differently from the latter and other classifications that rely only on last names, Onomap exploits the patterns of cross-occurrences between forenames and surnames to establish ethnicity. This advancement has been possible through the recent availability of digital registers containing almost the entire populations, including full first and last names. For this reason, Onomap can be considered superior to the name classifications used in previous studies in economics (e.g., Kerr, 2008) because it exploits an individual's full name and not only the last name.

The algorithm allows us to classify the directors' full names in several categories. The one we primarily use in our analysis captures the most likely geographical area of origin of the directors' names. The areas of origin are classified as Africa, Americas, British Isles, Central Asia, Central Europe, Diasporic, East Asia, Eastern Europe, Middle East, Northern Europe, South Asia, and Southern Europe.

The algorithm provides alternative classifications, which include the ethnic group (including the following categories: White-British, White-Irish, White-Any Other White

Background, Asian or Asian British-Indian, Asian or Asian British-Pakistani, Asian or Asian British-Bangladeshi, Asian or Asian British-Any other, Black or Black British-Caribbean, Black or Black British-African, Other Ethnic Group-Chinese, Other Ethnic Group-Any Other Ethnic Group) or the religious origin (Bhuddist, Christian, Hindu, Jewish, Muslim, Sikh) that are most likely to be associated with a name.[2]

In what follows, we describe board composition and diversity using each of these alternative categories in turn. Since the picture that emerges is similar, we tend to describe directors' ancestry using the geographical area of origin.

2.3 Measuring diversity

Based on the above alternative categories and existing literature (Alesina and La Ferrara, 2005), we define measures of board diversity capturing the probability that two randomly selected directors belong to two different groups for geographical area of origin, ethnic group or religion using an Herfindhal-based index as follows:

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

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

Panel A of Table 3 provides indexes of board diversity in terms of the directors' ancestral geographical origin, ethnic group, and religion. It also describes the diversity of the board along other dimensions, such as director age, tenure, number of directorships, and industry experience.

[2] If a name cannot be reliably classified, it is applied to the category unclassified and we ignore it for the purpose of building our indexes of diversity which we describe below.

2.4 Measuring firm volatility and other firm characteristics

Our main outcome variables aim to capture firm performance volatility. Our main proxy captures the total stock return volatility and is defined using the standard deviation of monthly stock returns over 12 months from the recent fiscal year end. We show that results are robust to using an alternative proxy for overall stock return volatility, defined using the monthly standard deviation of stock returns over 24 months.

Since stock return volatility changes in firm's return due to investor preferences and 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*. Like Irvine and Pontiff (2009), 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 1-year period controls for seasonality. If a firm reports its earnings on a quarterly basis, then 24-months earnings volatility is the standard deviation of eight earnings shocks. If a firm reports its earnings on a semi-annual basis, then earnings volatility is constructed using four earnings shocks.[3] We use the natural logarithm of this volatility measure as dependent variable of our regressions.

To capture that volatility arising from the effect of diversity on board decision-making is more likely to arise from firm idiosyncratic factors rather than from exposure to systematic risk factors, we also define a measure of idiosyncratic volatility. The 24-month idiosyncratic volatility is computed as the residual of a four-factor Fama French model (including also Cahart's momentum factor) estimated on monthly returns.

[3] Results are similar if we measure earnings shocks using cash flows per share.

3. The Ancestry of Directors

Table 1 describes the ancestral origins of the 33,706 directors represented in the boards of our sample firms starting from 2001 to 2011. Panel A classifies the directors' names based on the geographic area of origin of the ancestors. The unit of analysis is the director year.

An overwhelming majority of the directors has British origins as almost 80% of the directors' names are associated to ancestors from the British Isles. This proportion is much larger than the U.S. population with ancestors from these areas, which is slightly above 20%. This indicates persistency in the predominance of individuals with Anglo-Saxon origins at the vertex of the corporate ladder. This group is followed by individuals of European origin, predominantly Central Europe, followed by Southern Europe, and, to a much lower extent, Eastern Europe and Northern Europe. A number of other directors are of diasporic origin, indicating that they are Jewish, and from East Asia.

Panel B and C provide an analogous description of the directors' ethnic group and the religion of the ancestors. White individuals and individuals of Christian origins followed by Jewish appear to hold most of the seats in listed companies.

Table 2 describes the fraction of directors with different ancestral origin in our sample firms. In some firms, all directors have British origin, are white and have Christian ancestry. The representation of minorities, however, varies in firms' boardrooms. In some firms over 25% of the directors can be considered minorities either because of their ancestors' geographical origin or religion or because of their ethnic group. We can thus ask how the presence of minorities on the board affects corporate policies.

4. Firm Characteristics and Board Diversity

Table 4 relates each of the proxies for the diversity of directors' ancestral geographical origin, ethnic group, and religion to firm characteristics. It appears that the most important determinants of board diversity are the extent of ethnic diversity in the MSA where the firm is headquartered and board size.

We proxy for ethnic diversity in the MSA where a firm is headquartered using data from decennial censuses and the 2006-2010 American Community Survey (ACS), which provides information on the number of individuals from different ethnic groups in a MSA. The surveys are carried out in 2000 and 2010. MSA diversity is measured using an index that has the same expression as our index of board diversity and increases in heterogeneity; a value of 0 for the index indicates complete homogeneity, while a value of 100 complete heterogeneity. We use the 2000 data to measure MSA diversity in the years 2001-2006 and the 2010 data for the years 2007-2011.

The ethnic groups considered in ACS are White, Black, Asia, Hispanic and others. While the ethnic group classification does not perfectly match the finer ancestral origin classification in our data, this measure of ethnic diversity in the MSA clearly helps to explain board diversity in Table 4.

The measures of board ethnic diversity appear to be unrelated to other firm characteristics, such as growth opportunities, captured by the market-to-book ratio, or the firm's leverage. The indexes are equally unrelated to other common aspects of diversity, such as the proportion of female board members, or the tenure of the firm's board members. The correlation between ethnic diversity and the diversity in the directors' industry experience or in the diversity in the numbers of directorships held by a the directors of a firm is even negative.

It appears however that larger boards are more diverse. This may be a mechanical effect, but also indicates that firms hiring minority board members to their board do not substitute board members, but rather add the new, diverse ones. In columns 4 to 9, it also appears that firms with higher R&D to sales ratio have more diverse board members. This is consistent with the notion that diversity may foster creativity and may particularly benefit innovative firms.

Finally, in columns 6 to 9, we consider whether besides the ethnic composition of the MSA, also of the board composition of other firms affects a firm's board diversity. Since board members are often locally hired, directors may be shared by many local companies. We find however that this variable has little additional explanatory power.

5. Board Diversity and Firm Performance Volatility

In this section, we explore the idea of Page (2007) that a diverse board may increase firm volatility.

We start by relating alternative proxies for firm volatility to the indexes capturing the diversity of the directors' ancestors. In Subsection 5.1, we start by presenting ordinary least square estimates. However, we are aware that problems may arise because the composition of the board of directors is endogenously chosen (Adams, Hermalin, Weisbach, 2010). For this reason, in the following subsections, we introduce alternative identification strategies to deal with endogeneity problems.

5.1 Basic results

Table 5 shows that the alternative Herfindahl-based indexes of directors' ethnic diversity are increasingly associated with an increase in firm volatility. Importantly, this effect is present

not only when we consider the total return volatility, but also if we concentrate on fundamental volatility and we abstract from possible differences in exposure to systematic risk factors by considering a firm's idiosyncratic volatility.

The effect is also economically relevant. The parameter estimate in column 1 of Panel A of Table 5 implies that a one-standard-deviation increase in the measure of diversity based on the ancestral geographical area of origin explains 2.5% of the standard deviation of a firm's total return volatility. If one considers that the indexes of diversity are pretty skewed and takes a change in diversity from the bottom to the top decile of our sample, board diversity can account for over 7% of the standard deviation of a firm's total return volatility.

5.2 Instrumental variable estimates

A possible concern with the above estimates is that the effect of board diversity on firm volatility is driven by an omitted firm factor. As we show in Table 4, board diversity appears to be unrelated to firm characteristics other than board size and R&D expenses, features of the board we control for throughout the analysis. Table 4 also suggests a possible instrument for board diversity. The ethnic diversity of the board appears to reflect the ethnic diversity of the MSA. The Cragg-Donald Wald F statistics (which we present at the end of Table 6) confirms that our instrument is highly relevant for the aspects of board ancestral diversity we are focusing on.[4]

Thus, we can explore whether board diversity continues to be associated to higher firm volatility once we use ethnic diversity in the MSA in which a firm is incorporated as an

[4] In unreported estimates, we also use the ethnic composition of the board of other listed companies headquartered in the MSA as instrument. The estimates are qualitatively and quantitatively similar to the ones we report.

instrument and abstract from factors that may lead firms to choose more or less diverse boards within an MSA.

Table 6 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. In column 1 of Panel A of Table 6, a one-standard-deviation increase in the proxy for board diversity is associated with a 35% increase in firm volatility.

Such dramatic increase in the magnitude of the estimates may reflect the fact that 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 affects their performance to a larger extent than for other firms.

5.3 Unobserved MSA heterogeneity

A possible concern with the above estimates is that our instrument does not satisfy the exclusion restriction because more diverse areas have more volatile firms. Thus, board diversity could be associated with omitted factors directly affecting firm volatility. To address this concern, in Table 7, we explore whether board diversity is still associated with firm volatility when we exploit a source of variation in the data that is orthogonal to the one we consider in the instrumental variable estimates. Specifically, we explore whether within an MSA firms with more diverse boards still experience higher volatility.

Table 7 shows that our results are robust to the inclusion of MSA fixed effects. The magnitude of the parameter estimates is unsurprisingly closer to the one we obtain in in Table 5, when we use ordinary least squares. Again, firms could choose to have diverse boards when diversity has smaller effects on firm performance volatility. The estimates are both qualitatively

and quantitatively similar in Table 8 when we control for firms lagged volatility (instead of MSA fixed effects).

6. Why Does Board Diversity Lead to Higher Volatility?

The previous evidence suggests that board diversity is associated to higher performance volatility. In the rest, of the paper we explore possible mechanisms that may lead to this association.

Existing literature in social psychology would suggest that diverse board face coordination problem. For instance, communication between board members with different backgrounds and culture may be difficult. Table 9 explores whether this is the case. We conjecture that an increase in the number of board meetings indicates lengthier discussions between board members. We find that boards with members with disparate ethnic origins meet more often suggesting that they indeed have more cumbersome communications.

There is no evidence instead that firms with diverse boards take more risk. Table 10 shows that if anything ethnically diverse boards lead firms to invest less. Firms with diverse boards have similar leverage to other firms. In Table 11, there is some evidence that firms with diverse board have more patents; more importantly, these patents appear to obtain more citations, indicating that they are more influential.

Importantly, in Table 12 diversity appears to affect the distribution of firm profits in a way that is consistent with our earlier results on volatility. In particular, it appears that the bottom decile and the median of the distribution of firm average profitability in the following

three years is affected negatively by board diversity. There is no effect on the top decile of the distribution as well as on the average.

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Appendix

Variable	Definition and Data Source
Board Diversity	
Geographical Area	A Herfindhal-based index capturing the dispersion of a firm's directors across different geographical areas of origin; the areas of origin include Africa, Americas, British Isles, Central Asia, Central Europe, Diasporic, East Asia, Eastern Europe, Middle East, Northern Europe, South Asia, and Southern Europe .The index varies between 1 and 0. A value of the index closer to 1 indicates that directors are concentrated in fewer areas of origin. Source: Onomap and Board Analyst.
Ethnic Group	A Herfindhal-based index capturing the dispersion of a firm's directors across different ethnic groups; The ethnic groups include White-British, White-Irish, White-Any Other White Background, Asian or Asian British-Indian, Asian or Asian British-Pakistani, Asian or Asian British-Bangladeshi, Asian or Asian British-Any other, Black or Black British-Caribbean, Black or Black British-African, Other Ethnic Group-Chinese, Other Ethnic Group-Any Other Ethnic Group. The index varies between 1 and 0. A value of the index closer to 1 indicates that directors are concentrated in fewer areas of origin. Source: Onomap and Board Analyst.
Religion	A Herfindhal-based index capturing the dispersion of a firm's directors across different religious origins; The religious origins include Bhuddist, Christian, Hindu, Jewish, Muslim, Sikh. The index varies between 1 and 0. A value of the index closer to 1 indicates that directors are concentrated in fewer areas of origin. Source: Onomap and Board Analyst.
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: Corporate Library's Board Analyst.
Tenure_dissimilarity	The average distance of the tenure of each director in a firm from the mean tenure of the firm's directors, scaled by the mean tenure of the firm's directors. Source: Corporate Library's Board Analyst.
Dirship_dissimilarity	The average distance of the number of outside directorships 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: Corporate Library's Board Analyst.
Diverse_industry	This variable measures diversity in the industry experience of a firm's directors and is defined as 1-sum(*square of xk*), where *xk* is number 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.
% of Female Directors	The percentage of female directors on a firm's board. Source: Corporate Library's Board Analyst.
Firm Volatility	
TotRelVol (12 mon)	The standard deviation of a firm's monthly stock returns over 12 months. Source: CRSP.
TotRelVol (24 mon)	The standard deviation of a firm's monthly stock returns over 24 months. Source: CRSP.
Log(VolEPS)(24 mon)	The natural logarithm of the standard deviation of a firm's earnings per share shocks over 8 quarters. Earnings per share shocks are defined as in Irvine and Pontiff (2009). Source: CRSP and Compustat.
Idiovol	The standard deviation of the residuals obtained regressing a firm's monthly returns on the four Fama French factors (including the Cahart's momentum factor) over a 24 months interval. Source: CRSP.
Board Meetings	
Log number of meetings	The natural logarithm of the number of board meetings. Source: Corporate Library's Board Analyst.
Patents	
Log number of citations	The natural logarithm of 1 plus the number of citations of patents applied and eventually granted to a firm during a year. Source: NBER patent database.
Log number of patent grants	The natural logarithm of the number of patents granted to a firm during a year. Source: NBER patent database.
Instruments	
Eindex	Index of ethnic diversity in a MSA. The index is available from the Bureau of Census for 2000 and 2010. Since our sample period is 2001 to 2011, we use the 2000 Eindex for years up to 2007, and the 2010 Eindex for the following years including 2007. Results are similar if we just use the average of the two years Eindex or the most recent year. Source: Bureau of Census.
Firm Level Controls	
% of outside directors	The percentage of outside directors in a firm in a given year. Source: Corporate Library's Board Analyst.
CEOFounder	A dummy variable that takes a value equal to one if the CEO is also a firm's founder. Source: Corporate Library's Board Analyst.
Log(BoardSize)	The natural logarithm of the number of board members. Source: Corporate Library's Board Analyst.
% of female directors	Percentage of female directors on board. Source: Corporate Library's Board Analyst.
Number of segments	It is the number of business segments each firm has based on

	3-digit SIC code. Source: Compustat.
Log (Age)	The natural logarithm of a firm's age, defined as the number of years since incorporation. Source: Corporate Library's Board Analyst.
Log(Assets)	The natural logarithm of a firm's book value of assets. Source: Compustat.
Leverage	A firm's ratio of long-term debt to total assets. Source: Compustat.
Capex	A firm's ratio of capital expenditures to total assets. Source: Compustat.
Logq	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.
ROA	A firm's income before extraordinary items, divided by the firm's total assets. Source: Compustat.
R&D	A firm's research and development expenditures divided by the firm's sales. Source: Compustat.

Table 1: Descriptive Statistics of Director Diversity

This table reports descriptive statistics of director ethnic diversity. The unit of observation is director firm year. We report the number of directors and the percentage of directors in the sample with ancestors from a given geographical area, belonging to a given ethnic group and with ancestors with a given religion. We also report the percentage of U.S. population with ancestors from a given geographical area, belonging to a given ethnic group and with ancestors with a given religion. Information on the percentage of U.S. population with ancestors from a given geographical area is obtained from http://www.infoplease.com/ipa/A0762137.html; information on the ethnic group of the U.S. population is from Encyclopedia Brit; and the information on the religion of the ancestors of the U.S. population is from the U.S. Bureau of Census.

	Sample		U.S. Population
Panel A: Geographical Area	N	%	%
AFRICA	428	0.19	13.32
AMERICAS	184	0.08	16.43
BRITISH ISLES	184,128	80.25	24.24
CENTRAL ASIA	95	0.04	0.99
CENTRAL EUROPE	12,988	5.66	21.37
DIASPORIC	5,407	2.36	
EAST ASIA	3,217	1.4	1.51
EASTERN EUROPE	1,788	0.78	3.14
MIDDLE EAST	938	0.41	0.52
NORTHERN EUROPE	2,206	0.96	3.29
SOUTH ASIA	2,320	1.01	2.23
SOUTHERN EUROPE	8,369	3.65	6.55
UNCLASSIFIED	7,372	3	6.42
Total	229,440	100	100
	Sample		U.S. Population
Panel B: Ethnic Group	N	%	%/
WHITE – BRITISH	166,520	72.58	
WHITE – IRISH	17,608	7.67	
WHITE - ANY OTHER WHITE BACKGROUND	30,926	13.48	
Total white (excluding Hispanic)			69.13
Total white		93.73	81.68
ASIAN OR ASIAN BRITISH - INDIAN	1,543	0.67	
ASIAN OR ASIAN BRITISH - PAKISTANI	399	0.17	
ASIAN OR ASIAN BRITISH - BANGLADESHI	17	0.01	
ASIAN OR ASIAN BRITISH - ANY OTHER	45	0.02	
OTHER ETHNIC GROUPS - CHINESE	1,865	0.81	
Total Asian		*1.68*	
BLACK OR BLACK BRITISH - CARIBBEAN	124	0.05	
BLACK OR BLACK BRITISH - AFRICAN	353	0.15	
Total black		0.20	12.06
UNCLASSIFIED	10,040	4	2.66
Total	229,440	100	100
	Sample		
Panel C: Religion	N	%	%
BHUDDIST	3,522	1.54	0.80
CHRISTIAN	210,099	91.57	60.39
HINDU	1,187	0.52	0.34
JEWISH	4,343	1.89	1.84
MUSLIM	1,568	0.68	1.35
SIKH	285	0.12	0.08
NOT APPLICABLE	8,436	3.68	35.21
Total	229,440	100	100

Table 2: Descriptive Statistics of Board Diversity

This table reports descriptive statistics on the composition of the board of directors of U.S. listed companies. The unit of observation is the firm year. For each sample firm and year, we report the proportion of directors with ancestors from a given geographical area, from a given ethnic group and with ancestors with a given religion, respectively, in Panel A, Panel B and Panel C.

Panel A: Geographical Area	Mean	Median	P10	P90	N
AFRICA	0.002	0.000	0.000	0.000	18,123
AMERICAS	0.001	0.000	0.000	0.000	18,123
BRITISH ISLES	0.806	0.833	0.625	1.000	18,123
CENTRAL ASIA	0.000	0.000	0.000	0.000	18,123
CENTRAL EUROPE	0.057	0.000	0.000	0.154	18,123
DIASPORIC	0.024	0.000	0.000	0.100	18,123
EAST ASIA	0.014	0.000	0.000	0.042	18,123
EASTERN EUROPE	0.008	0.000	0.000	0.000	18,123
MIDDLE EAST	0.004	0.000	0.000	0.000	18,123
NORTHERN EUROPE	0.010	0.000	0.000	0.042	18,123
SOUTH ASIA	0.010	0.000	0.000	0.040	18,123
SOUTHERN EUROPE	0.035	0.000	0.000	0.111	18,123

Panel B: Ethnic Group	Mean	Median	P10	P90	N
WHITE - BRITISH	0.727	0.750	0.526	0.909	18,123
WHITE - IRISH	0.077	0.067	0.000	0.182	18,123
WHITE - ANY OTHER WHITE	0.134	0.118	0.000	0.286	18,123
ASIAN OR ASIAN BRITISH - INDIAN	0.007	0.000	0.000	0.000	18,123
ASIAN OR ASIAN BRITISH - PAKISTANI	0.002	0.000	0.000	0.000	18,123
ASIAN OR ASIAN BRITISH - BANGLADESHI	0.000	0.000	0.000	0.000	18,123
ASIAN OR ASIAN BRITISH - ANY OTHER	0.000	0.000	0.000	0.000	18,123
OTHER ETHNIC GROUPS - CHINESE	0.001	0.000	0.000	0.000	18,123
BLACK OR BLACK BRITISH - CARIBBEAN	0.002	0.000	0.000	0.000	18,123
BLACK OR BLACK BRITISH - AFRICAN	0.009	0.000	0.000	0.000	18,123

Panel C: Religion	Mean	Median	P10	P90	N
BHUDDIST	0.016	0.000	0.000	0.056	18,123
CHRISTIAN	0.916	0.938	0.792	1.000	18,123
HINDU	0.005	0.000	0.000	0.000	18,123
JEWISH	0.019	0.000	0.000	0.083	18,123
MUSLIM	0.007	0.000	0.000	0.000	18,123
SIKH	0.001	0.000	0.000	0.000	18,123

Table 3: Sample Summary Statistics

This table reports summary statistics for the sample firms. The unit of observation is the firm year. Panel A reports summary statistics for our board diversity measures. Panel B reports summary statistics for the performance volatility proxies. Panel C provides summary statistics of board meetings, patent citation and patent grants. Panel D provides summary statistics of board characteristics. Panel E summarizes firm characteristics. Variable definitions are provided in the appendix.

Panel A: Board Diversity	Mean	Median	SD	P10	P90	N
Geographical Area	0.317	0.314	0.199	0.000	0.585	18,124
Census Ethnic Group	0.402	0.421	0.179	0.163	0.623	18,124
Census Religion	0.150	0.124	0.162	0.000	0.391	18,124
Age Dissimilarity	0.118	0.115	0.035	0.076	0.164	22,500
Tenure Dissimilarity	1.084	0.871	0.877	0.468	1.866	22,447
Directorships Dissimilarity	5.778	5.000	4.566	2.038	10.038	22,473
Industry Experience Diversity	0.447	0.477	0.252	0.000	0.765	22,279

Panel B: Performance Volatility	Mean	Median	SD	P10	P90	N
Total Stock Vol (24 mons)	0.125	0.107	0.081	0.031	0.133	14,367
Total Stock Vol (12 mons)	0.121	0.103	0.084	0.032	0.136	16,910
Log (EPS Vol) (24 mons)	-8.471	-8.903	3.020	0.056	0.207	14,878
Idiosyncratic Stock Vol (24 mons)	0.077	0.063	0.061	-12.914	-4.734	14,446

Panel C: Board Meetings and Patent						
Board Meetings	7.989	7.000	3.842	4.000	13.000	15497
Log(Board Meetings)	2.122	2.079	0.377	1.609	2.639	15497
Patent Citation	17.634	0.000	152.654	0.000	12.000	5584
Log (1+Patent Citation)	0.455	0.000	0.941	0.000	2.565	5577
Patent Grant	19.923	0.000	115.866	0.000	23.000	5577
Log(1+Patent Grants)	0.825	0.000	1.351	0.000	3.178	5577

Panel D: Board Characteristics	Mean	Median	SD	P10	P90	N
Board Size	14.224	13.000	6.205	8.000	23.000	17,111
CEO Founder	0.101	0.000	0.301	0.000	1.000	17,034
% of Outside Directors	0.605	0.600	0.154	0.407	0.800	17,865
% of Female Directors	0.087	0.083	0.083	0.000	0.200	17,865

Panel E: Other Firm Variables	Mean	Median	SD	P10	P90	N
Assets	6405.256	1146.144	25508.410	166.051	13740.200	18161
Log(q)	0.530	0.433	0.498	0.005	1.216	18151
Number of Segments	1.681	1.000	1.083	1.000	3.000	16386
Company Age	38.667	25.000	37.011	3.000	97.000	14023
R&D/Sales	0.179	0.001	1.067	0.000	0.207	17401
Capex/Assets	0.060	0.037	0.079	0.010	0.127	18110
Leverage (t)	0.194	0.161	0.201	0.000	0.441	18084
ROA(t+1)	0.009	0.043	0.216	-0.109	0.126	17476
AvgROA(3yrs)	0.016	0.042	0.158	-0.094	0.119	14229

Table 4: Board Diversity

This table shows how alternative measures of board ethnic diversity are related to ethnic diversity in the MSA where a firm is headquartered, as captured by the MSA index and to other firm and board characteristics in columns (1) – (6). We also include a proxy for the diversity of board members of other listed companies in the MSA in columns (7) – (9). Variable definitions are provided in the Appendix. We include industry and year fixed effect in each regression. We present ordinary least squares parameter estimates. Robust T-statistics are reported and standard errors are clustered at firm level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Geographical Area	Census Ethnic Group	Census Religion	Geographical Area	Census Ethnic Group	Census Religion	Geographical Area	Census Ethnic Group	Census Religion
Eindex	0.001***	0.001**	0.001***	0.001***	0.001**	0.001***	0.001***	0.001**	0.001***
	(4.15)	(2.22)	(4.42)	(4.00)	(2.11)	(4.31)	(4.10)	(2.35)	(4.40)
MSA_Geographical							0.023		
							(1.22)		
MSA_Census Ethnic								0.037*	
								(1.85)	
MSA_Census Religion									0.012
									(1.00)
Age_dissimilarity	0.208	0.042	0.201*	0.211	0.042	0.196*	0.204	0.035	0.190*
	(1.55)	(0.36)	(1.76)	(1.58)	(0.36)	(1.71)	(1.52)	(0.30)	(1.66)
Tenure_dissimilarity	0.012**	0.007	0.007	0.012**	0.007	0.008*	0.012**	0.007	0.007*
	(2.11)	(1.25)	(1.63)	(2.12)	(1.25)	(1.68)	(2.13)	(1.29)	(1.65)
Dirship_dissimilarity	-0.002**	-0.001**	-0.002***	-0.002**	-0.001**	-0.002***	-0.002**	-0.001**	-0.002**
	(-2.16)	(-2.13)	(-2.62)	(-2.12)	(-2.07)	(-2.59)	(-2.08)	(-2.01)	(-2.55)
Diverse_industry	-0.072***	-0.047**	-0.033*	-0.071***	-0.045**	-0.032*	-0.068***	-0.042**	-0.031*
	(-3.32)	(-2.42)	(-1.88)	(-3.27)	(-2.33)	(-1.81)	(-3.14)	(-2.16)	(-1.75)
% of Female Directors	-0.019	-0.077*	-0.007	-0.020	-0.077*	-0.007	-0.022	-0.081*	-0.008
	(-0.38)	(-1.67)	(-0.17)	(-0.38)	(-1.67)	(-0.19)	(-0.43)	(-1.76)	(-0.21)
Log(Assets)	0.002	0.002	-0.001	0.004	0.002	0.000	0.004	0.002	0.000
	(0.66)	(0.49)	(-0.22)	(1.07)	(0.78)	(0.08)	(1.01)	(0.72)	(0.07)
Logq	-0.000	-0.001	-0.005	0.001	-0.001	-0.005	0.001	-0.001	-0.005
	(-0.04)	(-0.11)	(-0.81)	(0.14)	(-0.16)	(-0.78)	(0.18)	(-0.12)	(-0.72)
Debt/Assets	-0.019	-0.012	-0.015	-0.024	-0.016	-0.018	-0.023	-0.014	-0.018
	(-1.00)	(-0.76)	(-0.98)	(-1.29)	(-0.94)	(-1.16)	(-1.22)	(-0.85)	(-1.17)
Capex/Assets	-0.037	-0.030	-0.097***	-0.028	-0.023	-0.093***	-0.026	-0.019	-0.092***
	(-0.93)	(-0.85)	(-2.93)	(-0.72)	(-0.65)	(-2.81)	(-0.66)	(-0.52)	(-2.77)
Log(FirmAge)	-0.004	-0.003	-0.001	-0.002	-0.002	-0.000	-0.002	-0.003	-0.000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Geographical Area	Census Ethnic Group	Census Religion	Geographical Area	Census Ethnic Group	Census Religion	Geographical Area	Census Ethnic Group	Census Religion
	(-0.77)	(-0.76)	(-0.28)	(-0.52)	(-0.59)	(-0.10)	(-0.53)	(-0.61)	(-0.06)
Log(#ofSegments)	0.004	0.011	0.006	0.005	0.011	0.007	0.005	0.012	0.007
	(0.46)	(1.40)	(0.92)	(0.53)	(1.46)	(0.97)	(0.54)	(1.47)	(0.99)
Log(BoardSize)	0.070***	0.068***	0.047***	0.067***	0.066***	0.045***	0.067***	0.067***	0.045***
	(4.51)	(4.62)	(3.76)	(4.30)	(4.45)	(3.66)	(4.31)	(4.50)	(3.61)
CEOFounder	0.009	0.003	0.025**	0.007	0.002	0.025**	0.007	0.002	0.024**
	(0.68)	(0.29)	(2.24)	(0.55)	(0.18)	(2.23)	(0.55)	(0.15)	(2.20)
% of Outside Directors	0.009	0.012	-0.037*	0.009	0.012	-0.039*	0.009	0.012	-0.039*
	(0.34)	(0.48)	(-1.67)	(0.33)	(0.46)	(-1.73)	(0.34)	(0.45)	(-1.75)
ROA				-0.031*	-0.011	-0.011	-0.033*	-0.012	-0.015
				(-1.68)	(-0.68)	(-0.69)	(-1.82)	(-0.76)	(-0.94)
R&D/Sales				0.008**	0.008***	0.006	0.008**	0.008***	0.006
				(2.34)	(2.98)	(1.52)	(2.35)	(3.01)	(1.53)
Constant	0.042	0.159**	-0.076	0.035	0.156**	-0.079	0.018	0.129	-0.085
	(0.42)	(2.08)	(-1.25)	(0.36)	(2.05)	(-1.30)	(0.18)	(1.63)	(-1.38)
Observations	12,948	12,948	12,948	12,922	12,922	12,922	12,948	12,948	12,948
R-squared	0.08	0.08	0.08	0.09	0.08	0.08	0.09	0.08	0.08

Table 5: Firm Volatility and Board Diversity

This table relates a proxy for firm volatility to the main proxies for ethnic diversity. In panel A, dependent variable is the one-year total stock return volatility. In panel B, the dependent variables are respectively the two-year total stock return volatility, the fundamental volatility and the idiosyncratic return volatility. Variable definitions are provided in the appendix. All regressions include year and 2-digit SIC code industry fixed effects. We present ordinary least squares parameter estimates. Robust T-statistics are reported and standard errors are clustered at firm level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Panel A

	(1)	(2)	(3)
	TotRetVol (12 mon)	TotRetVol (12 mon)	TotRetVol (12 mon)
Geographical Area	0.014***		
	(3.57)		
Census Ethnic Group		0.013***	
		(2.98)	
Census Religion			0.017***
			(3.53)
Age_dissimilarity	-0.020	-0.017	-0.020
	(-0.82)	(-0.71)	(-0.80)
Tenure_dissimilarity	0.004***	0.004***	0.004***
	(3.23)	(3.29)	(3.24)
Dirship_dissimilarity	-0.000	-0.000	-0.000
	(-0.35)	(-0.41)	(-0.33)
Diverse_industry	0.007	0.006	0.006
	(1.61)	(1.50)	(1.48)
% of Female Directors	0.004	0.004	0.004
	(0.39)	(0.47)	(0.40)
Log(Assets)	-0.014***	-0.014***	-0.014***
	(-19.00)	(-18.97)	(-18.95)
Logq	-0.021***	-0.021***	-0.021***
	(-12.51)	(-12.49)	(-12.46)
Debt/Assets	0.061***	0.061***	0.061***
	(8.83)	(8.79)	(8.81)
Capex/Assets	0.018	0.018	0.020
	(1.52)	(1.48)	(1.62)
R&D/Sales	0.010***	0.010***	0.010***
	(5.34)	(5.31)	(5.24)
Log(FirmAge)	-0.005***	-0.005***	-0.005***
	(-5.27)	(-5.32)	(-5.35)
Log(#ofSegments)	-0.005***	-0.005***	-0.005***
	(-3.38)	(-3.44)	(-3.42)
Log(BoardSize)	0.005	0.005	0.005
	(1.34)	(1.37)	(1.39)
CEOFounder	0.008***	0.009***	0.008***
	(3.32)	(3.35)	(3.17)
% of Outside Directors	-0.008	-0.008	-0.008
	(-1.47)	(-1.47)	(-1.34)
Constant	0.233***	0.232***	0.234***
	(16.10)	(16.04)	(15.94)
Observations	12,881	12,881	12,881
R-squared	0.36	0.36	0.36

Table 5: Firm Volatility and Board Diversity (Continued)
Panel B

	(1)	(2)	(3)
	TotRetVol(24 mon)	Log(VolEPS)(24mon)	Idiovol(24 mon)
Geographical Area	0.016***	0.602***	0.009***
	(3.70)	(2.97)	(3.19)
Age_dissimilarity	-0.013	-1.851	-0.013
	(-0.41)	(-1.36)	(-0.59)
Tenure_dissimilarity	0.003***	0.280***	0.002**
	(2.58)	(4.17)	(2.34)
Dirship_dissimilarity	-0.000	0.000	0.000
	(-0.45)	(0.01)	(0.39)
Diverse_industry	0.008	0.451**	0.004
	(1.55)	(2.02)	(1.17)
% of Female Directors	0.008	0.703	-0.000
	(0.81)	(1.45)	(-0.04)
Log(Assets)	-0.014***	-0.431***	-0.010***
	(-16.96)	(-11.33)	(-19.33)
Logq	-0.025***	-2.932***	-0.015***
	(-12.68)	(-32.57)	(-11.91)
Debt/Assets	0.068***	2.513***	0.034***
	(7.34)	(10.84)	(6.24)
Capex/Assets	0.025*	-0.141	0.012
	(1.76)	(-0.24)	(1.29)
R&D/Sales	0.012***	0.298***	0.009***
	(4.47)	(5.01)	(4.47)
Log(FirmAge)	-0.005***	-0.204***	-0.003***
	(-4.83)	(-4.18)	(-5.26)
Log(#ofSegments)	-0.005***	-0.272***	-0.005***
	(-3.17)	(-3.02)	(-4.32)
Log(BoardSize)	0.006	0.614***	0.004
	(1.37)	(3.68)	(1.43)
CEOFounder	0.008***	0.308**	0.007***
	(2.72)	(2.33)	(3.55)
% of Outside Directors	-0.008	-0.345	-0.004
	(-1.30)	(-1.24)	(-0.95)
Constant	0.224***	-3.557***	0.149***
	(14.83)	(-4.37)	(13.01)
Observations	10,902	11,328	10,956
R-squared	0.41	0.40	0.31

Table 6: Firm Volatility and Board Diversity – Instrumental Variable Estimates

This table reports instrumental variables estimates for the effects of board diversity ethnic diversity for corporate volatility. The instrument is Eindex, capturing ethnic diversity in the MSA where a firm is headquartered. In panel A, dependent variable is the one-year total stock return volatility. In panel B, the dependent variables are respectively the two-year total stock return volatility, the fundamental volatility and the idiosyncratic return volatility. Variable definitions are provided in the appendix. All regressions include year and 2-digit SIC code industry fixed effects. Robust T-statistics are reported and standard errors are clustered at firm level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively. We also report the Cragg-Donald Wald F statistics for the validity of the instrument.

Panel A

	(1)	(2)	(3)
	TotRetVol (12 mon)	TotRetVol (12 mon)	TotRetVol (12 mon)
Geographical Area	0.145***		
	(2.81)		
Census Ethnic Group		0.311*	
		(1.92)	
Census Religion			0.166***
			(2.91)
Age_dissimilarity	-0.047	-0.029	-0.047
	(-1.44)	(-0.66)	(-1.46)
Tenure_dissimilarity	0.003**	0.003	0.003**
	(2.02)	(1.52)	(2.41)
Dirship_dissimilarity	0.000	0.000	0.000
	(1.01)	(1.15)	(1.12)
Diverse_industry	0.017***	0.021**	0.012**
	(2.71)	(2.04)	(2.25)
% of Female Directors	0.005	0.024	0.005
	(0.43)	(1.18)	(0.44)
Log(Assets)	-0.014***	-0.015***	-0.014***
	(-15.81)	(-11.43)	(-16.06)
Logq	-0.022***	-0.022***	-0.021***
	(-10.40)	(-7.66)	(-10.19)
Debt/Assets	0.061***	0.059***	0.061***
	(8.28)	(7.04)	(7.96)
Capex/Assets	0.024*	0.024	0.037**
	(1.65)	(1.30)	(2.19)
R&D/Sales	0.009***	0.007***	0.009***
	(4.59)	(2.84)	(4.12)
Log(FirmAge)	-0.004***	-0.003**	-0.004***
	(-3.61)	(-1.99)	(-4.40)
Log(#ofSegments)	-0.007***	-0.010***	-0.007***
	(-3.35)	(-2.67)	(-3.68)
Log(BoardSize)	-0.004	-0.013	-0.001
	(-0.74)	(-1.16)	(-0.29)
CEOFounder	0.008**	0.009*	0.004
	(2.45)	(1.93)	(1.24)
% of Outside Directors	-0.010	-0.012	-0.002
	(-1.39)	(-1.15)	(-0.22)
Constant	0.229***	0.195***	0.244***
	(16.70)	(6.92)	(16.79)
Cragg-Donald Wald F statistics	103.22	27.91	119.53
Observations	12,171	12,171	12,171
R-squared	0.25	0.24	0.27

Table 6: Firm Volatility and Board Diversity – Instrument Variable Estimation (Continued)

Panel B

	(1)	(2)	(3)
	TotRetVol(24 mon)	Log(VolEPS)(24mon)	Idiovol(24 mon)
Geographical Area	0.149**	8.241**	0.096**
	(2.41)	(2.54)	(2.37)
Age_dissimilarity	-0.065	-3.865**	-0.047
	(-1.42)	(-2.01)	(-1.53)
Tenure_dissimilarity	0.003*	0.202***	0.002*
	(1.74)	(2.65)	(1.73)
Dirship_dissimilarity	0.001	0.021*	0.001*
	(0.94)	(1.75)	(1.66)
Diverse_industry	0.022***	1.041***	0.013**
	(2.58)	(2.88)	(2.22)
% of Female Directors	0.011	0.783	-0.001
	(0.83)	(1.20)	(-0.17)
Log(Assets)	-0.015***	-0.456***	-0.011***
	(-14.35)	(-8.98)	(-15.80)
Logq	-0.026***	-2.983***	-0.016***
	(-10.72)	(-25.54)	(-10.03)
Debt/Assets	0.069***	2.589***	0.034***
	(7.09)	(8.88)	(5.96)
Capex/Assets	0.032*	0.042	0.015
	(1.96)	(0.06)	(1.45)
R&D/Sales	0.011***	0.205**	0.008***
	(4.06)	(2.51)	(4.04)
Log(FirmAge)	-0.004***	-0.182***	-0.003***
	(-3.69)	(-2.93)	(-3.88)
Log(#ofSegments)	-0.007***	-0.346***	-0.006***
	(-3.21)	(-2.97)	(-4.00)
Log(BoardSize)	-0.003	0.111	-0.002
	(-0.45)	(0.38)	(-0.51)
CEOFounder	0.008**	0.291*	0.007***
	(2.21)	(1.73)	(2.76)
% of Outside Directors	-0.011	-0.440	-0.005
	(-1.48)	(-1.21)	(-1.06)
Constant	0.224***	-4.443***	0.149***
	(16.01)	(-5.01)	(14.70)
Cragg-Donald Wald F statistic	72.91	81.57	72.99
Observations	10,298	10,693	10,350
R-squared	0.29	0.18	0.21

Table 7: Firm Volatility and Board Diversity – Controlling for unobserved MSA-heterogeneity

This table relates a proxy for firm volatility to the main proxies for ethnic diversity. In panel A, dependent variable is the one-year total stock return volatility. In panel B, the dependent variables are respectively the two-year total stock return volatility, the fundamental volatility and the idiosyncratic return volatility. Variable definitions are provided in the appendix. In all regressions, we include MSA fixed effects as well as year and 2-digit SIC code industry fixed effects. The MSA is the metropolitan statistical area where each sample firm is headquartered. We present ordinary least squares parameter estimates. Robust T-statistics are reported and standard errors are clustered at firm level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Panel A

	(1)	(2)	(3)
	TotRetVol (12 mon)	TotRetVol (12 mon)	TotRetVol (12 mon)
Geographical Area	0.009**		
	(2.11)		
Census Ethnic Group		0.008*	
		(1.70)	
Census Religion			0.013***
			(2.60)
Age_dissimilarity	0.002	0.003	0.001
	(0.06)	(0.13)	(0.05)
Tenure_dissimilarity	0.004***	0.004***	0.004***
	(3.14)	(3.18)	(3.15)
Dirship_dissimilarity	-0.000	-0.000	-0.000
	(-0.28)	(-0.31)	(-0.24)
Diverse_industry	0.009**	0.008*	0.009**
	(1.98)	(1.94)	(1.98)
% of Female Directors	0.002	0.002	0.001
	(0.17)	(0.21)	(0.15)
Log(Assets)	-0.014***	-0.014***	-0.014***
	(-18.83)	(-18.80)	(-18.72)
Logq	-0.021***	-0.021***	-0.021***
	(-11.87)	(-11.89)	(-11.85)
Debt/Assets	0.059***	0.059***	0.059***
	(7.74)	(7.73)	(7.75)
Capex/Assets	0.021*	0.021*	0.022*
	(1.69)	(1.67)	(1.76)
R&D/Sales	0.010***	0.010***	0.010***
	(5.25)	(5.24)	(5.20)
Log(FirmAge)	-0.004***	-0.004***	-0.004***
	(-4.56)	(-4.57)	(-4.55)
Log(#ofSegments)	-0.003*	-0.003*	-0.003*
	(-1.78)	(-1.80)	(-1.82)
Log(BoardSize)	0.006*	0.006*	0.006*
	(1.71)	(1.71)	(1.67)
CEOFounder	0.007***	0.007***	0.007***
	(2.74)	(2.77)	(2.62)
% of Outside Directors	-0.009	-0.009	-0.009
	(-1.57)	(-1.58)	(-1.45)
Constant	0.194***	0.193***	0.191***
	(6.64)	(6.57)	(6.55)
Observations	12,169	12,169	12,169
R-squared	0.40	0.40	0.40

Table 7: Firm Volatility and Board Diversity – Metropolitan Statistical Area Effect (Continued)

Panel B

	(1)	(2)	(3)
	TotRetVol(24 mon)	Log(VolEPS)(24mon)	Idiovol(24 mon)
Geographical Area	0.012**	0.405*	0.006*
	(2.53)	(1.90)	(1.93)
Age_dissimilarity	0.003	-0.902	-0.003
	(0.08)	(-0.68)	(-0.13)
Tenure_dissimilarity	0.003**	0.253***	0.002**
	(2.41)	(3.71)	(1.97)
Dirship_dissimilarity	-0.000	0.004	0.000
	(-0.12)	(0.43)	(0.52)
Diverse_industry	0.010**	0.459**	0.005
	(2.03)	(1.97)	(1.46)
% of Female Directors	0.002	0.193	-0.006
	(0.18)	(0.37)	(-0.82)
Log(Assets)	-0.015***	-0.456***	-0.011***
	(-17.04)	(-11.89)	(-19.19)
Logq	-0.024***	-2.878***	-0.015***
	(-11.90)	(-30.40)	(-10.89)
Debt/Assets	0.065***	2.409***	0.031***
	(6.37)	(10.72)	(5.18)
Capex/Assets	0.032**	0.258	0.012
	(2.20)	(0.43)	(1.33)
R&D/Sales	0.012***	0.278***	0.009***
	(4.48)	(4.79)	(4.19)
Log(FirmAge)	-0.005***	-0.173***	-0.003***
	(-4.25)	(-3.27)	(-4.41)
Log(#ofSegments)	-0.003*	-0.167*	-0.003**
	(-1.70)	(-1.79)	(-2.51)
Log(BoardSize)	0.009**	0.692***	0.006**
	(2.04)	(3.94)	(2.03)
CEOFounder	0.007**	0.162	0.006***
	(2.12)	(1.17)	(2.71)
% of Outside Directors	-0.010	-0.250	-0.005
	(-1.58)	(-0.89)	(-1.15)
Constant	0.176***	-6.933***	0.143***
	(7.10)	(-6.62)	(8.56)
Observations	10,302	10,696	10,353
R-squared	0.47	0.47	0.35

Table 8: Firm Volatility and Board Diversity – Controlling for Lagged Volatility

This table relates a proxy for firm volatility to the main proxies for ethnic diversity. In panel A, dependent variable is the one-year total stock return volatility. In panel B, the dependent variables are respectively the two-year total stock return volatility, the fundamental volatility and the idiosyncratic return volatility. Variable definitions are provided in the appendix. In all regressions, we control for lagged volatility as well as for year and 2-digit SIC code industry fixed effects. The MSA is the metropolitan statistical area where each sample firm is headquartered. We present ordinary least squares parameter estimates. All regressions include year and 2-digit SIC code industry fixed effects. Robust T-statistics are reported and standard errors are clustered at firm level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Panel A

	(1)	(2)	(3)
	TotRetVol (12 mon)	TotRetVol (12 mon)	TotRetVol (12 mon)
Geographical Area	0.009***		
	(3.22)		
Census Ethnic Group		0.009***	
		(2.72)	
Census Religion			0.011***
			(3.17)
Age_dissimilarity	-0.003	-0.001	-0.003
	(-0.15)	(-0.06)	(-0.13)
Tenure_dissimilarity	0.002**	0.002***	0.002**
	(2.53)	(2.58)	(2.54)
Dirship_dissimilarity	-0.000	-0.000	-0.000
	(-1.45)	(-1.49)	(-1.43)
Diverse_industry	0.004	0.003	0.003
	(1.21)	(1.11)	(1.08)
% of Female Directors	0.005	0.005	0.005
	(0.70)	(0.78)	(0.71)
Log(Assets)	-0.010***	-0.010***	-0.010***
	(-13.32)	(-13.32)	(-13.37)
Logq	-0.016***	-0.016***	-0.016***
	(-12.46)	(-12.45)	(-12.44)
Debt/Assets	0.045***	0.045***	0.045***
	(6.41)	(6.39)	(6.41)
Capex/Assets	0.013	0.012	0.013
	(1.28)	(1.24)	(1.36)
R&D/Sales	0.007***	0.007***	0.007***
	(4.87)	(4.86)	(4.83)
Log(FirmAge)	-0.003***	-0.003***	-0.003***
	(-4.80)	(-4.85)	(-4.87)
Log(#ofSegments)	-0.003***	-0.003***	-0.003***
	(-3.04)	(-3.09)	(-3.08)
Log(BoardSize)	0.004	0.004	0.004
	(1.40)	(1.43)	(1.45)
CEOFounder	0.005***	0.005***	0.005**
	(2.61)	(2.64)	(2.48)
% of Outside Directors	-0.005	-0.006	-0.005
	(-1.27)	(-1.28)	(-1.16)
LagTotRetVol(12mon)	0.308***	0.308***	0.308***
	(12.84)	(12.88)	(12.95)
Constant	0.161***	0.161***	0.162***
	(12.60)	(12.59)	(12.54)
Observations	12,839	12,839	12,839
R-squared	0.42	0.42	0.42

Table 8: Firm Volatility and Board Diversity – Controlling for Lagged Volatility (Continued)
Panel B

	(1)	(2)	(3)
	TotRetVol(24 mon)	Log(VolEPS)(24mon)	Idiovol(24 mon)
Geographical Area	0.005***	0.168**	0.007***
	(2.63)	(2.00)	(3.15)
Age_dissimilarity	0.003	-0.989	-0.004
	(0.16)	(-1.41)	(-0.24)
Tenure_dissimilarity	0.001	0.128***	0.002**
	(0.88)	(3.75)	(2.17)
Dirship_dissimilarity	-0.000	-0.009	0.000
	(-1.38)	(-1.13)	(0.00)
Diverse_industry	0.003	-0.070	0.003
	(1.31)	(-0.65)	(0.96)
% of Female Directors	0.005	0.238	-0.001
	(1.03)	(1.10)	(-0.16)
Log(Assets)	-0.005***	-0.096***	-0.008***
	(-10.01)	(-5.95)	(-14.27)
Logq	-0.012***	-0.830***	-0.013***
	(-10.53)	(-16.89)	(-11.38)
Debt/Assets	0.023***	0.376***	0.024***
	(3.55)	(3.91)	(4.66)
Capex/Assets	0.013	0.997***	0.009
	(1.48)	(3.32)	(1.24)
R&D/Sales	0.005***	0.156***	0.007***
	(4.30)	(4.50)	(3.59)
Log(FirmAge)	-0.001***	-0.030	-0.002***
	(-3.18)	(-1.53)	(-4.76)
Log(#ofSegments)	-0.002**	-0.055	-0.004***
	(-2.03)	(-1.59)	(-4.05)
Log(BoardSize)	0.003	0.114	0.003
	(1.64)	(1.52)	(1.49)
CEOFounder	0.002	0.077	0.005***
	(1.41)	(1.26)	(3.13)
% of Outside Directors	-0.004	-0.124	-0.002
	(-1.34)	(-0.96)	(-0.65)
lagTotRetVol(24mon)	0.638***		
	(38.21)		
LagVolEPS(24mon)		0.863***	
		(94.62)	
LagIdioVOl(24mon)			0.232***
			(7.75)
Constant	0.076***	-0.151	0.109***
	(9.34)	(-0.45)	(10.72)
Observations	10,884	11,193	10,943
R-squared	0.67	0.73	0.35

Table 9: Board Diversity and Board Meetings

This table relates the natural logarithm of the number of board meetings of a firm during an year to our main proxies for board diversity. We present ordinary least squares parameter estimates. All regressions include year and 2-digit SIC code industry fixed effects. Robust T-statistics are reported and standard errors are clustered at firm level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
	Log(Number of Meetings)	Log(Number of Meetings)	Log(Number of Meetings)
Geographical Area	0.468*		
	(1.80)		
Census Ethnic Group		0.531*	
		(1.83)	
Census Religion			0.537*
			(1.65)
Age_dissimilarity	-8.568***	-8.499***	-8.552***
	(-4.85)	(-4.81)	(-4.84)
Tenure_dissimilarity	0.446***	0.449***	0.448***
	(4.41)	(4.45)	(4.42)
Dirship_dissimilarity	0.037***	0.037***	0.037***
	(3.71)	(3.71)	(3.75)
Diverse_industry	-1.206***	-1.216***	-1.223***
	(-4.27)	(-4.31)	(-4.34)
% of Female Directors	-0.004	0.030	-0.003
	(-0.01)	(0.05)	(-0.00)
Log(Assets)	0.043	0.043	0.045
	(0.95)	(0.95)	(0.99)
Logq	-0.576***	-0.574***	-0.574***
	(-5.51)	(-5.50)	(-5.50)
Debt/Assets	1.026***	1.021***	1.022***
	(3.51)	(3.49)	(3.49)
Capex/Assets	-1.131	-1.135	-1.088
	(-1.45)	(-1.45)	(-1.39)
R&D/Sales	0.040	0.040	0.041
	(0.59)	(0.58)	(0.59)
Log(FirmAge)	-0.244***	-0.244***	-0.246***
	(-3.95)	(-3.95)	(-3.98)
Log(#ofSegments)	0.034	0.030	0.032
	(0.31)	(0.28)	(0.30)
Log(BoardSize)	1.845***	1.843***	1.852***
	(8.81)	(8.78)	(8.85)
CEOFounder	-0.040	-0.036	-0.050
	(-0.22)	(-0.21)	(-0.28)
% of Outside Directors	0.110	0.105	0.131
	(0.29)	(0.28)	(0.35)
Constant	3.904***	3.853***	3.969***
	(3.78)	(3.73)	(3.88)
Observations	12,485	12,485	12,485
R-squared	0.10	0.10	0.10

Table 10: Board Diversity, Capital Expenditure and Leverage

This table relates investment and leverage to the main proxies for to the main proxies for ethnic diversity. Investment is proxied by "Capex", the total capital expenditures, scaled by book value of assets at the beginning of the year. Leverage is measured as the total debt divided by book value of assets. Variable definitions are provided in the appendix. We present ordinary least squares parameter estimates. All regressions include year and 2-digit SIC code industry fixed effects. Robust T-statistics are reported and standard errors are clustered at firm level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Capex (t+1)	Capex (t+1)	Capex (t+1)	Leverage (t+1)	Leverage (t+1)	Leverage (t+1)
Geographical Area	-0.003			0.004		
	(-1.53)			(1.10)		
Census Ethnic Group		-0.003			0.005	
		(-1.59)			(1.23)	
Census Religion			-0.006**			0.005
			(-2.45)			(1.01)
Age_dissimilarity	0.030**	0.030**	0.030**	0.049*	0.050*	0.049*
	(2.06)	(2.03)	(2.08)	(1.72)	(1.76)	(1.73)
Tenure_dissimilarity	0.000	0.000	0.000	0.002	0.002	0.002
	(0.27)	(0.25)	(0.29)	(1.57)	(1.58)	(1.57)
Dirship_dissimilarity	-0.000	-0.000	-0.000	-0.001**	-0.001**	-0.001**
	(-0.49)	(-0.48)	(-0.52)	(-2.10)	(-2.11)	(-2.10)
Diverse_industry	0.000	0.000	0.000	0.007	0.007	0.007
	(0.14)	(0.18)	(0.16)	(1.59)	(1.57)	(1.55)
% of Female Directors	-0.012**	-0.013**	-0.012**	-0.007	-0.006	-0.007
	(-2.48)	(-2.52)	(-2.49)	(-0.70)	(-0.67)	(-0.70)
Log(Assets)	-0.000	-0.000	-0.000	0.003***	0.003***	0.003***
	(-1.14)	(-1.15)	(-1.16)	(3.61)	(3.63)	(3.65)
Logq	0.012***	0.012***	0.012***	-0.003	-0.003	-0.003
	(10.56)	(10.55)	(10.55)	(-1.54)	(-1.54)	(-1.53)
Debt/Assets	-0.005*	-0.005*	-0.005*	0.874***	0.874***	0.874***
	(-1.79)	(-1.78)	(-1.82)	(96.65)	(96.71)	(96.77)
Capex/Assets	0.627***	0.627***	0.626***	0.066***	0.066***	0.067***
	(27.59)	(27.61)	(27.52)	(4.60)	(4.60)	(4.62)
Log(FirmAge)	0.000	0.000	0.000	-0.001	-0.001	-0.001
	(0.91)	(0.93)	(0.92)	(-1.08)	(-1.09)	(-1.10)
Log(#ofSegments)	0.002**	0.002**	0.002**	-0.001	-0.001	-0.001
	(2.19)	(2.22)	(2.22)	(-0.58)	(-0.61)	(-0.59)
Log(BoardSize)	0.000	0.000	0.000	-0.003	-0.003	-0.003
	(0.10)	(0.10)	(0.13)	(-0.95)	(-0.96)	(-0.94)
CEOFounder	0.000	0.000	0.001	-0.007**	-0.007**	-0.007**
	(0.29)	(0.28)	(0.39)	(-2.43)	(-2.42)	(-2.46)
% of Outside Directors	-0.002	-0.002	-0.003	0.005	0.005	0.005
	(-0.74)	(-0.73)	(-0.82)	(0.79)	(0.78)	(0.82)
Constant	-0.004	-0.004	-0.004	0.008	0.007	0.008
	(-0.70)	(-0.65)	(-0.74)	(0.62)	(0.58)	(0.67)
Observations	13,264	13,264	13,264	13,243	13,243	13,243
R-squared	0.67	0.67	0.67	0.82	0.82	0.82

Table 11: Board Diversity and Innovation Output

This table relates patent citations and patent applications to our main proxies for board diversity. Variable definitions are provided in the appendix. We present ordinary least squares estimates. All regressions include year and 2-digit SIC code industry fixed effects. Robust T-statistics are reported and standard errors are clustered at firm level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	Log number of citations			Log number of patent grants		
	(1)	(2)	(3)	(4)	(5)	(6)
Geographical Area	0.171**			0.254**		
	(2.42)			(2.13)		
Census Ethnic Group		0.137*			0.091	
		(1.84)			(0.73)	
Census Religion			0.080			0.078
			(0.88)			(0.53)
Age_dissimilarity	0.464	0.547	0.533	0.647	0.785	0.766
	(0.76)	(0.90)	(0.88)	(0.64)	(0.78)	(0.76)
Tenure_dissimilarity	0.019	0.019	0.019	0.028	0.029	0.030
	(0.87)	(0.87)	(0.90)	(0.81)	(0.83)	(0.84)
Dirship_dissimilarity	-0.033**	-0.035***	-0.034***	-0.040*	-0.042**	-0.042**
	(-2.56)	(-2.65)	(-2.64)	(-1.95)	(-2.04)	(-2.04)
Diverse_industry	0.044	0.031	0.028	0.199	0.177	0.175
	(0.55)	(0.39)	(0.35)	(1.54)	(1.37)	(1.35)
% of Female Directors	-0.045	-0.046	-0.054	0.153	0.144	0.139
	(-0.27)	(-0.27)	(-0.32)	(0.54)	(0.50)	(0.49)
Log(Assets)	0.182***	0.183***	0.184***	0.350***	0.352***	0.352***
	(12.24)	(12.25)	(12.28)	(14.35)	(14.36)	(14.40)
Logq	0.122***	0.122***	0.122***	0.246***	0.246***	0.246***
	(3.58)	(3.56)	(3.57)	(4.21)	(4.20)	(4.20)
Debt/Assets	-0.195**	-0.201**	-0.204**	-0.400***	-0.415***	-0.415***
	(-2.20)	(-2.26)	(-2.29)	(-2.76)	(-2.84)	(-2.84)
Capex/Assets	-0.150	-0.159	-0.152	-0.406	-0.427	-0.417
	(-0.63)	(-0.66)	(-0.63)	(-0.95)	(-0.99)	(-0.97)
R&D/Sales	0.008	0.011	0.010	0.126*	0.132*	0.130*
	(0.29)	(0.38)	(0.35)	(1.80)	(1.89)	(1.87)
Log(FirmAge)	0.031*	0.031*	0.030*	0.066**	0.065**	0.065**
	(1.79)	(1.74)	(1.73)	(2.16)	(2.13)	(2.12)
Log(#ofSegments)	0.058*	0.057*	0.058*	0.111*	0.111*	0.112*
	(1.73)	(1.70)	(1.74)	(1.93)	(1.93)	(1.94)
Log(BoardSize)	-0.204***	-0.203***	-0.199***	-0.265**	-0.261**	-0.257**
	(-2.99)	(-2.97)	(-2.91)	(-2.40)	(-2.36)	(-2.33)
CEOFounder	0.108**	0.108**	0.106**	0.180**	0.178**	0.177**
	(2.24)	(2.23)	(2.19)	(2.35)	(2.32)	(2.31)
% of Outside Directors	0.124	0.125	0.131	0.350**	0.352**	0.358**
	(1.36)	(1.37)	(1.42)	(2.38)	(2.39)	(2.41)
Constant	-0.087	-0.087	-0.052	-1.083	-1.039	-1.022
	(-0.29)	(-0.29)	(-0.18)	(-1.24)	(-1.21)	(-1.19)
Observations	4,054	4,054	4,054	4,054	4,054	4,054
R-squared	0.41	0.41	0.41	0.52	0.52	0.52

Table 12: Board Diversity and Firm Performance

This table relates firm performance to our main proxies for board diversity. Firm performance is measured as average ROAs between year t+1 and t+3. In columns 2 to 4, we present quintile regressions. The relevant quintile is indicated on top of each column All regressions include year and 2-digit SIC code industry fixed effects. Robust T-statistics are reported and standard errors are clustered at firm level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
	Q=10th	Q=50th	Q=90th
Geographical Area	-0.025**	-0.007**	0.002
	(0.010)	(0.003)	(0.004)
Age_dissimilarity	0.146*	-0.015	-0.027
	(0.086)	(0.026)	(0.036)
Tenure_dissimilarity	-0.023***	-0.004***	-0.001
	(0.003)	(0.001)	(0.001)
Dirship_dissimilarity	0.002	0.001***	0.001**
	(0.001)	(0.000)	(0.000)
Diverse_industry	0.007	0.003	0.007
	(0.012)	(0.004)	(0.005)
% of Female	-0.025	-0.014*	-0.004
	(0.025)	(0.008)	(0.010)
Log(Assets)	0.019***	0.005***	-0.002***
	(0.002)	(0.001)	(0.001)
Logq	0.100***	0.083***	0.099***
	(0.005)	(0.001)	(0.002)
Debt/Assets	-0.017	-0.025***	-0.014***
	(0.011)	(0.003)	(0.005)
Capex/Assets	-0.011	-0.042***	-0.044***
	(0.034)	(0.010)	(0.014)
R&D/Sales	-0.241***	-0.078***	-0.034***
	(0.003)	(0.001)	(0.001)
Log(FirmAge)	0.011***	0.004***	0.001
	(0.002)	(0.001)	(0.001)
Log(#ofSegments)	0.008*	0.001	-0.000
	(0.004)	(0.001)	(0.002)
Log(BoardSize)	-0.015*	-0.005*	-0.001
	(0.008)	(0.003)	(0.004)
CEOFounder	-0.024***	-0.009***	-0.004
	(0.007)	(0.002)	(0.003)
% of Outside	-0.005	-0.002	0.001
	-0.025**	-0.007**	0.002
Constant	-0.258***	-0.056***	0.038*
	(0.047)	(0.014)	(0.020)
Observations	10800	10800	10800
R-squared	0.339	0.234	0.320