Corporate Risk Culture

Yihui Pan
University of Utah

Stephan Siegel
University of Washington

Tracy Yue Wang
University of Minnesota

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Abstract

We examine the formation and evolution of firms' attitudes towards risk and uncertainty, characterized by the shared risk preferences of corporate executives and directors, as well as their effect on corporate policies. We document the existence of commonality in risk preferences inside the firm, which arises as CEOs are selected to match the risk attitudes of existing directors and executives, and CEOs in turn shape the composition of executive teams and boards to be more aligned with their own risk preferences. Selection also gives rise to persistence in corporate risk attitudes over time and across generations of leadership, tracing the origin of culture back to the founder's risk attitude. Firms' risk-taking policies are significantly associated with corporate risk culture. In the cross section, difference in founders' risk attitudes is an important determinant of persistent differences in corporate risk-taking. Finally, divergence in risk preferences among corporate leaders affects real decisions in the firm, and is associated with more use of formal incentives in coordinating incentives.

JEL classification:
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1. Introduction

Following the recent global financial crisis, corporate culture with respect to risk, has become an object of focus and discussion by regulators, firms, and media. In a recent survey of almost 500 bank executives, half of the respondents identified corporate attitudes towards risk as a leading contributor to the global financial crisis (KPMG (2015)). In a world with incomplete contracts, corporate risk culture, i.e., the attitude towards risk and uncertainty shared by corporate decision makers, could indeed play an important role to coordinate and regulate firms' risk-related choices and decisions (e.g., O'Reilly (1989) and Kreps (1990)). However, little is known about how attitudes towards risk and uncertainty inside firms form, evolve over time, and ultimately affect corporate decisions.

We contribute to filling this gap. In our analysis, we characterize a firm's culture towards risk as the shared risk preferences of those at the top of the firm, i.e., founders, CEOs, other top executives, and board members. The corporate setting allows us to observe the initial formation of corporate risk culture, in the form of the risk attitudes of the founders, the successive changes as the firm's leadership team changes, and its effect on corporate risk-taking. Of course, firms do not rely exclusively on informal norms, but also employ formal incentives, for example by compensating CEOs directly for taking risks. We therefore also examine the interplay of firms' informal risk culture and more formal incentives.

Recent research shows that individuals' economic preferences, in particular risk attitudes and future-orientation (or patience), are partly shaped by cultural heritage (Chen (2013), Pan, Siegel, and Wang (2014), Becker, Enke, and Falk (2015)). Similar to biologically predisposed behaviors, culturally transmitted preferences are determined early in life, persistent, and therefore fundamental to understanding an individual's economic decisions (Giavazzi, Petkov, and Schiantarelli (2014)). Differently from variation due to genetic differences, variation in cultural origins is in many cases easily observed. In this study, we exploit the diversity of culturally determined risk preferences among corporate founders, executives, and board members in public

U.S. firms. Specifically, we use a person's last name to infer her cultural heritage and to determine her culturally transmitted risk preference. To do so, we match the last names of a large set of corporate leaders of over 7000 firms in a 19-year period to immigration records of passengers arriving in the port of New York between 1820 and 1957. Based on the citizenship of arriving passengers with a given last name, we obtain a distribution of countries of origin for each last name.

We employ Hofstede's (1980, 1991, 2001) uncertainty avoidance index (UAI) as a proxy for risk attitudes associated with cultural heritage. According to Hofstede, UAI captures a country's tolerance for uncertain and unfamiliar situations. Rieger, Wang, and Hens (2014) show that UAI, measured at the country level, is significantly correlated with individual risk preferences obtained from a survey of about 7,000 individuals in 53 countries. Using the distribution of countries of origin for each last name, we obtain a proxy for a person's risk attitudes in the form of the weighted average UAI across the associated countries of origin.

We begin our empirical analysis by documenting the commonality in risk preferences of key decision makers inside a firm, and propose the common component of corporate leaders' risk preferences as a measure of corporate risk culture. We examine its persistence over time and over multiple generations of corporate leaders, including firms' founders.

The strong and persistent commonality in risk attitudes inside a firm leads us to examine the mechanism that gives rise to it. According to Van den Steen (2010), corporate culture originates from selection or self-sorting of employees with similar beliefs and preferences into a firm as well as from learning experiences shared by those inside the firm. Given the predetermined nature of our risk preference proxy, which does not vary with experience, we cannot speak to the learning channel. But our approach is perfect to study the importance of selection for the persistence and evolution of corporate risk culture, as any commonality in risk preferences inside a firm (our notion of the risk culture) has to come from the selection channel. We ask how the risk attitudes of a firm's existing leadership, i.e., its board of directors and its

executive team, determine the selection of new CEOs, and how new CEOs in turn shape the composition of the board and the executive team based on risk attitudes. We also emphasize the long-lasting effect of the founders on the firm's risk culture.

Next, we study the role of corporate risk culture with respect to corporate risk taking. Specifically, since all investment decisions are made under uncertainty, we expect risk attitudes among corporate leaders to be significantly related to risky corporate investment decisions, such as acquisitions and R&D investments. Similarly, firms with a more uncertainty averse culture might have lower financial leverage and hold larger amounts of cash. Furthermore, founders' risk attitude, being the firm's risk culture at the very beginning of the firm's existence, could offer new insights about the persistent differences in risk taking across firms. Contrasting persistent policies such as R&D and cash with more dynamic and discrete decisions such as acquisitions, also deepens our understanding of the role that corporate risk culture plays in corporate decision making.

Selection is, of course, unlikely to lead to perfect matching on risk preferences between the existing corporate risk culture and new decision makers. For example, CEOs are selected on multiple dimensions, including skills and experiences. In case of large differences between the risk attitude of the CEO and that of the board, the firm might use formal incentives such as compensation contracts and job retention to better align the CEO's risk preference with those of the firm, suggesting an interaction between the strength of risk culture and the use of formal incentives.

Our results can be summarized as follows. First, we document significant commonality in risk preferences of a firm's CEO, executives, and outside directors. The first principal component of corporate leaders' risk preferences explains 43% of the variation across these leaders, compared to about 33% if corporate leaders were grouped randomly. We also document that such commonality is highly persistence across generations of leadership. In particular, using a subset of firms with information on their founders who are no longer part of the firm's leadership team,

we find that corporate risk culture is still significantly related to the founder's risk preference. Thus, the founder's risk preference, or the firm's founding risk culture, is an important time-invariant determinant of the firm's risk culture.

Second, we show how the persistent commonality in risk attitudes arises through the selection of corporate leaders. Specifically, we find that about 19% of the variation in incoming CEOs' risk preferences can be explained by the pre-turnover corporate risk culture, in particular by the risk preferences of the outside directors and top executives before the CEO turnover. The matching on risk preferences is not driven by boards and top executives simply selecting incoming CEOs with the same ethnicities or promoting people from the current management teams. Following the appointment of a new CEO, we find that differences in risk preferences across the firm's leadership team decrease over the CEO's time in office, consistent with CEOs promoting subordinates and appointing directors with risk preferences similar to their own.

Third, firms with a more uncertainty averse culture indeed invest less in R&D and acquisitions, hold more cash, and have lower financial leverage. Further, differences in the firm's founding risk culture in the form of founders' risk preference is an important determinant of persistent differences in risk taking across firms.

Finally, divergence in corporate leaders' risk attitudes can affect real decisions in the firm. Firms with weaker risk culture seem to make fewer acquisitions that usually require broad agreement within a firm. These firms also try to make more use of retention/termination and compensation incentives to align risk attitudes. Specifically, a CEO' compensation contract exhibits higher vegas, that is, it is more risk inducing, when the CEO has a lower uncertainty tolerance relative to the firm's board. CEOs whose risk preferences differ more from those of the board and executive team also tend to have shorter tenure.

Our study contributes to a new and growing literature on corporate culture. Guiso et al. (2014) and Popadak (2014) focus on corporate culture in terms of values such as integrity and customer satisfaction and measured through surveys or comments of firms' rank-and-file

employees, and its impact on firm value. Our analysis focuses on another important dimension, the firm's attitude towards risk and uncertainty. We characterize the formation, evolution, and persistence of a firm's risk culture, its interaction with formal incentives, and its effect on firm policies.

Prior studies have found that certain corporate policies are very persistent, as firm fixed effects or policies in the remote history still have strong predictive power for a firm's ongoing policies (e.g., Lemon, Roberts, and Zender (2008)). Our study suggests that one source of such policy persistence is the persistence in corporate culture, going back to the firm's founding culture in the form of the founders' preferences and values. For example, we find that persistent policies in the firm such as R&D, cash and leverage policies still reflect the founders' risk attitudes, even after the founder has long stepped down from the firm's leadership.

The rest of this paper is organized as follows. Section 2 introduces the main data for our empirical analysis and provides a detailed discussion of our measures of risk preferences of corporate leaders. Section 3 documents the existence of persistent commonality in the risk attitudes of corporate leaders inside a firm, and examines the formation and evolution of corporate culture through leadership selection. Section 4 examines how corporate risk culture affects corporate policies, and Section 5 examines the interplay between corporate risk culture with formal incentives. Section 6 concludes.

2. Data

2.1. Risk Attitudes of Corporate Leaders

Studies of corporate culture face the challenge that preferences and beliefs shared by corporate insiders, in particular by those at the top of the firm, are hard to observe. Hence researchers often rely on survey data, typically available only for small cross-sections of firms. We propose a new approach to overcome these limitations. The approach is based on the following arguments. First, attitudes towards risk and uncertainty differ across countries and

national cultures (e.g., Hofstede's (1980), Rieger, Wang, and Hens (2014), Becker et al. (2015)). Second, differences in preferences and attitudes often persist between individuals of different origins, even though these individuals grew up in the United States (U.S.) and their families might have been in the U.S. for several generations (e.g., Fernandez and Fogli (2006, 2009), Giavazzi, Petkov, and Schiantarelli (2014)). Finally, historical immigration records associated with a person's last name make it possible to construct a proxy for the countries of origin associated with that person. Thus using information on a person's likely origin together with risk preferences associated with different countries of origin, we are able to infer attitudes to risk and uncertainty for a large set of corporate leaders.

Our sample consists of publicly traded firms headquartered in the U.S., for which we can identify the CEO, other non-CEO top executives, as well as the firm's directors in a given year. Specifically, we collect the first and last names of CEOs and of the four most highly paid non-CEO executives using *Standard & Poor's ExecuComp* database, which covers S&P 1500 firms starting in 1992, and *Capital IQ*, which covers a large number of firms starting in 1996. Similarly, we collect information on directors' identity from *RiskMetrics* and *Capital IQ*. We are also able to identify the names of founders for a subset of firms using data from a number of sources, including *Wikipedia* and *Funding Universe*.

For each individual in our sample, we estimate the likelihood that her ancestors are from a given country, using her last name together with passenger lists of ships arriving in New York City from foreign ports between 1820 and 1957. The passenger lists, which are available through *Ancestry.com*, indicate each passenger's first and last names, gender, approximate birth year, and the passenger's nationality (see Appendix A for an example). We search through all available passenger records with non-missing and non-U.S. nationalities and, for each last name in our sample, compute the frequency distribution across 121 countries of origins.[1] The largest origin

[1] When needed, we aggregate historical origins to their modern counterparts. For example, we group different German origins, such as Hesse, Pomerania, and Preussen under Germany. In a few cases, we

for each name represents 65% of all non-missing and non-US records on average. Furthermore, 72% of the names have a dominant origin, i.e., an origin with a frequency weight of more than 50%. For example, according to these New York passenger lists, 55% of passengers with the last name *Welch* are of British origin, while 25% are Irish. The remaining 20% come from a variety of other countries.

We construct a proxy for an individual's attitude towards risk and uncertainty by combining this frequency distribution across countries of origin with a country-level measure of risk preferences. In particular, to characterize attitudes towards risk and uncertainty for each country of origin, we employ Hofstede's (1980, 1991, 2001) uncertainty avoidance index (UAI), which we rescale to take on values between 0 and 1. According to Hofstede, the uncertainty avoidance index indicates to what extent members of a national culture "feel either uncomfortable or comfortable in unstructured situations. Unstructured situations are novel, unknown, surprising, and different from usual."[2] Hofstede initially constructed the index by statistically analyzing answers to questions asked in detailed interviews of IBM employees in 53 countries between 1978 and 1983. Since then, the index has been replicated several times with non-IBM populations and extended to additional countries (Hofstede, Hofstede, and Minkov (2010), Rieger, Wang, and Hens (2014)). According to Hofstede et al. (2010), Denmark, Sweden, China, Ireland, and Great Britain are countries characterized by particularly low uncertainty avoidance, with UAI taking on values between 0.21 for Denmark and 0.31 for Great Britain. On the other hand, Greece, Portugal, Poland, France, and Italy are countries with relatively high uncertainty avoidance, with UAI ranging between the maximum of 1.00 in the case of Greece and 0.67 in the case of Italy.

While uncertainty avoidance and risk aversion are not the same, we verify that Hofstede's country-level UAI is significantly correlated with standard measures of risk aversion. Specifically,

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further group certain, typically smaller nationalities into larger groups. For example, we group Syrian and Tunisian passengers with those who state their nationality as "Arab," "Arabic," or "Arabian." See Pan, Siegel, and Wang (2014) for further details.

[2] See Geert Hofstede's website: http://www.geerthofstede.nl/dimensions-of-national-cultures.

using country-level lottery-based measures of risk aversion from Rieger, Wang, and Hens (2014), we find a correlation of 0.28 with the uncertainty avoidance index used here. Similarly, UAI and the country-level, survey-based measure of risk aversion from Becker et al. (2015) exhibit a correlation of 0.35.[3] At the same time, the notion of uncertainty avoidance as defined by Hofstede seems quite relevant in a corporate setting as corporations often face uncertainty arising from unstructured situations.

For each individual in our sample of corporate leaders, we form a weighted average of UAI associated with each relevant country of origin. That is, we calculate *UAI* for an individual with last name l as $UAI_l = \sum w_{lj} UAI_j$, where w_{lj} represents the passenger-record based frequency for last name *l* with respect to country *j*. We rescale the weights appropriately as we have country-level UAI values for only 91 out of the 121 possible countries of origins.

Table 1 Panel A reports summary statistics of our risk aversion proxy for CEOs (*UAI (CEO))*, other executives, outside (non-executive) directors, and founder(s). To characterize the risk attitudes of a firm's executive team and of a firm's outside directors, we average the UAI of the four most highly paid non-CEO executives as well as the UAI of the non-executive directors, for each firm-year. On average, we include four non-CEO executives and five outside directors in the calculation of *UAI (Executives)* and *UAI (Outside Directors)*. Similarly, if more than one person founded a given company, we average the UAIs across the members of the founding team (*UAI (Founders))*. Average UAIs are very similar across all groups, ranging between 0.448 (executives) and 0.467 (CEOs).

Our approach to measuring corporate leaders' attitudes towards risk and uncertainty has a number of strengths as well as several weaknesses that we briefly discuss here and address in more detail in our analysis below as well as in a companion paper. First, our characterization of

[3] Rieger, Wang, and Hens conduct a survey of about 7,000 participants in 53 countries. The reported correlation refers to risk aversion extracted from lotteries with positive expected pay-offs. Becker et al. (2015) survey 80,000 participants in 76 countries about their self-assessed willingness to take risk. We thank Benjamin Enke for providing the correlation statistic for the Becker et al. (2015) data.

corporate risk culture as the risk preferences shared by senior corporate leaders requires us to consistently measure risk preferences across a large set of individuals. The last-name-based approach allows us to approximate corporate leaders' risk preferences not only for a large number of firms, but also across several generations of leadership within a firm, including the risk preferences of a firm's founder(s) even after the founder has long left the firm. The resulting large panel data set of corporate risk culture enables us to study the formation and evolution of corporate risk culture as well as its impact on the firm's long-term risk-taking policies. However, the trade-off is that the approximation based on last names introduces measurement errors in our risk preference proxy, as we use a distribution of origins to approximate a person's true origin.

Second, by relying on culturally transmitted aspects of a person's risk attitudes, we capture a pre-determined and time-invariant component of an individual's preferences that by design cannot be caused by experiences, life events, or choices an individual makes (except for rare events related to changes of a person's last name). In the corporate context, this implies that any commonality we observe among a firm's leaders is due to selection of these leaders as opposed to social influences (Ahern, Duchin, and Shumway (2014)) or shared experiences (Van den Steen (2010)). While this means that the mechanism by which corporate risk culture arises in our context is well-identified, it also implies that we do not capture a firm's corporate risk culture in its entirety.

2.2. Outcome Variables

In our empirical analysis, we examine the selection of corporate leaders based on their risk preferences (Section 3), the impact of the shared risk preferences on corporate investment and financial policies (Section 4), and the interaction between corporate culture and formal incentives such as compensation and retention (Section 5).

Part of our selection analysis in Section 3 exams the absolute differences in UAI between the CEO and the Board, $|UAI\ (CEO) - UAI\ (Outside\ Directors)|$, and between the CEO and the executive team, $|UAI\ (CEO) - UAI\ (Executives)|$, over the course of a CEO's tenure. Table 1

Panel B reveals that on average the CEO's UAI differs from that of the outside directors as well as the executive team by about 0.14 or about 30% relative to the average CEO UAI.

In Section 4, we examine the association between the corporate leaders' risk attitudes and corporate investment and financial policies that are related to risk taking decisions. In particular, on the investment side we consider corporate acquisitions and investments in research and development (R&D). Acquisitions and the integration or reorganization associated with them are often marked by significant uncertainty. Similarly, R&D investments often require long-term commitments towards unknown outcomes. The existing literature has therefore used both policies when examining firms' willingness to take risk (e.g., Bhagat and Welch, 1995; Kothari et al., 2001; Coles et al., 2006; Kim and Lu (2011); Graham, Harvey, and Puri (2013)). We construct an indicator variable *Acquisition* that equals one if a firm makes a completed acquisition of assets or equity interests with disclosed transaction values covered by the SDC database during a given year and zero otherwise.[4] We calculate the *R&D Rate* as R&D expenses scaled by total sales, following Hirschey and Weygandt (1985), Lev and Sougiannis (1996), and Chambers et al. (2002). On the financial side, we consider *Cash Rate,* defined as cash holdings scaled by total book assets, and *Leverage,* defined as total book debt scaled by the sum of book debt and book equity. Debt payments pose significant constraints on a firm's financial flexibility, thus increase the volatility and hence riskiness of equity returns. In contrast, cash holdings offer financial flexibility and lower risk.

All corporate policy variables are winsorized at the 1st and 99th percentiles, except *R&D Rate,* which is highly skewed and is winsorized at the 2nd and 98th percentiles. Summary statistics suggest that on average the probability of a firm making an acquisition in a year is 17.2%. Conditional on non-missing R&D data, the average firm exhibits an *R&D Rate* of 46.7%. On the

[4] We exclude leveraged buyouts, exchange offers, repurchases, spinoffs, minority stake purchases, recapitalizations, self-tenders, and privatizations. We include only deals after which the acquirer owns at least 50% of the target.

financial side, the *Cash Rate* of the average firm is 16.3%, while the average leverage ratio is 33.1%.

Finally, in Section 5, we analyze the interaction between corporate risk culture and formal incentives such as the length of CEO tenure in the firm and the CEO's compensation vega. We follow Coles, Daniel, and Naveen (2006) and calculate vega for a subset of firms with available ExecuComp data. Vega is defined as the dollar change (in millions) in a CEO's wealth associated with a one-percentage-point change in the firm's stock return volatility. Conditional on vega being non-missing and non-zero, firms on average pay CEOs $143,000 for each percentage point increase in the volatility of the firm's stock return. The average tenure length of CEOs in our sample is 6.58 years with a standard deviation of 7.07 years.

2.3. Additional Variables

In parts of our empirical analysis, we also control for CEO characteristics such as age, education, gender, and firm characteristics such as firm size (logarithm of net sales), market-to-book ratio, and profitability (return on assets (ROA)). Table 1 Panel C reports summary statistics for these additional variables. Appendix B provides a detailed definition of all variables used in this paper.

3. Origin and Persistence of Corporate Risk Culture

Schein (1985) defines corporate culture as the beliefs and preferences shared by an organization's members, in particular by the organization's senior leaders. Thus, the foundation of corporate risk culture is the commonality in the risk preferences of a firm's senior leaders. In this section, we first document the existence of such commonality and its persistence, and propose the commonality in risk preferences as a measure of corporate risk culture. We then study the role of leadership selection based on risk preferences as well as the lasting impact of the founders' risk preferences in the formation and evolution of the firm's risk culture.

3.1. Commonality in Risk Attitudes among a Firm's Leaders

We define a firm's senior leadership to include the CEO, the executive team, and the non-executive directors. We measure the commonality among these corporate leaders' risk attitudes through a principal component analysis of risk attitudes, i.e., *UAI (CEO)*, *UAI (Executives)* and *UAI (Outside Directors)*. Panel A of Table 2 reports the results for our main sample of 6,110 firms with 36,880 firm-year observations. Specifically, the first principal component, which we refer to as "*UAI (Common)*", explains 43% of the total variation across the three parties' risk preferences. That is, *UAI (Common)* explains almost an additional 10 percentage points of the variation relative to what we would observe if corporate leaders were selected independently of their risk attitudes (33.3%).[5]

Panel B of Table 2 confirms that the commonality in risk preferences in our data is not due to chance. First, we randomly match CEOs, executive teams, and outside directors in the same year 100 times, and extract the first principal component of their UAIs each time. The first principal component on average explains about 33.6% (with a tight confidence interval ranging from 33.5 to 33.8%) of the total variation in UAIs, suggesting that the risk attitudes of randomly matched corporate leaders are largely independent of each other.

Commonality in risk preferences among corporate leaders could arise if corporate leaders come from the same geographical area within the U.S., for example, due to partially segmented executive and director labor markets (Knyazeva, Knyazeva, and Masulis (2013); Yonker (2015)), and are more likely to share the same ethnic background. To assess the possible impact of ethnicity clustering by geographical region, we randomly match the three leadership parties sampling only from within the firm's headquarter state in the same year. In this case, the first principal component of UAIs explains about 35.6% of the total variation, still well below the 43%

[5] Specifically, *UAI (Common)* is defined as the following linear combination: *UAI (Common)* = 0.568 *UAI (CEO)* + 0.590 *UAI (Outside Directors)* + 0.574 *UAI (Executives)*. We rescale *UAI (Common)* to have the same mean and variance as *UAI (CEO)*.

observed in actual matches in firms. Similarly, we account for potential ethnicity clustering in industries by conducting random matches of corporate leaders within industry-years. The industry effect on commonality is even smaller than the geographic effect, with the first principle component explaining about 34.1% of the total variation. Finally, the last row of Panel B reveals that state and industry effects together can only explain a small part of the commonality we observe in the actual data. Randomly assembling CEOs, outside directors, and executives within the firm's headquarter state and industry in the same year, leads to the first principal component explaining 36.0% of the total variation, compared to 43% found in the actual data in Panel A.

Although our approach allows us to approximate the risk preferences of a large sample of U.S. corporate leaders, it is a noisy approximation. In particular, we rely on a distribution of possible origins for a last name to infer a person's true origin. While 72% of corporate leaders' last names have a dominant origin, the average (median) number of different origins per last names is 14 (11). In addition to the number of origins associated with a given person, the dispersion of the different UAI values entering a person's weighted average should also capture the difficulty of accurately identifying an individual's true risk preference. The average (also median) dispersion across origins associated with a given last name is 0.14.

To gauge the impact of measurement error, we first consider a subsample of firm-years for which the number of origins associated with the CEO's last name, the average number of origins associated with outside directors, and the average number of origins associated with the executives are all in the bottom 50 percentile of their sample distributions. We compute *UAI (Common)* for this subsample with presumably smaller measurement error. Panel C of Table 2 shows that *UAI (Common)* explains 45.08% of the total variation in leadership's UAIs, only slightly higher than the 43% in the full sample.[6] We obtain an even more modest improvement of

[6] We have verified that the higher fraction of variation explained by UAI (Common) in the small subsamples in Panel C of Table 2 is not driven by the sample size. We randomly draw firms to form test subsamples of same sizes as the cleaner subsamples in Panel C, and compute the fraction of variation

the commonality estimate when using the standard deviation of UAI values across all possible origins associated with a given last name to create, in the same way, a subsample that is less affected by possible measurement error.

Overall, the results in Panel C suggest that measurement error in the UAI has a modest downward bias on the estimate of commonality in risk preferences. We also note that any measurement error in corporate leaders' UAIs and *UAI (Common)* applies equally to the actual sample in Panel A and the randomly generated sample in Panel B. Thus, the differences in the estimated commonality between the two panels cannot be due to measurement errors.

3.2. Persistence of Corporate Risk Culture

Culture in general is perceived to be slow-moving and persistent. We therefore examine the persistence of corporate risk culture, as proxied for by *UAI (Common)*.

We first tabulate the within-firm auto-correlation in *UAI (Common)* for a 10-year period. Panel A of Table 3 suggests that *UAI (Common)* is highly persistent over time. The year-to-year correlation is 0.89. There is a gradual decay of correlation as we increase the number of lags, but the correlation with a 10-year lag is still close to 0.50.

The high auto-correlation in *UAI (Common)* may not be surprising, as a firm's leadership team does not significantly change from year to year. We therefore also report the auto-correlation in *UAI (Common)* across generations of leadership. A generation is defined by the regime of a given CEO and we average *UAI (Common)* over the years belonging to one CEO's tenure. The results in Panel B of Table 3 suggest that the correlation in *UAI (Common)* across different generations of leadership is also high. Specifically, the correlation with the previous generation is 0.632, the correlation with the average *UAI (Common)* four generations prior is still 0.301, all of which are highly significant.

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explained by UAI (Common) in those test subsamples. The fraction is always very close to 43% in the test subsamples, similar to the number in the full sample.

Overall, these results suggest that despite the changes in leadership, the corporate risk culture is indeed quite persistent. We next examine the forces that give rise to the persistent commonality in risk preferences.

3.3. The Role of Leadership Selection

How does the commonality in risk attitudes among the firm's leaders arise? According to Van den Steen (2010), corporate culture can originate from two main sources: selection or self-sorting of employees, and shared learning experiences at work. Since our risk preference proxy for a given individual does not vary with time and cannot be affected by work experiences, any commonality in risk preferences has to come from the selection of corporate leaders with similar risk preferences into a firm. Thus, our results highlight the importance of leadership selection for the origin and persistence of corporate risk culture. We first discuss the selection of the CEO and then the selection of the executive team and the outside directors.

3.3.1. Selection of CEOs

What determines an incoming CEO's risk preference? Do firms select new CEOs to match the risk preferences of the existing leadership? Answers to these questions shed light on how leadership selection gives rise to correlated risk preferences within a leadership team (the basis of corporate risk culture), and how the risk preference of one generation of leadership relates to the next (the persistence of risk culture).

To answer these questions, we focus on a subset of 3,651 CEO turnovers between 1996 and 2012 with information on the composition of the board and the executive team before the turnovers. First, we relate the incoming CEO's risk preference to the firm's risk culture right before CEO turnover. Column (1) of Table 4 reports a positive and significant relation between the two. The firm's existing risk culture alone explains 13% of the variation in the incoming CEO's risk preference.

One of the board's main responsibilities is to select CEOs. The departing CEO and the top executives will in many cases be consulted in the search process as well. We therefore

examine the relation between the UAI of the incoming CEO and the UAIs of pre-turnover leaders: the pre-turnover outside directors, *Pre-turnover UAI (Outside Directors)*, the pre-turnover non-CEO top executives, *Pre-turnover UAI (Executives)*, and the departing CEO, *Pre-turnover UAI (CEO)*.

The results in Column (2) of Table 4 show that both the outside directors' and the top executive team's uncertainty avoidance are important and highly significant determinants of the new CEO's UAI, while the departing CEO's UAI has an insignificant effect. Together, the risk preferences of the existing leadership explain 19% of the variation in the incoming CEO's risk preference. In Column (3), we control for characteristics of the incoming CEO as well as of the firm. We also include headquarter state fixed effects and (2-digit SIC) industry fixed effects to absorb possible clustering of risk preferences by geographic area or industry. The size and significance of the estimated effects of the pre-turnover outside directors and the pre-turnover executive team remain unchanged.

One potential explanation for the above results is that directors and executives choose or attract CEOs of the same ethnicity as theirs. Thus, the correlation could arise from similarities in ethnicity rather than risk preferences. In Column (4), we interact the outside directors' UAI with *EthnicityMatch (Director)*, an indicator variable that equals one if the largest origin associated with a CEO's last name is the same as the most common largest origin among the outside directors and zero otherwise. The significantly positive direct effect of the directors' UAI supports the selection of CEO based on risk preferences, not just ethnicity. Not surprisingly, the matching on risk preferences becomes even stronger when the incoming CEO's ethnicity is the same as the most common origin among the directors, as evident in the positive and significant interaction effect of *UAI (Outside Directors)* and *EthnicityMatch (Director)*. We find a similar pattern with the executive team: the relation between the executive team's UAI and the incoming CEO's UAI is significant and positive regardless of ethnicity.

Another concern is that the risk preference match between the new CEO and the directors or executive team could arise mechanically due to the promotion of members of the executive team or the board to the CEO position. To address this concern, we distinguish between insider and outsider CEOs. Based on information from *ExecuComp* and *Boardex* available for a subset of CEOs, about 76% of CEOs are *Insider CEOs*, who was in the executive team of the firm before their appointment as CEO. Column (5) suggests that our results are not driven by insiders being appointed as CEOs. Nevertheless, the drop in the coefficient estimate for *Pre-turnover UAI (Executives)* and the significantly positive interaction term suggests that some of the matching effect reported in the previous columns is due to the new CEO being a former member of the executive team.

Overall, the results in Table 4 suggest that the risk preferences of the corporate leaders involved in the selection of the new CEO play a significant role in determining the risk preference of the incoming CEO.

3.3.2. Selection of Executives and Outside Directors

While boards and top executive teams tend to select CEOs whose risk preferences are similar to theirs, CEOs may also influence risk preferences in the board room and the executive suits by appointing new outside directors and promoting or hiring new subordinates whose risk attitudes are closer to their own. If this hypothesis is true, we expect the outside directors' and the executive team's average risk preferences to become closer to that of the CEO as the CEO's time in office lengthens.

In Column (1) of Table 5, we relate the CEO's time in office (in years), "*Tenure*," in year *t* to the absolute difference (multiplied by 100) between the UAIs of the outside directors and the CEO in year *t*. We find that the difference decreases as the CEO's tenure increases. While statistically significant, the effect is relatively small in magnitude. Specifically, over the average tenure length of 6.8 years, the absolute difference in risk preferences would decrease by about 2.7% relative to the sample mean.

Column (2) shows that the absolute difference between CEO's UAI and executive team's UAI decreases over the CEO's tenure in a similar way. Therefore, over time the CEO likely appoints or attracts immediate subordinates that share her risk preferences. Not surprisingly, we find in Column (3) that the divergence between the CEO's UAI and the firm's risk culture decreases over the CEO's time in office as well. In Columns (4) and (5), we further control for firm fixed effects or firm-CEO fixed effects, identifying the CEO's influence purely from the time-series variation within a firm or a firm-CEO pair. This approach mitigates the concern that the effect is driven by the correlation between unobservable, time-invariant firm or CEO characteristics and the CEOs' average tenure lengths. The coefficient estimates on *Tenure* remains statistically significant. According to Column (5), over a CEO's time in office, on average about 6.8 years, the absolute difference between the CEO's UAI and the firm's risk culture drops by 3.6%.

Overall, the results in Table 5 are consistent with the hypothesis that CEOs influence corporate risk culture by influencing the composition of the firms' senior leadership. However, the magnitude of the effect is modest, which is likely due to the persistence in the composition of the outside directors and the executive teams, but may also reflect the measurement error of our risk preference proxy.

3.4. The Role of Founders

Our results suggest that the persistent commonality in corporate leaders' risk preferences arise due to selection of corporate leaders. A firm's shared risk attitudes are transmitted from one generation of corporate leaders to the next, preserving differences across firms over long periods of time. But where do these differences in corporate risk culture come from and what is the origin of the selection process? Differently from societal culture in general, a firm's history and thus its culture can typically be traced back to its beginning and to the people who founded the firm. We therefore examine whether and to which extent a firm's risk culture can be traced back to the risk

preferences of the firm's founders. Van den Steen (2010) explicitly considers this possibility in his model of the origin of corporate culture.

To examine the link between founders' risk preferences and those of subsequent leaders as well as corporate risk culture, we use a subsample of 1,848 firms for which we have data to construct our proxy of founders' risk preferences (*UAI (Founder)*). Compared to our full data sample, the founder subsample consists of larger and more mature firms. For example, average size and firm age are $1.5 billion (book assets) and 23 years in the founder sample, compared to $0.22 billion and 17 years in the full sample.

The results are reported in Table 6. We find that the founders' risk preference are positively and significantly related to the risk preferences of the firm's subsequent generations of CEOs (Column (1)), executive teams (Column (2)), and outside directors (Column (3)). Column (4) shows that the founders' risk preferences are also positively correlated with the firm's risk culture, even when the founder is no longer on the leadership team. Columns (5) and (6) show that the link between founders' risk preferences and corporate risk culture is not driven by firm characteristics such as size, profitability, nor the choice of the firm's headquarter state or industry.

Overall, the results in Table 6 suggest that the founders' risk preferences are an important determinant of corporate risk culture, contributing to its persistence across generations of leadership, and, likely operating, at least in part, through the selection of corporate leaders as documented in general in Tables 4 and 5.

4. Corporate Risk Culture, Founders, and Corporate Policies

Firms select leaders with similar preferences and beliefs because the resulting corporate culture is one way to coordinate decision making inside the firm. In this section, we examine how corporate risk-taking policies, which are the outcome of such coordination, are relate to the risk preferences of corporate leaders and founders. We expect that, ceteris paribus, firms with a less risk averse culture are willing to take more risk. We examine this hypothesis empirically. To do

so, we follow the extant literature on corporate risk taking and, on the investments side, consider a firm's probability of engaging in merger and acquisition activities (*Acquisition*) and its investment in research and development (*R&D Rate*), and on the financial side, consider corporate risk-taking in form of financial leverage (*Leverage*) and cash holdings (*Cash Rate*).

4.1. Corporate Risk Culture and Corporate Policies

First, we examine the effect of corporate risk culture, as proxied for by *UAI (Common)*, on acquisitions or R&D investments, controlling for the firm's book-to-market ratio, ROA, and logarithms of sales at the beginning of the year, as well as various sets of fixed effects, i.e., year, headquarter state, 2-digit SIC industry fixed effects. The results in Panel A of Table 7 reveal a negative and significant relation between corporate risk culture and these corporate investments. According to Columns (3) and (6), firms with a one-standard-deviation higher *UAI (Common)* exhibit a 2 percentage-point lower acquisition probability, a difference of 11% relative to the sample mean, as well as a 7 percentage-point lower R&D rate, 15% relative to the sample mean. Given the likely measurement error in our risk preference proxy (see Section 2.1), these results likely represent a *lower* bound of the effect of corporate risk culture on corporate risky investment.

Panel B shows that a more risk-averse corporate culture is associated with higher cash holdings and lower financial leverage. However, differently from the results on investment policies, state and industry fixed effects seem to account for a sizable portion of this association between corporate risk culture and the financial policies. The effect of risk culture on leverage even becomes insignificant after the inclusion of industry fixed effects. One interpretation of this result is that the clustering of risk preferences among corporate leaders in an industry could have contributed to the strong industry effects in leverage (e.g., Welch (2004), MacKay and Phillips (2005), Frank and Goyal (2009), Leary and Roberts (2014)).

We note that the associations documented in Table 7 do not imply that corporate risk preferences cause more corporate risk-taking, but rather that corporate risk culture is aligned with

the amount of risk-taking as reflected by these corporate policies related to risk-taking. To gauge the extent to which the effect of risk culture might be causal, we now turn to the risk preference of a firm's founders.

4.2. Founders' Risk Preferences and Corporate Policies

The risk preference of a firm's founders can be viewed as the firm's risk culture at the beginning of the firm's existence. In Section 3 we have shown that this founding risk culture is positively related to future firm risk culture even after the founders have left the firm. This suggests that the founders' risk preference is a time-invariant component in the firm's risk culture. On the other hand, differently from subsequent corporate leaders, a firm's founder(s) are not selected, but are rather the ones that determine firm characteristics and strategic directions. Thus, the founder's preference should be exogenous to the firm's policies. Founders may therefore be an important source of cross-sectional differences in firm policies, particularly persistent policies such as *R&D Rate*, *Cash Rate*, and *Leverage*.[7]

We again employ the subset of 1,848 firms for which we have information on the founders' risk preferences, *UAI (Founders)*. As mentioned above, compared to our full sample, the founder subsample consists of larger and more mature firms, with about 66% of firm-year observations having founders no longer on the firms' leadership team. Therefore, this subsample allows us to study the extent to which cross-sectional differences in corporate risk-taking are due to differences in founders' risk preferences, but also the persistence of the effect of founders' preferences on policies.

4.2.1. Founders and Persistent Policy Differences across Firms

To test whether firms of more risk-averse founders adopt different corporate policies than firms of more risk-tolerant founders, we examine the impact of founders' risk preferences on the time invariant component in corporate risk-taking policies. We estimate firm fixed effects for

[7] Cash and leverage policies are most persistent, with annual autocorrelations of more than 0.80. R&D exhibits an annual autocorrelation 0.74. In contrast, acquisitions are infrequent and hence only have an annual autocorrelation of 0.28.

Acquisitions, *R&D Rate*, *Cash Rate*, and *Leverage*, controlling for the same firm characteristics as in Table 7 as well as year fixed effects. We then regress these policy fixed effects on *UAI (Founders)*. Results reported in Panel A of Table 8 suggest that founders' risk preferences indeed have a significant effect on a firm's long-term risk-taking policies, with higher values of *UAI (Founders)* leading to less risk-taking. Furthermore, differences in *UAI (Founders)* across firms indeed explain some of the cross-sectional variation in corporate policies. According to Columns (1), (4), (7), and (10), a one-standard-deviation change in *UAI (Founders)* explains 8, 12, 11, and 8% of the cross-sectional dispersion in *Acquisitions*, *R&D Rate*, *Cash Rate*, and *Leverage*, respectively. Given the measurement error of our risk preference proxy, the true effects are likely larger, as we will study in Section 4.3. Similar to Table 7, state and industry fixed effects reduce the effect of *UAI (Founders)* somewhat, especially in case of the financial policy. To the extent that the firm's headquarter location and industry membership are choices made by the founders, the reduction of the *UAI (Founders)* effect implies that the firm's policy choices are affected by these initial choices made by the founders.

The average firm age in our founder subsample is about 23 years and in about two thirds of the observations the founders are no longer part of the corporate leadership team of the firm. We therefore address the question whether founders' risk preferences continue to affect corporate risk-taking policies after the founders' departure from the firm. To gauge the persistence of the founder effect, we construct an indicator variable "*On Leadership*" that equals one for firm-years during which the founder still serves as the CEO, an executive, or a director of the firm and zero otherwise. Among the 1,848 firms with founder information, 570 firms have only firm-years with founder on the leadership; 987 firms have only firm-years with founder off the leadership; 291 firms have both types of firm-years. We separately estimate firm fixed effects for each policy variable for firm-years with and without founders' presence on the leadership team. Finally, we regress these policy fixed effects on *UAI (Founders)* and its interaction with the *On Leadership* indicator. The results are reported in Panel B of Table 8. For acquisition decisions, the founders'

effect is concentrated in the time period when the founder is on the firm's leadership team. For R&D and cash holdings, however, founders have a long-lasting impact, extending beyond the time when founders are part of the firm's leadership team.

The results in Table 8 suggest that the differences in founders' risk attitudes or the founding risk culture is an important determinant of the persistent differences in firms' risk taking. More generally, differences of founders' preferences and values could be an important but largely overlooked determinant of persistent differences in corporate policies across firms.

4.2.2. Founders' Risk Preferences and the Effect of Corporate Risk Culture

Given the lasting impact of founders' risk preferences on corporate risk-taking, we examine to which extent the association between corporate risk culture, *UAI (Common)*, and corporate policies reflects the persistent influence of a firm's founders. In Table 9, we repeat the analysis in Table 7, now including both the time-invariant founders' effect, *UAI (Founders)*, as well as the evolving measure of corporate risk culture, *UAI (Common)*, in the same regression. Interestingly, for persistent policies such as R&D and cash holding, the effect of corporate risk culture mainly goes through the founders' impact, or more specifically, through its correlation with the founding risk culture. This finding is consistent with the interpretation that founders' long-lasting effects on corporate policies operates at least partly through the firm's culture via the selection of subsequent firm leaders. For acquisition decisions, which are much less persistent and more discrete in nature, the current corporate risk culture continues to matter even after controlling founders' preferences, suggesting that the time-varying part of corporate risk culture that is not predicted by founders risk preferences contributes to shaping acquisition decisions.

In summary, the results in Tables 7-9 have several interesting and important implications. First, our proxies for risk preferences and corporate risk culture are associated with corporate risk taking in the expected ways, suggesting that these measures do indeed capture risk attitudes that matter for risk taking. Second, the founder's risk preference, an important time-invariant and relatively exogenous component in corporate risk culture, has a long-lasting effect on corporate

risk taking, even after the founder has left the firm. The existing corporate finance literature has documented the persistent differences across firms with respect to certain corporate policies, especially financial policies (e.g., Dittmar and Duchin (2010); Lemmon, Roberts, and Zender (2008); DeAngelo and Roll (2015)). Our results suggest that firm founders' risk preference, or the founding risk culture, is one possible determinant of these policy differences and that corporate culture, reflecting among other things the impact of the founders and the selection of firm leaders, is one mechanism through which such differences persist.

4.3. Robustness

As mentioned above, our approach to measuring individuals' risk preferences likely leads to measurement error in *UAI (Founders)* and *UAI (Common)*. Furthermore, the fact that all measures of risk attitudes are derived from a limited set of 91 origins could create a downward bias in the regression standard errors if the error term of the regression model exhibits clustering by origin. In this subsection, we address these issues. For brevity, we focus on the cross-sectional regressions of Panel A in Table 8 involving *UAI (Founders)*.

4.3.1. Measurement Error

While our risk preference proxies might suffer from a number of measurement errors, we again use the number of different origins associated with a last name (*# of Origins*) and the standard deviation of UAIs across the origins associated with a last name (*Dispersion in UAI*) to gauge the impact of measuring an individual's origin with noise. We repeat the regressions of firm policies on *UAI (Founders)* and state and industry fixed effects in Panel A of Table 8, adding the interactions terms between *UAI (Founders)* and *# of Origins* and *Dispersion in UAI*.[8] We expect that the effect of *UAI (Founder)* is stronger when the number of origins associated with a given founder's last name or the dispersion in UAI across these origins is smaller. The results in Appendix C Panel A suggest that this is generally the case. For example, in Column (1), the direct

[8] For the 507 firms that have more than one founder, we average the number of origins and the dispersion in UAI for all founders of a firm.

effect of *UAI (Founder)* on corporate acquisitiveness (-0.181) is significantly larger (based on a Wald test) than that in Column (3) of Table 8, Panel A (-0.091). The interaction effect between *UAI (Founder)* and *# of Origins* is also positive and significant. Both results suggest that the true effect of founders' risk preference on acquisition decisions could be quite a bit larger in absolute terms. We find a similar effect in Column (2), even though neither the difference in the *UAI (Founder)* effect relative to Table 8 nor the interaction term with *Dispersion in UAI* is statistically significant. The results for the remaining policies are similar as well, albeit often statistically insignificant. Only in columns (4) (*R&D Rate*) and (7) (*Leverage*) are the differences between the estimates in this table and in Table 8 significant at the 10% confidence level.

In conclusion, addressing measurement error due to the imprecision with which we identify a person's origin suggests that the true effect of *UAI (Founder)* on corporate policies is likely larger. The precise magnitude of the attenuation bias is harder to establish given our results. Comparing the estimated effects of *UAI (Founder)* between Appendix C Table A1 and Table 8 Panel A across all policies suggests that on average the true effect could be twice the size of the estimated effect. While speculative, this would further underscore the potential impact of founders' risk preferences on persistent policy differences across firms.

4.3.2. Regression Standard Errors

Given the limited number of origins, our measures of risk preferences and corporate risk culture are positively correlated across observations with overlapping origins. As is well known from the recent literature on clustered standard errors (e.g., Petersen (2009); Thompson (2011); Cameron et al. (2013)), such within cluster (here, within origin) correlation of a regressor will affect standard errors, if regression errors are also correlated across observations from the same origin.[9] To assess the magnitude of the bias, we repeat the regressions reported in Panel A of

[9] Cameron et al. (2013, p. 8, equation 6) provide an approximate scaler for standard errors in case of correlation within clusters: $1 + \rho_e \, \rho_{UAI} \, (N_{cluster} - 1)$, where ρ_e is the average correlation of the regression residuals within a cluster, ρ_{UAI} is the correlation of UAI within a cluster, and $N_{cluster}$ is the number of observations in a cluster.

Table 8, but calculate standard errors that account for clustering by the largest origin associated with a given founder's last names. Among the 1,848 firms with founder information, we select 1,278 firms with a single founder for whom we identify their largest origins. We use this sample and report the results in Appendix C Panels B and C.

Panel B report the results for investment policies; Panel C for financial policies. For each policy, we first report results without state and industry fixed effects, then results with the state and industry fixed effects. In each case, the first column reports results with non-clustered standard errors, just as those in Panel A of Table 8. Comparing clustered standard errors to non-clustered standard errors, we do not find a noticeable and systematic difference. Although not reported, the same holds for the standard errors for the effect of *UAI (Founder)* in the panel regressions in Table 9. Thus, there is no evidence that the standard errors we report are systematically biased.

5. Corporate Risk Culture and Formal Incentives

Culture serves as an unspoken language giving directives to the members of an organization (Crémer 1993). Firms select leaders and employees with similar risk preferences to coordinate decisions and actions within the firm. Coordinating decisions through corporate culture as opposed to formal contracts or incentives can be particularly advantageous in a world with a lot of unforeseen contingencies. Nevertheless, the *strength* of corporate risk culture, i.e., the degree to which risk attitudes are shared inside a firm, varies intentionally as well as unintentionally, across firms. In this section, we examine the consequences of differences in risk attitudes among corporate leaders. Specifically, we conjecture that divergence in corporate leaders' risk attitudes reduces the likelihood of large and discrete investment decisions, such as corporate acquisitions, which require broad support among corporate leaders. We hypothesize further that formal incentives, such as retention and compensation, are important in the presence of diverging risk preferences. That is, we expect that firms with weaker corporate risk culture, i.e.,

with more diverging risk attitudes, employ more formal contracts and incentives to coordinate decisions.

5.1. Divergence in risk attitudes and Corporate Acquisition

As we have shown in Section 3, corporate risk culture arises as corporate leaders are selected based on similarity in their risk preferences. Such similarity allows for delegation of corporate decisions, reduces monitoring costs, and facilitates equilibrium selection when multiple equilibra exist. Firms with less homogenous preferences might be less likely to reach consensus in case of large and discrete decisions that involve substantial uncertainty, as is the case with many corporate acquisitions. We therefore empirically examine whether the probability of a firm making an acquisition is lower for firms that exhibit larger differences in risk attitudes among their corporate leaders, controlling for the level of risk-aversion in the firm's culture. For each firm year, we measure differences in risk attitudes as the absolute differences between *UAI (CEO)* and *UAI (Outside Directors)*, between *UAI (CEO)* and *UAI (Executives)*, and between *UAI (Executives)* and *UAI (Outside Directors)*.

Table 10 reports results from panel regressions of *Acquisition* on the three UAI difference variables, separately in columns (1) through (3) and jointly in columns (4) and (5). All regressions include firm-level controls, year, industry, and state fixed effects as well as *UAI (Common)*. Column (1) reveals that differences in risk attitudes of the CEO and of outside directors significantly lower the probability of an acquisition. Specifically, a one standard deviation increase in the absolute difference between *UAI (CEO)* and *UAI (Outside Directors)* lowers the acquisition probability by 1.53 percentage points or about 9% relative to the average acquisition probability. Differences between the CEO and the Executive Team with respect to their risk preferences have a similar, negative effect on *Acquisition* (column (2)). The effect of absolute differences in risk attitudes between the executive team and the outside directors is negative, but not statistically significant (column (3)).

In column (4), we include all three difference terms simultaneously. The effect of all three differences is jointly significantly different from zero (*p*-value = 0.00%). In column (5), we replace state and industry fixed effects with firm fixed effects and find similar results. Even though only the difference in UAI between the CEO and the outside directors is statistically significant, the joint effect of the three differences in risk attitudes is again statistically significant with a *p*-value of 0.24%.

In summary, the results in Table 10 suggest that divergence in corporate leaders' risk preferences can affect real corporate decisions, especially those that require broad approval and coordination.

5.2. Formal incentives

The degree of homogeneity of risk preferences among corporate leaders is an equilibrium outcome that reflects trade-off between search costs for corporate leaders as well as benefits and costs of coordinating corporate actions through informal versus formal rules and incentives. We therefore do not expect higher divergence in corporate risk culture to be necessarily associated with higher or lower firm values.[10] Nevertheless, we expect that firms with less homogenous risk cultures rely more on formal incentives. To test this prediction, we examine the association between differences in risk attitudes and retention or compensation practices across firms. Given the prominence of the CEO as well as the availability of data for CEOs relative to other corporate leaders, we focus on CEO turnover and CEO compensation.

5.2.1 CEO Turnover

Our results in Section 5.1 suggest that increased differences in risk attitudes might decrease the probability of reaching consensus among corporate leaders. One possible consequence of a weaker corporate risk culture might therefore be more frequent (voluntary or involuntary) departures of senior corporate leaders than in firms with a stronger culture, i.e., with

[10] In the model of Van den Steen (2010), firms overinvest in corporate culture, as managers value homogeneity for its own good, above and beyond the benefits of coordinating decisions across the firm. In his model, an exogenous reduction of cultural homogeneity could therefore increase firm value.

more homogenous preferences. We therefore test whether CEOs whose risk preferences differ more from those of other corporate leaders tend to have shorter tenure. For each firm-CEO pair, we calculate the average of the absolute differences in UAI between the CEO, the outside directors, and the executive team over the CEO's entire tenure in the company, and examine their relationship with the length of the CEO's tenure.

Table 11 presents the results. Columns (1) through (3) report the effect of each difference separately on the length of a CEO's total time in office. All three differences are significantly associated with shorter CEO tenure. Specifically, a one-standard-deviation increase in the average absolute difference in UAI decreases CEO tenure by 3.4 months when comparing CEOs to outside directors, by 3.9 months when comparing CEOs to executive teams, and finally by 2.9 months when comparing executive teams and outside directors. Given an average tenure of 6.6 years or 79 months, the reduction in tenure corresponds to a relative effect of 4 to 5%. In Column (4), a test of joint significance reveals that the three difference variables are jointly significantly different from zero with a *p*-value of 2.21%.

Consistent with our conjecture, divergence in risk attitudes is related to the length of CEO tenure, possibly reflecting the difficulty of reaching consensus among corporate leaders when their risk preferences are not aligned. The magnitudes of the effects are modest and likely represent a lower bound, given that we do measure corporate leaders' risk preferences in an incomplete way and with noise.

5.2.2 CEO Compensation

In Table 4 above, we show that CEOs' predetermined risk attitudes match those of existing leaders to some degree. In case the similarity is less than what the firm desires, the firm, and in particular, its board of directors, can attempt to adjust CEOs' risk taking behavior through compensation contracts. Following Coles, Daniel, and Naveen (2006), we measure risk taking incentives provided by compensation contracts using *Vega*, the dollar change (in millions) in a

CEO's wealth associated with a 1 percentage-point change in the firm's stock return volatility, for a subset of firms and years with available CEO compensation data.

In Column (1) of Table 12, we examine the relation between the average vega of the CEO's compensation contract during her tenure at a given firm and the risk attitudes of the CEO and of the outside directors, controlling for CEO and firm characteristics, also averaged over time, for the subset of firms with non-zero and non-missing vega. *Vega* and *UAI (CEO)* are significantly and positively related. While the relationship is negative, it is statistically insignificant for *UAI (Outside Directors)*. A CEO with a one-standard-deviation higher UAI is given a compensation contract with a 4.8% higher vega relative to the sample mean (i.e., an additional $5,340 in CEO's wealth for a 1% increase in firm volatility).

In Column (2), we directly examine how *Vega* responds to the difference between the CEO's UAI and the outside directors' UAI. If the CEO's UAI is higher than that of outside directors, which we interpret as the desired level of risk aversion, then the board[11] could use a higher-vega compensation contract to counter the CEO's uncertainty avoidance. This is indeed what we find. The higher the CEO's UAI relative to that of the outside directors', the higher the vega in the CEO's compensation contract. In Column (3), we find a similarly positive, but statistically insignificant effect of the difference between CEO's UAI and that of the top executive team. When combined with difference between UAI (CEO) and UAI (Outside Directors) in Column (4), the latter remains significantly positive. Finally, Column (5) shows that this result holds when we use firm-year level panel data instead, and control for firm and year fixed effects. Thus, within a firm, the higher the CEO's UAI is relative to the UAI of the non-executive directors, the higher the CEO's compensation vega.

We note that *Vega* could be an omitted variable in our regressions of corporate policies on measures of corporate risk culture. In untabulated results, we have verified that while vega is

[11] The compensation committee mainly consists of outside directors, especially after NYSE/Nasdaq required full independence of the compensation committee (NYSE listing rules section 303A.05, Nasdaq listing rules section 5605(d)).

typically significantly associated with corporate policies, its inclusion changes the coefficient estimates on our measures of corporate risk culture only in very minor ways, consistent with the relatively modest effect we observe in Table 12.

In conclusion, divergence in corporate leaders' risk attitudes can affect real decisions in the firm. Firms with weaker risk culture seem to make fewer acquisitions that usually require broad agreement within a firm. These firms also try to make more use of retention/termination and compensation incentives to align risk attitudes.

6. Concluding Remarks

Corporate culture is often described as a critical determinant of corporate decisions by the popular press and executives. For example, Jim Sinegal, Costco's co-founder and former CEO, said in a CNBC documentary that "culture is not the most important thing; it's the only thing".[12] In this paper, we examine the formation and evolution of corporate *risk* culture, i.e. the risk preference shared by a firm's leadership team, as well as its effect on corporate risk taking.

Our findings suggest that risk preferences are significantly correlated across the firms' leaders, i.e., CEOs, top executives, and boards of directors, and also across generations of leadership (e.g., between founders and future generations of leadership, and between existing leadership and new CEO). Selection of the leadership along the risk preference dimension plays an important role in the formation and persistence of the risk culture. Formal incentives such as executive compensation and turnover are used more in the presence of diverging risk preferences.

Understanding a firm's risk culture also advances our understanding of corporate investment and financial decisions that involve risk taking. We find that except for acquisition decisions, which seem to be mainly influenced by the current CEO's risk preference, R&D expenditure, financial leverage, and cash holding are more influenced by the firm's risk culture.

[12] http://blog.marketculture.com/2012/09/14/culture-is-not-the-most-important-thing-its-the-only-thing-costcos-jim-sinegal/

In particular, corporate financial policies seem to be set in accordance with the persistent part of corporate risk culture, which is rooted in the founder's risk preference. Thus, one source of persistence in corporate financial policies documented by the existing literature is the persistence in corporate risk culture.

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Table 1: Summary Statistics

Panel A: Uncertainty Avoidance Index

This table reports summary statistics for variables related to corporate leader's culturally transmitted risk preferences, first by person, then by firm-year. Definitions of the variables are provided in Appendix B.

Variables by Firm	Obs.	Mean	Std. Dev.
UAI (Founders)	1,848	0.449	0.139
Variables by Firm-CEO			
UAI (CEO)	9,698	0.467	0.160
Variables by Firm-Year and Group of People			
UAI (Executives)	36,880	0.448	0.097
UAI (Outside Directors)	36,880	0.453	0.090
UAI (Common)	36,880	0.467	0.160

Panel B: Outcome Variables

This table reports summary statistics for outcome variables in the tables related to selection and incentives, as well as firm-level investment and financial policies that are related to risk-taking. The level of unit by which the variables vary, is also listed. Definitions of the variables are provided in Appendix B.

Selection	Unit	Obs.	Mean	Std. Dev.
|UAI (CEO) – UAI (Outside Directors)|	Firm-Year	36,880	0.138	0.102
|UAI (CEO) – UAI (Executives)|	Firm-Year	36,880	0.141	0.107
|UAI (CEO) – UAI (Common)|	Firm-Year	36,880	0.106	0.083
|UAI (Outside Directors) – UAI (Executives)|	Firm-Year	36,880	0.094	0.077
Investment and Financial Policies				
Acquisition (Indicator)	Firm-Year	36,112	0.172	0.377
R&D Rate	Firm-Year	17,955	0.467	2.470
Cash Rate	Firm-Year	36,112	0.163	0.196
Leverage	Firm-Year	36,112	0.331	0.262
Incentives				
Vega	Firm-Year	18,706	0.143	0.232
CEO Tenure (total length in years, excl. last CEO)	Firm-CEO	3,046	6.577	7.069

Panel C: Control Variables

This table reports summary statistics for control variables at the individual, firm-CEO, or firm-year levels. Definitions of the variables are provided in Appendix B.

Variables by Firm-CEO	Obs.	Mean	Std. Dev.
CEO Education	9,698	0.986	0.974
Missing CEO Edu. (Indicator)	9,698	0.431	0.495
Missing CEO Age (Indicator)	9,698	0.198	0.399
Female CEO (Indicator)	9,698	0.026	0.159
Variables by Firm-CEO at Turnover			
CEO Age (1st year as CEO in firm)	3,651	46.405	17.648
EthinicityMatchBoard (Indicator)	3,651	0.354	0.478
EthinicityMatchExec (Indicator)	3,651	0.358	0.479
Insider CEO (Indicator)	1,924	0.758	0.428
Variables by Firm-Year			
Log(MB)	36,112	0.739	0.814
ROA (%)	36,112	9.425	19.250
Log(Sales)	36,112	6.167	2.205
CEO Tenure	33,696	6.836	7.048

Table 2: Commonality of Risk Preferences of CEOs, Executive Teams, and Boards

In this table we conduct a principle component analysis to examine the commonality of risk attitudes among corporate leaders. Panel A reports the fraction of the total variation in UAI (CEO), UAI (Executives) and UAI (Outside Directors) that is explained by the first, second, and third principal components in the actual data. Panel B reports the fraction of the total variation in randomly matched UAI (CEO), UAI (Executives) and UAI (Outside Directors) that is explained by the first principal component. In each row, we report the mean and the [5%, 95%] confidence interval for the fraction explained from 100 iterations of randomly matching CEOs, executive teams, and outside directors. In row (1), CEOs, executive teams, and boards are randomly drawn from the same year, in row (2) from the same year and firm headquarter state, in row (3) from the same year and industry (2-digit SIC), and in row (4), from the same year, state and industry. We drop cases in which the randomly drawn combination of CEO, executive team, and board coincides with an actual combination.

Panel A: Actual Combinations of CEOs, Executive Team, and Boards

	Obs.	% of total variation explained
UAI (Common): First Principal Component	36,880	43.02%
Second Principal Component	36,880	28.83%
Third Principal Component	36,880	28.15%

Panel B: Random Combinations of CEO, Executive Team, and Boards

	First Principal Component Mean [5%, 95%]
(1) Draw from the same year	33.63% [33.45%, 33.84%]
(2) Draw from the same year-state	35.63% [35.29%, 35.93%]
(3) Draw from the same year-industry	34.12% [33.83%, 34.47%]
(4) Draw from the same year-industry-state	36.03% [35.46%, 36.54%]

Panel C: Random Combinations of CEO, Executive Team, and Boards

Sample	Obs.	% explained by the first principal component
# of Origins associated with a last name in the bottom 50% for each group (CEO, board, exec.)	5,061	45.08%
Std. Dev. of UAI associated with a last name in the bottom 50% for each group (CEO, board, exec.)	5,639	43.35%

Table 3: Persistence in Corporate Risk Culture

Panel A: Auto-correlations within Firm

This table reports the auto-correlations between UAI (Common) and its 10 lags within a firm. "L#.UAI (Common)" is the #-year lag of UAI (Common).

	Auto-correlations between UAI (Common) and its Lags
L1.UAI (Common)	0.891***
L2.UAI (Common)	0.826***
L3.UAI (Common)	0.769***
L4.UAI (Common)	0.717***
L5.UAI (Common)	0.666***
L6.UAI (Common)	0.615***
L7.UAI (Common)	0.578***
L8.UAI (Common)	0.543***
L9.UAI (Common)	0.516***
L10.UAI (Common)	0.485***

Panel B: Auto-correlations across Generations of Leadership

This table reports the auto-correlations between UAI (Common) of a generation of leadership (measured at the first year when a CEO took office) with the UAI (Common) of the previous generations, in the same firm. LG1.UAI (Common) is the UAI (Common) of the last generation, and so on. Generations of leadership represent the managers and directors under each new CEO's regime.

	Obs.	Auto-correlations of UAI (Common) across generations of leadership
LG1.UAI (Common)	3621	0.632***
LG2.UAI (Common)	1332	0.421***
LG3.UAI (Common)	423	0.310***
LG4.UAI (Common)	108	0.301**

Table 4: The Selection of CEO

This table examines the determinants of incoming CEO's UAI. *Pre-turnover UAI (Common)* is the first principle component in Pre-turnover UAI (Outside Directors), *Pre-turnover* UAI (Executives), and *Pre-turnover* UAI (CEO). "*Pre-turnover UAI (xx)*" is the UAI of xx in the year before turnover. *EthnicityMatchBoard (Exec)* is an indicator variable that equals one if the incoming CEO's (dominant) origin is the same as the most common origin among the pre-turnover board of directors (or the top four non-CEO executives). "*Insider CEO*" is an indicator variable equals one if a CEO is promoted to the position from within the firm. Control variables include CEO Age, Missing Age indicator, CEO Education, Missing Education indicator, Female, ROA, log(MB), and log(Sales). Definitions of the variables are provided in Appendix B. Standard errors are clustered at the firm level. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
			UAI (CEO)		
Pre-turnover UAI (common)	0.367***				
	(0.016)				
Pre-turnover UAI (Outside Directors)		0.280***	0.280***	0.150***	0.358**
		(0.029)	(0.035)	(0.039)	(0.141)
Pre-turnover UAI (Executives)		0.656***	0.619***	0.427***	0.363***
		(0.029)	(0.035)	(0.043)	(0.120)
Pre-turnover UAI (CEO)		0.010	0.016	-0.000	0.057*
		(0.017)	(0.020)	(0.019)	(0.030)
Pre-turnover UAI (Outside Directors) x EthinicityMatch(Board)				0.248***	
				(0.066)	
Pre-turnover UAI (Executives) x EthinicityMatch(Exec)				0.320***	
				(0.064)	
EthinicityMatch(Board)				-0.182***	
				(0.029)	
EthinicityMatch(Exec)				-0.188***	
				(0.029)	
Pre-turnover UAI (Outside Directors) x Insider New CEO					-0.156
					(0.156)
Pre-turnover UAI (Executives) x Insider New CEO					0.521***
					(0.133)
Insider New CEO					-0.174*
					(0.092)
CEO Age			-0.000	-0.000	0.000
			(0.000)	(0.000)	(0.001)
Missing CEO Age			-0.032	-0.021	-0.008
			(0.026)	(0.024)	(0.042)
CEO Education			0.003	-0.000	-0.006
			(0.006)	(0.006)	(0.010)
Missing CEO Edu.			0.013	0.010	-0.009
			(0.013)	(0.012)	(0.020)
Female CEO			-0.023	-0.020	0.009

			(0.015)	(0.014)	(0.026)
Log(MB)			0.004	0.002	-0.003
			(0.004)	(0.003)	(0.007)
ROA			-0.000	-0.000	0.000
			(0.000)	(0.000)	(0.000)
Log(Sales)			-0.001	-0.001	-0.000
			(0.002)	(0.002)	(0.003)
Industry and State FE			x	x	x
Observations	3,651	3,651	3,651	3,651	1,924
Adjusted R-squared	0.128	0.188	0.179	0.284	0.197

Table 5: CEO's Influence on the Board's and Executive Team's Preferences

This table reports how the divergence between board's (executive team's) and CEO's UAI changes over CEO tenure. In Columns (1) and (2), the dependent variable is the absolute difference between the UAI of the board and the UAI of the CEO in year t+1. In Columns (3) and (4), the dependent variable is the absolute difference between the UAI of the executive team and the UAI of the CEO in year t+1. We control for firm fixed effects in Columns (1 and (3)), and firm-CEO fixed effects in Columns (2) and (4). Definitions of all variables are in Appendix B. Standard errors are clustered at the firm level. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	|UAI - UAI (Outside Directors)|	|UAI - UAI (Exec)|	|UAI - UAI (Common)|	|UAI - UAI (Common)|	|UAI - UAI (Common)|
Tenure	-0.054***	-0.035*	-0.025*	-0.034*	-0.053*
	(0.018)	(0.018)	(0.013)	(0.018)	(0.029)
Firm FE				x	
Firm-CEO FE					x
Observations	33,696	33,696	33,696	33,696	33,696
Adj. R-squared	0.001	0.001	0.001	0.460	0.621

Table 6: The Role of Company Founders

This table reports the impact of company founders' UAI on the UAI of future leadership of the company, when the founder is not on the leadership team (i.e., not the CEO, not a top executive, not a director of the company). We have data on founders' UAI for 635 firms in our sample. The unit of observation is firm-year, as top executives and directors change over time. Definitions of all variables are provided in Appendix B. Standard errors are clustered at the firm level. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	UAI (CEO)	UAI (Executives)	UAI (Outsider Directors)	UAI (Common)		
	[Founder not CEO]	[Founder not on ET]	[Founder not on Board]	[Founder not in Leadership]		
UAI (Founder)	0.095***	0.052***	0.063***	0.152***	0.118***	0.114***
	(0.031)	(0.014)	(0.014)	(0.029)	(0.028)	(0.028)
Log(MB)					-0.003	0.002
					(0.005)	(0.005)
ROA					-0.000	-0.001***
					(0.000)	(0.000)
Log(Sales)					-0.004*	-0.003
					(0.002)	(0.003)
Year and State FF					x	
Year, State, and Industry FE						x
Observations	1,754	13,805	12,807	10,771	10,771	10,771
Adjusted R-squared	0.006	0.006	0.012	0.019	0.107	0.159

Table 7: Corporate Risk Culture and Risk-taking Policies

This table reports the relationship between measures of corporate risk culture and investment and financial policies. Panel A examines the effect of CEO's UAI. Panel B examines the effect of board's and executive team's risk preference. Panel C examines the common component in risk preferences within the leadership team (CEO, non-CEO executives, and board of directors). Panel D contrasts the effect of CEO's UAI (CEO) and the shared risk preference. Control variables (CEO Age, Missing Age, CEO Education, Missing Edu, Female, ROA, log(MB), log(Sales)), year fixed effects, and a constant term are included in all regressions, but omitted in panels B, C, and D for brevity. Definitions of the variables are in provided Appendix B. Standard errors are clustered at the firm level. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Panel A: Corporate Risk Culture and Investment Policies

	(1)	(2)	(3)	(4)	(5)	(6)
		Acquisition			R&D Rate	
UAI (Common)	-0.117***	-0.118***	-0.105***	-0.371**	-0.402***	-0.448***
	(0.017)	(0.017)	(0.017)	(0.146)	(0.152)	(0.152)
Log(MB)	0.031***	0.029***	0.026***	0.327***	0.328***	0.275***
	(0.003)	(0.003)	(0.003)	(0.033)	(0.034)	(0.036)
ROA	0.000***	0.000***	0.000	-0.039***	-0.038***	-0.033***
	(0.000)	(0.000)	(0.000)	(0.003)	(0.003)	(0.002)
Log(Sales)	0.018***	0.018***	0.026***	-0.238***	-0.256***	-0.299***
	(0.002)	(0.002)	(0.002)	(0.024)	(0.026)	(0.029)
Year FE	x	x	x	x	x	x
State FE		x	x		x	x
Industry FE			x			x
Observations	36,112	36,112	36,112	17,955	17,955	17,955
Adjusted R-squared	0.034	0.038	0.056	0.296	0.299	0.328

Panel B: Corporate Risk Culture and Financial Policies

	(1)	(2)	(3)	(4)	(5)	(6)
		Cash Rate			Leverage	
UAI (Common)	0.091***	0.063***	0.034***	-0.095***	-0.074***	-0.007
	(0.012)	(0.012)	(0.011)	(0.018)	(0.019)	(0.015)
Log(MB)	0.073***	0.063***	0.043***	-0.034***	-0.025***	0.005
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.003)
ROA	-0.002***	-0.001***	-0.001***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Sales)	-0.026***	-0.024***	-0.023***	0.038***	0.036***	0.038***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Year FE	x	x	x	x	x	x
State FE		x	x		x	x
Industry FE			x			x
Observations	36,112	36,112	36,112	36,112	36,112	36,112
Adjusted R-squared	0.253	0.326	0.436	0.100	0.143	0.373

Table 8: Corporate Founders and Corporate Policies

Panel A reports the effect of founder's UAI on corporate policies. Panels B and C contrast the effect of founder's UAI with the UAI of the current CEO and the current corporate risk culture, for the sample of firm-years when the founder is not on the leadership team any more. Control variables (CEO Age, Missing Age, CEO Education, Missing Edu, Female, ROA, log(MB), log(Sales)), 2-digit SIC industry fixed effects, (firm's headquarter) state fixed effects, year fixed effects, and a constant term are included in all regressions in this table, but omitted for brevity. Definitions of the variables are in provided Appendix B. Standard errors are clustered at the firm level. All regressions include a constant term. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Panel A: Founder's UAI and Investment Policies

	(1)	(2)	(3)	(4)	(5)	(6)
	Acquisition Firm FE			R&D Firm FE		
UAI (Founders)	-0.141***	-0.121***	-0.091**	-2.373***	-2.034***	-2.003***
	(0.040)	(0.041)	(0.042)	(0.558)	(0.566)	(0.558)
State FE		x	x		x	x
Industry FE			x			x
Observations	1,848	1,848	1,848	1,170	1,170	1,170
Adjusted R-squared	0.006	0.008	0.058	0.014	0.055	0.218

Panel B: Founder's UAI and Financial Policies

	(1)	(2)	(3)	(4)	(5)	(6)
	Cash Firm FE			Leverage Firm FE		
UAI (Founders)	0.127***	0.076***	0.063***	-0.127***	-0.105***	-0.020
	(0.029)	(0.026)	(0.024)	(0.038)	(0.038)	(0.034)
State FE		x	x		x	x
Industry FE			x			x
Observations	1,848	1,848	1,848	1,848	1,848	1,848
Adjusted R-squared	0.011	0.186	0.325	0.006	0.070	0.299

Panel C: Founders On or Off Leadership

	(1) Acquisition Firm FE	(2) R&D Firm FE	(3) Cash Firm FE	(4) Leverage Firm FE
UAI (Founders)	-0.029	-1.947***	0.043*	-0.041
	(0.056)	(0.684)	(0.026)	(0.041)
UAI (Founders) x On Leadership	-0.145*	0.052	0.014	0.059
	(0.082)	(1.013)	(0.045)	(0.060)
On Leadership	0.032	-1.416***	-0.052**	0.025
	(0.039)	(0.491)	(0.021)	(0.028)
State and Industry FE	x	x	x	x
Observations	2,139	1,355	2,139	2,139
Adjusted R-squared	0.050	0.268	0.295	0.290

Table 9: Founder's UAI vs. Current Corporate Risk Culture

This table contrasts the effect of founder's UAI with the current corporate risk culture. Definitions of the variables are in provided Appendix B. Standard errors are clustered at the firm level. All regressions include a constant term. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1) Acquisition	(2) R&D Rate	(3) Cash Rate	(4) Leverage
UAI (Founder)	-0.006	-0.436*	0.077***	-0.039
	(0.038)	(0.231)	(0.022)	(0.032)
UAI (Common)	-0.115***	0.161	0.015	-0.001
	(0.031)	(0.188)	(0.017)	(0.024)
Log(MB)	0.026***	0.282***	0.056***	0.015***
	(0.006)	(0.059)	(0.004)	(0.006)
ROA	0.001*	-0.031***	-0.002***	-0.003***
	(0.000)	(0.006)	(0.000)	(0.000)
Log(Sales)	0.025***	-0.187***	-0.033***	0.049***
	(0.004)	(0.044)	(0.002)	(0.003)
Year, State, and Industry FE	x	x	x	x
Observations	16,162	9,515	16,162	16,162
Adjusted R-squared	0.054	0.270	0.467	0.393

Table 10: Divergence in UAI and Corporate Acquisitiveness

This table reports with effect of divergence in UAI among corporate leaders on corporate acquisitiveness. Definitions of the variables are in provided Appendix B. Standard errors are clustered at the firm level. All regressions include a constant term. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
			Acquisition		
UAI (Common)	-0.072***	-0.078***	-0.103***	-0.060***	-0.070**
	(0.018)	(0.018)	(0.018)	(0.018)	(0.031)
|UAI (CEO)-UAI (Outside Directors)|	-0.150***			-0.120***	-0.111***
	(0.025)			(0.026)	(0.037)
|UAI (CEO)-UAI (Executives)|		-0.120***		-0.079***	-0.054
		(0.024)		(0.025)	(0.035)
|UAI (Executives)-UAI (Outside Directors)|			-0.018	-0.003	-0.022
			(0.030)	(0.030)	(0.040)
Log(MB)	0.026***	0.027***	0.026***	0.027***	0.035***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)
ROA	0.000	0.000	0.000	0.000	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Sales)	0.026***	0.026***	0.026***	0.026***	-0.031***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)
Year, State, and Industry FE	x	x	x	x	
Year and Firm FE					x
Observations	36,112	36,112	36,112	36,112	36,112
Adjusted R-squared	0.058	0.057	0.056	0.058	0.190

Table 11: Divergence in Risk Preferences and CEO Turnover

This table reports the relationship between CEO's total tenure length and the difference between CEO's UAI and the UAI of the board (Column (1)), executive team (Column (2), and founder (Column (3), when the founder is not the CEO). The absolute differences are the average differences over a CEO's tenure, scaled by their standard deviations. We exclude CEOs whose total tenure lengths are unknown (e.g., the current reining CEO). Firm-level controls such as M/B, sales, and ROA, are also average values over a CEO's tenure. All regressions include 2-digit SIC industry fixed effects. Definitions of other variables are in provided Appendix B. Standard errors are clustered at the firm level. All regressions include a constant term. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

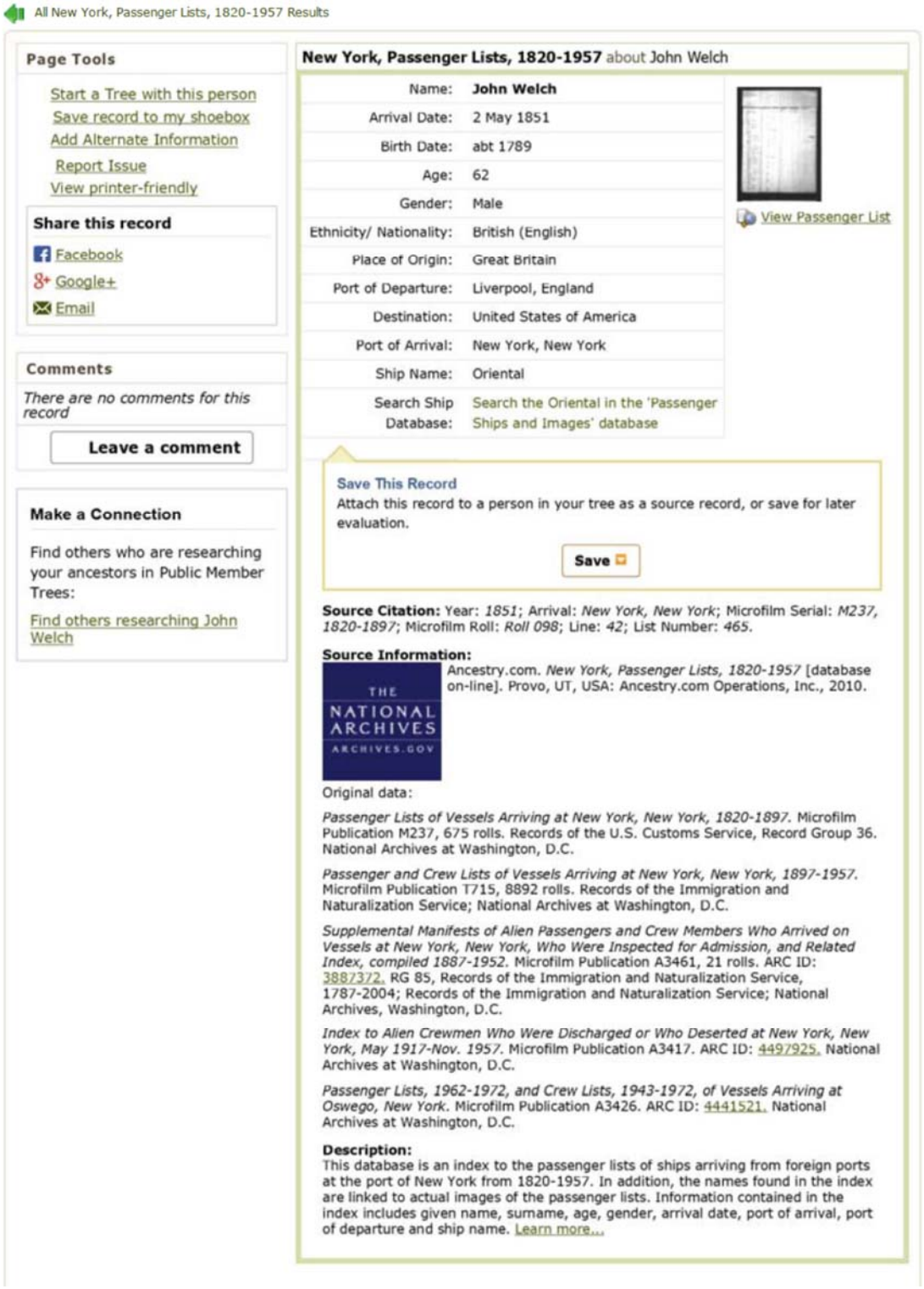
	(1)	(2)	(3)	(4)
	CEO Tenure			
$\|UAI\ (CEO)-UAI\ (Outside\ Directors)\|_{avg}$	-2.960**			-1.537
	(1.458)			(1.554)
$\|UAI\ (CEO)-UAI\ (Executives)\|_{avg}$		-3.401***		-2.461*
		(1.299)		(1.351)
$\|UAI\ (Executives)-UAI\ (Outside\ Directors)\|_{avg}$			-3.695**	-2.867
			(1.810)	(1.821)
CEO Age	0.111***	0.111***	0.111***	0.111***
	(0.023)	(0.023)	(0.023)	(0.023)
Missing Age	6.171***	6.178***	6.176***	6.146***
	(1.275)	(1.272)	(1.272)	(1.275)
CEO Education	0.452	0.452	0.438	0.471*
	(0.282)	(0.282)	(0.280)	(0.282)
Missing Edu.	1.747***	1.787***	1.743***	1.788***
	(0.588)	(0.588)	(0.587)	(0.588)
Female	-1.385***	-1.414***	-1.354***	-1.370***
	(0.477)	(0.482)	(0.479)	(0.479)
Log(MB)	0.061***	0.060***	0.060***	0.060***
	(0.009)	(0.009)	(0.009)	(0.009)
ROA	0.949***	0.955***	0.947***	0.946***
	(0.174)	(0.173)	(0.174)	(0.173)
Log(Sales)	0.094	0.102	0.088	0.083
	(0.077)	(0.077)	(0.078)	(0.078)
State and Industry FE	x	x	x	x
Observations	3,046	3,046	3,046	3,046
Adjusted R-squared	0.083	0.084	0.083	0.084

Table 12: Divergence in Risk Preferences and Compensation Vega

This table reports the relationship between CEO's compensation vega and his or her UAI or the difference between his or her UAI and the board's UAI. The analysis in Columns (1) and (2) is at the firm-CEO level. In these two columns, all the variables are the average values over a CEO's tenure at a given firm. The analysis in Columns (3) is at the firm-CEO-year level. In this column, firm-year level control variables (*Log(MB)*, *ROA*, and *Log(Sales)*) are lagged, and we also control for firm fixed effects and year fixed effects. *UAI - UAI (board)* is the difference between CEO's UAI and board' UAI. Definitions of all variables are in provided Appendix B. Standard errors are clustered at the firm level. All regressions include a constant term. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
			Vega		
UAI (CEO)	0.034**				
	(0.015)				
UAI (Outside Directors)	-0.004				
	(0.033)				
UAI (CEO)-UAI (Outside Directors)		0.031**		0.044*	0.065**
		(0.014)		(0.025)	(0.032)
UAI (CEO)-UAI (Executives)			0.019	-0.015	-0.022
			(0.013)	(0.023)	(0.030)
CEO Age	-0.001**	-0.001**	-0.001**	-0.001**	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Missing Age	-0.052***	-0.052***	-0.052***	-0.052***	0.165***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.035)
CEO Education	0.018***	0.018***	0.018***	0.018***	0.007
	(0.006)	(0.006)	(0.006)	(0.006)	(0.011)
Missing Edu.	0.004	0.004	0.005	0.004	0.011
	(0.010)	(0.010)	(0.010)	(0.010)	(0.022)
Female	-0.005	-0.005	-0.005	-0.005	-0.000
	(0.014)	(0.014)	(0.014)	(0.014)	(0.020)
Log(MB)	0.039***	0.039***	0.039***	0.039***	0.013***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
ROA	-0.001***	-0.001***	-0.001***	-0.001***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Sales)	0.062***	0.062***	0.062***	0.062***	0.066***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.008)
State and Industry FE	x	x	x	x	
Year and Firm FE					x
Observations	4,348	4,348	4,348	4,348	18,706
Adjusted R-squared	0.357	0.357	0.357	0.357	0.642

Appendix A: Image of a Passenger Record from Ancestry.com



All New York, Passenger Lists, 1820-1957 Results

Page Tools

Start a Tree with this person
Save record to my shoebox
Add Alternate Information
Report Issue
View printer-friendly

Share this record

Facebook
Google+
Email

Comments

There are no comments for this record

Leave a comment

Make a Connection

Find others who are researching your ancestors in Public Member Trees:

Find others researching John Welch

New York, Passenger Lists, 1820-1957 about John Welch

Name:	**John Welch**
Arrival Date:	2 May 1851
Birth Date:	abt 1789
Age:	62
Gender:	Male
Ethnicity/ Nationality:	British (English)
Place of Origin:	Great Britain
Port of Departure:	Liverpool, England
Destination:	United States of America
Port of Arrival:	New York, New York
Ship Name:	Oriental
Search Ship Database:	Search the Oriental in the 'Passenger Ships and Images' database

View Passenger List

Save This Record
Attach this record to a person in your tree as a source record, or save for later evaluation.

Save

Source Citation: Year: *1851*; Arrival: *New York, New York*; Microfilm Serial: *M237, 1820-1897*; Microfilm Roll: *Roll 098*; Line: *42*; List Number: *465*.

Source Information:

Ancestry.com. *New York, Passenger Lists, 1820-1957* [database on-line]. Provo, UT, USA: Ancestry.com Operations, Inc., 2010.

Original data:

Passenger Lists of Vessels Arriving at New York, New York, 1820-1897. Microfilm Publication M237, 675 rolls. Records of the U.S. Customs Service, Record Group 36. National Archives at Washington, D.C.

Passenger and Crew Lists of Vessels Arriving at New York, New York, 1897-1957. Microfilm Publication T715, 8892 rolls. Records of the Immigration and Naturalization Service; National Archives at Washington, D.C.

Supplemental Manifests of Alien Passengers and Crew Members Who Arrived on Vessels at New York, New York, Who Were Inspected for Admission, and Related Index, compiled 1887-1952. Microfilm Publication A3461, 21 rolls. ARC ID: 3887372. RG 85, Records of the Immigration and Naturalization Service, 1787-2004; Records of the Immigration and Naturalization Service; National Archives, Washington, D.C.

Index to Alien Crewmen Who Were Discharged or Who Deserted at New York, New York, May 1917-Nov. 1957. Microfilm Publication A3417. ARC ID: 4497925. National Archives at Washington, D.C.

Passenger Lists, 1962-1972, and Crew Lists, 1943-1972, of Vessels Arriving at Oswego, New York. Microfilm Publication A3426. ARC ID: 4441521. National Archives at Washington, D.C.

Description:
This database is an index to the passenger lists of ships arriving from foreign ports at the port of New York from 1820-1957. In addition, the names found in the index are linked to actual images of the passenger lists. Information contained in the index includes given name, surname, age, gender, arrival date, port of arrival, port of departure and ship name. Learn more...

Appendix B: Variable Definitions

UAI (CEO)	Uncertainty Avoidance Index for the CEO, from Hofstede. See the data section for detailed explanation.
UAI (Executive)	Uncertainty Avoidance Index for a non-CEO top executive (top four most highly paid non-CEO executives)
UAI (Exec Team)	The average value of *UAI* of the top four most highly paid non-CEO executives in a firm-year.
UAI (Director)	Uncertainty Avoidance Index for a corporate director
UAI (Board)	The average value of *UAI* of the board of directors in a firm-year.
UAI (Common)	The first principal component of UAI, UAI (Exec Team), and UAI (Board) in a firm-year, normalized to have the same mean and standard deviation as UAI (CEO).
L#.UAI (Common)	#-th Lag of UAI (Common) by firm-year. L1.UAI is the one-year lag of UAI (Common), and so on.
|Change in UAI(Common)|	The average absolute difference in UAI (Common) between a new CEO's first year in office and the year before
LG.UAI	Lag of UAI (Common) by generation. LG1.UAI (Common) is the UAI (Common) of the last generation (measured at the first year when the last CEO took office), and so on. Generations of leadership represent the managers and directors under each CEO's regime.
UAI – UAI (Board)	The difference between the CEO's UAI and the current board's UAI.
$\|UAI - UAI (Board)\|_{t+1}$	The absolute difference between the CEO's UAI and the board's UAI, measured at (t+1).
$\|UAI - UAI (Exec Team)\|_{t+1}$	The difference between the CEO's UAI and the executive team's UAI, measured at (t+1).
$\|UAI - UAI (Board)\|_{avg}$	The absolute difference between the CEO's UAI and the board's UAI, averaged over a CEO's entire tenure.
$\|UAI - UAI (Exec Team)\|_{avg}$	The difference between the CEO's UAI and the executive team's UAI, averaged over a CEO's entire tenure.
UAI (Founder)	The UAI of the founder, averaged if there are multiple founders.
|UAI (CEO) – UAI (Founder)| ((Founder is not the CEO)	The absolute difference between the non-founder CEO's UAI and the corporate founder's UAI, measured at the firm-CEO level.
UAI (Pre-turnover Exec Team)	The average value of *UAI* of the top four most highly paid non-CEO executives in the year before CEO turnover.
UAI (Pre-turnover Board)	The average value of *UAI* of the board of directors in the year before CEO turnover.
UAI (Outgoing CEO)	UAI of the departing CEO.
UAI (CEO) - Predicted	The part in CEO's UAI that is predicted by the UAI of the last generation of leadership (i.e., the previous CEO, the pre-turnover board, the pre-turnover executive team).
UAI (CEO) - Residual	The unpredicted (residual) component in UAI (CEO).
UAI (Common) - Predicted	The part in UAI (Common) that is predicted by the UAI of the last generation of leadership (i.e., the previous CEO, the pre-turnover board, the pre-turnover executive team)
UAI (Common) - Residual	The unpredicted (residual) component in UAI (Common)
EthnicityMatchBoard	An indicator variable that equals one if a CEO's (dominant) origin is the same as the most common origin among the board of directors, and zero otherwise.
EthnicityMatchExec	An indicator variable that equals one if a CEO's origin is the same as

	the most common origin among the top four non-CEO executives, and zero otherwise.
CEO Age	The age of the CEO.
Missing Age	An indicator variable that equals one if a CEO's age information is missing, and zero otherwise.
CEO Education	The level of the CEO's education. It is equal to three if the CEO holds a doctorate degree (including post-doctoral training), and equal to two if the highest degree is a Master's degree, and equal to one if the highest degree is undergraduate. If the education information is missing, we set "CEO Education" to be zero, and "Missing Education" is equal to one.
Missing Education	An indicator variable that equals one if a CEO's education information is missing, and zero otherwise.
Female	An indicator variable that equals one if a CEO is a female, and zero if female.
Insider CEO	An indicator variable that equals one if a CEO is promoted to the position from within the firm and zero otherwise.
Log(Tenure)	The logarithm of (CEO tenure +1), with "tenure" measuring the number of years since he took office. Zero is assigned as the value for "tenure" at the turnover year. This variable varies over time for a CEO-firm pair.
CEO Tenure	The total time in office, measured ex post for CEOs in our sample, except for the last CEO in each firm in our sample. This measure does not vary over time by firm-CEO.
Acquisition	An indicator variable that equals one if the firm engages in mergers or acquisitions during a fiscal year, and zero otherwise.
R&D Rate	Annual R&D expense scaled by the firm's sales at the beginning of the year, expressed in percentage term.
Cash Rate	Cash holding scaled by the firm's book assets, expressed in percentage term.
Leverage	Total debt scaled by the firm's book assets, expressed in percentage term.
Log(MB)	The logarithm of the firm's market value of equity to book value of equity ratio.
ROA	Earnings before interest, tax, and depreciation scaled by the firm's book assets at the beginning of the year, expressed in percentage term.
Log(Sales)	The logarithm of the firm's net sales.
IVOL	The volatility of the residual return from the Fama-French three-factor model in a month, aggregated to the annual level.
Vega	The dollar change (in millions) in CEO's wealth associated with a 0.01 change in the standard deviation of the firm's returns.

Appendix C: Robustness Checks

Panel A: Noise and Imprecision in Measuring UAI

This table reports the impact of noise and imprecision in the measurement of *UAI* on acquisition. In Column (1), we use *Fraction Unidentifiable*, which is fraction of passengers with a given last name that has unidentifiable origin. In Column (2), we use *# of Origins*, which is the number of non-USA origins. In Column (3), we use an indicator variable *Dominant Origin*, which equals one if a CEO's last name is associated with a dominant origin (outside US). In Column (4), we use *Dispersion in UAI*, which is the standard deviation of UAI values associated with different origins of a given last name. In Column (5), we use *Fraction of Origins Missing UAI*, which is the percentage of records without missing UAI values for a given last name. Firm-year level control variables (Log(MB), ROA, and Log(Sales)) are lagged. Definitions of all variables are provided in Appendix B. Standard errors are clustered at the firm level. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Acquisition		R&D		Cash		Leverage	
	Firm FE		Firm FE		Firm FE		Firm FE	
UAI (Founder)	-0.181**	-0.198*	-2.615**	-3.834**	0.065*	0.020	-0.088	-0.067
	(0.068)	(0.108)	(0.888)	(1.279)	(0.039)	(0.055)	(0.056)	(0.083)
UAI (Founder) x # of Origins	0.005**		0.025		-0.000		0.002	
	(0.002)		(0.031)		(0.001)		(0.002)	
# of Origins	-0.002		-0.012		-0.000		-0.001*	
	(0.001)		(0.014)		(0.001)		(0.001)	
UAI (Founder) x Dispersion in UAI		0.854		11.993*		0.201		0.238
		(0.593)		(7.160)		(0.315)		(0.462)
Dispersion in UAI		-0.300		-5.285		-0.133		-0.144
		(0.283)		(3.405)		(0.145)		(0.219)
State and Industry FE	x	x	x	x	x	x	x	x
Observations	1,848	1,848	1,170	1,170	1,848	1,848	1,848	1,848
Adjusted R-squared	0.060	0.059	0.217	0.219	0.324	0.324	0.300	0.298

Panel B: Different Clustering in Investment Policy Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Acquisition Firm FE				R&D Firm FE			
UAI (Founder)	-0.115**	-0.115**	-0.086*	-0.086**	-2.329**	-2.329**	-1.801**	-1.801**
	(0.045)	(0.036)	(0.049)	(0.032)	(0.635)	(0.700)	(0.648)	(0.505)
cluster by origin State and		x		x		x		x
Industry FE			x	x			x	x
Observations	1,278	1,278	1,278	1,278	783	783	783	783
Adjusted R-squared	0.004	0.004	0.042	0.042	0.015	0.015	0.260	0.260

Panel C: Different Clustering in Financial Policy Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cash Firm FE				Leverage Firm FE			
UAI (Founder)	0.113***	0.113***	0.058**	0.058	-0.082*	-0.082	0.021	0.021
	(0.030)	(0.041)	(0.027)	(0.036)	(0.044)	(0.053)	(0.040)	(0.032)
cluster by origin State and Industry FE		x		x		x		x
			x	x			x	x
Observations	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278
Adjusted R-squared	0.011	0.011	0.281	0.281	0.002	0.002	0.276	0.276