Bank Risk Governance*

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Abstract

Risk governance deficiencies were blamed for the subprime crisis and subsequent regulations called for increased board independence, more financial expertise and dedicated risk management committees. This surprises since banks were over-compliant at the time and there is scant evidence to this day. This paper investigates whether the requested changes do actually improve risk governance, by looking at a variety of risk measures across three categories (regulatory, economic, tail), for 472 U.S. bank holding companies (BHC) from 2000 to 2017. We evaluate risk governance through a key monitoring activity of boards, CEO turnover. According to regulatory risk measures, increasing board independence and having a risk committee *seem* to be beneficial, but Goodhart's Law questions the statistical validity. In fact, our economic and tail risk measures show the opposite, i.e. they do further harm risk governance. Our results thereby suggest that, while official responses to the subprime crisis claim that banks were not independent enough, rising independence ratios following Enron and Sabanes Oxley contributed the subprime crisis.

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Key words: Risk governance, independent directors, monitoring quality, tail risk taking, subprime crisis.

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The Director's Handbook of the Office of the Comptroller of Currency OCC (2020)[1]:

> "Risk governance, which is part of the corporate governance framework, is the bank's approach to risk management. Risk governance applies the principles of sound corporate governance to the identification, measurement, monitoring, and controlling of risks."

1 Introduction

The U.S. Financial Crisis Inquiry Commission (2011), the Report of Walker (2009) in the UK, the Basel Committee on Banking Supervision (2010), and the Financial Stability Board (2013) have all identified risk governance deficiencies as a major source of the recent subprime/global financial crisis. To improve risk governance, they have all called for greater board independence, more financial expertise, and the creation of board risk committees. While risk governance concerns the oversight of risk (taking) activities, it is part of the overall corporate governance of (financial) firms. It is tempting to apply corporate governance insights to the risk governance of banks. However, such a one-size-fits-all approach misses that banks are opaque companies with a business model centered around risk, a concept that is hard to understand and difficult to measure. Moreover, Stulz (2014) and Anginer et al. (2018) recall that finance theory suggests better corporate governance to harm risk governance, since shareholders have incentives to increase risk due to their limited liability.

Banks play a crucial role in the well-functioning of the economy and crises have had tremendous economic impact. Despite the high stakes in getting risk governance right, empirical analysis of the post-subprime changes continues to be rare. We intend to fill this gap and study the impact of the regulatory requests on the quality of risk governance in banks.

Initially, for comparability with previous studies, our paper carries out Panel regressions to look at the question of how risk governance characteristics affect bank risk taking. The core of our paper, however, studies how risk governance affects risk oversight, i.e. how it affects risk-based actions by the board. A key function of boards consists in evaluating the CEO and replacing unsatisfactory ones, see, e.g., Mace (1971). We assess CEO turnover through so-called survival regressions[2] . While the corporate governance literature studied CEO turnover in firms

[1]Analogously, the Financial Stability Board (2013) and (building upon this) the Basel Committee on Banking Supervision (2015) define the risk governance (framework): "As part of the overall corporate governance framework, the framework through which the board and management establish and make decisions about the bank's strategy and risk approach; articulate and monitor adherence to risk appetite and risk limits vis-à-vis the bank's strategy; and identify, measure, manage and control risks."

[2]These have been developed within a branch of statistical methods called survival analysis. Survival analysis has two advantages over the popular categorical regressions: first, it considers the accumulated hazard over the course of a CEO's tenure and, second, it takes into account (inevitable) data truncation issues from CEOs in job at the end of our data sample.

in response to performance[3], our risk governance focus leads us to look at dismissal in response to the interplay of risk governance and risk characteristics.

The scant literature on risk governance focuses on risk measures that are part of the capital regulations (capital ratios, leverage ratios). We are concerned that these risk measures may be subject to Goodhart's Law, see Goodhart (1975), i.e. simply by being at the center of regulatory attention, board actions may be distorted and this may misguide us. This echoes a common concern, so-called regulatory arbitrage, namely that banks tweak risk reporting (according regulatory risk measures) such that regulatory capital is "minimized", but they do internally manage risks using another set of rules centered on so-called economic capital (according economic risk measures)[4]. For that reason, in addition to regulatory risk measures, we study various economic risk measures (average risk weights, distance-to-default, volatility of ROA, of ROE, of stock returns), see, e.g. Laeven and Levine (2009). We further complement our study by a third category of risk measures that look at tail risks (derivatives usage, off-balance-sheet activities, kurtosis, stock return VaR), i.e. catastrophic events that occur (very) infrequently. One may view our tail risk measures as a subset of economic risk measures[5], but we treat them as a separate category due to differences in their analytical/informational complexity and in the underlying risk (infrequent catastrophes).

Our dataset consists of 472 U.S. bank holding companies from 2000 to 2017, a total of 3,841 bank-year observations. It contains board characteristics, performance and risk measures as well as the start date (and the dismissal date, if applicable) of CEOs for the banks in our sample. As mentioned before, we carry out both Panel regressions and survival regressions to assess risk governance and risk taking. We note that a major task of bank management and of their boards then consists in balancing performance and risk (taking). In addition to a narrow perspective that studies risk governance in isolation, we also study CEO turnover and risk governance controlling for performance.

We document a split economic/tail vs. regulatory risk measures. We find that raising independence ratios decreases risk taking and increase the sensitivity of CEO turnover when risk is monitored by regulatory risk measures. While this supports the regulatory push (in line the scant literature), Goodhart's Law questions the validity of such conclusions; in fact, our economic and tail risk measures show the opposite, i.e. increasing IR worsens risk oversight: raising independence ratios increases risk taking and decreases the sensitivity of CEO turnover. Similarly, having a risk committee appears beneficial when looking at regulatory risk measures,

[3]For example, Jensen and Murphy (1990) and Kaplan and Minton (2012) using categorical regressions and Jenter and Kanaan (2015) using survival analysis.

[4]Technically speaking, regulatory risk measures are constrained but economic risk measures are not, and banks use that to their advantage, supposedly.

[5]One may conjecture that regulators are concerned about tail risk and watch them qualitatively. Here, we refer to the lack of interest in measuring and in quantitative limitations.

but in our CEO turnover analysis this turns out to be detrimental according to economic and tail risk measures. Unfortunately, our analysis of financial expertise is limited by a small number of financial experts in our dataset and shows conflicting results.

Our paper contributes mostly to the risk governance literature. Previous studies looked exclusively at the relationship between risk governance and risk taking through (Panel) regressions, but results were ambiguous: if anything, they seem to support the regulatory requests only when regulatory risk measures are considered. For completeness, we carry out Panel regressions and find similar results to that in the literature. (We present the results from the literature and discuss this in subsection 4.2.) The core of our paper studies how risk governance relates to CEO turnover. Previous studies looked at corporate governance in non-financials (performance and CEO turnover), see, e.g. Jenter and Kanaan (2015). To our knowledge, this is the first study of the quality of risk oversight (a critical component of monitoring quality[6] in banks) and, more generally, of risk governance and CEO turnover. Taking into account Goodhart's law, our paper finds from various perspectives that independents are detrimental to the quality of risk monitoring (risk oversight) in banks. Thereby we argue that the main regulatory requests (more independent boards, having a risk committee) are harmful instead of being beneficial.

Along the way, our paper touches upon several issues in the literature. First of all, within the banking literature we touch upon regulatory arbitrage, i.e. that banks create a wedge between economic and regulatory capital. This may lead to banks holding insufficient capital despite regulatory compliance. As such it is widely considered to be one of the causes of the subprime crisis. However, while this is crucial for regulation and while it seems to make sense to be concerned, it has been hard to confirm empirically. A notable exception her is Behn et al. (2022). Our paper confirms a wedge between regulatory risk measures vis-a-vis economic and tail risk measures that we term regulatory risk arbitrage, akin to the common notion of regulatory (capital) arbitrage.

Second, our paper has some implications for the corporate governance literature, in general. Notwithstanding that independents may be better suited to keep a CEO at arms length, they may also be inferior in other aspects that matter in risk and corporate governance and reduce their effectiveness for risk governance: independent directors face difficulties in accessing critical information, see, e.g. Duchin et al. (2010). This is even more worrisome with tail risks since these are particularly opaque and complex to understand and measure. Tail risks should be disliked by regulators, shareholders and the board alike. Our results do hold not only for economic but also for tail risks, which suggests that independent directors, even those with financial expertise face informational and analytical difficulties.

[6]In general, the monitoring quality of boards in general appears vastly under-researched. A notable exception is Dah et al. (2014), albeit for firms in general: they study actual board changes made after enactment of Sarbanes-Oxley and find that large board independence changes seem to be most detrimental to the monitoring function of the board.

The remainder of the paper is organized as follows: The next section describes our research setup, including our formalization of our research question, a discussion of our risk measures, of Panel regressions and of survival regressions. Section 3 presents our data and descriptive statistics. The following section carries our Panel regressions of board characteristics and bank characteristics. Section 5 studies how (tail) risk taking affect CEO turnover using survival analysis and section 6 discusses economic implications. Finally, Section 7 concludes. Details on data, board characteristics, and risk variables are provided in the Appendix. The appendix also contains robustness studies, tests the validity of our various regressions and presents additional regressions of interest.

2 Empirical Approach

2.1 Research Question and Overall Research Design

The U.S. Financial Crisis Inquiry Commission (2011), the Report of Walker (2009) in the UK, the Basel Committee on Banking Supervision (2010), and the Financial Stability Board (2013) have all argued that the subprime crisis (and the ensuing global financial crisis) was due to deficiencies in capital, in adequate risk measurement (regulatory arbitrage) and in risk governance. To address risk governance deficiencies they called to increase board independence, increase financial expertise and to have a risk committee within the board of directors[7].

At the time there was limited empirical evidence dedicated to banks, and the various commissions seem to have based their recommendations on a one-size-fits-all approach, where they extend corporate governance insights (of non-financials) to risk governance (of financials). At first sight, this extension beyond the research boundary seems to make common sense. However, early-on this was already questionable. For example, as anecdotal evidence, when Lehman Brothers was declared bankrupt in 2008 as the defining moment in the subprime crisis, it overcomplied on these regulations[8]. Moreover, Adams (2012), among others, points out that, before the subprime crisis, financial firms already had much higher ratios of independent directors than did non-financial firms and that bailed-out banks had particularly high ratios.

Since then, despite considerable interest and relevance, there has been only a limited number of studies. Often, these study the performance during the subprime/GFC period and rely on Panel regressions, typically focusing on specific (regulatory) risk measures. This lead us to our research question throughout this paper: do the requested changes by the various inquiry

[7] In the U.S., the Dodd-Frank Act in 2010 imposed board risk committees on systemically important banks.

[8] At the time, eight of the ten directors of Lehman Brothers met the independence standards of the NYSE — exceeding by far the regulatory minimum of 50% —, two of these directors had a financial background — i.e., one quarter of independent directors, much more than the 8% we find in 2008, in our data sample — and the board had a risk committee — in 2008 less than 20% of banks in our sample had such a committee —.

commissions do actually improve risk governance in banks?

We study the following three variables:

1. Independence Ratio (IR), the fraction of independent directors on the board of directors.

2. Financial Expertise (FE), the fraction of independent directors with financial expertise[9], following the definition in Minton et al. (2014).

3. Having a risk committee within the board of directors (RC), a dummy/indicator variable that is set to one if the bank has this committee and zero, otherwise.

Given the enormous regulatory push, we adopt as standing hypotheses throughout this paper that increases in all three variables be beneficial for risk governance.

In their survey of the corporate governance literature, Hermalin and Weisbach (2003) identify three lines of corporate governance research. Analogous to that we look in our risk governance paper here at two questions: (1) how do risk governance characteristics affect bank risk? (2) how do risk governance characteristics affect the observable actions of the board? (We do not look into a third potential line of research based on Hermalin and Weisbach (2003) that would consider how bank risk affects its risk governance characteristics.)

As usual in the literature, we assess the first question by looking at Panel data over time. We study the second question through a key monitoring activity of the board, CEO turnover. In subsections 2.3 and 2.4 we will present separately our empirical approach to assess both and explain there also how we reformulate our research question to make it operational and therein assess our standing hypothesis statistically.

2.2 Risk Measures

Any assessment of bank risk requires us to quantify risk. Unfortunately, risk is a concept with many different facets and it is vain to expect a unique measure that assesses risk. Rather, the literature proposed many different measures that all address particular aspects of risk. Therefore, we study a variety of risk measures that all address a particular aspect[10], covering three categories, see appendix A for details:

1. Regulatory measures of risk taking (two measures): the (financial) leverage (LEV) and the Tier1 capital ratio (LEV, T1). We note that LEV is the usual leverage parameter

[9]Bank insiders are "financial experts" *per se*, hence this definition only looks at "financial experts" among independent directors (outside directors) and we do not study interaction terms between the FE and the independence ratio (IR).

[10]We study exclusively measures that are accessible through public reporting. Given that the Federal Reserve's bank holding database provides a very granular look at banks, it appears reasonable that this covers measures available to bank boards. We do exclude, however, proprietary and confidential data that is available only to the regulator, e.g. the Federal Reserve's CAMELS rating.

in finance; its inverse is a risk measure that entered explicitly into the Basel rules as part of the reforms following the global financial crisis. As such it is a risk measure that regulators pay immediate attention. The regulators also pay particular attention to the T1 measure, measures, which are monitored by the regulator.

2. Economic measures of risk taking (six measures): the average risk-weight (RW), the distance-to-default (Z-score), the probability of default (PD) and the volatility of ROA, ROE and of stock prices that have been studied in an extensive cross-country Panel study by Laeven and Levine (2009). They are well known within the risk management literature, see, Houston et al. (2010), and Hull (2018), among others. These are measures that management uses for internal risk management purposes, e.g. for internal risk analysis/reporting or risk allocation, but that are neither regulated nor of interest (i.e. out of sight) of regulators[11]. Analogous the distinction between regulatory capital — used by regulators to check capital adequacy — and economic capital — used for internal management purposes, specifically internal bank risk management — we refer to this second category as economic risk taking measures.

3. Tail risk measures (four measures): derivatives usage (DER), off-balance sheet activities (OBS), stock return tail risk (ST) and the kurtosis of ROA/ROE. These tail risk measures relate to events of small probability but "catastrophic" outcome. They are often associated with excessive risk taking ("gambling"). (Taking such risks may be of interest to management because they do increase income "slightly" until disaster strikes.) These risks are of great concern to regulators; however, they are monitored qualitatively but are not regulated explicitly/quantitatively.

The overarching theme of the post-subprime inquiry commissions and of regulators since then is that they all dislike risk taking across all three categories. However, they differ in the regulation they face and this allows us to study different economic aspects: while the first category is directly regulated and banks have to comply with it, the other two categories are unconstrained (economic risk taking measures and tail risk measures.)

Higher capital ratios (T1) and larger distance-to-default (Z) both correspond to lower risk. To ease our discussions throughout this paper, we usually study the negative values **-T1** and **-Z**, such that increases in all reported (tail) risk measures correspond to increases in risk taking.

We note that the three categories differ in terms of complexity/informational needs. Whereas regulatory and economic risk taking measures are relatively easy to assess/calculate, tail risks are challenging: models of tail risks are much less developed and observations are (quasi by

[11] The average risk weight that we use is based on the so-called standardized approach that is set by regulators. However, while the regulator sets the rules, she does not monitor this risk measure and so we categorize it as an economic risk measure, throughout.

definition) sparse. They are also much harder to understand conceptually, requiring profound knowledge of finance, banking, and financial markets (due to, e.g., ever more complex financial products). This distinction allows us to assess risk governance changes in terms of analytical/informational requirements.

2.3 Board Characteristics and Risk: OLS Panel Regressions

Most of the risk and corporate governance literature assesses the impact of board characteristics by studying how they affect risk. This literature relates risk (performance) measures to risk (governance) characteristics in OLS regressions.

Our data has a Panel structure (time and cross-sectional dimensions) such that, throughout *this type of analysis* we use Panel regressions. Specifically, we adopt the following baseline model with bank fixed effects for the risk measure $\mathtt{RM}_{it}$ of bank i over period t:

$$\mathtt{RM}_{it} = \alpha_i + \beta_{\mathtt{RG}}^{\top}\mathtt{RG}_{it} + \beta_{\mathtt{Ctrls}}^{\top}\mathtt{Ctrls}_{it} + \varepsilon_{it},$$

where $\mathtt{RG}_{it}$ is the vector of current risk governance characteristics (IR, FE, RC), $\mathtt{Ctrls}_{it}$ the vector of suitable control variables that will be detailed in the next section, and $\top$ the vector transpose. As usual, $\beta_{\mathtt{RG}}, \beta_{\mathtt{Ctrls}}$ describes the sensitivities and the terms α_i and ε_{it} describe the bank fixed effects and noise, respectively.

Our standing hypothesis throughout this paper is that increases in any of our risk governance variables are beneficial for risk governance, i.e. that they decrease risk, i.e. increases in all three risk governance characteristics (IR, FE, RC) decrease risk taking and tail risks:

Hypothesis 1 *There is a negative association between all three risk governance characteristics (IR, FE, RC) and all risk measures.*

To assess this, we study all our risk taking measures and tail risk measures in separate regressions and present the associated sensitivities β to IR, FE, RC in subsection 4.1. The sign of these sensitivities allows us to assess our hypothesis that they are all non-positive.

2.4 Board Characteristics and CEO Turnover: Survival Regressions

The core of our paper studies how risk governance characteristics affect board actions. Throughout we look at a particular form of board action that relates to the main monitoring activity of the board: dismissing "unsatisfactory" CEOs. The literature has studied this through the corporate governance lens and for non-financials, whereas we do, to our knowledge for the first time, study this through a risk governance lens and for financial companies.

We note that the prior CEO turnover literature is not only centered on corporate governance and performance based actions. In addition, it usually studies the likelihood to be dismissed using categorical regressions, e.g., logit or probit regressions. Throughout our paper we study dismissal using survival analysis, a branch of the statistical literature that came up in some papers in recent years to study CEO tenure, though exclusively for non-financials and ignoring (risk) governance issues, see, e.g., Jenter and Kanaan (2015).

Survival analysis[12] centers on the so-called hazard rate (aka hazard function) to be subject to a certain event, here in our framework the event that a CEO is dismissed. Throughout we focus on representations of survival analysis in the so-called "accelerated failure time" (AFT) form. They are interested in explaining the time T of a CEO to be dismissed (a random variable for estimation purposes, measured from the time the CEO starts). Throughout, for CEO number j we study

$$\ln T_j = -S(x_j) + \varepsilon_j,$$

where ε_j has an exponential distribution and we refer to the function

$$S(x) = \beta_x^\top x \tag{1}$$

as the risk score (aka log relative hazard). Here, the vector x_j captures the variables that drive the hazard and $\beta_x^\top$ describes the vector transpose of their sensitivities.

Increases (decreases) in the hazard rate of the CEO do decrease (increase) CEO tenure. We discuss the impact on the hazard and then on the length of the CEO's tenure. Note that a positive (negative) sensitivity translates into a higher (lower) hazard rate and hence decreases (increases) the CEO's tenure. This is associated with higher (lower) CEO turnover[13].

Our baseline regression studies (separately for each risk measure):

$$S(t, \texttt{RG}, \texttt{RM}, \texttt{Ctrls}) = \alpha + \beta_{\texttt{RM}}\texttt{RM}_{it} + \beta_{\texttt{RG}}^\top\texttt{RG}_{it} + \beta_{\texttt{RG}\times\texttt{RM}}^\top\texttt{RG}_{it}\texttt{RM}_{it} + \beta_{\texttt{Ctrls}}^\top\texttt{Ctrls}_{it}, \tag{2}$$

where the control vector on the right-hand-side may also contain interaction terms of control variables with risk governance variables. We will detail this exactly in the specific applications below.

Therein, the sensitivity $\beta_{\texttt{RM}}$ informs us, how dismissal hazard relates to changes in risk

[12]Here we sketch survival analysis as we apply it in this paper and refer the interested reader for further details to Cleves et al. (2010).

[13]Leaving aside parametric and technical issues, one may view the popular categorical regressions of CEO turnover as a form to characterize the *conditional* probability of dismissal over the next year (conditional on having survived up to that date). One may express this through the hazard at the current time (measures since entering the job) and be tempted to treat them as identical. However, this is not the case for two reasons: first, conceptual reasons and second, statistical efficiency reasons. We believe survival regressions to be more appropriate for our analysis here, for reasons that we detail in subsection C.1 of the appendix.

and the (vector of) sensitivities $\beta_{\mathtt{RG}}$ informs us how changes in risk governance variables affect dismissal hazard. Our focus in this paper is, however, whether regulatory changes lead to a stronger or weaker response on risk in terms of CEO dismissal risk. This leads us to focus on the sensitivity $\beta_{\mathtt{RG}\times\mathtt{RM}}$ of cross/interaction terms: when it is positive, say for IR, then it means that a more independent board is associated with a higher sensitivity of the CEO's hazard to risk. This is exactly what one would expect from our standing hypothesis that increase in IR be beneficial for risk governance. Analogous one can conclude that increases in FE and having a risk committee should correspond to positive interaction terms.

Hence, our regulatory hypothesis means in the framework of our survival regressions that these sensitivities are all positive:

Hypothesis 2 *There is a positive association between the interaction terms of all three risk governance characteristics (IR, FE, RC) with risk measures.*

While the focus of our paper is on the interaction terms, we find it interesting to look at the overall sensitivities at the currently prevailing independence ratios and financial expertise sensitivities and discuss these in light of their increase up to the subprime crisis. We do so briefly in the section 5.

The reader may have three concerns about the validity of our research design. First of all, AFT models (as ours) assume that the data admits a proportional hazard representation. We test for this and find no violation of the proportionality assumption. To save space and focus the discussion we report the test statistics in subsection C.2 (in the appendix) jointly for all the regressions that we present in the main body of this paper.

Second, when section 5 presents and discusses our control variables, one may be concerned that we miss important ones. Subsection C.2 (in the appendix) discusses jointly for all the regressions that we present in the main body of this paper whether there is unobserved heterogeneity and finds no statistical support.

Finally, we present survival analysis only for AFT models and only for one particular distribution (exponential). We also studied other forms of AFT models, i.e. other distributions than the exponential distribution for ε. We also studied so-called hazard representations, including Cox regressions. All results are all comparable but we do not report them separately.

2.5 The Risk Governance Corporate Governance Tradeoff

A major task of banks consists in balancing performance and risk (taking), in short balancing risk governance and corporate governance. In our CEO turnover analysis in Section 5 we do control for individual bank performance. Moreover, as agency theory suggests that exogenous industry shocks be filtered out of the performance evaluation by the board, see Holmstrom (1982), Gibbons and Murphy (1990), we control for systematic performance.

The literature considered various forms of controlling for systematic performance: most of the literature controls for excess performance $\texttt{ExcPerf}_{it} = \texttt{Perf}_{it} - \overline{\texttt{Perf}}_t$, see, e.g., Jensen and Murphy (1990). Here, $\texttt{Perf}_{it}$ denotes individual bank performance and $\overline{\texttt{Perf}}_t$ denotes systematic performance.

In addition, Jenter and Kanaan (2015), in their study of corporate governance (of non-financials) argue in favor of studying residual performance. Here, to take into account that banks balance performance and risk taking in monitoring, we decompose performance into its drivers: (risk-adjusted) outperformance and risk taking. This leads us to decompose performance into a term driven by a systematic performance and risk (according to a risk-measure, $\texttt{RM}$). We use Panel OLS regressions with bank fixed effects, i.e. for bank number i in year t

$$\texttt{Perf}_{it} - r_{ft} = \texttt{Residual Perf}_i + \beta_P \left(\overline{\texttt{Perf}} - r_{ft}\right) + \beta_{\texttt{RM}}\text{RM}_{it} + \varepsilon_{it} \tag{3}$$

where r_{ft} denotes the current risk-free interest rate.

Four our dataset (introduced in the next section), we report the sensitivities $\beta_P, \beta_{\texttt{RM}}$ in subsection 4.3. The $\texttt{Residual Perf}$ will be used alongside systematic performance and the respective risk measure in Section 5.

Section 5 studies three types of regressions: the first type controls for the three performance components (residual performance, systematic performance and risk); the second type controls for excess performance; finally, our third type take a narrow look at risk governance and reports survival regression without controlling for performance.

3 Data

Our data set is based on the intersection of BoardEx with the U.S. Federal Reserve's Bank Holding Company (BHC) database (quarterly FR 9Y-C reports). The BHC database provides a granular view on banks' balance sheets. BoardEx[14] is a business intelligence service that collects a variety of board characteristics from company reports (roughly 12,000 companies covered). It provides a comprehensive description of director characteristics at each reporting date and a history of current and prior board/non-board employments, education and achievements. In particular, from the BoardEx employment datafile, we take the start date and (if applicable) end date of all CEOs. We add stock market data from CRSP and CEO compensation data from ExecuComp, both accessed through WRDS. Purely for informative purposes, we present below various summary statistics of director compensation using BoardEx data. Overall our sample consists of a total of 472 banks with 3,841 bank-year observations.

Throughout, all monetary values are inflation-adjusted and expressed in 2017 dollars. More-

[14]As BoardEx started in 1999 but initial coverage is incomplete, our analysis covers the years 2000-2017.

over, we winsorize all financial data (yearly) at the 1%/99% levels. Winsorizing strengthens the statistical significance of our results but does not affect their qualitative implications.

The defining moment of the subprime crisis was the default of Lehman Brothers on September 15, 2008. It lead to a series of regulatory changes since 2009; to control for these we introduce a a dummy variable, called "post crisis", that is set equal to one for years after 2009 and zero, otherwise.

Table 1 provides summary statistics of all major variables used in our analysis, broadly separated into six Panels. We note that the distribution of total assets is highly skewed and our dataset is mostly composed of small/medium size banks that are organized as bank holding companies and make up the bulk of the US banking system.

Panel A of Table 1 describes risk governance characteristics at the board level. The average (median) bank board has 11.2 (11) members, which appears large, since the banks in our sample are mostly of small/medium size. The independence ratio has a mean (median) of 78.6% (81.8%) across all bank-year observations; this is well beyond the regulatory minimum. Further analysis (not reported) shows that, at the beginning of the millennium, the average independence ratio was already beyond 50% that became compulsory in the years 2002-2004, rose further strongly during those years, continued to increase at a slower pace up to the subprime crisis, and, since then, it remains stable at around 80%. Independent directors are close to or beyond retirement age (62 years) and sit for an extended period of time on the board (9 years).

Directors with financial expertise make up only a fairly small fraction (of the independent directors), on average roughly 7.5%. Note that this means that on average (no more than) 1 out of 10 independent directors has financial expertise. Despite the intuitive appeal and regulatory push after the subprime crisis, the fraction of financial experts seems not to have increased much over all the years that we look at. Noteworthy, in more than half of all bank-year observations there is no financial expert on the board; since this is a persistent variable, it complicates our later statistical analysis and does not allow us to look at interaction terms with other variables of interest for our analysis.

Further analysis (not reported) shows that, over the years, the fraction of banks with risk committees increased. At the beginning of our sample about 10%, around the subprime crisis about one-fifth and at the end of the sample roughly half of banks in our sample have such a committee within the board of directors. Panel B of Table 1 characterizes the risk committee. We note that this committee makes up a considerable fraction of all board members: on average 5 compared to 11 on the total board. The fraction of independents among the directors on the risk committee is higher than that of the entire board, on average 89.9% and for at least half of those, the Risk Committee is fully composed of independent directors.

In principle, BoardEx reports direct compensation for all directors but in practice we observe direct compensation only for a small number, such that our statistical analysis uses

Table 1: Summary statistics.

	Count	Mean	Std. Dev.	Min	Quantiles 25%	Quantiles 50%	Quantiles 75%	Max
Tot. Ass. ($ billion)	3475	48.40	255.7	0.232	1.151	2.478	7.834	2664.1
ln (Tot. Ass.)	3475	8.221	1.685	5.446	7.048	7.815	8.966	14.80
Panel A: Board Governance Characteristics								
Brd. Size	3825	11.16	3.224	5	9	11	13	27
Board Ind. Ratio	3825	0.786	0.123	0	0.714	0.818	0.889	0.941
Ratio Fin. Exp.	3818	0.0743	0.107	0	0	0	0.125	1
Age (Ind. Dir.)	3812	61.77	4.264	45	59.08	61.86	64.48	77.44
Yrs. Tenure (Ind. Dir.)	3809	8.680	4.166	0.100	5.770	8.442	11.35	25.90
Panel B: Risk Cmte Governance Characteristics								
Size (Numb. Dir.)	1092	5.040	1.824	1	4	5	6	14
Ind. Ratio	1092	0.879	0.181	0	0.750	1	1	1
Age (Ind. Dir.)	1084	62.54	4.568	45	59.75	62.54	65.50	77.67
Yrs. Tenure (Ind. Dir.)	1083	8.285	4.492	0.100	4.940	7.873	11.12	24.76
Panel C: CEO Characteristics								
Direct Comp. ($ thsd)	467	2897.7	3878.0	3.893	1022.5	1333.1	3096.1	29514.6
Delta ($ thsd.)	1017	1022.8	4167.2	0.304	51.46	159.2	602.0	75712.2
Vega ($ thsd.)	857	177.6	357.0	0	13.42	45.68	188.8	3763.9
CEO Age (at entry)	748	55.77	7.033	37	51	55	60	85
CEO Age (at exit)	511	61.46	7.007	42	57	62	66	87
Yrs. Tenure (at exit)	346	5.536	3.549	0.333	2.917	4.833	7.833	17.08
Panel D: Regulatory/Economic Risk Characteristics								
T1 (%)	3148	13.00	4.379	4.213	10.53	12.17	14.40	79.55
LEV	3473	10.91	4.144	1.488	8.827	10.39	12.30	93.15
RW	3158	0.734	0.115	0.198	0.665	0.739	0.807	1.202
Z	3069	2.604	0.601	-3.387	2.328	2.611	2.918	5.697
PD (%)	3069	10.93	75.81	0.336	5.402	7.348	9.748	2958.3
ROA vol. (%)	3620	0.892	0.784	0.114	0.523	0.667	0.888	7.134
ROE vol. (%)	3620	10.45	15.49	1.162	5.510	7.327	9.958	268.3
Stock vol. (%)	3806	29.51	14.71	6.061	20.39	25.90	33.95	129.3
Panel E: Tail Risk Characteristics								
DER (%)	3825	51.60	331.9	0	0	0.471	5.584	3768.9
OBS (%)	2756	7.601	8.507	0	2.241	5.258	9.790	92.49
Tail Risk (%)	3816	12.24	6.937	-0.615	7.711	10.40	14.87	43.26
Kurtosis (ROA)	3620	2.605	1.809	1	1.769	1.967	2.557	16.26
Kurtosis (ROE)	3620	2.728	2.082	1	1.763	1.993	2.597	16.49
Panel F: Performance Characteristics								
ROE (%)	3353	8.227	12.38	-134.0	6.051	9.716	13.51	55.37
ROA (%)	3354	0.803	1.060	-7.131	0.580	0.949	1.247	6.004
Stock Return (%)	3825	9.294	33.22	-177.6	-3.140	11.21	27.44	166.1

ExecuComp[15]. It is interesting to note, however, that a direct look at BoardEx compensation data shows that, on average, directors on the risk committee receive 394 thousand dollars, less than two-thirds of the compensation of independent directors on the board (695 thousand dollars). (To put this further into perspective, BoardEx reports average direct compensation of 2897 thousand dollars for the CEO.) Also, independent directors on the risk committee appear slightly older and serve longer than those on the entire board.

Panel C in Table 1 describes major characteristics of CEOs in our sample. On average, direct (annual) compensation is almost two million dollars. (This is based on ExecuComp; compared to the almost three million dollars that BoardEx reports, this is much smaller. Further analysis corroborates that BoardEx reports *compensation* only for a sub-sample of its database that is composed of larger companies.) For later reference we report delta and vega of incentive compensation. Here, delta refers to the dollar change in wealth associated with a 1% change in the bank's stock price and vega refers to the dollar change in wealth associated with a 0.01 change in the standard deviation of the bank's stock returns. We calculate both measures using the algorithm in Coles et al. (2006). The mean delta and vega of CEOs with monetary incentives are at roughly one million dollars and 180 thousand dollars, respectively. They both decreased considerably since the start of the millennium; in the last years of our sample they are a fraction of the value they have been in the early years of our sample. CEOs are leaving office on average at roughly 62 years of age; this is close to normal retirement but, unless they find employment elsewhere, cuts their working life (up to 70 years of age) by some years.

Finally, for reference in later analysis, Panels D-F of Table 1 describe the major risk and performance characteristics that we use in this paper.

4 Bank Characteristics and Risk Measures

4.1 Risk Governance Characteristics and Risk Measures

Table 2 studies in two Panels how risk governance characteristics affect bank risk taking and tail risk taking. The respective dependent variable (risk measure) is in the column heading. In both Panels we regress the respective risk measure on the independence ratio, the ratio of financial experts, and our dummy variable of having a risk committee, controlling for bank size (logarithm of total assets)[16]. Throughout we carry out Panel OLS regressions with bank fixed

[15]ExecuComp does not provide that for directors, but, unfortunately, BoardEx started in 2009/10 to collect compensation data only for a subset of all covered companies. Hence, we restrict our statistical analysis to CEO compensation, from ExecuComp.

[16]Alternatively, it is common to control for board size, defined as the number of board members. Controlling for both in the same regression usually leads to insignificant results, potentially since board size and bank size are highly correlated. Controlling for either board size or bank size leads to similar conclusions regarding our risk governance variables. In the interest of saving space, throughout this paper we present regressions controlling

Table 2: Studying how risk governance characteristics affect bank risk taking and tail risks. We control for bank size, risk taking incentives (vega) as well as post GFC fixed effects (Panel B). We use Panel OLS regressions with bank fixed effects. Coefficient statistics are calculated using robust methods; t-statistics are reported in parentheses; significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Economic Risk Measures						Regulatory Risk Meas.		Tail Risk Meas.			
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1	(9) DER	(10) OBS	(11) Kurt(ROA)	(12) Stock Tail
Panel A: Bank Fixed Effects												
Ind. Ratio (IR)	-0.0343	1.398***	-81.91	23.99***	8.394	0.0667	-3.947*	1.009	192.4**	2.816	0.475***	7.018**
	(-0.84)	(4.69)	(-0.98)	(3.70)	(1.31)	(0.29)	(-1.80)	(0.37)	(2.10)	(0.78)	(3.58)	(2.20)
Fin. Exp. (FE)	-0.0346	1.172***	-19.89	32.59***	28.22***	0.166	-4.034**	-5.038***	383.3***	-7.342***	0.375	13.75***
	(-1.07)	(3.63)	(-0.44)	(3.14)	(3.74)	(0.74)	(-2.27)	(-4.57)	(3.35)	(-3.00)	(1.48)	(3.55)
Has Risk C. (RC)	-0.00523	-0.163***	-16.62	-1.748	1.721	-0.253***	-1.331***	-1.139***	-15.80	1.423	-0.0100	0.914
	(-0.64)	(-3.03)	(-1.09)	(-1.04)	(1.22)	(-5.56)	(-2.75)	(-3.09)	(-0.68)	(1.61)	(-0.30)	(1.40)
Vega	0.0132*	0.0584	-1.158	0.400	-2.054	0.103	0.215	0.713**	-213.5***	0.902	-0.0687**	-1.433
	(1.84)	(1.20)	(-0.31)	(0.42)	(-1.00)	(1.60)	(0.70)	(2.04)	(-2.96)	(0.61)	(-2.00)	(-1.54)
ln (Tot. Ass.)	-0.0135	-0.145**	33.75	-7.219***	-4.327**	0.0192	0.485	-0.460	26.95	2.294	0.0509	-1.296
	(-1.27)	(-2.08)	(1.03)	(-3.42)	(-2.27)	(0.25)	(0.60)	(-1.20)	(0.79)	(1.51)	(0.93)	(-1.43)
Observations	719	787	710	787	787	710	787	711	787	630	787	787
Adjusted R^2	0.798	0.651	0.008	0.481	0.397	0.577	0.275	0.640	0.920	0.737	0.344	0.306
F	2.873	8.192	0.414	5.736	5.659	9.616	8.631	14.53	4.674	4.809	6.820	6.109
Panel B: Bank and Post GFC Fixed Effects												
Ind. Ratio (IR)	-0.00975	1.321***	-73.47	21.53***	3.611	0.244	-2.978	2.257	176.3*	3.430	0.444***	5.729*
	(-0.24)	(4.56)	(-0.96)	(3.58)	(0.57)	(1.13)	(-1.47)	(0.83)	(1.92)	(0.94)	(3.39)	(1.79)
Fin. Exp. (FE)	0.00650	1.066***	-6.669	29.20***	21.63***	0.443**	-2.700	-3.033***	361.1***	-5.877**	0.333	11.98***
	(0.20)	(3.44)	(-0.16)	(2.95)	(2.85)	(1.99)	(-1.63)	(-3.13)	(3.24)	(-2.46)	(1.34)	(3.10)
Has Risk C. (RC)	0.0135*	-0.216***	-10.49	-3.417*	-1.523	-0.124***	-0.673*	-0.211	-26.73	1.972**	-0.0306	0.0401
	(1.65)	(-3.49)	(-0.95)	(-1.91)	(-1.05)	(-3.09)	(-1.72)	(-0.52)	(-1.09)	(2.01)	(-0.85)	(0.06)
Vega	0.00482	0.0826	-3.698	1.169	-0.559	0.0499	-0.0874	0.324	-208.5***	0.705	-0.0592*	-1.030
	(0.60)	(1.62)	(-0.76)	(1.25)	(-0.30)	(0.97)	(-0.33)	(1.11)	(-2.84)	(0.51)	(-1.72)	(-1.10)
ln (Tot. Ass.)	0.00674	-0.202**	40.07	-9.015***	-7.817***	0.152*	1.192	0.519	15.20	2.882*	0.0288	-2.236**
	(0.66)	(-2.45)	(1.06)	(-3.57)	(-3.73)	(1.84)	(1.23)	(1.32)	(0.43)	(1.86)	(0.49)	(-2.20)
Post Crisis	-0.0506***	0.140**	-16.37	4.456***	8.662***	-0.344***	-1.755***	-2.497***	29.18	-1.478***	0.0549	2.334***
	(-7.84)	(1.98)	(-1.21)	(2.70)	(5.66)	(-8.55)	(-3.47)	(-7.69)	(1.43)	(-2.60)	(1.25)	(3.16)
Observations	719	787	710	787	787	710	787	711	787	630	787	787
Adjusted R^2	0.815	0.654	0.009	0.488	0.435	0.627	0.295	0.671	0.920	0.739	0.345	0.319
F	11.55	6.892	0.736	5.051	10.07	24.97	10.26	24.82	3.954	4.199	5.617	6.216

effects. After the subprime crisis a series of regulatory changes were implemented, including the risk governance overhaul that is the focus of our paper. Hence, we also control for that using our post crisis dummy (only Panel B).

A common concern is that CEO performance incentives do also (unintentionally) incentivize risk taking. This leads us to control for the CEO's vega in Table 2. Unfortunately, incentivized CEOs make up a relatively small number of our observations, which limits our statistical analysis in Table 2 with performance incentives. Therefore, Table B2 in the appendix reproduces Table 2 without controlling for vega, then using a much larger number of observations. It comes to similar conclusions regarding the impact of our risk governance characteristics of interest.

Table 2 shows that increasing either the independence ratio or the ratio of financial experts decreases regulatory measures, but *increases* the economic risk measures and the tail risk measures. Having a risk committee decreases regulatory and economic risk measures, with the exception of RW in Panel B. Among our tail risk measures, only the RC coefficient for the OBS risk measure in Panel B is statistically significant; it suggests that having a risk committee *increases* tail risk measures.

Looking at our control variables, we note, furthermore, that the coefficients on vega (risk taking incentives of CEO incentive compensation) are mostly insignificant; for our risk taking measure, they are significant only for RW as well as (-T1) and these are positive, which matches common belief. Surprisingly then, however, the coefficients in regressions of tail risk measure are negative. Total assets (as our size variable) is mostly insignificant and, if not, it is negative. While it would be interesting to further study these aspects, it is beyond our focus and so we refrain from this.

Panel B extends the regressions in Panel A by adding post-crisis dummies. These are negative for regulatory risk measure, which suggests that the post-crisis regulation succeeded. Unfortunately, the economic and tail risk measures do confirm this only for the RW, PD, -Z and OBS risk measures, while ROA and stock volatility, as well as stock tail risk (ST) suggest the opposite.

Our main question in this subsection is "how do risk governance variables affect risk taking?" Interestingly, both Panels show qualitatively similar results; this suggests that the relationship between risk governance and risk is fairly robust to the post-crisis regulatory changes. This leads us to exclude for simplicity of exposition the post-crisis dummy variable in our main analysis of CEO turnover in the next section but will revisit this omission in detail later in subsection 6.2.

Overall, our results so far note a split economic/tail vs. regulatory risk measures: whereas regulatory measures suggest that increases in IR or in FE decrease risk taking and are hence beneficial, we find the opposite when we look at economic and tail risk measures. The impact of

for bank size, only.

having a risk committee comes out unambiguously only for regulatory risk measures (negative coefficient).

(Panel) regressions that study associations between board characteristics and performance characteristics are popular but drawing economic implications tends to be hard. While the Panel regressions with fixed effects do (to some extent) control for unobserved heterogeneity, another criticism is reverse causality. We assess these issues in subsection B.1 of the appendix. Our survival analysis in the next section will study our research question from another angle.

4.2 How our Results Fit into the Risk Governance Literature

To our knowledge all prior studies have carried out some form of Panel or OLS regressions, often focusing on the subprime crisis period or a year before that. Before getting to our surivival analysis, it is therefore at this stage in order to review the prior literature in light of our results above. We note that the sparse literature on risk governance has come to different conclusions. We believe that looking at these through the lens of our three categories (economic, regulatory, tail risk measures) does (at least partially) help in bringing light.

For this we distinguish four lines of research. First and most important, there is a literature that looks at the impact of raising independence ratios. In a cross-country sample comparison of risk-taking before and after the subprime crisis, Vallascas et al. (2017) show that post-2009 increases in board independence lead to more prudent bank risk-taking compared to prior 2009. However, there remain questions about broader implications as they find these beneficial results are confined to banks benefiting from government bailouts during the crisis. The focus of Minton et al. (2014) is on financial expertise (before the subprime crisis, see below) but they also study IR and find that it decreases the capital ratio (as we do) but, interestingly, the association between IR and their other measure, i.e. w.r.t. real-estate loans, in our terminology an economic risk measure, is statistically insignificant.

Second, taking a broader view, we note that a larger fraction of independent directors is usually associated with a more shareholder-friendly board. There are several studies that look at the impact of more shareholder-friendly boards on bank risk taking. For example, Ellul and Yerramilli (2013) and Laeven and Levine (2009) argue that they decrease risk taking[17]. Overall, in contrast to our results above, these studies largely seem to support the regulatory push for greater board independence.

The remaining two lines attracted less interest in the literature. The third line studies the

[17]In addition, several studies looked at performance during the subprime crisis, i.e., when risk materialized, but usually find that more better governance (e.g., more independents directors) performed worse, see, e.g., Fahlenbrach and Stulz (2011), Becht et al. (2011), and Beltratti and Stulz (2012). If one views the subprime crisis as the materialization of tail risks, then this would be in line with our results that increases in IR increase (tail) risk gambling.

Table 3: Studying how risk and systematic performance (in excess of the riskfree return) affect bank excess performance. We use OLS regressions (Panel A) and Panel regressions with bank fixed effects (Panel B). Coefficient statistics are calculated using robust methods; t-statistics are reported in parentheses; significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Economic Risk Measures						Regulatory Risk Meas.	
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1
				Panel A: Bank Excess Performance, OLS				
Risk	-0.278*	-0.255***	-0.0345***	-0.223***	-0.188***	-5.361***	-0.988***	-0.228***
	(-1.71)	(-3.96)	(-6.38)	(-3.85)	(-7.38)	(-7.27)	(-11.96)	(-2.89)
Avg. Exc. Perf	1.000***	0.920***	0.925***	0.909***	0.893***	0.904***	0.935***	1.007***
	(18.35)	(20.22)	(21.06)	(21.32)	(20.12)	(24.38)	(23.59)	(19.85)
Observations	2892	3159	2875	3158	3146	2875	3156	2882
Adjusted R^2	0.235	0.265	0.319	0.326	0.295	0.341	0.376	0.262
F	168.7	210.1	236.3	264.3	220.2	303.5	289.9	236.4
				Panel B: Bank Excess Performance, Panel OLS with Bank FE				
Risk	0.438	-0.479***	-0.0316***	-0.191***	-0.177***	-10.57***	-1.198***	-0.373***
	(1.22)	(-6.52)	(-7.05)	(-3.01)	(-5.73)	(-12.84)	(-11.38)	(-2.79)
Avg. Exc. Perf	0.964***	0.811***	0.902***	0.897***	0.869***	0.780***	0.888***	0.971***
	(18.19)	(18.92)	(19.99)	(18.62)	(18.60)	(23.16)	(22.30)	(19.79)
Observations	2892	3159	2875	3158	3146	2875	3156	2882
Adjusted R^2	0.416	0.484	0.434	0.426	0.415	0.519	0.510	0.396
F	165.8	220.3	228.5	226.3	208.0	310.7	275.8	209.8

impact of FE and currently consists only of Minton et al. (2014). They find that increases in FE decreases the capital ratio but increase their other measure (real-estate loans). The former (latter) is in our terminology a regulatory (economic) risk measure and these associations match our results above.

The fourth line studies the impact of having risk committees. Anginer et al. (2018) do not study this directly: they define a risk-management index for banks that is determined by having a Chief Risk Officer and having a risk committee; they find that they lead to higher stand-alone risk (based on distance-to-default, LEV and asset volatility). Stulz et al. (2021) present a model of banks having a board risk committee; they confirm through interview data the model prediction that establishing a board risk committee does not reduce bank risk.

4.3 Risk Taking and Performance

Our survival analysis in the next section controls (among others) for residual performance. For those purposes, Table 3 presents the results of ordinary OLS regressions (Panel A) and Panel OLS regressions (Panel B) that decompose performance (in excess of the riskfree return) into risk taking, systematic performance and the residual, see equation (3). Therein, we calculate systematic performance as the average, annual performance across all banks in our sample. Throughout, we focus on our eight major riska taking measures; the respective risk measure is denoted in the column heading. Some of our risk taking measures relate to assets and others to equity. For consistency, the performance measure is ROA (ROE) when the risk taking measure is based on assets (equity), i.e. in columns 1-6 (columns 7-8). We present this Panel here for completeness and informative purposes, as it allows us to calculate the yearly residual performance of each bank in our dataset, see Subsection 2.5 that we use in the next Section.

As expected, the sensitivities to average excess performance (systematic performance) are all positive and close to 1. Surprisingly, sensitivities to risk measures are negative, with the exception of RW in Panel B (positive but insignificant). At first sight, that seems counter-intuitive from an investments perspective, but an analysis is beyond the scope of this paper. We merely note that increases in, say, the probability of default (PD) may be bad for performance once the benefits from higher refinancing costs outweigh the benefits of higher financial leverage. Qualitatively, both Panels A and B provide similar results but they differ quantitatively. We use Panel regressions (Panel B) to decompose performance into its drivers (residual, risk, systematic) in further analysis in this paper.

5 CEO Turnover

A major component of board monitoring consists in evaluating the CEO and, potentially, dismissing him. This section studies how risk governance characteristics affect CEO turnover. First, we look at the impact of risk taking measures and then, in the second subsection, at tail risk measures.

Some general comments regarding our survival regressions are in order. First, we note that dismissal may be driven by the board (internal), may be driven by external reasons, e.g., takeovers or mergers, or may occur for a variety of personal reasons, e.g., health or retirement. Previous studies of CEO turnover (in non-financials) aimed at distinguishing the various reasons for which CEOs leave their job. However, this usually succeeds only to a certain degree that introduces statistical noise. Here we note that both bankruptcy and takeovers are less common among banks than for non-financials. Moreover, we take a statistical approach and conjecture that age allows us to capture (most) personal reasons for leaving the job, adding age of the

Table 4: Studying how risk and board characteristics affect the CEO's hazard rate to be dismissed. The respective risk measure in each regression is specified in the column heading. Panel A presents results results from survival regressions with exponential distribution that control for industry performance and the performance residual, see Table 3 for the sensitivities of that decomposition; Panel B controls for bank performance in excess of industry performance, instead; Panel C does not control for performance. In all three Panels A-C, board characteristics are the independence ratio, the ratio of financial experts and our indicator variable of having a risk committee, controlling for the logarithm of total assets and for age of the CEO. To save space, this Table presents only the variables of interest; we report the full regression results of the three Panels in Tables C2-C4 of the Appendix. We use survival regressions with exponential distribution and time-varying covariates, control for age of the CEO and present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; t-statistics are reported in parentheses; significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Economic Risk Measures						Regulatory Risk Meas.	
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1
	Panel A: Survival Regressions Controlling for Residual Performance							
IR × Risk	17.54	-9.591***	-1.426**	-1.057*	-0.424	-8.314***	-0.701	1.922***
	(1.18)	(-3.61)	(-2.22)	(-1.96)	(-1.59)	(-2.93)	(-1.46)	(5.71)
FE × Risk	488.6***	7.310**	0.372	0.212	-0.0940	9.852**	-12.28***	-2.158***
	(4.46)	(2.14)	(1.09)	(1.10)	(-0.50)	(2.09)	(-4.10)	(-4.09)
RC × Risk	-5.675	0.451	0.0565	-0.0883	-0.0455	0.130	0.148	0.000732
	(-1.31)	(0.69)	(0.53)	(-1.04)	(-1.31)	(0.18)	(0.91)	(0.00)
Risk	-12.11	6.170***	0.859**	0.669**	0.261	5.629**	0.451*	-1.266***
	(-1.18)	(4.08)	(2.49)	(2.20)	(1.54)	(2.16)	(1.73)	(-5.73)
N	1637	1853	1625	1852	1852	1625	1850	1628
Wald χ^2	273.4	164.9	180.5	216.5	222.7	168.7	213.9	172.1
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Panel B: Survival Regressions Controlling for Excess Performance							
IR × Risk	-2.561	-5.327***	-0.821**	-0.553	-0.0199	-6.514*	0.0497	1.393***
	(-0.28)	(-2.76)	(-2.14)	(-1.60)	(-0.17)	(-1.74)	(0.10)	(2.97)
FE × Risk	45.73	-3.583	-0.0243	0.0161	0.0418	-1.266	-4.081***	-1.068**
	(1.53)	(-1.19)	(-0.06)	(0.06)	(0.27)	(-0.22)	(-2.87)	(-2.16)
RC × Risk	-2.856	-0.661	0.00923	-0.139*	-0.104***	0.173	0.340*	0.195
	(-0.99)	(-0.88)	(0.14)	(-1.78)	(-3.51)	(0.27)	(1.90)	(1.18)
Risk	2.120	3.871***	0.547**	0.380*	0.00577	5.187	-0.120	-0.990***
	(0.32)	(3.04)	(2.08)	(1.78)	(0.07)	(1.45)	(-0.37)	(-3.27)
N	1805	2021	1792	2020	2020	1792	2018	1795
Wald χ^2	178.6	195.3	128.7	107.0	184.2	134.6	268.0	206.6
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Panel C: Survival Regressions Without Controlling for Performance							
IR × Risk	-1.331	-6.143***	-0.733**	-0.488	-0.0188	-5.626*	-0.203	1.201***
	(-0.16)	(-3.46)	(-2.09)	(-1.59)	(-0.14)	(-1.96)	(-0.47)	(2.85)
FE × Risk	41.99**	0.644	-0.0317	-0.0274	0.0794	-0.577	-3.208**	-1.032**
	(2.11)	(0.22)	(-0.10)	(-0.16)	(0.54)	(-0.13)	(-2.35)	(-2.17)
RC × Risk	-2.739	-0.173	0.0204	-0.0714	-0.0851***	0.126	0.274	0.195
	(-0.87)	(-0.32)	(0.36)	(-1.19)	(-2.86)	(0.21)	(1.63)	(1.29)
Risk	0.985	4.264***	0.479**	0.337*	0.00188	4.427*	0.0472	-0.860***
	(0.15)	(3.56)	(2.17)	(1.80)	(0.02)	(1.71)	(0.15)	(-3.21)
N	1826	2046	1793	2046	2049	1793	2047	1817
Wald χ^2	137.7	86.0	37.4	33.2	91.1	45.5	245.6	60.3
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

CEO as a control variable in our regressions.

Second, dismissal may also depend on the size of a bank and, therefore we do control for size by adding the logarithm of total assets as a control variable.

Finally, all explanatory and control variables do change over time. In the survival literature that is well-understood; running regressions with such time-varying covariates presents no particular difficulty.

5.1 Risk Taking Measures

This subsection studies how risk taking measures affect CEO turnover. For this, Table 4 presents the results from survival regressions for our various risk taking measure, described in subsection 2.2. In three Panels A-C we carry out 8 survival regressions, each of these using one of our different risk variables, denoted in the column heading. We separate the risk variables into two groups, as discussed in subsection 2.2: we study economic risk measures (RW, PD, Z and ROA/ROE/stock volatility) in regressions (1-6) and regulatory risk measures (LEV, T1) in regressions (7, 8). Throughout the table we show the respective sensitivities of the risk score, see subsection 2.4 for a discussion.

Subsection 2.5 discussed that risk governance is part of corporate governance and so Panels A and B of Table 4 control for performance. In Panel C we take a narrower perspective that looks at risk governance without taking into account corporate governance aspects: therein, we do not control for performance.

All Panels use IR, RC, FE, the respective risk measure and its interaction terms with IR, FE, RC as explanatory variable; they control for age as well as bank size, and differ only in how they control for performance. Our focus is on the interaction terms of our risk governance variables with risk measures but we are also interested in the overall sensitivity at common values of the independence ratio, see subsection 2.4. To save space, we do report in all three Panels of Table 4 only the sensitivities of the risk measures and of their interaction terms with our risk governance variables; we do full regression results separately for the three Panels in three Tables in appendix C.3.

Panel A of Table 4 controls for residual performance and systematic performance, where these terms are determined as described in subsection 4.3; the full coefficient table is reported as Table C2 in the appendix. Regressions in Panel B replace (residual) performance and systematic performance by excess performance (and interaction terms); the full coefficient table is reported as Table C3 in the appendix. Compared to Panels A and B, Regressions in Panel C do not control at all for performance; the full coefficient table is reported as Table C4 in the appendix.

Overall, looking (only) at statistically significant coefficients, the interaction terms of risk measures with IR are negative (positive) for economic (regulatory) risk measures, and the interaction terms of risk measures with FE are positive (negative) for economic (regulatory) risk measures. Finally, the interaction terms of risk measures with RC are statistically significant only for some regressions of economic risk measures and these are negative.

This means that the sensitivity of CEO turnover (hazard) to economic (regulatory) risk taking measures decreases (increases) when the independence ratio becomes larger; similarly, we find that the sensitivity to economic (regulatory) risk measures increases (decreases) when FE is higher and that having a risk committee decreases that sensitivity. Except for FE with

Table 5: Presenting cutoff values for the independence ratio (IR), i.e. when then (the sensitivity) of the interaction term of IR with the (tail) risk variable equals that of the respective (risk) variable. We presents this here separately in Panels A-C for the three Panels A-C in Table 4 (only risk variable) and in Panels D-E for the three Panels A-C in Table 6 (risk and tail risk variable). The respective risk or tail risk variable in each regression is specified in the column heading; this is RW, ROA volatility, PD, ROE volatility, stock volatility, negative Z, LEV, negative T1 in Panels A-C; in Panels D-F we present here only risk measures RW, -T1 together with our four tail risk measures.

	Economic Risk Measures						Regulatory Risk Meas.	
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1
	Panel A: Survival Regressions Controlling for Residual Performance							
Risk	0.690	0.643	0.603	0.633	0.616	0.677	0.643	0.659
	Panel B: Survival Regressions Controlling for Excess Performance							
Risk	0.828	0.727	0.665	0.686	0.289	0.796	2.423	0.711
	Panel C: Survival Regressions Without Controlling for Performance							
Risk	0.740	0.694	0.653	0.691	0.100	0.787	0.233	0.716
	Risk (Measure): RW				Risk (Measure): -T1			
	DER (1)	OBS (2)	Kurt (3)	ST (4)	DER (5)	OBS (6)	Kurt (7)	ST (8)
	Panel D: Survival Regressions Controlling for Residual Performance							
Risk	0.748	0.783	0.743	0.696	0.677	0.687	0.674	0.708
Tail Risk	0.342	1.254	0.760	0.667	0.392	0.672	0.782	0.648
	Panel E: Survival Regressions Controlling for Excess Performance							
Risk	0.917	0.831	0.932	0.900	0.772	0.676	0.754	0.778
Tail Risk	1.087	0.095	0.742	0.613	0.477	0.660	0.761	0.637
	Panel F: Survival Regressions Without Controlling for Performance							
Risk	0.823	0.781	0.806	0.820	0.792	0.687	0.758	0.790
Tail Risk	1.432	2.325	0.754	0.601	0.490	0.668	0.758	0.652

regulatory risk measures, this all goes against the hypothesis 2.

In terms of economic significance, we note that the sensitivities of FE and RC are small, leading us to focus on IR.

We note furthermore that the (statistically significant) signs of the interaction terms of our risk variables with IR are the opposite of that for the risk measure. For further analysis we determine critical cutoff values in the IR where the total sensitivity to a particular risk measure switches sign, calculated as $-\beta_{\mathtt{RM}}/\beta_{\mathtt{IR\times RM}}$ in equation (2). Here we ignore any impact of FE and RC, since both sensitivities are small, the average FE is small (7%) and RC is an indicator variable that allows the reader to adjust the cutoffs easily.

Table 5 presents the cutoffs in Panels A-C for the regressions in Panels A-C of Table 4; Panels D-F will be studied in the next subsection. The IR cutoffs are between 60-70%, with the exception of (-Z) in Panel C (0.787) and other exceptions that are based on statistically insignificant coefficients (RW, -Z, LEV in Panel B). As the average of IR in our sample is beyond these cutoffs this suggests that the signs of the interaction terms determine the signs of the overall risk measure sensitivity: CEO turnover (hazard) increases when economic (regulatory) risk taking measures are higher.

5.2 Tail Risk Measures

To delve deeper into risk taking, we now take a look at tail risk taking which is particularly hard to monitor and manage. Therein, we control for risk taking and thereby extend our analysis by adding one tail risk measure at a time as explanatory variable to a particular risk measure under consideration.

Our survival regressions encounter statistical difficulties when we add tail risk measures (together with its risk governance interaction terms) and, at the same time, include the FE variable. We attribute these to a variety of issues with our data. First, both FE and RC are highly persistent variables. Second, while RC is a dichotomous variable, FE is a continuous variable. Moreover, Table 1 shows that for at least half of our observations FE is zero and the mean is at roughly 7%. Hence, we exclude FE from our analysis in this subsection. RC does not show such difficulties, potentially as it is a dichotomous variable and hence we continue to include it. In our robustness section we do consider whether unobserved heterogeneity (here, e.g. FE) affects our results and can negate this. Moreover, while we do include risk measures, we note that our focus here is on tail risk measures and, if anything, limits us only w.r.t. to (additional) conclusions regarding tail risk measures and FE.

Table 6 extends Table 4 by adding one tail risk measure at a time as explanatory variable. Therein, we use four of our tail risk measures (DER, OBS, stock tail risk, ROA kurtosis), excluding ROE kurtosis, only. (The insights for the latter are similar to those from ROA kurtosis.) To save space, we study one regulatory (-T1) and one economic (RW) risk taking measure, only. Tables C8 and C9 in the appendix present results for the other combinations of bank and tail risk measures.

As discussed in the previous subsection, our focus is mostly on the signs of the respective interaction terms of risk governance with (tail) risk measures and partly on the coefficients of these interaction terms and of (tail) risk measures. Hence, analogous Table 4, our Table 6 here presents an excerpt that contains these variables and postpones the full regression tables to Appendix C.3. Table 6 is organized analogous Table 4: Panels A-C present the sensitivities of

Table 6: Studying how board characteristics and bank (tail) risk drive the CEO's hazard rate to be dismissed. The risk measure is RW in regressions (1-4) and -T1 in regressions (5-8). The respective risk measure in each regression is specified in the column heading. Panel A presents results results from survival regressions with exponential distribution that control for industry performance and the performance residual, see Table 3 for the sensitivities of that decomposition; Panel B controls for bank performance in excess of industry performance, instead; Panel C does not control for performance. In all three Panels A-C, board characteristics are the independence ratio and our indicator variable of having a risk committee, controlling for the logarithm of total assets and for age of the CEO. To save space, this Table presents only the variables of interest; we report the full regression results of the three Panels in Tables C2-C4 of the Appendix. We use survival regressions with exponential distribution and time-varying covariates, control for age of the CEO and present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; t-statistics are reported in parentheses; significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Risk (Measure): RW				Risk (Measure): -T1			
	DER (1)	OBS (2)	Kurt (3)	ST (4)	DER (5)	OBS (6)	Kurt (7)	ST (8)
	Panel A: Survival Regressions Controlling for Residual Performance							
IR × Risk	-34.19**	-56.08***	-54.61***	-47.25***	2.371***	2.849***	3.448***	1.974***
	(-2.51)	(-3.02)	(-3.83)	(-3.32)	(4.91)	(4.39)	(2.73)	(3.05)
RC × Risk	-1.074	2.002	-1.142	3.713	-0.0671	-0.351**	-0.102	0.273
	(-0.22)	(0.44)	(-0.28)	(0.77)	(-0.37)	(-2.45)	(-0.56)	(1.37)
IR × Tail Risk	-0.229	0.157	-16.24*	-0.467	-0.267	-0.482	-17.52	-0.484
	(-0.98)	(0.76)	(-1.78)	(-0.73)	(-1.11)	(-1.58)	(-1.49)	(-0.95)
RC × Tail Risk	0.0363	0.0780	-3.356	-0.369***	0.0275	0.0933	-6.190	-0.432***
	(1.10)	(1.17)	(-0.99)	(-3.64)	(0.92)	(1.04)	(-1.27)	(-3.51)
Risk	25.58***	43.91***	40.58***	32.88***	-1.604***	-1.956***	-2.325***	-1.396***
	(3.40)	(4.39)	(4.52)	(3.96)	(-5.57)	(-4.15)	(-2.97)	(-3.33)
Tail Risk	0.0781	-0.197	12.35*	0.311	0.105	0.324	13.70	0.314
	(0.66)	(-0.87)	(1.90)	(0.84)	(1.11)	(1.28)	(1.60)	(0.96)
N	1637	1478	1637	1637	1628	1470	1628	1628
Wald χ^2	238.9	307.5	185.6	185.9	176.4	178.5	154.7	144.3
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Panel B: Survival Regressions Controlling for Excess Performance							
IR × Risk	-10.54	-29.30*	-11.32	-11.49	1.120	3.038***	1.322	1.098
	(-0.81)	(-1.84)	(-0.96)	(-0.79)	(1.45)	(4.68)	(1.47)	(1.30)
RC × Risk	-2.661	-0.922	-3.622	-3.004	0.197	-0.292**	0.162	0.189
	(-0.69)	(-0.24)	(-1.45)	(-0.84)	(1.03)	(-2.14)	(0.78)	(0.96)
IR × Tail Risk	0.00155	-0.141	-15.68**	-0.223	-0.0169	-0.788**	-11.44	-0.374
	(0.28)	(-0.54)	(-2.35)	(-0.63)	(-0.46)	(-2.32)	(-1.52)	(-1.02)
RC × Tail Risk	-0.00807	0.134	-3.920	-0.375***	-0.0193	0.110*	-3.720	-0.435**
	(-0.73)	(1.62)	(-1.07)	(-2.61)	(-1.02)	(1.86)	(-1.19)	(-2.23)
Risk	9.664	24.35***	10.55	10.35	-0.865*	-2.053***	-0.997*	-0.855
	(1.09)	(2.62)	(1.26)	(1.04)	(-1.81)	(-4.29)	(-1.83)	(-1.64)
Tail Risk	-0.00169	0.0134	11.64**	0.136	0.00808	0.520**	8.709	0.238
	(-0.82)	(0.06)	(2.37)	(0.47)	(0.55)	(2.01)	(1.58)	(0.91)
N	1805	1478	1805	1805	1795	1470	1795	1795
Wald χ^2	152.7	187.6	132.2	245.6	146.9	130.7	147.2	206.9
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Panel C: Survival Regressions Without Controlling for Performance							
IR × Risk	-18.64	-45.25**	-28.18**	-19.23	0.941	2.532***	1.294	0.949
	(-1.58)	(-2.20)	(-2.35)	(-1.63)	(1.42)	(4.14)	(1.54)	(1.35)
RC × Risk	-1.625	1.463	-1.745	-1.687	0.204	-0.233**	0.166	0.240
	(-0.42)	(0.36)	(-0.60)	(-0.50)	(1.19)	(-2.29)	(0.80)	(1.37)
IR × Tail Risk	0.00116	0.0533	-12.76**	-0.231	-0.0110	-0.664**	-11.40*	-0.389
	(0.19)	(0.23)	(-2.30)	(-0.74)	(-0.37)	(-2.13)	(-1.83)	(-1.26)
RC × Tail Risk	-0.0102	0.0992	-3.363	-0.285*	-0.0178	0.100*	-3.617	-0.345**
	(-0.74)	(1.24)	(-1.18)	(-1.95)	(-0.92)	(1.66)	(-1.27)	(-2.04)
Risk	15.35**	35.32***	22.72***	15.77**	-0.745*	-1.740***	-0.981*	-0.750*
	(2.10)	(3.01)	(3.00)	(2.13)	(-1.80)	(-3.78)	(-1.92)	(-1.74)
Tail Risk	-0.00166	-0.124	9.619**	0.139	0.00538	0.443*	8.642*	0.253
	(-0.88)	(-0.55)	(2.34)	(0.54)	(0.43)	(1.83)	(1.88)	(1.04)
N	1826	1491	1826	1826	1817	1484	1817	1817
Wald χ^2	115.3	91.6	88.4	191.0	53.8	78.9	41.5	92.5
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

the respective IR/RC interaction terms with risk/tail risk controlling for residual performance (Panel A), controlling for excess performance (Panel B) and not controlling for performance at all (Panel C); the full tables with all sensitivities are reported in Tables C5, C6 and C7 of the appendix, respectively.

Comparing the common variables across Tables 4 and 6, i.e. focusing on the risk measures and their interaction terms with IR/RC, we find that all interaction terms are qualitatively (signs) unchanged and that their statistical significance are comparable. Hence, regarding risk taking measures, our previous insights from Table 4 carry over qualitatively.

Next, we take a look at our tail risk measures. We see that they are mostly insignificant with some exceptions: the interaction of tail risk with IR coefficient is negative; its interaction term with RC is negative for ST but positive for OBS in regression (6). With that exception, this rejects hypothesis 2. Note that tail risk measures are non-regulatory risk measures. Qualitatively, for IR and RC, our insights here match those for economic risk measures throughout this section.

Finally, we take again a quantitative look at the overall sensitivity of (tail) risk at the average IR. The risk related coefficients in Table 6 are, quantitatively changed and for further analysis we note (as in the previous subsections) that risk variables and interaction terms for IR have opposite signs. (Again, we focus on IR, as an adjustment for RC is straightforward and the RC interaction term is much smaller in size.) As before, we calculate cutoff values as $-\beta_{\mathtt{RM}}/\beta_{\mathtt{IR}\times\mathtt{RM}}$ (based on the notation in equation (2)) and report this separately in three Panels D-F in Table 5: they gives the IR cutoffs for the regressions in Panels A-C of Table 6. The risk cutoff values are slightly higher than in the previous subsection but are in the range of the average IR in our dataset, which suggests that higher risk taking decreases CEO hazard. Analogously, we determine critical cutoff values in the IR w.r.t. to tail risk, i.e. values where the total sensitivity to a particular risk measure switches sign (analogous to our previous calculation above for risk measures). The (four) cutoff values based on statistically significant coefficients are around 70% which suggests that at the average IR in our dataset, increasing tail risks decreases the CEO's hazard.

As a summary of our observations in this section, we conclude first that we see a split economic/tail vs. regulatory risk measures. The sensitivity of CEO turnover (hazard) to economic/tail (regulatory) risk taking measures decreases (increases) when the independence ratio becomes larger or when a risk committee is added. Our analysis of financial expertise is limited by data constraints, but suggests that the sensitivity to economic (regulatory) risk measures increases (decreases) when FE is higher.

6 Economic Implications

Our analysis in the previous sections noted a split between regulatory risk measures and the other risk measures (economic risk measure and tail risk measures). Whereas the former risk measures support the regulatory push to increase IR, FE and having a risk committee, the latter risk measures suggest that this push weakens risk governance in banks. This section discusses broader economic implications.

6.1 Studying Risk Governance using Regulatory Risk Measures

The split between internal and external risk measures means: When we evaluate board monitoring through the lens of risk measures that the regulator monitors, risk governance "works." However, when we watch this through the lens of the other risk measures (economic and tail risk measures), the opposite holds.

To put this into perspective, we recall Goodhart's Law, see Goodhart (1975): "Any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes." Here, this suggests that, once the regulatory risk measures have become part of the Basel regulation, any statistical association between our risk governance variables and our risk measures may have changed. Overall, this questions the usefulness of the popular approach to assess risk governance through regulatory risk measures. Ultimately, this leads us to study economic risk measures and, in light of Goodhart's Law, focus on these measures when drawing risk governance conclusions.

Doing so then questions the requested risk governance changes[18]: looking at non-regulatory risk measures (economic risk measures and tail risk measures), we find that increasing the fraction of independents, increasing financial expertise and having a risk committee do all lead to higher risk taking (Section 4) and do *not strengthen but instead weaken* board risk monitoring (Section 5).

6.2 Risk Governance Regime Change

We discussed at various occasions that the subprime crises lead to many changes in bank regulation, both in capital regulation and in risk governance. One may conjecture that these changes amount to a change in the risk governance regime and that this may impact our research.

Our Panels regressions in Table 2 of Subsection 4.1 studied how risk governance affects our risk measures. Therein, Panel A did not control and Panel B did control for post-crisis changes.

[18]This matches an older theory literature that notes that the introduction of solvency regulation (here measured through the Tier1 capital ratio) may increase rather then decrease bank risk, see, e.g. section 6.4. in Bhattacharya and Thakor (1993) and sections 8.3 & 9.5 in Freixas and Rochet (2008).

Table 7: Studying how risk and board characteristics affect the CEO's hazard rate to be dismissed. We extend Table 4 by adding our post-crisis dummy and interaction terms with risk and of its interaction terms with our risk governance variables (IR, FE, RC). The respective risk variable in each regression is specified in the column heading (RW, ROA volatility, PD, ROE volatility, stock volatility, negative Z, LEV, negative T1). The Table is organized analogous Table 4. Coefficient statistics are calculated using robust methods; t-statistics are reported in parentheses; significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Economic Risk Measures						Regulatory Risk Meas.	
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1
	Panel A: Survival Regressions Controlling for Residual Performance							
IR × Risk	13.85	-5.889	-1.228**	-1.565***	-0.364*	-9.222***	-1.951	1.342**
	(1.03)	(-1.63)	(-2.53)	(-4.65)	(-1.88)	(-3.03)	(-1.29)	(2.52)
FE × Risk	742.3***	33.42**	1.092	0.947	0.164	15.20***	-15.47***	-2.678
	(4.24)	(2.36)	(1.38)	(0.67)	(0.43)	(2.75)	(-2.89)	(-1.55)
RC × Risk	-5.181	0.0919	0.0147	0.0540	0.0268	0.200	-0.0275	-0.183
	(-1.37)	(0.08)	(0.11)	(0.74)	(0.64)	(0.37)	(-0.15)	(-0.67)
Risk	-18.93*	-0.369	0.437	0.671	0.238	4.019	1.001	-0.940*
	(-1.86)	(-0.14)	(1.32)	(1.10)	(1.49)	(1.35)	(0.89)	(-1.95)
Post Crisis	-15.69***	-3.476	-2.325	-2.124	2.172	8.359**	-5.614	4.260
	(-4.33)	(-1.57)	(-0.98)	(-0.45)	(0.84)	(2.30)	(-1.57)	(1.36)
Post Crisis × Risk	27.16***	5.869*	0.306	0.0301	-0.0661	2.477	0.766	0.137
	(3.68)	(1.64)	(0.61)	(0.08)	(-0.85)	(0.97)	(1.30)	(0.50)
Post Crisis × IR × Risk	-9.808	-2.026	0.0897	0.467	0.0219	0.774	-0.317	0.218
	(-1.63)	(-0.32)	(0.07)	(0.91)	(0.16)	(0.38)	(-0.79)	(0.48)
Post Crisis × FE × Risk	-100.9***	-340.3***	-113.5***	-51.59***	-9.602***	51.36***	-45.25***	13.04***
	(-3.82)	(-5.12)	(-3.13)	(-6.85)	(-11.89)	(4.39)	(-3.08)	(11.90)
N	1637	1853	1625	1852	1852	1625	1850	1628
Wald χ^2	543.1	612.6	410.9	871.9	663.7	209.5	482.4	1402.1
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Panel B: Survival Regressions Controlling for Excess Performance							
IR × Risk	-23.51	-6.004	-0.764*	-0.676	0.00848	-7.893**	-0.112	1.272***
	(-1.64)	(-0.86)	(-1.72)	(-1.42)	(0.05)	(-2.03)	(-0.18)	(2.75)
FE × Risk	66.43	-2.270	0.317	0.306	-0.000333	2.365	-4.292***	-1.023
	(1.23)	(-0.23)	(0.43)	(0.45)	(-0.00)	(0.59)	(-3.83)	(-1.06)
RC × Risk	-5.815**	-0.486	0.00318	-0.114**	-0.0900***	0.109	0.218	0.193
	(-2.22)	(-0.78)	(0.06)	(-1.98)	(-3.18)	(0.14)	(1.14)	(0.91)
Risk	13.17	3.975	0.407	0.358	0.0226	4.994	-0.397	-0.998***
	(1.47)	(0.80)	(1.10)	(0.97)	(0.23)	(1.18)	(-1.16)	(-3.18)
Post Crisis	-6.545*	-0.176	-0.439	-0.650	1.881	4.031	-6.260**	2.604
	(-1.88)	(-0.11)	(-0.20)	(-0.31)	(1.48)	(1.14)	(-2.14)	(1.44)
Post Crisis × Risk	12.08**	-0.860	-0.0353	-0.112	-0.106	1.831	0.617	0.273
	(2.25)	(-0.20)	(-0.16)	(-0.37)	(-0.93)	(0.69)	(1.50)	(1.01)
Post Crisis × IR × Risk	-4.789	1.944	0.252	0.357	0.0682	-0.372	-0.0399	-0.139
	(-0.66)	(0.31)	(0.59)	(0.75)	(0.43)	(-0.18)	(-0.13)	(-0.47)
Post Crisis × FE × Risk	14.61***	-2.738	-0.709	-0.489	-0.0136	-2.741	0.931	-0.0769
	(2.87)	(-0.29)	(-0.92)	(-0.65)	(-0.05)	(-1.31)	(1.11)	(-0.18)
N	1805	2021	1792	2020	2020	1792	2018	1795
Wald χ^2	310.3	275.7	173.8	209.3	216.1	253.1	253.8	285.7
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Panel C: Survival Regressions Without Controlling for Performance							
IR × Risk	-22.63	-6.609	-0.714**	-0.616	-0.00593	-6.982**	-0.357	1.115***
	(-1.53)	(-1.21)	(-2.01)	(-1.33)	(-0.04)	(-2.56)	(-0.87)	(2.69)
FE × Risk	58.63*	1.543	0.246	0.200	0.0175	2.862	-3.317***	-0.851
	(1.65)	(0.17)	(0.44)	(0.37)	(0.08)	(0.86)	(-3.60)	(-0.99)
RC × Risk	-6.141**	-0.166	-0.0138	-0.0584	-0.0711**	-0.0144	0.124	0.197
	(-2.12)	(-0.36)	(-0.27)	(-1.32)	(-2.40)	(-0.02)	(0.66)	(1.02)
Risk	12.35	4.027	0.373	0.318	0.0255	4.307	-0.167	-0.899***
	(1.26)	(0.98)	(1.37)	(1.08)	(0.26)	(1.41)	(-0.46)	(-3.15)
Post Crisis	-6.629*	-0.444	-0.652	-0.787	1.627	3.433	-5.524**	2.474
	(-1.73)	(-0.29)	(-0.34)	(-0.42)	(1.49)	(1.02)	(-2.22)	(1.32)
Post Crisis × Risk	11.96**	-0.540	-0.000933	-0.0766	-0.0928	1.463	0.514	0.269
	(2.31)	(-0.15)	(-0.01)	(-0.29)	(-0.81)	(0.56)	(1.02)	(0.91)
Post Crisis × IR × Risk	-4.552	1.857	0.202	0.303	0.0573	-0.127	-0.0237	-0.130
	(-0.59)	(0.37)	(0.54)	(0.70)	(0.36)	(-0.06)	(-0.06)	(-0.40)
Post Crisis × FE × Risk	15.31***	-1.334	-0.382	-0.337	0.0371	-2.663	0.953	-0.181
	(3.13)	(-0.19)	(-0.72)	(-0.60)	(0.17)	(-1.15)	(1.23)	(-0.47)
N	1826	2046	1793	2046	2049	1793	2047	1817
Wald χ^2	227.5	208.0	120.9	135.7	192.3	168.1	216.6	222.7
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Across risk measures, the impact was inconclusive. Moreover, both Panels showed qualitatively similar results regarding risk governance and risk taking; this suggests that the relationship between these variables is fairly robust to the post-crisis regulatory changes.

The main part of our analysis looked at the question: "how do risk governance characteristics affect the observable actions of the board (here CEO turnover)?" Based on the insights above, to simplify our exposition, our survival analysis did not control for post-crisis effects. We now revisit this issue; Table 7 extends Table 4 by adding our post-crisis dummy and all relevant interaction terms[19]. (As before, to save space, we report only the sensitivities for variables of interest.)

We are mostly interested in knowing if the post-subprime changes affect our insights so far. For this we ignore for a moment all post-crisis (interaction) terms in Table 7 and look only at the interaction terms of risk measures with our three risk governance variables. (I.e. we compare the common variables across Tables 4 & 7.) While the sensitivities change quantitatively, they do not change qualitatively (positive/negative): firstly, we continue to see in Table 7 a split between economic and regulatory risk measures. Secondly, the interaction terms of risk measures with IR are negative (positive) for economic (regulatory) risk measures, while the interaction terms of risk measures with FE are positive (negative) for economic (regulatory) risk measures; the coefficients for RC are statistically significant only for some regressions of economic risk measures and these are negative. This means that our insights so far remain valid *before* the subprime crisis.

To assess, if they also remain valid *after* the subprime crisis, we need to take account of the before-mentioned terms and add up the corresponding post-crisis dummy (interaction) term. Overall, taking into account only statistically significant coefficients, we find that the post-crisis coefficient is negative, and that its interaction with the cross-terms of risk measure and IR (FE) is insignificant (positive for economic risk measures). The latter do work in the direction of the regulatory requests, but we note that the effects are economically too small and hence they do not affect our insights *after* the subprime crisis.

Overall, our insights so far remain valid irrespective of the regulatory changes after the subprime crisis. In retrospect, this validates our approach to exclude them, for simplicity[20].

6.3 Regulatory Risk Arbitrage

Leaving aside the risk governance perspective that is at the center of this paper (discussed in previous subsection), it is interesting to discuss further the difference between regulatory measures on one side and economic/tail measures on the other side.

[19] We do not add cross-terms of RC with our post-crisis dummy, since most risk committees were added in the aftermath of the subprime crisis.

[20] In line with that, we did not find evidence for unobserved heterogeneity, see Subsection B.1 in the appendix.

This split resounds that banks calculate capital in two ways: the first calculation is for the regulator according to well-specified rules and regulations and gives so-called regulatory capital; the second capital calculation is for internal bank purposes, e.g. risk management or bank management through risk capital allocations, and gives so-called economic capital. An often voiced critique of the Basel regulations is that banks create a wedge between these two capital calculations; this alludes that banks internal calculation (economic capital) properly assess the necessary bank capital but that they tweak regulatory capital calculations to their favor. The literature refers to this wedge as regulatory arbitrage.

Understanding regulatory arbitrage has large implications for the effectiveness of regulations that aim to ensure a safe and sound banking system. Going back historically to the time-period just before the subprime crisis, we recall that reducing regulatory arbitrage one of the explicit motivations for the Basel II reforms and that this was intended by allowing banks to use internal models for regulatory capital calculation purposes. However, one of the interpretations of deficiencies that then showed up during the subprime crisis was that banks did not have sufficient capital despite (over-)complying with capital regulations. This lead to numerous adjustments since then, e.g. the capital output floor that limits the usefulness of internal models.

Despite the economic importance, there is scant empirical evidence on regulatory (capital) arbitrage. Behn et al. (2022) is a notable exception as they provide evidence how banks use internal models for regulatory arbitrage.

Here we find a wedge between internal risk measures and regulatory risk measures that we therefore refer to as regulatory risk arbitrage. We note that this is *one* component of regulatory arbitrage. Our paper provides an indirect look at these issues through the wedge between economic and regulatory risk measures and thereby provides a confirmation.

For further analysis we note that one may argue that regulatory risk measures set a boundary within which banks can operate but that these constrain banks in such a way that all risk measures move together. (E.g. reducing regulatory risk measures would then reduce economic risk measures as well.) This lead us to conjecture the hypothesis:

Hypothesis 3 *There is a positive association between economic/tail risk measures and regulatory risk measures.*

To assess this hypothesis, we carry out Panel OLS regressions with bank fixed effects. Panel A of Table 8 studies how changes in our (-T1) risk measure affect the other risk measures: we find that the coefficients on our other regulatory risk measure (LEV) is positive; regarding our economic risk measures, the results are mixed since the coefficients on RW, PD and Z are positive but the coefficients on ROA and stock volatility are negative; finally, the coefficients on our tail risk measures are negative.

Table 8: Studying how regulatory risk measures relate to other risk measures. Panel A (B) looks at -T1 (LEV). We use Panel OLS regressions with bank fixed effects. Coefficient statistics are calculated using robust methods; t-statistics are reported in parentheses; significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Economic Risk Measures						Reg. Risk Meas.	Tail Risk Meas.			
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) DER	(9) OBS	(10) Kurt(ROA)	(11) Stock Tail
Panel A											
-T1	0.0103***	-0.0190***	2.364*	-0.211	-0.700***	0.0552***	0.458***	-2.120***	0.0245	-0.0170***	-0.286***
	(12.86)	(-2.58)	(1.92)	(-1.30)	(-6.59)	(9.14)	(8.26)	(-3.11)	(0.68)	(-4.11)	(-6.19)
Constant	0.868***	0.664***	41.56**	8.245***	20.88***	-1.888***	17.06***	25.45***	7.880***	2.694***	8.858***
	(82.31)	(7.00)	(2.41)	(4.00)	(14.85)	(-23.81)	(22.81)	(2.86)	(16.32)	(50.79)	(14.50)
Observations	3152	3138	3073	3138	3138	3073	3148	3152	2749	3138	3144
Adjusted R^2	0.792	0.451	-0.026	0.392	0.325	0.570	0.385	0.902	0.686	0.264	0.292
F	165.3	6.669	3.689	1.688	43.48	83.50	68.15	9.698	0.463	16.89	38.38
Panel B											
LEV	-0.00110***	0.0344***	16.14***	1.016***	0.611***	0.0737***		-0.667	-0.131***	0.00804***	0.333***
	(-3.42)	(5.95)	(2.76)	(4.18)	(4.38)	(19.18)		(-1.43)	(-4.12)	(3.08)	(5.83)
Constant	0.746***	0.523***	-167.9***	-0.571	23.08***	-3.420***		64.03***	9.081***	2.817***	8.774***
	(198.48)	(8.27)	(-2.62)	(-0.21)	(15.27)	(-80.54)		(11.87)	(24.71)	(97.01)	(14.09)
Observations	3158	3456	3072	3456	3459	3072		3476	2756	3456	3468
Adjusted R^2	0.738	0.501	0.453	0.422	0.383	0.677		0.910	0.692	0.257	0.337
F	11.70	35.39	7.603	17.50	19.22	367.9		2.046	16.97	9.479	33.97

Next, Panel B of Table 8 studies how changes in LEV affect the other risk measures: here, all economic risk measures have positive coefficients, with the exception of RW (negative coefficient); our tail risk measures have negative coefficients, with the exception of ROA kurtosis and stock tail risk (ST).

The coefficients in Table 8 are not unanimously positive, some are negative[21] (statistically significant) and hence reject Hypothesis 3. This means that we find some direct support for the presence of regulatory risk arbitrage.

6.4 (Board Monitoring of) Tail Risks

It appears intuitively appealing, that directors should be able to act "sufficiently independent." From a conceptual perspective, notwithstanding that independents may be better suited to keep a CEO at arms length, they may also be inferior in other aspects that matter in risk and corporate governance: independent directors may face difficulties in accessing critical information[22], and may lack the knowledge to monitor the companies for which they are sitting on the board.

Both concerns are even more worrisome since financial institutions are particularly opaque and complex companies. Also, risk is a concept that is hard to measure and understand, in part due to its counterfactual nature. A particular challenge are tail risks hard: models are much less developed and observations are (quasi by definition) sparse. They are also much harder to understand conceptually, requiring much deeper financial understanding. Hence, independents may be more inferior on bank boards compared to their counterparts on non-bank boards.

It is a common thinking that tail risks represent excessive risk taking, potentially as they share some aspects of risk gambling. As such, shareholders and regulators both aim to keep a close eye on such risks and aim as much as possible at reducing them. Our paper finds that increasing independent directors and increasing financial expertise do worsen the oversight of risks, which may appear initially counter-intuitive. These findings are, however, in line with informational and analytical deficiencies of independent directors[23]: First of all, while independents in banks may be more ready to act "independently", they suffer more from information deficiencies in assessing risks which is all the more acute for analyzing tail risks; being out-of-the-loop then impedes the monitoring of tail risks. Second, another concern of independent

[21]A direct calculation reveals that $T1 = 1/(RW \cdot LEV)$ or equivalently that $1/T1 = RW \cdot LEV$. We just noted that decreases in LEV increase RW. Interestingly, the increase in RW is not strong enough to have 1/T1 increase, since we noted above that a decrease in LEV is associated with a decrease in (-T1), equivalent to a decrease in 1/T1.

[22]Duchin et al. (2010) argue that the effectiveness of independent directors depends on information acquisition costs.

[23]Further analysis of both issues (access to information and analytical capacity) would be interesting to understand further the causes of the monitoring deficiencies in banks. Doing so is, however, the focus of this paper.

directors concerns a lack of general *financial expertise* necessary to monitor financial institutions and the various regulations after the subprime crisis addressed this explicitly. Clearly, these might improve the quality of analyzing risks (analytical capacity) but they may not improve the flow of (critical) information flow to them that all independent directors suffer to some extent.

7 Conclusion

Various regulatory bodies have all argued that risk governance deficiencies were the root of the subprime/global financial crisis. Specifically, they named the lack of risk committees and of financial expertise as well as insufficient board independence. This paper studied empirically how these affect the quality of risk governance through two perspectives: firstly, we studied how they affect risk taking (Panel regressions); secondly and most important, we studied how they affect monitoring, assessed through CEO turnover (survival regressions).

We documented a split between risk measures that have to be complied and that regulators pay close attention (termed regulatory risk measures) vis-a-vis (our) other risk measures that banks use internally to manage risks (termed economic risk measures). Whereas our empirical analysis of the former supports the regulatory requests, further analysis using the latter shows the opposite. We extend this through empirical analysis using tail risk measures (a non-regulatory risk measure according our classification) and also find the regulatory risk governance requests to be detrimental.

Risk is a complicated concept with many different facets and any risk measure can only assess a particular aspect. Goodhart's law questions the validity of statistical inferences using economic measures once regulators start monitoring these. This is consistent with our observed split between regulatory and economic/tail risk measures. This split (in risk measures) also resound a common concern of capital regulation: regulatory (capital) arbitrage, i.e. that banks comply according to regulatory capital rules but do manage banks internally using another set of (so-called economic) capital rules, potentially even holding insufficient capital at all.

We looked at a variety of economic and tail risk measures that cover different facets of risk and concluded that the requested risk governance changes (increased board independence, having risk committees) are harmful. Ultimately, our results thereby suggest that, while official responses to the subprime crisis claim that banks were not independent enough, rising independence ratios following Enron and Sabanes Oxley contributed to the subprime crisis.

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Table A1: Source/calculation of accounting variables.

net income	BHCK 4340
common equity (k$)	BHCK 3210
total assets (k$)	BHCK 2170
risk-weighted assets (k$)	BHCK A223 (up to Q4 2014); (BHCK B704 - BHCK A222 - BHCK 3128) (since Q1 2015)
T1 Capital (k$)	BHCK 8274
Value of Off-Balance Sheet items (excl. Derivatives)	BHCK B546 + BHCT 6570 + BHCT 3411 + BHCK 3429 + BHCT 3433 + BHCT A250 + BHCK B541 + BHCK B675 + BHCK B681 + BHCK 6572
Total interest rate, exchange rate and credit derivatives (except hedging purposes)	BHCK A126 + BHCK A127 + BHCK 8723 + BHCK 8724 + BHCK 8725 + BHCK 8726 + BHCK 8727 + BHCK 8728

Appendix

A Data and Variables

We start with the CRSP-Compustat merged (CCM) link table and take the applicable Central Index Key (CIK) of the U.S. Securities and Exchange Commission (SEC). The Federal Reserve Bank of New York[24] provides a dataset that links the CRSP permco identifier with the RSSD identifier of the Federal Reserve database. Merging the files creates a file that links for each quarter the Compustat gvkey identifier with the Federal Reserve's RSSD identifier, CRSP's permco identifier (together with its permno identifier of the main stock series), and the SEC's CIK. BoardEX provides a database that links its CompanyID with the CIK.

A major variable governance variable in the literature is the independence ratio, defined as

$$\text{Independence Ratio (IR)} \quad = \quad \frac{\text{\#Ind. Brd. Members}}{\text{\# Board Members}} \, ,$$

where we adopt the BoardEx independence classification for directors.

In addition, we use the financial expertise measure of Minton et al. (2014), defined as

$$\text{Financial Expertise (FE)} \quad = \quad \frac{\text{\#Ind. Brd. Members with Financial Expertise}}{\text{\# Ind. Board Members}} \, ,$$

[24]Source: Federal Reserve Bank of New York. 2017, available at: https://www.newyorkfed.org/research/banking_research/datasets.html

Table A2: Description of our Risk Measures. We report the sign of the direction for the respective measure as discussed in the main text, with the understanding that +/- means that higher measurements correspond to more/less risk NB: all variables are annualized, resp. refer to annual period of time.

Shortcut	Source	Description	Definition/Calculation	Sign
		Panel A: Regulatory Measures of Risk Taking		
LEV	BHC	leverage	ratio of total assets to equity	+
T1	BHC	capital ratio	ratio of Tier 1 capital to risk-weighted assets	−
		Panel B: Economic Measures of Risk Taking		
RW	BHC	risk density	average risk weight (ratio of risk-weighted assets to total assets)	+
σ(ROA)	BHC	asset volatility	standard deviation of ROA	+
z, **Z**	BHC	z/Z-score, distance-to-default	$z = (ROA + LEV^{-1})/\sigma_A$, $\mathbf{Z} = \ln(z)$	−
PD	BHC	probability of default	$1/z$	+
σ(ROE)	BHC	equity volatility	standard deviation of ROE	+
stock volatility	CRSP		standard deviation of stock returns	+
		Panel C: Tail Risk Measures		
DER	BHC	derivatives' usage	ratio of financial derivatives (interest, FX, credit derivatives) to total assets	+
OBS	BHC	off-balance sheet activities	ratio of off-balance sheet items to total assets	+
ST	CRSP	stock return tail risk	95%-Value-at-Risk	+
Kurt(ROA), Kurt(ROE)	BHC	asset kurtosis equity kurtosis	kurtosis of ROA/ROE	+

where we classify an individual board member as a "financial expert" (FE) following the definition in Minton et al. (2014), based on Burak Güner et al. (2008). At each date we determine this using the employment history in BoardEx.

BoardEx provides a list of all committees that a bank has and so we set the risk committee indicator variable (RC) depending on whether that list includes a risk or an asset-liability management (ALM) committee. (Mostly before the global financial crisis, ALM is the committee with objectives similar to current risk committees and was replaced.)

To assess performance we look at yearly stock returns (Return) and at yearly classical accounting measures, return on equity (ROE), and return on assets (ROA); these are defined as net income divided by lagged equity and total assets, respectively. Throughout, we present our analysis for ROE and ROA, only.

At times, (common) equity, tier 1 equity, or risk-weighted assets are zero or negative in the BHC database. In either of these cases we ignore the reported value. Estimations of stock volatility, stock tail risk (value-at-risk), ROE/ROA volatility/skewness/kurtosis use data from the previous five years (60 months/20 quarters).

While the standard deviation and Value-at-Risk measures are well known, some comments are in order regarding the other risk measures. First, the leverage ratio that we consider here is a common variable in banking; importantly, this (banking) leverage measure is the inverse of the common leverage in finance. The Tier 1 capital ratio is another measure of leverage; it differs from the leverage ratio in the numerator (Tier 1 capital versus common equity for the leverage ratio) and in denominator (T1 capital ratio: risk-weighted assets; Leverage ratio: total assets). Second, the z-score (aka distance to default) is a balance sheet measure defined in the usual way. Since z is skewed, it is common to use Z, see, e.g., Laeven and Levine (2009) and Houston et al. (2010), among others. For details on PD see, e.g., Laeven and Levine (2009). Third, we note that **OBS** (the ratio of the notional amount of off-balance sheet items to total assets) measures how much the bank carries out more lightly regulated activities (often simply referred to as "unregulated" activities). Fifth, both skewness and kurtosis provide an assessment as to whether the underlying distributions are not normal and, hence, given the central role of the normal distribution in risk management of so-called "fat tails" ("extreme" events) of the probability distribution. Specifically, since the kurtosis of the normal distribution is equal to 3, it is common to refer to kurtosis larger than 3 as "fat tail" risk. Skewness refers to the asymmetry of a distribution. Specifically, negative skewness means that "fat tails" appear for events with negative value realizations (here low ROA).

Table A2 also reports through a +/- sign whether increases in the variable signify more/less risk. Some of these have been explained when we explained them above; for those that are not well known we note: An increase in T1 corresponds to a reduction in leverage (w.r.t. risk-weighted assets) and an increase in **Z** means that default is *less* likely. An increase in skewness means *less* tail risk, whereas increases in our other risk tail risk variables all correspond to *more* (tail) risk. Most of these are straightforward to see or are already explained above. However the following two require some discussion: Increases in **DER** mean more activities in derivatives, which are usually attributed to an increase in risk-taking. (Clearly, derivatives may also be used for hedging, i.e., to reduce risks. Our view means that the "speculative" motive outweighs the hedging motivation. Li and Marinč (2014) find empirically that their use is associated with systemic risk taking, a specific form of tail risk taking that manifested during the subprime crisis.); an increase in **OBS** is usually associated with more risk, as riskier positions outside the balance sheet may require less equity capital.

Throughout, skewness is defined as the third central moment divided by the standard deviation to the third power. Kurtosis is defined as the fourth central moment divided by the standard deviation to the fourth power. VaR is the non-parametric estimate of the 5% smallest stock return (so-called 95%-Value-at-Risk).

B Panel Analysis of Characteristics

B.1 Tests of Statistical Techniques

One may argue that analysis suffers from common statistical issues. Here we addresses endogeneity issues related to board characteristics, i.e., concerns that our interpretations and conclusions may be the result of a reverse causality.

Wintoki et al. (2012) address endogeneity in their fixed effects Panel OLS regressions. To assess whether these should be of concern, they recommend running regressions of the variables of interest on current and future values of the explanatory variables.

Table B1 presents the result of such Panel OLS regressions. Panel A regresses our eight bank risk measures on the current and future independence ratio and ratio of financial experts; Panel B regresses our five tail risk measures on these and Panel C regresses our three performance measures. The dependent variable is denoted in the column heading. As usual in such Panel regressions, we control for bank size through the logarithm of total assets.

The coefficients of the future independence ratio are statistically significant only for the stock tail risk measure. The coefficients of the future ratio of financial experts are related statistically significant to some measures, which suggests some concern of reversed causality. Since most of our analysis centers on the independence ratio, this should not be too much of a concern.

B.2 Additional OLS Panel Regression

Table 2 in subsection 4.1 of the main body of this paper studied how risk governance characteristics affect our risk measures. It controlled for CEO performance incentives by adding vega as a control variable. As noted there, information on vega is available only for a limited number of observations. To further study this, Table B2 carries out the analysis in Table 2 without controlling for vega. Overall, the results are comparable.

C CEO Turnover Analysis

C.1 Why use Survival Regressions and Not Categorical Regressions

First of all, we stress at this stage *conceptually* that survival analysis does not consider any immediate ("short-term") impact of any particular covariate on CEO dismissal, rather the

Table B1: Results from Panel OLS regressions with bank fixed effects. The dependent variables are contemporaneous (tail) risk measures; independent variables are contemporaneous and future board characteristics (independence ratio, ratio of financial experts). Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Economic Risk Measures						Regulatory Risk Meas.		Tail Risk Meas.			
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1	(9) DER	(10) OBS	(11) Kurt(ROA)	(12) Stock Tail
Panel A: Bank Fixed Effects												
Ind. Ratio (t+1)	-0.00550	0.108	-25.41	0.683	-1.395	-0.224	-0.575	-0.247	52.82	-1.198	-0.0329	1.923
	(-0.20)	(0.45)	(-1.21)	(0.12)	(-0.27)	(-1.21)	(-0.34)	(-0.18)	(0.87)	(-0.66)	(-0.19)	(0.79)
Ind. Ratio (t)	0.00483	0.575***	18.83	7.800*	12.97***	0.121	-1.517	-1.879	43.03	4.658***	0.715***	7.422***
	(0.20)	(2.65)	(0.78)	(1.70)	(2.73)	(0.74)	(-1.11)	(-1.64)	(0.86)	(2.76)	(4.89)	(3.30)
Fin. Exp. (t+1)	-0.0684***	0.850***	-23.78	17.98**	18.93***	0.292	0.206	-1.109	78.03*	-3.198*	0.149	9.616***
	(-2.77)	(2.76)	(-0.75)	(2.30)	(3.56)	(1.46)	(0.14)	(-1.00)	(1.86)	(-1.92)	(0.90)	(3.63)
Fin. Exp. (t)	-0.0177	0.316	-13.43	4.941	3.268	-0.111	-1.975	-2.875***	123.6***	-1.113	0.224	1.229
	(-0.70)	(1.02)	(-0.38)	(0.57)	(0.62)	(-0.55)	(-1.42)	(-2.87)	(3.26)	(-0.61)	(1.24)	(0.45)
Has Risk Cmte (t+1)	-0.0104	0.112*	-6.552	3.797**	4.644***	-0.0643	-0.998***	-1.521***	19.61	0.0733	0.0526	2.069***
	(-1.62)	(1.77)	(-0.86)	(2.25)	(3.85)	(-1.38)	(-3.45)	(-6.13)	(1.21)	(0.12)	(1.21)	(3.22)
Has Risk Cmte (t)	0.00273	-0.0225	0.835	-2.277	0.149	-0.0607	-0.280	-0.276	-4.414	0.398	0.0339	0.113
	(0.43)	(-0.36)	(0.24)	(-1.28)	(0.12)	(-1.36)	(-1.16)	(-1.08)	(-0.24)	(0.61)	(0.75)	(0.17)
ln (Tot. Ass.)	0.00991*	-0.222***	-1.085	-5.438***	-7.050***	-0.0654*	-0.941***	0.897***	5.690	1.073**	-0.0516*	-3.023***
	(1.80)	(-5.50)	(-0.09)	(-5.39)	(-7.57)	(-1.65)	(-2.90)	(4.57)	(0.67)	(2.27)	(-1.73)	(-6.92)
Observations	2772	3031	2730	3031	3035	2730	3033	2762	3035	2392	3031	3035
Adjusted R^2	0.747	0.505	-0.031	0.431	0.386	0.526	0.342	0.650	0.914	0.776	0.287	0.342
F	3.591	11.38	1.039	7.931	16.28	5.743	25.34	23.56	2.956	5.217	11.29	17.05
Panel B: Bank and Post GFC Fixed Effects												
Ind. Ratio (t+1)	0.00889	0.0522	-25.21	-0.618	-4.651	-0.182	-0.379	0.358	49.85	-0.920	-0.0772	0.763
	(0.34)	(0.22)	(-1.22)	(-0.11)	(-0.97)	(-1.00)	(-0.22)	(0.26)	(0.82)	(-0.51)	(-0.44)	(0.33)
Ind. Ratio (t)	0.0356	0.443**	19.43	4.716	5.251	0.244	-1.015	-0.524	35.99	5.299***	0.610***	4.674**
	(1.54)	(2.07)	(0.85)	(1.03)	(1.21)	(1.50)	(-0.75)	(-0.47)	(0.72)	(3.12)	(4.21)	(2.17)
Fin. Exp. (t+1)	-0.0625***	0.839***	-23.66	17.71**	18.24***	0.316	0.246	-0.864	77.40*	-2.963*	0.140	9.369***
	(-2.64)	(2.78)	(-0.75)	(2.31)	(3.77)	(1.57)	(0.17)	(-0.81)	(1.85)	(-1.79)	(0.86)	(3.72)
Fin. Exp. (t)	0.00884	0.204	-12.97	2.332	-3.279	-0.0152	-1.529	-1.721*	117.6***	-0.441	0.135	-1.103
	(0.36)	(0.67)	(-0.35)	(0.27)	(-0.66)	(-0.07)	(-1.09)	(-1.83)	(3.15)	(-0.25)	(0.76)	(-0.42)
Has Risk Cmte (t+1)	-0.000839	0.0697	-6.372	2.816*	2.188*	-0.0269	-0.837***	-1.106***	17.37	0.295	0.0192	1.194*
	(-0.14)	(1.07)	(-0.89)	(1.69)	(1.75)	(-0.61)	(-3.04)	(-4.82)	(1.04)	(0.48)	(0.44)	(1.81)
Has Risk Cmte (t)	0.0141**	-0.0670	1.039	-3.317*	-2.455**	-0.0184	-0.110	0.218	-6.790	0.670	-0.00153	-0.815
	(2.38)	(-1.05)	(0.29)	(-1.83)	(-1.98)	(-0.42)	(-0.46)	(0.92)	(-0.37)	(1.02)	(-0.03)	(-1.23)
ln (Tot. Ass.)	0.0352***	-0.324***	-0.640	-7.817***	-13.03***	0.0269	-0.548	1.989***	0.230	1.667***	-0.133***	-5.155***
	(6.47)	(-6.76)	(-0.05)	(-6.34)	(-12.74)	(0.60)	(-1.46)	(9.80)	(0.03)	(3.50)	(-3.88)	(-10.60)
Observations	2772	3031	2730	3031	3035	2730	3033	2762	3035	2392	3031	3035
Adjusted R^2	0.775	0.514	-0.032	0.443	0.480	0.539	0.346	0.690	0.914	0.779	0.303	0.394
F	39.62	12.01	1.010	7.684	45.78	15.92	30.68	55.44	2.941	7.664	16.35	33.34

Table B2: Studying how risk governance characteristics affect bank risk. We control for bank size as well as post GFC fixed effects (Panel B). We use Panel OLS regressions with bank fixed effects. Coefficient statistics are calculated using robust methods; t-statistics are reported in parentheses; significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Economic Risk Measures						Regulatory Risk Meas.		Tail Risk Meas.			
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1	(9) DER	(10) OBS	(11) Kurt(ROA)	(12) Stock Tail
Panel A: Bank Fixed Effects												
Ind. Ratio (IR)	-0.00166	0.457***	-11.13	5.347	9.053**	-0.167	-2.839***	-2.309**	73.85**	4.203***	0.591***	6.208***
	(-0.08)	(2.81)	(-0.42)	(1.53)	(2.42)	(-1.32)	(-3.03)	(-2.31)	(2.44)	(3.27)	(6.08)	(3.70)
Fin. Exp. (FE)	-0.0663***	1.008***	-25.68	19.15***	18.20***	0.147	-1.508	-3.690***	177.0***	-3.532***	0.365***	8.975***
	(-3.44)	(4.84)	(-0.72)	(3.06)	(4.62)	(0.99)	(-1.19)	(-4.96)	(4.05)	(-2.64)	(2.71)	(4.40)
Has Risk C. (RC)	-0.00477	0.00806	-6.931	-0.443	2.283***	-0.141***	-1.197***	-1.368***	9.240	0.505	0.0445	0.876**
	(-0.98)	(0.23)	(-1.12)	(-0.48)	(2.72)	(-4.63)	(-5.20)	(-6.91)	(0.89)	(1.17)	(1.49)	(2.08)
ln (Tot. Ass.)	0.00756	0.0123	9.908	-1.045	-1.863**	0.0628	-0.252	0.627***	13.45	0.575	0.0669**	0.273
	(1.35)	(0.28)	(0.90)	(-1.10)	(-2.12)	(1.62)	(-0.75)	(3.21)	(1.50)	(0.99)	(2.12)	(0.63)
Observations	2747	3059	2730	3059	3059	2730	2999	2737	3059	2374	3059	3059
Adjusted R^2	0.747	0.490	-0.030	0.422	0.368	0.525	0.332	0.643	0.913	0.775	0.291	0.326
F	3.799	9.613	0.491	4.809	10.36	6.468	29.54	30.30	4.580	6.630	19.92	13.89
Panel B: Bank and Post GFC Fixed Effects												
Ind. Ratio (IR)	0.0364*	0.336**	-8.013	2.242	0.452	-0.00166	-2.067**	-0.619	66.16**	4.938***	0.487***	3.353**
	(1.91)	(2.07)	(-0.33)	(0.64)	(0.13)	(-0.01)	(-2.36)	(-0.63)	(2.17)	(3.85)	(4.96)	(2.03)
Fin. Exp. (FE)	-0.0364*	0.916***	-23.26	16.80***	11.67***	0.275*	-0.921	-2.376***	171.1***	-2.731**	0.286**	6.807***
	(-1.93)	(4.43)	(-0.64)	(2.70)	(3.07)	(1.86)	(-0.73)	(-3.63)	(3.97)	(-2.09)	(2.16)	(3.40)
Has Risk C. (RC)	0.0143***	-0.0514	-5.366	-1.960**	-1.920**	-0.0577*	-0.816***	-0.524***	5.479	0.945**	-0.00592	-0.520
	(2.89)	(-1.40)	(-1.11)	(-2.01)	(-2.36)	(-1.87)	(-3.85)	(-2.72)	(0.52)	(2.06)	(-0.19)	(-1.22)
ln (Tot. Ass.)	0.0363***	-0.0790	12.24	-3.374***	-8.313***	0.186***	0.315	1.898***	7.682	1.272**	-0.0105	-1.869***
	(6.53)	(-1.50)	(0.93)	(-2.86)	(-8.41)	(4.28)	(0.80)	(9.17)	(0.80)	(2.06)	(-0.29)	(-3.73)
Post Crisis	-0.0513***	0.163***	-4.192	4.152***	11.50***	-0.222***	-1.028***	-2.275***	10.29**	-1.145***	0.138***	3.819***
	(-17.33)	(4.41)	(-1.04)	(4.68)	(16.01)	(-8.68)	(-5.37)	(-17.23)	(2.00)	(-5.43)	(5.51)	(11.24)
Observations	2747	3059	2730	3059	3059	2730	2999	2737	3059	2374	3059	3059
Adjusted R^2	0.775	0.496	-0.030	0.430	0.452	0.544	0.339	0.687	0.914	0.778	0.302	0.367
F	63.56	11.19	0.427	7.407	57.88	22.09	32.40	81.17	4.079	9.019	24.84	36.87

impact that it has on the hazard to be dismissed; the overall likelihood to be dismissed is a consequence of current and prior activities (here mostly performance and risk taking) that accumulate over time.

Moreover, categorical regressions often assume that dismissal is driven, say, by current and lagged (excess) stock returns (Jensen and Murphy (1990)). However, it may well be that boards dismiss a CEO not only because they are (very) *dissatisfied by current events*, but rather because they *became increasingly disappointed* over time. For example, a board may dismiss a CEO because current performance is miserable or because it has been deceiving over an extended period of time, became increasingly disappointed and ultimately dismisses the CEO, although performance may then not be (particularly) bad. This suggests basing dismissal, not only on the events immediately preceding dismissal, but on their accumulated impact. Survival analysis does precisely aim for those cumulative impacts whereas categorical regressions consider the explicit impact for each of a given number of years before dismissal. From an economic perspective, we find the cumulative impact to be more reasonable. But we note that this is, ultimately, an empirical issue and that the statistical significance of categorical versus survival regressions should be used in assessing this.

Moreover, there are statistical issues with categorical regressions: these types of regressions cannot capture adequately data truncation issues with dismissal, e.g., CEOs still in office when our sample ends in 2017. In categorical regressions, this may portray falsely statistical significance and/or bias coefficients. More generally, categorical regressions do not make efficient use of data, such that interesting economic analysis with further explanatory or control variables becomes statistically in-feasible. These issues of categorical regressions are well studied in the statistical literature and a branch evolved that focuses on such issues: survival analysis.

C.2 Tests of Statistical Methods

This subsection presents tests that assess the validity of our approach. To save space and since it turns out that they unanimously confirm our approach we present these here for the regressions in the main body of this paper, only, but do not report them for the additional survival regressions in the appendix of this paper.

Table C1 presents such statistics in Panels A-C for the regressions in Panels A-C of Table 4 and in Panels D-F for the regressions in Panels A-C of Table 6. They are organized analogous their respective Panels in the main text.

A common way to assess the proportional hazard assumption is to plot residuals. On this basis one can then test the null hypothesis of no systematic variation in the residuals over time (proportional hazards). We report the p-value of that test in Table C1 in the respective row entitled "PH". We find that they are all close to 1, most important they are nowhere near zero

Table C1: Presenting tests results of unobserved heterogeneity ($\ln \theta, p$) and, separately, of the proportionality in hazard (PH). We presents this here separately in Panels A-C for the three Panels A-C in Table 4 (only risk variable) and in Panels D-E for the three Panels A-C in Table 6 (risk and tail risk variable). The respective risk or tail risk variable in each regression is specified in the column heading; this is RW, ROA volatility, PD, ROE volatility, stock volatility, negative Z, LEV, negative T1 in Panels A-C; in Panels D-F we present here only risk measures RW, -T1 together with our four tail risk measures.

	Economic Risk Measures						Regulatory Risk Meas.	
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1
	Panel A: Survival Regressions Controlling for Residual Performance							
N	1637	1853	1625	1852	1852	1625	1850	1628
$\ln(\theta)$	-16.7	-16.7	-15.0	-14.2	-14.1	-15.3	-15.4	-15.6
p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PH	0.91	0.95	1.00	0.96	0.98	1.00	0.99	1.00
	Panel B: Survival Regressions Controlling for Excess Performance							
N	1805	2021	1792	2020	2020	1792	2018	1795
$\ln(\theta)$	-14.6	-14.3	-15.8	-14.2	-14.1	-15.2	-16.6	-16.6
p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PH	0.76	0.66	0.81	0.80	0.87	0.78	0.70	0.79
	Panel C: Survival Regressions Without Controlling for Performance							
N	1827	2159	1793	2159	2283	1793	2047	1818
$\ln(\theta)$	-15.5	-14.2	-16.4	-14.3	-14.0	-16.4	-15.7	-14.3
p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PH	0.79	0.53	0.68	0.73	0.99	0.64	0.66	0.72

	Risk (Measure): RW				Risk (Measure): -T1			
	DER (1)	OBS (2)	Kurt (3)	ST (4)	DER (5)	OBS (6)	Kurt (7)	ST (8)
	Panel D: Survival Regressions Controlling for Residual Performance							
N	1637	1478	1637	1637	1628	1470	1628	1628
$\ln(\theta)$	-15.3	-14.6	-17.6	-16.9	-16.3	-14.3	-17.6	-16.6
p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PH	0.83	1.00	1.00	0.95	1.00	1.00	1.00	1.00
	Panel E: Survival Regressions Controlling for Excess Performance							
N	1805	1478	1805	1805	1795	1470	1795	1795
$\ln(\theta)$	-15.4	-15.8	-18.1	-16.4	-14.4	-14.8	-16.2	-15.6
p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PH	0.86	0.98	0.92	0.82	0.83	0.99	0.84	0.84
	Panel F: Survival Regressions Without Controlling for Performance							
N	1826	1491	1826	1826	1817	1484	1817	1817
$\ln(\theta)$	-15.4	-16.2	-15.7	-14.8	-16.6	-15.3	-16.2	-16.1
p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PH	0.94	0.97	0.93	0.91	0.71	0.99	0.67	0.75

that would permit rejection of the proportional hazard assumption and hence do conclude that our proportionality assumption is appropriate.

Table C1 also presents test for unobserved heterogeneity. Therein, the row θ measures the correction due to unobserved heterogeneity. We see that these are all virtually zero. For proper assessment we carry out a test of the null hypothesis that $\theta = 0$; we the p-value in the table in row "p": to reject would need small p value, i.e. to see the observed theta (larger zero) only due to randomness has small probability (and hence rejected). Here, we usually have very large p-values (close to 1) hence our null hypothesis cannot be rejected. We conclude that there is no unobserved heterogeneity in our survival regressions.

C.3 Additional Survival Analysis Tables

The main body of the paper presented in Table 4 only the sensitivities for the coefficients of interest. The three Tables C2-C4 separately present the full coefficient table separately for the three Panels of Table 4.

Analogously, the main body of the paper presented in Table 6 only the sensitivities for the coefficients of interest. The three Tables C5-C7 separately present the full coefficient table separately for the three Panels of Table 4.

Tables C8-C11 present additional tables of risk together with tail risk that complement our tables of risk with the tail risk measures studied in the main body of this paper.

Table C2: This Table provides the full regression results for Panel A of Table 4 in the main body of the paper. Studying how risk and board characteristics affect the CEO's hazard rate to be dismissed. The respective risk measure in each regression is specified in the column heading. We control for industry performance and the performance residual, see Table 3 for the sensitivities of that decomposition. We use survival regressions with exponential distribution and time-varying covariates, control for age of the CEO and present the respective sensitivities of the risk score. We present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Economic Risk Measures						Regulatory Risk Meas.	
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1
IR × Risk	17.54	-9.591***	-1.426**	-1.057*	-0.424	-8.314***	-0.701	1.922***
	(1.18)	(-3.61)	(-2.22)	(-1.96)	(-1.59)	(-2.93)	(-1.46)	(5.71)
FE × Risk	488.6***	7.310**	0.372	0.212	-0.0940	9.852**	-12.28***	-2.158***
	(4.46)	(2.14)	(1.09)	(1.10)	(-0.50)	(2.09)	(-4.10)	(-4.09)
RC=1 × Risk	-5.675	0.451	0.0565	-0.0883	-0.0455	0.130	0.148	0.000732
	(-1.31)	(0.69)	(0.53)	(-1.04)	(-1.31)	(0.18)	(0.91)	(0.00)
Risk	-12.11	6.170***	0.859**	0.669**	0.261	5.629**	0.451*	-1.266***
	(-1.18)	(4.08)	(2.49)	(2.20)	(1.54)	(2.16)	(1.73)	(-5.73)
IR	-32.51***	-5.474	-11.15	-11.11**	-6.842*	-40.45***	-11.63*	7.402
	(-4.44)	(-0.88)	(-1.35)	(-2.29)	(-1.95)	(-3.66)	(-1.90)	(1.51)
FE	-504.0***	-26.79***	-12.19***	-8.147*	-2.470	12.18	76.99***	-44.88***
	(-4.40)	(-2.76)	(-2.84)	(-1.93)	(-0.43)	(1.06)	(4.07)	(-3.95)
RC	3.982	0.452	2.813	2.731*	3.851*	3.301	0.977	2.471
	(1.10)	(0.21)	(1.33)	(1.65)	(1.76)	(0.91)	(0.51)	(1.21)
Res. Perf	-6.532***	-0.851	-0.507***	-0.672*	-0.588*	-0.370***	-0.563***	-0.568***
	(-3.81)	(-0.33)	(-2.67)	(-1.73)	(-1.87)	(-4.75)	(-5.42)	(-3.35)
IR × Res. Perf	10.02***	2.080	0.899***	1.181*	1.062*	0.699***	0.944***	0.952***
	(4.81)	(0.40)	(3.19)	(1.76)	(1.95)	(5.40)	(5.67)	(4.06)
RC × Res. Perf	-0.709	-1.035	-0.147**	-0.0970**	-0.157*	-0.127***	-0.0522	-0.0975
	(-1.24)	(-0.99)	(-2.30)	(-2.17)	(-1.92)	(-2.66)	(-1.02)	(-1.46)
Avg. Exc. Perf	-6.843	-1.237	-0.514	-0.389	-0.270	-0.309	-0.401	-0.213
	(-1.46)	(-0.26)	(-0.88)	(-0.88)	(-0.83)	(-0.77)	(-1.25)	(-1.03)
IR × Avg. Exc. Perf	11.34	2.981	0.885	0.696	0.514	0.578	0.692	0.404
	(1.14)	(0.31)	(0.76)	(0.87)	(0.89)	(0.69)	(0.97)	(1.04)
RC × Avg. Exc. Perf	2.550	0.918	-0.0671	-0.0374	-0.106	-0.0607	-0.00336	0.0273
	(0.63)	(0.32)	(-0.27)	(-0.28)	(-0.68)	(-0.27)	(-0.01)	(0.16)
Age	0.235***	0.194**	0.179***	0.153***	0.146***	0.188***	0.240***	0.226***
	(2.86)	(2.11)	(3.64)	(3.05)	(2.87)	(2.73)	(2.85)	(2.81)
ln (Tot. Ass.)	-0.460	-0.299	-0.208	-0.172	-0.121	-0.169	-0.483	-0.297
	(-0.98)	(-0.77)	(-0.60)	(-0.48)	(-0.40)	(-0.65)	(-1.20)	(-0.85)
N	1637	1853	1625	1852	1852	1625	1850	1628
Wald χ^2	273.4	164.9	180.5	216.5	222.7	168.7	213.9	172.1
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table C3: This Table provides the full regression results for Panel B of Table 4 in the main body of the paper. Studying how risk and board characteristics affect the CEO's hazard rate to be dismissed. The respective risk measure in each regression is specified in the column heading. We control for bank performance in excess of industry performance. We use survival regressions with exponential distribution and time-varying covariates, control for age of the CEO and present the respective sensitivities of the risk score. We present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Economic Risk Measures						Regulatory Risk Meas.	
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1
IR × Risk	-2.561	-5.327***	-0.821**	-0.553	-0.0199	-6.514*	0.0497	1.393***
	(-0.28)	(-2.76)	(-2.14)	(-1.60)	(-0.17)	(-1.74)	(0.10)	(2.97)
FE × Risk	45.73	-3.583	-0.0243	0.0161	0.0418	-1.266	-4.081***	-1.068**
	(1.53)	(-1.19)	(-0.06)	(0.06)	(0.27)	(-0.22)	(-2.87)	(-2.16)
RC × Risk	-2.856	-0.661	0.00923	-0.139*	-0.104***	0.173	0.340*	0.195
	(-0.99)	(-0.88)	(0.14)	(-1.78)	(-3.51)	(0.27)	(1.90)	(1.18)
Risk	2.120	3.871***	0.547**	0.380*	0.00577	5.187	-0.120	-0.990***
	(0.32)	(3.04)	(2.08)	(1.78)	(0.07)	(1.45)	(-0.37)	(-3.27)
IR	-4.250	-2.780	-1.672	-4.140	-7.851***	-24.72***	-8.603	10.55*
	(-0.61)	(-0.85)	(-0.36)	(-1.07)	(-2.68)	(-3.21)	(-1.44)	(1.91)
FE	-40.46	-2.015	-2.322	-1.922	-1.992	-5.436	32.64***	-18.34
	(-1.37)	(-0.25)	(-0.33)	(-0.35)	(-0.34)	(-0.41)	(3.87)	(-1.55)
RC	3.389	1.554	1.046	1.710	3.079***	1.519	-2.474	3.645
	(1.49)	(1.43)	(1.08)	(1.40)	(2.61)	(0.79)	(-1.08)	(1.58)
Outperf	-0.981	-0.444	-0.0793	-0.103	-0.0312	-0.0380	-0.229**	-0.157
	(-0.64)	(-0.30)	(-0.43)	(-0.55)	(-0.15)	(-0.22)	(-2.34)	(-1.45)
IR × Outperf	1.274	0.602	0.153	0.181	0.0619	0.0927	0.349***	0.231
	(0.72)	(0.26)	(0.65)	(0.64)	(0.23)	(0.40)	(3.46)	(1.46)
FE × Outperf	1.551	3.583*	0.102	0.158	0.131	0.0334	-0.169*	0.112
	(0.87)	(1.69)	(0.47)	(0.70)	(0.52)	(0.21)	(-1.90)	(0.93)
RC × Outperf	0.0948	-0.0936	-0.0181	-0.00837	0.000888	-0.00144	0.0276	-0.00494
	(0.15)	(-0.12)	(-0.33)	(-0.13)	(0.01)	(-0.03)	(0.46)	(-0.09)
Age	0.139***	0.153***	0.146***	0.136***	0.129***	0.148***	0.204***	0.176***
	(3.04)	(3.27)	(3.48)	(3.45)	(3.16)	(3.16)	(3.00)	(3.66)
ln (Tot. Ass.)	-0.332	-0.338	-0.198	-0.136	-0.0882	-0.215	-0.307	-0.320
	(-1.03)	(-0.93)	(-0.84)	(-0.60)	(-0.38)	(-0.97)	(-1.21)	(-1.16)
N	1805	2021	1792	2020	2020	1792	2018	1795
Wald χ^2	178.6	195.3	128.7	107.0	184.2	134.6	268.0	206.6
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table C4: This Table provides the full regression results for Panel C of Table 4 in the main body of the paper. Studying how risk and board characteristics affect the CEO's hazard rate to be dismissed. The respective risk measure in each regression is specified in the column heading. (We do not control for performance.) We use survival regressions with exponential distribution and time-varying covariates, control for age of the CEO and present the respective sensitivities of the risk score. We present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Economic Risk Measures						Regulatory Risk Meas.	
	(1) RW	(2) σ(ROA)	(3) PD	(4) σ(ROE)	(5) Stock vol.	(6) -Z	(7) LEV	(8) -T1
IR × Risk	-1.331	-6.143***	-0.733**	-0.488	-0.0188	-5.626*	-0.203	1.201***
	(-0.16)	(-3.46)	(-2.09)	(-1.59)	(-0.14)	(-1.96)	(-0.47)	(2.85)
FE × Risk	41.99**	0.644	-0.0317	-0.0274	0.0794	-0.577	-3.208**	-1.032**
	(2.11)	(0.22)	(-0.10)	(-0.16)	(0.54)	(-0.13)	(-2.35)	(-2.17)
RC × Risk	-2.739	-0.173	0.0204	-0.0714	-0.0851***	0.126	0.274	0.195
	(-0.87)	(-0.32)	(0.36)	(-1.19)	(-2.86)	(0.21)	(1.63)	(1.29)
Risk	0.985	4.264***	0.479**	0.337*	0.00188	4.427*	0.0472	-0.860***
	(0.15)	(3.56)	(2.17)	(1.80)	(0.02)	(1.71)	(0.15)	(-3.21)
IR	-5.359	-2.254	-2.340	-4.567	-7.998***	-22.38***	-5.395	8.280*
	(-0.83)	(-0.70)	(-0.58)	(-1.35)	(-2.69)	(-3.37)	(-0.88)	(1.76)
FE	-36.45*	-3.920	-1.555	-0.901	-2.250	-3.127	24.11***	-17.49
	(-1.72)	(-0.50)	(-0.29)	(-0.21)	(-0.47)	(-0.33)	(3.25)	(-1.58)
RC	3.392	1.244	0.952	1.308	2.736***	1.394	-1.827	3.761
	(1.58)	(1.00)	(0.89)	(1.10)	(3.11)	(0.76)	(-0.83)	(1.64)
Age	0.137***	0.156***	0.144***	0.137***	0.131***	0.148***	0.184***	0.170***
	(3.10)	(3.21)	(3.30)	(3.35)	(3.24)	(3.10)	(2.79)	(3.56)
ln (Tot. Ass.)	-0.334	-0.322	-0.180	-0.131	-0.0798	-0.192	-0.304	-0.346
	(-0.94)	(-0.89)	(-0.62)	(-0.48)	(-0.29)	(-0.72)	(-0.91)	(-1.06)
N	1826	2046	1793	2046	2049	1793	2047	1817
Wald χ^2	137.7	86.0	37.4	33.2	91.1	45.5	245.6	60.3
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table C5: This Table provides the full regression results for Panel A of Table 6 in the main body of the paper. Studying how risk and board characteristics affect the CEO's hazard rate to be dismissed. The respective risk measure in each regression is specified in the column heading. We control for industry performance and the performance residual, see Table 3 for the sensitivities of that decomposition. We use survival regressions with exponential distribution and time-varying covariates, control for age of the CEO and present the respective sensitivities of the risk score. We present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Risk (Measure): RW				Risk (Measure): -T1			
	DER (1)	OBS (2)	Kurt (3)	ST (4)	DER (5)	OBS (6)	Kurt (7)	ST (8)
IR × Risk	-34.19**	-56.08***	-54.61***	-47.25***	2.371***	2.849***	3.448***	1.974***
	(-2.51)	(-3.02)	(-3.83)	(-3.32)	(4.91)	(4.39)	(2.73)	(3.05)
RC=1 × Risk	-1.074	2.002	-1.142	3.713	-0.0671	-0.351**	-0.102	0.273
	(-0.22)	(0.44)	(-0.28)	(0.77)	(-0.37)	(-2.45)	(-0.56)	(1.37)
IR × Tail Risk	-0.229	0.157	-16.24*	-0.467	-0.267	-0.482	-17.52	-0.484
	(-0.98)	(0.76)	(-1.78)	(-0.73)	(-1.11)	(-1.58)	(-1.49)	(-0.95)
RC × Tail Risk	0.0363	0.0780	-3.356	-0.369***	0.0275	0.0933	-6.190	-0.432***
	(1.10)	(1.17)	(-0.99)	(-3.64)	(0.92)	(1.04)	(-1.27)	(-3.51)
Risk	25.58***	43.91***	40.58***	32.88***	-1.604***	-1.956***	-2.325***	-1.396***
	(3.40)	(4.39)	(4.52)	(3.96)	(-5.57)	(-4.15)	(-2.97)	(-3.33)
Tail Risk	0.0781	-0.197	12.35*	0.311	0.105	0.324	13.70	0.314
	(0.66)	(-0.87)	(1.90)	(0.84)	(1.11)	(1.28)	(1.60)	(0.96)
IR	13.08	27.19*	69.21*	25.03***	14.82***	22.61**	71.48*	11.07
	(1.31)	(1.77)	(1.86)	(3.40)	(2.85)	(2.09)	(1.65)	(1.18)
FE	-12.37***	-13.29***	-11.94***	-9.723***	-14.00***	-7.990**	-13.88**	-8.275***
	(-4.02)	(-3.41)	(-3.09)	(-2.62)	(-3.25)	(-2.04)	(-2.08)	(-2.73)
RC	1.269	-0.0573	13.39	2.746	1.660	-2.347	20.78	11.86***
	(0.32)	(-0.02)	(1.31)	(1.20)	(0.71)	(-0.82)	(1.57)	(3.31)
Res. Perf	-1.020	-1.129	-0.728	-2.771	-0.547***	-0.473**	-0.703**	-0.668***
	(-0.86)	(-0.99)	(-0.57)	(-0.96)	(-3.49)	(-2.49)	(-2.10)	(-3.19)
IR × Res. Perf	2.983**	3.101**	2.971*	5.952	0.925***	0.820***	1.235**	1.161***
	(2.07)	(2.25)	(1.92)	(1.11)	(4.21)	(3.57)	(2.29)	(2.89)
RC × Res. Perf	-1.847***	-1.446***	-2.009***	-4.714***	-0.117	-0.137*	-0.166**	-0.290**
	(-2.70)	(-2.77)	(-2.62)	(-2.82)	(-1.59)	(-1.76)	(-2.04)	(-2.56)
Avg. Exc. Perf	-1.869	-2.775	-4.181	-2.951	-0.158	-0.211	-0.195	-0.271
	(-0.51)	(-0.63)	(-0.64)	(-0.55)	(-0.75)	(-1.17)	(-0.74)	(-1.15)
IR × Avg. Exc. Perf	4.151	5.907	8.566	5.936	0.349	0.420	0.489	0.501
	(0.55)	(0.66)	(0.68)	(0.60)	(0.91)	(1.17)	(1.03)	(1.16)
RC × Avg. Exc. Perf	1.656	-0.142	-0.404	-0.270	0.0257	0.0100	-0.0829	-0.181
	(0.61)	(-0.06)	(-0.12)	(-0.06)	(0.14)	(0.06)	(-0.44)	(-1.12)
Age	0.146**	0.105**	0.165**	0.142***	0.205***	0.174**	0.249**	0.193***
	(2.45)	(1.99)	(2.20)	(3.03)	(3.12)	(2.54)	(2.08)	(3.49)
ln (Tot. Ass.)	-0.0671	-0.720	-0.378	-0.489	-0.0116	-0.632	-0.184	-0.379
	(-0.10)	(-0.96)	(-0.74)	(-1.16)	(-0.02)	(-1.25)	(-0.50)	(-1.06)
N	1637	1478	1637	1637	1628	1470	1628	1628
Wald χ^2	238.9	307.5	185.6	185.9	176.4	178.5	154.7	144.3
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table C6: This Table provides the full regression results for Panel B of Table 6 in the main body of the paper. Studying how risk and board characteristics affect the CEO's hazard rate to be dismissed. The respective risk measure in each regression is specified in the column heading. We control for bank performance in excess of industry performance. We use survival regressions with exponential distribution and time-varying covariates, control for age of the CEO and present the respective sensitivities of the risk score. We present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Risk (Measure): RW				Risk (Measure): -T1			
	DER (1)	OBS (2)	Kurt (3)	ST (4)	DER (5)	OBS (6)	Kurt (7)	ST (8)
IR × Risk	-10.54	-29.30*	-11.32	-11.49	1.120	3.038***	1.322	1.098
	(-0.81)	(-1.84)	(-0.96)	(-0.79)	(1.45)	(4.68)	(1.47)	(1.30)
RC × Risk	-2.661	-0.922	-3.622	-3.004	0.197	-0.292**	0.162	0.189
	(-0.69)	(-0.24)	(-1.45)	(-0.84)	(1.03)	(-2.14)	(0.78)	(0.96)
IR × Tail Risk	0.00155	-0.141	-15.68**	-0.223	-0.0169	-0.788**	-11.44	-0.374
	(0.28)	(-0.54)	(-2.35)	(-0.63)	(-0.46)	(-2.32)	(-1.52)	(-1.02)
RC × Tail Risk	-0.00807	0.134	-3.920	-0.375***	-0.0193	0.110*	-3.720	-0.435**
	(-0.73)	(1.62)	(-1.07)	(-2.61)	(-1.02)	(1.86)	(-1.19)	(-2.23)
Risk	9.664	24.35***	10.55	10.35	-0.865*	-2.053***	-0.997*	-0.855
	(1.09)	(2.62)	(1.26)	(1.04)	(-1.81)	(-4.29)	(-1.83)	(-1.64)
Tail Risk	-0.00169	0.0134	11.64**	0.136	0.00808	0.520**	8.709	0.238
	(-0.82)	(0.06)	(2.37)	(0.47)	(0.55)	(2.01)	(1.58)	(0.91)
IR × Outperf	-0.945	-2.231	-1.931	-1.003	0.210	0.234	0.104	0.210
	(-0.67)	(-1.12)	(-0.94)	(-0.63)	(1.04)	(1.48)	(0.39)	(0.87)
Outperf	0.829	1.723	1.667	0.844	-0.138	-0.155	-0.0447	-0.131
	(1.02)	(1.45)	(1.38)	(0.96)	(-1.22)	(-1.52)	(-0.26)	(-0.98)
IR	1.274	13.71	46.67**	4.606	6.739	33.61***	41.25*	10.19
	(0.15)	(1.51)	(2.45)	(0.53)	(0.75)	(3.97)	(1.75)	(1.32)
FE	-3.753	-13.61**	-3.233	-3.774	-1.323	-6.784**	-0.0966	-1.074
	(-0.65)	(-2.45)	(-0.56)	(-0.61)	(-0.29)	(-2.40)	(-0.02)	(-0.26)
Age	0.137***	0.116*	0.154***	0.135***	0.161***	0.163**	0.166***	0.160***
	(3.00)	(1.89)	(2.80)	(2.81)	(3.90)	(2.19)	(3.70)	(3.77)
ln (Tot. Ass.)	-0.239	-0.767	-0.371	-0.297	-0.130	-0.554	-0.251	-0.248
	(-0.54)	(-0.97)	(-0.99)	(-0.82)	(-0.36)	(-1.30)	(-0.86)	(-0.86)
RC	3.273	1.295	15.22	6.650*	3.828	-2.452	13.85	7.277**
	(1.10)	(0.49)	(1.54)	(1.85)	(1.48)	(-1.21)	(1.55)	(2.52)
RC × Outperf	0.113	0.812	0.0617	0.650	-0.00236	0.0136	-0.0163	0.0538
	(0.18)	(0.93)	(0.07)	(0.81)	(-0.03)	(0.23)	(-0.20)	(0.60)
N	1805	1478	1805	1805	1795	1470	1795	1795
Wald χ^2	152.7	187.6	132.2	245.6	146.9	130.7	147.2	206.9
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table C7: This Table provides the full regression results for Panel C of Table 6 in the main body of the paper. Studying how risk and board characteristics affect the CEO's hazard rate to be dismissed. The respective risk measure in each regression is specified in the column heading. (We do not control for performance.) We use survival regressions with exponential distribution, time-varying covariates, control for age of the CEO and present the respective sensitivities of the risk score. We present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Risk (Measure): RW				Risk (Measure): -T1			
	DER	OBS	Kurt	ST	DER	OBS	Kurt	ST
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IR × Risk	-18.64	-45.25**	-28.18**	-19.23	0.941	2.532***	1.294	0.949
	(-1.58)	(-2.20)	(-2.35)	(-1.63)	(1.42)	(4.14)	(1.54)	(1.35)
RC × Risk	-1.625	1.463	-1.745	-1.687	0.204	-0.233**	0.166	0.240
	(-0.42)	(0.36)	(-0.60)	(-0.50)	(1.19)	(-2.29)	(0.80)	(1.37)
IR × Tail Risk	0.00116	0.0533	-12.76**	-0.231	-0.0110	-0.664**	-11.40*	-0.389
	(0.19)	(0.23)	(-2.30)	(-0.74)	(-0.37)	(-2.13)	(-1.83)	(-1.26)
RC × Tail Risk	-0.0102	0.0992	-3.363	-0.285*	-0.0178	0.100*	-3.617	-0.345**
	(-0.74)	(1.24)	(-1.18)	(-1.95)	(-0.92)	(1.66)	(-1.27)	(-2.04)
Risk	15.35**	35.32***	22.72***	15.77**	-0.745*	-1.740***	-0.981*	-0.750*
	(2.10)	(3.01)	(3.00)	(2.13)	(-1.80)	(-3.78)	(-1.92)	(-1.74)
Tail Risk	-0.00166	-0.124	9.619**	0.139	0.00538	0.443*	8.642*	0.253
	(-0.88)	(-0.55)	(2.34)	(0.54)	(0.43)	(1.83)	(1.88)	(1.04)
IR	7.084	24.77*	50.60***	10.30	4.781	26.55***	41.04*	8.935
	(1.02)	(1.93)	(2.68)	(1.57)	(0.63)	(3.55)	(1.94)	(1.22)
FE	-2.853	-10.90**	-2.099	-2.437	-1.572	-6.755**	-0.161	-1.147
	(-0.59)	(-2.46)	(-0.45)	(-0.53)	(-0.34)	(-2.18)	(-0.04)	(-0.28)
RC	2.515	-0.104	12.28*	5.011	3.942	-1.613	13.61	7.302**
	(0.94)	(-0.04)	(1.74)	(1.61)	(1.61)	(-0.97)	(1.62)	(2.31)
Age	0.134***	0.109*	0.146***	0.131***	0.156***	0.154**	0.167***	0.155***
	(3.07)	(1.82)	(2.95)	(2.91)	(3.73)	(2.22)	(3.46)	(3.49)
ln (Tot. Ass.)	-0.195	-0.648	-0.315	-0.262	-0.156	-0.578	-0.243	-0.263
	(-0.43)	(-0.86)	(-0.85)	(-0.68)	(-0.38)	(-1.09)	(-0.78)	(-0.73)
N	1826	1491	1826	1826	1817	1484	1817	1817
Wald χ^2	115.3	91.6	88.4	191.0	53.8	78.9	41.5	92.5
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table C8: Studying how board characteristics and bank (tail) risk drive the CEO's hazard rate to be dismissed. Board characteristics are the independence ratio and the ratio of financial experts. Regressions (1-5) use ROA volatility as the bank risk measure, regressions (6-10) use PD and regressions (11-15) use ROE volatility. The respective tail risk variable is specified in the column heading (DER, OBS, stock tail risk=TR, ROA skewness=Skew, and ROA kurtosis=Kurt). We use survival regressions with exponential distribution, control for age of the CEO and present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	σ(ROA) Risk Measure				PD Risk Measure				σ(ROE) Risk Measure			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
IR × Risk	-6.290***	-11.75***	-8.272***	-6.383***	-0.679*	-0.833	-0.952*	-0.772**	-0.466*	-0.607	-0.564	-0.488
	(-2.98)	(-2.64)	(-2.81)	(-2.59)	(-1.94)	(-1.46)	(-1.95)	(-2.39)	(-1.67)	(-1.13)	(-0.94)	(-1.28)
RC × Risk	0.233	-0.242	0.918*	1.295*	0.0290	-0.0441	0.0958	0.224**	-0.0173	-0.253*	0.00824	0.0911
	(0.50)	(-0.45)	(1.68)	(1.74)	(0.73)	(-0.52)	(1.31)	(2.26)	(-0.43)	(-1.74)	(0.10)	(1.30)
IR × Tail Risk	0.00344	-0.307	-7.231	-0.0334	-0.000659	-0.0470	-8.683	-0.141	-0.00633	-0.220	-6.544	-0.191
	(0.75)	(-1.39)	(-1.13)	(-0.11)	(-0.04)	(-0.19)	(-1.25)	(-0.48)	(-0.25)	(-1.02)	(-0.79)	(-0.58)
RC × Tail Risk	-0.0180	0.0862*	-5.315	-0.341**	-0.0207	0.0877	-5.128	-0.483**	-0.0214	0.0983*	-4.251	-0.346**
	(-1.23)	(1.68)	(-1.40)	(-2.12)	(-1.22)	(1.49)	(-1.40)	(-2.26)	(-1.30)	(1.80)	(-1.11)	(-2.08)
Risk	4.350***	7.695***	5.081***	4.447***	0.439**	0.536	0.555**	0.496**	0.319*	0.404	0.331	0.333
	(3.35)	(2.84)	(3.20)	(2.88)	(2.13)	(1.57)	(2.03)	(2.54)	(1.85)	(1.26)	(0.92)	(1.38)
Tail Risk	-0.00269	0.188	5.923	0.00719	-0.00104	-0.0309	6.983	0.0861	0.00157	0.0891	5.452	0.117
	(-0.90)	(1.12)	(1.24)	(0.03)	(-0.17)	(-0.19)	(1.35)	(0.36)	(0.15)	(0.61)	(0.91)	(0.48)
IR	-2.312	0.457	19.13	-1.721	-2.689	-4.526***	22.91	-0.529	-4.616	-5.164**	13.59	-2.502
	(-0.86)	(0.21)	(1.00)	(-0.37)	(-0.69)	(-2.60)	(1.10)	(-0.10)	(-1.31)	(-2.54)	(0.61)	(-0.50)
FE	-3.523	-11.37***	-2.064	-3.175	-2.197	-5.755**	-0.768	-1.689	-1.500	-4.438	-0.132	-1.056
	(-0.66)	(-3.57)	(-0.42)	(-0.61)	(-0.56)	(-2.21)	(-0.22)	(-0.46)	(-0.40)	(-1.52)	(-0.04)	(-0.30)
RC	1.087	1.344	15.36	3.079**	1.047	1.258	14.94	3.695**	1.145	2.560	12.71	3.267**
	(1.01)	(1.07)	(1.40)	(2.34)	(0.92)	(0.92)	(1.39)	(2.37)	(1.04)	(1.57)	(1.17)	(2.15)
Age	0.154***	0.149**	0.158***	0.150***	0.144***	0.120**	0.150***	0.142***	0.137***	0.114**	0.140***	0.136***
	(3.23)	(2.04)	(3.01)	(3.16)	(3.31)	(2.50)	(3.04)	(3.30)	(3.33)	(2.57)	(3.16)	(3.34)
ln (Tot. Ass.)	-0.238	-0.613	-0.276	-0.284	-0.0583	-0.274	-0.145	-0.189	-0.0108	-0.243	-0.103	-0.122
	(-0.55)	(-1.03)	(-0.71)	(-0.77)	(-0.15)	(-0.66)	(-0.48)	(-0.63)	(-0.03)	(-0.61)	(-0.34)	(-0.42)
N	2046	1491	2046	2046	1793	1468	1793	1793	2046	1491	2046	2046
Wald χ^2	117.9	68.1	77.5	132.0	51.1	54.8	34.8	92.1	48.3	61.1	34.8	105.8
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table C9: Studying how board characteristics and bank (tail) risk drive the CEO's hazard rate to be dismissed. Board characteristics are the independence ratio and the ratio of financial experts. Regressions (1-5) use stock volatility as the bank risk measure, regressions (6-10) use -Z and regressions (11-15) use -T1. The respective tail risk variable is specified in the column heading (DER, OBS, stock tail risk=TR, ROA skewness=Skew, and ROA kurtosis=Kurt). We use survival regressions with exponential distribution, control for age of the CEO and present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Stock Volatility				-Z				LEV			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
IR × Risk	0.0247	-0.0927	0.0340	0.425	-5.340**	-5.152*	-5.212*	-6.528**	0.425	1.501***	0.831	0.364
	(0.19)	(-0.41)	(0.11)	(1.41)	(-2.28)	(-1.80)	(-1.80)	(-2.22)	(0.55)	(2.85)	(1.00)	(0.46)
RC × Risk	-0.0735**	-0.176***	-0.0603	0.0607	0.314	-0.664	0.790	2.235*	0.377	-0.198	0.466*	0.481*
	(-2.52)	(-3.11)	(-1.43)	(0.60)	(0.52)	(-1.05)	(1.31)	(1.84)	(1.61)	(-1.45)	(1.76)	(1.96)
IR × Tail Risk	-0.0164	-0.293	-8.947	-1.233**	-0.00117	-0.0159	-6.903	-0.123	-0.000552	-0.405**	-14.42*	-0.346
	(-0.34)	(-1.14)	(-0.91)	(-1.96)	(-0.08)	(-0.08)	(-1.13)	(-0.46)	(-0.12)	(-2.13)	(-1.72)	(-1.36)
RC × Tail Risk	-0.0191	0.0899*	-3.076	-0.409	-0.0241	0.0740	-4.931	-0.457**	-0.0171	0.0792	-4.477	-0.330*
	(-1.18)	(1.70)	(-0.91)	(-1.19)	(-1.39)	(1.41)	(-1.54)	(-2.34)	(-1.30)	(1.42)	(-1.29)	(-1.85)
Risk	-0.0244	0.0630	-0.0467	-0.300	4.100**	4.162**	3.565	5.129**	-0.581	-1.304***	-0.971*	-0.537
	(-0.26)	(0.43)	(-0.23)	(-1.17)	(2.09)	(1.97)	(1.64)	(2.14)	(-1.37)	(-2.96)	(-1.83)	(-1.18)
Tail Risk	0.00568	0.136	7.069	0.846*	-0.000928	-0.0484	5.542	0.0468	0.0000950	0.259	10.98*	0.245
	(0.31)	(0.72)	(1.01)	(1.71)	(-0.15)	(-0.32)	(1.22)	(0.23)	(0.04)	(1.55)	(1.78)	(1.11)
IR	-9.182***	-6.928*	14.91	-6.795	-21.66***	-24.56**	-2.756	-23.66**	-12.38	-23.13***	23.96	-8.139
	(-2.65)	(-1.72)	(0.64)	(-1.41)	(-3.51)	(-2.25)	(-0.13)	(-2.31)	(-1.26)	(-3.40)	(1.04)	(-0.79)
FE	-0.456	-3.058	0.697	-0.117	-2.193	-5.273*	-0.357	-1.669	-1.857	-6.220**	-0.716	-1.232
	(-0.14)	(-0.75)	(0.23)	(-0.03)	(-0.54)	(-1.69)	(-0.10)	(-0.43)	(-0.45)	(-2.37)	(-0.18)	(-0.34)
RC	2.624***	5.129**	10.81	2.929***	2.104	-0.736	17.11*	11.16**	-2.570	2.885	9.264	-0.795
	(2.84)	(2.35)	(1.14)	(2.74)	(1.11)	(-0.33)	(1.87)	(2.35)	(-0.96)	(1.32)	(0.80)	(-0.31)
Age	0.134***	0.109**	0.146***	0.164**	0.148***	0.121**	0.151***	0.142***	0.157***	0.125*	0.182**	0.154***
	(3.28)	(2.52)	(3.00)	(2.49)	(3.07)	(2.49)	(3.05)	(3.17)	(3.21)	(1.92)	(2.56)	(3.11)
ln (Tot. Ass.)	0.0676	-0.196	-0.0377	-0.0672	-0.0641	-0.281	-0.126	-0.288	-0.163	-0.582	-0.291	-0.268
	(0.17)	(-0.44)	(-0.12)	(-0.22)	(-0.18)	(-0.74)	(-0.50)	(-1.07)	(-0.43)	(-1.07)	(-0.86)	(-0.77)
N	2049	1491	2046	2049	1793	1468	1793	1793	2047	1489	2044	2047
Wald χ^2	81.8	91.0	82.8	135.1	56.7	59.7	42.9	123.1	158.5	114.7	151.8	145.5
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table C10: Studying how board characteristics and bank (tail) risk drive the CEO's hazard rate to be dismissed. Board characteristics are the independence ratio and the ratio of financial experts. Regressions (1-5) use ROA volatility as the bank risk measure, regressions (6-10) use PD and regressions (11-15) use ROE volatility. The respective tail risk variable is specified in the column heading (DER, OBS, stock tail risk=TR, ROA skewness=Skew, and ROA kurtosis=Kurt). We use survival regressions with exponential distribution, time-varying covariates, control for age of the CEO, outperformance, size and present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	σ(ROA) Risk Measure				PD Risk Measure				σ(ROE) Risk Measure			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
IR × Risk	-6.443***	-8.675***	-4.892*	-6.841**	-0.813**	-0.827**	-1.158**	-1.024**	-0.584*	-0.624*	-0.842*	-0.607
	(-4.00)	(-3.65)	(-1.68)	(-2.42)	(-2.25)	(-2.27)	(-2.53)	(-2.49)	(-1.74)	(-1.69)	(-1.88)	(-1.43)
RC × Risk	0.0928	-0.109	0.974**	0.839	0.0418	-0.0839	0.151	0.276**	-0.0502	-0.343**	-0.0286	0.0372
	(0.12)	(-0.16)	(2.23)	(0.58)	(0.65)	(-0.75)	(1.46)	(2.16)	(-0.75)	(-2.13)	(-0.31)	(0.29)
IR × Tail Risk	0.00310	-0.388*	-13.20	-0.0249	-0.00105	-0.112	-9.993	-0.151	-0.00910	-0.301	-7.355	-0.210
	(0.64)	(-1.70)	(-1.46)	(-0.07)	(-0.07)	(-0.45)	(-1.23)	(-0.50)	(-0.30)	(-1.38)	(-0.83)	(-0.63)
RC × Tail Risk	-0.0155	0.103*	-5.448	-0.379***	-0.0218	0.102	-6.255	-0.521***	-0.0195	0.123**	-4.878	-0.413**
	(-1.22)	(1.89)	(-1.42)	(-2.71)	(-1.46)	(1.46)	(-1.60)	(-2.65)	(-1.27)	(2.03)	(-1.09)	(-2.23)
Risk	4.433***	5.834***	2.870	4.719***	0.529***	0.558**	0.682***	0.663***	0.400**	0.428*	0.499*	0.418
	(5.00)	(3.80)	(1.58)	(2.65)	(2.66)	(2.54)	(2.65)	(2.71)	(2.03)	(1.94)	(1.81)	(1.56)
Tail Risk	-0.00238	0.243	10.08	0.00225	-0.000842	0.0175	7.979	0.0864	0.00279	0.148	6.131	0.122
	(-0.78)	(1.42)	(1.55)	(0.01)	(-0.13)	(0.11)	(1.33)	(0.36)	(0.23)	(1.09)	(0.95)	(0.51)
IR × Outperf	0.0421	-2.458	-1.535	0.225	0.168	-0.0674	0.0959	0.198	0.170	-0.116	0.136	0.173
	(0.02)	(-0.90)	(-0.63)	(0.10)	(0.71)	(-0.12)	(0.39)	(0.87)	(0.57)	(-0.18)	(0.47)	(0.56)
Outperf	0.0282	1.648	1.514	-0.0900	-0.0848	0.0837	-0.0161	-0.0973	-0.0845	0.108	-0.0388	-0.0802
	(0.03)	(1.14)	(1.10)	(-0.08)	(-0.57)	(0.28)	(-0.10)	(-0.62)	(-0.50)	(0.30)	(-0.22)	(-0.44)
IR	-2.201	-0.814	34.10	-1.606	-1.942	-3.983	27.91	1.026	-3.972	-4.327	17.54	-1.739
	(-0.66)	(-0.29)	(1.35)	(-0.30)	(-0.47)	(-1.42)	(1.14)	(0.19)	(-0.96)	(-1.36)	(0.72)	(-0.30)
FE	-3.924	-13.56***	-3.019	-3.717	-2.381	-6.683**	-1.287	-2.352	-1.601	-5.281*	-0.597	-1.438
	(-0.62)	(-2.87)	(-0.52)	(-0.57)	(-0.53)	(-2.22)	(-0.31)	(-0.49)	(-0.39)	(-1.82)	(-0.16)	(-0.35)
Age	0.153***	0.145**	0.161***	0.150***	0.147***	0.119***	0.153***	0.146***	0.137***	0.113***	0.139***	0.135***
	(3.23)	(1.99)	(2.88)	(3.21)	(3.50)	(2.78)	(3.14)	(3.49)	(3.46)	(2.77)	(3.28)	(3.49)
ln (Tot. Ass.)	-0.264	-0.723	-0.381	-0.303	-0.0783	-0.367	-0.207	-0.254	-0.0252	-0.334	-0.153	-0.147
	(-0.61)	(-1.10)	(-0.93)	(-0.86)	(-0.24)	(-0.87)	(-0.70)	(-1.02)	(-0.08)	(-0.79)	(-0.50)	(-0.61)
RC	1.160	0.697	15.83	3.667**	1.006	1.335	17.77	3.755***	1.360	2.737*	14.73	4.099**
	(0.95)	(0.76)	(1.44)	(2.23)	(0.95)	(1.02)	(1.61)	(2.62)	(1.23)	(1.77)	(1.18)	(2.43)
RC × Outperf	0.246	1.604	0.0396	0.439	-0.00248	0.0432	0.0162	0.0336	0.00466	0.0744	0.0260	0.0370
	(0.31)	(1.55)	(0.04)	(0.40)	(-0.03)	(0.27)	(0.16)	(0.43)	(0.06)	(0.46)	(0.23)	(0.49)
N	2021	1478	2021	2021	1792	1467	1792	1792	2020	1477	2020	2020
Wald χ^2	194.1	222.8	164.2	231.4	120.1	153.5	100.5	146.4	122.0	170.8	133.4	171.2
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table C11: Studying how board characteristics and bank (tail) risk drive the CEO's hazard rate to be dismissed. Board characteristics are the independence ratio and the ratio of financial experts. Regressions (1-5) use stock volatility as the bank risk measure, regressions (6-10) use -Z and regressions (11-15) use -T1. The respective tail risk variable is specified in the column heading (DER, OBS, stock tail risk=TR, ROA skewness=Skew, and ROA kurtosis=Kurt). We use survival regressions with exponential distribution, control for age of the CEO, outperformance, size and present the respective sensitivities of the risk score. Coefficient statistics are calculated using robust methods; the significance levels refer to * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Stock Volatility				-Z				LEV			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
IR × Risk	0.0252	-0.0770	0.0803	0.470	-6.361**	-5.565**	-6.332**	-7.564**	0.823	2.053***	1.021	0.721
	(0.21)	(-0.31)	(0.33)	(1.47)	(-2.40)	(-2.18)	(-2.15)	(-2.20)	(0.95)	(3.26)	(1.19)	(0.79)
RC × Risk	-0.101***	-0.195***	-0.0749**	0.0564	0.464	-0.706	1.107*	2.065	0.418*	-0.218**	0.483*	0.439
	(-3.16)	(-3.01)	(-1.97)	(0.49)	(0.73)	(-0.76)	(1.75)	(1.43)	(1.66)	(-2.07)	(1.73)	(1.56)
IR × Tail Risk	-0.0209	-0.339	-10.45	-1.332*	-0.00158	-0.0548	-8.279	-0.123	-0.00310	-0.509**	-14.17	-0.402
	(-0.33)	(-1.36)	(-1.08)	(-1.84)	(-0.10)	(-0.28)	(-1.22)	(-0.45)	(-0.43)	(-2.06)	(-1.53)	(-1.54)
RC × Tail Risk	-0.0189	0.105*	-3.746	-0.486	-0.0260	0.0792	-5.661*	-0.479***	-0.0200	0.0742	-4.701	-0.406**
	(-1.11)	(1.73)	(-0.94)	(-1.24)	(-1.61)	(1.46)	(-1.75)	(-2.69)	(-1.59)	(1.20)	(-1.28)	(-2.37)
Risk	-0.0241	0.0528	-0.0815	-0.335	4.872**	4.620**	4.404*	5.913**	-0.900*	-1.733***	-1.135**	-0.834
	(-0.27)	(0.33)	(-0.47)	(-1.22)	(2.04)	(2.07)	(1.82)	(1.98)	(-1.91)	(-3.18)	(-2.22)	(-1.64)
Tail Risk	0.00753	0.171	8.154	0.918*	-0.000740	-0.0189	6.545	0.0462	0.00170	0.335*	10.84	0.275
	(0.31)	(0.99)	(1.17)	(1.68)	(-0.11)	(-0.14)	(1.30)	(0.23)	(0.58)	(1.65)	(1.59)	(1.38)
IR × Outperf	0.0596	-0.145	-0.100	-0.000492	0.147	-0.0535	0.0146	0.171	0.331**	0.330	0.270*	0.334*
	(0.22)	(-0.33)	(-0.24)	(-0.00)	(0.68)	(-0.11)	(0.05)	(0.67)	(2.46)	(1.51)	(1.71)	(1.85)
Outperf	-0.0192	0.121	0.111	0.0388	-0.0758	0.0662	0.0343	-0.0852	-0.229***	-0.227*	-0.165	-0.217**
	(-0.11)	(0.48)	(0.39)	(0.14)	(-0.58)	(0.25)	(0.19)	(-0.55)	(-3.34)	(-1.89)	(-1.61)	(-2.48)
IR	-9.216***	-7.090	18.08	-6.950	-24.56***	-25.20***	-1.803	-26.60***	-16.93*	-28.18***	20.50	-11.78
	(-2.64)	(-1.55)	(0.77)	(-1.32)	(-4.34)	(-3.00)	(-0.09)	(-2.65)	(-1.69)	(-4.43)	(0.76)	(-0.99)
FE	-0.729	-3.612	0.340	-0.618	-2.444	-6.077*	-0.924	-1.764	-1.682	-6.373***	-0.644	-1.139
	(-0.20)	(-1.06)	(0.11)	(-0.17)	(-0.52)	(-1.70)	(-0.23)	(-0.39)	(-0.43)	(-2.76)	(-0.17)	(-0.31)
Age	0.132***	0.104**	0.141***	0.163**	0.151***	0.120**	0.150***	0.145***	0.172***	0.141**	0.188***	0.167***
	(3.27)	(2.55)	(2.93)	(2.47)	(3.13)	(2.51)	(3.06)	(3.29)	(3.61)	(2.11)	(2.83)	(3.50)
ln (Tot. Ass.)	0.0529	-0.289	-0.0953	-0.111	-0.0833	-0.360	-0.194	-0.309	-0.146	-0.557	-0.297	-0.285
	(0.15)	(-0.65)	(-0.31)	(-0.40)	(-0.27)	(-0.92)	(-0.78)	(-1.42)	(-0.49)	(-1.24)	(-1.04)	(-1.09)
RC	3.200***	5.274**	13.02	3.624***	2.554	-0.925	20.09**	10.93**	-2.990	3.035*	9.729	0.141
	(2.89)	(2.34)	(1.16)	(3.44)	(1.24)	(-0.32)	(2.08)	(2.27)	(-1.13)	(1.71)	(0.80)	(0.04)
RC × Outperf	0.0291	0.0684	0.0190	0.0303	-0.00170	0.0350	-0.00345	0.00279	0.0142	0.0196	-0.00199	0.0564
	(0.38)	(0.46)	(0.18)	(0.31)	(-0.03)	(0.29)	(-0.04)	(0.04)	(0.20)	(0.23)	(-0.03)	(0.60)
N	2020	1477	2020	2020	1792	1467	1792	1792	2018	1475	2018	2018
Wald χ^2	154.1	167.0	168.2	187.2	131.8	159.7	125.3	151.3	250.3	194.8	231.7	258.8
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000