MUCH ADO ABOUT RISK GOVERNANCE: AN EXAMINATION OF U.S. BANK HOLDING COMPANIES' RISK MANAGEMENT AND OVERSIGHT PRACTICES AFTER DODD-FRANK

A Dissertation

by

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ABSTRACT

The 2010 Dodd-Frank Act requires large bank holding companies (BHCs) to implement strong risk governance structures. Utilizing a difference-in-differences design that exploits BHCs' staggered adoption of the new rules, this study examines whether the mandates have affected bank risk. I find no evidence of a relation between board-level risk committees and bank risk. I then construct a summative measure of risk governance quality, the Risk Governance Index, that incorporates board-level risk oversight and functional risk management activities. Results using this measure are weakly suggestive that the Dodd-Frank risk oversight and risk management requirements have been moderately effective at reducing bank risk.

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1. INTRODUCTION

In 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act (hereafter, Dodd-Frank, or the Act) was signed into law with the intent of building a safer U.S. financial system (White House, 2010). Many have attributed the preceding financial crisis, at least in part, to systematic failures of financial institutions' risk management and oversight practices (e.g., Acharya, Philippon, Richardson & Roubini, 2009; Kirkpatrick, 2009; Yellen, 2015). A subset of Dodd-Frank, known as Enhanced Supervisory and Prudential Standards (hereafter, EPS), requires large bank holding companies (BHCs) to form board-level risk oversight committees and implement robust enterprise risk management practices (collectively, *risk governance*). In this study, I use the passage of the Act as a quasi-natural experiment setting to examine the outcomes of the EPS mandates with respect to bank risk.[1]

Many of the practices required under the EPS rules are not unique to the post-Dodd-Frank period, and have therefore been examined, either directly or indirectly, in prior literature. Most extant studies use single (often binary) measures of banks' risk management and board-level risk oversight activities, and provide inconclusive support for the potential efficacy of the rules: the within-study findings are mixed, and the results across studies are inconsistent (e.g., Aebi, Sabato, & Schmid, 2012; Hines & Peters, 2015; Minton, Taillard, & Williamson, 2014). A few studies combine various risk governance measures, almost exclusively with principal component analysis,

[1] As the Dodd-Frank EPS laws apply at the holding company level, bank holding companies (BHCs) are the unit of analysis in this study. Throughout this paper, the terms "bank holding company," "BHC," "financial institution," and "bank" are used interchangeably.

and generally find that stronger risk governance is associated with lower risk (e.g., Ellul & Yerramilli, 2013; Lingel & Sheedy, 2012). However, the latter group of studies leaves the extent to which any of the individual mechanisms explains results unclear, and *none* of the related prior literature employs similar operational definitions of risk management and oversight characteristics, which hinders comparability from a meta-analysis perspective. Furthermore, the evidence in prior literature is drawn exclusively from the pre-Dodd-Frank era, when risk governance practices were still emerging and voluntary. As I show in this paper, there have been fundamental shifts in bank's risk governance structures – at both the board and operations level – over the past decade. To my knowledge, no extant study has examined the consequences of these changes. Whether mandated risk governance affects bank risk is therefore an important, and as of yet, unanswered, empirical question.

The reforms are based heavily on the notion that enhanced risk governance will improve the stability of the financial system (12 C.F.R. §252, 2012). Before 2010, risk management was often considered an obligatory support function or cost center, rather than a foundation for good business. Managers regularly pushed or exceeded internal risk limits in pursuit of short-term profits (Kirkpatrick, 2009; Carney, 2015), and boards were often unaware of, or not informed in a timely manner about, banks' risk exposures (Kirkpatrick, 2009). In contrast, regulators and standard setters now expect risk management to be at the top of the board's agenda (Carney, 2015). Buy-in and adherence to the organization's risk strategy should be evident throughout the firm, and board members should be able to both clearly articulate the firm's risk profile and provide effective challenge to management's decisions (e.g., Deloitte, 2015; BGFRS, 2016).[2] Furthermore,

[2] See, also, Basel (2015).

compliance with regulatory expectations represents a significant cost for banks of all sizes. From a pragmatic standpoint, then, an examination of the effect of the EPS mandates may yield important practical and policy implications.

Given the above, the new rules represent an externally imposed "treatment" that may shift the banks' risk management practices away from a compulsory exercise and towards a way of life. If this is the case, then compliance with the new regulations should be associated with lower risk, *ceteris paribus*.

As with most regulations, though, there are substantial doubts as to whether mandated risk governance will be effective in limiting bank risk. For one, legal and advisory professionals caution that a separate, board-level risk committee is not a cure-all solution, and that any committee can only be as good as the information it receives (e.g., Eggleston & Ware, 2009). Some have raised concerns that by the mere creation of a board-level risk committee, board members and managers not involved in the risk management process may adopt a "subconscious attitude of delegation," thereby undermining any risk management efforts (Protiviti, 2011). Recent risk management failures, such as the concurrently headlining Wells Fargo debacle, raise concerns over whether it is even possible for large, complex BHCs to identify and mitigate risk (Hurtado, 2016).[3] In a similar vein, it is possible that many BHCs have adopted the mandates in form, but not in function (as a form of window-dressing). Altogether, the effectiveness of these risk oversight and risk management reforms is ultimately an empirical question.

[3] In September of 2016, Wells Fargo disclosed a $185 million settlement with the Consumer Financial Protection Bureau (CFPB), the City and County of Los Angeles, and the Office of the Comptroller of the Currency (OCC) over illegal sales practices within the bank's retail branches (CFPB, 2016).

A common challenge in identifying the effect of any regulation is the lack of a true control group, or a set of firms that is not affected by the regulation (e.g., Beatty & Liao, 2014). If all firms simultaneously adopt reforms, the researcher cannot separate the effects of the regulation from the passage of time. Given that the Act coincided with the end of the financial crisis, this is a serious concern when attempting to identify any causal effect on bank risk.

A crucial identifying feature in this setting, however, is that individual banks have implemented the EPS requirements at different times throughout the post-Dodd-Frank period, while the remainder of Dodd-Frank, and the post-crisis economic recovery more generally, have affected the sample banks relatively equally. This variation allows for the use of what is essentially a difference-in-differences approach to examine the effect of the risk governance requirements. The design controls for time-invariant firm characteristics by using the same firm over time, and for time-variant trends by using similar firms – subject to the same regulatory and/or macroeconomic environment, but in different stages of EPS adoption – as controls. Any difference in risk that I find to be associated with risk governance is therefore incremental to other post-crisis period factors that affect all sample banks' risk, and also incremental to post-Dodd-Frank changes common to all BHCs to which the law applies.

Using hand-collected information from BHCs' public filings, I begin my analysis by examining risk governance structures for large, publicly traded, U.S. bank holding companies across the period from 2004 to 2016. This process reveals significant cross-sectional and time-series variation in BHCs' risk oversight practices, offering some insights into prior studies' lack of, or conflicting, results with respect to risk committees and other risk oversight mechanisms. Using the EPS rules, I define a risk committee as a separate, or standalone, board-level committee that is dedicated to enterprise-wide risk oversight. Based on this definition, which is more precise

than definitions used across the extant literature, I find that only 18 sample BHCs (approximately 21.5% of the sample) have standalone enterprise-wide risk committees as of the end of 2009. By contrast, if I apply the risk committee definitions used within comparable prior studies, then anywhere from 39 to 70 of the sample BHCs could be considered to have a risk committee by the 2009 year-end. A thorough examination of these additional committees' roles, however, reveals that most either oversaw risk as a secondary subset of overall responsibilities, or only oversaw a subset of risks (versus enterprise-wide risks). Moreover, since 2010, all of the sample banks have made visible changes to their risk governance practices to conform to the EPS rules, which suggests that pre-existing policies and practices, either in fact or in appearance, were insufficient.

Beyond changes in the existence, form, and scope of the risk committee, itself, I also document a notable overhaul of the sample BHCs' corporate governance, risk governance, and risk management characteristics over the sample period. From the presence and stature of a dedicated Chief Risk Officer with enterprise-wide risk oversight responsibilities, to the depth of risk committee members' experience and quality of disclosures supporting the committee's role, to the overall composition of the board, today's average bank stands in stark contrast to the average bank in the years leading up to the financial crisis. Collectively, these transformations work together to challenge the notion that banks' compliance with the EPS rules has been superficial in nature, and further motivate the research question in this study.

In the empirical tests, I first examine whether the presence, at the board level, of a dedicated, standalone risk committee with clear responsibility for enterprise-wide risk oversight is associated with any difference in several measures of aggregate (i.e., enterprise-wide) bank risk. More specifically, I employ two market-based measures of risk, downside tail risk (e.g., Ellul & Yerramilli, 2013) and daily stock return volatility (e.g., Minton, Taillard, & Williamson, 2014),

and several operating and balance sheet measures of risk (earnings volatility, regulatory capital adequacy, and asset composition). Aside from one set of tests with weak evidence that risk committees are associated with lower proportions of higher risk assets in the post-Dodd-Frank period, I find no evidence to suggest that dedicated board-level risk oversight committees are associated with meaningful differences in any of the other risk proxies.

Farrell and Gallagher (2015) argue that the enterprise risk management process "cannot be simply characterized by one or two defining components or attributes" (p.630). This suggests that the lack of results for risk committees could be a symptom of omitted information – about the entire system of risk governance – from my use of a single binary measure of risk oversight. Beyond stipulating that BHC boards form risk committees, the final EPS rules include specific requirements for committee composition and procedures, as well as rules regarding the presence, organizational stature, and independence of a Chief Risk Officer. While some prior studies have examined the combination of some of the mechanisms (e.g., Ellul & Yerramilli, 2013; Lingel & Sheedy, 2012), to my knowledge, none have examined whether the specific combination of the EPS mechanisms, in the post-Dodd-Frank era, have affected bank risk-taking.

Accordingly, I next develop a novel measure of risk governance quality, which I call the Risk Governance Index (*RGI*). The variable measures the extent of banks' compliance with the EPS mandates, and improves upon the *RC* indicator by capturing observed variation in banks' risk governance practices, as well as substantive changes in those practices over recent years both within and between the sample BHCs. The multivariate results using the *RGI* measure, although still not entirely conclusive, are generally stronger than the results with the risk committee indicator: risk governance practices in line with the EPS mandates are associated with moderately lower future tail risk and returns volatility, lower volatility in net interest margins, lower Texas

Ratios and risk-weighted assets. Though the results are modest, it is worth stressing that these effects are incremental to both changes in risk levels for all sample BHCs over time, and in relation to Dodd-Frank. To my knowledge, these results provide the first empirical evidence of the effectiveness of the sum of the EPS risk management mandates in reducing bank risk.

The final appendix of this paper provides an in depth reconciliation between the findings of this study and those reported within Ellul and Yerramilli (2013; henceforth, E&Y). That study documents that for the period from 1998 to 2009, stronger risk oversight is associated with lower risk, ceteris paribus. The objective of the reconciliation exercise is to explain why I generally do not find this relation for a standalone, board-level risk committee. Despite using the same sample BHCs, I was unable to replicate E&Y's primary measure of interest. I do find, however, results consistent with E&Y when using a measure of board risk oversight that includes the audit committee. I also find that relative to banks with audit committee risk oversight, banks with standalone enterprise risk committees – the specific form of board risk oversight mandated by the EPS rules – are associated with significantly *higher* risk in the pre-Dodd Frank period. This suggests that prior to Dodd-Frank, standalone enterprise risk committees may not have operated to constrain risk. Instead, BHCs that formed separate enterprise risk committees before 2010 may have done so either for regulatory appeasement (window dressing) or to hedge higher risk strategies.

Evaluating the effect of the EPS requirements is important for several reasons. First, the mandates represent the first time that large financial institutions face a legal requirement to comply with specific risk governance standards (Mayer Brown, 2014). Despite the costs of complying with these standards, prior literature provides very little evidence to support the very specifically prescribed directives. Different from extant studies, I employ a setting with a regulatory shock,

and a comparatively objective blueprint for defining what *does*, and what is *does not*, constitute risk governance, to expand both our understanding of the role of risk management as a tool of corporate governance (e.g., Kaplan, 2011), and the role of regulation in the effectiveness of corporate governance (e.g., Cohen, Dey, & Lys, 2013). The evidence suggests that on average, stronger risk governance practices – as defined by the EPS rules – were not associated with any differences in risk prior to Dodd-Frank, but that after Dodd-Frank, stronger risk governance is associated with moderately lower risk. I attribute this finding to the mandatory nature of risk governance practices in the post-2010 period – or the shift in the purpose and organizational importance of BHCs' risk management and oversight practices in response to the new regulatory expectations. To the extent generalizable, the findings in this study may have important implications for mandated risk governance for other industries, especially those with inherently complex operations or high risk.

Second, while a robust literature has, in recent years, thoroughly examined whether shortcomings in bank corporate governance contributed to crisis outcomes, fewer studies have examined the outcomes related to the many subsequent changes in banks' governance. In evaluating the effects of one of the few bank-specific, or micro prudential, Dodd-Frank mandates, this study also provides a wealth of descriptive evidence that serves to highlight the changing corporate governance landscape among large U.S. bank holding companies in recent years. This information may yield new insights when examining important questions – both old and new – about the effectiveness of bank governance.

Finally, this study also contributes more broadly to the enterprise risk management literature by introducing a straightforward and flexible measure of the strength of risk controls. As shown in the first half of this study, binary indicators for the presence of certain risk management

or risk governance characteristics ignore the remainder of the risk governance system. The typical alternative, thus far, has been to use principal component analysis (PCA) to form a summary score, or a linear combination of weighted variables, to measure the strength or quality of risk controls. Despite the appeal of this approach, the variable weights and resulting scores from PCA procedures are sample-specific in both derivation and interpretation, and this limits the external validity of research in this area. The *RGI* measure developed in this study is replicable for any sample of firms for which the necessary information is publicly available, and for any time period. As innovations in the field become leading practices, the measure can easily be altered to reflect new knowledge. Moreover, the measure is not so particular to banks that a similar approach could not be used in studies of risk management among other industries, or even adapted to measure other types of internal information and control systems. In this sense, this study addresses calls for the development of more comprehensive measures of governance that incorporate management and that better capture governance processes, rather than singular characteristics (e.g., Carcello, Hermanson, & Zhongxia, 2011).

This paper proceeds as follows. I discuss the institutional background and prior literature for this setting in the next section (Section 2). I then discuss the hypotheses (Section 3), sample and data collected (Section 4), research methodology (Section 5), and risk committee results (Section 6). I then discuss the construction of, and results using, the Risk Governance Index measure in Section 7, and I conclude in Section 8. All figures and tables are contained within the appendices.

2. INSTITUTIONAL BACKGROUND AND PRIOR LITERATURE

2.1. Institutional Background

2.1.1. Bank Risk

Bank risk is "the potential that events, expected or unexpected, will have an adverse effect on a bank's earnings, capital, or franchise or enterprise value" (OCC, 2013). The Federal Reserve classifies sources of bank risk into six broad categories: credit risk, market risk (which includes price, interest, and foreign exchange risks), liquidity risk, operational risk, legal risk, and reputation risk (BGFRS, 1997; BGFRS, 2008).[4] In practice, banks' activities generally give rise to correlations and concentrations, both within and across a BHC's business lines and legal entities, across several types of risk (BGFRS, 2016). Underscoring the importance of comprehensive risk management and oversight practices, decentralized decision-making and the nature of banks' balance sheets amplify these interrelationships, as a bank's aggregate risk profile can change rapidly (Becht, Bolton, & Röell, 2011; Stulz, 2015).

2.1.2. Risk Governance versus Risk Management

In this paper, the term risk governance refers to the combination of (a) the board's oversight of the risk management framework, and (b) the structures, culture, processes, and lines of communication that serve as the foundation for effective risk management (PWC, 2012; Lundqvist, 2015). In contrast, risk management denotes the functional, or operations-level,

[4] Strategic risk, or the risk that a bank will not be able to carry out its strategy, encompasses each of these six categories (BGFRS, 1997).

application of the organization's risk management framework. Risk management involves the identification, measurement, monitoring, and mitigating of specific risks. The scale of this process can range from the management of individual risk types to a more holistic, portfolio approach that considers all risks in consolidation. Risk governance formalizes and integrates organization-wide risk management processes, and is the "identifying component of an enterprise risk management system" (Lundqvist, 2015, p. 442). An important implication of this relationship is that even the most sophisticated and comprehensive risk management process is not truly "enterprise-wide" without sufficient organizational buy-in, structure, and oversight (Lundqvist, 2015).[5]

Understanding the difference between risk management and risk governance is critical to understanding banks' risk failures during the financial crisis. Certainly, most banks had in place the functional "tools" of risk management – risk officers and risk management departments, risk models, and risk limits – prior to the crisis. Anecdotal accounts of the meltdown, however, suggest that the ineffectiveness of those tools resulted from inadequate risk governance (Kirkpatrick, 2009). Risk limits, if established, were frequently overridden or ignored (SSG, 2008; Kirkpatrick, 2009). If identified, mounting risk concentrations were either never reported to the board of directors, reported with a significant delay, or downplayed in severity (SSG, 2008; Kirkpatrick, 2009).[6] Moreover, until recent years, many of the largest BHCs lacked one of the most basic

[5] The converse is also true: board-level risk oversight is clearly not a sufficient substitute for a deficient risk management function (e.g., Protiviti, 2011).

[6] For example, UBS's risk management group first identified potential subprime losses during the first quarter of 2007. It was not until August 6, 2007, that the full extent of the firm's exposures were communicated to the board. The communication failure was attributed, in part, to a silo approach to risk management (Kirkpatrick, 2009).

elements of a formal risk governance framework: a formal statement of risk appetite.[7] These lapses reflect both deficiencies in board practices and board members' qualifications, as well as inadequacies in organizational policies and processes for risk ownership and risk reporting.

Banks create value by taking risks (e.g., Becht et al., 2011). As a result, effective risk management should be considered a key component of a bank's productive technology - one that maximizes firm value (Stulz, 2015). The sampling of risk management failures described above does not, however, validate this conjecture. Instead, these lapses likely reflect conflicting interests between bank regulators and shareholders with respect to the net benefit of investments in risk management. Regulators acknowledge that risk is intrinsic to the banking business, and therefore the purpose in mandating risk controls is not for banks to eliminate all risks. Instead, regulators expect risk management practices to support the safety and soundness of the financial system, as a whole, by reducing the likelihood of individual bank distress or failure (12 CFR § 252, 2012).

In contrast, BHCs' shareholders appoint directors whose fiduciary duty is to ensure that managers pursue the level of risk that maximizes shareholder value (Johnson, 2011; Stulz, 2015; Macey & O'Hara, 2016). This level of risk may not be optimal from the regulator's standpoint. Furthermore, the institutional features unique to banks – high leverage, opacity, deposit insurance, government safety nets, and regulatory restrictions on activities and ownership that limit the effectiveness of market discipline – not only dilute the incentives to invest in risk management, but also encourage risk-taking (e.g., Bhattacharya & Thakor, 1993; Laeven & Levine, 2009; Acharya et al., 2009; Bushman, Hendricks, & Williams, 2015). The recent financial crisis suggests

[7] JPMorgan Chase, for example, first adopted a firm-wide risk appetite statement in December of 2010. A firm's risk appetite is the level of risk that the firm is both comfortable with, and capable of, pursuing (e.g., Nocco & Stulz, 2006). A formal statement of risk appetite can be thought of as a "roadmap" that guides risk-based decisions in order to remain within a desired, or acceptable, range (i.e., risk tolerance).

that the tension between these two stakeholders' objectives broke toward shareholders' interests more often than not.[8] The Dodd-Frank risk governance requirements, described in more detail below, are intended to align bank directors' actions with regulators' micro-prudential objective of promoting safety and soundness at the individual bank-level.

2.2. Section 165 of the Dodd-Frank Wall Street Reform and Consumer Protection Act: Enhanced Prudential Standards

Title I, Subtitle C, Section 165 of Dodd-Frank, commonly referred to as "Enhanced Prudential Standards" (EPS), mandates risk governance and risk management reforms for large financial institutions.[9] The law assigned the task of drafting and enforcing the functional EPS rules to the Board of Governors of the Federal Reserve System (FRB). Under the same title (i.e., EPS), the FRB released proposed rules for public comment in January of 2012, and issued the final rules on February 18, 2014. With few exceptions, the final rules are substantially similar to the requirements outlined in the 2012 proposal, as well as within Dodd Frank. The rules first became effective for U.S. BHCs in 2015, and the Federal Reserve expected full compliance with the EPS rules as of the effective date.[10] I provide a summary of the EPS requirements in the paragraphs

[8] Consistent with this conjecture, recent studies find that banks with more pro-shareholder governance mechanisms were more profitable in years leading up to the crisis, yet were among the worst performers through the financial crisis (e.g., Fahlenbrach & Stulz, 2011; Minton et al., 2014).

[9] Dodd-Frank weighs in at roughly 2,300 pages. A complete discussion of the legislation is beyond the scope of this study. See https://www.govinfo.gov/content/pkg/PLAW-111publ203/pdf/PLAW-111publ203.pdf for the full text of the Act.

[10] The EPS effective date for BHCs with at least $50 billion ($10 to $50 billion) in assets was January 1 (July 1), 2015. For both groups, initial application is based on average consolidated assets over the four quarters from July 1, 2013 to June 30, 2014. Any BHC that subsequently has average total assets, for four consecutive quarters, of $10 billion must begin complying with all size-based Dodd-Frank regulations.

that follow. For reference, additional details related to each stage of the EPS legislative and rule-making process are provided in Appendix C, Figure 1.

The EPS rules require all U.S. BHCs with at least $50 billion in consolidated assets, as well as all publicly traded U.S. BHCs with at least $10 billion in consolidated assets, to establish a board-level risk committee (RC) responsible for oversight of the enterprise-wide risk management function. The RC must review and approve the BHC's formal risk management framework and statement of risk appetite, and monitor management's effectiveness in maintaining the organization's overall risk strategy. The chair of the RC must be an independent director, and at least one committee member must qualify as a risk management expert, or a person with experience managing and evaluating the risks of a comparable organization. Minimum procedural standards require the RC to adopt a formal charter, to meet at least quarterly, and to maintain detailed records of all meeting discussions and risk management decisions.

In line with the greater risks that larger institutions pose to the financial stability of the greater economy, the rules for covered institutions (i.e., BHCs with assets over $50 billion) are more stringent.[11] Within this group, the risk committee must be a standalone committee of the BHC board with enterprise-wide risk management oversight as its sole function: the RC may not be a subcommittee of another committee, and it may not have substantive responsibilities unrelated to risk.[12] The standalone requirement is intended to ensure that the board dedicates sufficient

[11] Both size groups are governed under Regulation YY, Subpart C (§ 252.22), and *covered institutions* (those with total assets ≥ $50 billion) must also comply with Regulation YY, Subpart D (§ 252.33). Where applicable, I note the differences in the rules for these two groups. Unless otherwise noted, all remaining information in this section comes from these two sections of Title 12, Section 252 of the United States Code of Federal Regulations (12 CFR § 252, 2014).

[12] Examples of inappropriate joint, or multi-purpose, committee structures, given within the preface to the final EPS rules, are an Audit and Risk Committee, or a Risk and Finance Committee (BGFRS, 2014).

attention to risk management, and that risk committee members have adequate time to dedicate to risk oversight. Covered institutions must also appoint an executive-level Chief Risk Officer (CRO), whose sole responsibility is to establish and oversee the enterprise-wide risk management function. The risk committee is charged with approving all CRO appointment and removal decisions, evaluating the CRO's performance and compensation, and ensuring that sufficient resources are dedicated towards the risk management function so that entity-wide risk management objectives can be met. Finally, to support the independence of the CRO and the risk management function, the CRO must report directly to both the risk committee and the CEO.

2.3. Prior Literature Examining Risk Governance Mechanisms

The various EPS requirements, such as board-level risk committees, Chief Risk Officers, and risk management mechanisms, are not unique to the post-Dodd Frank period, especially among financial institutions. Motivated by the conjecture that risk management failures are at least partially to blame for the financial crisis (e.g., SSG, 2008), a handful of recent studies within the accounting and finance literatures have therefore examined – either directly or indirectly – the association between risk controls and bank risk and performance among financial institutions. Many are largely exploratory in nature, with an emphasis on explaining cross-sectional differences in crisis-period outcomes.

In the following discussion, I summarize the extant literature most relevant to the present study, focusing primarily on studies that directly investigate the effectiveness of financial institutions' risk controls. Because of the lack of extant depth in this area, I also discuss indirect

findings from related studies that control for banks' risk management and risk oversight activities while primarily examining a different research question.

Within these studies, the empirical measurement of financial institutions' risk management mechanisms generally falls into one of two categories: (i) singular, or indicator, measurement of the presence or structure of one or more constructs, and (ii) summary scores derived with principal component analysis (PCA). To the extent possible, the organization of the below discussion mirrors these groupings. I conclude this section with a discussion of the limitations in comparing, and therefore drawing inferences from, these studies' findings.

2.3.1. Individual or Singular Risk Control Constructs

2.3.1.1. Chief Risk Officers

Aebi, Sabato, and Schmid (2012)

Academics have long endorsed the notion that bank corporate governance is different from that of non-financial firms (e.g., Adams & Mehran, 2003; Macey & O'Hara, 2003). Because risk governance may be an important, but little understood, element of banks' corporate governance structures, Aebi, Sabato, and Schmid (2012) examine whether risk governance mechanisms are related to bank performance during the recent financial crisis.

The Aebi et al. (2012) sample includes 372 public U.S. commercial banks and savings institutions, each with at least $100 million in total assets by the end of 2006. All risk management, governance, and financial characteristics are measured as of year-end 2006, and performance is measured from July 1, 2007 to December 31, 2008 with both stock returns (cumulative monthly buy-and-hold returns) and accounting returns (cumulative ROE). The study's key explanatory

variables include the presence of a CRO, the presence of a board-level risk committee (RC), the fraction of board members with financial services experience, and other structural corporate governance characteristics, such as board size and board independence. For a subset of 85 larger banks (henceforth, "large bank subsample"), the authors also collect the reporting line of the CRO, the number of RC meetings during 2006, the size of the RC, and the fraction of RC members that are independent.

Aebi et al. (2012) define a risk committee as a "dedicated committee solely charged with monitoring and managing the risk management efforts within the bank" (p.3215). If there is no committee in charge of RM oversight, or if the AC assumes this responsibility, the authors set the RC indicator to zero. The data shows that 8% of the main sample (30 of 372 banks), and 23% of the subsample of larger BHCs (20 of 85 banks), had a board-level risk committee meeting this definition as of year-end 2006. Within large bank subsample, the average RC met around four times in 2006 and had 3.8 members, 56.4% of which were independent.[13]

The CRO indicator takes a value of one if the company has a CRO that is a member of the executive team. Among the main sample of 372 financial firms, 47 have an executive CRO present in 2006. Within the subsample of 85 larger banks, 31 have an executive CRO. Among these, six (seven) of the CROs report directly to the CEO (board of directors). A director is considered to have a finance background if he or she has current or previous experience as an executive officer of a bank or insurance company. As of 2006, 22.5% of the sample firms' directors have a finance background.

[13] The authors do not incorporate RC size nor RC independence in the reported multivariate results. A footnote explains that untabulated tests using these variables were not significant.

In multivariate tests, the results across the majority of specifications indicate that director financial expertise is related to worse performance during the crisis. This contradicts critics' claims increasing board members' industry experience will enhance board risk monitoring efforts. Across both sample groups, Aebi et al. (2012) find that neither risk committees, nor CROs, have any relation to crisis-period performance. Within the large bank subsample, upon the inclusion of the number of RC meetings along with the RC indicator, Aebi et al. (2012) find some evidence to suggest that the subset of larger financial institutions with risk committees in place in 2006 have *lower* stock market and operating performance during the crisis, but that more active oversight by the RC (i.e., more frequent meetings) mitigates this relation.[14] The authors interpret this finding as evidence that the presence of a board-level risk committee, alone, is a noisy measure of the board's dedication to risk oversight.

The study's key finding and primary contribution, however, is related to the reporting line of the CRO. Aebi et al. (2012) find that a direct reporting line from the CRO to the board (to the CEO) has a significantly positive (significantly negative) association with both accounting and stock returns during the crisis. As noted above, the number of observations disclosing the CRO's reporting line is relatively small; nevertheless, the study provides the first empirical evidence to support the importance of the CRO's reporting line in promoting a strong and independent risk management function.

[14] As the number of RC meetings is measured for 2006, only, there are fewer concerns about more frequent meetings in response to higher risk during the crisis, so the presumption that more meetings reflect more active (or even proactive) risk oversight seems reasonable.

Other Evidence on the Importance of the CRO

Similar to Aebi et al. (2012), other studies find evidence that the relative importance and independence of the CRO seem to be important dimensions along which risk management's effectiveness varies. Keys, Mukherjee, Seru and Vig (2009) find that risk manager "centrality," or the ratio of CRO-to-CEO compensation, is positively related to sub-prime mortgage origination quality. Employing a similar definition, Ellul and Yerramilli (2013) find that CRO centrality has a positive relation with BHCs' crisis-period accounting returns, and a weak negative relation with tail risk over the period from 1995 to 2009.[15] For a sample of international financial institutions, Lingel and Sheedy (2012) find that the CRO's organizational status (the simple average of an indicator for whether or not the CRO is an executive, and whether the CRO is among the top five highest paid executives) has a strong negative association with return volatility, and a moderate negative relation with tail risk.[16] Taken together, these study's findings imply that a risk manager's independence and relative status within the organization have a strong moderating effect on bank risk-taking.

2.3.1.2. Risk Committees

Hines & Peters (2015)

Motivated by the lack of empirical evidence to support recent calls and regulatory mandates for improvements in board risk oversight (such as Section 165 of Dodd-Frank), Hines and Peters (2015) investigate whether voluntary risk committee formation among U.S. public financial

[15] These results are tabulated in the study's internet appendix.

[16] I discuss both Ellul and Yerramilli (2013) and Lingel and Sheedy (2012) in more detail in Section 2.3.2.

institutions is associated with measures of subsequent risk and performance. Across the period from 1994 to 2008, the authors identify 47 firms that establish board-level risk committees. Each of these "treatment" firms is matched with a similarly sized control firm, in the same two-digit SIC, that does not form a RC in the same year.[17]

Hines and Peters (2015) first explore the determinants of RC formation in year *t* as a function of hypothesized explanatory variables measured in year *t*-1. The probit regression results indicate that the likelihood of forming a standalone board-level risk committee is strongest for firms with international banking activities, larger and more independent boards, recent merger activity, and recent restatements.[18] RC formation is also marginally more likely with higher levels of net loan charge-offs, higher leverage, CRO presence, and having a Big N auditor.

As the focus of the paper is on voluntary board-level actions, all subsequent tests include the inverse Mills ratio from the aforementioned determinants model to control for self-selection bias. The primary tests examine whether RC formation in year *t* is associated with changes, from year *t*-1 to *t*+1, in non-performing assets, net loan charge-offs, hedging and trading derivatives, and risk-adjusted ROA (net income scaled by risk-weighted assets). The authors hypothesize that changes in outcome variables, post-RC formation, are more likely to be observed among firms that have deviated sufficiently from acceptable levels of risk or performance. Accordingly, the

[17] The sample of financial firms in Hines and Peters (2015) includes banks with two-digit SIC codes 60 (Depository Institutions) and 61 (non-depository credit institutions).

[18] A significant portion of this study's front matter is devoted to the discussion as to whether or not risk oversight should be a responsibility of the Audit Committee (AC). Whether financial reporting quality improves after risk is split off from the AC's responsibilities is an important – and as of yet, unanswered – empirical question. To the extent that the majority of the "treatment" firms in Hines and Peters (2015) shifted risk oversight responsibilities from the AC to a newly formed RC, the result that RC formation is more likely after a restatement may suggest that RC formation is perhaps seen as one solution to relieving an already over-burdened Audit Committee from more ancillary responsibilities (see, for example, related discussions in Hines and Peters (2015, p.270 and p.278) and Hines et al. (2015, p.60-62)).

specifications allow the effect of RC formation to vary across firms with an indicator for unusually high (or in the case of hedging derivatives, unusually low) lagged values of the dependent variable.[19] Controls include each of the variables determined to be significant predictors of risk committee formation, except for the restatement indicator, as well as size, and regulator and year fixed effects, among others.

Tests within the matched sample yield no evidence that RC formation is associated with short-term changes in any of the selected risk or performance measures.[20] More specifically, the main effect on the RC indicator is never different from zero, and joint tests for the conditional effect of RC formation among "high risk" firms do not support the authors' hypotheses. The results for within-firm robustness tests (using only the "treatment" firms) are similarly null, with the exception that RC formation is followed by *increases* in non-performing assets. The authors interpret their findings to suggest that on average, board-level RC formation is a "symbolic" governance practice (i.e., window-dressing).[21]

Hines, Masli, Mauldin, & Peters (2015)

Hines, Masli, Mauldin and Peters (2015) investigate the whether banks' board-level risk oversight activities are associated with audit fees. The premise of the authors' hypotheses is that

[19] The indicator is based on the sample-wide median of the dependent variable, measured in year t-1; however, as the number of firms (including both treatment and control firms) in any given year is very small, it is not clear what this indicator – and its interaction with RC – is actually capturing. Unfortunately, tests without the "high risk" interaction are not presented.

[20] The authors report that untabulated results, estimated with a longer test window (specifically, examining changes from *t*-1 to *t*+2), yield qualitatively similar results.

[21] As for the results for the CRO control variable, the matched sample test results suggest that the presence of a CRO is marginally associated with improvements in risk-adjusted ROA ($p < 0.10$, one-tailed) post-RC formation. Results of the within-firm tests suggest that CRO presence is weakly related to decreases, post-RC formation, in both derivative hedging and trading activities ($p < 0.10$, one-tailed).

the presence of a risk committee will affect audit fees through the external auditor's risk assessment process (i.e., a supply-side explanation, where the auditor's efforts change in response to *ex ante* evaluations of inherent and/or control risks). The study covers the time period from 2003 to 2011, for an unbalanced sample includes 3,980 bank-year observations and a maximum (minimum) of 495 (334) unique banks per year.[22]

Hines et al. (2015) identify risk committees with word searches of the Audit Analytics and Morningstar board databases: a committee is a "risk committee" if the word "risk" is in the committee's name. The study's RC indicator consequently includes committees with and without enterprise-wide scope, as well as both standalone and multi-purpose committees (such as an "Audit and Risk" committee). The authors also include *AC is RC*, an indicator variable equal to one if the audit committee has the word "risk" in its name, in all tests. [23]

In the main analysis, Hines et al. (2015) consistently find a positive association between the presence of a board-level risk committee – that is separate from the audit committee – and audit fees. One interesting result, not addressed within the study, is that having a joint Audit-and-Risk committee appears to mitigate this effect.[24] While the study's research question primarily centers on the conjecture that a separate, board-level risk committee signals higher risk (and affects auditors' judgments of inherent risk and control risk, accordingly), it may be that the client

[22] I use the term "banks" somewhat liberally here. While the actual sample composition is not reported, the authors report that Compustat Bank Annual, the data source used for banks' characteristics, includes SIC codes 6020 (commercial BHCs), 6035 (Federally chartered savings institutions), and 6036 (non-federally chartered savings institutions). All tests include four-digit SIC industry fixed effects.

[23] For observations where *AC is RC* equals one, *RC* is also equal to one.

[24] The coefficient estimates on *RC* are positive and significant in three out of three tests, and the estimates for *AC Is RC* are negative and significant in two of the three models. The authors do not present joint tests for the sum of the *RC* and *AC is RC* coefficients.

demands greater testing and assurance of more extensive risk controls. In that case, higher audit fees would likely signal lower, not higher, overall firm risk.[25]

2.3.1.3. Board Members' Financial Services Experience

The EPS rules stipulate that at least one RC member has risk management experience commensurate with the BHC's structure and risk profile. In addition, the FRB expects all committee members to understand sound risk management practices with respect to banking organizations. Since the financial crisis, most banks have increased the number of outside board members with industry experience (PWC, 2016), and I observe, in my data, that many of those directors sit on BHCs' risk committees. To my knowledge, no extant study directly examines the relation between bank risk-taking and *risk committee* members' financial services experience, much less of board or RC members' *risk management* expertise.[26] Given that critics of banks' pre-crisis corporate governance efficacy frequently point to the lack of qualified directors on BHC boards as a significant flaw (e.g., Kirkpatrick, 2009; Macey & O'Hara, 2016), it is perhaps even more surprising that few studies have examined the relation between bank performance or risk and the extent of financial expertise among the full board. The following discussion is therefore limited

[25] Because prior literature has found that audit fees are lower among companies subject to regulation, a secondary research question in Hines et al. (2015) is whether the association between RCs and audit fees is any different post-Dodd-Frank. More specifically, Hines et al. (2015) add the variable *MANDATORY*, an indicator equal to one for any bank with assets of at least $10 billion in either or both of years 2010 and 2011, to all tests. The estimates on this variable are negative and moderately significant in four of five reported tests. As the variable is not interacted with the RC indicator, the authors' interpretation that the RC-audit fee relation varies across voluntary and mandatory conditions lacks validity. Instead, the negative estimates simply indicate that in 2010 and 2011, banks with assets of at least $10 billion have lower audit fees, on average, relative to banks with assets below $10 billion. As I am not aware of any other reason to expect this relationship, I assume it simply means that either this group of banks (> $10 billion) faced higher audit fees in years before 2010 and 2011, or that various discretionary audit services were either cut or delayed, or negotiated downward as the larger banks continued to recover from the crisis.

[26] There is some indirect evidence about risk committee members' financial services experience found within the additional analyses of Ellul and Yerramilli (2013) and Lingel and Sheedy (2012). As both studies' primary variable(s) of interest are risk governance scores derived with PCA, I discuss this evidence in Section 2.3.2.

to the single extant study that directly examines the association between board members' financial expertise and U.S. financial institutions' risk and performance.[27]

Minton, Taillard, and Williamson (2014)

Independent directors generally face higher costs of acquiring information about the firms they oversee (e.g., Adams & Ferreira, 2007); these costs should be lower, however, for industry experts. Lower information asymmetry, along with depth of experience, should enable independent directors to understand and recognize risks that may be unsound, and to more efficiently monitor management risk-taking. Boards also play an advisory role, and have a fiduciary duty to maximize shareholder value. Thus, board financial experts may identify, and even encourage management to pursue, risk-taking strategies that increase shareholder value. With these competing theories as the backdrop, Minton, Taillard, and Williamson (2014) directly investigate the claim that in the years leading up to and including the crisis, financial firms' directors – and independent directors, in particular – lacked sufficient industry expertise to properly monitor management's actions (e.g., Kirkpatrick, 2009).

Using both commercially available data and hand-collected information, Minton et al. (2014) compile a large dataset of public U.S. financial institutions' board and risk management characteristics for the 2003 to 2008 period. All sample institutions – the majority of which are commercial BHCs (banks) – have assets of at least $1 billion. Results for all tests are presented for

[27] I use the terms "financial experience" and "financial expertise" interchangeably throughout this section. I intend for both terms to imply industry-relevant (i.e., banking and/or financial services) qualifications, rather than the usual connotation of the term(s) when used in reference to audit committee members' qualifications.

the full sample, as well as for a subset of "large" banks, where the size cutoff varies annually based on the annual median of total assets.

Following Güner, Malmendier, and Tate (2008), Minton et al. (2014) consider an independent director to be a financial expert if that individual (1) has held an executive-level position at a financial institution; (2) is an executive at a non-bank financial institution; (3) has executive-level experience in a finance-related position (e.g., CFO, accountants) at a non-financial firm; (4) has experience as a professional investor (e.g., hedge funds, private equity, venture capital); or (5) is an academic in a related field (finance, accounting, or economics).[28] The measure of financial expertise employed in all tests is the number of independent directors meeting any of the above criteria, scaled by the total number of independent directors. Across the period from 2003 to 2008, Minton et al. (2014) report that the average fraction of independent directors with industry-relevant experience among U.S. BHC boards ranges from 20% to 26%.

The main tests of the study consist of OLS regressions with lagged independent variables. To address endogeneity concerns, Minton et al. (2014) present the main results with a matched sample (using propensity score matching), and incorporate tests designed to rule out alternative explanations about reverse causality. The main results hold under these alternative specifications, and are also robust to different definitions of financial expertise and independence, as well as the inclusion or exclusion of various subsets of financial institutions. In the interest of brevity, I therefore limit the following discussion to the study's main results.

[28] As current executives of depository institutions are prohibited from sitting on the board of another bank, the first grouping is strictly confined to past experience. While not stated explicitly within Minton et al. (2014), I assume that the remaining categories include both current and past experience.

Minton et al (2014) find that independent financial expert directors are associated with more risk-taking and better performance in the years leading up to the crisis (2004 to 2006). More specifically, a higher percentage of financial expertise among independent directors in 2003 is, on average, associated with higher daily stock return volatility across 2004-2006, as well as better stock performance (nominal cumulative stock returns) for the period from January 2003 to December 2006. Minton et al. (2014) also find that real estate exposures were higher among banks with at least one independent financial expert board member. Among the subset of larger banks, however, independent director financial expertise, as measured in 2005, is associated with lower Tier 1 risk-weighted capital ratios in 2006. The latter result suggests that banks with more qualified boards did not internally hedge their risk-taking by holding more capital.

It is perhaps unsurprising, then, that Minton et al. (2014) find strong evidence that these same banks did not fare well in the crisis. More specifically, the study's results indicate that a higher proportion of independent financial experts on the board in 2006 is associated with worse stock performance (nominal cumulative stock returns) across the January 2007 to December 2008 period.[29] The magnitude and significance of this result is strongest among the subset of larger commercial banks.[30]

In all tests, Minton et al. (2014) also control for the presence of a CRO and the presence of a risk committee. The estimates for these indicators vary with the sample composition and the time

[29] Using a similar design and for a similar time period, Aebi et al. (2012) also find that director financial expertise is associated with worse performance during the crisis.

[30] The main variable of interest is measured as the number of independent directors with financial backgrounds scaled by the total number of independent directors. Thus, one concern may be that the variable is inflated for banks with fewer independent directors, in general; however, all tests include controls for board size and independence. Interestingly, in seven of eight reported tests, board independence has a significant negative relation with crisis-period stock returns. Board independence is not related to risk or performance in any of the pre-crisis tests.

period examined. CRO presence is not related to any measure of risk or performance in the pre-crisis period, but there is weak evidence that crisis-period stock returns were higher, on average, for firms with a CRO. When controlling for independent director financial expertise, risk committee presence is negatively associated with pre-crisis stock returns, but this result is only present within the full sample. Collectively, the bulk of the evidence presented within Minton et al. (2014) suggests that there is not a meaningful association between CRO or RC presence and the selected measures of bank risk and performance.[31]

Overall, Minton et al. (2014) interpret these findings as evidence that independent financial experts either encouraged risk-taking as a means of increasing shareholder value, or were more permissive of risk-taking due to their familiarity with such strategies and their understanding of explicit and implicit government guarantees against bankruptcy. The authors' conclusion, however, that these results "challenge the regulators' view that more financial expertise on the boards of banks would unambiguously lower their risk profile" (Minton et al., 2014; p. 377), is somewhat of a straw man fallacy. While it is true that U.S. regulators have expressed their belief that all bank board members should have a general understanding of the underlying business, the only place where expertise is explicitly required is on the risk committee. Because Minton et al. (2014) do not investigate the committee assignments of independent financial experts, a plausible alternative explanation for the study's findings is that the majority of these experts were not as directly involved in risk oversight as they perhaps should have been.

Many have argued that the risk committee's composition is crucial to effective risk oversight (Macey & O'Hara, 2016; Kirkpatrick, 2009), stressing that BHCs' directors, and risk

[31] Of 32 reported regressions including the CRO and RC indicators, all but four (three) of the estimates for CRO (RC) are statistically insignificant.

committee members in particular, should have sufficient relevant experience to provide effective challenge to management's decisions (Pozen, 2010). Underscoring this argument, Macey and O'Hara (2016) assert, "ignorance is […] not a good strategy for risk control – relying on directors' lack of knowledge to restrain risk is surely not a formula for a safe and sound banking system" (p.103). In light of these arguments, the expectation that risk committee members have a better understanding of the banking industry and of risk management practices is likely a necessary (although certainly not sufficient) condition for effective board-level risk oversight.

2.3.2. Summary Scores of Risk Management & Oversight Quality

Enterprise Risk Management (ERM), as a field of professional practice as well as within the academic literature, is relatively new. The term *Enterprise Risk Management* first surfaced in practitioner-oriented articles in the mid-1990s, and the first academic studies to use the phrase appeared in 2001 (Bromiley, McShane, Nair, & Rustambekov, 2015). One of the more significant hurdles faced by this developing line of literature involves settling on the appropriate measurement of not only the presence, but also the quality or maturity, of ERM practices.

Each of the studies discussed in the previous section uses indicators (or otherwise singular measures) to capture the presence of certain risk management or risk governance characteristics (e.g., CRO or risk committee presence). Given that ERM is fundamentally a systems concept, the ERM literature has more recently acknowledged that there are at least two primary limitations to measuring risk management and oversight quality in this manner. First, narrowly defined indicators may not adequately distinguish between superficial disclosures and more comprehensive, substantive activities (e.g., Lundqvist & Vilhelmsson, 2016). Second, indicator

variables fail to differentiate between stages of ERM implementation or maturity (e.g., Farrell & Gallagher, 2015; McShane, Nair, & Rustambekov, 2011).

A naive solution to this measurement problem might be to include multiple indicators, perhaps along with their various interactions, for each observable component of an ERM system. However, as the various parts of a firm's ERM system are interrelated – if not strictly conditional upon one another's presence – multicollinearity concerns render such an approach infeasible. Instead, a summary measurement that incorporates multiple attributes of the organization's ERM system not only addresses the multicollinearity problem, but also allows for finer differentiation across practices that may otherwise be categorized equivalently under dichotomous measurement. The relevant extant studies that take this approach use principal component analysis (PCA), almost exclusively, to combine attributes of the CRO and of board-level risk oversight to measure the strength of risk controls. I summarize those studies below, and then conclude this section by summarizing the takeaways from the extant literature on bank risk governance and bank risk.

Ellul and Yerramilli (2013)

Ellul and Yerramilli (2013; hereafter, E&Y) find robust evidence that higher quality risk management practices are associated with lower future risk and better crisis-period performance. Whereas the previously discussed studies are largely deductive in nature, E&Y take a more inductive approach towards evaluating the relationship between banks' risk controls and risk. In addition to incorporating hedging theory into the analysis, E&Y acknowledge that BHCs' risk control systems are endogenously determined.

E&Y argue that while strong risk controls are a prerequisite for identifying and mitigating large losses, the direction of the relationship between risk controls and risk depends on the reason

for implementing such systems in the first place. On the one hand, an institution with a higher risk appetite may implement strong risk controls to insure that risk levels do not exceed stated tolerances. E&Y refer to this as the "hedging" channel, wherein stronger risk controls will be associated with higher levels of risk. On the other hand, institutions with lower risk appetites may implement strong risk controls as a preventive measure, such that stronger risk controls will be associated with lower risk. E&Y refer to this as the "business model" channel. E&Y's alternative hypothesis is that banks' risk functions have no real power within the organization, such that there will be no relation between risk controls and bank risk.

The E&Y sample covers the period from 1994 to 2010, and consists of 72 of the largest 100 publicly traded U.S. financial institutions as of 2007. E&Y's explanatory variable of interest is the risk management index (RMI), which is the first principal component, estimated on an annual basis, of six hand-collected risk management and oversight variables. The first four, *CRO Present*, *CRO Executive*, *CRO Top5*, and *CRO Centrality*, capture the presence and organizational status of the CRO. The other two variables, *Active Risk Committee* and *Risk Committee Experience*, measure the quality of board-level risk oversight in terms of the frequency of risk committee meetings and independent risk committee members' financial services experience.[32]

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[32] In Appendix F, I discuss (at length) the definitions and shortcomings of E&Y's RMI input variables. Some of the more important caveats related to the following discussion of E&Y's findings are as follows:

(i) The committee used as the RC (for *Active Risk Committee* and *Risk Committee Experience*) includes audit committees with risk oversight; for all types of risk committees, the scope of the committee's risk oversight does not appear to have been a discriminatory factor;

(ii) The CRO classification criteria includes, for "smaller BHCs mainly oriented towards retail banking," silo-type risk officers, such as Chief Credit Officers, Chief Lending Officers, and Chief Compliance Officers. The specific rules followed, or BHCs for which this concession is made, are not disclosed; *CRO Centrality* takes a non-zero value even when a CRO (or equivalent) does not appear to be present within the organization;

Taken together, (i) and (ii) imply that even without a dedicated risk committee and without a CRO, a BHC can conceivably have non-zero RMI scores. The descriptive statistics presented in E&Y's Table 1 and the pre-crisis RMI scores listed within E&Y's Appendix A both support this conjecture.

Across the entire sample period (1994 to 2010), E&Y report that a CRO is present (is an executive) in 80.6% (40.2%) of the observations. The average for the *CRO Top5* indicator, which captures whether or not the CRO's compensation is disclosed for a given year, is 20.5%. This implies that the values of a key variable throughout the analysis, *CRO Centrality* (the ratio of CRO-to-CEO pay; reported mean of 31.3%), are based on *estimated compensation* for nearly 80% of the sample.[33] Risk committees meet, on average, 5.4 times per year, and 30.7% of risk committees have at least one independent member with financial services experience. Consistent with increasing attention towards risk management during the study's time period, the annual means for each of the RMI input variables are generally increasing over time.

E&Y first investigate the determinants of stronger risk controls (RMI), and find that RMI is increasing with bank size (although this relation is concave), the extent of non-traditional banking activities (e.g., derivatives trading, proportion of non-interest income), and the sensitivity of the CEO's compensation to stock volatility (vega), but not to changes in share price (delta). In addition, several characteristics usually associated with better corporate governance, such as lower values of the G-Index, more independent boards, and less-entrenched CEOs (or, CEOs with shorter tenure), are positively associated with RMI. In contrast, higher Tier 1 capital holdings and the presence of board members with industry experience are both negatively associated with RMI. E&Y interpret this latter finding to suggest that regulatory capital and board member experience may act as substitutes for stronger internal risk controls.

[33] The CRO's compensation is not available if the CRO is not among the top five highest paid executives (79.5% of the sample). Rather than code *CRO Centrality* to zero, E&Y use either the compensation of the lowest of the top five executives or of the CFO, if *CRO Top*5 equals zero.

E&Y next test whether banks with high pre-crisis RMI prior to the crisis fared better during the crisis. The dependent variables, measured in 2007 and 2008, include balance sheet-based risk measures, market-based risk (tail risk), and accounting and stock market performance.[34] All control variables are measured in 2006 except for *pre-crisis RMI*, which is the BHC's average RMI over the 2005 to 2006 period. E&Y report that higher *pre-crisis RMI* is associated with better performing loan portfolios, higher ROA and stock returns, and lower tail risk during the crisis.

Higher RMI is also associated with lower tail risk across the full sample period (1995 to 2010), and this result is robust to the inclusion of controls for CEO compensation structure, other corporate governance characteristics, and BHC fixed effects. The tail risk results are also robust to 2SLS instrumental variable regressions and dynamic panel GMM estimation, mitigating concerns that previous results are either driven by simultaneity, or are simply picking up a feedback effect between risk and RMI (such that causation runs both ways).

To identify whether the "business model" or "hedging" channel is more consistent with the study's findings, E&Y test whether the sample firms revised internal risk controls subsequent to the 1998 Russian financial crisis. The basic premise of these tests is that the BHCs which performed worst during the 1998 crisis will improve (or not change) their internal risk controls if the hedging (or business model) channel prevails. The results suggest that the BHCs with the worst

[34] More specifically, the dependent variables include holdings of private-label (i.e., not government-guaranteed) mortgage-backed securities, derivatives held for trading purposes scaled by assets, non-performing loans scaled by assets, ROA, buy-and-hold stock returns, and tail risk. *Tail risk* is defined as the negative of a BHC's average returns over the worst 5% return days for that BHC in a given calendar year. I use the same definition for the analyses within this paper.

performance (above median values of tail risk) in 1998 did not change their RMI by as much as their peers over time, consistent with the business model explanation.[35]

Lingel and Sheedy (2012)

Lingel and Sheedy (2012; henceforth, L&S) extend the E&Y study to an international setting, using a sample of 60 financial institutions from 17 different countries across the 2004 to 2011 period. The study's primary risk proxies are weekly stock return volatility and tail risk, but L&S also examine whether stronger risk governance is associated with annual stock returns, accounting performance (ROA), and crisis-period loan quality.[36]

Taking an approach similar to E&Y, L&S use PCA to summarize several hand-collected risk governance and risk management characteristics. Due to data quality and availability limitations, L&S construct the resulting risk governance indices with only four variables: *CRO Executive*, *CRO Top 5*, *Active Risk Committee*, and *Experienced Risk Committee*.[37] Underscoring

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[35] Several caveats are necessary with respect to these tests. First, it appears that roughly 80% of the study's 72 BHCs have data available for these tests. Given the number of significant bank mergers during the 1998-2000 era, this figure seems too high, and E&Y do not explain whether (and if so, how) adjustments were made for banks experiencing significant organizational changes during this time period (e.g., Bank of America and Nations Bank in 1998; Wells Fargo and Norwest in 1998; Citicorp and Travelers Group in 1998; JPMorgan and Chase Manhattan in 2000; etc.).

Second, the instrumental variable in these tests is the change in comparable BHCs' RMI from 1998 to 2000. The repeal of Glass-Steagall's affiliation provisions, through the Financial Services Modernization Act of 1999 (Gramm-Leach-Bliley Act), likely played a far more significant role in large financial institutions' risk control environment than did the Russian Financial Crisis of 1998.

[36] With respect to the risk proxies, L&S define *Aggregate Risk* as the standard deviation of the firm's weekly abnormal returns (versus the MSCI World Index), and *Tail Risk* as the negative of the firm's worst weekly abnormal return, both estimated for the fiscal year ended at t+1.

[37] All four variables are indicators. The *CRO Executive* variable equals one if an institution has a CRO or Chief Credit Officer that is a member of the senior executive team. Similar to E&Y, *CRO Top 5* equals one if the CRO is one of the top five highest paid executives of the firm for a given year, and a risk committee includes any board-level committee that oversees risk management, including the audit committee. *Active Risk Committee* equals one if the committee meets more times than the same annual median number of committee meetings, and *Experienced Risk Committee* equals one if the fraction of non-insider RC directors with prior experience in banking or financial services exceeds the annual average for the sample firms.

the data-sensitive nature of PCA procedures, in general, L&S are not able to reduce the underlying variables to a single score (as in E&Y). The first principal component explains only 36.6% of the variation in the underlying variables, while the second and third components explain an additional 25.7% and 22.6%, respectively. L&S therefore retain the first three components for inclusion in subsequent analysis (*RGI_1*, *RGI_2*, and *RGI_3*). The component loadings suggest that *RGI_1* measures the CRO's organizational status, *RGI_2* captures risk committee meetings, and *RGI_3* captures risk committee financial services experience.[38]

The remainder of the L&S study essentially follows E&Y's blueprint. Whereas E&Y find that stronger pre-crisis risk governance is associated with lower risk and better performance for the 2006 to 2008 time period, L&S find no evidence of this relation.[39] Tests across the entire 2004 to 2011 sample period, which include controls for time-variant firm characteristics as well as firm, year, and country fixed effects, are somewhat mixed. RC members' industry experience (*RGI_3*) is generally associated with lower risk and better performance (buy-and-hold returns and ROA). Overall, the L&S results mostly support the notion that CRO Status (*RGI_1*) is at least weakly associated with lower stock return volatility and lower tail risk. L&S find no evidence that RC meeting frequency (*RGI_2*) has any relation to risk or performance. Taken together, the full period

[38] To my knowledge, L&S is the only study in this area of the literature that presents the PCA loadings within the paper. In Appendix F of the present paper, I discuss my attempts to replicate E&Y's RMI using E&Y's exact same sample banks and following E&Y's definitions for the underlying variables. The PCA procedure with my data yields component loadings that are quite similar to those reported within L&S, whether or not I include the additional two variables used in E&Y's RMI. Several of the loadings are counter-intuitive, suggesting that these characteristics measure different underlying constructs. For example, *RC Experience* has a large and negative loading on the first component, while *Active RC* does not load (or is not meaningfully weighted). See Appendix F for further discussion.

[39] Instead, L&S find some evidence suggesting that banks with more experienced risk committees had higher levels of non-performing loans during the crisis. This is consistent with the Minton et al. (2014) finding that board members' financial service experience is associated with more risk-taking leading up to the crisis.

results suggest that stronger risk governance, especially with respect to risk committee composition, is moderately related to lower risk and improved performance.

Commentary on Ellul & Yerramilli (2013) and Lingel and Sheedy (2012)

Sample differences aside, a direct comparison of the E&Y and L&S results is not possible, since the outcomes of the two studies' PCA procedures were considerably different. At a high level, it can be fairly stated that for the main analysis, L&S find some evidence that supports, and no evidence that directly contradicts, the E&Y findings. A more straightforward comparison of the two studies' results, however, is possible for some of the additional analyses, where both studies deconstruct the PCA-derived scores into two, similarly defined measures.

The first measure is intended to capture the CRO's relative organization status or power. E&Y use the *CRO Centrality* measure (the ratio of CRO-to-CEO pay), whereas L&S employ a new variable, *CRO Status* (the simple average of the *CRO Executive* and *CRO Top5* indicators).[40] The second variable, *Oversight Quality*, is defined the same in both studies (the simple average of *Active RC* and *RC Experience*).

When using these measures in place of RMI, E&Y find a weak negative relation between *CRO Centrality* and tail risk ($p < 0.10$) across the study's full sample period (1994 to 2010),

[40] Lingel and Sheedy (2012) discuss several challenges encountered in not only collecting, but also interpreting, the *CRO Centrality* measure for their sample banks. While data limitations in the international sample are partly at fault, the primary difficulty appears to have been that a number of the L&S observations have *CRO Centrality* ratios greater than one. L&S explain that this was because the CEO had foregone some or all of his or her compensation for the period. I also find this to be the case when replicating the E&Y study with the E&Y sample, although E&Y are silent on the issue. L&S also point out the "interesting" univariate relationship that risk and *CRO Centrality* are positively related (as I report in Appendix F, I also find this relationship within the E&Y replication sample). Concluding that the measure is "not a useful discriminator for risk outcomes," L&S omit *CRO Centrality* from all subsequent analysis (Lingel & Sheedy, 2012, p.15).

although this finding does not hold in the presence of firm fixed effects.[41] In contrast, across the 2004 to 2011 period, L&S find that after controlling for both country and firm fixed effects, *CRO Status* has a strong negative association with stock return volatility ($p < 0.01$), and a weak negative relation with tail risk ($p < 0.10$). L&S also report that *Oversight Quality* is associated with marginally lower future stock return volatility ($p < 0.05$) and tail risk ($p < 0.10$), whereas E&Y find no relation between *Oversight Quality* and tail risk.

E&Y's lack of findings for these tests stands in contrast to the main results of the study. The authors conjecture that this is because the PCA-derived RMI measure incorporates aspects of the firm's risk controls that are not fully captured by either *CRO Centrality* or *Oversight Quality*. On the other hand, the L&S results generally confirm their main findings, and again highlight the importance of risk committee composition with respect to the effectiveness banks' risk governance structures.

2.4. Synthesis of Prior Literature

2.4.1. Limitations

Through supervisory letters and the examination process, the Federal Reserve (FRB) began advocating for widespread implementation of the now mandated EPS practices as early as 1995, and began formally incorporating examiners' evaluations of institutions' risk management systems

[41] The results for these tests are tabulated in E&Y's Internet Appendix, DOI: 10.1111/jofi.12057.

into supervisory ratings in 1996 (BGFRS, 1997).[42] Rather than prescribe specific roles and functions related to risk management and risk oversight, the FRB has historically evaluated banks' compliance with these expectations in a context-specific manner, taking into account a given institution's size, activities, and complexity (FRB, 1995; FRB 1997).

Consequently, BHCs' risk management and oversight practices were fairly diverse before Dodd-Frank. Due, in part, to a 2004 NYSE rule discussed in more detail, below, many publicly traded BHCs assigned some level of board risk oversight to the audit committee. Some boards also formed separate risk committees dedicated to overseeing subsets (or silos) of risks, such as credit risk or interest rate risk committees (Deloitte, 2013). Many boards delegated risk oversight responsibilities across multiple committees, while others retained risk oversight as board-wide responsibility. Prior to 2010, a few banks' disclosures provided no indication whatsoever that the board played any role in risk oversight. It was objectively rare to have a dedicated, enterprise-wide risk committee at the board level. If present at all, the scope of risks overseen, and the composition (independence and qualifications) and activities of each bank's designated "risk committee" varied substantially across banks.

In light of this heterogeneity during the pre-Dodd Frank period, it is not surprising that each study discussed in the preceding two sections employs a unique empirical definition for each

[42] Supervisory letters "address significant policy and procedural matters related to the Federal Reserve System's supervisory responsibilities," which are, fundamentally, to ensure that banks are managed in a safe and sound manner (www.federalreserve.gov). Supervisory letters are normative, rather than authoritative. For example, Supervisory Letter SR 08-8 uses language such as "guiding principles," "should generally implement," and "strongly encourage" in describing supervisors' expectations for directors' and managers' activities (BGFRS, 2008). In practice, the distinction between supervisory guidance and definitive rules is not always clear; however, the fact that many large BHCs apparently did not comply with stated supervisory expectations prior to Dodd-Frank suggests that most banks did not consider supervisory guidance on risk governance practices to be binding.

risk management construct.[43] Most studies fail to find that board-level risk committees affect bank risk. The default conclusion is that banks' risk management and oversight mechanisms serve superficial, rather than substantive purposes (e.g., Hines & Peters, 2015). The null results within extant literature, however, are perhaps a consequence of noise, attributable to the extent of diversity among banks' practices.

Some studies use audit committee characteristics in the absence of an obvious risk committee (e.g., Ellul & Yerramilli, 2013; Lingel & Sheedy, 2012). Unless it is clear that an audit committee oversees enterprise-wide risk management efforts, treating the audit committee – by default – as a risk committee raises at least two inferential concerns. First, a few extant studies refer to a NYSE listing rule, which became effective in 2004, that requires audit committees to "discuss policies with respect to risk assessment and risk management" (SEC, 2003). That rule was cast in relation to Sarbanes-Oxley, and was adopted, nearly verbatim, from recommendations made within the 1999 Blue Ribbon Committee Report (which was, without question, entirely about improving financial reporting quality) (Blue Ribbon Committee, 1999). In that context, it is not apparent that an audit committee's risk "discussions" would (or should) extend to any area beyond financial reporting-related risk.

Second, several studies use the number of RC meetings, as compared to the sample annual mean or median, to proxy for "active" risk oversight. Relative to other board committees, audit committees usually meet more often in a given fiscal year; however, the extent to which audit committees actually discuss risk matters during meetings is not observable. A dedicated enterprise

[43] The lack of an accepted, or well-defined, classification system for these mechanisms, now provided by the EPS rules, is likely at fault. Thus, I provide the following information not to criticize the various authors' design choices, but rather to highlight the difficulty in comparing results across these studies.

risk committee that meets only four times a year presumably has a more "active" role in risk oversight than an audit committee that meets twice as often (or more). Yet, under the "active" RC definition used in several extant studies (such as E&Y and L&S), the audit committee would be considered more the "active" of the two.

On the other end of the spectrum, a few studies explicitly *exclude* the audit committee, or other specific committees, from the RC definition. For example, Aebi et al. (2012) and Hines and Peters (2015) restrict the RC classification to include only standalone, board-level risk committees, thereby excluding audit committees (presumably even if the audit committee does oversee enterprise-wide risk). Minton et al. (2014) define a risk committee as one that oversees risk-monitoring, reports to the board of directors, and is "separate from the audit or asset and liability management committee" (Minton et al., 2014; p. 359). The third criterion is based on the authors' observations that almost all sample firms have one or both of those committees.[44]

Several extant studies identify risk committees with keyword searches of standard corporate governance databases (e.g., BoardEx), without considering the actual responsibilities of the committee as described in the firm's proxy (e.g., Minton et al., 2014; Hines et al., 2015). A listing of the names of committees used for the present paper, provided in Appendix A.2, highlights the potential for measurement error if a keyword search fails to consider the committee's remit: several "risk" committees shown in Appendix A.2 oversee only a subset of risk.

With respect to the EPS chief risk officer requirements, a cursory synthesis of prior literature's findings may suggest that on average, CROs are not meaningfully associated with bank

[44] The exclusion of these two committees is based on the authors' observations that almost all sample firms have one or both of those committees, so there would be no variation in an indicator that included them. By this same logic, a credit risk committee (or similar, such as a loan review committee) could also reasonably be excluded. These types of committees are omitted from the discussion throughout Minton et al. (2014), suggesting that the RC designation likely includes several silo-type risk committees.

risk. In some cases, CRO effects are only present during the crisis period, or vary by sample composition. Again, the conventional explanation is that CROs do not have sufficient power to constrain other employees' risk-taking incentives, but also again, the same criticisms of the empirical RC designation apply to the CRO position. Each of the previously discussed studies uses different classification criteria for CRO presence, as well as for determining when an individual is considered to be part of the executive team. For example, E&Y and L&S include chief credit officers within the same group as CROs. In contrast, Aebi et al. (2012) restrict this classification to include only those individuals with responsibility for the entire risk management function. Other studies (e.g., Keys et al., 2009; Minton et al., 2014) are silent on the CRO classification criteria, altogether. Finally, none of the papers discussed in this section explain, nor refer to by citation, the process followed when determining whether or not a CRO is an executive of the organization.

2.4.2. Conclusions from Review of Prior Literature

Taken together, prior literature provides little backing for conjectures about the effects of the EPS rules. Not only are there inconsistencies across studies, but the within-study findings are often also mixed (e.g., Aebi, Sabato, & Schmid, 2012; Hines & Peters, 2015; Minton et al., 2014). There is almost no evidence that risk committees, alone, are associated with differences in bank risk. On its own, the presence of a CRO does not appear to have a strong relation with bank risk of performance, although there is some evidence that this relation varies with the relative importance and independence of the CRO (e.g., Aebi et al., 2012; Keys et al., 2009).

In contrast, the two studies that use PCA to combine several risk management and oversight characteristics (e.g., Ellul & Yerramilli, 2013; Lingel & Sheedy, 2012) find more convincing

evidence that stronger risk governance is associated with lower risk. However, this latter group of studies leaves unclear the extent to which any of the individual mechanisms explains the results.

Perhaps most importantly, all extant research is drawn from sample periods that end by 2011, and frequently, the various risk management and oversight mechanisms are measured in the pre-crisis period. For example, Minton et al. (2014) measure banks' financial, governance, and risk management characteristics in 2003, 2005, and 2006, only. The Aebi et al. (2012) findings for the CRO's reporting line are based on a single year of collected data: 2006. During this time period, few banks disclosed having CROs, and the majority of boards did not have separate risk committees. Furthermore, many of these practices were – at the time – only recently implemented (and therefore not well established), inconsistently disclosed, and perhaps most importantly, voluntary. Low power may therefore explain the null results in most extant studies, at least for CRO and RC indicators.

Of the extant literature, Ellul and Yerramilli (2013; E&Y) is the only study to consistently find strong evidence that stronger risk management mechanisms are associated with lower risk and better crisis-period performance. E&Y's findings generally support the authors' "business model" conjecture that firms with low risk appetites adopt strong risk controls to limit the downside effects of excessive risk-taking.

This has two important implications. First, some unobservable and fixed characteristic of the bank – call it the risk culture – drives both the choice of risk management strength and the bank's risk appetite.[45] Second, the E&Y findings imply that prior to 2010, riskier BHCs chose not

[45] Consistent with this explanation, Bushman, Davidson, Dey, and Smith (2018) find that bank CEO materialism (as implied by a preference for owning luxury goods) is negatively related to E&Y's RMI.

to implement robust risk controls (and safer BHCs implemented strong risk controls). If this was indeed the case, then the E&Y findings do not actually inform the question of whether strong risk controls constrain risk, as it is possible that less risky banks – those with stronger risk controls – would *always* have lower risk than banks with weaker controls. Within this context, the "business model" explanation is also an "entrenchment" story, whereby regulatory intervention is necessary to effect changes in management's otherwise suboptimal practices.

In summary, prior literature does not provide conclusive evidence to support the notion that board-level risk oversight practices (or risk governance, more generally) are associated with significant differences in bank-level outcomes. As I show in this study, there have been notable shifts in bank's risk governance structures – at both the board and operations level – over the past decade. The Dodd-Frank Enhanced Prudential Standards (EPS) requirements present an opportunity to build upon previous work and by re-examining the association between risk oversight and risk in the post-Dodd-Frank period, when risk governance is a regulated matter.

Bushman et al. (2018) obtain the RMI measure directly from Andrew Ellul and Vijay Yerramilli. Interestingly, while E&Y (2013) presents results for only 72 BHCs, the Bushman et al. (2018) tests using RMI include up to 158 unique BHCs. Whether these additional BHCs were added after the fact is not clear; however, the use of a larger sample for E&Y's estimation of the PCA procedure to construct the RMI measure may at least partially explain the difficulties I encountered when attempting to replicate the measure (see Appendix F for further details).

3. HYPOTHESIS DEVELOPMENT

While the majority of the reforms within Dodd-Frank aim to streamline the regulatory supervision of all financial institutions, the Section 165 risk management requirements (i.e., EPS) apply at the individual bank level, to all BHCs of a given size, regardless of the entity's risk profile. As discussed in Section 2.1, banks are in the business of taking risks (e.g., Becht et al., 2011), and institutional features that are unique to banks limit the incentives for outsiders to monitor risk-taking, as well as the effectiveness of market discipline. At the same time, the same institutional features encourage bank managers to take on more risk.[46] Bank regulation emerged as a partial solution to the monitoring problem, but as history has shown, regulatory supervision, alone, is insufficient for adequately preventing excessive risk-taking and safeguarding the financial system.

A strong risk management system is necessary for identification and prevention of excessive risk-taking (e.g., E&Y, 2013; Calomiris & Carlson, 2016). Since the distress or failure of one institution can put several others at risk, strong risk controls are a crucial, but often overlooked, aspect of the macro-prudential regulatory landscape. While some theorists contend that the appropriate solution to monitoring failures involves regulatory capital reforms (e.g., Acharya, Mehran, & Thakor, 2016), the effectiveness of bank capital regulation depends, to a large extent, on banks' internal risk assessments, as well as their capacity to adequately measure and

[46] Calomiris and Carlson (2016) hypothesize that absent deposit insurance, government safety nets, and limits on ownership concentration, banks will endogenously adopt corporate governance mechanisms that credibly manage risk in order to mitigate the agency conflicts between bank owners and creditors and between bank managers and outsiders. Using bank examination data from the 1890's, when government guarantees and regulatory governance requirements did not exist, the authors' findings support this conjecture. This implies that by dampening the monitoring incentives and disciplinary mechanisms of creditors and shareholders, the modern regulatory regime has perhaps impeded the natural formation of robust risk control structures within financial institutions.

manage those risks. In addition to enhancing boards' and managers' accountability for risk-taking, better internal risk management and risk oversight practices should therefore assist supervisors in evaluating the safety and soundness of individual banks (e.g., 12 C.F.R. § 252, 2012,).

Regulators, practitioners, and other subject matter experts believe that strong risk management starts at the top, or at the board level (e.g., Beasley, et al., 2015; FSB, 2014). The FRB requires that the largest BHCs centralize the risk oversight function within a separate (or standalone), dedicated risk committee of the board. Implicit in this requirement is the notion that lawmakers and regulators believe this is most effective way for the board to carry out its risk oversight duties.

Critics of Dodd-Frank point out that Congress failed to change bank directors' fiduciary duty to monitor the effectiveness of risk management systems (Johnson, 2011). Case law precedent, or the "business judgment rule," currently limits directors' legal accountability for risk oversight failures to what essentially amounts to gross negligence (i.e., failure to respond to a known red flag). While this may suggest that minimum compliance with the rules is potentially sufficient to protect directors from being personally held liable for risk management failures (e.g., Johnson, 2011), case law is ultimately subject to change, and directors appear to be keenly aware of this fact. Anecdotally speaking, director sentiment in recent years reflects a heightened level of concern with respect to the legal, financial, and reputational consequences of being a board member. Confirming this empirically, Ormazabal (2018) documents that individual directors are more likely to depart from their riskiest directorships in the post-crisis era.

In light of the heightened personal risks directors take on when accepting an appointment, board members have incentives to commit to effectively carrying out this duty now, more than ever. Directors cannot effectively monitor something that is not working well or that does not exist.

In order to facilitate their own monitoring of management, boards may demand more transparent reporting (e.g., Armstrong, Core, & Guay, 2014), and direct additional resources towards the risk management function to ensure that those reporting demands can be satisfied. Because regulators can impose penalties with potentially severe consequences to long-term bank value if BHCs fail to meet regulatory expectations, the use of resources in this manner is value preserving, if not value enhancing.[47]

By changing the tone at the top, dedicated risk oversight by the board can have a real effect on the underlying risk management policies and processes. Board-level involvement and attention may reinforce operational level practices and enhance the firm's ability to identify, and coordinate actions to mitigate, interrelated and often hidden risks (e.g., Ittner & Keusch, 2015). In general, effective risk management practices should reduce the likelihood and costs of financial distress (e.g., Smith & Stulz, 1985). This suggests that for any level of risk-taking, stronger risk controls should be associated with lower risk, all else equal.

Likewise, subject matter experts have long advocated that by improving both the board's and management's understanding of the firm's risk profile, strong risk management should enable more efficient capital allocation and facilitate better strategic decisions about which risks to take on and which risks to lay off (Nocco & Stulz, 2006; Stulz, 2015; Kaplan & Mikes, 2016). If these actions are effective, all decisions – including some that may appear risky – should have more certain payoffs. In this case, we should observe that temporary increases in risk are smaller (or less severe) and less frequent. In other words, it may not be likely that we would observe that banks

[47] For example, in response to failures of risk management and oversight, recent regulatory actions against Wells Fargo include a cap on total assets, forced board refreshment, loss of decision-making autonomy, and significant investments in reorganization efforts at both the operations and board level, all in addition to being hit with record fines (Volkov, 2018).

engage in strictly less risk-taking in the post-implementation period, but if risk management delivers these purported benefits, then overall risk should be lower.

Nevertheless, there are several reasons we might not observe a negative association between stronger risk governance and bank risk. The purpose of the new regulations is not to force all banks to reduce, or even eliminate, risk. Instead, regulators want banks to take risks that are within each bank's risk management capabilities, and that banks are prepared to absorb the costs of any related losses. The risk committee, for example, is charged with ensuring that actual risk remains within the bank's stated and board-approved risk appetite. If a bank can demonstrate that it can remain sound while pursuing this stated risk strategy, then there would be no reason to expect that risk would be any lower, much less any higher, post EPS-adoption.

A primary concern amongst critics of the Enhanced Prudential Standards mandates is related to institutional theory, or the notion that firms' governance mechanisms generally only serve to legitimize activities, and are rarely associated with effective oversight (e.g., Carcello et al., 2011; Beasley, Branson, & Pagach, 2015; Duchin, Matsusaka, & Ozbas, 2010). Taken at face value, however, window-dressing does not seem to be a plausible (or at least sustainable) concern in the heightened regulatory environment that characterizes the post-Dodd-Frank period. The Federal Reserve (FRB) now performs uniform supervisory stress tests and comprehensive capital adequacy reviews that involve not only a quantitative assessment of asset quality, liquidity sources, and regulatory capital adequacy, but also a qualitative evaluation of banks' risk management and oversight practices. The FRB can fail banks based on the qualitative assessment – and has done so – even if the bank passes the quantitative evaluation. The FRB not only publicly discloses its rationale for qualitative failures, but can also restrict a bank's ability to return capital to shareholders (via dividends and repurchases), make acquisitions, and even engage in product or

market expansion, until the bank remedies the articulated problems. The threat against noncompliance is therefore both real and costly.

Finally, there is also some reason to believe that we could observe increases in risk, on average. Given the scant empirical evidence to support the specific nature of the final EPS rules, one must presume that the rules are based on the regulator's private observations of what seem to be best practices. Nevertheless, the extant literature does not appear to support the notion that any specific form of risk oversight will be the silver bullet. Many of the individuals and organizations that submitted comment letters for the proposed EPS rules argued that because boards were more knowledgeable about their own internal processes and competencies, the Federal Reserve should not prescribe any specific committee type or structure. Many were staunchly against the idea that the board's risk oversight duty should ever be delegated away from the board as a whole. Others have suggested that for some boards, it may be that the responsibility to oversee different kinds of risk is best divided among committees with the appropriate expertise, rather than assigned to one specific committee (Lipton, 2014). Each of these arguments reflects a common concern that forced adoption of a given risk oversight structure may ultimately result in a decline in the quality of risk oversight.

Given the preceding discussion, the effects of the Dodd-Frank EPS requirements are ultimately an empirical question. I therefore state the following hypothesis in the null:

H1: Mandated board-level risk oversight practices have no relation with bank risk.

4. SAMPLE & DATA SOURCES

4.1. Sample Banks

I obtained annual financial data from BHCs' consolidated financial statements (FR Y-9C's), downloaded from the Federal Reserve Board of Chicago website, and stock return data from CRSP.[48] The full sample is comprised of publicly traded U.S. BHCs that either (a) have average total assets of at least $10 billion as of June 30, 2014, or (b) cross (or anticipate crossing) the $10 billion threshold at some point thereafter.[49]

The sample includes a number of BHCs that are not yet subject to most of Dodd-Frank, much less the EPS provisions, as of the end of the sample period. All sample BHCs with assets under $10 billion as of December 31, 2016 have since crossed the threshold, or disclosed the implications of – and ongoing planning activities for – doing so in the near future. Examples of these preparation activities include forming a board-level risk committee, engaging external

[48] The web address for the FR Y-9C reports is https://www.chicagofed.org/banking/financial-institution-reports/bhc-data. I obtain BHCs' CRSP identifiers (PERMCOs) from the CRSPFRB link table, available at the Federal Reserve Bank of New York website (address included in references; see: FRBNY, 2017).

[49] To determine if, and when, a BHC is subject to Dodd-Frank (i.e., meets the minimum size threshold), I use average total assets on a rolling four-quarter basis (which mirrors the scope of application within the EPS rules). I then check that all banks with average assets of at least $10 billion – at least one time between July of 2010 and December of 2015 – subsequently remain above the size threshold.

One BHC, MB Financial, Inc., had average assets above $10 billion during 2010, but assets subsequently fell – and remained below – the $10 billion mark for all of 2011 through mid-2014. With the acquisition of Taylor Capital Group ($5.9 billion) in 2014, MB Financial again passed the $10 billion threshold, ending the 2014 fiscal year with $14.6 billion in assets. A review of MB Financial's disclosures for each year between 2011 and 2014 confirmed that the BHC was not, in fact, subject to the EPS provisions of Dodd-Frank until after this acquisition. All reported tests for the *DF Bank* sample include this bank, but inferences are not different if I change this BHC's sample group designation or drop this BHC altogether.

consultants, upgrading information systems and data capabilities, and hiring qualified staff to ensure the company is ready to meet heightened regulatory expectations.

The sample excludes the U.S. holding companies of foreign banking institutions, non-bank financial institutions, and companies not under the jurisdiction of the Federal Reserve for the duration of the sample period.[50] I further impose a minimum requirement that all sample BHCs have complete data for at least one year before, and at least three years after, the signing of Dodd-Frank (in 2010), although the majority of the sample BHCs (87%) have complete data for all 13 years in the sample period.

The largest resulting sample is comprised of 84 bank holding companies (982 bank-year observations), and covers the period from 2004 to 2016.[51] When restricting to *DF Banks*, or BHCs that become subject to the provisions of Dodd-Frank before the end of the sample period (i.e, by the beginning of 2015), there are 59 unique BHCs (maximum of 693 bank-year observations).[52] A few BHCs are not publicly listed until later years in the sample period, but have complete data for some tests that do not require market data. Since sample size is already a constraint, I retain these BHCs in the main sample.

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[50] Holding companies not under the FRB's jurisdiction do not file FR Y-9C's, so incorporating these banks into my sample would require the use of an alternative (and less rich) source for financial data. In addition, since some holding companies became subject to FRB oversight *as a result of* Dodd-Frank, the latter exclusion helps to rule out concerns that any observable changes in risk are attributable to changes in a group of banks' regulatory oversight regime, rather than to governance changes. Examples of financial firms that are excluded as a result of this restriction are investment banks and brokers/advisors (e.g., Goldman Sachs, Morgan Stanley, e*Trade, TIAA) and savings and loan holding companies (e.g., CIT Group, First Niagara, Astoria FC).

[51] As the risk governance information I use in this study is hand-collected, I consider 2004 to be a reasonable start year, as it allows for several years of pre-Dodd Frank (and pre-crisis) data. Further, expanding the sample to include earlier years would not Provide additional insights for my research question, as I find that only one sample BHC has a standalone board-level risk committee with enterprise-wide risk oversight responsibilities in 2004 (see Table 1, Panel B).

[52] Since neither sample is balanced, I perform robustness checks, for all tests, with a more balanced sample that is restricted to banks with at least 11 firm-year observations, as well as a completely balanced sample of the 73 BHCs that have complete data for all sample years.

Table 1, Panel A displays the distribution of sample observations by year and regulatory size category (i.e., average total assets of less than $10 billion, $10 to $50 billion, and over $50 billion). In addition, Appendix A, Table A.1 contains a listing of all 84 sample BHCs, their respective Federal Reserve System entity ID (RSSDID), the years each bank is included in the full sample empirical tests, and each bank's average total assets at year-end 2010 and 2014.

4.2. Risk Governance Data

I hand-collected a substantial amount of data in order to document and measure the sample banks' board risk oversight practices. This information was collected primarily from disclosures in the sample BHCs' proxy statements (Form DEF 14-A) and annual reports (Form 10-K and the Annual Report to Shareholders).[53] Occasionally, it is supplemented with information from other public filings (e.g., 8-Ks, 10-Qs), BHCs' investor relations websites (e.g., committee charters, investor presentations), and in some cases, LinkedIn and Google searches (namely in relation to the individual holding the CRO position).

The resulting dataset contains information about (1) board-level risk committee existence, form, and scope; (2) risk committee meetings and composition (size, member qualifications, and independence); (3) the primary risk manager, which is often the Chief Risk Officer (name, title, organizational rank, reporting line, approximate tenure, and if available, compensation details); (4) board-wide governance (board size, director independence, leadership structure, CEO tenure,

[53] To simplify this process, I used the redline feature within Intelligize, a web-based tool for retrieving (directly from EDGAR) and analyzing SEC registrants' public filings (www.intelligize.com). The feature quickly compares two or more selected filings and strikes out similarities and underlines differences, making it fairly simple to identify significant changes in committee descriptions or duties within a given BHCs' filings.

committee overlaps, refreshment, board members' qualifications and areas of expertise, number of board meetings); and (5) Ownership structure and other (CEO ownership, Board and Executive ownership, founder or founder-family presence and ownership).

Most BHCs file the annual proxy statement late in Q1, or early in Q2, and the proxy contains a mix of historical, current, and forward-looking information. For example, the number of board and committee meetings reported relate to the preceding fiscal year, but committee composition commonly reflects current appointments (i.e., as of the date that the proxy was issued). If the proxy ballot includes new director nominees, those individuals' qualifications and skills are highlighted, but expected committee assignments are not usually stated. Moreover, some board members depart or are appointed outside of the annual meeting, and individual directors' committee assignments can shift throughout the year (even without director turnover). In many cases, these changes are not disclosed until the filing of the subsequent proxy statement. As a result, the information disclosed in the proxy, even if current at the time of filing, is frequently incomplete or incorrect within the context of the entire fiscal year.

Because I am interested in evaluating the effects of such changes, I went to great lengths to reduce any noise in the data by determining the approximate, if not exact, dates that risk committees were formed (or restructured) and specific committee members were appointed.[54] In the case that change or implementation dates (or a reasonable range of dates) were not determinable, I assumed that the date of the first disclosure of a change coincided with the change, itself, unless the facts of the data or the patterns of a given BHCs' disclosures suggested otherwise.

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[54] *Committee restructuring* refers to the practice of reassigning responsibilities among existing board committees. For the purposes of this paper, the most relevant (and most common) form of reorganization involves shifting risk oversight responsibilities from one or more committees (primarily from the Audit or Audit and Risk Committee) to a pre-existing committee (e.g., the Credit Risk Committee), with the result that one central committee emerges as the primary in charge of risk oversight.

For all collected data, I performed both forward and backward validation tests (for existence, completeness, and accuracy) with each subsequently issued proxy statement or other information filing.[55] When merging the hand-collected dataset with the financial data from the FR Y-9C filings, I matched on the fiscal year of the respective underlying information, rather than on the year of the filing.

4.2.1. Risk Committees, Defined

Under the EPS rules, a compliant risk committee is one that (i) is a standalone committee of the BHC's board; (ii) is the primary committee with risk oversight responsibilities (and any other committee with oversight of specific risk types reports on those risks to the risk committee); and (iii) has oversight of the enterprise-wide risk-management policies of the company (12 C.F.R. § 252, 2014). I set an indicator variable, *RC*, equal to one for all BHC-years with a board risk committee that meets all three of these criteria. I report the number of BHC-year observations that meet this definition, by concurrent average assets ($Size_t$), and by average assets as of year-end 2014 ($Size_{2014}$), in Table 1, Panels B and C, respectively.

Because the committee classification process was not as straightforward as one might hope, I also collected information related to the scope and form of committees that met some, but not all, of the requirements. Without knowledge of the EPS guidelines, many of these might be considered "risk committees." Beyond assisting in reconciling the results of this study to those

[55] I maintained, and can provide upon reasonable request, a detailed log – along with underling support – of any collection or coding decisions I made, whenever information was in the least bit subject to interpretation. I also used this log as a reference to ensure that I recorded and coded information consistently within and across firm-years.

within the extant literature, the data depict a non-trivial shift – discussed below – in banks' risk oversight practices across the sample period.[56]

4.2.2. Evolution of Risk Committee Structure & Responsibilities

Table 2, Panel A illustrates the trends in banks' risk oversight practices since 2004. Moving from left to right, the columns in this table contain the annual counts for different types of committees within the sample, by the scope of risks overseen by a committee of the board (none, some, and enterprise-wide), and by that committee's form (audit, multi-purpose, or standalone). For ease of reference in the following discussion, each column in Panel A is assigned a different letter, or "Type," found in the bottom row of the table. Examples of some specific committee names are given in Appendix Table A.2, and are grouped according to these same "Type" labels.[57]

Bank-year observations for which it does not appear that any committee oversees risk are included within Type *A*. These boards usually have only three or four standard board committees (audit, nominating, compensation, and executive), and the audit committee duties are strictly

[56] Reconciliations to prior studies are addressed in Section 6.2 and in Appendix F.

[57] At least one extant study has used word searches for committee names that include "risk" to identify banks' risk committees. The list of the sample BHCs' various risk committee names in Appendix A, Table A.2 highlights the potential for significant measurement error with a keyword search procedure: several "risk" committees are actually "silo-type" committees – i.e., the committee oversees a subset of risk(s), rather than enterprise-wide risks.

related to financial reporting matters (i.e., do not include any mention of risk).[58] The second column (Type *B*) contains observations where the audit committee responsibilities include the discussion or oversight of risk management policies (or something relatively similar), with little-to-no detail as to what this duty actually entails. It is worth noting that when this duty is listed within the audit committee charter, it is but one item among 20 to 40 other, more traditional responsibilities. Moreover, this role is usually listed either within the committee's duties in relation to the Internal Audit function, or in a generic ("other") category at the end of the charter. The third column (Type *C*) includes committees with some stated risk oversight duties, but also other, non-risk responsibilities, and the latter appear more reflective of the committee's primary purpose. Type *D* (column 4) refers to standalone (i.e., dedicated) *silo*-type risk committees, such as a Credit Committee or an Asset Quality Committee.

The above risk oversight practices have steadily declined in prevalence. By the end of 2009, 77 of the 84 BHC boards assigned at least some level of risk oversight to a committee (all columns except Type *A*). Nevertheless, roughly half of those committees continued to oversee only

[58] From January 2000 through the 2006 proxy season, SEC Rule 34-42266 required that registrants attach the current charter of the audit committee to the proxy statement, triennially or subsequent to any substantial revision, whichever came first. I was therefore able to obtain historic charters for nearly all sample BHCs for at least one period before 2004, and for at least one of the three years from 2004 to 2006. Because charters contain far more information about a committee's role, I used these historic charters – along with the proxy disclosures – to confirm, at least at that point in time, whether the audit committee was, or was not, tasked with any degree of risk oversight. In late 2006, SEC Rule 33-8732A amended this requirement, and permitted firms the option of posting the audit committee charter on their websites, instead. Unfortunately, there was no accompanying requirement that public access to historic charters be maintained or be furnished upon request. From 2007, forward, I therefore rely almost exclusively on the committee descriptions included within the proxy to evaluate risk scope. (Note: the last statement is true of *all* sample years when evaluating the duties of *non-audit* committees.)

a subset of risks (Types *B*, *C*, and *D*). As of the end of 2016, 59 of the 80 remaining sample BHCs have a standalone committee with enterprise-wide risk oversight responsibilities (Type *G*).[59]

Note that committee type *G* corresponds to the principal definition of a risk committee used within this study (i.e., *RC* equals one for Type *G* committees, and zero for all other types). The second-to-last column, or Type *F*, includes (i) committees with additional non-risk duties, but where risk oversight appears to be the primary charge of the committee, or (ii) joint committees of the BHC and subsidiary bank boards. These committees could possibly be in compliance with the EPS rules, but since it is not clear that these structures would meet either the scope or the form requirements, I set *RC* equal to zero for these observations. To the extent that this design choice fails to capture substantive compliance for this group, it should bias against finding an association between risk oversight and bank risk.[60]

Finally, the data in Table 2, Panel A also highlights that enterprise risk oversight (Types *E*, *F*, and *G*), irrespective of the committee's form, was not a prevalent practice until recent years: only eight (10%) of the sample banks have such a committee in 2004. In 2006, immediately before the financial crisis, just 19 (23%) of the BHC boards had an enterprise risk committee; among them, only eight had standalone committees that would likely meet today's EPS requirements (Type *G*). It was not until the years surrounding the EPS proposed and final rules (2012 and 2014) that the scales tipped, and the required form become the majority. Taken together with the

[59] Excluding the eight Type *F* committees, thirteen sample BHCs did not have a dedicated, enterprise-wide, board-level risk committee by the end of 2016 (see Types *C* and *E*). Of those, six banks range in size from $11.2 to $25.7 billion, where the standalone requirement does not apply, and seven had assets of less than $10 billion, and were not yet subject to Dodd Frank. At the time this manuscript was written, all but one of the latter group of banks have since crossed the $10 billion mark, and seven of the thirteen BHCs, including the one that had not yet surpassed $10 billion in assets, have formed EPS-compliant (Type *G*) risk committees.

[60] I discuss results using an alternative risk committee definition that makes concessions for this group (Type *F* committees), in addition to addressing other, size-based concerns, within the sensitivity analysis (Section 6.2).

observation that many banks below the $50 billion, and even $10 billion, thresholds have also formed separate risk committees, this suggests that there may be some benefit – be it real or perceived – to having a dedicated risk oversight function.

4.2.3. Other Changes in Corporate Governance, Risk Governance, and Risk Management

The remaining panels of Table 2 show annual means for a number of the hand-collected variables for the period from 2004 to 2016. Each variable (or column header) is defined in the notes or legend immediately below the respective panel. While some of the variables in Table 2, Panels B, C and D, are not used within the present analysis, many are incorporated into an alternative proxy for risk oversight (i.e., an alternative to the *RC* indicator) in Section 7 of this manuscript.

The figures in Panel B highlight some of the many changes that have taken place at the board-level over the sample period. While the average board has fewer members today than in 2004 (*Board Size*), board independence (*Board Indep*) has increased, on average. To some extent, these trends can be explained by non-independent directors leaving the board during and after the crisis (departures are not tabulated); however, these spots have generally been filled with new, independent directors that generally have more relevant experience in the financial services industry and (or) in risk management (see columns 4 through 9 of Table 2, Panel B).[61]

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[61] Director independence is based on disclosures within the proxy, which pertain to whether or not the individual meets the requirements of the exchange on which the firm is listed. If independence is not disclosed (such as for the few sample BHCs that are controlled companies), I assume the individual members of the Audit, Compensation, and/or Nominating committees (each of which must meet the respective company's exchange listing standards for independence) are independent, and any remaining directors are not.

For details regarding the measurement of directors' qualifications (i.e., financial services experience and risk management expertise), see the notes to Appendix E.1.

If board meetings (*# of Bd Mtgs*) capture the extent of board oversight, then today's board appears to be more involved in overseeing management's activities than in the earlier years of the sample period. Finally, while there was a small decrease in the fraction of BHCs that combined the CEO and Chairman roles (*Dual CEO*) from 2009 to 2012, most sample BHCs that previously combined the roles have since returned to this practice. On the other side of the same coin, though, boards have increasingly instituted and formalized the role of the so-called "Lead Independent Director." By 2016, 85% of the sample firms either have an independent board Chairperson or a Lead Independent Director (versus 22% in 2004).[62]

Changes within the committee tasked with risk oversight are shown in Table 2, Panel C. Other than in the first column (*Risk Resp Unclear*), the statistics in Panel C were tabulated for any type (or form) of risk oversight committee (i.e., Audit, Risk, Audit & Risk, etc.), as long as (i) the primary committee tasked with risk oversight responsibility is clear, or is otherwise reasonable to assume; and (ii) all necessary details – such as the names of the committee members and the number of meetings for a given year – are disclosed for that particular committee.[63] To simplify the discussion of the remaining information in this particular panel, I use "risk committee" in a

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[62] According to the National Association of Corporate Directors (NACD; nacdonline.org), it is considered a corporate governance best practice to appoint a lead independent director (LID) when the Chairperson of the board is not independent. The LID is usually elected by the independent members of the board, and is assigned responsibilities such as organizing and leading the board's evaluation of the CEO, having the authority to call meetings of the independent directors, approving board meeting agendas, and serving as a liaison between the other board members and the Chairman, and/or between major stockholders and the board. The role is usually formalized further with a significant increase in the LID's compensation in exchange for his or her leadership service.

Indep Bd Ldshp equals one if the board had an independent Chairperson, or if the board had a LID (or equivalent) that was elected by the board and whose duties were formalized (e.g., stated in the proxy; listed in the board's governance documents). The variable is set to zero, otherwise.

[63] Despite the fact that some proxy disclosures do not clearly designate a primary risk committee, I assume that a committee overseeing enterprise risk (regardless of form) is the primary designee with respect to risk oversight, absent any evidence to the contrary. The majority of observations excluded from the statistics in columns 2 through 10 of Table 2, Panel C fail the second condition (i.e., I lack details about the committee membership and/or meetings).

more general sense (i.e., to refer to whichever committee oversees risk, irrespective of form or scope).

In the first column (*Risk Resp Unclear*), I include the annual means for an indicator equal to one when disclosures did not clearly designate a particular committee as the primary responsible for risk oversight. Since 2012, disclosures in this area have been improving; however, a number of BHCs continue to state that the board, as a whole, retains this responsibility – and is assisted by various committees in carrying out this duty – but without naming a particular primary committee.[64]

The size of the risk committee (*Cmte Size*) has increased slightly over the sample period, while the percent of committee members that are independent has stayed relatively constant (*Cmte Indep*). The current CEO sits on roughly one sixth of the sample BHCs' risk oversight committees in the latter half of the sample period (*CEO is Cmte Mbr,* column 8).[65] The average risk committee currently meets around 7.5 times per year (nearly double the minimum expectation within the final EPS rules).

The number of independent risk committee members with recent and relevant financial services experience has increased from an average of roughly one member in 2004 (about 21% of

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[64] In earlier years of the sample period (especially before the 2010 implementation of the SEC's Enhanced Proxy Disclosure rules), this created a fair amount of ambiguity concerning the specific committee (if any at all) for which data should be collected. In many, but not all, of these cases, subsequent disclosures related to committee restructuring (e.g., rearranging responsibilities, creating a new committee, etc.) would clarify the antecedent committees' roles, and if necessary, I revised previously collected data accordingly. Because there is still room for error in my collection choices (and therefore noise in the data), I left the *Risk Resp Unclear* variable as originally coded, and I incorporate it within the risk governance measure that I introduce in Section 7.

[65] Because the means presented in this panel include several types of committees, the figures for earlier years are more heavily weighted with audit committee data. Because a CEO cannot be a member of his own firm's audit committee, what may look like a trend of increasing CEO membership on the risk committee (*CEO is Cmte Mbr*) is not so. The apparent increase in the mean of this indicator over the sample period is merely a result of BHCs shifting risk oversight duties from the audit committee to some other committee of the board. It is worth noting, however, that these shifts are *not* driving any of the apparent trends for the other variables in Table 2, Panel C.

the average committee), to 2.4 members in 2016 (about 42% of the average committee). A similar trend can be observed for the number of committee members (both independent and not) that likely meet the EPS definition of a risk management expert, or RME (*Cmte Indep RME* and *Cmte Tot RME*). Very few of the sample BHCs identified the specific individual(s) satisfying the RME requirement. I describe my evaluation process for this designation in Section 7.1 and in the notes to Appendix Table E.1. I also note that in conjunction with the years in the proposed and final EPS rules were each issued (2012 and 2014, respectively), Table 2, Panel C shows that there is a notable increase from 2011 to 2013, and again from 2014 through 2016, in the frequency with which an independent risk management expert, who is new to the board (tenure is less than 2 years), is appointed to the risk committee (*Cmte New Ind RME*). These new RME appointment events are frequently followed by significant improvements in all disclosed risk management and oversight policies and practices (as well as enhancements in the disclosures, themselves), which provides some level of comfort around my RME classification process.

Finally, risk management enhancements at the operational-level are tabulated in Panel D of Table 2. While roughly a third of the sample banks had a true Chief Risk Officer (CRO) in 2004, nearly all sample banks (96.3%) have a CRO by the end of 2016 (*CRO with EW Remit*). Moreover, the CRO role, itself, has become more refined (*Dedicated EW CRO*) and prominent (*CRO is Exec*), and 77.5% of the sample banks disclose that the CRO reports directly to the board or a committee of the board by 2016.

Collectively, the data presented in Table 2 underscores the extent of changes among the sample BHCs' corporate governance, risk governance, and operational-level risk management across the 2004 to 2016 period, and further motivate the analysis that follows.

5. METHODOLOGY

5.1. Empirical Approach

The subsequent analysis begins by examining whether the risk committee's form and scope of risk oversight is associated with bank risk. This preliminary focus on only the risk committee rule – rather than the sum of the EPS risk governance mandates – is motivated primarily by two considerations. First, in late 2009, the SEC issued enhanced proxy disclosure rules, effective during the first quarter of 2010, which required registrants to explain the board's role in risk oversight, as well as expand upon directors' qualifications and merits (SEC, 2009).[66] There is a marked difference in the extent of information provided before and after this rule became effective. Details necessary for evaluating compliance with the remaining EPS requirements (i.e., those beyond the formation of a risk committee), such as information regarding board and committee members' qualifications, the specific directors assigned to a particular committee, the number of committee meetings, and characteristics of the chief risk officer position, were not provided by most sample banks before 2010.[67] At the same time, descriptions of committee structures and responsibilities are relatively consistent, both across time and in the cross-section.

Second, Section 165 of the Dodd-Frank Act only clearly articulated that large financial institutions would be required (i) to have a board-level committee charged with oversight of the bank's enterprise-wide risk management practices; (ii) one member of the committee should be a

[66] The rule was effective for all proxy statements (Form DEF 14A) filed on or after February 28, 2010. The majority of the sample BHCs filed the 2010 proxy statement after this date, but before the passage of Dodd-Frank.

[67] Most frequently, the issue encountered in earlier years was the situations where a BHC disclosed having a risk committee, but did not provide details about the committee's members or meetings.

risk management expert; (iii) the FRB would determine the appropriate number of independent risk committee members, and (iv) the rules should be more stringent for the largest financial institutions (12 U.S.C. 5365, §165(h)3; see also, Figure 1). It was not until the EPS rule-making process (which took place from late 2012 to early 2014), that the Federal Reserve clarified these, and added others, such as the CRO requirement.

Taken together, these factors suggest that examining only the risk committee requirement, at least initially, yields the cleanest comparison across the whole sample period. The focus on just the committee also has some intuitive appeal, as the establishment of a new committee is also the most visible board-level change. A more ancillary reason to focus on the strict definition of a risk committee is that prior literature, as discussed in Section 2, has not consistently defined board risk oversight.

Implicit in this approach is the assumption that a risk committee, or more precisely, the *RC* definition I employ in this study, is a satisfactory proxy for real risk oversight activities. Whether or not that appears to be the case, I incorporate the other mechanisms required by the EPS rules – the sum of which should be fairly representative, on average, of real practices – in Section 7.

5.2. Design

I exploit three important features of this setting to examine whether risk committees are associated with bank risk after Dodd-Frank. First, the sample includes banks that have been subject to Dodd-Frank from its passage, and banks that become subject to the law at some point between 2010 and 2015, and banks that are not yet subject to any of the provisions of Dodd-Frank. Because all sample BHCs have lower risk in the post-crisis (and post-Dodd-Frank) period, the banks that

are not yet subject to any part of Dodd-Frank help to rule out concerns that tests will only pick up changes in risk attributable to changes economic conditions. Including this group of banks also helps to separate the effects of Dodd-Frank from those of time, alone.

Second, the Section 165 (EPS) requirements are the only set of reforms that both apply at the *individual* BHC level, and also apply to *all* banks of a given size. All other Dodd-Frank reforms either apply to the entire industry, to all financial firms of a given type or size, or only to banks engaged in certain activities. Third, across all three of these groups, individual BHCs have formed enterprise risk committees at different times.

This variation allows for the use of what is essentially a difference-in-difference specification that exploits both the staggered applicability of Dodd-Frank to individual BHCs, and BHCs' staggered formation of standalone risk committees (or implementation of the EPS requirements, more generally), to separate the effect of risk governance – if any – from more general post-crisis changes in risk among all banks and from changes in risk among banks subject to Dodd-Frank. The method is similar to that of other studies that examine the effect of staggered policy enactment (e.g., Bertrand & Mullainathan, 2003; Armstrong, Balakrishnan, & Cohen, 2012). The design controls for time-invariant firm characteristics by using the same firm over time, and for time-related trends by using similar firms, in different stages of EPS implementation in the same time period, as controls.

More formally, to evaluate the effect of board risk oversight on bank risk, I estimate the following OLS model for the full sample period:

$$Risk_{i,t+1} = \alpha + \beta_1 * RC_{i,t} + \beta_2 * DF_{i,t} + \beta_3 * RCxDF_{i,t} + \gamma * X_{i,t} + YEAR\ FE + e_{i,t}, \quad (1)$$

where the subscripts *i* and *t* represent BHCs and time, respectively. Following prior literature (e.g., E&Y, 2013), I estimate all regressions with lagged independent variables to rule out simultaneity concerns, and year fixed effects (*YEAR FE*) to control for common shocks to banks' risk across time. In all regressions, standard errors are clustered by BHC.

The dependent variable, *Risk*, represents one of several risk proxies, and the vector *X* represents control variables, all of which are defined below. Variable definitions and related data sources are also provided in Appendix B.

As discussed previously, the variable *RC* equals one for all bank-years where there is a standalone board committee responsible for enterprise-wide risk oversight.[68] The variable *DF* is both time- and bank-size-specific: the indicator equals one in the first year, and each year thereafter, that a bank must begin complying with the various provisions of Dodd-Frank. More specifically, for banks with year-end assets of at least $10 billion in 2010, I set *DF* equal to one for all years from 2011, forward.[69] For all other BHCs, *DF* equals one from the first year after a bank surpasses $10 billion in average total assets, forward. For example, if a bank ends 2011 with assets of $9.5 billion, and has ending assets of $11 billion for 2012, *DF* equals one for this bank from 2013 through the end of the sample period.

The EPS mandates were not effective until 2015, and the specific EPS rules were not drafted (finalized) until 2012 (2014). By defining *DF* in this way, I assume that whether or not the final rules or effective dates for any portion of Dodd-Frank (including the EPS standards) were

[68] Refer to Section 4.2.1 for details.

[69] As discussed in a previous footnote, one BHC in the main sample (MB Financial) has average assets above the $10 billion threshold in 2009 and 2010, but then its assets fall below $10 billion until mid-2014. A review of MB Financial's disclosures (in all 10-K's for 2010 through 2014) confirmed that the BHC did not become subject to Dodd-Frank until 2015. Accordingly, I set *DF* equal to zero for this BHC until 2015.

known with certainty, any BHC with at least $10 billion in assets would be aware of future regulatory expectations surrounding board-level risk oversight, and begin to prepare accordingly. Using the effective date, instead, would rely on the "highly unlikely assumption" that banks will not alter their practices in advance of the effective date (Beatty & Liao, 2014, p.341). At least anecdotally, there is sufficient support for this assumption. Beginning in 2011, the majority of the sample BHCs' disclosures directly address the implications of various rules within Dodd-Frank, including Section 165, and any actions the company had undertaken (or had plans to undertake) in order to comply with the new regulations.[70]

The main variable of interest, *RCxDF*, is the interaction between *RC* and *DF*. Recall that the sample contains banks subject to Dodd-Frank that (1) had risk committees in place prior to having to comply with Dodd-Frank, (2) formed risk committees after becoming subject to Dodd-Frank, and (3) never form risk committees that meet the expectations set forth within the EPS rules. The sample also contains banks that are not yet subject to Dodd-Frank, some of which have formed EPS-compliant risk committees. In the presence of the *RCxDF* interaction, then, the estimated coefficient on *RC* measures the difference in bank risk associated with risk oversight relative to observations with both *RC* and *DF* equal to zero, all else equal. In other words, *RC* is identified by bank-years with voluntary, standalone, enterprise risk committees.

The main effect for *DF* captures the difference in bank risk when BHCs subject to Dodd-Frank have not yet formed an EPS-compliant risk committee. In the presence of year fixed effects,

[70] In further support of the assumption behind the *DF* definition, the Federal Reserve (FRB) both (a) expected BHCs to be fully and actively compliant with EPS by the effective date; and (b) gave BHCs relatively little time (less than 10 months) between issuing the final rules and the effective date to comply with the rules. It seems reasonable to expect that if BHCs had not already begun the implementation process, the time granted between the final rule issuance and the effective date may have been longer. Moreover, the full effect of risk committee formation is not likely realized for any individual BHC within a single year, so a more traditional two period difference-in-differences model is likely insufficient to capture the full effect of risk governance, if any.

the estimate on *DF* is incremental to changes in risk over time that are common to all sample BHCs where *DF* equals zero. A negative (positive) and significant coefficient on *DF* (β_2) would indicate that BHCs have lower (higher) risk, on average, after becoming subject to Dodd-Frank but before forming a risk committee, relative to BHCs not yet subject to Dodd-Frank during the same time periods.

Finally, *RCxDF* captures the incremental difference (i.e., the difference-in-differences) in risk, if any, when both *RC* and *DF* equal one, or when risk committees meet regulatory expectations and the BHC is simultaneously subject to complying with all other aspects of the Act. A significant coefficient on β_3 (*RCxDF*) would result in the rejection of H1.

It is important to note that the control group in this estimation is not restricted to banks that never have a risk committee in the post-Dodd-Frank period (e.g., Bertrand & Mullainathan, 2003; Armstrong et al., 2012). The model only requires that the control group consist of similar BHCs (i.e., those that are or will also be subjected to the same regulations within Dodd-Frank), in the same time period, without enterprise risk oversight committees. As long as the composition of observations with and without risk committee varies, and the number of observations and BHCs where *DF* equals one is not fixed, then *RCxDF* is identified (as are the individual year fixed effects).[71]

[71] Because the reforms potentially targeted all BHCs, the model does not include a "treatment" or "control" group in the sense of a more traditional difference-in-differences design.

5.3. Variable Definitions

5.3.1. Market-based Risk Proxies & Related Control Variables

Recall that regulators define bank risk as "the potential that events, expected or unexpected, will have an adverse effect on a bank's earnings, capital, or franchise or enterprise value" (OCC, 2013).[72] As the focal point of this study is the board's oversight of enterprise-wide risk, the only conceptually appropriate way to operationalize risk is with aggregate, or summary measures of risk that are consistent with the regulator's definition. In this regard, market-based measures of bank risk have qualitative appeal, as prices impound the market's expectations of multiple underlying components of risk (e.g., Bushman & Williams, 2015).

The primary risk proxies used in this study are therefore two market-based variables: downside tail risk (*TailRisk*) and daily stock return volatility (*RetVol*). Following prior literature, *TailRisk* is the average of a BHC's lowest 5 percent daily returns over the preceding year, multiplied by negative one so the variable is increasing in risk (E&Y, 2013). If stock returns are normally distributed, *TailRisk* captures the far left tail (i.e., downside) of the market reaction to negative (or bad news) events, which can be interpreted as the probability of a large loss.

Return volatility (*RetVol*) is defined as the standard deviation of a BHC's daily stock returns, measured over the preceding twelve months. Higher return volatility is consistent with greater uncertainty about future cash flows: in other words, higher risk (e.g., Laeven & Levine, 2009; Hoyt & Liebenberg, 2011).

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[72] In the wake of the financial crisis, regulators, politicians, academics, and the general public are also concerned with *systemic* risk, or the collective risk that financial institutions pose to the health of the greater economy. Because the EPS mandates are only one component of Dodd-Frank's "multi-pronged approach" toward reducing systemic risk (12 C.F.R. § 252, 2012, p. 595), it is not possible to disentangle changes in systemic risk attributable to firm-level changes in risk governance from those changes attributable to other Dodd-Frank reforms. Nevertheless, lower risk at the bank level should be associated with lower systemic risk, all else equal.

Control Variables for Market-based Risk Tests

In all regressions, I control for bank *Size* and *SizeSq* (the square of *Size*, which is first orthogonalized to *Size* to reduce collinearity). In regressions with *TailRisk* and *RetVol* as the dependent variable, *Size* is measured as the natural logarithm of ending total assets or of market value of equity, respectively. I control for bank performance with pretax earnings before extraordinary items, scaled by total risk-weighted assets (*pretaxRoRWA*). Scaling earnings by risk-weighted assets, rather than by total assets, controls for inherent differences, in both earnings and risk, across similar-sized banks with very different balance sheet compositions.

I include several additional variables to control for differences in risk attributable to banks' underlying business models and balance sheet composition. To control for the diversity of banks' activities, I include the ratio of non-interest income to total interest and non-interest income (*NonInt_Ratio*) and its square (*NonInt_RatioSq*).[73] To the extent that a bank derives most of its income from lending activities (fee-based income-generating activities), the non-interest ratio is lower (higher), and therefore controls for differences in risk across bank business models.

I also include a measure of loan portfolio quality that captures both portfolio health and the extent to which a bank is effectively managing and accruing for non-performing loans. The variable *ALLL>NPL* is the difference between the allowance for loan and lease losses and non-performing loans, and is increasing to the extent that a bank has sufficient reserves to cover a total-loss scenario in its portfolio of non-performing loans and leases. Because this measure takes on

[73] Gambacorta and van Rixtel (2013) find a non-linear relation between income diversity and bank returns on equity. As with *SizeSq* and *Size*, I orthogonalize *NonInt_RatioSq* to *NonInt_Ratio* before including the variable in the regressions.

larger values (both positive and negative) for banks engaged in relatively more lending activities, *ALLL>NPL* also controls for differences in risk across various business models.

Section 619 of the Dodd-Frank Act, commonly referred to as the Volcker Rule, prohibits bank holding companies from engaging in proprietary trading activities and holding or sponsoring certain investments. Ideally, one would control for these types of activities directly; however, banks are not required to disclose earnings from proprietary and non-proprietary trading activities separately. Since aggregate net revenues from all types of trading activities are reflected in non-interest income, *NonInt_Ratio* (and its square) already control, at least indirectly, for proprietary trading activities.[74] In addition, I include *HighTrdgDum*, an indicator for observations with relatively high values (in the 95th percentile) of trading assets to total assets, in all tests.

I also control for liability structure with the ratio of subordinated notes and debentures to total equity (*SubordDebt/Eq*). Certain components of subordinated debt, such as trust-preferred securities and other "illiquid" funds which involve commitments to invest, are now either limited or prohibited under the Volcker Rule, a highly contested, last-minute addendum to Dodd-Frank. To the extent that these securities and contractual obligations contributed to higher risk during and leading up to the crisis, this variable is an important control for subsequent changes in banks' liability structures as a result of this rule.

Because prior studies find that executives' experience is associated with bank risk (e.g., Ahmed et al., 2015), I include *CEO_Tenure* (the log of one plus the current CEO's tenure) in all tests. To control for differences in the sample BHCs' underlying ownership structures, I include

[74] An in-depth examination of the SEC filings and FR Y-9Cs for a handful of sample banks known to have had large proprietary trading divisions revealed little insight or direction insofar as collecting, or constructing, an objective and replicable measure of proprietary trading activities.

FamFdrOwnshp, or the percent of common equity shares held by individuals or beneficial owners known to be founders (or relatives of founders) of the bank. Founder-family presence on the board of directors or management team, and/or ownership of at least 1% of the common shares outstanding, is present for just under 30% of the sample observations.[75] High founder-family ownership may represent higher risk-aversion, or lower effectiveness of market discipline, with opposing effects on risk-taking (decreasing and increasing, respectively).[76]

Perhaps unsurprisingly, both market-based measures of risk are highly correlated with the receipt of federal assistance (both the incidence and the magnitude) during and after the crisis (i.e., TARP "bailout" funds). I therefore include *TARP Issuance*, or the value of preferred stock issued by the BHC in 2008 or 2009 (and 0 for all other years), scaled by beginning equity, to control for subsequent stock transactions related to TARP issuance that may have affected stock returns.

5.3.2. Non-market Risk Proxies & Related Control Variables

In addition to the two market-based proxies of bank risk, I use several income statement and balance sheet proxies for bank risk. Beyond potentially triangulating the results for market-assessed risk, these proxies also allow for a slightly larger sample size, since some sample BHCs are not listed on a national stock exchange in the earlier years of the sample period. The measures fall into three categories: earnings volatility, asset composition, and capital adequacy.

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[75] The number of shares held by directors and members of the executive management team are reported in either the proxy statement or the 10-K. The corresponding percentage of shares outstanding, however, is not provided – and therefore not included in this measure – unless holdings exceed 1%. Likewise, in the event that an individual (or a group that files a Schedule 13D with the SEC) is not a member of the board or executive team, and holds more than 1% but less than 5% of the shares outstanding, share ownership is not reported anywhere, and is therefore omitted from this measure.

[76] Barry, Lepetit, and Tarazi (2011) find that higher family equity stakes are associated with lower risk among privately-held, but not publicly-traded, European banks. To my knowledge, no study examines this relation among U.S. bank holding companies.

Strong risk management practices should minimize variance in all outcomes, including earnings (e.g., Stulz, 1996; McShane et al., 2011; Edmonds, Edmonds, Leece, & Vermeer, 2015). To examine this conjecture within the context of this study, I use three alternate proxies for earnings volatility: the standard deviation of (1) after-tax earnings (*ROAvol*), (2) pretax earnings before loan loss provisions (*EBLLPvol*), and (3) net interest margin, (*NIMvol*), all scaled by average total assets. I require eight consecutive quarterly observations, including the quarter ended at the end of year *t*, to compute the standard deviations, and take the log of the resulting values for use in the regressions.[77] Higher values of each of the earnings volatility proxies correspond to higher risk.

To complement the earnings volatility tests, I use two balance sheet-based measures of risk. The first, *RWA*, is the ratio of risk-weighted assets to total assets. As a summary measure of overall asset composition, risk-weighted assets conceptually reflects the risk inherent within an individual bank's business strategy. A higher ratio of risk-weighted assets total assets (i.e., higher *RWA*) reflects a more aggressive business strategy.

The second, which is the so-called "Texas Ratio," captures both asset quality and capital adequacy (*TexasRatio*), with a greater emphasis on the condition of the bank's loan portfolio.[78] The ratio is calculated by taking the sum of non-performing loans (*NPL*) and other real estate owned, and dividing by the sum of Tier 1 capital and the balance of the allowance for loan and

[77] The use of quarterly data for these measures was intended to minimize the influence of time-varying economic conditions that would be present if computing the standard deviation of annual earnings. The measures are logged because they are highly skewed.

[78] During an informal telephone interview, the current Chairman and CEO of a large, privately held BHC (which, if publicly traded, would be included in this study's sample) suggested that I include this ratio as a measure of overall bank health.

lease losses (*ALLL*).[79] Essentially, the Texas Ratio captures the degree to which a bank is insulated against severe losses in its loan portfolio. One advantage of the measure is that it does have some predictive value: higher values are considered leading indicators of bank distress, and analysts often include banks with ratios above 40% on "troubled bank watch lists" (Jesswein, 2009).[80] One downside of this measure, though, is that it has little-to-no meaning for business models that do not revolve around lending. I therefore set values of *TexasRatio* to missing if loans comprise slightly less than 34% of total assets (this value corresponds to the bottom 4% of the sample-wide distribution of the loans-to-assets ratio). This treatment reduces the sample size for these tests by 44 bank-year observations.

Finally, I explore whether risk committees are associated with regulatory capital ratios. Regulators monitor several measures of capital adequacy, and each is intended to capture different facets of bank soundness (e.g., Spong, 2000). Regulatory capital holdings should therefore capture, albeit indirectly, a bank's risk tolerance. I therefore use four measures of bank capital: (1) Tier 1 risk-based capital ratio (*Tier1/RWA*), (2) Tier 1 Leverage Ratio (*T1Levg_Ratio*), (3) Total risk-based capital ratio (*TotCap_Ratio*), and (4) Tier 1 scaled by ending assets (*Tier1/AT*). Different from all other dependent variables used within this study, *lower* values of all four capital ratios are generally thought to be consistent with higher risk. That being said, there are sound reasons to expect that better risk management, through more effective capital deployment (i.e., laying off of bad risks and taking on good risks), may permit a bank to safely hold lower levels of capital, all else equal (e.g., Stulz, 2015).

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[79] Other real estate owned is generally comprised of foreclosed properties.

[80] For an example of a troubled bank watch list, see http://bankimplode.com/list/troubledbanks.htm.

Control Variables for non-Market Risk Tests

With three exceptions, the control variables for all measures of earnings risk are the same set of controls as for the market risk tests. First, because each earnings volatility proxy is a function of pretax earnings, I replace *pretaxRoRWA* with an indicator for negative net income (*Loss*). Second, because the receipt of TARP bailout funds could be considered a result of earnings risk, I omit *TARP Issuance* from the earnings volatility tests. Third, I augment the earnings volatility controls with *MVE/RegCapital*, or the firm's market value of equity scaled by risk-weighted capital, to control for growth opportunities.[81]

In the regulatory capital tests, the set of control variables is expanded to include *LoanGrowth* (total loans scaled by ending total assets in year *t*, divided by the same ratio in year *t-1*) and the ratio of deposits to loans (*Depos/Loans*). The latter captures the degree to which a bank can increase lending with readily available, low-cost funds. A lower deposits-to-loans ratio means that a bank is relatively constrained, or that it must use other (non-deposit) sources of financing for lending activities, while higher values of this ratio indicate increased lending capacity.[82] To some extent, *Depos/Loans* also controls for differences in the sample BHCs' business models. Finally, the Loss indicator is dropped and the variable *pretaxRoRWA* is added back to control for recent operating performance.

The control variables in the *TexasRatio* regressions differ from the regulatory capital controls in a few ways. First, because the loan loss allowance is a component of the ratio, I replace the *ALLL>NPL* variable with an indicator equal to one if the provision for loan and lease losses

[81] Results are not different with a more traditional measure of Market-to-Book (i.e., MVE scaled by the book value of equity).

[82] The capital ratio models also exclude *CEO_Tenure*. Inferences are unchanged when including this variable, and the coefficient estimate on *CEO_Tenure* is not significantly different from zero.

exceeds the amount of loan and lease charge-offs for the year (*LLPvsCHO*). Second, since the ratio is generally meaningful only for banks that engage in relatively more lending, I omit *NonInt_Ratio* (and its square) from these tests.

An exploratory analysis reveals that the ratio of risk-weighted-assets to total assets (*RWA*) is remarkably constant within a bank (for example, a regression of *RWA* on firm i.d. dummies, untabulated, yields an adjusted-R^2 of 0.756). I therefore estimate the *RWA* regressions with BHC-fixed effects, and employ a smaller set of controls, which are discussed in Section 6 and defined in Appendix B.[83]

5.4. Descriptive Statistics

Broad summary statistics for all variables used in this study are included in Appendix D, in Table D.1. In Appendix C, Figure 2 displays plots of the actual sample banks' values, by year, for four of the above-described *Risk* proxies: *TailRisk* (A), *RetVol* (B), *ROAvol* (C), and *TexasRatio* (D).[84] The grey area behind the annual dot plots represents the 95% confidence interval around the mean annual values from a regression of *Risk* on year indicators. Across the full sample period, *TailRisk* ranges from around 1.5% to over 16% (1st and 99th percentile values, respectively), and peak values for this measure occur in 2009, followed by 2008. The highest values for stock return volatility (*RetVol*) occur in the same periods. Due to the measures' use of eight quarters of data, values for all three earnings volatility measures (*ROAvol*, *EBLLPvol*, and *NIMvol*) peak slightly

[83] The sample for the *RWA* tests is also restricted to BHCs with at least 11 years of complete data.

[84] The takeaways from graphs for the additional earnings volatility measures (i.e., *EBLLPvol* and *NIMvol*) would not have incremental informative value, and have therefore been omitted from Figure 2.

earlier (in 2008) and remain higher for a few periods. Accordingly, in addition to the one-year lag used for all other *Risk* proxies, I also estimate the earnings volatility tests with independent variables lagged two years.

The average sample BHC has a *TexasRatio* of 0.183 (see Table D.1), meaning that troubled assets currently represent 18.3% of the capital and loan loss allowance cushion. Figure 2 shows that values of the ratio peak in 2009 and 2010, suggesting that this variable is capturing risk as intended. The interquartile range of risk-weighted assets-to-assets (*RWA*) is 0.665 to 0.815 (see Table D.1). Since risk-weighted assets comprise the denominators for several regulatory capital ratios, the intentional pursuit of a business model that would cause the *RWA* ratio to be greater than unity seems counter-intuitive and cost-prohibitive. Nevertheless, I note that the sample includes 24 observations with *RWA* values in excess of 1.0, and several of those instances occur well outside the range of the crisis years (untabulated).

Means and tests of mean differences for the aforementioned risk proxies and control variables are presented in Table 3, by pre-2010 and post-2010, and by *RC* within each time period.[85] Because all regression models use lagged independent variables, all values in this Table 3, as well as in the supplemental tables in Appendix D, are tabulated so that risk variables are measured in year $t + 1$, and control variables are measured in year t. For example, Table 3 presents means for the dependent (independent) variables measured from 2005 to 2016 (2004 to 2015).

In the pre-2010 period, the tests of differences in Table 3 show that bank-year observations where *RC* equals one are associated with higher average risk across both market-based risk proxies, two of the three earnings volatility measures, and the *TexasRatio* ($p < 0.01$ for all differences).

[85] Overall summary statistics for the full sample and full period are included in Appendix D, Table D.1.

Risk committees do not appear to be associated with any meaningful difference in risk-weighted assets, nor in any of the regulatory capital ratios, during the pre-period.

In contrast, in the post-period (2011-2016), the sign of the mean difference for all risk proxies other than *RWA* is opposite that of the pre-Dodd Frank period. Risk committees are now associated with significantly lower average values of *TailRisk*, *RetVol*, *ROAvol* and *EBLLPvol*. All sample BHCs appear to have increased the four capital ratios, on average, from the pre- to the post-period, although observations where *RC* equals one appear to have done so by less than BHCs where *RC* equals zero. Only the *LevgRatio* mean difference, however, is different from zero ($p < 0.05$).[86] Because U.S. Basel III became effective in the last two years of the sample period for some of the largest BHCs, referred to for capital purposes as *Advanced Approaches* banks (FRS, 2013, p.62029), I perform all *RWA* and capital ratio tests both with, and without, this group.[87]

With respect to the control variables, pre-2010 bank-year observations where *RC* equals one are larger (*aSize*, $p < 0.01$, and *mSize*, $p < 0.05$), are less profitable per dollar of risk-weighted assets and have more frequent losses (*pretaxRoRWA* and *Loss*, respectively; $p < 0.01$ for each), are under-reserved for the current level of non-performing loans (*ALLL>NPL*), and receive larger bailouts per dollar of pre-bailout equity (*TARP Issuance*). In addition, BHCs with risk committees

[86] Table D.1 shows that the average sample bank has a ratio of Tier 1 capital to risk-weighted assets (*Tier1Levg*) of just over 9.0%, which is well over the *current* (i.e., under U.S. Basel III – see subsequent footnote for details) regulatory minimum of 6%. The same can be said for the mean values of each capital ratio. In fact, an exploratory analysis (untabulated) revealed that apart from the accompanying changes in the definitions calculations of the ratio components, all but a small handful of the sample BHCs would have met the U.S. Basel III capital requirements for a classification of adequately-capitalized not only when the rules were issued in 2013, but also for the majority of the sample period. Those that would have fallen short, hypothetically, of those standards would have only done so by a small percentage (0.5% to 1.0%), and were considered either adequately- or well-capitalized under the capital standards in effect at the time.

[87] Relative to the previous requirements, the U.S. Basel III regulatory capital standards are more stringent in terms of what counts (and what does not) as Tier 1 and Tier 2 capital, the weightings applied to various asset categories for the calculation of risk-weighted assets, and the minimum percentages necessary in order to be considered well-capitalized.

during this time period had greater levels of riskier debt as a percent of equity (*SubordDebt/Eq*) and engaged more in non-traditional banking activities (*NonInt_Ratio*). The shift in focus towards a non-interest revenue model likely explains the negative average value for *LoanGrowth* for this group.

Finally, I note that in the post-period, several of the differences in the control variables are smaller in magnitude and in statistical significance, and many also change signs. In addition, the number of observations in each group (*RC* versus no *RC*) is relatively more balanced in the post-2010 period.

As supplements to Table 3, Appendix D contains Table D.1 (Overall summary statistics for the full sample), and two additional tables. Table D.2 contains tests of mean differences, estimated in the pre-Dodd-Frank period (2004-2010), for all dependent and independent variables, across two size groups. More specifically, the variable *DF Bank* equals one if the BHC ever becomes subject to Dodd-Frank within the sample period (i.e., assets are greater than $10 billion by year-end 2014), and zero otherwise. It can be reasonably argued that the Act arbitrarily singled out banks of a given size from others. In support of this conjecture, as well as of incorporating the group of smaller BHCs (i.e., those where *DF Bank* equals zero) in the subsequent analysis, Table D.2 shows that there are no differences across the two groups in the mean values *TailRisk*, *RetVol*, nor in any of the earnings volatility measures, in the period leading up to the passage of Dodd-Frank. There is also no difference across the two groups, on average, in *RWA*.

Table D.2 does show that irrespective of the particular regulatory capital definition, the larger BHCs (where *DF Bank* equals one) hold smaller amounts of capital per dollar of assets or

risk-weighted assets.[88] This may also explain the significant difference in the average *TexasRatio* across the two groups.

Because there may still be concerns about the use of the smaller BHCs as a control group, I estimate and present regression results for all of the *Risk* variables using both the full sample and for only the sample BHCs where *DF Bank* equals one. Furthermore, I perform the same tests for all dependent variables after dropping various grouping of the largest BHCs (e.g., assets greater than $50 billion, global systemically important banks, or GSIBs, etc.), and comment on any changes in inferences where appropriate.

Finally, Table D.3 presents the Pearson pairwise correlation coefficients for all *Risk* measures (in year $t + 1$) and all independent variables (in year t), for the full sample and full period. The signs and significance of all correlations are consistent with expectations and with prior literature.

[88] That larger banks hold less capital per dollar of assets is a well-documented result within the banking literature.

6. BOARD RISK COMMITTEES & BHC RISK – REGRESSION RESULTS

6.1. Primary Multivariate Results

6.1.1. Market-based Risk

The results for tests of the association between board-level risk committees (*RC*) on the market-based measures of bank risk across the entire sample period (2004 to 2016) are presented in Table 4 across the entire sample period (2004 to 2016). Panel A and Panel B display the regression results for *TailRisk* and *RetVol*, respectively. For each risk proxy, I first present estimates for stepwise regression models that first include only the *RC* indicator, and subsequently add *DF* and then *RCxDF*. In each panel, columns (1) to (3) contain results for the full sample of BHCs, and columns (4) through (6) are for the *DF Banks*, only (under column heading DFB Sample). I caveat that because only a handful of these larger BHCs have both *RC* and *DF* equal to zero in the later years of the sample period, the year fixed effects are only weakly identified.

The results for the control variables are consistent with expectations and with prior literature. For example, performance (*PretaxRoRWA*) is negatively associated with both downside tail risk and stock return volatility ($p < 0.01$ in all specifications). The coefficient on *NonInt_Ratio* is negative in all specifications, but is only significantly different from zero in the *TailRisk* tests for the *DF Bank* sample (Panel A, columns 3-6, $p < 0.05$). Consistent with the findings in Gambacorta and van Rixtel (2013), however, the relation appears to be non-linear within the full sample: both *TailRisk* and *RetVol* are increasing in *NonInt_RatioSq* (columns 1, 2, and 3 of Panels A and B). The indicator for high trading assets, *HighTrdgDum*, is positive in all specifications, and is significantly different from zero in the *RetVol* tests (Panel B, all columns, $p < 0.05$).

Unsurprisingly, *TARP Issuance* has a strong and negative relation with future risk across both risk proxies, and larger loan and lease loss reserves relative to non-performing loans (*ALLL>NPL*) are associated with moderately lower risk across all specifications ($p < 0.05$).

Longer *CEO Tenure* is related to lower future risk for both *TailRisk* and *RetVol*, consistent with prior literature documenting the accrued benefits of executive experience (e.g., Ahmed et al., 2015). Founder-family ownership (*FamFdrOwnshp*) is negatively associated with downside tail risk and return volatility in all specifications, but only for the full sample. Given that the under $10 billion group has a higher relative proportion of firms with founder-family presence, this is not surprising; yet, this result does highlight the importance of controlling for this characteristic within all full-sample models.

Turning to the results for the risk committee indicator (*RC*), the results in Table 4 suggest that voluntary, standalone enterprise risk committees are not associated with any difference in either *TailRisk* or *RetVol*. The estimate for *DF* is positive in all specifications, but is never statistically different from zero. For both the *TailRisk* and the *RetVol* tests, the estimates on *RCxDF* are always negative, but never significant. Taken together, the results in Table 4 provide little support for the notion that board-level risk committees have any incremental association with changes in bank risk in the post-Dodd-Frank period.

6.1.2. Earnings Risk

I present the results for the earnings volatility (*ROAvol*, *EBLLPvol*, and *NIMvol*) tests in Table 5 (Panels A through C, respectively). As discussed in Section 5.4, because these measures incorporate eight quarters' worth of information, I present results from the estimation of equation (1) for each earnings volatility proxy measured in year $t + 2$ alongside the estimates for earnings

volatility in year $t + 1$. To conserve space, I omit the results for the middle step-wise column that includes both the *RC* and *DF* indicators, but without the *RCxDF* interaction, and because the coefficient estimates are similar across each of the three measures, I only present the estimates for the full set of controls for *ROAvol* (Panel A), and present abbreviated results for *EBLLPvol* (Panel B) and *NIMvol* (Panel C).[89]

The results for the control variables are in line with expectations and with prior literature. For example, while higher income from non-traditional activities (*NonInt_Ratio*) has no statistically significant association with *ROAvol* (Panel A), the relation between income diversity and earnings risk is non-linear. All coefficient estimates for *NonInt_RatioSq* are positive and significant ($p < 0.01$). The estimates for *HighTrdgDum* are positive and significant in the *ROAvol* and *EBLLPvol* tests, supporting for the notion that higher levels of trading activities generate more variable income, *ceteris paribus*. Surprisingly, *Size* is not significantly associated with *ROAvol*, but the estimates for *SizeSq* are negative and significant ($p < 0.01$) for the full-sample tests with a one year lead of the dependent variable (Panel A, columns 1 and 2). While this may imply there are economies to scale with respect to earnings consistency, this relation is generally not present for the other two proxies (untabulated).

Turning to the variables of interest, the only estimates that are significantly different from zero are for the large bank subsample (*DF Banks*) with two-year-ahead *ROAvol*. The estimate on *RCxDF* is negative and weakly significant in the two-year-ahead *EBLLPvol* tests (Panel A, column 8; $\beta_3 = -0.351$, $p < 0.10$). Overall, the evidence in Table 5 for the earnings volatility tests does not provide sufficient grounds to reject H1.

[89] For the omitted specifications, the signs and significance of the estimates on *DF* and *RC* do not differ from those in the full model with the interaction term.

To examine whether more forward-looking earnings volatility measures would provide stronger tests of the benefits of risk committees, I performing three (separate) additional tests. First, I estimate regressions with all four earnings risk proxies measured in year $t + 3$. Second, because some firms enter the sample in later years, and are therefore missing values for the earnings risk measures until after Dodd-Frank, I restrict the sample to only those firms with at least 11 observations (i.e., the "more balanced" sample). Third, using a constant sample of BHCs, I restrict the estimations to use only those firm-years from 2004 to 2007 and 2013 to 2016 to reduce the influence of crisis years on the earnings volatility estimates. Results for all three sets of tests, not tabulated, are similarly inconclusive.

6.1.3. Balance Sheet Risk

6.1.3.1. Risk-Weighted Assets

As previously discussed (see Section 5.3.2), the ratio of risk-weighted assets to total assets (*RWA*) is relatively fixed across time within banks. I therefore augment the regression model with BHC fixed effects, and for transparency, I present estimates without and with BHC fixed effects in Panel A of Table 6.[90] In all *RWA* tests, I use a more-balanced subset of the sample BHCs with at least 11 bank-year observations, each. This restriction drops two BHCs from the panel, for a total of 82 BHCs per year.

[90] An initial concern in using a firm-fixed effects model with indicator explanatory variables is that relatively constant binary indicators will be absorbed by the respective firm's intercepts. In the extreme scenario of a bank having *RC* equal to 1 for the entire sample period, the coefficient estimate for *RC* (β_1) will exclude the effect of that bank having a risk committee entirely. In the same vein, most endogeneity concerns about the choice to form a risk committee prior to Dodd Frank are allayed, as formations that occur later in the sample period are more likely to be related to regulatory expectations. Further, shorter-term innovations in those variables, or changes, such as those identified by *RCxDF*, will be more strongly identified for those firms that had risk committees in place for longer periods before Dodd Frank.

I also employ a smaller set of control variables for the *RWA* tests, and strive to include only those variables that not only appear to explain common differences in *RWA* across banks, but that have relatively large within-subject variance relative to between, to better identify the effects of innovations in firm characteristics on changes in *RWA*. More specifically, the RWA tests include the following controls: *Size* (log of ending assets), *NonInt_Ratio*, the proportion of the loan portfolio that is made up of commercial and industrial loans and of real estate loans (*C&I Loans* and *RealEst Loans*, respectively), *CEO_Tenure*, the sum of cash and marketable securities over total assets (*Slack*), *SubordDebt/Eq*, and the fraction of loans that is currently classified as non-performing (*NPLoans/TotLoans*).

Depending on whether or not the model includes firm fixed effects, the estimates on the control variables, as shown in Panel A of Table 6, differ in several ways. For example, without BHC fixed effects, *Size* has a positive and significant association with risk-weighted assets. This effect disappears upon the inclusion of BHC fixed effects. The two variables representing proportions of loan categories in the BHC portfolios are both significant: BHCs with loan portfolios more heavily concentrated in commercial and industrial loans (*C&I Loans*) and in real estate-backed assets (*RealEst Loans*) have higher risk-weighted assets, on average. The ratio of non-performing loans to total loans (*NPLoans/TotLoans*) is negatively associated with future *RWA*, but only in the firm fixed effects model estimated for the full sample.

Turning to the variables of interest, the coefficient on the *RC* indicator is not significant in any of the four tests for *RWA*; however, I note that the sign changes upon the addition of BHC fixed effects (from negative to positive) in the full sample and the *DF Bank* sub-sample. The coefficient on the *DF* indicator is negative in all models, and is significantly negative in the full sample tests, both without and with BHC fixed effects (columns 1 and 2; $p < 0.01$ and $p < 0.05$,

respectively). The *RCxDF* interaction term is negative and significantly different from zero in both firm fixed effects models (columns 2 and 4). This suggests that after controlling for a given bank's average asset mix (and by extension, business model), time, and all other aspects of Dodd-Frank, large BHCs with mandatory EPS-compliant risk committees have weakly lower values of risk-weighted assets. Since several regulatory capital ratios use risk-weighted assets as the denominator, this finding suggests that perhaps some BHCs (or more specifically, BHCs with *RCxDF* equal to 1) are achieving compliance with new regulatory capital requirements by restructuring the bank's underlying investments and activities (i.e., by de-risking the balance sheet), rather than by holding additional capital.

6.1.3.2. Texas Ratio

Panel B of Table 6 presents the results for tests of the association between board-level enterprise risk committees and the Texas Ratio, the joint proxy for loan portfolio health and adequacy of regulatory capital and the loan loss allowance.[91] Recall that the values of this variable are increasing with risk of distress. The estimated coefficients on *RC* (*DF* and *RCxDF*) are positive (negative) in all specifications, but are never significantly different from zero.

With respect to the control variables, for the full sample specifications (Panel B, columns 1 and 2), bank *Size*, but not *SizeSq*, has a positive and significant relation with the Texas Ratio, and *MVE/RegCapital*, the proxy for growth opportunities, is negative and significantly associated with loan-related distress. These are both intuitive results, as larger banks tend to hold lower levels of capital per dollar of assets, and may engage in riskier lending to maintain already-large market

[91] The use of balance sheet risk proxies permits a larger estimation sample, all else equal; however, as the sample includes a few BHCs with little-to-no lending activity, I drop observations with *TexasRatio* values in the bottom 4 percentile of the sample, resulting in a small difference between the number of observations used for these tests.

shares within lending activities. Likewise, banks with higher market-to-book capital values are likely able to more easily issue new equity to boost regulatory capital holdings as needed.

In all four columns, *LLPvsCHO* has a strong association with higher future Texas Ratios ($p < 0.01$). This indicator variable equals one if the dollar amount of the loan loss provision exceeds the dollar amount of loans charged off in a given year, meaning that problem loans are accruing faster than they are being charged off. The estimates for the *Depos/Loans* control are negative and highly significant ($p < 0.01$) in all specifications. To some extent, this variable controls for banks different overall levels of lending and deposits; but for those banks with higher lending activities, it also captures the extent to which a BHC has "spent" relatively cheap deposits to fund lending activities. As this ratio decreases, banks must fund loans with more costly liabilities to maintain size (and growth) in the loan portfolio, resulting in a higher required rate of return on loans – or riskier lending activities. The inverse relation between this variable and *TexasRatio* is consistent with this line of thought.

6.1.4. Regulatory Capital

Table 7 presents the abbreviated results with the four regulatory capital ratios (*Tier1Levg*, *LevgRatio*, *Tier1/AT*, and *TotCap*) as dependent variables measured in $t + 1$. Recall that in these tests, the dependent variable is not strictly increasing or decreasing in risk. Positive coefficient estimates simply indicate higher capital ratios, all else equal.

As with *RWA*, there is very little within-bank variation in capital ratios across time. Panels A and B of Table 7 show no differences in the sample banks' regulatory capital ratios attributable to risk oversight, Dodd-Frank, nor their interaction (*RCxDF*). Similarly null results were obtained when estimating these tests with BHC fixed effects, as well as with a dynamic panel data model

(untabulated). Since it is not clear whether regulatory capital should be considered a measure of risk, in the first place, I perform no other tests with these measures as dependent variables.

6.2. Additional Analyses

6.2.1. Sample-Based Sensitivity Tests

In Table 8, I present the abbreviated results from the estimation of equation (1) with both market risk proxies (*TailRisk* and *RetVol*), under different sample conditions. For each dependent variable, I present the estimates for *RC*, *DF*, and *RCxDF* after the following independent conditions: (i) requiring that all sample BHCs are in the sample for at least 11 years; (ii) dropping covered institutions (BHCs that ever have assets greater than $50 billion); and (iii) dropping *GSIB* BHCs, or the six sample BHCs that are designated by the Basel Committee on Banking Supervision as Global Systemically Important Banks (*GSIB* BHCs).

With one exception, the sign and significance of each coefficient estimate is similar to that reported within the respective panel of Table 4. The single exception is that for stock return volatility tests, the estimate on *DF* is positive and is now statistically significant (Column 5; β_2 = 0.020, $p < 0.05$) when the covered institutions are dropped from the regressions. This implies that relative to BHCs not yet subject to Dodd-Frank, the subset of BHCs with assets between $10 and $50 billion have higher stock return volatility in the post-Dodd-Frank period.

While not tabulated, similar tests were performed for all other dependent variables used in this study, and results were similar enough to the previously reported results that additional reporting was not deemed necessary.

6.2.2. Reconciliation to Prior Literature

The null results documented in this Section do not shed light on the mixed results within prior literature, as summarized in Section 2. I therefore re-estimate equation (1) for the pre-Dodd-Frank period (2004-2010), and again for the crisis period (2006-2009), to examine whether the RC indicator yields similar results to extant studies. In particular, I am interested in understanding and explaining the differences in both sample composition and research design (including data collection choices) between this study and E&Y (2013), which is the only extant study to consistently find – for a similar sample of U.S. BHCs – that stronger risk controls are associated with lower future risk.

For these tests, I only use the market-based proxies, since E&Y uses the same measures and this should enhance comparability. The results of the initial tests, which include only the *RC* indicator (because *DF* and *RCxDF* are both equal to zero for all BHCs during this time period), are presented in Table 9, Panel A. None of the coefficient estimates on *RC* are significantly different from zero, but I note that each estimate is positive, which runs counter to the E&Y results.

In the absence of a dedicated risk committee, E&Y use other committees' characteristics in constructing the study's risk management index. I therefore re-estimate the pre-Dodd Frank tests using a broader definition of board risk oversight. More specifically, I set the indicator *RC_AltDef* equal to one for observations where any board committee has enterprise-wide risk oversight (i.e., committee types *E*, *F*, and *G* from Table 2, Panel A), *or* if the audit committee oversees any subset of risk (committee type *B*). The comparison group consists of BHC-years where either no committee of the board oversees risk (type *A*), or a multi-purpose or silo-type committee oversees only a subset of risks (types *C* and *D*). By default, *RC_AltDef* equals one if *RC* equals one (i.e., *RC* is a subset of *RC_AltDef*).

I first examine *RC_AltDef* alone, and then add the *RC* indicator back to the model. The latter specification is equivalent to having a main effect for more general board risk oversight (*RC_AltDef*), and a conditional term to evaluate the subset of *RC_AltDef* that also meets the more narrow EPS risk committee definition (*RC*). All control variables are the same as those included in the Table 4 estimations, but to conserve space, I present the abbreviated results (i.e., only the estimates for *RC_AltDef, RC,* the intercept, and related summary statistics) in Panels B and C of Table 9. Panel B contains the estimations for the entire pre-Dodd-Frank period (2004-2010), while Panel C presents the results for the crisis period (2006-2009). The latter set of results is most comparable to the results presented within E&Y's Table IV.

In contrast to the results for RC in Table 9, Panel A, the estimated coefficient on *RC_AltDef* is negative in all specifications. The coefficients are not significantly different from zero when *RC_AltDef* is included on its own, but upon the inclusion of *RC*, the effect for *RC_AltDef* becomes significantly different from zero in six out of eight models. The magnitude of the estimate is especially large during the crisis period (Panel C). This result is more in line with the E&Y results; i.e., a more general operationalization of board risk oversight appears to approximate the effect of E&Y's RMI measure.

Moreover, after controlling for that relation, EPS-compliant risk committees (i.e., where *RC* equals 1) are actually associated with *higher* risk during the crisis period (Panel C). These results suggest that banks that formed dedicated, enterprise-wide risk committees did so either to appease regulators (window dressing), or to engage in more risk-taking, both of which would be consistent with E&Y's hypothesized hedging channel. Further, if less clearly delineated risk oversight responsibilities and structures, captured within *RC_AltDef*, are indicative of weaker risk controls, then the result that *RC_AltDef* is associated with lower future risk suggests that BHCs

with lower risk appetites may not have found strong risk controls to be necessary – also consistent with E&Y's hedging story.

The results in Panels B and C of Table 9 suggest that perhaps some other characteristic of the sample firms is captured by E&Y's RMI. This analysis, however, represents only a cursory attempt to reconcile the differing results between this study and E&Y. For the curious reader, a more in-depth analysis of the E&Y study is provided in Appendix F.

6.2.3. Relaxing the Risk Committee Definition

The risk committee's specific form (i.e., standalone) was not clarified until the first EPS rule proposal (in 2012), and does not apply to BHCs with assets below $50 billion. I therefore perform all tests with a more relaxed definition, *RC2*, that incorporates a size-based concession for the smaller sample banks, and allows for the possibility that a bank otherwise in compliance with the risk committee requirements (i.e., risk is the primary purpose, and remit is enterprise-wide) may not have made substantial changes to the risk committee's functions in order to fully comply with the subsequently clarified definition of "standalone." By default, *RC2* equals one for all bank-years where *RC* equals one. Then, for any bank-years where a risk committee has primary risk oversight responsibility and oversees all risks, but is not entirely standalone, I set *RC2* equal to one if the committee meets any one of the following criteria:

> (1) For BHCs of any size: the risk committee has additional responsibilities, but those duties are conceivably risk-related (e.g., debt/equity issuance, dividend policy, etc., which are directly related to capital adequacy; many of these BHCs fall under the Type *F* classification in Table 2, Panel A);

(2) For BHCs with assets < $50 billion: the risk committee has additional responsibilities, but risk oversight is the primary responsibility of the committee (most of these are classified as Type *F* committees in Table 2, Panel A, although a few are Type *E*; note that the "primary" condition continues to exclude audit committees with enterprise-wide risk oversight);

(3) For BHCs with assets < $50 billion, where the main subsidiary bank comprises at least 95% of the consolidated assets of the BHC, only: the risk committee otherwise meets the definition of *RC* but is either (a) at the Bank-Board level, and reports to the BHC board, or (b) a joint committee of the Bank and BHC Boards. The 95% threshold is consistent with the OCC's view that the risk profiles of the bank and the BHC, in this scenario, are essentially the same (12 CFR § 30, 2014).

With the *RC2* indicator in place of *RC*, the results for the market-based risk measures, tabulated in Table 10, are quite different from those presented in Table 4. In the difference-in-differences tests (columns 3 and 6), the estimates for *RC2xDF* appear larger in magnitude (relative to the *RCxDF* estimates reported in Table 4) for both *TailRisk* and *RetVol*. Furthermore, for the *TailRisk* tests (Panel A) the coefficients on *DF* are now significantly positive (full sample $p < 0.05$; DF Banks $p < 0.10$), and the estimate on *RC2xDF* is significantly negative ($p < 0.05$ for both groups). While the *RetVol* results in Panel B display similar patterns to *TailRisk*, the estimates are statistically weaker. Nevertheless, this small change in the *RC* designation yields notably different results, which may suggest that the *specific form* of the risk committee (i.e., standalone) is less important; instead, it may be more essential that the committee be *dedicated* to risk oversight (i.e., that risk oversight is the committee's primary purpose).

6.2.4. Other Sensitivity Analyses

Gao, Liao, and Wang (2016) find that in the first six months 2010, the year in which Dodd-Frank was passed, news of legislative activity related to Dodd-Frank negatively affected financial institutions' stock returns. I run all previous tests after excluding all 2009 observations (where risk

is measured in 2010). Further, to rule out concerns about the specific timing of a few BHCs' risk committee formations during 2010, I re-estimate the Table 4 regressions after dropping observations for both 2009 and 2010 (risk measured in 2010 and 2011), and note that the previously reported inferences are not altered with these exclusions (results not tabulated).

I also perform a variety of sensitivity checks to ensure that the difference-in-differences estimates are not sensitive to specific design choices. All previous results are unchanged upon (a) the exclusion of insignificant controls; and (b) the use of alternative controls for banks' balance sheet composition and performance. The results are also not sensitive to the use of alternative definitions of the market-based risk proxies (e.g., tail risk, using the lowest 5% of abnormal returns; abnormal return volatility; weekly return volatility; etc.).

7. RISK GOVERNANCE INDEX

Beyond the form and scope of the committee, the EPS rules require that risk committees meet certain minimum standards for composition, member qualifications, and activities. More specifically, the minimum EPS standards require the BHC board's enterprise risk committee to (1) have an independent chair; (2) have at least one member with "experience in identifying, assessing, and managing risk exposures of large, complex firms;" (3) adopt a formal, written charter that is approved by the whole board; and (4) meet "at least quarterly, and otherwise as needed" (12 CFR § 252.31, 2014, pg. 373). In addition, covered institutions (BHCs with total assets ≥ $50 billion) must (5) appoint a Chief Risk Officer (CRO) responsible for implementing and overseeing the enterprise-wide risk management program; and (6) the CRO must have a dual-reporting line to both the risk committee and the CEO.

In addition, within the preface to the final EPS rules, the FRB encourages certain best practices that exceed these minimum requirements. For example, while an independent chair and at least one risk management expert satisfy the minimum RC composition requirements, the FRB expects all RC members to have appropriate levels of understanding of risk management practices and of banking organizations, adding that presence of additional independent directors on the RC "is vital to robust oversight of risk management" (FRS, 2014, p.17249). Additional examples of similar statements are provided within in Figure 1.

Regulators presumably included the full set of EPS requirements on the premise that each element is important for the effectiveness of risk management and oversight efforts, although this is likely in a collective, rather than individual, sense. As a simple binary measure, then, the *RC*

indicator may not adequately capture the variation (present both within and across banks) in these other, potentially important, qualitative aspects of risk governance.

Defining a measure of compliance with *all* of these conditions, though, presents several empirical challenges. First, banks vary in the extent to which they disclose some of this information (e.g., committee members, committee meetings, board member qualifications, reporting lines of key executives, etc.), especially prior to the 2010 implementation of the SEC's enhanced proxy disclosure rules.[92] Second, committee composition varies from year-to-year, and so it is possible that a bank could appear to comply in one year and not comply in the next, even though the period of noncompliance was brief. Taken together, these two issues raise the concern that an "all or nothing" (i.e., binary) approach to measuring compliance could potentially result in intertemporal assignment of false negative classifications for risk governance strength.

Third, while the FRB does not impose the standalone (or separate) committee nor CRO-related requirements on banks with assets less than $50 billion, I observe that several banks within this group nevertheless meet the higher standards, and have for many years. It is not clear how to handle this if defining an indicator for full EPS compliance. For example, size-based concessions (for the smaller BHCs) related to the CRO requirement might be appropriate if smaller banks do not need a CRO, but this would treat similar banks without a CRO the same as banks with a CRO.

Furthermore, during the data collection process, it became apparent that a good measure of the strength or quality of risk governance should be flexible enough to incorporate not only

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[92] Before 2010, Regulation S-K mandated the following board activity and committee-related disclosures: (1) the total number of board meetings; and (2) whether the company had an audit, nominating, or compensation committee (or committees with similar functions). Conditional upon having any of these committees, registrants were then required to disclose the function, number of meetings, and members of only *these* committees. Any disclosures about *other* types of committees were strictly voluntary. Beginning in 2010, Rule 33-9089 required additional disclosures, including discussion of the board's leadership structure and role in risk oversight, and of each board member's background and qualifications (SEC, 2009).

compliance with the minimum EPS requirements, but also whether the BHC had embraced the Federal Reserve's (FRB's) supplementary expectations, or had adopted other best practices.

Accordingly, I construct a novel proxy of risk governance quality for use in all tests (in place of the *RC* indicator). The measure, which I refer to as the Risk Governance Index (*RGI*), is a composite score of the overall quality of a bank's risk management and oversight structures. The index incorporates characteristics of the Chief Risk Officer, and the composition, qualifications, and activities of the board committee tasked with responsibility for risk oversight, as well as variation in the form and scope of board-level risk oversight.[93]

7.1. Risk Governance Index Construction & Descriptives

Different from prior studies that use principal components analysis (PCA) to assess which risk governance attributes are more or less important (e.g., E&Y, 2013; L&S, 2012), *RGI* is the sum of several binary indicators that capture the degree to which a BHC complies with, or exceeds, all of the EPS requirements.[94]

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[93] With a large enough sample, one might include each element required by EPS within the same model and explore various interactions; however, sample size is generally not a luxury in banking studies, and all of the mechanisms are potentially important, at least at the margin. Even if possible to execute, this approach would not be informative as to whether the system (or combination) of all risk governance elements is more or less effective.

[94] PCA has appealing properties, but the procedure also has its limitations. Perhaps the most notable disadvantage, at least in the context of large financial institutions' characteristics, is that PCA is less reliable for use in small sample sizes. The procedure is also intended for use with multivariate normal, and ideally continuous, data (e.g., Kolenikov & Angeles, 2009). Furthermore, from a practical standpoint, the estimated principal component weights are dataset-specific. Because other researchers may be interested in using similar measures of risk governance quality, this issue can be especially problematic when using hand-collected variables: small differences in collection choices can potentially have a large impact on estimated weights and related inferences. In contrast, index measures are not sample dependent (at least with respect to either sample size or industry). Thus, beyond providing a more in-depth analysis of large banks' implementation of the EPS requirements, this study contributes to the literature by introducing an independent measure of risk governance quality that can easily be used by other researchers for future studies. Certainly, indices are not without their critics; but in the context of this study, which examines a set of a rules or practices, a summative measure of compliance seems appropriate.

I build the index by assigning one point for the presence of each of the required mechanisms in the EPS rules, and additional points for practices that exceed the minimum requirements. By design, *RGI* is increasing in more EPS-compliant forms of risk governance. The scoring criteria pertain to four categories. In the first three, points are awarded related to (1) risk oversight committee presence, form, and scope of responsibilities (extent of risks overseen); (2) committee composition and procedures; and (3) the presence, organizational stature, and reporting line of the primary risk manager. In the fourth category, I subtract points for unclear delegation or description of risk oversight responsibilities, and for qualities that otherwise undermine the credibility of the BHC's risk oversight function. Some of the details for each category are discussed below, and the complete set of scoring criteria, along with related rationale and specific definitions, is provided in Appendix E.1.

7.1.1. RGI – Baseline Construction

I first create a baseline index (RGI) under the assumption that the presence of *any* risk oversight or risk management mechanism is likely better than having nothing in place at all. For example, in the first category (risk committee form and scope), a bank that does not appear to assign risk oversight to any committee of the board earns zero points. At the other end of the spectrum, a standalone risk committee with enterprise-wide risk oversight responsibilities receives three points (four if the committee has been in place for more than one year). In between, a multi-purpose committee with EWRM oversight earns two points (three if in place for more than one year), and a non-audit, standalone, silo-type risk committee (e.g., a credit risk committee) would earn two points in category 1.

In forming the baseline RGI, as long as a given committee appears to be the primary committee tasked with risk oversight (regardless of scope or form), points can be accrued for committee composition and activities (category 2). I assign one point, each, if the risk committee has at least one risk management expert and the committee meets at least four times per year (i.e., minimum membership and procedural requirements are met).[95] I then assign additional points for exceeding the minimum standards where encouraged by the FRB. If the BHC does not disclose the information necessary for evaluating a particular item in category (2), I assign zero points for the respective characteristic.[96]

During the collection process, I observed several instances where, despite having a separate risk committee, substantially all of the committee members are also members of the Audit Committee. However, the FRB takes a strong stance on the separation of risk oversight from the Audit Committee's duties, stressing that risk committee members must be able to devote the proper level of time and attention to risk oversight. The implication is that a risk committee comprised entirely, or nearly entirely, of Audit Committee members calls into question the board's dedication and attention to risk oversight. I therefore add one point to the baseline RGI if there is *no* substantial overlap between the members of the risk committee and audit committee. Most sample risk committees have five members (average and median RC size is 5), and most audit committees have four members. I therefore define substantial overlap as the case where more than 60% (e.g., more than 3, if the RC has 5 members) of the risk committee members also serve on the audit

[95] I do not award points for having an independent chair, as there is almost no variation in this indicator. See Appendix E (or more specifically, the notes to Table E.1) for details related to the risk management expert (RME) designation.

[96] For example, if a committee's meetings are given, but its members are not disclosed, I am not able to determine the members' qualifications, independence, etc. The observation could still earn one point, though, in Category 2, assuming the number of committee meetings was at least four.

committee (for the average BHC, this equates to 75% of the audit committee members also sitting on the risk committee).[97]

The items in category (3) use characteristics of the bank's primary risk manager to capture the existence, strength, and independence of the company's enterprise-wide risk management function. Banks often have other types of risk officers, such as Chief Credit Officers and Chief Compliance Officers. As individuals with these titles presumably only oversee a subset of risks (i.e., risk silos), and not *enterprise-wide* risks, I conjecture that these represent only the presence of components of risk management. Nevertheless, if there does not appear to be a CRO (or equivalent) for a given observation, I do include these types of risk managers in the baseline RGI calculation. As with committee the characteristics (category 1), a silo-type risk manager, such as a Chief Credit Officer, will contribute less to overall RGI than will a designated risk officer that oversees the entire risk management function, such as a Chief Risk Officer or VP of Risk Management.

In 122 of the 992 sample observations, the CEO is a member of the risk committee. A bank's CEO technically meets the FRB's definition of a "risk management expert," or RME, and since the EPS rules do not require that the designated RME is independent, RGI is higher by at least one point when the current CEO is a member of the risk committee. It is relatively straightforward to conceive, however, that having the CEO as a member of the risk committee may undermine the risk committee's ability to provide "credible challenge" to management. Furthermore, the CEO's membership on the risk committee most likely neutralizes any positive

[97] The FRB acknowledges that some overlap may be necessary and is acceptable (12 CFR, § 252, 2014), and practitioners suggest that this may facilitate information sharing and coordination of the board's oversight activities (e.g., Protiviti, 2011). Thus, a point is awarded here if the ratio of the number of RC members who also serve on the audit committee, to the total number of RC members, is from 0 to 0.6 (inclusive).

benefits of having a CRO with a dual reporting line to both the CEO and the risk committee. Thus, in category 3, a point is awarded if the risk manager has a direct reporting line to the board or risk committee, *and* the CEO is *not* a member of the committee.

Finally, in category (4), I subtract points for characteristics create doubts with respect to the effectiveness or credibility of a bank's risk governance framework. For example, regulators expect management and all board members to be able to clearly articulate the organization's approach to risk management and risk oversight, and states that public disclosures of such practices are equally clear and transparent (FRB, 1997). Under the assumption that unclear disclosures are correlated with the underlying development (or lack thereof) of the firm's risk governance framework and policies, I subtract one point from RGI when there is any doubt about which committee oversees risk, or which committee is the primary with this duty.

EPS requires that all risk committees establish a charter, and that the charter is reviewed and approved by the full board at least annually. Charters establish the formal authorities and duties of the committee, and can also be used to articulate specific areas of responsibility to ensure that duties are not duplicated among committees, and that important areas are not overlooked. I therefore subtract a point from RGI if the committee does not appear to have a charter that is approved by the board.

7.1.2. RGI Variants & Descriptives

To use RGI in the multivariate models, I scale the final score for each BHC-year observation by the sample maximum score so that the variable (*RGI1*) ranges from zero to one. An alternative would be to scale by the annual maximum score, instead, which would give the resulting RGI an interpretation that is relative to the "best" risk governance structure present in a

given year. However, that definition would not inform as to whether or not subsequent improvements in risk governance, within a BHC, are more or less effective. For example, the maximum score in 2005 is 11 and the maximum score in 2014 is 16; scaling by the annual maximum would treat these scores equivalently within the regressions, despite the fact that a score of 16 is presumably better than a score of 11.

I also define two alternatives to the baseline RGI. The first, *RGI4*, is a copy of the baseline RGI that I then set to zero unless there is a board-level committee (of any form) that oversees enterprise-wide risk management. The second, *RGI5*, is also a copy of RGI, but is set to zero for any observation without a dedicated, enterprise risk committee (equivalent to *RC2*, as defined in section 6.2.3). Like *RGI1*, the resulting scores are scaled by their own sample maximum score. In comparison to one another, *RGI1* is the most general, and can be thought of as the presence of some (or many) risk controls, relative to the case where *RGI1* equals zero (no risk controls present or apparent). Since there are observations with non-zero values of RGI that have values of zero for RGI4 and RGI5, the estimates for these two scores reflect differences in risk relative to any other combination of risk controls not meeting the minimum criteria for either score. Comparisons across the estimates for each RGI variant may shed light on whether the committee's form is important (*RGI5* vs *RGI1* and *RGI4*).

Annual and summary statistics for the baseline RGI measure are presented in Table 11. RGI has a maximum score of 16 (minimum of 0). The mean (median) *RGI* for the sample period is 8.89 (9.0), and consistent with my observations, risk governance quality is increasing over time. This trend is depicted in Figure 3, which graphs the distribution of *RGI1* (the baseline RGI scaled by the maximum of 16) over the sample period. The graph depicts a wide range of risk governance practices across the sample BHCs until 2011, and then substantial improvements among most

BHCs' risk governance practices from 2012 to 2015. The improvement trend is consistent with the timing of the proposed EPS rules, issued in January of 2012, and the final rules, issued late in 2014.

Together, the values for the baseline RGI (shown in Table 11) and the trend in *RGI1* (depicted in Figure 3) indicate that banks are making substantive changes to risk governance practices that not only exceed the FRB's minimum expectations, but also seem to converge upon a target level of risk governance quality. One initial concern with the RGI measure is that more extensive disclosures in 2010 (as a result of the SEC's enhanced proxy disclosure rule) may explain the post-2010 trend in *RGI*. If banks were withholding disclosure about risk oversight and management activities that were implemented and active well before 2010, then the increase in information available to me as the outside user of the enhanced 2010 (and subsequent) disclosures would not reflect real changes in firm-wide risk management and oversight. Instead, any documented results would be completely spurious.

To examine this possibility, I regress the annual change in *RGI* ($\Delta RGI_{t\text{-}1\ to\ t}$) on the full set of year indicators. If enhanced disclosures explain the increase in the RGI measure, I should expect to see a significant coefficient on the 2010 indicator (representing ΔRGI from 2009 to 2010), and perhaps again on the 2011 indicator, since new disclosure requirements are typically accompanied by a learning curve. Furthermore, if the new disclosures explain the increase in RGI, I would *not* expect to observe significant changes in RGI around times of the EPS rule proposal (2012) and final rule issuance (2014).

Of the estimated coefficients on the year indicators for $\Delta RGI1$ (untabulated) the only year with a significant year-over-year change in *RGI1* is 2014 ($\beta = 0.0406$, $p < 0.05$). For both $\Delta RGI4$ and $\Delta RGI5$, the estimates on the year indicators are significantly different from zero for 2010, but

also for 2009, 2011, 2013, 2014, and 2015. Altogether, this analysis does not suggest that the SEC's enhanced proxy disclosure rules caused any potentially confounding discontinuity in measuring observed risk governance practices across the 2010 proxy period.

7.2. Results for the Relation between RGI and Risk

Table 12 contains the abbreviated OLS regression results for most of the tests in Section 6, but using a variant of *RGI* in place of *RC*. All tabulated results are for the full sample period, and as before, all explanatory variables, including *RGI* and its interaction with the time-and-size-specific *DF* indicator, are lagged one period, and all standard errors are clustered by BHC. Further, as in all previous tests, all RGI tests are reported for the full sample as well as the sample of DF Banks, only.

Panel A (Panel B) of Table 12 presents the regression results for tests where *TailRisk* (*RetVol*) is the dependent variable. The comparable results with *RC* are in Table 4. Panel C contains the abbreviated results with *TexasRatio* as the dependent variable, and Panel D presents estimates with risk-weighted assets (*RWA*) as the dependent variable. As before, the *RWA* regressions include BHC fixed effects. Comparable results for *TexasRatio* and *RWA* with the *RC* indicator are in Table 6. Similar to the results using the *RC* indicator, regression results using the RGI measures with the regulatory capital ratios were null, and are therefore not presented for brevity. Aside from some weak evidence that all three RGI measures are associated with lower net interest margin volatility (*NIMvol*) in the post-Dodd-Frank period, the overall results for the earnings volatility measures were inconclusive, and are therefore not presented in Table 12.

For the full sample, there is no evidence that stronger risk governance is associated with any difference in *TailRisk*, *RetVol*, nor *TexasRatio* (Table 12, Panels A, B, and C, respectively), whether voluntary (*RGI*) or mandatory (*RGIxDF*). The picture changes when restricting to the sample of banks subject to Dodd-Frank. First, while not different from zero, it is notable that the coefficient estimates on the *RGI* main effect, for all three variants of RGI, are positive in both the *TailRisk* and *RetVol* tests. In contrast, the coefficients on the *RGIxDF* interaction are all negative, and are significantly different from zero when using *RGI5* for *TailRisk* (β_3 = -0.750, $p < 0.05$; Panel A, column 6) and *RetVol* (β_3 = -0.033, $p < 0.10$; Panel B, column 6).

In the *TexasRatio* tests, the full sample results are similarly null, but among the subset of DF Banks, there is some evidence that voluntary risk governance practices are associated with higher balance sheet risk when using the more general *RGI1* measure (β_1 = 0.174, $p < 0.05$; Panel C, column 4). For all three definitions of the index, mandatory risk governance (*RGIxDF*) is associated with significantly lower *TexasRatio* values ($p < 0.01$, $p < 0.10$, and $p < 0.05$ for *RGI1*, *RGI4*, and *RGI5*, respectively).

Finally, there is also some evidence that even among the full sample, voluntary (mandatory) risk governance is associated with higher-risk (lower-risk) asset composition (Table 12, Panel D). The estimate on the RGI main effect is positive in all specifications, and is significantly different from zero ($p < 0.05$) for *RGI1* within the full sample and the subset of DF Banks. Aside from the coefficient on *RGI5xDF* within the subset of DF Banks, all estimates for the RGIxDF interaction are negative and significant. Taken together, the *RWA* results in Panel D, which control for BHC and year fixed effects, bank-specific but time-variant characteristics, and whether or not a bank is subject to Dodd-Frank, suggest that stronger risk governance – irrespective of how risk governance is defined – is associated with the rebalancing of a bank's asset

composition to achieve a lower ratio of risk-weighted assets to total assets. As suggested before, this result may indicate that BHCs with stronger risk oversight are achieving compliance with new regulatory capital requirements by restructuring the bank's underlying investments and activities (i.e., by de-risking the balance sheet), rather than by holding additional capital.

7.3. Sensitivity Analysis

7.3.1. Few Degrees of Freedom in Final Sample Year

Among the sample of DF Banks, there is not one BHC with a score of zero for any of the RGI definitions after 2014. To address potential specification concerns with respect to the results for tests using only this group, I run the same regressions for the 2004-2015 period, only (i.e., where the final year in which RGI and all control variables are measured, for all sample firms, is in 2014). The results reported in Table 12 generally hold, but are in some cases statistically weaker (untabulated). For example, for the *TailRisk* tests, the coefficient on *RGI5xDF* continues to be negative but is less significant (β_3 = -0.858, $p < 0.10$), and the coefficient on *RGI5xDF* for the *RetVol* tests is virtually unchanged (β_3 = -0.037, $p < 0.05$).

7.3.2. U.S. Basel III

As discussed previously, U.S. Basel III became effective in the last two years of the sample period for some of the largest BHCs, referred to as *Advanced Approaches* banks. The new capital requirements eventually changed the weighting scheme for risk-weighted assets for all banks, but during the sample period used in this study, the new weights applied to 10 of the largest sample

BHCs. To rule out concerns that the results in Table 12, Panel D are driven by the changes within this group of BHCs, I re-estimate the RWA tests after dropping the values of *RWA* for Advanced Approaches BHCs for 2014, 2015, and 2016. Aside from the full sample estimates on *DF* and *RGI5xDF* becoming insignificant, inferences do not change: stronger risk governance practices in the post-Dodd-Frank period continue to be associated with moderately lower-risk asset composition (results untabulated).

7.4. Summary of RGI Analysis

Comparing the results in Table 12 across the three different *RGI* variants, the evidence in support of *any* risk oversight or risk management mechanism (*RGI1*) is relatively weak, whether or not mandatory. Recall that *RGI4* only takes non-zero values if a committee of the board oversees enterprise-wide risks. The tests using *RGI4* suggest that enterprise-wide risk oversight by any board committee (which includes the audit committee) is only occasionally associated with lower risk in the post-Dodd-Frank period. In contrast, the results using *RGI5* (which only takes a non-zero value if the board has a dedicated enterprise risk oversight committee) provide some consistent support of the notion that mandatory risk governance, when implemented with dedicated board committee oversight, is associated with lower risk.

Though not entirely conclusive, I stress that the effects documented in Table 12 are incremental to both changes in risk levels for all sample BHCs over time, as well as changes in risk as a result of the non-EPS-related provisions within Dodd-Frank. I interpret the RGI results to suggest that the sum of the EPS requirements are functioning to limit bank risk, and that the requirement that a committee of the board be *dedicated* to risk oversight, and not simply tasked

with enterprise-wide remit, is a critical aspect of the EPS rules. Further, because the measure is increasing in the extent of best practices implemented, the results in this Section – relative to those for the RC indicator (in Section 6) – imply that simply forming a risk committee is not enough to reduce risk. To my knowledge, these results provide the first empirical evidence of the effectiveness of the sum of the EPS risk management mandates in reducing bank risk.

8. CONCLUSIONS

Signed into law by President Obama on July 21, 2010, Dodd-Frank represents "the most sweeping financial reform since the Great Depression."[98] The Enhanced Prudential Standards (EPS) subset of the Act requires large financial institutions to adopt comprehensive risk governance reforms, such as adopting a board-level enterprise risk oversight committee and ensuring a qualified and capable risk management function is in place. Whether board-level risk oversight, and in particular, mandatory risk governance and risk management, can affect bank risk is an important question yet unresolved by prior literature.

Using a difference-in-differences design that exploits the passage of Dodd-Frank as a regulatory shock, and the staggered adoption of the EPS requirements across the post-Dodd Frank period, I find no meaningful difference in bank risk associated with the standalone risk committee requirement. Tests with a novel measure of risk governance quality that incorporates the remaining EPS rules, however, indicate that greater conformance with the EPS mandates and expectations is associated with subsequently lower bank risk, but only in the Dodd-Frank era (i.e., when these practices are mandatory). The latter results provide the first empirical support for the effectiveness of the sum of the EPS mandates. Further, the values for the RGI measure, itself, indicate that banks are making substantive changes to risk governance practices that not only exceed the FRB's minimum expectations, but seem to converge upon a target level of risk governance quality. This trend, and others documented in this study, may have several implications for future research.

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[98] http://www.bankrate.com/finance/personal-finance/finreg-one-year-after-Dodd Frank-act-1.aspx

The EPS rules represent the first legal requirement for large financial institutions to implement and comply with specific risk governance mandates (Mayer Brown, 2014). Evaluating the effect of the EPS requirements is important for several reasons. First, despite the costs of complying with these standards, prior literature provides very little evidence to support the prescribed requirements. This study provides initial evidence on the effectiveness of mandatory board risk oversight as a tool of bank corporate governance (e.g., Kaplan, 2011). Second, the evidence in this study suggests that mandatory risk governance constrains bank risk. In light of recent proposals to repeal many parts of Dodd Frank, this finding is timely, and the results in this study should be of interest to regulators and lawmakers, as well as to board directors, investors, and others in the financial services industry. Finally, to the extent that the takeaways are generalizable, the results of this study may have important implications for mandated risk governance for other inherently complex or high-risk industries.

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APPENDIX A

NAMES OF SAMPLE BANKS AND RISK COMMITTEES

Table A.1 Listing of all Bank Holding Companies in the Full Sample

RSSDID	BHC Name	2010 Avg. Tot Assets	2014 Avg. Tot Assets	$X_{Year\ 1}$	$Y_{Year\ 1}$	$X_{Year\ N}$	$Y_{Year\ N}$
1073757	BANK OF AMERICA	$ 2,249.9	$ 2,105.9	2004	2005	2015	2016
1039502	JPMORGAN CHASE	2,074.8	2,494.2	2004	2005	2015	2016
1951350	CITIGROUP	1,888.1	1,861.1	2004	2005	2015	2016
1120754	WELLS FARGO	1,250.9	1,607.1	2004	2005	2015	2016
1119794	U.S. BANCORP	294.5	383.3	2004	2005	2015	2016
1069778	PNC FIN SVCS GRP	267.2	332.9	2004	2005	2015	2016
3587146	BNY MELLON	229.7	379.8	2006	2007	2015	2016
2277860	CAPITAL ONE FINL	183.5	303.2	2004	2005	2015	2016
1131787	SUNTRUST BANKS	173.5	182.9	2004	2005	2015	2016
1074156	BB&T CORP	161.4	184.9	2004	2005	2015	2016
1111435	STATE STREET	157.8	258.6	2004	2005	2015	2016
3242838	REGIONS FINL	137.4	118.8	2004	2005	2015	2016
1070345	FIFTH THIRD BNCRP	112.2	134.2	2004	2005	2015	2016
1068025	KEYCORP	92.6	93.4	2004	2005	2015	2016
1199611	NORTHERN TRUST	83.0	106.4	2004	2005	2015	2016
1037003	M&T BANK	68.5	90.9	2004	2005	2015	2016
3846375	DISCOVER FS	66.2	81.2	2009	2010	2015	2016
1199844	COMERICA INC	56.7	67.4	2004	2005	2015	2016
1068191	HUNTINGTON	52.7	62.9	2004	2005	2015	2016
1027004	ZIONS	51.1	56.6	2004	2005	2015	2016
2132932	NYCB	41.7	47.6	2004	2005	2015	2016
1129382	POPULAR	36.7	34.4	2004	2005	2015	2016
1078846	SYNOVUS	31.5	26.6	2004	2005	2015	2016
1094640	FIRST HORIZON NATL	25.4	24.7	2004	2005	2015	2016
1883693	BOK FINL CORP	23.7	28.1	2004	2005	2015	2016
1199563	ASSOCIATED B-C	22.3	25.5	2004	2005	2015	2016
1027518	CITY NATL CORP	21.2	31.2	2004	2005	2013	2014
2734233	EAST WEST BNCRP	20.7	26.7	2004	2005	2015	2016
1075612	FIRST CITIZENS	19.6	25.6	2004	2005	2015	2016
1049341	COMMERCE BANCSH	18.3	23.5	2004	2005	2015	2016

Table A.1 Continued

RSSDID	BHC Name	2010 Avg. Tot Assets	2014 Avg. Tot Assets	$X_{Year\ 1}$	$Y,Mkt_{Year\ 1}$	$X_{Year\ N}$	$Y_{Year\ N}$
2389941	TCF FINL CORP	$ 18.2	$ 18.9	2004	2005	2015	2016
1145476	WEBSTER FINL	17.9	21.7	2004	2005	2015	2016
2744894	FIRST BANCORP	17.6	12.7	2004	2005	2015	2016
1102367	CULLEN/FROST	17.0	26.4	2004	2005	2015	2016
1117129	FULTON FINL	16.5	17.0	2004	2005	2015	2016
1031449	SVB FINL GRP	15.2	32.9	2004	2005	2015	2016
1048773	VALLEY NATL	14.2	17.5	2004	2005	2015	2016
1117156	SUSQUEHANNA	13.8	18.6	2004	2005	2013	2014
1097614	BANCORPSOUTH	13.4	13.2	2004	2005	2015	2016
2260406	WINTRUST FINL	13.1	19.1	2004	2005	2015	2016
1025309	BANK OF HAWAII	12.8	14.5	2004	2005	2015	2016
1070804	FIRSTMERIT	12.3	24.4	2004	2005	2014	2015
1839319	PRIVATEBANCORP	12.3	14.8	2004	2005	2015	2016
1049828	UMB FINL	12.0	17.2	2004	2005	2015	2016
1104231	INTL BANCSH CORP	11.9	12.1	2004	2005	2015	2016
1843080	CATHAY GENERAL	11.2	11.3	2004	2005	2015	2016
1090987	MB FINANCIAL	10.6	12.1	2004	2005	2015	2016
2747644	UMPQUA	10.5	17.1	2004	2005	2015	2016
2291914	IBERIABANK	9.9	14.6	2004	2005	2015	2016
1079562	TRUSTMARK CORP	9.5	12.0	2004	2005	2015	2016
1109599	PROSPERITY BANCSH	9.2	20.1	2004	2005	2015	2016
1117026	NATL PENN	9.2	9.2	2004	2005	2014	2015
2477754	INVESTORS BNCRP	9.0	17.2	2004	2007	2015	2016
3005332	F.N.B. CORP	8.8	14.8	2004	2005	2015	2016
1086533	HANCOCK HOLDCO	8.4	19.9	2004	2005	2015	2016
1208184	FIRST MIDWEST BNCRP	7.9	8.8	2004	2005	2015	2016
1249347	UCBI	7.6	7.5	2004	2005	2015	2016
1098303	OLD NATL BNCRP	7.6	10.6	2004	2005	2015	2016
1076217	UNITED BANKSH	7.5	10.5	2004	2005	2015	2016
1123670	FIRST INTRST	7.3	8.1	2004	2011	2015	2016

Table A.1 Continued

RSSDID	BHC Name	2010 Avg. Tot Assets	2014 Avg. Tot Assets	$X_{Year\ 1}$	$Y,Mkt_{Year\ 1}$	$X_{Year\ N}$	$Y_{Year\ N}$
3133637	PROV FNCL SV	$ 6.8	$ 8.0	2004	2005	2015	2016
1029222	CVB	6.6	7.0	2004	2005	2015	2016
2003975	GLACIER	6.5	8.1	2004	2005	2015	2016
1071276	FIRST FNCL	6.5	6.8	2004	2005	2015	2016
2706735	TEXAS CAP BANCSH	6.1	13.8	2004	2005	2015	2016
2349815	WESTERN ALLIANCE	6.0	10.0	2004	2007	2015	2016
2875332	PACWEST BNCRP	5.4	11.4	2004	2005	2015	2016
1048867	COMMUNITY BS	5.4	7.3	2004	2005	2015	2016
1139279	NBTB	5.4	7.7	2004	2005	2015	2016
1070448	WESBANCO	5.4	6.2	2004	2005	2015	2016
2925657	PINNACLE	5.0	5.8	2004	2005	2015	2016
1201934	CHEM FC	4.7	6.8	2004	2005	2015	2016
2126977	BANNER	4.6	4.6	2004	2005	2015	2016
1208559	FIRST MERCH	4.3	5.6	2004	2005	2015	2016
1206546	HEARTLAND	4.0	6.0	2004	2005	2015	2016
1098844	RENASANT	4.0	5.8	2004	2005	2015	2016
2078816	COLUMBIA BS	3.7	7.9	2004	2005	2015	2016
3063622	STIFEL FINL	3.7	9.3	2007	2008	2015	2016
1491409	HOME	3.2	7.1	2004	2008	2015	2016
1971693	UNION BC	3.2	5.8	2004	2005	2015	2016
1094828	SIMMONS FIRST	3.2	4.5	2004	2005	2015	2016
1133437	SOUTH STATE	3.1	7.9	2004	2005	2015	2016
2961879	NARA HOPE	3.1	6.8	2004	2005	2015	2016
1097089	BK OZARKS	3.0	5.8	2004	2005	2015	2016

Table A.2 Example Names of Sample BHCs' Risk Committees, by Scope of Risk Oversight and by Committee Form

Scope = Some Risks

B - Audit Committee
- Audit
- Audit & Risk
- Audit & Examination
- Audit & Compliance
- Audit & Finance

C - Multi-purpose
- Finance, Credit, and Operations
- Risk Mgmt/Corp Governance
- Executive
- Governance

D -Standalone, not EWRM
- Credit Review
- Credit & Finance
- Risk Policy
- Business Risk
- Risk & Compliance
- Asset & Liability (ALCO)
- Risk Management
- Risk & Credit
- Finance
- Asset Quality
- Credit Risk

Scope = All Risks (Enterprise-wide)

E (1) - Audit Committee
- Audit
- Audit & Finance
- Audit & Risk

E (2) - Multi-purpose, Risk not Primary
- Executive & Risk Management
- Risk & Governance

F - Multi-purpose, Risk is Primary
- Executive & Risk Management
- Risk & Capital
- Risk Management & Finance
- Risk & Investor Relations

G - Standalone RC
- Risk
- Enterprise Risk
- Directors' Risk Policy
- Risk & Credit Policy
- Enterprise Risk & Credit
- Risk Management
- Risk Assessment
- Risk Oversight
- Board Risk

Letter headings for each category correspond to the committee types in the bottom row of Table 2, Panel D.

APPENDIX B

VARIABLE DEFINITIONS

Variable Name	Definition	Data Source
Risk Proxies		
TailRisk	= - 1 * (average of BHC's lowest 5% daily returns over the preceding 12 months); I use the actual value multiplied by 100 for all regressions.	CRSP
RetVol	Standard deviation of a BHC's daily returns over the preceding 12 months; I use the actual value multiplied by 10 for all regressions.	CRSP
TexasRatio	= (all non-performing loans + other real estate owned) / (Tier 1 capital + allowance for loan losses); For use in regressions, variable is truncated at the bottom 4 percentile of the sample distribution for the ratio of total loans to assets. Higher values (i.e., close to or above 1) correspond with poor bank health.	FR Y-9C
ROAvol	Log of the standard deviation, over preceding 8 quarters (inclusive of current quarter), of quarterly net income/average assets. (Net income is BHCK4340.)	FR Y-9C
EBLLPvol	Log of the standard deviation, over preceding 8 quarters (inclusive of current quarter), of quarterly EBLLP/average assets. EBLLP is earnings before taxes and the loan loss provision (BHCK4301 + BHCK4230).	FR Y-9C
NIMvol	Log of the standard deviation, over preceding 8 quarters (inclusive of current quarter), of the quarterly net interest margin (net interest income/average assets). Net interest income is total interest income minus total interest expense, or BHCK4074.	FR Y-9C
RWA	Ratio of risk-weighted assets (BHCKA223 for 12/31/2014 and prior, or BHCKG641 after) to total assets; both measured at year-end.	FR Y-9C
Capital Ratios		
Tier1Levg	Tier 1 Regulatory Capital divided by average assets for leverage ratio	FR Y-9C
LevgRatio	Tier 1 Regulatory Capital divided by total risk-weighted assets (at year-end)	FR Y-9C
Tier1/AT	Tier 1 Regulatory Capital divided by ending total assets	FR Y-9C
TotCap	Sum of Tier 1 and Tier 2 Regulatory Capital divided by total risk-weighted assets	FR Y-9C

Variable Name	Definition	Data Source
Risk Oversight Proxies & Dodd-Frank Indicator (*DF*)		
RC	Indicator equal to 1 if BHC board has a standalone risk committee with enterprise-wide risk oversight during that year (equal to zero otherwise).	Hand-collected[99]
RC_AltDef	Indicator equal to 1 if any type of board committee oversees enterprise-wide risk management.	
DF	Beginning with 2011, indicator equal to 1 if BHC has average (trailing four quarters) assets ≥ $10 billion.	FR Y-9C
RGI1	$RGI_{i,t}$, scaled by the sample maximum RGI value.	*See Appendix E for RGI construction details.*
RGI4	$RGI_{i,t}$, but first set to zero if a committee of the board committee does not oversee all areas of risk (i.e., does not have enterprise-wide risk oversight duties).	
RGI5	$RGI_{i,t}$, but first set to zero if a committee of the board (i) does not oversee all areas of risk (i.e., does not have enterprise-wide risk oversight duties), and (ii) is not a dedicated, standalone risk committee.	
BHC Characteristics		
Size	For all dependent variables other than *RetVol*, equals the natural log of ending total assets (BHCK2170.) When *RetVol* is the dependent variable, *Size* is equal to the natural log of one plus the market value of equity (CSHO * prc) divided by one million.	FR Y-9C or CRSP
SizeSq	Orthogonalized square of *Size* (whichever definition is used for the respective test).	n/a
MVE/RegCapital	Market value of equity (divided by one million), scaled by ending total regulatory (risk-weighted) capital (BHCK3792 for 12/31/2014 and prior, and BHCA3792 thereafter).	FR Y-9C and CRSP
Loss	Equals one if net income (BHCK4340) is less than zero.	FR Y-9C
PretaxRORWA	Pretax income before extr. items / ending risk-weighted assets (BHCK4301/*RWA*).	FR Y-9C
Deposits/Loans	Ratio of ending total deposits to ending total loans.	FR Y-9C
Slack	Ratio of cash and marketable securities to total ending assets.	FR Y-9C
C&I Loans	Ratio of ending commercial and industrial loans to ending total assets.	FR Y-9C

[99] The primary source of information for this data was the annual proxy statement (Form DEF 14A, and occasionally Form DEFM14A or Form DEFA14A, if applicable). Other sources consulted include the 10-K, Annual Letter (or Report) to Shareholders (ARS), 8-K (Current Report), and corporate investor relations websites (investor presentations, board committee assignments, leadership biographies, board and committee charters, etc.). I occasionally found some details, such as date of hire or job title history, from LinkedIn or Google searches.

Variable Name	Definition	Data Source
RealEst Loans	Ratio of ending loans backed by real estate to ending total assets.	FR Y-9C
NonInt_Ratio	The ratio of non-interest income to total income.	FR Y-9C
NonInt_RatioSq	The square of *NonInt_Ratio*, orthogonalized to *NonInt_Ratio* before inclusion in regressions.	n/a
HighTrdgDum	Indicator equal to one if a BHC's ratio of trading assets to assets is in the top 5 percentile of the annual distribution sample values.	FR Y-9C
SubordDebt/Eq	Ratio of subordinated notes and debentures to ending equity.	FR Y-9C
LLPvsCHO	Indicator equal to 1 if the current (YTD) loan loss provision exceeds the current (YTD) loan charge-offs.	FR Y-9C
ALLL>NPL	Allowance for losses on loans and leases less the value of non-performing loans, scaled by ending assets.	FR Y-9C
NPLoans/TotLoans	Ratio of non-performing loans to total loans.	FR Y-9C
TARP Issuance	Value of preferred stock issued in 2008 or 2009, scaled by beginning equity; variable is set to 0 for all other years. I confirm that the values for 2008 and 2009 correspond to TARP assistance by cross-checking with information obtained from Propublica.org.[100]	FR Y-9C & ProPublica.org
CEOTenure	Natural log of one plus the CEO's tenure (in years).	Hand-collected[101]
∆***CEO***	Indicator equal to 1 if the CEO has been in office for one year or less.	
FamFdrOwnshp	Fraction of common shares outstanding held or controlled by BHC founder(s) or family members of founder(s).	

[100] See https://projects.propublica.org/bailout/list.

[101] The primary source of information for this data was the annual proxy statement (Form DEF 14A, and occasionally Form DEFM14A or Form DEFA14A, if applicable). Other sources consulted include the 10-K, Annual Letter (or Report) to Shareholders (ARS), 8-K (Current Report), and corporate investor relations websites (investor presentations, board committee assignments, leadership biographies, board and committee charters, etc.). I occasionally found some details, such as date of hire or job title history, from LinkedIn or Google searches.

APPENDIX C

FIGURES & TABLES

Figure 1 Dodd-Frank Section 165, Enhanced Prudential Standards – Rules and Timeline

Mechanism	*Rule*	*Mandate, Addition, or Clarification*	*Examples, Explanations, & Additional Expectations*
Risk Committee (RC)	***Dodd Frank***	All publicly traded BHCs with assets ≥ $10 billion, and all BHCs with assets ≥ $50 billion, must establish a risk committee	The FRB has authority to impose the same RC requirement upon public BHCs with total assets < $10 billion
	EPS - Proposed	RC is of the board of directors; No other changes	The rules only apply to public BHCs with assets ≥ $10 billion (and all BHCs with assets ≥ $50 billion)
	EPS - Final	No changes to the above; initial date for determining applicability (size, in terms of average assets over the preceding 4 quarters) is June 30, 2014	
RC Purpose	***Dodd Frank***	RC oversees BHC's enterprise-wide risk management practices	n/a
	EPS - Proposed	RC must document and oversee enterprise-wide risk management policies and practices of the BHC's worldwide operations	RC must review and approve an appropriate (i.e., commensurate with size, complexity, etc.) RM framework
	EPS - Final	Removed the word "practices"	The RC does not have management-related duties
RC Form	***Dodd Frank***	n/a	n/a
	EPS - Proposed	For BHCs with assets ≥ $50 billion: the RC must be a stand-alone committee of the board of directors	The RC may not be "housed within another committee or be part of a joint committee"
	EPS - Final	Assets ≥ $50 billion: RC must be a separate committee, *dedicated to RM oversight* ; RC must be distinct from other board committees, but some overlap across committees acceptable	"A stand-alone risk committee, **rather than a joint risk/audit or risk/finance committee**, **enables appropriate board-level attention to risk management**. […This prevents the RC] from **having other substantive responsibilities**" at the BHC
RC Members (Composition)	***Dodd Frank***	Number of independent directors left to determination by the FRB	n/a
	EPS - Proposed	RC must be chaired by an independent director; independence defined in accordance with the SEC's Regulation S-K	Independent directors' active involvement is "vital to robust oversight" of RM; the FRB encourages additional independent directors on RC
	EPS - Final	No changes (the minimum requirement of an independent chairperson was not revised)	The FRB continues to encourages additional independent directors on the RC, but notes that affiliated directors may complement the involvement of independent directors

Figure 1 Continued

Mechanism	*Rule*	*Mandate, Addition, or Clarification*	*Examples, Explanations, & Additional Expectations*
Risk Management Expert (RME)	***Dodd Frank***	RC must have at least one "risk management expert" with "experience identifying, assessing, and managing risk exposures of large, complex firms"	n/a
	EPS - Proposed	At least one RC member must have "risk management expertise that is commensurate with the company's capital structure, risk profile, complexity, size, and other appropriate risk-related factors."	FRB expects all RC members to understand RM principles and practices relevant to the company; depth of knowledge and expertise should match BHC riskiness and complexity
	EPS - Final	"*Expertise* " replaced with "*experience* in identifying, assessing, and managing risk exposures of large, complex financial* firms." **For assets < $50 billion, nonbanking or nonfinanancial experience may fulfill the requirements*	Larger/more complex companies should have more qualified RC members (quantitatively and qualitatively); For some BHCs, indirect RM experience may be sufficient. In all cases, the BHC "should be able to demonstrate that an individual's experience is relevant to the particular risks facing the company."
RC Charter	***Dodd Frank***	n/a	n/a
	EPS - Proposed	RC must have a formal, written charter that is approved by the company's board of directors	n/a
	EPS - Final	No changes	n/a
RC Meetings	***Dodd Frank***	n/a	n/a
	EPS - Proposed	RC must "meet with an appropriate frequency and as needed, and fully document and maintain records of such proceedings, including risk management decisions"	Although a minimum number of meetings was not specified in the proposed EPS rules, the RC would be required to review various reports (e.g., cash flow projections, liquidity stress test results) at least quarterly.
	EPS - Final	RC must "meet at least quarterly and otherwise as needed"; documentation requirement remained unchanged	Added the following clarification: documenting RM decisions does not imply that the RC has management-related responsibilities

Figure 1 Continued

Mechanism	*Rule*	*Mandate, Addition, or Clarification*	*Examples, Explanations, & Additional Expectations*
Chief Risk Officer (CRO)	***Dodd Frank***	n/a	
	EPS - Proposed	CRO with appropriate levels of independence, expertise, and stature (i.e., executive rank); must directly oversee EWRM practices/function and provide regular reports to RC & Board	CRO requirement applies only if total assets ≥$50 billion; Risk oversight should be the sole responsibility of the CRO; CRO should be appropriately compensated and incentivized
	EPS - Final	"*Expertise*" replaced with "*experience*" (similar to RME)	
CRO's Reporting Line	***Dodd Frank***	n/a	
	EPS - Proposed	CRO to report directly to both the risk committee and to the CEO	
	EPS - Final	"Dual reporting by the [CRO] to both the [RC] and the [CEO] will help the board of directors to oversee the [RM] function" and "may help disseminate information relevant to [RM] throughout the organization."	Guidance issued by the Basel Committee and the Financial Stability Board (FSB) supports dual reporting by the CRO to the RC and the CEO

Title/Descr.	*Legislation or Code*	*Relevant Dates*
Dodd-Frank	12 U.S.C. § 5365, Section 165	July 7, 2010 - Signed into law (public print: May 27, 2010)
EPS - Proposed	Enhanced Prudential Standards (Regulation YY), 12 CFR §252 (2012)	January 5, 2012 - Issued for public comment
EPS - Final	Enhanced Prudential Standards (Regulation YY), 12 CFR §252 (2014)	February 18, 2014 - Finalized/published

Acronymns/abbreviations:

BHC	Bank Holding Company
CRO	Chief Risk Officer
EWRM	Enterprise-wide Risk Management
FRB	Board of Governors of the Federal Reserve
RC	Risk Committee
RM	Risk Management

Figure 2 Annual Distribution of Selected Risk Proxies, 2005-2016

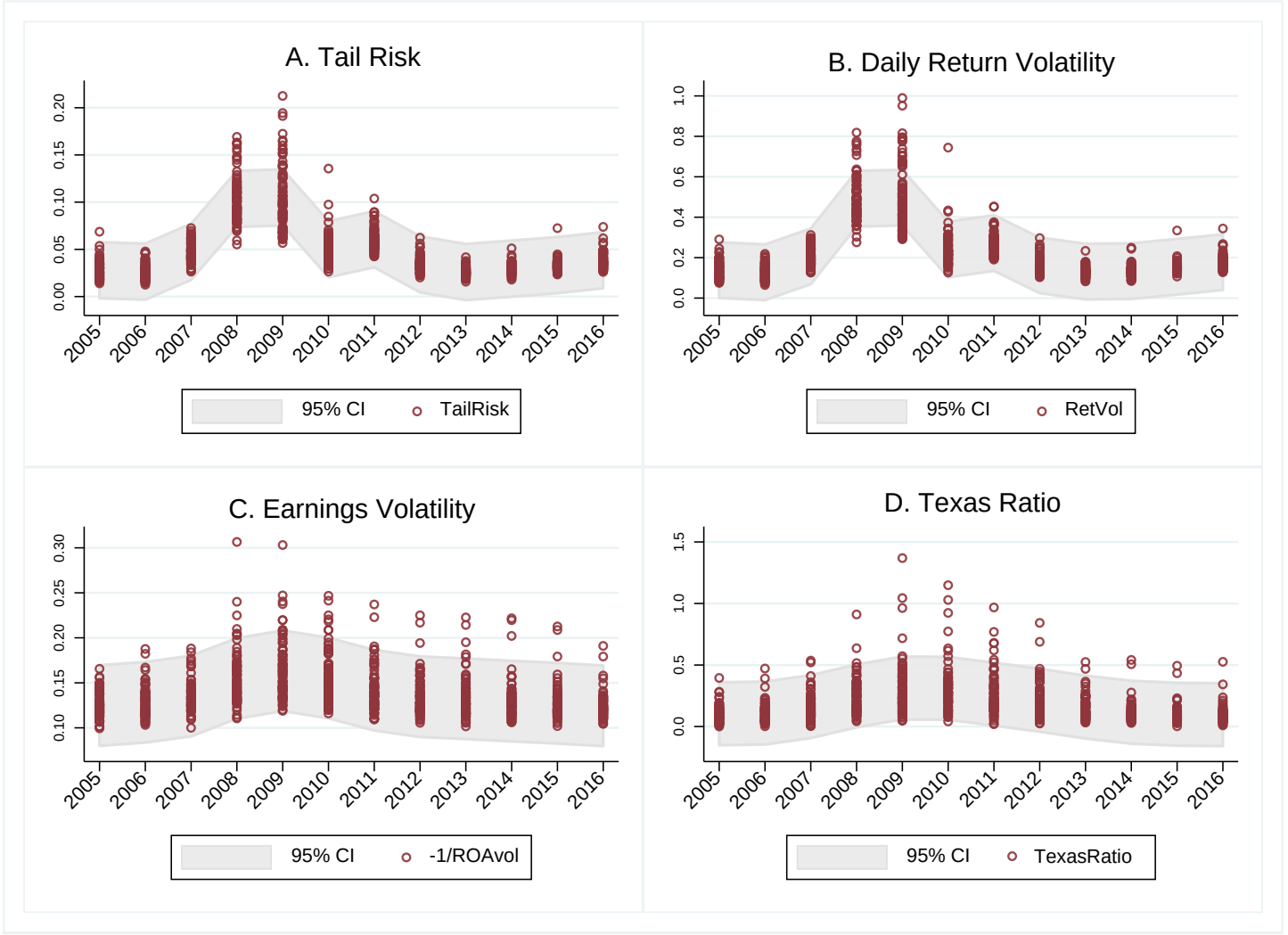
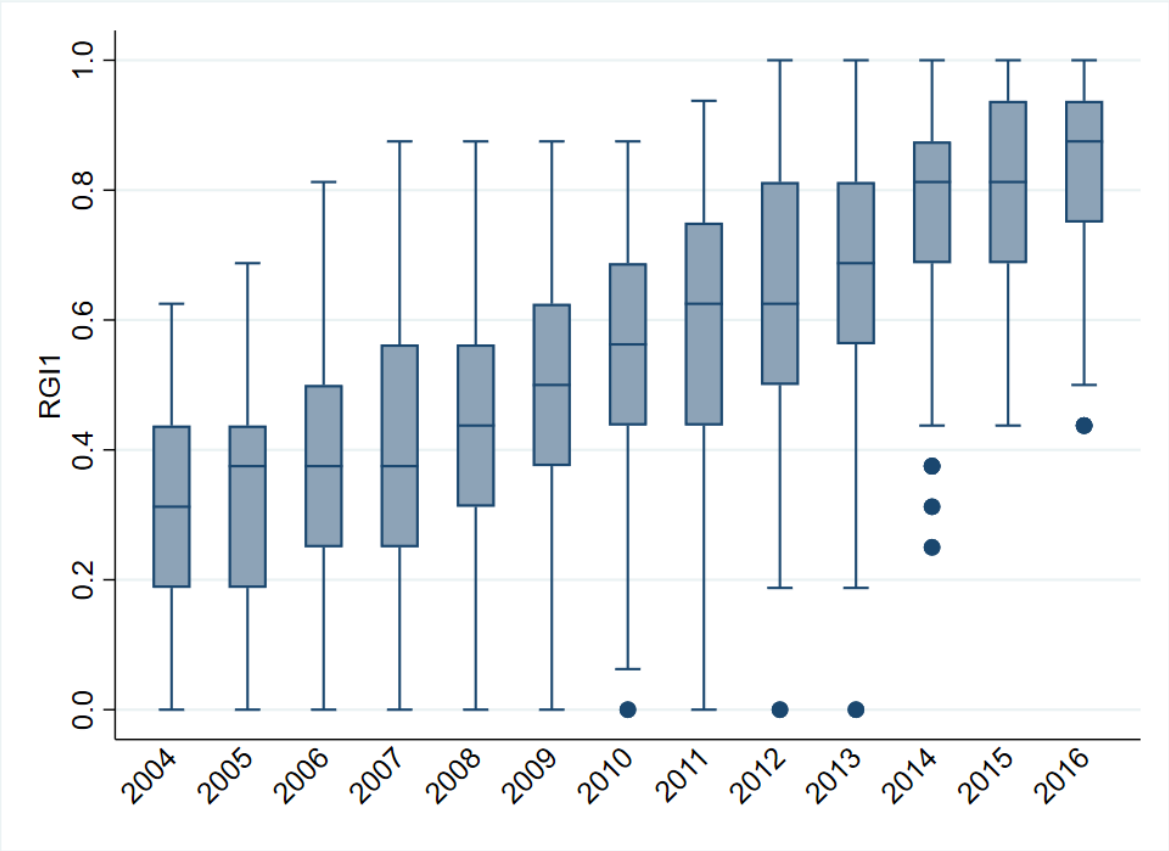


Figure 3 Annual Distribution (Box Plot) of Sample BHCs' *RGI1* Values, 2004-2016



Note: See Appendix E for the definition of *RGI1*.

Table 1 Sample Distribution: Number of Bank Holding Companies (BHCs) by *Size*, Year, and *RC* Designation, 2004-2016

Panel A: *Sample BHCs - N. by year, by regulatory size group in year t (i.e., Size $_t$)*

Year	**< $10B**	**$10↔50B**	**≥ $50B**	***n. BHCs per year***
2004	47	19	15	81
2005	45	21	15	81
2006	44	21	16	81
2007	43	23	17	83
2008	40	24	19	83
2009	38	26	20	84
2010	36	28	20	84
2011	33	31	20	84
2012	32	32	20	84
2013	30	34	20	84
2014	26	38	20	84
2015	24	38	20	82
2016	18	42	20	80

Panel B: *N. BHCs with RC = 1 by year, by regul. size group in year t (i.e., Size $_t$)*

	RC = 1			***n. with RC = 1***	***n. with RC = 0***
Year	**< $10B**	**$10↔50B**	**≥ $50B**		
2004	0	1	0	1	80
2005	1	2	1	4	77
2006	2	3	3	8	73
2007	1	5	4	10	73
2008	2	4	6	12	71
2009	4	6	8	18	66
2010	8	6	10	24	60
2011	7	9	12	28	56
2012	9	12	12	33	51
2013	12	16	15	43	41
2014	12	25	18	55	29
2015	12	27	20	59	23
2016	10	29	20	59	21

Table 1 Continued

Panel C: *N. BHCs with RC = 1 by year, by size as measured in 2014 (Size $_{2014}$)*

	RC = 1			***n. with RC = 1***	***n. with RC = 0***
Year	**< $10B**	**$10↔50B**	**≥ $50B**		
2004	0	1	0	1	80
2005	1	1	2	4	77
2006	1	3	4	8	73
2007	1	4	5	10	73
2008	1	5	6	12	71
2009	3	7	8	18	66
2010	6	8	10	24	60
2011	6	10	12	28	56
2012	7	14	12	33	51
2013	9	19	15	43	41
2014	12	25	18	55	29
2015	13	26	20	59	23
2016	14	25	20	59	21

RC = 1 for a given bank-year observation if the BHC has a standalone risk committee with responsibility for overseeing the enterprise-wide risk management function of the entire organization. *Size* refers to average total consolidated assets, in billions, as of a given year-end in Panels A and B (and held constant, measured as of year-end 2014, in Panel C). See Table A.1 for a complete listing of each BHC included in the sample, along with the respective years where complete data is available for a given BHC.

Table 2 Evolution of Large U.S. Bank Holding Companies' Board Risk Oversight Practices, Risk Management, and Corporate Governance Environments, 2004-2016

Panel A: *Risk Committee Scope & Form* †

Scope:	***None***	***Some Risk Oversight***			***Enterprise-wide***		
Form:		Multi-Function		Standalone	Multi-Function		Standalone
Year	None	Audit	Other	"Silo" Risk	Audit or Other	Minimal Addl. Duties	RC
2004	14	39	6	11	7	-	1
2005	13	36	6	13	8	-	4
2006	11	35	5	12	9	2	8
2007	9	36	5	11	10	2	10
2008	9	32	5	11	13	1	12
2009	7	20	6	12	19	2	18
2010	2	8	12	10	21	7	24
2011	2	5	11	9	21	8	28
2012	2	3	10	6	21	9	33
2013	1	2	8	3	16	11	43
2014	-	1	7	-	11	10	55
2015	-	-	6	-	9	8	59
2016	-	-	5	-	8	8	59
Type	***A***	***B***	***C***	***D***	***E***	***F***	***G***

Panel A Notes:

† Committee forms and scope of risk oversight were determined by reading disclosures/descriptions of the committee's substantive responsibilities. See Appendix Table A.2 for a examples of the various committee names within these categories.

Table 2 Continued

Panel B: *Board-level Governance Changes*

Year	ΔCEO	Dual CEO	Indep Bd Ldrshp	Board Size (n. Tot)	Board Indep (%)	n. New Ind Dir, ≤ 1 yr	n. New Ind Dir, ≤ 2 yrs	n. Ind Bd, FS Exper	n. Ind Bd, RM Exper	# of Bd Mtgs
2004	7.7%	56.4%	22.0%	13.77	77.3%	0.94	1.67	2.14	1.49	8.60
2005	7.5%	55.0%	26.8%	13.28	77.8%	0.78	1.73	2.16	1.69	9.63
2006	11.1%	59.3%	25.6%	12.93	77.2%	0.54	1.33	2.20	1.74	8.80
2007	12.0%	55.4%	31.3%	13.19	78.2%	0.89	1.45	2.43	1.93	8.89
2008	10.8%	55.4%	36.1%	13.12	78.7%	0.70	1.52	2.57	2.01	10.50
2009	6.0%	54.8%	48.8%	12.86	80.0%	0.63	1.35	2.85	2.37	11.39
2010	10.7%	52.4%	63.1%	12.74	80.7%	0.69	1.32	3.01	2.70	10.32
2011	6.0%	51.2%	71.4%	12.55	81.8%	0.70	1.36	3.19	2.99	9.94
2012	2.4%	53.6%	76.2%	12.55	81.9%	0.79	1.46	3.25	3.23	9.74
2013	4.8%	57.1%	82.1%	12.52	81.8%	0.82	1.56	3.23	3.48	9.79
2014	4.8%	58.3%	83.3%	12.65	82.6%	0.76	1.51	3.40	3.75	9.87
2015	2.4%	58.5%	86.6%	12.79	83.5%	0.90	1.68	3.77	4.07	9.16
2016	6.3%	56.3%	85.0%	12.91	83.8%	1.18	1.89	3.94	4.48	9.65

Panel B Legend:

ΔCEO = 1 if the current CEO's tenure is < 1 year

Dual CEO = 1 if the CEO is also the Chairman of the Board

Indep Bd Ldrshp = 1 if the Chairman of the Board is an independent director, *or* if the board has a credible Lead Independent Director

Board Size (n. Tot) = Weighted average total number of board members serving during the current fiscal year

Board Indep (%) = Weighted average total number of independent directors divided by Board Size

n. New Ind Dir, ≤ 1 yr = the number of independent directors with directorship tenure of 1 year or less

n. New Ind Dir, ≤ 2 yrs = the number of independent directors with directorship tenure of 1 year or less

n. Ind Bd, FS Exper = the number of independent directors with recent, relevant financial services experience

n. Ind Bd, RM Exper = the number of independent directors with risk management experience (but not necessarily *expertise*)

# of Bd Mtgs = # of Board meetings, regular and special, held during the current fiscal year

Table 2 Continued

Panel C: *Changes within Board-level Committees tasked with Risk Oversight* ‡

Year	Risk Resp Unclear	Cmte Size (n. Tot)	Cmte Indep (%)	n. Cmte, Ind FS Exper	n. Cmte, Indep RME	n. Cmte, Tot RME	n. Cmte, New Ind RME	CEO is Cmte Mbr	Cmte has Charter	# Cmte Mtgs
2004	31.8%	4.79	93.9%	0.97	0.13	0.27	0.06	9.7%	93.6%	8.84
2005	34.9%	4.70	93.1%	0.97	0.13	0.27	0.06	9.4%	93.8%	8.97
2006	33.3%	4.60	92.8%	1.12	0.18	0.35	0.04	10.1%	94.1%	8.79
2007	26.8%	4.76	93.9%	1.28	0.24	0.42	0.14	9.9%	93.0%	9.04
2008	26.4%	4.86	93.7%	1.38	0.29	0.53	0.14	12.5%	90.3%	8.46
2009	24.7%	4.95	93.2%	1.45	0.42	0.69	0.18	14.3%	83.1%	8.29
2010	29.5%	4.96	93.3%	1.58	0.49	0.74	0.21	15.4%	83.3%	8.40
2011	30.4%	5.09	92.3%	1.73	0.58	0.84	0.18	16.5%	82.3%	7.81
2012	27.9%	5.03	92.1%	1.65	0.67	0.92	0.23	16.5%	84.8%	7.56
2013	19.0%	5.10	93.0%	1.76	0.85	1.10	0.29	15.2%	84.8%	7.67
2014	11.3%	5.20	93.4%	2.03	0.98	1.28	0.33	15.0%	90.0%	7.61
2015	10.0%	5.53	93.7%	2.26	1.18	1.49	0.26	17.5%	91.3%	7.59
2016	8.9%	5.68	94.0%	2.41	1.34	1.67	0.32	16.5%	89.9%	7.66

Panel C Legend:

‡ Information in Panel C is reported for the primary committee with risk oversight responsibilities ("Cmte"), as long as the members, meetings, and other information for that particular committee are discloed/available. In other words, the figures are not conditioned upon the type of committee that oversees risk.

Cmte refers to the primary committee that oversees risk.

Risk Resp Unclear = 1 if the primary committee responsible for risk oversight is not apparent (i.e., ≥ 1 other committee could be the "risk" committee)

Cmte Size (n. Tot) = Weighted average total number of board members serving on Cmte during the current fiscal year

Cmte Indep (%) = Weighted average total number of independent directors serving on Cmte during the current fiscal year, divided by Cmte Size

n. Cmte, Ind FS Exper = the number of independent Cmte members with recent, relevant financial services experience

n. Cmte, Indep RME = the number of independent directors on the Cmte that qualify as risk management experts (RME)

n. Cmte, Tot RME = the number of directors on the Cmte, whether or not independent, that qualify as risk management experts (RME)

n. Cmte, New Ind RME = the number of "new" indep. directors on the Cmte that qualify as risk management experts (RME); "new" = board tenure < 2 years

CEO is Cmte Mbr = 1 if the current CEO is a member of Cmte

Cmte has Charter = 1 if the Cmte charter - and its availablility/accessibility to the public - is discussed within disclosures

 # Cmte Mtgs = # of Cmte meetings, regular and special, held during the current fiscal year

Table 2 Continued

Panel D: *Operational Risk Management Changes*

Year	New EW CRO (Δ)	CRO with EW Remit	Dedicated EW CRO	CRO is Exec	CRO repts to Bd/RC	Silo-type Risk Mgr	No apparent Risk Mgr
2004	7.7%	34.6%	30.5%	25.6%	5.1%	47.4%	17.1%
2005	16.3%	46.3%	41.5%	35.0%	6.3%	40.0%	13.4%
2006	13.4%	51.2%	47.6%	39.0%	8.5%	39.0%	9.8%
2007	24.1%	57.8%	53.0%	45.8%	8.4%	33.7%	8.4%
2008	14.5%	63.9%	59.0%	51.8%	15.7%	30.1%	6.0%
2009	19.0%	70.2%	65.5%	56.0%	23.8%	25.0%	4.8%
2010	15.5%	76.2%	71.4%	59.5%	39.3%	21.4%	2.4%
2011	14.3%	81.0%	78.6%	69.0%	46.4%	17.9%	1.2%
2012	14.3%	85.7%	82.1%	71.4%	51.2%	13.1%	1.2%
2013	17.9%	89.3%	82.1%	79.8%	56.0%	9.5%	1.2%
2014	17.9%	92.9%	90.5%	85.7%	67.9%	7.1%	0.0%
2015	17.1%	95.1%	92.7%	90.2%	72.0%	4.9%	0.0%
2016	25.0%	96.3%	92.5%	90.0%	77.5%	3.8%	0.0%

Panel D Legend:

EW = Enterprise-wide, and is included here to delineate between a "true" CRO and a "silo-type" risk manager
New EW CRO (Δ) = 1 if the current CRO's tenure is < 1 year
CRO with EW Remit = if the current CRO oversees all risks/the entire risk management function
Dedicated EW CRO = 1 if ***CRO with EW Remit*** equals 1 *and* risk management is the individual's sole job function
CRO is Exec = 1 if ***CRO with EW Remit*** equals 1 *and* the person is listed as a member of the executive team
CRO repts to Bd/RC = 1 if ***CRO with EW Remit*** equals 1 *and* the CRO reports directly to either the **Cmte** or the full board
Silo-type Risk Mgr = 1 if ***CRO with EW Remit=0*** , but there is a risk manager with a more narrow scope of responsibility (e.g., Chief Credit Officer)
No apparent Risk Mgr = 1 if ***CRO with EW Remit*** = 0 and ***Silo-type Risk Mgr*** = 0

Table 3 Means and Tests of Mean Differences across 2010 and by *RC* Presence, 2004-2016

	2005-2010						2011-2016					
	(1)		(2)		(1) - (2)		(3)		(4)		(3) - (4)	
	RC = 0		RC = 1		0 vs. 1		RC = 0		RC = 1		0 vs. 1	
Risk Proxy	***N***	***Mean***	***N***	***Mean***	***Difference***		***N***	***Mean***	***N***	***Mean***	***Difference***	
TailRisk	434	0.058	53	0.078	(0.020)	***	259	0.038	239	0.036	0.002	*
RetVol	434	0.028	53	0.037	(0.009)	***	259	0.018	239	0.017	0.001	**
ROAvol	439	(7.282)	53	(6.367)	(0.915)	***	259	(7.629)	239	(7.874)	0.244	***
EBLLPvol	439	(7.093)	53	(6.502)	(0.592)	***	259	(7.366)	239	(7.607)	0.241	***
NIMvol	439	(8.006)	53	(7.889)	(0.117)		259	(8.278)	239	(8.384)	0.106	
RWA	443	0.746	53	0.768	(0.022)		259	0.716	239	0.741	(0.025)	**
Texas Ratio	430	0.194	48	0.328	(0.134)	***	251	0.160	221	0.156	0.004	
Tier1Levg	443	9.103	53	9.325	(0.222)		259	9.930	239	9.825	0.104	
LevgRatio	443	11.875	53	11.878	(0.004)		259	13.506	239	12.927	0.578	**
Tier1/AT	443	8.656	53	8.811	(0.156)		259	9.474	239	9.415	0.059	
TotCap	443	13.943	53	14.331	(0.388)		259	15.089	239	14.784	0.305	

	2004-2009						2010-2015					
	(5)		(6)		(5) - (6)		(7)		(8)		(7) - (8)	
	RC = 0		RC = 1		0 vs. 1		RC = 0		RC = 1		0 vs. 1	
Controls	***N***	***Mean***	***N***	***Mean***	***Difference***		***N***	***Mean***	***N***	***Mean***	***Difference***	
Assets ($ bn)	443	100.321	53	77.844	22.477		259	130.690	239	144.687	(13.997)	
aSize	443	16.398	53	17.450	(1.052)	***	259	16.597	239	17.379	(0.781)	***
mSize	433	1.329	53	1.755	(0.426)	**	259	1.263	239	1.852	(0.588)	***
pretaxRORWA	443	0.017	53	0.006	0.011	***	259	0.018	239	0.018	0.000	
Loss	443	0.079	53	0.302	(0.223)	***	259	0.062	239	0.029	0.032	*
NonInt_Ratio	443	0.236	53	0.282	(0.047)	**	259	0.260	239	0.292	(0.032)	**
ALLL>NPL	443	(0.007)	53	(0.023)	0.016	***	259	(0.014)	239	(0.014)	0.000	
HighTrdgDum	443	0.054	53	0.038	0.016		259	0.073	239	0.033	0.040	**
SubordDebt/Eq	443	0.212	53	0.277	(0.065)	***	259	0.146	239	0.128	0.018	**
FamFdrOwnshp	437	0.066	53	0.009	0.057	***	259	0.067	239	0.014	0.053	***
CEO_Tenure	436	8.716	53	8.717	(0.001)		259	10.734	239	10.615	0.119	
TARP Issuance	443	0.029	53	0.078	(0.049)	***	-	-	-	-	-	
Deposits/Loans	443	1.197	53	1.278	(0.080)		259	1.277	239	1.566	(0.289)	**
LLPvsCHO	443	0.765	53	0.830	(0.065)		259	0.421	239	0.351	0.069	
MVE/RegCap	433	1.755	53	1.198	0.558	***	259	1.347	239	1.304	0.042	
LoanGrowth	443	0.015	53	(0.019)	0.034	**	259	0.003	239	0.008	(0.006)	
C&I Loans	443	0.123	53	0.150	(0.028)	***	259	0.116	239	0.141	(0.025)	***
RealEst Loans	443	0.434	53	0.405	0.029		259	0.403	239	0.384	0.020	
Slack	443	0.215	53	0.220	(0.004)		259	0.232	239	0.226	0.006	

Notes: This table presents, for the full sample of BHCs, the means and for all dependent and control variables used in this study. Tests of mean differences across the pre- and post-2010 periods, by *RC presence, are also presented*. *RC* equals 1 if the BHC has a standalone, enterprise risk committee at the board-level in year *t*, and zero otherwise. Asterisks indicate statistical significance of tests of the difference in means (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$). Unconditional summary statistics can be found in Appendix D (see Table D.1).

The variable *aSize* refers to the log of total assets, and *mSize* refers to the log of the market value of equity. All other variables are defined in Appendix B.

Table 4 Board-Level Risk Committees and Market Risk, 2004-2016

Panel A: *TailRisk* $_{t+1}$						
	Full Sample			*DFBanks, Only*		
	(1)	(2)	(3)	(4)	(5)	(6)
RC_{it}	0.013	0.008	0.054	0.071	0.071	0.228
	[0.123]	[0.123]	[0.167]	[0.154]	[0.155]	[0.243]
DF_{it}		0.118	0.182		0.039	0.189
		[0.136]	[0.169]		[0.139]	[0.183]
$RCxDF_{it}$			-0.124			-0.312
			[0.179]			[0.233]
Control Variables [(a)]						
Size [(b)]	0.025	0.012	0.013	0.102	0.100	0.101
	[0.063]	[0.071]	[0.070]	[0.089]	[0.093]	[0.093]
SizeSq [(b)]	-0.028	-0.024	-0.019	-0.164	-0.163	-0.149
	[0.088]	[0.088]	[0.088]	[0.109]	[0.109]	[0.110]
pretaxRoRWA	-28.962***	-28.859***	-28.820***	-27.933***	-27.901***	-27.873***
	[4.185]	[4.206]	[4.229]	[5.391]	[5.426]	[5.488]
NonInt_Ratio	-0.707	-0.705	-0.704	-1.281**	-1.281**	-1.306**
	[0.511]	[0.512]	[0.514]	[0.592]	[0.592]	[0.593]
NonInt_RatioSq	0.163***	0.161**	0.165***	0.104	0.104	0.109
	[0.061]	[0.061]	[0.060]	[0.080]	[0.080]	[0.080]
ALLL>NPL	-11.031**	-11.094**	-11.089**	-11.169**	-11.188**	-10.908**
	[4.250]	[4.216]	[4.230]	[5.005]	[5.011]	[5.146]
HighTrdgDum	0.266	0.288	0.268	0.368	0.369	0.322
	[0.364]	[0.365]	[0.360]	[0.388]	[0.389]	[0.379]
SubordDebt/Eq	0.602	0.628	0.635	0.451	0.455	0.455
	[0.587]	[0.588]	[0.592]	[0.732]	[0.735]	[0.738]
FamFdrOwnshp	-0.841**	-0.850**	-0.846**	-0.750	-0.753	-0.750
	[0.332]	[0.340]	[0.346]	[0.465]	[0.465]	[0.474]
CEO_Tenure	-0.137*	-0.138*	-0.137*	-0.218**	-0.218**	-0.218**
	[0.070]	[0.070]	[0.070]	[0.091]	[0.091]	[0.093]
TARP Issuance	9.363***	9.396***	9.367***	10.223***	10.227***	10.138***
	[1.536]	[1.545]	[1.540]	[1.846]	[1.848]	[1.848]
Constant	3.572***	3.776***	3.757***	2.287	2.320	2.307
	[0.976]	[1.103]	[1.100]	[1.376]	[1.438]	[1.448]
Observations	982	982	982	693	693	693
R^2	0.8351	0.8352	0.8352	0.8457	0.8457	0.8461
Adj. R^2	0.8311	0.8311	0.8309	0.8404	0.8402	0.8403
Year FE	YES	YES	YES	YES	YES	YES

Table 4 Continued

Panel B: $RetVol_{i,t+1}$						
	Full Sample			*DFBanks, Only*		
	(1)	(2)	(3)	(4)	(5)	(6)
RC_{it}	0.002	0.001	0.003	0.004	0.004	0.010
	[0.006]	[0.006]	[0.008]	[0.008]	[0.008]	[0.013]
DF_{it}		0.006	0.008		0.005	0.010
		[0.006]	[0.008]		[0.007]	[0.009]
$RCxDF_{it}$			-0.004			-0.012
			[0.009]			[0.012]
Control Variables[(a)]						
Size[(b)]	-0.006*	-0.007*	-0.007*	-0.005	-0.005	-0.005
	[0.004]	[0.004]	[0.004]	[0.005]	[0.005]	[0.005]
SizeSq[(b)]	-0.003	-0.002	-0.002	-0.005	-0.005	-0.005
	[0.003]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
pretaxRoRWA	-1.336***	-1.323***	-1.322***	-1.198***	-1.193***	-1.193***
	[0.239]	[0.243]	[0.244]	[0.313]	[0.316]	[0.317]
NonInt_Ratio	-0.028	-0.028	-0.028	-0.047	-0.048	-0.049
	[0.025]	[0.025]	[0.025]	[0.030]	[0.030]	[0.030]
NonInt_RatioSq	0.007**	0.007**	0.007**	0.005	0.005	0.006
	[0.003]	[0.003]	[0.003]	[0.004]	[0.004]	[0.004]
ALLL>NPL	-0.601**	-0.600**	-0.599**	-0.655**	-0.656**	-0.644**
	[0.239]	[0.235]	[0.236]	[0.297]	[0.296]	[0.301]
HighTrdgDum	0.029**	0.030**	0.029**	0.031**	0.031**	0.029**
	[0.013]	[0.013]	[0.013]	[0.013]	[0.013]	[0.013]
SubordDebt/Eq	0.041	0.042	0.042	0.038	0.038	0.038
	[0.027]	[0.027]	[0.027]	[0.034]	[0.034]	[0.035]
FamFdrOwnshp	-0.036**	-0.037**	-0.036**	-0.028	-0.029	-0.029
	[0.014]	[0.014]	[0.015]	[0.019]	[0.019]	[0.019]
CEO_Tenure	-0.007**	-0.007**	-0.007**	-0.011**	-0.011**	-0.011**
	[0.003]	[0.003]	[0.003]	[0.004]	[0.004]	[0.005]
TARP Issuance	0.484***	0.485***	0.484***	0.518***	0.518***	0.515***
	[0.067]	[0.067]	[0.066]	[0.079]	[0.079]	[0.078]
Constant	0.200***	0.201***	0.201***	0.194***	0.194***	0.194***
	[0.014]	[0.014]	[0.014]	[0.020]	[0.020]	[0.020]
Observations	981	981	981	693	693	693
R^2	0.8499	0.8500	0.8500	0.8551	0.8552	0.8554
Adj. R^2	0.8463	0.8462	0.8461	0.8502	0.8500	0.8500
Year FE	YES	YES	YES	YES	YES	YES

Notes: All control variables are measured in year *t*, subscripts omitted. Robust standard errors, clustered by BHC, are presented in brackets. All regressions include year fixed effects; coefficients not reported. Asterisks indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1); all tests are two-tailed. *TailRisk* is the average of the lowest 5% of the bank's daily returns over the preceding 12 months, times negative one. *RetVol* is the standard deviation of the bank's daily returns over the preceding 12 months. In order to present more discernible coefficients, I multiply *TailRisk* by 100, and *RetVol* by 10, for all tests. In the *TailRisk* regressions, *Size* (*SizeSq*) is measured as the natural log of total ending assets (orthogonalized square of *Size*). In the *RetVol* regressions, I instead use *mSize* (*mSizeSq*), measured as the natural log of market value of equity (orthogonalized square of *mSize*). All other variables are defined in Appendix B.

Table 5 Board-level Risk Committees and Earnings Risk, 2004-2016

***Panel A** : Earnings Volatility = ROAvol*

	Full Sample				*DF Banks, Only*			
Risk Proxy:	***ROAvol,*** $_{it+1}$		***ROAvol,*** $_{it+2}$		***ROAvol,*** $_{it+1}$		***ROAvol,*** $_{it+2}$	
RC_{it}	-0.095	-0.026	-0.161	-0.064	-0.098	0.035	-0.194	-0.036
	[0.110]	[0.120]	[0.124]	[0.135]	[0.121]	[0.131]	[0.120]	[0.130]
DF_{it}		-0.125		-0.029		-0.024		0.022
		[0.161]		[0.156]		[0.268]		[0.242]
$RCxDF_{it}$		-0.175		-0.281		-0.269		-0.351*
		[0.208]		[0.194]		[0.217]		[0.199]
Control Variables [(a)]								
Size [(b)]	-0.007	0.018	0.037	0.055	0.030	0.037	0.088	0.097
	[0.039]	[0.043]	[0.040]	[0.045]	[0.069]	[0.069]	[0.070]	[0.070]
SizeSq [(b)]	-0.133***	-0.134***	-0.113*	-0.108*	-0.133	-0.125	-0.169	-0.159
	[0.050]	[0.048]	[0.059]	[0.057]	[0.091]	[0.087]	[0.104]	[0.101]
Loss	1.330***	1.315***	0.810***	0.796***	1.337***	1.330***	0.790***	0.780***
	[0.139]	[0.142]	[0.165]	[0.166]	[0.162]	[0.166]	[0.176]	[0.178]
NonInt_Ratio	0.543	0.550	0.324	0.340	0.384	0.372	0.270	0.259
	[0.364]	[0.356]	[0.359]	[0.348]	[0.474]	[0.463]	[0.463]	[0.447]
NonInt_RatioSq	0.137***	0.146***	0.180***	0.191***	0.104	0.109	0.128*	0.136*
	[0.047]	[0.047]	[0.052]	[0.052]	[0.067]	[0.066]	[0.073]	[0.072]
ALLL>NPL	-7.897***	-7.671***	-5.998*	-5.817*	-7.987***	-7.617**	-8.436**	-8.017**
	[2.365]	[2.428]	[3.150]	[3.267]	[2.824]	[2.974]	[3.640]	[3.867]
SubordDebt/Eq	-0.071	-0.145	0.003	-0.042	-0.139	-0.171	-0.057	-0.092
	[0.348]	[0.360]	[0.380]	[0.395]	[0.448]	[0.442]	[0.499]	[0.503]
HighTrdgDum	0.641***	0.564**	0.376	0.295	0.489*	0.442	0.291	0.228
	[0.229]	[0.238]	[0.253]	[0.262]	[0.273]	[0.275]	[0.303]	[0.307]
CEO_Tenure	-0.039	-0.035	-0.008	-0.006	-0.030	-0.031	-0.020	-0.022
	[0.050]	[0.049]	[0.058]	[0.058]	[0.061]	[0.061]	[0.067]	[0.068]
FamFdrOwnshp	-0.350*	-0.341	-0.262	-0.252	-0.276	-0.266	-0.248	-0.237
	[0.206]	[0.214]	[0.226]	[0.227]	[0.224]	[0.222]	[0.294]	[0.291]
MVE/Reg.Capital	-0.325***	-0.347***	-0.315***	-0.330***	-0.351***	-0.362***	-0.307***	-0.320***
	[0.102]	[0.103]	[0.097]	[0.098]	[0.108]	[0.104]	[0.111]	[0.111]
Constant	-7.278***	-7.629***	-7.843***	-8.104***	-7.755***	-7.848***	-8.641***	-8.736***
	[0.658]	[0.696]	[0.669]	[0.715]	[1.118]	[1.110]	[1.128]	[1.110]
Observations	977	977	897	897	690	690	634	634
R^2	0.4760	0.4796	0.3977	0.4012	0.4975	0.5005	0.4234	0.4279
Adj. R^2	0.4634	0.4659	0.3826	0.3847	0.4802	0.4817	0.4027	0.4053
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Table 5 Continued

Panel B: *Earnings Volatility = EBLLPvol*

	Full Sample				*DF Banks, Only*			
Risk Proxy:	***EBLLPvol,*** $_{it+1}$		***EBLLPvol,*** $_{it+2}$		***EBLLPvol,*** $_{it+1}$		***EBLLPvol,*** $_{it+2}$	
RC_{it}	-0.099	-0.047	-0.090	-0.007	-0.142	-0.093	-0.185	-0.109
	[0.102]	[0.111]	[0.116]	[0.124]	[0.123]	[0.135]	[0.126]	[0.138]
DF_{it}		-0.107		-0.046		-0.173		-0.136
		[0.156]		[0.165]		[0.246]		[0.238]
$RCxDF_{it}$		-0.129		-0.240		-0.101		-0.171
		[0.188]		[0.182]		[0.198]		[0.187]
Constant	-7.380***	-7.662***	-7.743***	-7.994***	-7.699***	-7.833***	-8.216***	-8.355***
	[0.658]	[0.689]	[0.711]	[0.771]	[1.018]	[1.018]	[1.127]	[1.134]
Observations	977	977	897	897	690	690	634	634
R^2	0.3465	0.3494	0.2753	0.2791	0.3745	0.3768	0.3021	0.3052
Adj. R^2	0.3307	0.3323	0.2571	0.2592	0.3529	0.3533	0.2770	0.2778
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Panel C: *Earnings Volatility = NIMvol*

	Full Sample				*DF Banks, Only*			
Risk Proxy:	***NIMvol,*** $_{it+1}$		***NIMvol,*** $_{it+2}$		***NIMvol,*** $_{it+1}$		***NIMvol,*** $_{it+2}$	
RC_{it}	0.013	0.053	0.002	0.036	0.035	0.121	0.002	0.057
	[0.085]	[0.102]	[0.094]	[0.114]	[0.098]	[0.128]	[0.103]	[0.137]
DF_{it}		0.024		0.072		-0.022		-0.070
		[0.121]		[0.131]		[0.178]		[0.176]
$RCxDF_{it}$		-0.106		-0.103		-0.172		-0.123
		[0.136]		[0.144]		[0.151]		[0.163]
Constant	-8.483***	-8.544***	-8.348***	-8.331***	-8.907***	-8.970***	-9.093***	-9.175***
	[0.555]	[0.572]	[0.525]	[0.549]	[1.029]	[1.016]	[0.960]	[0.951]
Observations	977	977	897	897	690	690	634	634
R^2	0.1784	0.1794	0.1930	0.1938	0.1812	0.1842	0.1912	0.1936
Adj. R^2	0.1586	0.1578	0.1727	0.1716	0.1529	0.1535	0.1621	0.1618
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: All explanatory variables are measured in year t, subscripts omitted. All regressions include year fixed effects; coefficients not reported for brevity. The regressions in Panels B and C were estimated with the full set of control variables shown in Panel A; coefficient estimates omitted for brevity. Robust standard errors, clustered by BHC, are presented in brackets. Asterisks indicate statistical significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$); all tests are two-tailed.

Size (*SizeSq*) is measured as the natural log of total ending assets (orthogonalized square of *Size*). *ROAvol* (*EBLLPvol*) [*NimVol*] is the standard deviation of 8 rolling quarters, ended in the last quarter of year $t + 1$, of return on assets (earnings before taxes and loan loss provisions) [net interest margin]. All earnings volatility proxies are logged before inclusion in the regressions. All other variables are defined in Appendix B.

Table 6 Board-level Risk Committees and Balance Sheet Risk, 2004-2016

Panel A: *Risk-weighted Assets ($RWA_{i,t+1}$)*

	Full Sample		*DF Banks, Only*	
	Year FE	Year & BHC FE	Year FE	Year & BHC FE
RC_{it}	-0.008	0.005	-0.001	0.006
	[0.012]	[0.008]	[0.015]	[0.009]
DF_{it}	-0.046***	-0.021**	-0.035	-0.020
	[0.016]	[0.010]	[0.026]	[0.014]
$RCxDF_{it}$	0.006	**-0.014***	-0.002	**-0.015***
	[0.014]	**[0.008]**	[0.015]	**[0.009]**
Control Variables[(a)]				
Size[(b)]	0.016***	0.012	0.017**	0.007
	[0.006]	[0.014]	[0.007]	[0.017]
NonInt_Ratio	0.039	-0.046	0.063	-0.042
	[0.047]	[0.043]	[0.053]	[0.053]
C&I Loans	1.093***	0.760***	1.162***	0.776***
	[0.112]	[0.148]	[0.127]	[0.169]
RealEst Loans	0.438***	0.365***	0.411***	0.341***
	[0.103]	[0.115]	[0.116]	[0.126]
CEO_Tenure	0.003	-0.002	0.002	-0.001
	[0.006]	[0.003]	[0.007]	[0.004]
Slack	-0.093	-0.196**	-0.136	-0.202*
	[0.096]	[0.090]	[0.110]	[0.103]
SubordDebt/Eq	0.177***	0.072**	0.163**	0.093**
	[0.055]	[0.035]	[0.065]	[0.041]
NPLoans/TotLoans	0.050	-0.329**	0.074	-0.205
	[0.214]	[0.139]	[0.260]	[0.174]
Constant	0.174	0.384	0.150	0.473
	[0.146]	[0.256]	[0.183]	[0.309]
Observations	971	971	686	686
Number of BHCs	82	82	58	58
R^2	0.6992	0.5137	0.7353	0.5133
Adj. R^2	0.6922	0.5024	0.7265	0.4972
Year FE	YES	YES	YES	YES
BHC FE	NO	YES	NO	YES

Table 6 Continued

Panel B: *Texas Ratio* $_{i,t+1}$

	Full Sample		*DF Banks, Only*	
RC_{it}	0.018	0.021	0.041	0.068
	[0.025]	[0.033]	[0.031]	[0.046]
DF_{it}		-0.022		-0.015
		[0.014]		[0.024]
$RCxDF_{it}$		-0.006		-0.055
		[0.026]		[0.035]
Control Variables [(a)]				
Size [(b)]	0.016***	0.018***	0.012	0.013*
	[0.005]	[0.005]	[0.008]	[0.008]
SizeSq [(b)]	0.004	0.003	0.008	0.008
	[0.010]	[0.010]	[0.012]	[0.011]
pretaxRORWA	-0.012	0.001	-0.554	-0.536
	[0.513]	[0.517]	[0.584]	[0.586]
Deposits/Loans	-0.099***	-0.097***	-0.089***	-0.091***
	[0.022]	[0.021]	[0.022]	[0.021]
LLPvsCHO	0.030***	0.031***	0.034***	0.032***
	[0.008]	[0.008]	[0.010]	[0.010]
SubordDebt/Eq	-0.091	-0.099	-0.112	-0.119
	[0.074]	[0.074]	[0.103]	[0.102]
CEO_Tenure	0.000	0.001	-0.003	-0.004
	[0.011]	[0.011]	[0.014]	[0.014]
FamFdrOwnshp	-0.033	-0.034	-0.064	-0.061
	[0.037]	[0.037]	[0.052]	[0.052]
TARP Issuance	0.217**	0.206**	0.113	0.091
	[0.098]	[0.098]	[0.084]	[0.082]
MVE/Reg.Capital	-0.046*	-0.049*	-0.058	-0.059
	[0.026]	[0.026]	[0.038]	[0.038]
Constant	0.064	0.030	0.170	0.157
	[0.107]	[0.110]	[0.207]	[0.208]
Observations	941	941	660	660
R^2	0.3918	0.3939	0.4066	0.4138
Adj. R^2	0.3772	0.3780	0.3861	0.3916
Year FE	YES	YES	YES	YES

Notes: All explanatory variables are measured in year *t*, subscripts omitted for brevity. Robust standard errors, clustered by BHC, are presented in brackets. Asterisks indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1); all tests are two-tailed.

The dependent variable in Panel A is *RWA*, or the ratio of risk-weighted assets to total assets. The dependent variable in Panel B is the TexasRatio, as defined in AppendixB but set to missing if a BHC's ratio of loans to assets is in the bottom 4% of the sample. *Size* (*SizeSq*) is measured as the natural log of total ending assets (orthogonalized square of *Size*). All other variables are defined in AppendixB.

Table 7 Board-level Risk Committees and Regulatory Capital Ratios, 2004-2016

Panel A: *Leverage Ratio (LevgRatio) and Tier 1 Leverage Ratio (Tier1Levg)*

	LevgRatio $_{i,t+1}$		***Tier1Levg*** $_{i,t+1}$	
	Full Sample	*DF Banks, Only*	*Full Sample*	*DF Banks, Only*
RC_{it}	0.098	-0.238	0.177	0.027
	[0.329]	[0.317]	[0.277]	[0.313]
DF_{it}	0.476	0.709	-0.088	-0.289
	[0.516]	[0.529]	[0.415]	[0.375]
$RCxDF_{it}$	-0.117	0.089	0.188	0.246
	[0.413]	[0.414]	[0.331]	[0.364]
Control Variables [(a)]				
Size [(b)]	-0.761***	-0.429**	-0.508***	-0.173
	[0.165]	[0.164]	[0.164]	[0.120]
SizeSq [(b)]	0.208	0.285	0.121	0.123
	[0.164]	[0.195]	[0.169]	[0.141]
pretaxRORWA	38.522**	14.410	25.034**	8.031
	[15.187]	[13.514]	[10.935]	[8.589]
LoanGrowth	5.752*	4.962	2.435**	1.853
	[3.278]	[3.965]	[1.170]	[1.312]
NonInt_Ratio	5.190***	1.029	3.370*	-0.854
	[1.659]	[0.927]	[1.697]	[1.188]
NonInt_RatioSq	0.896***	0.219	0.705***	0.037
	[0.218]	[0.197]	[0.231]	[0.171]
Deposits/Loans	0.137	0.505***	-0.600***	-0.206*
	[0.113]	[0.082]	[0.214]	[0.103]
ALLL>NPL	-16.208**	-18.898**	-3.583	-2.176
	[6.696]	[7.523]	[4.293]	[3.528]
HighTrdgDum	2.093**	0.077	-0.223	-2.052***
	[0.819]	[0.512]	[0.991]	[0.435]
SubordDebt/Eq	-3.909***	-4.966***	0.914	-0.074
	[1.302]	[1.614]	[1.092]	[1.079]
FamFdrOwnshp	0.369	0.143	-0.476	-0.599
	[0.881]	[1.042]	[0.443]	[0.364]
MVE/RegCapital	-0.866***	-0.767**	-0.911***	-1.133***
	[0.255]	[0.349]	[0.279]	[0.242]
Constant	22.742***	18.560***	17.904***	14.171***
	[2.455]	[2.956]	[2.511]	[1.959]
Observations	982	694	982	694
R^2	0.5161	0.4104	0.4014	0.3680
Adj. R^2	0.5029	0.3875	0.3851	0.3433
Year FE	YES	YES	YES	YES

Table 7 Continued

Panel B: *Tier 1 Ratio (Tier1/AT) and Total Capital Ratio (TotCap)*

	Tier1/AT $_{i,t+1}$		***TotCap*** $_{i,t+1}$	
	Full Sample	*DF Banks, Only*	*Full Sample*	*DF Banks, Only*
RC_{it}	0.177	0.027	0.029	-0.401
	[0.277]	[0.313]	[0.350]	[0.395]
DF_{it}	-0.088	-0.289	0.134	0.393
	[0.415]	[0.375]	[0.517]	[0.573]
$RCxDF_{it}$	0.188	0.246	0.132	0.421
	[0.331]	[0.364]	[0.445]	[0.502]
Control Variables [(a)]				
Size [(b)]	-0.508***	-0.173	-0.421**	-0.046
	[0.164]	[0.120]	[0.171]	[0.179]
SizeSq [(b)]	0.121	0.123	0.074	0.086
	[0.169]	[0.141]	[0.159]	[0.199]
pretaxRORWA	25.034**	8.031	36.317**	10.915
	[10.935]	[8.589]	[14.649]	[12.646]
LoanGrowth	2.435**	1.853	4.905	3.995
	[1.170]	[1.312]	[3.299]	[4.007]
NonInt_Ratio	3.370*	-0.854	5.142***	0.745
	[1.697]	[1.188]	[1.703]	[1.024]
NonInt_RatioSq	0.705***	0.037	0.801***	0.114
	[0.231]	[0.171]	[0.221]	[0.195]
Deposits/Loans	-0.600***	-0.206*	0.065	0.443***
	[0.214]	[0.103]	[0.121]	[0.075]
ALLL>NPL	-3.583	-2.176	-13.327**	-14.904**
	[4.293]	[3.528]	[5.519]	[6.388]
HighTrdgDum	-0.223	-2.052***	2.127**	0.179
	[0.991]	[0.435]	[0.819]	[0.540]
SubordDebt/Eq	0.914	-0.074	-1.046	-1.862
	[1.092]	[1.079]	[1.417]	[1.752]
FamFdrOwnshp	-0.476	-0.599	0.380	0.238
	[0.443]	[0.364]	[0.706]	[0.799]
MVE/RegCapital	-0.911***	-1.133***	-1.018***	-0.865**
	[0.279]	[0.242]	[0.257]	[0.359]
Constant	17.904***	14.171***	19.529***	14.496***
	[2.511]	[1.959]	[2.517]	[3.147]
Observations	982	694	982	694
R^2	0.4014	0.3680	0.4327	0.3045
Adj. R^2	0.3851	0.3433	0.4172	0.2774
Year FE	YES	YES	YES	YES

Notes: All explanatory variables are measured in year *t*, subscripts omitted for brevity. Robust standard errors, clustered by BHC, are presented in brackets. Asterisks indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1); all tests are two-tailed. *Size* (*SizeSq*) is measured as the natural log of total ending assets (orthogonalized square of *Size*). All other variables are defined in Appendix B.

Table 8 Board-level Risk Committees and Market Risk: Sample-Based Sensitivity Tests, 2004-2016

Risk Proxy:	***TailRisk*** $_{t+1}$			***RetVol*** $_{t+1}$		
Sample Restriction:	**Balanced Sample**	**Drop *Ever $50bn***	**Drop *GSIB* BHCs**	**Balanced Sample**	**Drop *Ever $50bn***	**Drop *GSIB* BHCs**
RC_{it}	0.075	0.048	0.057	0.003	0.004	0.003
	[0.166]	[0.181]	[0.178]	[0.008]	[0.009]	[0.009]
DF_{it}	0.196	0.169	0.249	0.007	0.020**	0.011
	[0.167]	[0.171]	[0.173]	[0.008]	[0.008]	[0.008]
$RCxDF_{it}$	-0.111	-0.114	-0.176	-0.002	-0.005	-0.004
	[0.177]	[0.222]	[0.185]	[0.009]	[0.010]	[0.009]
Constant	3.610***	-4.294	3.217*	0.202***	0.173***	0.205***
	[1.227]	[5.102]	[1.676]	[0.014]	[0.032]	[0.015]
Observations	966	738	913	965	737	912
R^2	0.8360	0.8432	0.8326	0.8505	0.8605	0.8472
Adj. R^2	0.8278	0.8278	0.8278	0.8429	0.8429	0.8429
Year FE	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors, clustered by BHC, are presented in brackets. All explanatory variables are measured in year *t*, subscripts omitted for revity. Coefficients on control variables and year fixed effects (Year FE) are omitted for brevity. Asterisks indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1); all tests are two-tailed. *TailRisk* is the average of the lowest 5% of the bank's daily returns over the preceding 12 months, multiplied by negative one. *RetVol* is the standard deviation of the bank's daily returns over the preceding 12 months. In order to present more discernible coefficients, I multiply *TailRisk* by 100, and *RetVol* by 10, for all tests. All other variables are defined in Appendix B.

Restriction Definitions:

Balanced Sample refers to sample BHCs with at least 11 observations (out of 13 possible bank-year observations).

Ever $50bn = 1 if a BHC ever crosses $50 billion in total assets.

GSIB stands for Global Systemically Important Bank. This designation is assigned by the Basel Committee on Banking Supervision, and it applies to 8 of the largest U.S. financial institutions, 6 of which are in my sample: Bank of America, Bank of New York Mellon, Citigroup, JPMorgan Chase, State Street, and Wells Fargo. In this restriction, all sample years are dropped for these 6 BHCs.

Table 9 Board-level Risk Oversight and Market Risk, 2004-2010

Panel A: *Risk Committees & Market Risk, pre-Dodd-Frank (2004-2010) & Crisis (2006-2009)*

Risk Proxy:	***TailRisk*** $_{i,t+1}$				***RetVol*** $_{i,t+1}$			
	Full Sample		*DF Banks, Only*		*Full Sample*		*DF Banks, Only*	
	2004-2010	2006-2009	2004-2010	2006-2009	2004-2010	2006-2009	2004-2010	2006-2009
RC_{it}	0.206	0.573	0.235	0.533	0.007	0.025	0.006	0.026
	[0.297]	[0.497]	[0.335]	[0.576]	[0.015]	[0.024]	[0.018]	[0.029]
Control Variables[(a)]								
Size[(b)]	0.072	0.315*	0.197	0.538**	-0.007	0.000	-0.001	0.006
	[0.115]	[0.173]	[0.125]	[0.213]	[0.006]	[0.009]	[0.007]	[0.010]
SizeSq[(b)]	0.140	0.074	-0.096	-0.340	-0.002	-0.010	-0.009	-0.018*
	[0.126]	[0.203]	[0.158]	[0.296]	[0.005]	[0.008]	[0.006]	[0.010]
pretaxRoRWA	-31.419***	-40.701***	-29.112***	-37.869***	-1.486***	-1.686**	-1.326***	-1.437**
	[6.802]	[14.356]	[7.065]	[12.670]	[0.372]	[0.701]	[0.414]	[0.660]
NonInt_Ratio	-0.989	-0.595	-2.131**	-2.578	-0.027	-0.014	-0.074	-0.064
	[0.879]	[1.489]	[1.055]	[2.230]	[0.047]	[0.077]	[0.059]	[0.121]
NonInt_RatioSq	0.186	0.305	0.082	0.111	0.007	0.007	0.005	0.004
	[0.129]	[0.197]	[0.186]	[0.381]	[0.006]	[0.009]	[0.009]	[0.019]
ALLL>NPL	-20.682***	-28.190**	-17.552**	-20.842	-1.243***	-2.129***	-1.226**	-2.230***
	[7.483]	[11.059]	[7.227]	[12.898]	[0.471]	[0.447]	[0.528]	[0.508]
HighTrdgDum	-0.325	-0.345	-0.128	0.020	0.020	0.036	0.022	0.038
	[0.677]	[0.944]	[0.639]	[0.937]	[0.022]	[0.037]	[0.019]	[0.036]
SubordDebt/Eq	0.470	1.242	0.395	1.282	0.036	0.068	0.036	0.078
	[0.778]	[1.203]	[0.905]	[1.375]	[0.034]	[0.050]	[0.040]	[0.059]
FamFdrOwnshp	-1.171**	-1.915**	-0.788	-1.234	-0.051*	-0.068	-0.023	-0.033
	[0.474]	[0.856]	[0.646]	[1.242]	[0.026]	[0.044]	[0.031]	[0.058]
CEO_Tenure	-0.167	-0.357**	-0.281**	-0.517**	-0.009*	-0.017**	-0.013**	-0.020**
	[0.106]	[0.167]	[0.129]	[0.220]	[0.005]	[0.008]	[0.006]	[0.010]
TARP Issuance	8.624***	8.057***	9.537***	8.390***	0.459***	0.441***	0.493***	0.441***
	[1.557]	[1.664]	[1.868]	[1.917]	[0.067]	[0.080]	[0.079]	[0.096]
Constant	3.046*	0.957	1.155	-2.656	0.210***	0.257***	0.203***	0.233***
	[1.774]	[2.648]	[1.958]	[3.404]	[0.018]	[0.025]	[0.025]	[0.040]
Observations	484	244	344	173	483	244	344	173
R^2	0.8166	0.7328	0.8357	0.7602	0.8339	0.7641	0.8460	0.7758
Adj. R^2	0.8099	0.7165	0.8271	0.7389	0.8279	0.7497	0.8380	0.7559
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Table 9 Continued

Panel B: *RC_AltDef versus RC, 2004-2010*

Risk Proxy:	***TailRisk*** $_{i,t+1}$				***RetVol*** $_{i,t+1}$			
	Full Sample		*DF Banks, Only*		*Full Sample*		*DF Banks, Only*	
RC_AltDef $_{it}$	-0.126	-0.316*	-0.141	-0.399	-0.013	-0.023**	-0.017	-0.031**
	[0.196]	[0.187]	[0.254]	[0.272]	[0.010]	[0.009]	[0.013]	[0.013]
RC $_{it}$		0.457		0.544		0.025*		0.030
		[0.301]		[0.360]		[0.015]		[0.018]
Constant	3.032*	3.283*	1.009	1.345	0.211***	0.213***	0.200***	0.202***
	[1.725]	[1.772]	[1.875]	[1.942]	[0.018]	[0.018]	[0.025]	[0.025]
Observations	484	484	344	344	483	483	344	344
R^2	0.8165	0.8173	0.8356	0.8366	0.8346	0.8357	0.8471	0.8485
Adj. R^2	0.8098	0.8102	0.8270	0.8276	0.8286	0.8294	0.8391	0.8401
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Panel C: *RC_AltDef versus RC, 2006-2009*

Risk Proxy:	***TailRisk*** $_{i,t+1}$				***RetVol*** $_{i,t+1}$			
	Full Sample		*DF Banks, Only*		*Full Sample*		*DF Banks, Only*	
RC_AltDef $_{it}$	-0.128	-0.639**	-0.013	-0.522	-0.014	-0.043***	-0.010	-0.043**
	[0.337]	[0.298]	[0.407]	[0.410]	[0.017]	[0.013]	[0.022]	[0.018]
RC $_{it}$		1.093**		0.957		0.061***		0.061**
		[0.506]		[0.644]		[0.023]		[0.029]
Constant	0.776	1.678	-3.137	-2.170	0.260***	0.265***	0.228***	0.235***
	[2.520]	[2.610]	[3.244]	[3.386]	[0.025]	[0.024]	[0.038]	[0.038]
Observations	244	244	173	173	244	244	173	173
R^2	0.7308	0.7358	0.7583	0.7618	0.7632	0.7699	0.7743	0.7805
Adj. R^2	0.7144	0.7184	0.7369	0.7390	0.7487	0.7548	0.7543	0.7596
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Robust standard errors, clustered by BHC, are presented in brackets. All explanatory variables are measured in year *t*, subscripts omitted. All regressions include year fixed effects; coefficients not reported. Asterisks indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1); all tests are two-tailed. *RC_AltDef* is equal to one if any committee of the board oversees enterprise-wide risk (this corresponds to committees that meet criteria for types E, F, and G in Table 2, Panel A, and equals one if any committee oversees enterprise-wide risk). All other variables are defined in Appendix B.

Table 10 Relaxed Risk Committee Definition (*RC2*) & Market Risk, 2004-2016

Panel A: $TailRisk_{t+1}$

Risk Proxy:	***TailRisk*** $_{i,t+1}$					
	Full Sample			*DF Banks, Only*		
	(1)	(2)	(3)	(4)	(5)	(6)
$RC2_{it}$	-0.052	-0.064	0.040	-0.039	-0.039	0.183
	[0.127]	[0.128]	[0.156]	[0.163]	[0.163]	[0.218]
DF_{it}		0.129	0.368**		0.037	0.391*
		[0.134]	[0.177]		[0.140]	[0.203]
$RC2xDF_{it}$			-0.366**			-0.559**
			[0.174]			[0.218]
Constant	3.504***	3.722***	3.705***	2.158	2.189	2.144
	[0.965]	[1.086]	[1.085]	[1.316]	[1.381]	[1.387]
Observations	982	982	982	693	693	693
R^2	0.8351	0.8352	0.8357	0.8457	0.8457	0.8467
Adj. R^2	0.8311	0.8311	0.8314	0.8404	0.8401	0.8410
Year FE	YES	YES	YES	YES	YES	YES

Panel B: $RetVol_{t+1}$

Risk Proxy:	***RetVol*** $_{i,t+1}$					
	Full Sample			*DFB Sample*		
	(1)	(2)	(3)	(4)	(5)	(6)
$RC2_{it}$	-0.003	-0.004	0.000	-0.003	-0.003	0.005
	[0.006]	[0.006]	[0.008]	[0.009]	[0.009]	[0.012]
DF_{it}		0.007	0.015*		0.005	0.018*
		[0.006]	[0.008]		[0.007]	[0.010]
$RC2xDF_{it}$			-0.013			-0.020*
			[0.008]			[0.011]
Constant	0.201***	0.201***	0.201***	0.193***	0.193***	0.194***
	[0.014]	[0.014]	[0.014]	[0.020]	[0.020]	[0.020]
Observations	981	981	981	693	693	693
R^2	0.8499	0.8501	0.8503	0.8551	0.8551	0.8557
Adj. R^2	YES	YES	YES	YES	YES	YES
Year FE	0.8463	0.8463	0.8464	0.8501	0.8499	0.8503

Notes: Robust standard errors, clustered by BHC, are presented in brackets. All regressions include control variables & year fixed effects; coefficients not reported. Asterisks indicate statistical significance (*** p<0.01, ** p<0.05, * p<0.1); all tests are two-tailed. *TailRisk* is the average of the lowest 5% of the bank's daily returns over the preceding 12 months, multiplied by negative one. *RetVol* is the standard deviation of the bank's daily returns over the preceding 12 months. In order to present more discernible coefficients, I multiply *TailRisk* by 100, and *RetVol* by 10, for all tests. All other variables are defined in Appendix B.

Table 11 Baseline Risk Governance Index (RGI) Summary Statistics, 2004-2016

	Baseline RGI, by Year (Full Sample)					
Year	**N**	**Mean**	**Std.Dev.**	**Min**	**Median**	**Max**
2004	78	4.795	2.392	0	5	10
2005	79	5.316	2.570	0	6	11
2006	81	5.938	2.790	0	6	13
2007	83	6.518	2.965	0	6	14
2008	83	7.012	2.957	0	7	14
2009	84	7.940	3.148	0	8	14
2010	84	8.821	3.231	0	9	14
2011	84	9.595	3.478	0	10	15
2012	84	10.119	3.385	0	10	16
2013	84	10.917	3.129	0	11	16
2014	84	12.131	2.750	4	13	16
2015	82	12.793	2.438	7	13	16
2016	80	13.250	2.286	7	14	16
Full Period	1,070	8.885	3.990	0	9	16
2004-2010	572	6.654	3.160	0	7	14
2011-2016	498	11.448	3.234	0	12	16

Note: The *RGI* statistics presented above are for the baseline *RGI* (i.e., prior to scaling by the sample maximum score to form *RGI1*), as defined in Appendix E.1.

Table 12 Abbreviated Regression Results, RGI Variants & Risk, 2004-2016

Panel A: *Dependent Variable = TailRisk* $_{i,t+1}$

	Full Sample			*DF Banks, Only*		
RGI =	***RGI1***	***RGI4***	***RGI5***	***RGI1***	***RGI4***	***RGI5***
$RGI_{i,t}$	-0.100	-0.071	0.061	0.323	0.193	0.377
	[0.363]	[0.273]	[0.258]	[0.577]	[0.428]	[0.380]
$DF_{i,t}$	0.375	0.143	**0.298***	0.646	0.219	**0.354***
	[0.359]	[0.208]	**[0.175]**	[0.424]	[0.262]	**[0.205]**
$RGIxDF_{i,t}$	-0.344	-0.023	-0.376	-0.884	-0.361	**-0.750****
	[0.462]	[0.305]	[0.259]	[0.554]	[0.423]	**[0.353]**
Constant	3.661***	3.715***	3.665***	2.124	2.232	2.180
	[1.081]	[1.084]	[1.093]	[1.379]	[1.395]	[1.406]
Observations	981	981	981	692	692	692
R^2	0.836	0.836	0.836	0.846	0.846	0.847
Adj. R^2	0.831	0.831	0.832	0.841	0.840	0.841
Year FE	YES	YES	YES	YES	YES	YES

Panel B: *Dependent Variable = RetVol* $_{i,t+1}$

	Full Sample			*DF Banks, Only*		
RGI =	***RGI1***	***RGI4***	***RGI5***	***RGI1***	***RGI4***	***RGI5***
$RGI_{i,t}$	-0.001	-0.004	0.002	0.020	0.006	0.016
	[0.017]	[0.013]	[0.012]	[0.027]	[0.021]	[0.019]
$DF_{i,t}$	0.015	0.003	0.010	0.029	0.006	0.013
	[0.017]	[0.010]	[0.008]	[0.020]	[0.013]	[0.010]
$RGIxDF_{i,t}$	-0.017	-0.001	-0.017	-0.043	-0.014	**-0.033***
	[0.022]	[0.014]	[0.012]	[0.027]	[0.021]	**[0.018]**
Constant	0.204***	0.206***	0.203***	0.120*	0.123*	0.121*
	[0.049]	[0.049]	[0.050]	[0.066]	[0.067]	[0.067]
Observations	981	981	981	692	692	692
R^2	0.849	0.849	0.849	0.856	0.855	0.856
Adj. R^2	0.845	0.845	0.845	0.850	0.850	0.851
Year FE	YES	YES	YES	YES	YES	YES

Table 12 Continued

Panel C: *Dependent Variable = TexasRatio* $_{i,t+1}$

	Full Sample			*DF Banks, Only*		
RGI =	***RGI1***	***RGI4***	***RGI5***	***RGI1***	***RGI4***	***RGI5***
$RGI_{i,t}$	0.023	-0.011	0.026	**0.174****	0.065	0.107
	[0.052]	[0.051]	[0.050]	**[0.078]**	[0.073]	[0.072]
$DF_{i,t}$	-0.036	-0.031	-0.024	0.052	-0.009	-0.003
	[0.034]	[0.021]	[0.017]	[0.036]	[0.026]	[0.025]
$RGIxDF_{i,t}$	0.014	0.014	-0.009	**-0.142*****	**-0.073***	**-0.100****
	[0.043]	[0.033]	[0.035]	**[0.044]**	**[0.040]**	**[0.047]**
Constant	0.008	0.002	0.010	0.112	0.116	0.130
	[0.112]	[0.109]	[0.111]	[0.215]	[0.208]	[0.211]
Observations	937	937	937	656	656	656
R^2	0.395	0.394	0.395	0.420	0.408	0.417
Adj. R^2	0.379	0.378	0.379	0.398	0.386	0.395
Year FE	YES	YES	YES	YES	YES	YES

Panel D: *Dependent Variable = RWA* $_{i,t+1}$

	Full Sample			*DF Banks, Only*		
	RGI1	RGI4	RGI5	RGI1	RGI4	RGI5
RGI	**0.042****	0.008	0.010	**0.060****	0.007	0.008
	[0.016]	[0.013]	[0.011]	**[0.026]**	[0.014]	[0.014]
DF	0.014	-0.013	**-0.019***	0.024	-0.012	-0.018
	[0.019]	[0.013]	**[0.011]**	[0.019]	[0.014]	[0.015]
RGIxDF	**-0.061****	**-0.030****	**-0.022***	**-0.072****	**-0.028***	-0.020
	[0.025]	**[0.015]**	**[0.012]**	**[0.027]**	**[0.015]**	[0.013]
Constant	0.440*	0.431*	0.424*	0.577*	0.535*	0.531*
	[0.248]	[0.251]	[0.250]	[0.292]	[0.294]	[0.297]
Observations	970	970	970	685	685	685
N. BHCs	82	82	82	58	58	58
R^2	0.517	0.513	0.512	0.520	0.513	0.511
Adj. R^2	0.506	0.501	0.501	0.504	0.496	0.495
Year FE	YES	YES	YES	YES	YES	YES
BHC FE	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**

Notes: Standard errors, clustered by BHC, in brackets. All regressions include the control variables used in the respective dependent variable's *RC* tests, as well as year fixed effects; coefficients have been omitted for brevity. All regressions in Panel D include BHC fixed effects. Asterisks indicate significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$); All tests are two-tailed. All variables are defined in Appendix B.

APPENDIX D

SUPPLEMENTAL SUMMARY STATISTICS

Table D.1 General Descriptive Statistics, Full Sample (2004-2016)

	Dependent Variables (2005-2016)					
Variable	**Mean**	**Median**	**Std Dev**	**p25**	**p75**	**N**
TailRisk	0.049	0.037	0.031	0.029	0.058	985
RetVol	0.023	0.017	0.014	0.014	0.026	985
ROAvol	(7.467)	(7.623)	1.142	(8.311)	(6.835)	990
EBLLPvol	(7.257)	(7.418)	0.990	(7.959)	(6.762)	990
NIMvol	(8.162)	(8.187)	0.704	(8.640)	(7.731)	990
RWA	0.738	0.745	0.128	0.665	0.815	994
TexasRatio	0.183	0.137	0.152	0.084	0.236	950
Tier1Levg	9.504	9.280	2.205	8.230	10.450	994
LevgRatio	12.553	12.065	3.403	10.640	13.620	994
Tier1/AT	9.060	8.886	2.029	7.844	9.972	994
TotCap	14.464	13.985	3.160	12.510	15.560	994
	Independent Variables (2004-2015)					
Variable	**Mean**	**Median**	**Std Dev**	**p25**	**p75**	**N**
RC	0.294	0.000	0.456	0.000	1.000	994
Assets ($ bn)	117.703	12.437	380.417	6.363	37.017	994
aSize	16.742	16.336	1.582	15.666	17.427	994
mSize	1.462	1.038	1.196	0.665	1.768	984
pretaxRoRWA	0.017	0.018	0.016	0.012	0.024	994
Loss	0.074	0.000	0.263	0.000	0.000	994
NonInt_Ratio	0.258	0.234	0.155	0.158	0.321	994
ALLL>NPL	(0.011)	(0.005)	0.021	(0.016)	0.001	994
HighTrdgDum	0.053	0.000	0.225	0.000	0.000	994
SurbordDebt/Eq	0.178	0.160	0.134	0.083	0.249	994
FamFdrOwnshp	0.051	0.000	0.145	0.000	0.017	988
CEO_Tenure	9.705	7.000	8.380	3.000	14.000	987
TARP Issuance	0.017	0.000	0.071	0.000	0.000	994
Deposits/Loans	1.311	1.107	1.155	1.002	1.267	994
LLPvsCHO	0.579	1.000	0.494	0.000	1.000	994
MVE/RegCap	1.508	1.431	0.681	1.023	1.944	984
LoanGrowth	0.008	0.007	0.079	(0.023)	0.036	994
C&I Loans	0.127	0.114	0.076	0.076	0.164	994
RealEst Loans	0.412	0.437	0.161	0.323	0.519	994
Slack	0.223	0.197	0.120	0.150	0.261	994

Notes: This table presents the summary statistics for all variables used in the main study, for all sample BHC-years. The variable *aSize* refers to the log of total assets, and *mSize* refers to the log of the market value of equity. All other variables are defined in Appendix B.

Table D.2 Means and Tests of Mean Differences across *DF Bank*, 2004-2010

	2005-2010							
	Full Sample		DFBank = 0		DFBank = 1		0 - 1	
Risk Proxies	***N***	***Mean***	***N***	***Mean***	***N***	***Mean***	***Difference***	
TailRisk	487	0.060	140	0.062	347	0.060	0.000	
RetVol	487	0.029	140	0.029	347	0.028	0.001	
ROAvol	492	(7.183)	146	(7.393)	346	(7.095)	(0.081)	
EBLLPvol	492	(7.030)	146	(7.223)	346	(6.948)	(0.089)	
NIMvol	492	(7.993)	146	(7.963)	346	(8.006)	0.051	
RWA	496	0.749	147	0.736	349	0.754	(0.010)	
TexasRatio	478	0.207	144	0.183	334	0.218	(0.028)	***
Tier1Levg	496	9.127	147	9.860	349	8.818	1.049	***
LevgRatio	496	11.875	147	13.009	349	11.397	1.469	***
Tier1/AT	496	8.672	147	9.436	349	8.351	0.983	***
TotCap	496	13.984	147	14.405	349	13.807	0.659	***
	2004-2009							
	Full Sample		DFBank = 0		DFBank = 1		0 - 1	
Controls	***N***	***Mean***	***N***	***Mean***	***N***	***Mean***	***Difference***	
aSize	496	16.511	147	15.122	349	17.095	(1.930)	***
mSize	486	1.376	139	0.481	347	1.734	(1.237)	***
pretaxRoRWA	496	0.016	147	0.017	349	0.016	0.000	
Loss	496	0.103	147	0.075	349	0.115	(0.019)	
NonInt_Ratio	496	0.241	147	0.188	349	0.263	(0.063)	***
ALLL>NPL	496	(0.008)	147	(0.005)	349	(0.010)	0.003	**
HighTrdgDum	496	0.052	147	0.020	349	0.066	(0.033)	**
SubordDebt/Eq	496	0.219	147	0.163	349	0.242	(0.060)	***
FamFdrOwnshp	490	0.060	145	0.074	345	0.055	0.018	*
CEO_Tenure	489	8.716	145	6.966	344	9.453	(1.934)	***
TARP Issuance	496	0.034	147	0.028	349	0.037	(0.005)	
Deposits/Loans	496	1.206	147	1.072	349	1.262	(0.225)	***
LLPvsCHO	496	0.772	147	0.844	349	0.742	0.079	**
MVE/RegCap	486	1.695	139	1.673	347	1.703	0.063	
LoanGrowth	496	0.012	147	0.012	349	0.011	0.000	
C&I Loans	496	0.126	147	0.102	349	0.136	(0.039)	***
RealEst Loans	496	0.431	147	0.507	349	0.398	0.114	***
Slack	496	0.216	147	0.212	349	0.217	(0.011)	

Notes: This table presents the overall means for all variables used in this study for the pre-2010 period, and the means and tests of mean differences for the same period, by *DFBank* . *DFBank* equals 1 for all sample years if the BHC has average assets greater than $10 billion by Q4 of 2014, and zero otherwise. Asterisks indicate statistical significance of tests of the difference in means (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$).

The variable *aSize* refers to the log of total assets, and *mSize* refers to the log of the market value of equity. All other variables are defined in Appendix B.

Table D.3 Pearson Pairwise Correlations, Full Sample (2004 - 2016)

	$Risk_{t+1}$										
X_t	***TailRisk***	***RetVol***	***ROAvol***	***EBLLPvol***	***NIMvol***	***RWA***	***TexasRatio***	***Tier1Levg***	***LevgRatio***	***Tier1/AT***	***TotCap***
RC	(0.106) *	(0.116) *	(0.076) *	(0.098) *	(0.121) *	0.038	0.016	0.068 *	0.035	0.078 *	0.048
RGI1	(0.136) *	(0.144) *	(0.058) *	(0.065) *	(0.195) *	(0.038)	0.014	0.019	0.050	0.034	0.099 *
RGI4	(0.192) *	(0.202) *	(0.119) *	(0.123) *	(0.233) *	(0.025) *	(0.068) *	0.033	0.056 *	0.051	0.077 *
RGI5	(0.156) *	(0.166) *	(0.082) *	(0.102) *	(0.199) *	0.029 *	(0.015)	0.059 *	0.037	0.075 *	0.062 *
DF	(0.302) *	(0.311) *	(0.208) *	(0.188) *	(0.210) *	(0.026) *	(0.157) *	0.012	0.034	0.037	0.037
aSize	0.012	(0.006)	0.080 *	0.084 *	(0.082) *	(0.062) *	0.176 *	(0.256) *	(0.174) *	(0.262) *	(0.001)
mSize	(0.074) *	(0.096) *	(0.001)	0.032	(0.078) *	(0.055)	0.071 *	(0.245) *	(0.180) *	(0.271) *	(0.013)
pretaxRoRWA	(0.360) *	(0.366) *	(0.434) *	(0.328) *	(0.082) *	(0.152) *	(0.298) *	(0.006)	0.078 *	(0.074) *	0.037
Loss	0.322 *	0.330 *	0.479 *	0.370 *	0.171 *	(0.014) *	0.280 *	0.114 *	0.128 *	0.152 *	0.174 *
NonInt_Ratio	(0.151) *	(0.161) *	0.006	0.084 *	(0.148) *	(0.302) *	(0.016)	(0.003)	0.193 *	(0.066) *	0.265 *
ALLL>NPL	(0.178) *	(0.182) *	(0.301) *	(0.249) *	(0.174) *	0.112 *	(0.741) *	(0.090) *	(0.166) *	(0.131) *	(0.201) *
HighTrdgDum	0.033	0.024	0.117 *	0.170 *	(0.018)	(0.228)	0.063 *	(0.002)	0.146 *	(0.032)	0.220 *
SubordDebt/Eq	0.292 *	0.287 *	0.221 *	0.170 *	0.038	0.335 *	0.216 *	(0.089) *	(0.281) *	(0.081) *	(0.108) *
FamFdrOwnshp	(0.055) *	(0.046)	(0.051)	(0.018)	0.034	(0.043)	(0.056) *	(0.031)	0.011	(0.007)	(0.006)
CEO_Tenure	(0.104) *	(0.104) *	(0.109) *	(0.062) *	0.004	0.060	(0.066) *	0.137 *	0.076 *	0.138 *	0.048
TARP Issuance	0.519 *	0.536 *	0.283 *	0.270 *	0.175 *	0.017 *	0.309 *	0.015	0.008	0.036	0.062 *
Deposts/Loans	(0.063) *	(0.066) *	(0.018)	(0.019)	(0.054) *	(0.469)	(0.283) *	(0.196) *	0.185 *	(0.220) *	0.176 *
LLPvsCHO	0.362 *	0.358 *	0.156 *	0.169 *	0.185 *	0.012 *	0.202 *	0.022	0.021	0.017	0.021
MVE/RegCap	(0.272) *	(0.288) *	(0.329) *	(0.218) *	(0.024)	(0.123) *	(0.389) *	(0.202) *	(0.125) *	(0.275) *	(0.207) *
LoanGrowth	(0.098) *	(0.098) *	(0.106) *	(0.062) *	(0.025)	0.058 *	(0.187) *	0.090 *	0.112 *	0.112 *	0.074 *
C&I Loans	0.042	0.036	(0.054) *	(0.076) *	(0.033)	0.578 *	(0.095) *	0.058 *	(0.323) *	0.070 *	(0.271) *
RealEst Loans	0.098 *	0.109 *	0.026	(0.004)	0.027	0.316	0.140 *	0.101 *	(0.130) *	0.146 *	(0.203) *
Slack	(0.123) *	(0.124) *	(0.074) *	(0.050)	(0.020)	(0.509)	(0.183) *	(0.156) *	0.215 *	(0.171) *	0.201 *

Notes: * indicates correlation is significant at $p < 0.10$; The variables *aSize* and *mSize* refer to the log of total assets, and the log of market value of equity, respectively. All other variables are defined in Appendix B.

APPENDIX E

RISK GOVERNANCE INDEX CONSTRUCTON DETAILS

Table E.1 RGI Construction (Scoring Criteria)

	Positive Values	*Points*	*Description*	*Notes*
Category 1 - RC Form & Scope	Non-Audit Risk Committee	1	Any committee of the board, other than the Audit committee, oversees industry-relevant risks or the risk management function (regardless of scope of oversight or committee form).	[1]
	Standalone Risk Committee	1	Risk oversight (regardless of scope) is the *sole purpose* of the committee; Committee is not a sub-committee of another committee; Bank-board and joint BHC-bank board risk committees that report to the BHC board are included within this definition.	[2]
	Committee oversees enterprise-wide risk management	1	The committee with risk oversight responsibility has enterprise-wide scope; Any dual- or multi-purpose committees (including Audit committees), in addition to standalone risk committees, with enterprise-wide risk oversight duties, are assigned one point for this item.	[3]
	Is not first year of RC with EWRM	1	Risk committee with EWRM oversight has been in place for more than one year; Only applies to non-audit risk committees with EWRM responsibility.	[4]
Category 2 - RC Composition & Meetings	Committee has at least one "risk management expert" (RME)	1-2	EPS requires at least one RME, but encourages more. A risk oversight committee meeting the minimum standard is awarded one point; having more than one RME earns two points (the maximum points assigned for this item = 2). Points are not conditional upon director independence.	[5] [6]
	Committee has at least one *independent* RME	1	Independent, "effective challenge" is a key component in a strong risk framework and culture (e.g., COSO, 2016; Evans, 2015). I therefore award additional points (i.e., beyond the preceding two categories) for *independent* members' qualifications/expertise in this and the following criteria.	
	At least one *independent* member has banking or financial services experience	1	Experience must be functional and recent. If the independent RME is the only independent member of the risk committee with financial services experience, no additional point is awarded for this item.	[7]
	No substantial overlap between RC and Audit Committee	1	I define "substantial overlap" as any situation where > 60% of the RC members also serve on the AC. By default, Audit committees earn 0 points for this item (because overlap is always 100%).	
	Majority of committee members are independent	1	"Majority" is defined as > 50%; Independence is met if the director meets the respective stock exchange's independence requirements.	[8]
	Committee meets ≥ 4 times per year	1	EPS requires the RC to meet at least quarterly. Because committee meeting dates are not disclosed, I assume that any committee meeting at least 4 times a year does so on a quarterly basis.	[9]

Table E.1 Continued

	Positive Values	*Points*	*Description*	*Notes*
Category 3 - CRO	CRO Score	1-3	The CRO Score ranges from 0 to 3, with points assigned as follows: 0 = No risk officer (of any type) appears to be present; 1 = Silo-type risk officer is present, but position also encompasses other duties not directly related to risk oversight (i.e., the risk officer is "busy"); 2 = Silo-type risk officer is dedicated (not busy), or CRO (enterprise-wide risk manager) is busy; 3 = Bank has a dedicated (i.e., not "busy"), enterprise-wide CRO.	[10]
	Risk Officer is an Executive	1	Risk officer is an executive that reports directly to the CEO, the full board, and/or a committee of the board.	[11]
	Independent RM Function	1	CRO (whether or not the CRO is an executive) reports to Board and/or a Committee of the Board, *and* the CEO is not a member of the committee to which the CRO reports.	[12]
	Negative Values		***Explanation***	
Category 4 - Penalties	Committee does not have a charter	-1	EPS requires that all risk oversight committees establish a committee charter, and that the charter is reviewed and approved by the board at least annually.	[13]
	Multiple committees oversee risk; "primary" is not clear	-1	I assume that unclear disclosure of the board's delegation of risk oversight responsibility is correlated with the underlying clarity and development of a BHC's risk governance framework.	
	The "standalone" nature of the committee is questionable	-1	Standalone is "questionable" if the committee has functional duties that are conceivably related to risk (e.g., reputational risk/public relations, finance, corporate governance), but are nevertheless additional/ancillary to the committee's primary purpose.	
	Maximum RGI	***16***		

Table E.1 Continued

Notes

[1] Industry-relevant risk types include credit risk, market risk, interest rate risk, liquidity risk, etc. Example committee names include Credit Risk, Asset and Liability, Risk and Governance, Risk and Finance, Enterprise Risk, and Risk Committee.

[2] Audit Committees, by default, earn zero points in this category.

[3] Disclosures need not include the words "enterprise" or "enterprise-wide." For example, if a committee has oversight either of the risk management function, or of a list of all potential risk types (as defined by the OCC), I consider this equivalent to “enterprise-wide” risk oversight. If other committees of the board are assigned oversight for functionally appropriate risk types (e.g., the AC oversees financial reporting risk), and it is clear that those committees report on their respective areas to the RC, I continue to classify the RC as having oversight of all risk.

Often, key identifying characteristics for enterprise-wide risk oversight include, but are not limited to: (1) an exclusive designation of the committee as the primary vehicle for board risk oversight; (2) use of ERM/risk governance terminology, such as risk framework, risk appetite, risk tolerance, or risk culture; and/or (3) discussion of the committee's responsibilities with respect to the CRO.

[4] Most committee formations do not coincide with the beginning of the fiscal year. Furthermore, as committee formation likely corresponds with the implementation or revision of the company’s risk governance framework, the committee may face a steep learning curve, and may not be as effective in its first year relative to subsequent years.

[5] The committee's designated risk management experts are usually not named within BHCs' disclosures. Practitioners and regulators suggest that individuals with high level, functional experience overseeing risk in similar financial institutions, or in other highly regulated industries, are likely to meet this requirement. This includes current and former CEOs, CFOs, CROs, COOs, etc. of the BHC or of other, similarly sized institutions or from complex/high risk industries (i.e. chemicals, oil and gas, utilities), large cap asset managers and private equity investors, former regulators/former bank examiners, and the like. I also consider certain experience from public accounting - such as being the partner in charge of a large public accounting firm's financial services or risk management consulting practice - to fulfill this requirement.

While this procedure was probably the most subjective of the entire process, I note that in almost every case where a RME (per my classification) was elected to the board, it followed that there were large changes over the next year in the other risk governance and management structures. I interpret this as evidence that the indicator does a decent job of capturing this concept. Furthermore, a few BHCs have disclosed the name(s) of the RME(s) on the risk committee (this is becoming more commonplace, but it is certainly not the norm). When this is the case, my RME designations generally agree with the disclosed information; if not, it is usually because my choices were more conservative (or skeptical).

[6] Non-independent directors that meet this criterion are most often current or former bank executives (e.g., the CEO, COO, CRO, or CFO). I adjust for a current CEO’s membership in a later step.

[7] I follow Minton et al. (2014) in defining financial expertise, but with two exceptions. First, I require functional experience in the industry - which rules out Minton et al. (2014)'s categories of academics and executives from other industries whose experience is more accounting-related (i.e. CFO, CAO, Treasurer), unless, of course, those individuals have prior experience in the banking industry. Second, because I am concerned with these individuals' ability to comprehend the complexity of the BHCs' activities, and of the processes and systems for effective risk management, I require the individual's functional experience to be recent. I define "recent" on a rolling basis, and consider any director that retired from the industry less than 10 years before a given observation-year to have recent, functional experience.

Table E.1 Continued

Notes

[8] EPS requires that the chair of the RC is independent. However, if the AC has risk oversight, this is always the case, and in the post-2010 period, almost all RCs have an independent chair. To allow for more variation in this category (and in the spirit of "effective challenge," discussed above), this condition treats the extent of independence of the committee with risk oversight as a positive characteristic. Nevertheless, a tradeoff involved in this choice is that an Audit Committee that oversees risk will always earn a point here, and thus may be over-weighted in the index. However, characteristics of the Audit Committee are not weighted in several of the other components.

[9] If a risk committee is formed in the middle of the year, the number of meetings of the new committee is often less than four; however, the committee formerly overseeing some (or all) risk presumably met to discuss risk prior to the new committee's formation. Accordingly, if it is the first year of a new risk oversight committee, and meetings for that year are less than four, but are at least four the following year, then I still award a point for this category.

[10] Silo-type risk managers have titles (or job descriptions) that imply the individual only oversees a subset of risks (e.g., Chief Credit Officer, Chief Loan Officer, and Chief Compliance Officer). The CRO designation includes employees that oversee the entire RM function that may have a title other than "CRO" (e.g., VP of Risk Management). A risk officer (silo-type or CRO) is considered "busy" if the individual's job title (or job description, if available) implies that risk oversight is not the individual's only responsibility. Example titles of "busy" risk managers include the following: General Counsel, Secretary, and Chief Risk Officer; Chief Auditor/Risk Manager; a CFO or a Chief Operating Officer that also serves as the CRO; and Chief Credit and Compliance Officer.

[11] Unless it is disclosed that the executive reports directly to the board or a committee of the board, an individual included on the company-disclosed list of executives does not meet this condition if that person is a subordinate – for reporting purposes – to any executive other than the CEO.

Within the extant literature, there does not appear to be a cleanly defined or accepted method for identifying "executive" status. In comparing my data to that of similar studies, I appear to have been somewhat more liberal when coding this designation. Without the reporting line condition, above, nearly all sample BHCs would receive a point for this item for all years.

[12] A bank's current CEO technically qualifies as a "Risk Management Expert," and is counted as a RME above (in Category 2) if he/she is a member of the risk committee. When a CEO sits on the risk committee, the independence of the risk management function is likely compromised: this arrangement may undermine the objectivity of the RC and negate the purpose of the CRO's dual reporting line.

[13] All audit committees have charters, and while many other types of committees have charters, only the charters of the Audit, Nominating, and Corporate Governance committees are required to be made public. If disclosures do not discuss the availability of a risk committee (or similar) charter (e.g., it is stated that the charter is available on the website, or can be furnished upon written request), I assume there was no charter at that time. I searched investor relations websites for evidence to the contrary, and revised my coding if necessary.

Table E.2 Definitions of Variations of RGI

RGI Measure & Definition	
RGI1	No changes to the composition of/assumptions behind RGI. *RGI1* = RGI, scaled by the sample max score of RGI (16). *Note:* even if there is no committee of the board designated with risk oversight, a BHC's RGI1 score can take a value of up to 0.31 (5 out of 16), if the bank has a CRO that earns the maximum points in Category 3 (see Appendix Table D1, Category 3).
RGI4	=RGI, with one restriction: I set *RGI4* = 0 for all bank-years where no board committee has enterprise-wide risk oversight responsibility (by default, then, *RGI4* equals zero for bank-years where no committee has any level of risk oversight, and for bank-years where there is some degree of board-level risk oversight, even if the BHC has a Chief Risk Officer). Under this definition, I consider ACs with enterprise-wide risk oversight to be a potentially legitimate component of risk governance; however, the score continues to be higher (as in RGI) for risk oversight by a committee other than the AC. Requiring EWRM oversight causes some degree of discontinuity at the lower end of RGI4; to correct this, I set all values less than or equal to 5 to zero, and subtract 5 from all remaining non-zero values (this forces the minimum non-zero score to equal 1, and the resulting distribution of non-zero scores is approximately normal). I then scale the resulting score by the resulting sample max for RGI4 (value of 11).
RGI5	=RGI, with one restriction: I set RGI5 equal to zero for any bank-year where the *RC* indicator (as defined in the main analysis and in Appendix A) equals zero. *RGI5* therefore provides a measure of heterogeneity in the extent of compliance with the final risk committee rule among banks that have a dedicated risk committee with EWRM oversight responsibilities. Similar to RGI4, this restriction imposes a discontinuity from the resulting minimum RGI5 score (0) to the next highest RGI5 score (6). I therefore subtract 5 from all non-zero scores before scaling RGI5 by the sample max (11).

APPENDIX F

RECONCILIATION TO ELLUL & YERAMILLI (2013)

F.1. Overview

In the pre-Dodd-Frank period, I find that observations with dedicated enterprise risk committees have no different risk (measured as *TailRisk* or *RetVol*) relative to observations without risk committees (see Table 9, Panel A). I also find that a more general definition of board-level risk oversight (*RC_AltDef*) is associated with lower *TailRisk* and *RetVol*, while the specific risk committee definition used throughout this study (*RC*) is associated with higher *TailRisk* and *RetVol* (see Table 9, Panels B and C). These results differ from the finding that stronger risk controls are associated with lower tail risk and stock return volatility, documented by Ellul and Yerramilli (2013; henceforth, E&Y), for a similar sample and across a similar period. The purpose of this appendix is to reconcile the findings presented in Section 6 to those documented within E&Y.

The E&Y sample is comprised of public, U.S. financial institutions, and spans the period from 1994 to 2010. The study's variable of interest is the risk management index, or RMI. The measure is the predicted score from the first principal component, or the eigenvector with the highest eigenvalue, from annual estimation of principal component analysis (PCA) with four measures related to Chief Risk Officer (CRO) presence and organizational status, and two measures of board-level risk oversight.

Replicating any study that uses hand-collected data comes with challenges, and the E&Y study is no exception. For example, in the absence of a clearly designated risk committee, it is not clear how the authors determined which board-level committee should be used for collection of the risk oversight data.[102] In addition, E&Y employ a broad definition of "Chief Risk Officer" that includes, for example, Chief Credit Officers, Chief Lending Officers, and Chief Compliance Officers. While the authors imply that this is the exception, rather than the rule, my data shows a lower incidence of CRO presence than that reported by E&Y, despite employing a broad definition as the rule, rather than the exception. In the sections that follow, I discuss these and other challenges in more detail. I then present my replication findings along with my reconciliation results.

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[102] The authors used "the characteristics of the board committee designated with overseeing and managing risk, which is usually either the Risk Management Committee or the Audit and Risk Management Committee" (Ellul & Yerramilli, 2013, p.1766). This is the only direction given throughout the study; it is not clear how the authors proceeded when neither type of committee was present, nor whether risk committees were identified based on the scope of risk oversight (i.e. all/enterprise-wide risk oversight, versus silo-type oversight).

F.2. Sample Reconciliation & Descriptive Statistics

E&Y provide, in the study's appendix, the name and size of each BHCs included in the study's main analysis. The list includes 19 BHCs that I do not utilize in my primary tests.[103] After adding these 19 BHCs, and removing any BHCs included in my study, but not in E&Y, the resulting sample ("replication sample") is comprised of a maximum of 72 unique BHCs with total assets in 2007 ranging from $6.5 billion to $2.2 trillion.[104]

The E&Y study uses data from 1994 to 2010; however, because the risk governance data I collected for my primary sample begins in 2004, I restrict the collection process for the 19 additional BHCs to data for the years from 2004 to 2010. E&Y estimate the RMI measure on a year-by-year basis, so pre-2004 data should not be necessary for replication purposes. Data for the 2004 to 2010 time period is also sufficient for replicating E&Y's Table IV tests, which use data from 2006 to 2008. The disadvantage of this choice, however, is that my replication results for any other tests are not directly comparable to those reported within E&Y.

Univariate statistics for the replication sample for the 2004 to 2010 period are presented in Table F.1.[105] In comparison to E&Y's Table I, Panel A, time trends likely explain many of the apparent differences in the sample BHCs' financial and risk and return characteristics. For example, E&Y report mean total assets (*Assets*) of $84.615 billion for the 1994 to 2009 time period, and I report mean *Assets* of $134.757 billion for the 2004 to 2009 time period. I report mean (median) future tail risk (*Tail Risk*$_{t+1}$) of 0.061 (0.043), whereas E&Y report mean (median) *Tail Risk* of 0.047 (0.038). As my sample period includes more crisis years as a percentage of all sample period years, these differences appear reasonable. Similar differences are also apparent for

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[103] E&Y list all BHCs in their sample in their Appendix A. E&Y's sample period ends in 2010, and 12 of the 72 BHCs in their sample either failed, delisted, or were acquired by the end of 2010. Another four were acquired by mid-2011, with deals announced during 2010. As I am primarily interested in evaluating the outcomes of post-2010 changes in risk oversight, these 16 BHCs, along with one acquired in 2012, two institutions with minimal-to-no traditional banking activities (e.g., Metlife), and two smaller banks that, as of March 31, 2018, have yet to pass the $10 billion threshold, were excluded from the primary sample used in my study.

[104] Following E&Y (2013), I obtain the replication sample's financial information from the FR Y-9Cs, and stock return data from CRSP. I hand-collect all risk management and board-level attributes from the BHCs' public filings (e.g., annual proxy statements, 10-Ks, and annual reports to shareholders), press releases, and websites (when available).

[105] Data for explanatory/control variables are presented for 2004-2009; *Tail Risk* and *Annual Return* are presented for both 2004-2009 and 2005-2010 (statistics for the latter period are denoted with the subscript *t+1*).

annual buy-and-hold stock returns (*Annual Return*$_{t+1}$), profitability (*ROA*), and non-performing loans (*Bad Loans/Assets*).

A few financial characteristics do appear to be somewhat constant, consistent with banks' business models remaining relatively fixed over time. For example, the ratios of deposits to assets (*Deposits/Assets*), Tier-1 Capital to assets (*Tier 1 Cap/Assets*), loans to assets (*Loans/Assets*), and non-interest income to total income (*Nonint Inc/Income*) presented in Table F.1 are comparable those presented in E&Y (2013) Table I, despite the differences in time period.

In contrast, the statistics for the hand-collected risk governance data diverge to a greater extent from those reported within E&Y (2013). E&Y's RMI is the first principal component from a PCA of the following six hand-collected variables: *CRO Present*, *CRO Exec*, *CRO Top5*, *CRO Centrality*, *Active RC*, and RC members' financial services experience (*RC Exper*). I discuss the definitions of these variables, along with any notable differences in the replication data as compared to E&Y, in detail, below.

F.2.1. Presence and Status of a Chief Risk Officer: CRO Present and CRO Exec

E&Y set the indicator *CRO Present* equal to one if the BHC reports having a Chief Risk Officer, or similar officer with risk oversight, for a given year. I follow E&Y, and include Chief Risk Officer, Chief Credit Officer, Chief Lending Officer, Chief Compliance Officer, and other similar titles, in the designation of *CRO Present*.[106] Again, time trends likely explain some of the inconsistencies between my data and E&Y. For example, as more BHCs appoint CROs over time, higher overall averages in my sample for *CRO Present* and *CRO Executive* (0.867 and 0.749, versus 0.806 and 0.402 in E&Y, respectively) seem reasonable. Upon further inspection, however, the differences likely also reflect divergent definitions and classification choices during the collection process.

This conjecture is supported by a comparison of the annual means presented in Table F.2 with those for the same years in E&Y's Table I, Panel C. For example, E&Y report that 100% of the sample BHCs have a CRO present in both 2008 and 2009. Despite including a wide range of

[106] I also include officers whose titles do not imply any degree of risk oversight, but whose job descriptions include oversight of risk management, in this designation.

titles in my classification process (and not conditioning their use on size or activities, as described by E&Y), I appear to have been more conservative than E&Y in coding the *CRO Present* variable. One potential explanation for this discrepancy is that during this time period, many BHCs, albeit with decreasing frequency, described having a risk manager *of the bank*, but not *of the company*. Most of these positions were later (i.e., after 2010) given company-wide risk oversight. As I began my original data collection process with the Dodd-Frank EPS rules in mind (i.e., enterprise-wide risk oversight), I coded *CRO Present* equal to zero in instances where it did not appear that the risk manager had company-wide risk oversight responsibility and authority.

CRO Exec is an indicator variable equal to one if the chief risk officer (or similar) is an executive of the company. As E&Y do not specify the conditions under which an individual qualifies as an "executive," I relied primarily upon whether or not an individual was listed as an executive officer in public filings for this designation.[107] Similar to my procedure for *CRO Present*, if an executive was listed as an officer of the bank, rather than of the bank holding company (usually referred to as "the Company" in SEC filings), I did not consider the individual to be an executive (i.e., *CRO Exec* was set to zero). Nevertheless, I appear to have been more liberal than E&Y for this classification: The average of *CRO Exec* in my replication sample ranges from 0.667 in 2004 to 0.800 in 2009 (see Table F.2), and is are notably higher than the annual means reported by E&Y for 2005 and each year thereafter.

The difference could be due to E&Y distinguishing among ranks of executives (per the executive's title), but I did not make such distinctions because seniority in titles likely means different things across different banks, and may also simply reflect tenure in a given position. Aside from the difference in *CRO Exec* frequency during the replication sample period, my data indicates that executive-level status among CROs exhibits a monotonic, increasing trend across the replication period. In contrast, E&Y's data depicts a drop in the frequency with which a risk officer is an executive across 2005 to 2007, with some recovery in 2008 and 2009. This suggests

[107] This listing appears in either the 10-K or the annual proxy (Form DEF 14A), and is a mandatory disclosure. I also searched the annual report (or letter) to shareholders for this information (if included in this type of filing, the list of executive positions and individuals' names is most often found on the last page of the report). In practice, the decision as to which officers should be listed as executives is, perhaps unsurprisingly, highly subjective. See http://www.meridiancp.com/insights/thought-leadership/proxy-named-executive-officers-should-business-unit-heads-be-included/ for a brief summary of the related complications and diversity in disclosure practices across firms.

at least one potentially significant hurdle for my replication of E&Y's PCA procedure, as differences in collection choices and/or definitions do not appear to be consistent across time.

F.2.2. CRO Status, as Implied by Compensation: CRO Top5 and CRO Centrality

The variable *CRO Top5* indicates whether the risk manager (CRO or equivalent title) appears among the highest paid executives, as disclosed in the Summary Compensation Table of the annual proxy statement (form DEF-14A), for a given year. The sample-wide average of *CRO Top5* in my replication sample appears to be comparable to that of E&Y (21.9% of the replication sample has a CRO among the top five highest paid, versus 20.5% in E&Y). A comparison of the annual averages between those in Table F.2 and E&Y's Table I, Panel C, however, reveals potentially significant differences across our studies. The most notable differences are in 2006 and 2009, where E&Y report that 30% and 43.5% of the sample, respectively, have *CRO Top5* equal to one (I report 14.1% for 2006, and 26.7% for 2009).

Such a large discrepancy is somewhat surprising, as the issue of whether or not an individual's compensation is disclosed is perhaps the least subjective of any of the CRO measures. Further, when an officer's compensation is disclosed, the related Compensation Discussion and Analysis section of the annual proxy statement usually provides far more detail and context to aid in the determination of whether any of the named officers oversees the risk management function. There are, however, at least two possible explanations for the discord between my data and E&Y.

First, I observed several instances where companies voluntarily disclosed compensation for more than five individuals each year. For example, in the summary compensation tables included in Bank of America's 2008 and 2007 proxy statement filings (within which, executive compensation is disclosed for 2007 and 2006, respectively), the company reports compensation for seven executives. Although included in this list, the Global Risk Manager is not in the "top five" based on total compensation (total compensation for the risk manager is the lowest of the seven for 2006, and the second lowest for 2007). In this situation, I did *not* code *CRO Top5* equal to one, but it is possible that E&Y did not make the "top five" classification choice so literally.

Second, in defining *CRO Centrality* (discussed in more detail below), E&Y use the CFO's compensation if there does not appear to be a CRO present. The authors support this choice by

stating that if there is not a designated risk manager, the CFO most likely has risk oversight responsibility.[108] By extension, it is possible that E&Y coded *CRO Top5* equal to one in the case where *CRO Present* equals zero but CFO compensation is disclosed. I concede that this conjecture is, at best, speculation; nevertheless, this explanation would be consistent with the patterns in both CRO presence and in *CRO Top5* frequency reported in E&Y's Table I, Panel C.

I turn next to *CRO Centrality*. Conceptually, the measure is intended to reflect the relative organizational status of the risk officer, and in its simplest form, is measured as the CRO's total cash compensation divided by the CEO's compensation. As E&Y explain, however, current disclosure rules preclude such a straightforward computation. Under Rule 402 of Regulation S-K, SEC registrants must only report compensation for the CEO, CFO, and three most highly compensated executive officers other than the CEO and CFO (17 CFR, §229.402(a)(3)).[109] Thus, if the CRO is not one of these named executive officers (i.e., if *CRO Top5* equals zero), his or her pay is unknown. As shown in Table F.1, the average for *CRO Top5* in my replication sample is 23.1% (it is 20.5% in E&Y), meaning that actual CRO compensation is unknown for roughly 75% of the sample observations.[110]

In cases where *CRO Top5* equals zero, E&Y measure *CRO Centrality* as follows: If there does not appear to be a CRO present, and if CFO pay is known, E&Y assume that the CFO has risk oversight responsibility, and *CRO Centrality* is the ratio of the CFO's compensation to the CEO's compensation. Because CFO compensation was not a required disclosure until 2006, if CFO pay is unknown, or if the BHC does have a CRO but his or her compensation is not disclosed,

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[108] Within the replication sample, I observe this to be explicitly the case for only 15 bank-year observations between 2004 and 2009.

[109] The determination of "most highly compensated" is based on the list of executive officers employed as of the end of the most recent fiscal year, and ranked by the "total compensation" figure reported in the Summary Compensation Table (required under Item 7 of the annual proxy statement), excluding changes in pension value and non-qualified deferred compensation earnings. (Thus, "total compensation" for the purposes of ranking the most highly compensated executives includes salary, cash bonus, stock and option awards, non-equity incentive plan compensation, and all other compensation (e.g., perquisites)). Registrants must provide compensation information for any individual who served in the CEO and/or CFO role during the most recent fiscal year, whether or not that individual remained in that role at year-end. Finally, registrants are also required to provide compensation information for up to two additional officers that would have been considered the three (non-CEO/non-CFO) most highly compensated executives had they remained in office through year-end, but that no longer serve as executives at year-end. (See 17 CFR, §229.402(a)(3) and §229.402(c) for more details.)

[110] I obtained actual CRO compensation data for an additional 12 observations where *CRO Top5* equals zero, making the actual percentage of observations where true CRO pay is unknown closer to 74%.

CRO Centrality is the ratio of the lowest of the named executive officers' pay, divided by the CEO's pay, less one percent.[111] In Table F.1, I also report descriptive statistics for *Alt CRO Centrality*, which is equal to *CRO Centrality*, but is set to zero if the BHC does not appear to have a risk manager (i.e., if *CRO Present* equals zero).

In defining *CRO Centrality*, E&Y state that the centrality ratio is the ratio of the CRO's (or whichever officer's compensation has been used in the numerator) "total compensation, excluding stock and option awards, to the CEO's total compensation" (E&Y, 2013; p.1766). Specific components of pay that are included or excluded from the CRO's compensation are not given, and E&Y do not clarify whether or not the same adjustment is also applied to the CEO's compensation. The data I report uses the sum of the CRO's salary, bonus, and non-equity incentive plan compensation ("cash compensation") in the numerator, and the CEO's total compensation in the denominator.[112] I did not collect the equivalent of the CEO's cash compensation; however, I did collect the CRO's total compensation.[113] Results with this measure (CRO total compensation

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[111] The authors acknowledge that this procedure results in measurement error, but that to the extent that actual CRO pay is much lower, this biases against their findings. Within my replication data, untabulated analysis suggests that the extent of measurement error in *CRO Centrality* is cause for concern. In four out of the six years from 2004 to 2009, average *CRO Centrality* is *higher* for BHCs where the CRO is not actually a named executive officer (i.e., *CRO Top5* is equal to zero). Moreover, across all six years, *CRO Centrality* is *higher* among BHCs in which the CRO is not even an executive (i.e., *CRO Exec* is equal to zero). The two largest values of *CRO Centrality* are 0.804 and 0.831 for 2006 and 2004, respectively. One of these BHCs does not have a CRO of any type; and while the other has an executive-level CRO, that individual is not among the highest paid officers (i.e., *CRO Top5* is equal to zero). Similarly, among the 21 bank-year observations in the top 5% of the sample distribution, only five actually have a CRO in the top five, and six of these do not even have a CRO present. On the other end of the distribution, three of the 21 bank-year observations in the bottom 5% of *CRO Centrality* actually have CROs in the top five.

[112] I note a few other complications, not addressed by E&Y, in calculating *CRO Centrality*. In instances where *CRO Centrality* would otherwise be greater than one (e.g., the CEO foregoes some or all of his or her compensation for a period; the CEO was appointed mid-year; etc.), I used in the denominator the highest paid executive's compensation, rather than the CEO's. Further, there is a large amount of executive-level turnover during the end of the E&Y sample period (i.e., during the crisis), and I frequently observe cases where more than one executive holds the same position in a given year. If both individuals are named executive officers (i.e., each of their compensation details are disclosed), and the sum of the two individuals' pay appears to be a reasonable proxy for annualized pay (i.e., is in line with prior and future years), I use the sum in the *CRO Centrality* calculation. If two individuals hold the position, but only one is a named executive officer, I use the figures as disclosed if they represent more than two thirds of the year. If compensation reported is for less than two thirds of the year, I instead use the compensation of the next closest executive, where "closest" is determined by comparing annualized base salaries.

[113] Note: total compensation comes from the "total compensation" column of the Summary Compensation Table (which is provided in the annual proxy statement). It is this figure that is used for ranking compensation and determining whether or not an executive (other than the CEO or CFO) is a named executive officer.

divided by CEO total compensation) do not qualitatively change any of the following results or discussion, and are therefore not tabulated.

In Table F.1, I report average *CRO Centrality* of 21.9% (E&Y report a mean of 31.3%). The annual averages for this variable (presented in Table F.2) depict a concave pattern (peak of 0.283 in 2004, trough of 0.185 in 2006, and slight recovery to 0.209 by 2009). If it is reasonable to (i) disregard 2004 and 2005, as FAS 123R and Regulation S-K changed the compensation disclosure and reporting regime for fiscal years ending in December 2005, forward; and (ii) consider this measure as simply the inverse of the CEO-to-lowest of the top 5 pay ratio, then the pattern documented here is consistent with higher pay-for-performance sensitivity for CEOs. In non-crisis periods, total CEO compensation is higher, driving *Centrality* down. In crisis periods, total CEO compensation is lower, and while other officers' pay is also lower, it is generally hit to a lesser degree (compared to the CEO), driving *Centrality* upward.

F.2.3. Risk Committee Qualifications and Activities: RC Exper & ActiveRC

E&Y's RMI incorporates a measure of risk committee members' banking and finance experience, but how experience is defined is not stated in the study. To measure relevant board and committee member expertise, I therefore rely on prior literature and the Dodd-Frank EPS rules. Minton et al. (2014) define financial expertise as the case where an independent director is, or has been, (1) a bank executive; (2) an executive of a non-bank financial firm; (3) a finance or accounting officer (e.g., CFO, treasurer, VP finance, accountant) of a non-financial firm; (4) a professional investor (e.g., hedge funds, private equity, venture capital); or (5) an academic in a related field, such as finance, accounting, or economics. Among a sample of public U.S. BHCs with assets great than $1 billion, Minton et al. (2014) report that the fraction of independent directors with these qualifications ranges from 20% to 26% across the period from 2003 to 2008 (see Table 1 of that study).

I primarily rely on the Minton et al. (2014) definition of financial expertise, with two exceptions motivated by requirements within the Dodd-Frank EPS rules. First, I require *functional* experience in the industry, thereby eliminating academics and executives from non-financial industries, unless those individuals have prior experience in the banking industry. Second, because regulators have emphasized that RC members are able to understand the complexity of the BHCs'

activities and the processes and systems for necessary effective risk management, I also require an individual's functional industry experience to be *recent*. I define "recent" on a rolling basis, and consider any director that retired from the industry less than 10 years before a given BHC-year observation to have recent, functional experience. Using these classification rules, the mean annual percentage of independent financial experts on the Board (*Board FS Exper*) is, expectedly, somewhat smaller than the annual averages reported in Minton et al. (2014; see Table 1).[114] Nevertheless, average *Board FS Exper* exhibits an increasing trend throughout the sample period (untabulated), consistent with statistics reported in Table 1 of Minton et al. (2014). As E&Y only present sample-wide, but not annual, averages for the board experience indicator, this comparison provides some comfort in the validity of my financial services experience classification process.

The fraction of RC members with financial expertise, *RC FS Exper*, exhibits a trend in line with *Board FS Exper*. In the PCA procedure, E&Y use an indicator variable for risk committee members' financial services experience. I follow E&Y and define *RC Exper* equal to one if at least one of the RC members is both independent and meets the above definition of financial expertise. In comparing the annual means for *RC Exper (Dummy)*, presented in Table F.2, with those reported in E&Y's Table I, Panel C, I note that the average BHC in my dataset appears to be more likely to have a financial expert on its risk committee. Whether the differences are driven by the definition of financial services experience, or by the underlying committee used as the risk committee, is not readily determinable.

The final RMI input is an indicator of risk committee activity. More specifically, *ActiveRC* is an indicator equal to one if the risk committee meets more times than the average risk committee in a given year. The sample-wide average for *ActiveRC* (0.451, see Table F.1) is comparable to

[114] Aside from my exclusion of a few categories of experience from the Minton et al. (2014) measure of financial expertise, the measures I report will be systematically smaller than those reported in Minton et al. (2014). This is because Minton et al. (2014) report the percent of financial experts among independent directors (i.e., the denominator is the number of independent directors), whereas I define the corresponding measure, for both the board and the risk committee, as the number of independent directors with financial services experience divided by the total number of directors. In other words, because the denominator in my definition is always larger than that of the Minton et al. (2014) definition, the percentages I report for *Board FS Exper* will naturally be smaller, on average. As the majority of directors within my sample are independent, this alteration makes very little qualitative difference for the board-level measure of financial expertise. Risk committees, on the other hand, typically have fewer members (the replication sample average is 4.7 members), and more often than not, non-audit risk oversight committees include at least one non-independent director (many of these are current executives of the BHC). I believe my definition of *RC FS Exper* is more appropriate.

that reported in E&Y (0.439).[115] The underlying data on the number of meetings, however, suggests otherwise. E&Y report that the average RC meets 5.369 times per year. I find RC meeting frequency (*Freq RC Meetings*, Table F.1) to be significantly higher: the average RC in the replication sample meets 8.704 times per year. Some of the divergence is likely driven by differences in time periods presented, as listing requirements and market pressures have caused all types of committees to meet more frequently in recent years. The difference is likely also caused by differences in the committees chosen for data collection, an issue upon which I expand in subsection F.3.2 of this appendix.

F.2.4. Correlations between Tail Risk and Explanatory Variables

In Table F.3, Panel A, I present pairwise correlations for the period from 2004 to 2010 between future *Tail Risk*, E&Y's *pre-crisis RMI*, BHC *Size*, and the control variables most commonly used throughout this analysis.[116] The correlations are largely consistent in direction, size, and significance with those reported in E&Y (2013), Table II, with a few notable exceptions, detailed below.

Size is positively associated with future *Tail Risk*, as in E&Y, but the correlation is not significant in my replication sample. E&Y report positive and significant correlations between future *Tail Risk* and both board member independence (*Board Indep*) and *CEO Tenure*, whereas I find negative, but insignificant, correlations in my replication sample. As these variables are less sensitive to measurement choices and definitions, the observed differences are most likely explained by time.

Independent board members' financial services experience (*Board FS Exper*) is positively and significantly correlated with future *Tail Risk*, and negatively and significantly correlated with *E&Y's pre-crisis RMI*. E&Y present correlations that are directionally consistent with these estimates, but the relationships are not significant in their dataset.[117] In addition, E&Y report a positive and significant correlation between board members' experience and BHC *Size*, whereas I

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[115] E&Y do not present annual averages for *ActiveRC*, but I include them, nevertheless, in Table F.2.

[116] The *pre-crisis RMI* is obtained from Appendix A of E&Y (2013). It is the average across the 2005 and 2006 RMI score for each BHC.

[117] Note: E&Y's corresponding variable is named *Board Experience*.

find a strong negative correlation between *Board FS Exper* and *Size* ($p < 0.0001$, untabulated). The extent to which these differences are explained by time or by differences in the definitions of financial services experience is not easily determinable. I note, however, that the correlations in my replication dataset are consistent with those presented within Minton et al. (2014), whose sample period is from 2003 to 2008, and whose financial experience definition I rely mostly upon.

F.3. Replication of RMI Measure

E&Y's RMI is the first principal component from a PCA of six variables: *CRO Present*, *CRO Executive*, *CRO Top5*, *CRO Centrality*, *Active RC*, and *RC Experience*. My intuition, based on the preceding analysis of the univariate statistics, is that the underlying committee used for data collection purposes may differ, perhaps to a large extent, across my replication dataset and E&Y's.[118] To further explore this conjecture, I present the pairwise correlations between the six underlying risk governance variables included in E&Y's RMI, and *E&Y's pre-crisis RMI*, in Table F.3, Panel B.

While there is no corresponding table in E&Y (2013), previous working paper versions of E&Y report large positive correlations between each of the risk governance variables and RMI. In contrast, I only find positive correlations between *CRO Exec*, *CRO Present*, and E&Y's *pre-crisis RMI*. All other correlations with *E&Y's pre-crisis RMI* are negative within my replication sample. Notably, the correlation between the *RC Exper* dummy and *E&Y's pre-crisis RMI* is negative, relatively large, and statistically significant ($p < 0.05$). This supports my conjecture that there are likely substantial differences in the choice of committee used for data collection purposes.

In addition, I find it notable that there is a negative correlation between *CRO Centrality* and *E&Y's pre-crisis RMI* ($p < 0.05$). I also find that *CRO Centrality* is positively correlated with future risk (correlation coefficient untabulated). Figures F.1 and F.2 plot the relationship between actual and fitted values of the replication sample BHCs' crisis period risk (either *Tail Risk* or

[118] It should be noted that E&Y do not present, nor discuss, the component loadings for each of the six risk management input variables, nor discuss the proportion of variance explained by any component. I am therefore limited in my analysis to comparisons with each sample BHC's pre-crisis RMI, which is the average of each bank's RMI scores across 2005 and 2006, reported in E&Y's Appendix A. Where appropriate, I also attempt to corroborate my results with information from prior (i.e., working paper) versions of E&Y.

RetVol, averaged across 2007 and 2008), and average *CRO Centrality*, measured across 2004 to 2006.[119] The data depict a clear positive relation between *CRO Centrality* and measures of future risk, suggesting that the relative importance of the CRO (as purported to be measured with this ratio) either is correlated with higher risk-taking, or is capturing some other aspect of the BHCs' compensation structure that is associated with higher risk.[120] With respect to the latter explanation, I note that these plots support my previous conjecture that *CRO Centrality*, as measured in this replication, is mostly capturing higher CEO pay-for-performance sensitivity (and therefore higher future risk).

F.3.1. PCA Results

The differences in my replication sample descriptive statistics notwithstanding, I next proceed with principal component analysis (PCA) with my collected data in an attempt to replicate RMI. Following E&Y, I run the PCA on an annual basis (*RMI_y*), and also on the full sample (*RMI_fw*). Table F.4 presents a summary of the PCA outcomes under both approaches. As results for the full sample PCA estimation (*RMI_fw*) are not qualitatively different, I restrict the following discussion to the annual PCA estimation results (*RMI_y*).

The first component explains, on average, only 33.2% of the variance in the data (the high is 35.8% in 2005, and the low is 30.25% in 2008). The cumulative variance explained by the first three components is, on average, just below 70%. As E&Y do not present, nor discuss, the variance explained by the selected component used to predict RMI, I cannot draw conclusions as to whether or not this is in line with their results. Conventionally speaking, the use of only the first component with my data would result in a loss of roughly 67% of the information contained in these variables, and would likely be viewed as an inferior statistical approach. The overall Kaiser-Meyer-Olin

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[119] E&Y present a similar graph in working paper versions of the paper, where the data depicts a clear *negative* relation between *CRO Centrality* and measures of bank risk for these same periods. In contrast, my data not only depicts a clear *positive* relation, but the coefficient estimates for both measures of risk are also significantly different from zero. The coefficient estimate on *CRO Centrality* for the *Tail Risk* regression is 0.0897 ($p = 0.018$); in the *RetVol* regression, the coefficient estimate on *CRO Centrality* is 0.082 ($p = 0.071$).

[120] The result is similar when using the ratio of total CRO compensation to total CEO compensation (*Total CRO Centrality*). The correlation between *Total CRO Centrality* and measures of future risk (untabulated) is positive, but insignificant, in the full sample, and is positive and significant ($p < 0.10$ for $Tail\ Risk_{t+1}$, and $p < 0.01$ for $RetVol\_m_{t+1}$) when estimated for the 2005-2006 period.

(KMO) measure of sampling adequacy, reported at the bottom of Table F.4, further supports this conclusion: based on the ratings within Kaiser and Rice (1974), the average overall KMO across the annual PCA estimations of 56.87 is "miserable," indicating that PCA is not appropriate for summarizing the underlying data.

E&Y acknowledge that annual estimation of the PCA procedure could generate inconsistent factor loadings.[121] The results from annual PCA estimation with my data, presented in Table F.4 demonstrate that the loadings for the first component (and the second and third) are indeed unstable over time. For example, using a 0.3 cutoff (loadings with values > |0.3| are highlighted in bold font), the number and combination of variables loading on the first component is, more often than not, different across any chosen set of years. Many of the variable loadings, most notably *CRO Centrality* and *ActiveRC*, not only vary quite a bit in size, but also change signs from year-to-year.[122] Finally, I note there is never an estimation period (annually or for the full sample period) where all six variables have meaningful positive loadings on the first component.

Unsurprisingly, the correlations (untabulated) between the predicted RMI scores with my replication sample and E&Y's pre-crisis RMI, for the years 2005-2006 (for which E&Y's *pre-crisis RMI* is averaged) are low. The correlation coefficients range from 0.0895 to 0.1451. Further, only the Pearson correlation between E&Y's *pre-crisis RMI* and *RMI_y* is statistically significant at, but not below, the 10% level. Since it does not appear that my data yields a comparable measure of E&Y's RMI, I conclude that I cannot use my predicted RMI scores (i.e., *RMI_y* or *RMI_fw*) in the subsequent analysis.

F.3.2. Implications of the Choice of a Particular "Risk" Committee

In the preceding sections, I highlight many of the reasons the PCA procedure, estimated within my data, does not result in a comparable RMI score to that within E&Y. Because the

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[121] The justification for the year-by-year approach is to "avoid possible look-ahead bias that may arise" when incorporating future information (E&Y, 2013; p.1767).

[122] In all but one specification, *CRO Centrality* loads negatively on the first component, and the loading is relatively large in all periods except 2004 and 2009. Taken together with the descriptive results for this variable, this is perhaps unsurprising. In untabulated analysis, I re-perform the PCA procedure (annually and for the full sample) with *Alt CRO Centrality* or *Total CRO Centrality* in place of *CRO Centrality*, and also without any measure of centrality. The results are somewhat better in that the loadings on the other variables are generally more stable over time (especially when omitting *CRO Centrality*, altogether), but there is little improvement in the proportion of variance explained by the first component, and in no specification do all incorporated variables load on the first component.

underlying data is for the exact same set of banks, the discord must be attributable to differences in data collection procedures and choices. One particular area where differences in the E&Y data and my data likely depart is in the initial selection of the board-level committee to use for collection of RC characteristics. In this sub-section, I expand upon this issue.

For the risk committee attributes captured by *RC Exper* and *ActiveRC*, E&Y use "the characteristics of the board committee designated with overseeing and managing risk, which is usually either the Risk Management Committee or the Audit and Risk Management Committee" (E&Y, 2013, p.1766). There is no explanation as to which committee's characteristics were used either in the absence of an obvious risk committee, or if multiple committees had oversight of different risk areas. Similarly, it is also unclear whether E&Y identify risk committees based on the scope of risk oversight (i.e. enterprise-wide risk oversight, versus oversight of risk silos).Whenever the committee with primary responsibility for risk oversight was unclear, I coded an indicator variable, *Many Cttees*, equal to one. In Table F.2, the average annual values of *Many Cttees* range from a high of 40% in 2005 (28 BHCs) to a low of 25% in 2009 (16 BHCs). To state the implications more directly: for almost one-third of the bank-year observations in this sample, I could just as easily have chosen to use a different committee's members and activities, as there was no single committee with clearly designated risk oversight responsibilities. As clarified by the following example, the choice of one committee over another could have a significant effect on the underlying relationships within the data.

Zions Bancorporation had a "Credit Review/Compliance" Committee in place until 2002/2003, when "compliance" was removed from the committee's name (and presumably added to the responsibilities of the Audit Committee). Zions' board formed its Risk Oversight Committee (ROC), which replaced the Credit Review Committee (CRC), in October of 2011. All members of the former CRC remained as members of the ROC, but the scope of the committee's risk oversight was expanded to include the entire ERM function. Zions is in my primary sample, and I recorded committee characteristics (members and meetings) for the Credit Review Committee for periods up to October 2011, and for the Risk Oversight Committee for periods thereafter.

Disclosures in Zions' 2010 proxy statement (filed April 15, 2010) clarify that the Board does not have a separate Risk Management Committee. Instead, the entire Board is responsible for RM oversight, and Board is assisted in this process via the activities of three board-level committees: the Audit Committee, Credit Review Committee, and Executive Compensation

Committee. Additional discussion suggests that of these three committees, the AC likely plays the largest role in overseeing the ERM function; but the extent to which that was the case in 2010, much less in previous years, is unknown.

The oldest Audit Committee (AC) charter found within Zions' publicly available filings is in the bank's 2001 proxy statement (filed March 21, 2001).[123] While the AC charter includes some discussion of risk oversight, the language is boilerplate (i.e., is almost identical to the NYSE/NASDAQ listing standards with respect to audit committee risk oversight responsibilities) and the discussion pertains only to the AC's oversight of the independent audit function and financial risk exposures. Zions' AC charter undergoes significant changes each year thereafter, and while the scope of the committee's disclosed responsibilities widens over time, the focus is categorically centered on ensuring that appropriate financial reporting controls exist. With respect to risk oversight responsibilities and procedures, the AC Charter included within the 2007 proxy (filed March 28, 2007) differs from prior versions only in that the Chief Risk Officer is added to a list of executives that can be invited to attend AC meetings. Nevertheless, as the risk-related responsibilities of the AC do not appear to change, the purpose of inviting the CRO to attend AC meetings, the extent to which this occurs, and the nature of the meetings that the CRO attends, are unknown. Absent these types of details, a conservative approach to data collection would be assume that the CRO's attendance would primarily relate to ensuring that risk-related *accounting* measurements and disclosures (such as the adequacy of the Allowance for Loan and Lease Losses, or the completeness of contingent liability disclosures) are appropriate.

Ultimately, the decision as to which of Zions' board-level committees is the "risk" committee depends on the research question. If the researcher is concerned about the types of risks typically overseen by an Audit Committee, then the AC should be used as the risk committee; however, if the researcher is interested in bank-specific risks, then the Credit Review (formerly Credit Review/Compliance) Committee is likely the more appropriate choice. In any case, prior to the company's formation of the ROC in October 2011there would have been – and even in hindsight, continues to be – reasonable uncertainty as to which of Zions' Board Committees, if

[123] Refer to Section 4.2.2 for a discussion of the charter filing requirements for SEC registrants for the periods from 2000 to 2006.

any, should be used for the purposes of measuring the presence and strength of board-level risk controls.

The Zions example underscores the ramifications of differences in collection choices: using the Audit Committee as the risk committee, the indicator for *RC experience* would equal one for all of E&Y's sample period, and *Active RC* would equal one for the vast majority of the sample period (using E&Y's sample-wide average of 5.369 RC meetings per year). On the other hand, using the Credit Review/Compliance (and later, Credit Review) Committee as the risk committee, *RC experience* would only equal one for the last three years of E&Y's sample period (2007-2009), and *Active RC* would only equal one in the final year (2009).

In line with the outcomes of different committee choices for Zions, I find in my replication sample that Audit Committees are more likely to be considered active under E&Y's definition (recall, *ActiveRC* equals one if a committee meets more times than the average sample committee in a given year). The average AC meets 9.96 times per year, whereas the average non-audit committee with risk oversight meets an average of 6.61 times per year (untabulated). The mean difference in *ActiveRC* across AC- and other-type risk committees, 0.38, is highly significant ($p < 0.001$; untabulated).

Conceptually, the fact that audit committees are more likely to be classified as "active" is somewhat problematic. Since 2004, NYSE listing standards have tasked audit committees with the requirement to discuss the firm's risk policies and procedures. The rule was cast in relation to Sarbanes Oxley, and it is not clear that any such "discussions" are meant to cover any areas outside of financial reporting-related risk. Because access to AC meeting minutes is not public, the extent to which ACs actually discuss risk matters is unknown. By contrast, while dedicated risk committees may meet less frequently, on average, than audit committees, it is reasonable to assume that risk is the primary item on that committee's agenda.[124]

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[124] Similar concerns arise with respect to the *RC Exper* indicator. Audit Committees in my sample are fully independent, whereas other types of risk oversight committees usually include at least one non-independent director (average *RC Indep* is 81.4%; the annual average for *RC Indep* ranges from a low of 76.9% in 2004, to a high of 85.2% in 2009). Furthermore, the 2004 NYSE and NASDAQ rules imposed more stringent independence and qualification restrictions on AC members. However, despite listing requirements for both independence and financial expertise (which is correlated with financial services experience), there is no difference in the sample-wide means of *RC Exper* (whether measured as a percentage or as an indicator) across BHC observations with AC risk oversight and RC risk oversight.

F.3.3. PCA Summary & Alternative Approach

In sum, I was unable to come anywhere close to the bank-specific RMI figures reported within EY's Appendix A, so a *bona fide* replication was not feasible.[125] However, as E&Y report the pre-crisis RMI scores (the average RMI across 2005 and 2006) by BHC within Appendix A of that study, I incorporated the actual disclosed scores (*EY pre-crisis RMI*) in my replication dataset to see if I can (1) obtain similar results to the published E&Y results when using the pre-crisis scores, and if so, (2) perhaps identify the sources of differences between my study and E&Y with respect to the risk governance data. This analysis is described below.

F.4. Multivariate Results & Analysis

I follow E&Y (2013) in defining all risk measures, control variables, and risk management characteristics. In the following sections, I report the results when replicating several tests within E&Y with the *EY pre-crisis RMI* measure. For each test replicated, I also report or discuss, where appropriate, the findings for alternative specifications of the E&Y tests, including (i) the use of board committee indicators, and/or indicators of CRO presence, instead of *EY pre-crisis RMI*; (ii) controlling for and/or dropping failed/troubled banks and banks acquired during or just after the replication sample period; and (iii) the use of this study's risk oversight data in place of *EY pre-crisis RMI*.

In Table F.5, I present the results from replicating E&Y's Table IV, where the dependent variable is *TailRisk*, and the regressions are estimated for the 2006 to 2008 period, only. All estimates for the pre-crisis RMI measure are comparable in sign, size, and significance to those

[125] I am not the only researcher to have trouble replicating E&Y's RMI. Using a sample of international BHCs, Lingel and Sheedy (2012) also attempt to replicate E&Y's RMI with PCA. Due to data limitations and low correlations between some of E&Y's RMI variables, the authors perform the PCA procedure for the entire pre-2010 sample period using just four variables: CRO Exec, CRO Top5, ActiveRC, and RC Exper. The definitions of these variables are similar to those in E&Y, with the exception that the ActiveRC designation is based on annual medians, rather than annual means. The component loadings for the first three components are presented in Table IV.a of the study. Consistent with my PCA results using six E&Y variables, Lingel and Sheedy (2012)'s first component explains just 36.3% of the variance in the underlying data. The cumulative variance explained by the first three components is 84.6%. With the exception of the loadings on *RC Exper*, which have the opposite sign for each component versus that reported in L&S, the PCA results using my data and the same four variables (untabulated) are strikingly similar to those reported by Lingel and Sheedy (2012).

reported by E&Y. Similar results are presented in Table F.6, where *RetVol* is the dependent variable, and are also comparable to E&Y's Table IA.X (from the study's internet appendix). To examine whether similar results can be obtained with committee and/or CRO indicators, I replace E&Y's *pre-crisis RMI* with indicators for *RC*, *EWRM*, and the interaction of *AC* or *RC* with EWRM, in Table F.7. Here, *RC* equals one if a committee other than the audit committee oversees risk – irrespective of the committee's scope – and *AC* equals one if the audit committee oversees risk (again, irrespective of scope). Scope of risk oversight is distinguished with *EWRM*, which equals one if the risk committee has enterprise-wide remit.

The takeaways in Table F.7 are similar to those for *EY pre-crisis RMI* in my replication of E&Y's Table IV if I instead an indicator for enterprise-wide risk oversight (*EWRM*), or an indicator for Audit Committee risk oversight interacted with EWRM (*AC*EWRM*) instead of EY's pre-crisis RMI. Inclusion of the *CRO Exec* indicator does not change inferences for *EWRM* oversight, but it does appear to subsume the significance of *AC*EWRM*.

Interestingly, an indicator for *CRO Reports to Board* (rather than to the CEO or some other executive; untabulated) has a significant and positive (negative) relation with performance (risk), consistent with Aebi et al. (2012). This also provides support for the EPS requirement that the CRO has a direct and independent reporting line to the board of directors.

In untabulated results, I re-estimate the same E&Y Table IV replication after either controlling for or dropping the BHCs that failed or were closed/acquired during or just after the crisis. Although the main takeaways remain unchanged (*EY pre-crisis RMI* continues to be associated with lower levels of non-performing loans, higher ROA and buy-and-hold returns, and lower tail risk in 2007 and 2008), the magnitude of the coefficient estimates on the *EY pre-crisis RMI* variable is generally much smaller than in my the baseline replication (Table F.5). For example, the coefficient on *EY pre-crisis RMI* in the tail risk tests is -0.036 in my base replication, and the same estimate varies from -0.21 to -0.29 in the models where I either control for or drop failed and acquired BHCs (untabulated).

Table F.8 (Table F.9) presents the results from replicating E&Y's Table V (Table IA.IV, from the study's internet appendix), with the following caveats. First, E&Y include the years from 1995-2010 in this specification, whereas I can only include the period from 2004 to 2009. Second, I do not have Institutional Ownership, the G-Index, nor CEO Delta/Vega. In columns 3b and 3c, however, I include measures of CEO ownership and combined Board/Executive ownership (% of

shares outstanding owned, as reported in the BHC's proxy or 10-k) to control for BHC-specific ownership characteristics. Third, as the values for *EY pre-crisis RMI* are bank-specific and not time-variant, I am not able to include BHC fixed effects as E&Y do in column 5.

The results in Table F.8 are similar to those presented in E&Y's Table 5. The *pre-crisis RMI* measure is significantly negatively related to future *TailRisk*. Likewise, the results in Table F.9 are similar to those presented in E&Y's Table IA.IV (*pre-crisis RMI* is negatively related to future stock return volatility). Similar to the previous replication analysis, I then substitute the pre-crisis RMI measure with committee indicators in Table F.10, and obtain similar results with indicators for board-level enterprise risk oversight (*EWRM*), and this is driven by audit committees with EWRM scope (*AC*EWRM*).

F.5. E&Y Replication Conclusion

The results reported within E&Y (2013) suggest that higher quality risk management is generally associated with lower risk and better crisis-period performance, and are generally consistent with a "business model" explanation, where firms with low risk appetites adopt strong risk controls to prevent excessive risk-taking. However, measurement issues for several components of E&Y's RMI leave the question as to whether the Dodd Frank EPS requirements will be effective on the table. For example, in the absence of a separate risk committee, the authors appear to use audit committee characteristics. This not only leaves unexplained the extent to which certain mechanisms explain the reported results within E&Y, but also prevents other researchers from replicating the primary variable of interest.

F.6. Appendix F Figures & Tables

Figure F.1 Crisis Risk (*TailRisk*) versus pre-Crisis *CRO Centrality*

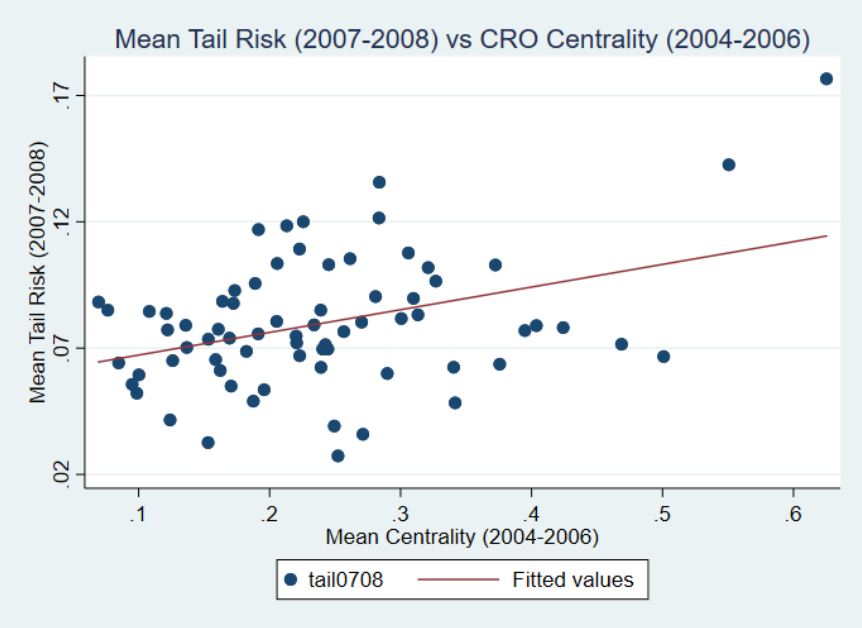
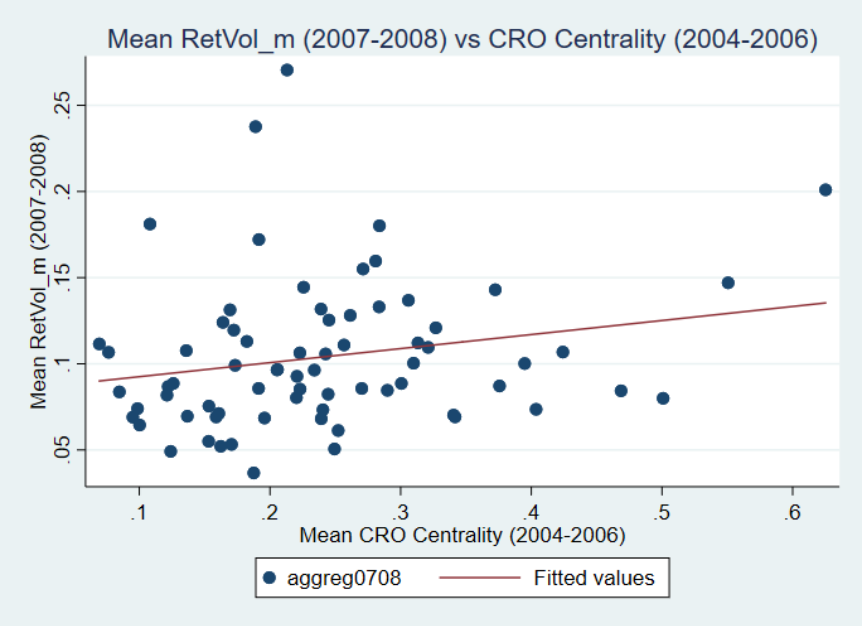


Figure F.2 Crisis Risk (*RetVol*) versus pre-Crisis *CRO Centrality*



Figures F.1 and F.2 show the fitted predicted values from regressing average crisis-period (2007 to 2008) *Tail Risk* and stock return volatility (*RetVol*), respectively, on average pre-crisis (2004 to 2006) *CRO Centrality* and an intercept. The coefficient estimates for both measures of risk are positive and significantly different from zero. More specifically, the estimated coefficient on *CRO Centrality* in the *Tail Risk* regression is 0.0897 (p = 0.018); in the *RetVol* regression, the estimate on *CRO Centrality* is 0.082 (p = 0.071).

Table F.1 Summary Statistics for E&Y Replication Sample, 2004-2010

	Mean	Median	Std Dev	p25	p75	N
Risk and Return Characteristics[1]						
Tail Risk$_{t+1}$	0.064	0.045	0.048	0.027	0.091	399
Annual Return$_{t+1}$	-0.062	-0.024	0.315	-0.248	0.119	399
Tail Risk	0.057	0.036	0.046	0.023	0.084	398
Annual Return	-0.053	-0.005	0.274	-0.215	0.134	397
Characteristics of the Risk Management Function						
CRO Present	0.867	1.000	0.340	1.000	1.000	399
CRO Exec	0.749	1.000	0.434	0.000	1.000	399
CRO Top5	0.231	0.000	0.422	0.000	0.000	399
CRO Centrality	0.219	0.187	0.137	0.116	0.287	399
Alt CRO Centrality[4]	0.180	0.157	0.140	0.080	0.263	399
RC FS Exper (%)	0.226	0.200	0.217	0.000	0.333	399
RC Exper (Dummy)	0.662	1.000	0.474	0.000	1.000	399
Freq RC Mtgs	8.704	8.000	4.212	5.000	12.000	399
Active RC	0.451	0.000	0.498	0.000	1.000	399
EY's Pre-Crisis RMI[2]	0.695	0.603	0.273	0.499	0.940	399
Financial Characteristics						
Assets	134.757	16.160	366.216	9.627	62.757	399
Size	17.177	16.598	1.481	16.080	17.955	399
ROA	0.009	0.010	0.020	0.006	0.013	399
Deposits/Assets	0.661	0.686	0.147	0.626	0.746	399
Tier 1 Cap/Assets	0.086	0.079	0.055	0.069	0.090	399
Loans/Assets	0.623	0.677	0.165	0.585	0.722	399
Bad Loans/Assets	0.010	0.005	0.014	0.003	0.013	399
Nonint Inc/Income	0.275	0.254	0.167	0.164	0.344	399
Deriv Hdging/Assets	0.116	0.056	0.174	0.014	0.149	399
Deriv Trading/Assets	1.422	0.004	5.788	0.000	0.197	399
Governance Characteristics & Acquisition Activity[3]						
Board Indep	0.772	0.786	0.113	0.700	0.846	399
Board Indep w FS Exper	0.163	0.154	0.102	0.083	0.222	399
CEO Tenure	9.957	8.000	8.503	3.000	16.000	399
Δ CEO	0.090	0.000	0.287	0.000	0.000	399
Large M&A	0.170	0.000	0.376	0.000	0.000	399

Table F.1 Continued

	Mean	Median	Std Dev	p25	p75	N
Alternative Measures of Risk Management Characteristics[4]						
Risk Manager has EWRM Oversight Responsibilities (i.e., is a "CRO")						
EW CRO	0.602	1.000	0.490	0.000	1.000	399
Dedic EW CRO	0.524	1.000	0.500	0.000	1.000	399
CFO-CRO	0.038	0.000	0.190	0.000	0.000	399
Many roles, incl RM	0.040	0.000	0.196	0.000	0.000	399
EW CRO is Exec	0.551	1.000	0.498	0.000	1.000	399
EW CRO is Top5	0.158	0.000	0.365	0.000	0.000	399
Alternative types of Risk Managers						
Alt Risk Mgr	0.266	0.000	0.442	0.000	1.000	399
CCO or CLO	0.206	0.000	0.405	0.000	0.000	399
Other Type RMgr	0.060	0.000	0.238	0.000	0.000	399
Alt RMgr is Exec	0.198	0.000	0.399	0.000	0.000	399
AltRMgr is Top5	0.073	0.000	0.260	0.000	0.000	399
Risk Committee Details						
AC Details Used	0.624	1.000	0.485	0.000	1.000	399
Lack Cttee Info	0.065	0.000	0.247	0.000	0.000	399
Multiple Committees	0.323	0.000	0.468	0.000	1.000	399
EWRM Ovst	0.266	0.000	0.442	0.000	1.000	399
*AC*EWRM*	0.110	0.000	0.314	0.000	0.000	399
*RC*EWRM*	0.155	0.000	0.363	0.000	0.000	399

Notes:

[1] Unless otherwise subscripted, all variables are measured in time period *t* for the years 2004 to 2009; variables measured in *t+1* are for the period from 2005 to 2010.

[2] This variable containes the values reported in E&Y (2013), Appendix A (i.e., pre-crisis RMI, or the average RMI, by BHC, across 2005 and 2006). Note that it is not time-variant.

[3] E&Y (2013) include four variables in this group that I was not able to obtain or calculate reliably: G-Index, Institutional Ownership, CEO Delta, and CEO Vega.

[4] These variables are included in addition to those presented in E&Y (2013) Table I, Panel A.

Table F.2 Annual Means for RMI Components & Related Variables – E&Y Replication Sample, 2004-2009

Panel A: *Original RMI Inputs, as defined by E&Y (2013)*

Year	CRO Present	CRO Exec	CRO Top5	CRO Centrality	RC Exper (Dummy)	Active RC
2004	0.7536	0.6667	0.2754	0.2833	0.5507	0.4493
2005	0.8286	0.7286	0.2571	0.2555	0.6000	0.4857
2006	0.8592	0.7324	0.1408	0.1849	0.6197	0.4507
2007	0.8939	0.7727	0.1818	0.1895	0.6970	0.4242
2008	0.9365	0.8095	0.2698	0.1893	0.7619	0.4444
2009	0.9500	0.8000	0.2667	0.2087	0.7667	0.4500

Panel B: *Potential Sources of Differences between Replication Data & E&Y (2013), Table 1 (Panel C)*

Year	Alt Centrality	EW CRO	EW CRO is Exec	EW CRO is Top5	RC FS Exper (%)	Freq RC Mtgs
2004	0.2066	0.3913	0.3478	0.1304	0.1923	8.83
2005	0.1979	0.5429	0.5000	0.1714	0.2036	8.80
2006	0.1469	0.5775	0.5352	0.0845	0.2207	8.56
2007	0.1579	0.6364	0.5909	0.1364	0.2401	8.73
2008	0.1733	0.7302	0.6667	0.2222	0.2538	8.68
2009	0.1978	0.7667	0.7000	0.2167	0.2539	8.62

Year	AC Used	Lack Details	Many Cmttees	Audit Committee	Risk Committee	EWRM Ovst
2004	0.7391	0.0870	0.3623	0.6522	0.2319	0.0870
2005	0.6714	0.0714	0.4000	0.6000	0.3000	0.1286
2006	0.6338	0.0845	0.3380	0.5493	0.3662	0.2535
2007	0.6061	0.0606	0.3030	0.5455	0.4091	0.2879
2008	0.6032	0.0476	0.2698	0.5556	0.3968	0.3492
2009	0.4667	0.0333	0.2500	0.4333	0.5333	0.5333

Table F.3 Pairwise Correlations, E&Y Replication Sample, 2004-2010

Panel A: *Correlations between Risk Proxies and Explanatory Variables*

	Tail Risk$_{t+1}$	**EY's *Pre-crisis* *RMI$_{2005\text{-}2006}$***	***Size$_t$***
Tail Risk$_{t+1}$	1.000		
EY's PreCrisis RMI	**-0.091**	1.000	
Size	0.064	**0.422**	1.000
ROA	**-0.301**	-0.003	-0.081
Tier1 Cap/Assets	-0.022	**-0.110**	**-0.189**
Deposits/Assets	**-0.085**	-0.007	**-0.426**
STBorrow/Assets	**0.186**	**0.102**	**0.237**
BadLoans/Assets	**0.436**	0.030	0.069
Non-Int Income/Income	**-0.195**	**0.208**	**0.354**
Deriv Hedging/Assets	-0.006	**0.314**	**0.546**
Deriv Trading/Assets	0.012	**0.194**	**0.586**
Board FS Exper	**0.110**	**-0.174**	**-0.222**
Board Indep	-0.038	**0.273**	**0.309**
CEO Tenure	-0.069	**-0.170**	**-0.214**

Panel B: *Correlations between Risk, E&Y's pre-crisis RMI, and RMI Inputs, 2004-2010*

	Tail Risk$_{t+1}$	***RetVol$_{t+1}$***	**EY's *Pre-crisis* *RMI$_{2005\text{-}2006}$***
CRO is Exec	0.085 *	0.083 *	0.258 ***
CRO is Top5	0.022	0.056	-0.051
CRO Centrality	-0.075	-0.005	-0.105 **
RC Exper (Dummy)	0.171 ***	0.185 ***	-0.127 **
ActiveRC	0.055	0.089 *	-0.088 *
CRO Present	0.116 **	0.115 **	0.240 ***
Experienced Board	0.011	0.011	-0.067

Unless otherwise indicated, variables are measured in time period *t*. In Panel A, **bold** font indicates correlations are significant at $p < 0.10$. In Panel B, correlations significant at $p < 0.10$, $p < 0.05$, and $p < 0.01$ are indicated by *, **, and ***, respectively.

Table F.4 Results of Principal Component Analysis with E&Y Replication Sample

	PCA by Year						***Full period***
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	
	Eigenvectors (component loadings)						
Comp1							
CRO Present	**0.6109**	**0.5788**	**0.6238**	**0.5809**	**0.6105**	**0.5112**	**0.6111**
CRO Exec	**0.6258**	**0.6072**	**0.6414**	**0.6118**	**0.6196**	**0.5523**	**0.6279**
CRO Top5	**0.4496**	**0.3711**	0.2513	0.2728	**0.3676**	**0.3711**	**0.3549**
CRO Centrality	-0.1174	**-0.3404**	**-0.3413**	**-0.3889**	-0.2194	0.0612	-0.2568
RC Exper	0.0953	0.1416	0.1040	0.0674	0.1871	**0.3988**	0.1855
ActiveRC	0.1007	-0.1508	-0.0945	0.2409	0.1584	**0.3649**	0.0776
% Variance Explained	0.3547	0.3584	0.3198	0.3416	0.3025	0.3153	0.3272
Cumul. % Var. Expld.	0.3547	0.3584	0.3198	0.3416	0.3025	0.3153	0.3272
Comp2	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	***Full period***
CRO Present	-0.0372	0.1509	0.0948	0.2454	0.0076	-0.2581	0.0074
CRO Exec	-0.1435	0.0773	-0.0015	-0.0054	-0.1695	-0.1172	-0.0381
CRO Top5	-0.0983	0.1822	**0.4279**	**-0.3576**	-0.1704	**0.4193**	0.1488
CRO Centrality	-0.1973	**0.5668**	**0.6437**	0.0880	0.2753	**0.8292**	**0.6217**
RC Exper	**0.6337**	**0.5418**	**0.6177**	**0.8550**	**0.5719**	0.1465	**0.4083**
ActiveRC	**0.7266**	**0.5685**	0.1094	-0.2704	**0.7344**	-0.1866	**0.6505**
% Variance Explained	0.1841	0.1897	0.2157	0.1836	0.2100	0.1760	0.1869
Cumul. % Var. Expld.	0.5388	0.5481	0.5355	0.5252	0.5125	0.4913	0.5141
Comp3	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	***Full period***
CRO Present	0.1410	0.0530	0.0405	0.0298	0.0271	-0.0506	-0.0836
CRO Exec	0.0697	0.1873	0.1938	-0.0194	0.1434	-0.2785	0.1142
CRO Top5	-0.1226	0.1015	0.1103	0.2243	**0.3298**	**-0.5511**	**0.5262**
CRO Centrality	**0.8699**	-0.0556	0.1557	**0.6418**	**0.7620**	**0.3101**	0.2764
RC Exper	**0.4305**	**-0.7133**	**-0.3993**	0.2381	**-0.4953**	**0.3281**	**-0.7833**
ActiveRC	-0.1348	**0.6632**	**0.8746**	**0.6927**	0.2094	**0.6421**	0.1148
% Variance Explained	0.1701	0.1632	0.1805	0.1725	0.1857	0.1647	0.1599
Cumul. % Var. Expld.	0.7089	0.7113	0.7160	0.6977	0.6982	0.6560	0.6740
Overall K-M-O	0.5746	0.5874	0.5081	0.6038	0.5217	0.6168	0.5752

Table F.5 Replication of E&Y Table IV, 2006-2008

	Private MBS		Derivative Trading	Bad Loans/ Assets	ROA	Annual Return	Tail Risk
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PrecrisisRMI_EY	-4.123	-2.365	5.114	-0.027**	0.018***	0.347***	-0.036***
	(2.565)	(2.532)	(4.862)	(0.011)	(0.005)	(0.089)	(0.010)
$Size_{2006}$	4.414***	4.691***	7.134***	0.001	-0.002	-0.116***	0.003
	(1.151)	(1.090)	(2.103)	(0.002)	(0.001)	(0.029)	(0.003)
$Size^2_{2006}$		2.180**	6.843***	-0.001	0.001	0.032	-0.003
		(1.082)	(2.121)	(0.001)	(0.001)	(0.020)	(0.002)
ROA_{2006}	284.298**	270.717**	-207.145	0.006		3.705	-0.418
	(129.800)	(129.810)	(189.550)	(0.283)		(4.237)	(0.577)
$(Tier1Cap/Assets)_{2006}$	-113.515***	-104.424**	68.006	0.013	0.308***	-1.543	0.065
	(38.911)	(40.577)	(56.216)	(0.075)	(0.017)	(1.192)	(0.167)
$(BadLoans/Assets)_{2006}$	-31.076	-5.875	-46.077	3.812***	-0.539	-8.421	2.123*
	(200.685)	(173.381)	(209.013)	(1.140)	(0.370)	(11.645)	(1.211)
$(Deposits/Assets)_{2006}$	-8.959**	-6.369	11.670	0.038	-0.009	0.084	-0.030
	(4.411)	(4.806)	(9.870)	(0.035)	(0.013)	(0.256)	(0.027)
$(Loans/Assets)_{2006}$	-14.364***	-12.591***	-5.150	-0.030	-0.016	-0.451**	0.006
	(4.972)	(4.588)	(5.107)	(0.026)	(0.010)	(0.190)	(0.019)
Constant	27.070***	22.427***	-8.263	0.004	-0.008	-0.108	0.079***
	(5.676)	(6.611)	(10.388)	(0.013)	(0.006)	(0.175)	(0.019)
R^2	0.670	0.723	0.644	0.424	0.756	0.196	0.726
N	138	138	138	138	138	138	138

Notes: Explanatory variables measured in 2006; dependent variables – indicated by the column headings – are measured in 2007 & 2008. Standard errors, clustered by BHC, in parenthesis. All regressions include year fixed effects; coefficients not reported for brevity. Asterisks indicate significance (* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$); all tests are two-tailed.

Table F.6 Replication of E&Y Table IA.X, Panel A; 2006-2008

	Private MBS (1)	**Derivative Trading** (2)	**Bad Loans/ Assets** (3)	**ROA** (4)	**BHR** (5)	**Tail Risk** (6)
CRO_Centrality$_{2006}$	-3.455	3.288	0.050***	0.002	-0.442	0.063**
	(2.715)	(4.026)	(0.017)	(0.008)	(0.272)	(0.027)
OversightQual$_{2006}$	1.982*	-0.745	0.006	-0.006	-0.051	0.006
	(1.159)	(1.433)	(0.005)	(0.003)	(0.065)	(0.007)
Size$_{2006}$	4.428***	7.997***	0.001	-0.003*	-0.098***	0.003
	(1.323)	(2.736)	(0.002)	(0.001)	(0.034)	(0.003)
Size$^2_{2006}$	2.487**	6.592***	-0.001	0.000	0.025	-0.002
	(0.974)	(1.996)	(0.001)	(0.001)	(0.025)	(0.002)
ROA$_{2006}$	219.313**	-194.084	-0.212	1.064***	5.127	-0.686
	(107.196)	(161.477)	(0.278)	(0.192)	(4.710)	(0.644)
(Tier1Cap/Assets)$_{2006}$	-88.732***	69.047	0.088	0.007	-1.915	0.154
	(32.949)	(50.380)	(0.083)	(0.058)	(1.319)	(0.189)
(BadLoans/Assets)$_{2006}$	-4.766	-24.953	3.100***	-0.171	-0.952	1.255
	(146.572)	(199.674)	(0.859)	(0.412)	(10.870)	(1.024)
(Deposits/Assets)$_{2006}$	-6.917	13.699	0.041	-0.010	0.097	-0.027
	(5.666)	(11.330)	(0.036)	(0.016)	(0.312)	(0.031)
(Loans/Assets)$_{2006}$	-11.379***	-3.759	-0.033	-0.013	-0.360	0.002
	(3.412)	(4.805)	(0.028)	(0.012)	(0.228)	(0.022)
Constant	19.091***	-7.577	-0.027	0.015*	0.147	0.041**
	(5.813)	(10.206)	(0.019)	(0.009)	(0.182)	(0.019)
R^2	0.753	0.633	0.426	0.763	0.145	0.718
N	137	137	137	137	137	137

Notes: Explanatory variables measured in 2006; dependent variables – indicated by the column headings – are measured in 2007 & 2008. Standard errors, clustered by BHC, in parenthesis. All regressions include year fixed effects; coefficients not reported for brevity. Asterisks indicate significance (* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$); all tests are two-tailed.

Table F.7 Alternative Risk Oversight Indicators versus E&Y Table IV and Table F.5

	DV = Tail Risk in 2007 & 2008				
	Baseline Replic. (1)	(2)	(3)	(4)	(5)
PrecrisisRMI_EY	-0.036***				
	(0.010)				
RC_{t-1}		0.010	0.011	0.010	0.011
		(0.007)	(0.009)	(0.006)	(0.008)
$EWRM_{t-1}$		-0.014**		-0.014**	
		(0.006)		(0.006)	
$AC*EWRM_{t-1}$			-0.013*		-0.013*
			(0.007)		(0.008)
$RC*EWRM_{t-1}$			-0.014		-0.014
			(0.009)		(0.009)
CRO_Exec_{t-1}				-0.000	-0.000
				(0.007)	(0.007)
Constant	0.079***	0.074***	0.074***	0.074***	0.074***
	(0.019)	(0.021)	(0.021)	(0.021)	(0.021)
R^2	0.726	0.705	0.705	0.705	0.705
N	138	137	137	137	137

Notes: Dependent variable (*TailRisk*) measured in 2007 & 2008. Indicators for *RC*, *CRO_Exec*, *EWRM*, and *AC* are lagged one year. All other control variables are measured in 2006. Standard errors, clustered by BHC, in parenthesis. All regressions include year fixed effects; coefficients not reported for brevity. Results on control variables (the same as those included in EY's Table IV, and measured in 2006) do not qualitatively differ from those presented in my replication of Table IV (Table F.5), and are therefore omitted from this table for brevity. Asterisks indicate significance (* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$); all tests are two-tailed.

Table F.8 Replication of E&Y Table V, Columns 1, 3 and 5 (*TailRisk*); 2004-2010

	DV = *Tail Risk*$_t$				
	(1)	(3)	(3b)	(3c)	(5)
PrecrisisRMI_EY	-0.014***	-0.014***	-0.014***	-0.015***	-0.012**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Size $_{t-1}$	0.002	0.002	0.002	0.001	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Size$^2_{t-1}$	0.000	0.001	0.001	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ROA $_{t-1}$	-0.656***	-0.664***	-0.651***	-0.623***	-0.669***
	(0.202)	(0.201)	(0.201)	(0.198)	(0.202)
AnnualReturn$_{t-1}$	-0.029***	-0.029***	-0.030***	-0.029***	-0.029***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
(Deposits/Assets) $_{t-1}$	-0.010	-0.007	-0.009	-0.008	-0.009
	(0.013)	(0.012)	(0.012)	(0.011)	(0.013)
(ST Borrow/Assets) $_{t-1}$	0.047	0.056*	0.058*	0.067**	0.048
	(0.035)	(0.033)	(0.033)	(0.033)	(0.035)
(Tier1Cap/Assets) $_{t-1}$	0.184***	0.190***	0.185***	0.191***	0.189***
	(0.055)	(0.055)	(0.055)	(0.054)	(0.055)
(Loans/Assets) $_{t-1}$	-0.011	-0.013	-0.011	-0.017*	-0.013
	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)
(BadLoans/Assets) $_{t-1}$	0.747***	0.725***	0.710***	0.742***	0.741***
	(0.151)	(0.152)	(0.154)	(0.152)	(0.154)
(Non-int Inc/Income)$_{t-1}$	-0.011	-0.014	-0.014	-0.015	-0.012
	(0.012)	(0.013)	(0.012)	(0.013)	(0.013)
(Deriv.Trdg/Assets)$_{t-1}$		-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
(Deriv.Hdg/Assets)$_{t-1}$		0.004	0.004	0.004	0.005
		(0.007)	(0.007)	(0.007)	(0.007)
Δ*CEO* $_{t-1}$		-0.004	-0.005	-0.004	-0.002
		(0.004)	(0.004)	(0.004)	(0.004)
Large M&A$_{t-1}$		0.003	0.003	0.003	0.004
		(0.002)	(0.002)	(0.002)	(0.002)
CEO_Tenure $_{t-1}$		-0.000*	-0.000	-0.000	
		(0.000)	(0.000)	(0.000)	
CEO_Ownership $_{t-1}$			0.025	0.050*	
			(0.033)	(0.030)	
Board_Exec Ownshp$_{t-1}$				-0.029***	
				(0.008)	
Constant	0.046***	0.047***	0.048***	0.052***	0.045***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
R^2	0.820	0.822	0.823	0.825	0.821
N	397	397	396	396	397

Notes: DV=*TailRisk* in year *t* (2005-2010); explanatory variables measured in year *t*-1 (2004-2009). Standard errors, clustered by BHC, in parenthesis. All regressions include year fixed effects; coefficients not reported for brevity. Asterisks indicate significance (* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$); all tests are two-tailed.

Table F.9 Replication of E&Y Table IA.IV, Panel B (*RetVol*); 2004-2010

	DV = $RetVol_t$				
	(1)	(2)	(3)	(3b)	(3c)
precrisisRMI_EY	-0.031***	-0.029***	-0.028***	-0.029***	-0.028***
	(0.010)	(0.010)	(0.011)	(0.011)	(0.011)
$Size_{t-1}$	0.003	0.002	0.002	0.002	0.003
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
$Size^2_{t-1}$	0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
ROA_{t-1}	-0.904***	-0.928***	-0.932***	-0.949***	-0.949***
	(0.278)	(0.278)	(0.275)	(0.278)	(0.275)
$AnnualReturn_{t-1}$	-0.050***	-0.051***	-0.052***	-0.050***	-0.050***
	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)
$(Deposits/Assets)_{t-1}$	-0.023	-0.024	-0.026	-0.024	-0.027
	(0.021)	(0.021)	(0.022)	(0.022)	(0.021)
$(ST\ Borrow/Assets)_{t-1}$	0.050	0.048	0.043	0.044	0.036
	(0.073)	(0.070)	(0.073)	(0.074)	(0.074)
$(Tier1Cap/Assets)_{t-1}$	0.289***	0.293***	0.292***	0.293***	0.290***
	(0.088)	(0.089)	(0.089)	(0.090)	(0.089)
$(Loans/Assets)_{t-1}$	-0.028	-0.030	-0.030	-0.032*	-0.028
	(0.017)	(0.019)	(0.019)	(0.018)	(0.023)
$(BadLoans/Assets)_{t-1}$	1.879***	1.878***	1.889***	1.904***	1.886***
	(0.287)	(0.294)	(0.295)	(0.294)	(0.304)
$(NonintInc/Income)_{t-1}$	-0.062**	-0.061**	-0.059**	-0.057**	-0.059**
	(0.027)	(0.027)	(0.028)	(0.028)	(0.027)
$(Deriv.Trdg/Assets)_{t-1}$		-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
$(Deriv.Hdg/Assets)_{t-1}$		0.011	0.012	0.011	0.010
		(0.013)	(0.013)	(0.013)	(0.013)
ΔCEO_{t-1}		-0.009	-0.008	-0.008	-0.008
		(0.008)	(0.008)	(0.008)	(0.008)
$Large\ M\&A_{t-1}$		0.007	0.007	0.008	0.008
		(0.007)	(0.007)	(0.007)	(0.007)
CEO_Tenure_{t-1}			0.000	0.000	0.000
			(0.000)	(0.000)	(0.000)
$CEO\_Ownership_{t-1}$				-0.006	-0.013
				(0.047)	(0.050)
$Founder\_Family_{t-1}$					0.004
					(0.007)
Constant	0.112***	0.110***	0.108***	0.108***	0.107***
	(0.023)	(0.024)	(0.024)	(0.024)	(0.025)
R^2	0.711	0.713	0.714	0.714	0.715
N	397	397	397	396	396

Notes: DV=*RetVol* in year *t* (2005-2010); explanatory variables measured in year *t*-1 (2004-2009). Standard errors, clustered by BHC, in parenthesis. All regressions include year fixed effects; coefficients not reported for brevity. Asterisks indicate significance (* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$); all tests are two-tailed.

Table F.10 Reconciliation between E&Y Table V, Table F.8, and Table 9 – Committee Characteristics versus E&Y's *pre-crisisRMI*; 2004-2010

	DV = *TailRisk$_t$*				
	(1) Baseline	(2)	(3)	(4)	(5)
PrecrisisRMI_EY	-0.014***				
	(0.005)				
EWRM$_{t-1}$		-0.007**	-0.007**		
		(0.003)	(0.003)		
AC $_{t-1}$		-0.002		0.001	
		(0.003)		(0.003)	
RC $_{t-1}$			0.004		0.004
			(0.003)		(0.003)
*AC*EWRM $_{t-1}$*				-0.011**	
				(0.005)	
*RC*EWRM $_{t-1}$*					-0.004
					(0.004)
Constant	0.047***	0.046***	0.045***	0.046***	0.043***
	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)
R^2	0.822	0.822	0.822	0.823	0.819
N	397	397	397	397	397

Notes: DV=*TailRisk* in *t* (2005-2010); Explanatory variables in *t*-1 (2004-2009). Standard errors, clustered by BHC, in parenthesis. All regressions include year FE; coefficients not reported for brevity. Asterisks indicate significance (* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$); all tests are two-tailed. Control variables include all those reported in my replication of EY's Table V, column 3 (Table F.8, column 3); coefficients not reported for brevity.