

**Checking the Box: Does Compliance with Risk Management Regulation Increase Financial
Stability?**

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Degree
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Dedication

This dissertation is dedicated to everyone who helped and supported me throughout my academic career. To my advisor, Larry Fauver, who helped me rediscover my passion for banking and took a chance on an unproven graduate student. I am forever grateful for our countless conversations and the invaluable guidance you have given me. I would also like to thank all the professors who believed in me and encouraged me to pursue a doctorate. From Timothy Yeager, who inspired me to earn a doctorate, to Ken Xie, who gave me my first research assistantship, and Gregory Eaton, who helped me understand the research process, I am thankful for your mentorships. Lastly, to my wife, Jane, for your support and encouragement. Your unwavering belief in me and positivity helped me persevere through tough times. Without you, I could not have completed this dissertation. This dissertation is dedicated to you.

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Abstract

This dissertation examines how bank risk management impacts financial stability. In the first chapter, my coauthors and I study how bank risk management impacts systemic risk using a global sample of banks from 2002 to 2020. We find that bank risk management has improved since the global financial crisis, driven by the implementation of country-level reforms mandating Chief Risk Officers and board-level risk committees. We find that stronger risk management lowers banks' contribution to systemic risk. Using the staggered enactment of bank risk management reforms as a quasi-natural experiment, we provide evidence that the relation is causal. Subsample analysis on most impacted banks, defined as those without Chief Risk Officers or risk committees pre-reform, exhibit the largest reductions in systemic risk post-reform. We further document that banks with stronger risk controls have lower stand-alone risk, more stable funding, and higher valuations, suggesting that these are likely channels through which systemic risk is mitigated.

In the second chapter, I examine the impact of risk management on the performance of publicly traded U.S. banks during the Silicon Valley Bank crisis. Using a novel dataset of risk management characteristics that measure both the presence and strength of Chief Risk Officers and board-level risk committees, I find no evidence of a link between bank risk management and performance during the crisis. Tests on bank behavior before the crisis show that banks with stronger risk management hold larger amounts of interest rate derivatives for hedging purposes. However, this does not translate into better performance or lower uninsured deposit outflows during the crisis. Examining risk management within a subsample of banks with the greatest exposure to interest rate and deposit outflow risk confirms these results.

Together, these results indicate that the impact of risk management on financial stability depends on the situation. In normal economic times, strong risk management improves financial stability by lowering systemic and standalone risk. However, in times of acute banking stress, such as during the Silicon Valley Bank crisis, the benefits of stronger risk management are unclear. These findings suggest that while banks are not simply checking the box regarding risk management, current practices are not a blanket solution to financial stability.

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Chapter One – Bank Risk Management and Financial Stability: Global Evidence

Abstract

We examine how risk management affects banking stability. Using a global sample of banks from 2002 through 2020, we document improvements in risk management practices in the post-global financial crisis (GFC) period. We find that stronger risk management lowers banks' contribution to systemic risk. Using the staggered enactment of bank risk management reforms as a quasi-natural experiment, we provide evidence that the relation is causal. Subsample analysis on most impacted banks, defined as those without Chief Risk Officers or risk committees pre-reform, exhibit the largest reductions in systemic risk post-reform. We further document that banks with stronger risk controls have lower stand-alone risk, more stable funding, and higher valuation, suggesting that these are likely channels through which systemic risk is mitigated.

Disclosure

The first chapter of my dissertation is composed of a coauthored article. My coauthors are Larry Fauver from the University of Tennessee, Knoxville, and Alvaro G. Taboada and Lauren Milbach from Mississippi State University. Responsibilities for the article are shared between coauthors. I directly contributed to the idea generation, data collection, empirical analysis, writing and presentation of the article.

1. Introduction

Many argue that risk management failures played a key role in exacerbating the global financial crisis (GFC) (e.g., Kashyap (2010); Ellul (2015)) and in the 2023 collapses of Silicon Valley Bank (SVB) and Signature Bank (e.g., Acharya, Richardson, Schoenholtz, and Tuckman (2023); Glazer, Farrell, and Patrick (2021)).¹ These recent bank failures suggest that despite global efforts since the GFC to rein in excessive risk-taking and reduce systemic risk, vulnerabilities remain in the banking sector (e.g., Acharya, Cecchetti, and Schoenholtz (2023)). In particular, the collapse of SVB demonstrates how inadequate risk management can destroy value (e.g., Stulz (2016)): the bank's mismanagement of interest rate risk, which many would consider a core risk common to all banks, contributed to its failure.² Importantly, SVB's failure sparked a regional banking crisis, suggesting that at least one way to reduce systemic risk is through stronger risk management at the individual bank-level.³ Several studies explore the role of risk management on bank risk-taking, primarily before and during the GFC, showing that stronger risk controls lower bank risk (e.g., Ellul and Yerramilli (2013); Lingel and Sheedy (2012); and Ji and Jiang (2022)),⁴ but others find that risk controls do not affect bank risk-taking (Balasubramanyan, Daniel, Haubrich, and Naveen (2024); Stulz, Tompkins, Williamson, and Ye (2021)).⁵ These findings highlight the need to better understand the role of risk management in limiting systemic risk buildup.

¹ The 2023 collapse of Credit Suisse Group AG can also be attributed to risk management breakdowns. Credit Suisse accrued large losses after the 2021 collapse of Archegos Capital Management, which contributed to its eventual demise. "*The fallout from the Archegos collapse shows the Swiss bank's creaky risk-management systems didn't do their job, leaving the bank vulnerable with out-of-date trading data and big exposure to single stocks*" (Glazer, Farrell, and Patrick (2021)).

² As explained by Acharya, et al. (2023), SVB management failed to protect its capital from the impact of higher interest rates, and rather used accounting discretion to limit the impact of changing rates on regulatory capital by designating a large proportion of their securities as held-to-maturity. Under current U.S. GAAP, held-to-maturity securities are not marked to market unless the investor (bank) cannot credibly assert that it has the ability and intent to hold such securities until maturity; accumulated losses under this assertion therefore do not affect earnings nor regulatory capital.

³ Richardson, Savov, and Schnabl (2023) call for higher capital and liquidity requirements for banks with "longer duration assets and/or large fraction of uninsured deposits," because presence of these common risks at the bank-level contributes more to systemic risk across the sector.

⁴ See Ellul (2015) for a thorough review of the empirical literature on the impact of governance and risk management structures on bank risk-taking and performance.

⁵ Silva-Buston (2016) develops a model where active risk management allows banks to operate with riskier balance sheets during normal times, while reducing the risk of insolvency during crises. The empirical evidence supports the model's predictions.

Accordingly, in this paper, we explore several important unanswered questions related to the role of bank risk management. First, how has bank risk management around the world evolved since the GFC? Second, have risk management reforms strengthened bank's risk management function? Third, how does risk management affect banks' contributions to systemic risk, and through what channels? We examine these questions using a global sample of 613 banks across 47 countries from 2002 to 2020. We assemble a novel dataset of risk management characteristics from a variety of sources to construct a Risk Management Index (*RMI*) that incorporates mechanisms such as the presence of a board risk committee (RC) and a Chief Risk Officer (CRO) to proxy for the strength of a bank's risk controls.

We find that bank risk management has significantly strengthened since the GFC. For example, Panel A of Figure I, presented in Appendix A alongside other figures referenced in this dissertation, illustrates that the proportion of sample banks with a board-level risk committee (CRO) increased from 32% (32%) in 2006 to 87% (88%) by 2020. In Panel B of Figure 1 we graph the evolution of our risk management index, *RMI*, over the post-GFC period for banks in countries that enacted reforms targeting banks' risk management practices, as well as for banks in countries without such reforms.⁶ Panel B of Figure I shows significant improvements in *RMI* since 2010, especially among banks in those countries that enacted reforms.

Turning to the determinants of the strength of risk management practices, we confirm the univariate trends depicted in Figure I and show that on average, banks' risk controls are stronger post-GFC. We also find that banks with higher capital ratios have stronger risk controls, but those with lower bankruptcy risk (higher *Z-score*) have weaker risk management functions. We next examine the relation between risk management and banks' contributions to systemic risk, which is a priori unclear. On the one hand, banks with stronger risk management practices, which should correctly identify and mitigate preventable risks (Stulz (2008); Kashyap, Rajan, and Stein (2008); Kaplan and Mikes (2012)) could engage in less risk-taking, thereby improving their ability to withstand shocks (e.g. Ellul and Yerramilli (2013); Aebi, Sabato, and Schmid (2012)).⁷ On the other hand, stronger risk controls may increase banks' contributions to systemic risk by improving

⁶ Appendix D provides detail on the risk management reforms enacted by 39 countries during our sample period.

⁷ In addition, banks with stronger risk management functions could be less likely to experience risk management failures, such as mismeasurement of risks, and failure to communicate and monitor identified risks (Stulz (2008)).

the board's ability to measure and manage risk, leading to the adoption of riskier strategies that maximize shareholder value, but may not be optimal from a systemwide perspective (e.g., Stulz (2008), (2016); Silva-Buston (2016)).⁸ Finally, strong risk controls may have no impact on banks' risk and performance in cases where the risk committee or the CRO may not have power to influence decisions (e.g., Stulz, et al. (2021); Balasubramanyan, et al. (2024)).

Our results show that stronger risk management is associated with lower contributions to systemic risk in the post-GFC period, but we find no such relation in the pre-GFC period. For example, in the post-GFC period, a one-standard-deviation increase in *RMI* (0.376) is associated with a 20.3% decrease relative to its mean for *SRISK*, the expected capital shortfall conditional on a crisis event (Brownlees and Engle (2017)). We document similar results across alternate measures of systemic risk. The observed relation between risk management and systemic risk does not establish a causal link, as both could be jointly determined.

We address these endogeneity concerns by exploiting the staggered enactment of various bank-level risk management-related reforms across countries during our sample period. Specifically, we implement an event-based stacked difference-in-differences (DiD) design (e.g., de Chaisemartin and D'Haultfoeuille (2022)).⁹ Using this approach, we confirm that banks in countries that adopt risk management reforms in the post-GFC period (treatment countries) experience a significant reduction in systemic risk post-reform relative to the control group.¹⁰ We use several approaches to mitigate the concern of confounding events. First, we examine the effects using a narrow window around the reform (-3,+3). Second, we control for the effects of the adoption of BASEL III and the implementation of macroprudential policies. Third, we replicate our results after excluding EU countries, where the risk management reform was part of a broader reform package.¹¹ In addition, to better isolate the effect of risk management, we assess the

⁸ While a better risk management function should be able to detect and reduce "preventable" risks and correctly identify "external" risks, as defined in Kaplan and Mikes (2012), more accurate measurement and monitoring of risks could allow management to pursue higher risk strategies (i.e., "take on good risks"), which may be consistent with the bank's risk culture and optimal for shareholders, but may lead to excessive systemic risk (Stulz (2008), (2016)).

⁹ The stacked DiD approach uses alternative groups as controls to mitigate the inherent bias associated with the staggered DiD estimates (e.g., Barrios (2021); Baker, Larcker, and Wang (2022)).

¹⁰ To address concerns about the "multiple hypothesis" problems associated with reusing natural experiments highlighted by Heath, Ringgenberg, Samadi, and Werner (2023), we confirm the significance of our results using Romano and Wolf (2005), (2016)) adjusted *p*-values.

¹¹ In 2013, EU countries implemented the broad Capital Requirements Directive 2013/36/EU (CRD IV).

differential effect on banks that are most impacted by the risk management reforms (i.e., those without a CRO or an RC (board-level risk committee) prior to the passage of such a requirement).¹² We find that most impacted banks experience larger improvements in risk controls and larger reductions in systemic risk contributions around the reform. The evidence suggests that improvements in risk management contribute to the reductions in systemic risk.

Finally, we explore the channels through which strong risk management lowers systemic risk contributions, and find that banks with stronger risk management have lower stand-alone risk, rely more on stable funding sources (i.e., more deposits, less reliance on short-term funding), and have higher valuations (Tobin's q), suggesting that these are likely channels through which systemic risk is mitigated. Using the event-based stacked DiD approach, we document that these effects are stronger for most impacted banks. In additional analyses, we also find evidence that banks with stronger risk management are more likely to use derivatives to hedge risk exposures.

This study contributes to and extends the extant literature on the relation between bank risk management and risk, which yields mixed evidence and predominantly consists of single-country studies ((e.g., Ellul and Yerramilli (2013); Balasubramanyan, et al. (2024); Ji and Jiang (2022); Stulz, et al. (2021)). First, by using the staggered enactment of risk management reforms across countries as quasi-natural experiments, we directly address endogeneity concerns present in prior studies in settings where the adoption of board risk committees and the appointment of a CRO was largely voluntary. Second, by assembling a large dataset of risk management characteristics for a global sample of banks, we address another major challenge facing risk management studies: data availability, and document significant changes across the globe in banks' risk management practices. Finally, we extend prior studies by examining the financial stability implications of the risk management function.

Our findings also contribute to studies assessing determinants of systemic risk (e.g., Chu, Deng, and Xia (2020); Brunnermeier, Dong, and Palia (2020); Karolyi, Sedunov, and Taboada (2023)) and to the vast literature evaluating the impact of post-GFC regulations on systemic risk

¹² In banks without a risk committee and without a CRO, risk management failures (failure to measure or address known risks, or failure to communicate risks to management) are more likely to occur, *ceteris paribus* (Stulz (2008), (2016)). Thus, for such banks, improvements in risk management practices are more likely to lead to reductions in bank's contributions to systemic risk, as boards of such banks become better able to avoid "preventable" risks and to identify "external" risks (Kaplan and Mikes (2012)).

(e.g., Kleymenova and Tuna (2021); Roberts, Sarkar, and Shachar (2018); Adrian and Boyarchenko (2018)).¹³ The findings in this study underscore the importance of strong risk controls for financial stability and document how reforms that specifically focus on improvements in individual banks' risk management practices can help constrain systemic risk buildup, especially among banks with weaker ex-ante risk controls.

One limitation of our study is that the sample period ends in 2020, which does not allow us to examine how risk management may have contributed to the recent U.S. regional banking crisis. In addition, data limitations prevent us from capturing additional important aspects of the risk management function, such as compensation-based measures that may proxy for the organizational power of CROs. With these caveats in mind, we believe this study's results is of interest to policy-makers and regulators and will spark interest in and help guide more research on this important topic.

2. Prior Literature and Hypothesis Development

While there is some evidence that stronger risk controls – such as board risk committees and strong Chief Risk Officers – are associated with lower stand-alone bank risk (e.g., Ellul and Yerramilli (2013); Keys, et al. (2009); Lingel and Sheedy (2012)), several studies find no evidence of this relation (e.g., Aebi, Sabato, and Schmid (2012); Hines and Peters (2015); Balasubramanyan, et al. (2024); Stulz, et al. (2021)). With the exception of Lingel and Sheedy (2012), who use an international sample, most extant studies of bank risk controls rely solely on U.S. data from the pre-2010 period, when risk controls were largely voluntarily implemented, or are based upon other single-country datasets. Despite the importance of the topic and the wave of bank-focused risk management reforms enacted worldwide in the post-GFC period, there is a dearth of international evidence on the relation between banks' risk controls and standalone bank risk. Furthermore, to the best of our knowledge, no extant studies examine the relation between an individual bank's risk controls and its contribution to systemic risk. This study aims to fill this gap by examining the impact of banks' risk controls on risk outcomes for a broad international sample of banks across

¹³ Roberts, Sarkar, and Shachar (2018) assess the effects of the Liquidity Capital Regulation (LCR) on liquidity creation and systemic risk, while Kleymenova and Tuna (2021) assess the consequences of regulations on executive compensation at financial institutions in the UK. Anginer et al. (2021) provides a thorough review of the post-GFC capital regulations and their impact on bank risk.

the 2002 to 2020 period, with particular emphasis on the post-GFC years, when many of these controls became mandatory.

In any firm, the role of risk management is to identify and measure risks, to appropriately communicate those risks to management, and to monitor and manage such risks (e.g., Stulz (2008); Ellul (2015); Kaplan and Mikes (2012)). Dedicated risk oversight by the board may reinforce existing risk management policies and practices and enhance the firm's ability to identify and deal with emerging risks (e.g., Ittner and Keusch (2015)). Likewise, by improving bank leadership's understanding of existing and potential risks, strong risk management can aid in bank decision making and capital allocation (Nocco and Stulz (2006), Stulz (2016), Kaplan and Mikes (2016)).

Because the distress or failure of one financial institution can put others at risk (e.g., Kashyap, et al. (2008); Rajan (2006)), strong risk controls and risk management regulation are an important part in creating financial stability. While many have focused on the importance of appropriate regulatory capital reforms post-GFC (e.g., Acharya, Mehra, & Thakor (2016)), the effectiveness of bank capital regulation depends, to a large extent, on the quality of individual banks' internal risk assessments, and on banks' capacity to adequately measure and manage those risks. Similarly, the effectiveness of stress testing – a relatively new regulatory tool that usually incorporates correlations of risks both within and across banks – depends on individual banks' systems for processing a wide variety of scenarios, and regulators' ability to trust that those systems are sufficiently robust.

While effective risk management should enable a firm to pursue a value-maximizing strategy, it may not necessarily reduce risk (Stulz (2008), (2016)), so its effect on banks' contribution to systemic risk is unclear. On one hand, stronger risk controls may prevent value-destroying risk-taking and reduce the likelihood and costs of any individual bank's financial distress, which should lead to a reduction in the bank's contributions to systemic risk (e.g., Ellul (2015); Bartram (2000); Nocco and Stulz (2021)). On the other hand, banks with stronger risk controls are better able to measure and monitor risks, which may lead to the adoption of riskier strategies that maximize shareholder value, but that may create excessive systemic risk from a systemwide perspective (e.g., Stulz (2008); (2016)). Finally, the adoption of better risk controls may have no impact on a bank's contribution to systemic risk; for example, a bank may have a

risk committee and a CRO, but they may not have the power to influence decisions (Stulz, et al. (2021)). Assessing the effects of risk management on systemic risk is thus an empirical question.

3. Data and Methodology

To examine how risk management practices affect banks' contributions to systemic risk, we first assemble a dataset of bank risk management characteristics for a global sample of banks from 2002 to 2020, defined as those with two-digit SIC code of 60 (or classified as banks using the industry group classification from Thomson Reuters) with data available from Refinitiv's ESG database, which is the source of our governance data.¹⁴ We restrict our sample to banks with a deposits-to-assets ratio above 10% to ensure that our sample consists of only deposit-taking institutions. We next collect data focusing on characteristics that have been shown to be associated with strong and independent risk management, such as the existence of a RC and a CRO (e.g., Ellul and Yerramilli (2013); Liebenberg and Hoyt (2003); Lingel and Sheedy (2012)). We hand-collect data from annual reports and proxy statements and supplement it with data obtained from various additional sources, including NRG Metrics, Refinitiv's Eikon database, ISS Global Directors database (non-U.S. banks) and BoardEx (U.S. banks).¹⁵

When collecting CRO data, we look for evidence that the bank has an executive in charge of the entire risk function for the bank. We rely primarily on bank organizational charts, descriptions of the risk management function and executive lists and biographies to identify CROs. We exclude executives that oversee multiple bank functions, such as Chief Legal and Risk Officer or Chief Risk and Human Resources Officer, as well as executives in charge of specific risk functions, such as Chief Credit Risk Officer or Chief Market Risk Officer. We include in this designation alternate titles, such as Director – Risks and Head of Risk Management, when there is evidence that these individuals serve a similar role to that of a Chief Risk Officer. For our primary measure of the strength of risk management (*RMI*), we do not require that banks explicitly name the individual in charge of risk functions, only that the bank indicates the existence of a CRO or

¹⁴ We require governance data as this has been shown to be a determinant of the strength of the risk management function (e.g., Ellul and Yerramilli (2013); Ellul (2015)).

¹⁵ Annual reports and proxy statements for international firms are collected directly from bank websites, when possible, with the remaining documents coming from Mergent Online, AnnualReports.com, stock exchange databases, and internet searches.

similar position. In robustness tests presented in the Table XIX of Appendix G, we document that our results hold when considering only named CROs within the measurement of *RMI*.¹⁶

For the RC, we require that the committee be at the board level. We primarily rely on bank organizational charts and descriptions of board level committees to determine whether banks have an RC.¹⁷ Similar to our CRO classification, we do not include joint committees where the committee's other responsibilities fall outside of the risk category. For example, we do not classify joint audit and risk management committees or joint human resources and risk management committees as RCs, whereas we do classify joint risk management and compliance committees as an RC. In addition, single topic (silo) risk committees, such as credit risk committees or interest rate risk committees, are not considered risk committees for the purposes of this study.

We then construct a risk management index, *RMI*, using an approach that parallels the construction of governance indices (e.g., Aggarwal, Erel, Stulz, and Williamson (2009)). *RMI* represents the proportion of four risk management characteristics that are present within each bank in a given year: 1) *RC*, an indicator variable that equals one if the bank has a risk committee and zero otherwise; 2) *CRO*, an indicator variable that equals one if the bank has an executive who is designated as a Chief Risk Officer and zero otherwise; 3) *RM expert*, an indicator equal to one if the bank has a risk committee and at least one independent member of the audit committee is classified as a financial expert;¹⁸ and 4) *Active RC*, an indicator equal to one if the bank has a risk

¹⁶ Across our sample 62% of bank-year observations have a CRO, with 46% of bank-year observations having an explicitly named CRO. This pattern is consistent across both U.S. and international banks. Disclosing the individual's name may be related to importance or seniority, but as the name of this type of executive is not typically a required disclosure, it can also be related to turnover (e.g., new hire, retirement, etc.), organizational (but not necessarily positional) tenure, or other arbitrary reasons unrelated to the importance of the position. Accordingly, the main *RMI* measure takes into consideration any disclosure of the presence of a CRO.

¹⁷ In the limited instances where the level of the committee is unclear (i.e., the committee could be board-level or management-level), we rely on the presence of non-executive directors on the committee when committee composition data is available to infer the committee's level. As we are interested in the monitoring and challenge provided by a board-level RC, a "board" committee that consists of only management is not considered to be an RC for the purposes of this study.

¹⁸ As committee composition, qualifications, and meetings are rarely required disclosures for any board committees other than the Audit, Compensation, and Nominating/Governance Committees, the data sources do not provide sufficient details to directly observe or measure the composition of the risk committee nor the frequency of its meetings. We thus code *RM expert* as one for banks with a risk committee and an independent financial expert on the audit committee. Similarly, we use the frequency of board of directors' meetings for banks with a risk committee to code the variable *Active RC*.

committee and its board of directors meets more frequently than the median board of directors in its country each year.¹⁹

We also collect information on risk management reforms enacted in our sample of countries between 2002 and 2020. Risk management reforms are those that specifically address banks' risk management function or oversight thereof (e.g., the role of the CRO or the risk committee). We first identify countries that enact such reforms using the World Bank's Supervision and Regulation Surveys and proceed to collect information on the year of enactment from a variety of sources, including websites of the countries' primary regulators. Appendix D shows details of the reforms. Most countries enact such reforms following the GFC. In many cases, the reforms are part of a broader reform package that addresses issues beyond banks' risk management. For example, for many European Union (EU) countries, the reform year corresponds to the implementation of the Capital Requirements Directive 2013/36/EU. Some EU countries enacted risk management reforms prior to the implementation of the latter EU directive, in which case we designate the reform year as the year in which the first reform was passed.²⁰ We classify reforms into two non-mutually exclusive categories: reforms addressing the risk committee (RC reforms) and reforms addressing the function/role of the CRO (CRO reforms). In many cases, the reforms simultaneously target both components.

We obtain financial and stock market data from WorldScope and DataStream, respectively. We construct three measures of systemic risk:²¹ *SRISK*, the expected capital shortfall (in US\$ million) of a bank conditional on a crisis event (Brownlees and Engle (2017)), scaled by market capitalization, as in Berger et al. (2020; 2022); *MES*, the negative of the average bank return during the worst 5% of market return days in a year (Acharya et al. (2017)); and *LVG*, market leverage,

¹⁹ Some banks have missing data for board meetings, and therefore for *Active RC*. In such cases, we scale *RMI* based on the percentage of the three available characteristics. In robustness tests, we construct *RMI* from the three characteristics available for all banks and obtain similar results to the main results discussed in the paper.

²⁰ The reform year is 2013 for most EU countries, which corresponds to the year EU countries implemented the EU Capital Directive. For France and Ireland, however, the reform year (2010) predates the implementation of the EU directive. In 2010, France adopted a reform requiring banks to set up a risk department led by a Chief Risk Officer. As part of the November 2010 update to the Corporate Governance Code for Credit Institutions, Ireland introduced a requirement for banks to set up a stand-alone risk committee unless the board has five or fewer members, in which case the committee may be joint with the audit committee. See Appendix D for details on these and all other risk management reforms enacted during our sample period.

²¹ These measures are commonly used in the literature and have been shown to be suitable proxies of systemic risk (see, e.g. Acharya, et al. (2017), Anginer et al. (2018); Berger et al. (2020)).

computed as the market value of equity plus book value of liabilities, scaled by the market value of equity (Acharya et al. (2017)).

We obtain data on several country-level macroeconomic indicators, *GDP growth*, and *Inflation* from the World Bank's World Development Indicators database, and annual stock market index returns (*Market return*), and stock market volatility (*Volatility*), the annualized standard deviation of weekly stock market index returns, from DataStream. To capture the impact of macroprudential policies on systemic risk, we use the macroprudential policy index (*MPI*) obtained from Cerutti et al. (2017). We also measure bank regulatory quality following prior studies (e.g., Frame, Mihov, and Sanz (2020); Karolyi and Taboada (2015)) and use *Regulatory quality*, which is the first principal component of the four indices from Barth, Caprio and Levine (2013) and the World Bank's Supervision and Regulation Surveys: (1) *Restrictions*; (2) *Capital stringency*, (3) *Supervisory power*, and (4) *Private monitoring*.²² All variables used in our analyses are defined in Appendix C.

To obtain our final sample, we merge the bank risk management data with WorldScope and drop observations with missing or negative assets or equity and drop countries with data on fewer than two banks, that appear in less than four years, or that have gaps in data during our sample period.²³ The final sample includes 613 banks from 47 countries and covers the period from 2002 to 2020.

Table I, presented in Appendix B alongside other tables used in this dissertation, shows the distribution of banks across countries as well as the year in which countries adopt reforms related to risk management during our sample period.²⁴ All but nine countries in our sample enacted risk management reforms at some point during the sample period; most of the reforms were passed after the GFC. Banks from the U.S. make up about 48% of the banks, and about 36% of the bank-

²² *Restrictions* is an index that measures regulatory impediments to banks engaging in securities market activities, insurance activities, and real estate activities; *Capital stringency* is an index measuring minimum bank capital ratios and the sources of regulatory capital; *Supervisory power* is an index that measures whether supervisory authorities have the power to take actions to prevent or correct problems, and *Private monitoring* is an index that measures whether there are incentives for the private monitoring of banks. The underlying surveys are not performed annually; we therefore use the values from the 2002 survey for the period 2002 to 2005, the 2006 survey values for the period 2006 to 2010, the 2011 survey values for 2011 to 2015, and the 2016 survey values for 2016 to 2020.

²³ We also exclude banks missing key lagged controls including *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital ratio*, *Noninterest income*, *Regulatory quality*, *GDP growth*, *Volatility*, *Market return* and *Inflation*. We also require banks to have at least one of our board level governance measures.

²⁴ Tables are presented in the Appendix B following the second chapter.

year observations, in our sample.²⁵ For all but five countries, sample coverage begins before 2010, and we have data for the entire sample period (from 2002 to 2020) for banks from 13 countries.²⁶

The second to last column of Table I shows the average *RMI* for the banks in each country. Across the full sample period, Israeli and Pakistani banks have the highest average *RMI*, while Brazilian banks have the lowest (0.16). The average *RMI* for U.S. banks is relatively low (0.487), although this is likely attributable to a large number of smaller U.S. banks in the sample. The last column of Table I shows the average annual percent of a country's total banking assets represented by the sample banks. On average, the sample banks' assets constitute 68% of their countries' total banking assets.

Table II shows the descriptive statistics of the key variables in our analysis. Approximately 62% (58%) of sample observations have CROs (risk committees). Banks in our sample are large, with average total assets of \$56.4 billion.²⁷ Sample banks have average institutional ownership of 41.25%, and the average (median) proportion of independent directors on the board is 59.7% (66.67%). The average expected capital shortfall conditional upon a crisis event (*SRISK*) represents about 57.2% of market capitalization, while the average *MES (LVG)* is 2.87% (14.01).

4. Empirical Results

4.1. Determinants of Risk Management

We first examine the determinants of risk management for the banks in our sample and assess how risk controls have evolved since the GFC by estimating various specifications of the following model:

$$RMI_{i,c,t} = \alpha + \beta_1 Post - GFC + \theta_{i,c,t-1} + \gamma_{c,t-1} + \varepsilon_{i,t} \quad (1)$$

where $RMI_{i,c,t}$ is the risk management index for bank i in country c in year t ; *Post-GFC* is an indicator variable equal to one for years starting in 2010 and zero otherwise; and $\theta_{i,c,t-1}$ is a vector of lagged bank-level controls that have been shown in prior studies to affect the choice of risk management controls. The baseline bank-level controls include: *Size*, the log of the book value

²⁵ We conduct several robustness tests presented in Appendix G to ensure our results are not driven by U.S. banks.

²⁶ The five countries with data available only after 2010 are Argentina (2015), Pakistan (2017), Peru (2016), Romania (2017), and Saudi Arabia (2015).

²⁷ From Table II, the average *Size* (log assets - US\$000s) is 17.848, corresponding to an average size of \$56,401 billion [(exp17.848) x 1000].

of assets; *ROA*, net income scaled by assets; *MTB*, market-to-book value of equity; the ratio of *Deposits-to-assets*; *Capital Ratio*, equity scaled by assets; *Noninterest income*, non-interest income-to-total income; and *Board independence* to control for the effect of bank-level governance (e.g., Ellul and Yerramilli (2013)). In additional tests we include other controls used in the literature, some of which reduce our sample size due to data availability: *Size*²; *Return*, annual buy and hold returns; *Loans-to-assets*; *Z-score*, log of Z-score, estimated as $(ROA + Equity/Assets)/\sigma ROA$; and *Institutional ownership*, the fraction of shares owned by institutional investors.²⁸ Finally, $\gamma_{c,t-1}$ is a vector of country-level controls that includes *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. Standard errors are clustered at the country level. All variables are defined in Appendix C.

Table III shows results from the estimation of Equation (1) across the full sample period. The results in columns (1) through (3) use country and year fixed effects, whereas the results in columns (4) through (6) use bank and year fixed effects. For ease in interpreting the *Post-GFC* coefficient, we choose 2006 as the benchmark year.²⁹ Results show an increase in *RMI* post-GFC. For example, in column (1), the coefficient of 0.203 on *Post-GFC* represents a 40% increase in *RMI* post-GFC relative to its mean value of 0.508. Results are similar in magnitude and economic significance when we use an expanded set of control variables in columns (2) and (5). In columns (3) and (6), we add interactions between *Post-GFC* and *Developed*, an indicator equal to one for countries that are included in Morgan Stanley Capital International's (MSCI's) developed market index and zero otherwise. These results show larger improvements in *RMI* post-GFC for banks in developed countries.³⁰

The cross-sectional results in columns (1) through (3) of Panel A of Table III show that larger banks have higher *RMI* and that the relation between *RMI* and size is concave, as shown by the negative coefficient on *Size*².³¹ We further find that better capitalized banks (i.e., those with a

²⁸ σROA is computed as the standard deviation of ROA over the prior four years. Given the high correlation between *Size* and its square, we orthogonalize *Size*² when included in regressions.

²⁹ That is, we include year fixed effects for all years except 2006. Because one of the years from 2010 to 2020 has to be omitted to avoid perfect collinearity with the *Post-GFC* indicator, we also drop the 2010 indicator. Results are similar if we let the statistical package (STATA) randomly drop the year when using fixed effects.

³⁰ In results tabulated in Appendix G Table XXII, we re-estimate Equation (1) using the individual components of *RMI* and find that all components improved post-GFC. Banks in developed markets experienced larger improvements across all components except *RC*, relative to banks in emerging markets post-GFC.

³¹ These results are in line with those for US banks (Ellul and Yerramilli (2013)).

higher *Capital ratio*) have a higher *RMI*. In addition, we find that banks with higher distance-to-default (*Z-score*) have weaker risk management controls, which is in line with the “hedging hypothesis.” The results in columns (4) and (5) indicate that higher *MTB* ratios are associated with lower *RMI*, further supporting the “hedging hypothesis.” While board independence is not associated with *RMI*, we find evidence that higher institutional ownership is positively associated with *RMI*. With respect to the country-level variables, results in Table III show that banks in faster-growing economies with higher stock market returns have stronger risk management practices, but banking sector regulatory quality and stock market volatility are not associated with *RMI*, on average.

Next, we perform tests to differentiate between two hypotheses related to the choice of risk management: the “risk culture hypothesis,” which argues that the bank’s risk culture determines its choice of risk management, and the “hedging hypothesis,” which suggests that banks with higher risk exposures choose stronger risk management (e.g., Froot, Scharfstein and Stein (1993), Froot and Stein (1998)). Specifically, we follow an approach similar to that of Ellul and Yerramilli (2013) that uses GFC performance as a proxy for a bank’s risk strategy. Per the “hedging hypothesis,” poor performance during the GFC should lead to subsequent improvements in risk management post-GFC if banks adjust their risk controls based on their experience during the crisis. In contrast, finding no change or a deterioration in *RMI* post-GFC for banks with worse performance during the GFC would be in line with the “risk culture” hypothesis. We measure banks’ performance during the GFC as the buy-and-hold returns from July 2007 through December 2008 (*GFC return*).³² For ease of interpretation of the interaction term, we create an indicator variable, *Low GFC return*, equal to one for banks with *GFC return* in the bottom tercile of the distribution in their country and zero otherwise. Using *Low GFC return* as a key explanatory variable, we estimate Equation (1) but restrict the sample period to the post-GFC period (2010 to 2020). We include all controls in column (2) of Panel A but omit them from presentation for brevity.

Results in column (1) of Panel B of Table III show that the coefficient on *Low GFC return* is positive but insignificant, providing support to the “risk culture” hypothesis. In columns (2) and

³² We follow Fahlenbrach and Stulz (2011) in computing buy-and-hold returns from July 2007 to December 2008.

(3) we add interactions between *Low GFC return* and one of two indicator variables: *Large*, an indicator equal to one for banks with assets above the median in a country in year $t-1$, and zero otherwise; or 2) *G-SIB*, an indicator equal to one for banks classified as Globally Systemically Important Banks by the Financial Stability Board in year $t-1$.³³ The results in columns (2) and (3) show that GFC performance leads to different outcomes across large and small banks, in terms of the evolution of *RMI* in the post-GFC period. The main effect of *Low GFC return* in columns (2) and (3) is not different from zero, indicating that small banks (non-G-SIBs) that underperformed during the GFC did not improve their risk controls in the post-GFC period, in line with the “risk culture hypothesis.” In contrast, large banks (*G-SIBs*) with *Low GFC return* have higher *RMI* in the post-GFC period.³⁴ While the latter results for *Large (G-SIB)* banks with poor crisis performance are consistent with the “hedging” hypothesis, we caution that the increased regulatory scrutiny that larger banks have received since the GFC may at least partially explain the improvement in *RMI* for such banks.

4.2. Risk Management and Systemic Risk

We next examine whether the post-GFC improvements in risk management documented in the preceding section are associated with systemic risk by estimating panel regressions of the following model:

$$Systemic_{i,c,t} = \alpha + \beta_1 PostGFC \times RMI_{i,c,t-1} + \beta_2 RMI_{i,c,t-1} + \beta_3 Post\ GFC + X_{i,c,t-1} + \beta_3 Z_{c,t-1} + \varepsilon_{i,c,t} \quad (2)$$

where *Systemic_{i,c,t}* refers to one of three measures of systemic risk for bank i in country c in year t : *SRISK*, *MES*, or *LVG*; *RMI_{i,c,t-1}* is the banks’ risk management index; *Post GFC* is an indicator for years 2010 and after; *X_{i,c,t-1}* is a vector of bank-level controls that includes *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital ratio*, and *Noninterest income*; and *Z_{c,t-1}* is a vector of country-level variables that have been shown to affect systemic risk (e.g., Engle, Jondeau, and Rockinger (2015)), which includes *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and

³³ Historical G-SIB designations date back to 2011, when the classification was created by the Financial Stability Board (FSB). The details are available at <https://www.fsb.org/work-of-the-fsb/market-and-institutional-resilience/global-systemically-important-financial-institutions-g-sifis/>. G-SIB designations pre-2011 sample years are based on the 2011 G-SIB designation.

³⁴ The p -values from F -tests for the significance of the sum of coefficients [*Low GFC return* x *Large (G-SIB)* + *Low GFC return*] are 0.076 and 0.028 in columns (2) and (3), respectively.

MPI, an index of macroprudential policies. We include bank and year fixed effects in all regressions and cluster standard errors at the country level.³⁵

We present the results from the estimation of Equation (2) in Table IV. The results show that *RMI* is not significantly associated with systemic risk in the pre-GFC period, but the relation becomes negative and significant in the post-GFC period. From column (1), while *RMI* is not significantly associated with *SRISK* in the pre-GFC period (the coefficient on *RMI* is insignificant), a one-standard-deviation increase in *RMI* (0.376) is associated with a 0.116 decrease in *SRISK* in the post-GFC period, or a 20.3% reduction relative to its mean.³⁶ The associated *F*-tests reveal that *RMI* is associated with a significantly lower *SRISK* in the post-GFC period.³⁷ The results are similar when using alternate proxies for systemic risk (*MES*, *LVG*). The observed negative relation between *RMI* and systemic risk in the post-GFC period could be a result of the significant improvements in risk management post-GFC. We investigate this formally in the next section.

In columns (4) through (6) of Table IV, we present results from the estimation of Equation (2) after adding interactions with the *Developed* indicator. The results show that higher *RMI* is associated with reduced contributions to systemic risk post-GFC, especially among banks in developed markets. While *RMI* continues to be associated with a significant reduction in systemic risk for banks in emerging markets (based on *p*-values from *F*-tests for the significance of the sum of the coefficients [*RMI* x *Post-GFC* + *RMI*]), the effect is significantly stronger for banks in developed markets (based on the negative and significant coefficient on the triple interaction term [*Post-GFC* x *RMI* x *Developed*]).

We perform several robustness tests and report the results in Appendix G. Results of tests including additional controls for bank governance (*Board independence* and *Institutional ownership*), excluding U.S. banks, and using alternate measures of the risk management index, including a PCA-based measure of the components of *RMI* as in Ellul and Yerramilli (2013), continue to show that higher *RMI* is associated with lower contributions to systemic risk in the post-GFC period.

³⁵ All variables are defined in Appendix C.

³⁶ $0.203 = -0.116/0.572$; $-0.116 = [0.272 + (-0.580)] \times 0.376$; where 0.272 (-0.580) is the coefficient on *RMI* (*Post GFC* x *RMI*) from column (1) of Table IV, and 0.572 is the mean of *SRISK* from Table II.

³⁷ The bottom rows of Table IV show *p*-values from *F*-tests for the significance of the sum of the coefficients [*RMI* x *Post-GFC* + *RMI*].

Overall, the results in this section provide evidence of positive effects associated with significant improvements in risk management since the GFC. Stronger risk controls are associated with lower systemic risk in the post-GFC period, and these results are stronger for banks in developed markets. Nevertheless, the results fall short of establishing causality. We next exploit a quasi-natural experiment to improve our identification and to provide more convincing evidence that the relation is causal.

4.3. Risk Management Reforms and Systemic Risk

In addition to capital and liquidity regulations implemented across countries since the GFC, many countries adopt reforms that aim to strengthen banks' risk management function. Figure II highlights the countries in our sample that adopt risk management reforms. In our sample, 39 countries adopt such reforms between 2002 and 2020, and 30 of them adopt such reforms post 2010. We exploit these quasi-natural experiments to establish a more causal link between the risk management function and systemic risk. Isolating the effects of the risk management reforms on banks' contribution to systemic risk is challenging given the vast array of regulations implemented across countries since the GFC whose objective is to rein in excessive risk-taking and to lower systemic risk. We address these challenges by controlling for other confounding factors and by focusing on banks that are most impacted by the risk management reforms (i.e., those without a CRO or a risk committee prior to the reform).

To examine the effects of the risk management reforms, we implement event-based stacked regressions, an alternative staggered DiD approach that uses alternative groups to serve as the controls (Cengiz, et al. (2019); Callaway and Sant'Anna (2021); de Chaisemartin and D'Haultfoeuille (2022)) to mitigate the inherent bias associated with the staggered DiD estimates (e.g., Barrios (2021); Baker, Larcker, and Wang (2022)). We start by forming treatment cohorts for the 30 countries that enact risk management reforms post-2010, and limit the analysis to the seven-year window around the effective year of the reform (i.e., from $t-3$ to $t+3$). We focus on treatment countries that adopt reforms post-GFC to avoid picking up the effects of the GFC in the

pre-reform period.³⁸ For each treatment cohort, we create a separate dataset in which the control group consists of banks in countries that do not adopt a risk management reform during our sample period (*never-treated*) and those in countries that have not yet adopted such reforms (*not yet treated*). We then evaluate the impact of the risk management reforms running the following stacked DiD model:

$$Y_{i,c,j,t} = \alpha + \beta_1 Post \times Treat_{i,c,j} + \beta_2 X_{i,c,j,t-1} + \beta_3 Z_{c,j,t-1} + \gamma_{i,j} + \delta_{t,j} + \varepsilon_{i,c,j,t} \quad (3),$$

where $Y_{i,c,j,t}$ refers to one of the proxies for risk management (*RMI*, *CRO*, *RC*, *Active RC*, or *RM Expert*), or one of three measures of systemic risk (*SRISK*, *MES*, or *LVG*) for bank i in country c and treatment cohort j in year t ; $Post$ is an indicator equal to one starting the year the reform in treatment cohort j becomes effective and zero otherwise; $Treat$ is an indicator equal to one for bank i in reform (i.e., treatment) country c in cohort j and zero otherwise; $X_{i,c,j,t-1}$ is a vector of bank-level controls that includes *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital ratio*, and *Noninterest income*; and $Z_{c,j,t-1}$ is a vector of country level controls that includes *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. Importantly, to control for other regulatory reforms not targeted at individual banks' risk management mechanisms, but intended to reduce risk in the banking sector, we also include in Equation (3) *MPI*, an index of financial sector macroprudential policies in place at the country level, and *Post BASEL*, an indicator equal to one after the adoption of BASEL III in the country and zero otherwise. $Treat$ and $Post$ are excluded from the estimation because they are subsumed by the fixed effects, which include bank by treatment cohort ($\gamma_{i,j}$) and year by treatment cohort ($\delta_{t,j}$) to control for time invariant differences between treatment and control banks as well as any secular time trends (Gormley and Matsa (2011)).

We use the enactment of risk management reforms to establish a causal relation between risk management and contributions to systemic risk. The assumption is that these reforms represent an exogenous shock to banks' risk management practices. Before assessing the systemic risk implications of the reforms, we evaluate this assumption by exploring the direct impact of the

³⁸ For the 2011 and 2012 treatment cohorts, we focus on the periods $[t-1, t+3]$ and $[t-2, t+3]$, respectively, to avoid picking up the effects of the GFC in the pre-period. Lifting this restriction or dropping these cohort years does not materially affect our results.

reforms on banks' risk management practices. We estimate Equation (3) using our main proxy for risk management, *RMI*, and its components as dependent variables. Results in Panel A of Table V show larger improvements in risk management for banks in treatment countries post-reform relative to the control group. With the exception of column (5), which uses *RM Expert*, we observe positive and significant coefficients on the interaction term *Post x Treat*. From column (1), results show that banks in treatment countries experience a 0.071 larger increase in *RMI* post-reform relative to the control group, which represents 13.98% of its mean (0.508). Results using other proxies for risk controls, shown in columns (2) through (4), show that post-reform, banks in treatment countries are more likely to have a risk committee, a CRO, and to have more active committees, relative to the control group. In Panel B of Table V, we show results using interactions with *Most impacted*, an indicator equal to one for banks in treatment countries that do not have a risk committee or a CRO in the year prior to the enactment of the reform, and zero otherwise. We include all controls used in Panel A but omit them from presentation for brevity. In columns (1) through (4) of Panel B we find positive and significant coefficients on the triple interaction term *Post x Treat x Most impacted*, which captures the incremental effect on most impacted banks in the treatment group relative to other banks in the treatment group. The results show compelling evidence that banks with weaker *ex ante* risk management experience larger improvements in risk management post-reform.

The above results confirm that the reforms lead to significant improvement in banks' risk management, especially for banks with weaker *ex ante* risk controls. We now turn to assess the impact of the reforms on systemic risk by estimating Equation (3) with alternative measures of systemic risk as the dependent variable. Results are tabulated in Panel A of Table VI. In columns (1) through (3), we observe negative and significant coefficients on the interaction term *Post x Treat*, which suggests a reduction in systemic risk post-reform for banks in the treatment group relative to the control group. Results in Panel A of Table VI are economically significant as well. For instance, in column (1), banks in treatment countries experience a 0.222 larger decrease in *SRISK* post reform relative to the control group, which represents 38.81% of its mean (0.572). Similar results hold when using alternate systemic risk measures.

Some of the risk management reforms we study are part of a broader package of reforms that address issues beyond risk management. The impact of those additional confounding factors

may be driving the results in columns (1) through (3) of Table VI (Panel A). To better isolate the effect of risk management, in columns (4) through (6) of Panel A of Table VI we show results from estimations of Equation (3) including interactions with *Most impacted*. The coefficient on the triple interaction term *Post x Treat x Most impacted* captures the incremental effect on most impacted banks in the treatment group relative to other banks in the treatment group. As such, this approach better controls for other confounding factors in the treatment country that may be unrelated to individual banks' risk management practices.

The results in columns (4) through (6) show negative and significant coefficients on the triple interaction term, *Post x Treat x Most impacted* across all model specifications, which suggest that the reduced contribution to systemic risk post-reform is larger for *Most impacted* banks, which as shown in Table V, experience larger improvements in risk management around the reforms. Thus, these findings add support to the view that improvements in risk management play an important role in the observed reductions in banks' contributions to systemic risk post-reform.

Next, we evaluate the parallel trends assumption underlying our DiD estimation. Specifically, in Panel B of Table VI, we follow Bertrand and Mullainathan (2003) and estimate Equation (3) replacing the *Post* indicator with timing variables for each year of the [-3, +3] event window: Year -3, Year -2, Year 0, Year 1, Year 2, and Year 3, with Year 0 being the effective year of the reform and Year -1 being the benchmark year. We interact each of these timing indicators with *Treat*. We use all controls used in Panel A of Table VI but omit them for brevity. The coefficients on the interaction terms are insignificant during the pre-reform period and become negative and significant on or after the effective year of the reform. In line with the parallel trends assumption, these findings suggest that systemic risk follows similar trends before the reforms for the treatment and benchmark groups. Figure III plots the coefficients from column (1) of Panel B of Table VI to illustrate that the parallel trends assumption holds.

Some of the reforms we study are part of a broader package of reforms that prior studies have used as quasi natural experiments in other settings (e.g., Athanasakou, et al., (2020); Mielcarz, Osiihuk, and Pulawska (2023); Belghitar and Gontarek (2018); Colonnello, Koetter, and Wagner (2023); Kleymenova and Tuna (2021)). To address the “multiple hypotheses” problems associated with reusing natural experiments (Heath, et al. (2023)), we compute Romano and Wolf (2005; 2016, RW) adjusted *p*-values. Specifically, we control for 26 outcome variables

from prior studies that use some of our reforms as quasi-natural experiments.³⁹ The results are reported in Appendix E, Table XVIII. Using the RW-adjusted p -values, the interaction term $Post \times Treat$ is still statistically significant at the 1% level or better for all three systemic risk measures.⁴⁰ Appendix E presents more detailed discussion of this RW correction analysis.

One additional concern with the results in Table VI is that the reforms may also affect some of the control variables we use. To address this “bad controls” problem in our DiD analysis (Angrist and Pischke (2009)), we estimate Equation (3) using controls as of the year before the reform ($t-1$) in each cohort, interacted with the indicator $Post$. Our results using this approach confirm our findings in Panel A and are shown in Appendix G Table XXVI.

In our results we attempt to isolate the effects of the reforms on risk management by focusing on a narrow window around the reform in each country, by controlling for confounding events such as the adoption of BASEL III and the adoption of macroprudential policies, and by focusing on the most impacted banks. We perform several additional robustness tests and report those results in our internet appendix. First, our main results remain robust after controlling for lagged systemic risk. To further control for plausible effects associated with capital and liquidity regulations, we estimate Equation (3) using additional controls that include Tier 1 risk-based capital ratio and a liquid assets ratio, computed as cash and Treasury securities-to-assets. Our sample size is reduced when using these additional controls, but our main findings continue to show that banks in treatment countries reduce systemic risk post-reform relative to the control group, even after accounting for the effects of concurrent reforms.

4.4. Risk Management, Stand-Alone Risk, Funding Structure, and Performance

Our results show that a stronger risk management function is associated with reduced contributions to systemic risk. We now examine plausible channels through which stronger risk controls can mitigate systemic risk. To address this question, we again exploit the staggered

³⁹ Bui et al. (2023) use a similar approach to address the multiple hypotheses problems in their study of Regulation SHO.

⁴⁰ Among our risk management reforms, the EU Capital Markets Directive, which is the reform for 13 countries in our sample, is the reform that has been more commonly studied in other settings. In additional robustness tests, we replicate the analysis in Table VI, after excluding the 13 EU countries from the analysis. The results, which are less likely to suffer from the “multiple hypothesis” problem associated with reusing natural experiments, are in line with those presented in Table VI.

adoption of risk management reforms across countries to identify the effects of improvements in risk management on stand-alone risk, funding structure and performance. Specifically, we estimate the stacked DiD regressions (Equation (3)) using the following dependent variables: 1) *Tail risk*, the negative of the average return on the banks' stock during the 5% worst returns days over the year; 2) *Equity volatility* – the annualized standard deviation of weekly stock returns; *Z-score*; 3) *Deposits-to-assets*; 4) *ST funding*—short-term debt/(deposits + short-term debt); 5) Tobin's *q*- the market-to-book value of assets, where the market value of assets is the sum of the market value of equity and book value of liabilities; and 6) *ROA*- net income plus interest expense divided by book value of assets. We use the same set of controls used in Table VI but omit them to conserve space.

The results from the stacked DiD regressions are shown in Panel A of Table VII. The results show a significant decline in *Tail risk*, an increase in deposit funding, and higher Tobin's *q* post reform for banks in treatment countries relative to the control group, suggesting that these are channels through which risk management mitigates systemic risk. From column (1), results show that banks in treatment countries experience a 0.4 decrease in *Tail risk* post reform relative to the control group, which represents 9.5% of its mean (4.24). Similar results hold when using alternate measures. The results also show a decline in profitability (*ROA*) post reform for treatment banks; further analysis reveals that this is driven by a reduction in net interest margin (*NIM*), which suggests that these banks may take lower risk on their assets.

In Panel B of Table VII, we explore the impact on *Most impacted* banks, by including interactions with *Most impacted*. The results reveal a more significant decrease in stand-alone risk, more (less) reliance in deposit (volatile short-term) funding, and higher valuation post-reform for *Most impacted* banks. The coefficients on the triple interaction term, *Post x Treat x Most impacted* are negative and significant for *Equity volatility*, *ST funding*, and positive and significant for *Deposits-to-assets* and *Tobin's q*. Overall, these findings reveal that banks that improve their risk management around the reforms lower stand-alone risk, rely more on stable funding sources, and have higher valuation, which lowers their contribution to systemic risk. In additional exploratory analyses presented in Appendix G Table XXIX, we examine whether banks with stronger risk controls are more likely to hedge their risks. To do so, we obtain supplemental data from

Refinitiv's Financials on the fair value of derivative contracts used for hedging.⁴¹ We then create two variables: 1) *Hedger*, an indicator variable equal to one for banks with non-zero values on derivative contracts used for hedging and zero otherwise; and 2) $\ln(Hedge)$, the natural logarithm of (1+ fair value of derivatives used for hedging). We replicate the results in Table VI using these measures as our main dependent variables and report results in Appendix G. While data availability significantly reduces the sample size, we find evidence suggesting that banks with better risk controls are more likely to hedge and have larger derivative positions used for hedging purposes.

4.5. Robustness Tests

We perform a battery of robustness tests and report the results in Appendix G. We first test the robustness of our results to alternate measures of risk management. We estimate Equation (2) using a PCA-based *RMI*, and an alternate measure of *RMI* that restricts the index to include only non-missing risk management characteristics. Our results using these alternate measures confirm our main findings.

Because our reforms are concentrated in the post GFC period we acknowledge the presence of other banking reforms during our timeframe. We explicitly control for the effects of banking capital and liquidity regulations in our main regressions by controlling for a country's year of Basel III implementation. In addition, we utilize several other approaches to boost confidence that our results are driven by the impact of the reforms on risk management. First, we run the stacked DiD regressions using an alternate control group formed of countries that never enacted a risk management reform. These results confirm our main findings. Second, we confirm that our main results hold if we exclude European Union countries, which adopted a broad reform that addresses issues beyond risk management, alleviating concerns about confounding factors driving the results. Lastly, we examine the differential impact of the risk management reforms across banks based on pre reform capital and liquidity levels. If the reductions in systemic risk we uncover are driven by the impact of capital or liquidity regulations instead of risk management, we would expect larger

⁴¹ Specifically, we obtain data on the following variables: 1) *Non-current derivative liabilities-hedging*, which captures the fair value of derivative contracts that "represent long-term liabilities arising from hedging derivative instruments; and 2) *Current derivative liabilities-hedging*, the fair value of derivative contracts whose purpose is to "limit the risk related to the volatility of market prices of goods sold or to significant changes in foreign exchange rates." The sum of these variables is our proxy for derivatives used for hedging.

reductions in systemic risk for banks with low pre reform liquidity and capital ratios. We examine this conjecture by estimating our stacked DiD regressions (Equation 3) using interactions with one of two indicators of *Most impacted* banks, defined as banks with *Tier 1 capital ratio (Liquidity ratio)* in the bottom tercile of the distribution in each country in the year prior to the reform. Results (presented in the internet appendix) show no differential impact on systemic risk around the reform for banks with low liquid assets; in addition, banks with low *Tier 1 capital* experience smaller decreases in systemic risk around the reform relative to the control group. These results lend support to our findings that the reductions in systemic risk are driven by the risk management reforms and not by the concurrent reforms targeting capital or liquidity.

In our event-based stacked regressions approach, we focus on risk management reforms that occur in the post-GFC period to mitigate concerns about the GFC contaminating the results in the pre-reform period. To alleviate concerns about our choices, we run the stacked DiD regressions by forming treatment cohorts for all countries that enact risk management reforms during our sample period, including those with reforms on or before 2010. We then replicate the results in Table VI and confirm our findings of significant reductions in contributions to systemic risk post reform for banks in treatment countries relative to the control group. Because the U.S. enters as a treatment country when using this approach (reform in 2010) and U.S. banks comprise a large fraction of our sample, we run the analysis with and without U.S. banks and confirm our findings.

We further explore whether our results are robust to alternate definitions of *Most impacted*. We use two alternate definitions of *Most impacted*: 1) Banks without a CRO, and 2) Banks without a risk committee as of $t-1$, relative to the enactment of the risk management reforms. Results using these alternate definitions of *Most impacted* are weaker than those reported in Panel A Table VI; the coefficients on the triple interaction term *Post x Treat x Most impacted* are all negative, but only statistically significant in regressions using *MES*. The results suggest that banks with the weakest ex ante risk controls (no CRO and no RC) experience the largest reductions in systemic risk.

In additional analyses, we assess the effect of additional country characteristics, such as regulatory and institutional quality. Our findings reveal that these country-level characteristics do not materially affect our findings. Risk management improvements and their systemic risk

implications are observed for banks in reform countries, but the effect does not differ by institutional or regulatory quality.

5. Conclusion

Motivated by the recent U.S. regional banking crisis that revealed significant risk management failures, in this paper we examine the evolution of risk management practices for a broad global sample of banks from 2000 to 2020 and assess their impact on banks' contributions to systemic risk. We assemble data on risk management characteristics and construct a risk management index, *RMI*, similar to Ellul and Yerramilli (2013) for a broad international sample of banks across 47 countries. We document significant improvements in risk management practices since the GFC, especially in developed countries.

We further show that stronger risk management is associated with lower systemic risk in the post-GFC period, and the results are stronger for banks in developed countries. Results using an event-based stacked DiD approach around the staggered enactment of risk management reforms across countries suggest that the relation is causal. Specifically, we document more significant reductions in systemic risk contributions post-reform for banks with weaker ex ante risk controls (i.e., those banks more impacted by the risk management reforms). Finally, we observe that risk management is associated with lower stand-alone risk, more reliance on stable funding sources, and higher valuation, which suggest that these are likely channels through which stronger risk controls help mitigate systemic risk.

Our findings underscore the importance of the risk management function in curtailing excessive risk-taking and improving banks' financial stability. A few caveats are in order, however. First, data limitations prevent us from capturing additional and likely important aspects of the risk management function, including compensation-based measures that may help to assess the power of *CROs*, for example. We note that the inability to capture the power that the *CRO* or the risk committee members may exert on bank management would work against our results, which show that *RMI* has a significant impact on banks' contribution to systemic risk. Second, our sample period ends in 2020, so we are unable to explore the role of risk management in the recent banking crisis of 2023. However, we believe that our study and results will spark more research on this important topic to answer some lingering and relevant policy questions about the role of

risk management and steps that can be taken to improve risk controls at banks to maintain financial stability.

Chapter Two – Betting on Zero: Risk Management in U.S. Banks Around the Silicon Valley Banking Crisis.

Abstract

In this paper, I examine the impact of risk management on the performance of publicly traded U.S. banks during the Silicon Valley Bank (SVB) crisis. Using a novel dataset of risk management characteristics that measure both the presence and strength of Chief Risk Officers and board-level risk committees, I find no evidence of a link between bank risk management and performance during the crisis. Tests on bank behavior before the crisis show that banks with stronger risk management hold larger amounts of interest rate derivatives for hedging purposes. However, this does not translate into better performance or lower uninsured deposit outflows during the crisis. Examining risk management within a subsample of banks with the greatest exposure to interest rate and deposit outflow risk confirms these results.

“This is a textbook case of bank mismanagement. SVB failed because the bank’s management did not effectively manage its interest rate and liquidity risk.”

- *Michael Barr, Vice Chair of Supervision, Federal Reserve*⁴²

1. Introduction

When regulators seized control of Silicon Valley Bank (SVB) on March 10th, 2023, the bank’s collapse represented the second-largest bank failure in U.S. history.⁴³ Over the following two months, the SVB crisis and its fallout saw the failure of banks with a collective half a trillion in assets, including First Republic Bank (FRB), \$229 billion, and Signature Bank, \$109 billion. In the aftermath of the crisis, regulators and legislators highlighted risk management failures as a main contributor to the crisis. Chief among them was the absence of a Chief Risk Officer (CRO) at SVB from April 2022 to January 2023, during which the federal funds rate rose from 0.5% to 4.5%, significantly increasing interest rate risk.⁴⁴ These findings renewed calls for stronger bank risk management and stricter regulations targeting Chief Risk Officers and board-level risk committees.⁴⁵ However, the existing literature disagrees on the effectiveness of bank risk management in reducing risk and preventing crises (Adams et al. (2024); Balasubramanyan et al. (2024); Ellul and Yerramilli (2013); Ji and Jiang (2022); Stulz et al. (2021)).

In this paper, I study the impact of risk management on the performance of banks during the SVB crisis using a sample of 298 publicly traded U.S. banks. To measure the strength of a bank’s risk management function I construct a Risk Management Index (*RMI*) (e.g., Adams et al. (2024) and Ellul and Yerramilli (2013)) using a dataset of risk management characteristics collected from bank filings and BoardEx. *RMI* is calculated as the proportion of eleven risk management characteristics a bank possesses centered around the presence and strength of the Chief Risk Officer, five characteristics, and the board-level risk committee, six characteristics.

⁴² See “The Federal Regulators’ Response to Recent Bank Failures” House Financial Services hearing, March 29th, 2023.

⁴³ The largest three bank failures in terms of asset size in U.S. history before March 2023 were Washington Mutual – 424 billion (2008), Continental Illinois National Bank – 111 billion (1984), and American Savings and Loan – 73 billion (1988) according to “Most U.S. bank failures have come in a few big waves,” April 11, 2023 by Drew Desilver published through the Pew Research Center.

⁴⁴ Bloomberg.com “SVB’s Lack of Risk Officer Emerges as Focus in Fed Probe,” March 14, 2023 by Katanga Johnson, Joel Rosenblatt, and Chris Dolmetsch.

⁴⁵ See “White House to Call for New Midsize Bank Rules After SVB, Signature Failures” Wall Street Journal, March 29th, 2023 by Andrew Restuccia, Andrew Ackerman and Andrew Duehren.

I begin by documenting the widespread voluntary adoption of risk management characteristics in publicly traded U.S. banks. At the end of 2021, 40% of banks had appointed both a Chief Risk Officer and a board-level risk committee. Adoption of single risk management characteristics is even more pronounced with 70% of banks having either a CRO or a RC. These statistics emphasize the widespread voluntary adoption of risk management practices as only 10% of banks are required to appoint a CRO and a RC to comply with regulation.⁴⁶ There is also considerable variation in the strength of the risk management function. Conditional on having at least one risk management characteristic, the average bank has a *RMI* of 0.56, which indicates that the average bank has six characteristics, with a standard deviation of 0.21, two characteristics.

Using cross sectional regressions of bank stock market and financial performance during the crisis on risk management I find no evidence that banks with stronger risk management perform better or face lower uninsured deposit outflows during the crisis than banks with weaker risk management. This finding holds across bank sizes including large banks, over ten billion in assets, where some banks are required to adopt certain risk management characteristics, and small banks, under ten billion in assets, where the adoption of any risk management characteristics is voluntary. The lack of significant differences in performance during the crisis raises an important question about the role risk management functions played before and during the crisis. Why did banks with stronger risk management not perform better during the crisis? A plausible explanation is that there was no difference in the way banks with different levels of risk management responded to rising interest rate risks in 2022. Since interest rate risk is a fundamental banking risk, banks with weaker risk management likely still possess decision makers who understand interest rate risk and its accompanying deposit outflow risk.

To test this explanation, I examine differences across bank characteristics before the crisis that proxy for a bank's protection against interest rate and deposit outflow risk. Specifically, I study differences in the usage of interest rate derivatives for hedging (Purnanandam (2005); Brewer III et al. (2000)), liquidity and capital hoarding, securities management, and the value of the deposit franchise (Drechsler et al. (2021); (2023)). Using financial data from quarter four of

⁴⁶ Regulation on bank risk management in the U.S. was initially passed as part of the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010 and was amended by the Economic Growth, Regulatory Relief, and Consumer Protection Act in 2018 to require banks exceeding \$50 billion in assets to appoint a stand-alone RC chaired by an independent director and appoint a Chief Risk Officer.

2022 to proxy for bank's position before the crisis I find that stronger risk management is associated with greater use of interest rate derivatives for hedging, especially in small banks. Results also show that stronger risk management is associated with greater reliance on time deposit funding in large banks. Increased proportion of time deposit funding is considered a signal of higher deposit franchise value and serves as a buffer against deposit outflow risk. However, these results are the exception across the full set of bank characteristics considered which largely shows no association with risk management. These results help explain why I find no evidence of performance differences during the crisis.

Recent work analyzing the SVB crisis and its determinates has illustrated that banks vary substantially in their exposure to interest rate and deposit outflow risk (Acharya et al. (2023); Drechsler et al. (2023); Jiang et al. (2023)). Stronger risk management could benefit the banks with the most risk exposure while having minimal effect on the average bank. To test this hypothesis, I perform two additional sets of tests. First, I regress performance during the crisis on three proxies for interest rate and deposit outflow risk exposure, the ratio of uninsured deposits to deposits, bank-level deposit betas (Drechsler et al. (2017); (2021)), and the expected decrease in asset value due to increased interest rates (Jiang et al. (2023)). Results show that banks with higher uninsured deposit funding and expected losses perform significantly worse during the crisis than banks with lower risk exposure. Banks with lower value deposit franchises, proxied by deposit betas, experience stronger outflows of uninsured deposits during the crisis but otherwise perform no different than banks with higher value deposit franchises. Second, I examine whether banks with stronger risk management perform better during the crisis in the subsample of banks with higher risk exposure. Results support earlier findings.

This paper contributes to the literature in several ways. I document the widespread adoption of risk management practices among publicly traded U.S. banks. This builds on the work of Ellul and Yerramilli (2013), which measures bank risk management practices around the Global Financial Crisis (GFC), and Adams et al. (2024) by expanding the data on U.S. risk management practices in greater detail and for a more recent timeframe. My findings also contribute our understanding of risk management practices at small banks which are often overlooked in previous studies.

To the best of my knowledge, this is the first paper to examine the effect of risk management practices on the behavior and performance of banks around the SVB crisis. Ellul and Yerramilli (2013) show that banks with stronger risk management practices before the GFC take less risk leading up to the GFC and have stronger (less negative) stock returns during the GFC. The SVB crisis represents a distinctly unique crisis compared to the GFC with the more recent crisis being significantly shorter in duration and related to risks more pervasive to small and mid-sized banks. Examining how risk management impacts bank performance across different types and severities of crises increases our understanding of the value of risk management and the situations where risk management is most effective.

In addition, this paper contributes to the rapidly expanding literature that discusses the value of bank risk management. Recent findings have been mixed on the value of bank risk management. Balasubramanian et al. (2024) and Stulz et al. (2021) document no impact of risk management on bank risk or value around the introduction of risk committee and Chief Risk Officer mandates in the U.S. Whereas Adams et al. (2024) and Ji and Jiang (2022) find evidence of reduced risk around risk management reforms using international and U.S. based samples respectively. This paper contributes to the literature by documenting no association between risk management and bank performance during the SVB crisis. This paper also contributes to the emerging literature on the SVB crisis (e.g. Acharya et al. (2023); Drechsler et al. (2023); Jiang et al. (2023)) by documenting how risk management impacted bank behavior and performance around the crisis.

It is important to stress that while this study does not find any relationship between risk management and performance during the SVB crisis I caution readers against interpreting these results as evidence the bank risk management provides no value. Risk management has been shown to provide value in other types of crises such as the GFC (Ellul and Yerramilli (2013)) and to reduce standalone and systemic risk during non-crises periods (Adams et al. (2024); and Ji and Jiang (2022)). In this study I also find that banks with stronger risk management practices are more likely to engage in interest rate hedging using derivative contracts. Purnanandam (2005) and Brewer III et al. (2000) show that increased hedging using derivative contracts serves as an alternative to expensive sources of capital and can help banks maintain strong lending programs and access to liquidity during monetary policy shocks. These studies highlight potential benefits

provided by risk management outside of the SVB crisis. In addition, due to the financial data being measured quarterly I cannot rule out unobserved benefits or costs to risk management that banks realized at the beginning of the SVB crisis that were no longer present in the end of quarter financial data. I also cannot rule out the impact of risk management through non-financial channels such as advisory, social network, or experience benefits that might be utilized during crises. With these caveats in mind, I believe this study raises important questions about the role risk management played in the SVB crisis.

2. Data and Methodology

2.1 Sample Construction

To construct the dataset, I start with the CRSP-FRB linking file of publicly traded U.S. banks published by the Federal Reserve Bank of New York.⁴⁷ I restrict the sample to publicly traded banks as data on bank risk management practices is contained in the annual reports and proxy statements filed with the SEC. I collect data on bank risk management practices as of December 31, 2021 from BoardEx and supplement it with hand collected data from bank annual reports and proxy statements. I chose to measure risk management practices at the end of 2021 to minimize reverse causality concerns while reflecting the risk management practices of banks during the rising interest rate environment of 2022 and subsequent crisis as accurately as possible.⁴⁸ This approach is similar to the approach employed in Ellul and Yerramilli (2013) to examine the impact of risk management practices on bank performance and risk taking during the Global Financial Crisis.

I focus the data collection around the existence of board-level risk management committees (RC) and executive-level Chief Risk Officers (CRO). The presence of risk committees and Chief Risk Officers has been shown to be associated with stronger risk management practices and have

⁴⁷ The CRSP-FRB linking file which matches CRSP PERMCO numbers to bank level RSSDID identifiers can be accessed at https://www.newyorkfed.org/research/banking_research/crsp-frb.

⁴⁸ Measuring risk management and control variables in the pre-period helps alleviate but cannot fully remove concerns of reverse causality as both risk management and financial policies exhibit moderate degrees of stickiness. The unexpected shock caused by SVB's collapse and the uncertain language around the Federal Reserve's interest rate policy in 2022 help further alleviate concerns by serving as pseudo exogenous shocks to the U.S. banking environment.

been the focus of reforms targeting bank risk management (e.g., Ellul and Yerramilli (2013); Liebenberg and Hoyt (2003); Lingel and Sheedy (2012); Adams et al. (2024)).

For CRO identification, I require that banks have an executive solely focused on the risk management function of the bank. Individuals whose titles suggest that they split time between the risk management function and other banking functions, such as legal, finance, or accounting are not considered CROs. Also, executives in charge of narrow portions of risk management, such as credit or cyber risk and not considered CROs for the purposes of this study as it is unclear whether they exercise control over more wholistic risk policies at the bank. Similar to the collection process in Adams et al. (2024), I do not require banks to explicitly name the CRO. In my sample, under 10% of CROs are unnamed. In addition to collecting the presence and name of CROs, I also collect data on the year of appointment to the CRO role and any information on the CRO's pay package.

For RC identification, I require that banks have a standalone risk committee at the board-level. This mirrors the criteria used by the Federal Reserve to determine compliance with regulations. This criterion excludes joint risk committees such as audit and risk committees as well as siloed risk committees such as information technology risk committees. I collect several data points on the composition and strength of risk committees including the size and independence of the committee, the presence of an independent chair, and the number of committee meetings held during 2021. Definitions and sources of all variables used in this study are detailed in Appendix F.

I use the risk management data to construct a risk management index, *RMI*, following the process used to construct other risk management and governance indices such as those from Ellul and Yerramilli (2013) and Aggarwal, Erel, Stulz, and Williamson (2009). *RMI* represents the proportion of eleven risk management characteristics in each bank as of the end of 2021: 1.) *RC*; 2.) *RC Size*; 3.) *Independent RC*; 4.) *Independent RC Chair*; 5.) *Active RC*; 6.) *RC Expert*; 7.) *CRO*; 8.) *CRO Named*; 9.) *CRO Tenure*; 10.) *CRO Pay Reported*; and 11.) *CRO Top Pay*. *RC* is an indicator variable that equals one if the bank has a stand-alone board-level risk committee and zero otherwise. *RC Size*, is an indicator variable that equals one if the size of the risk committee is larger than the median risk committee and zero otherwise. *Independent RC*, is an indicator variable that equals one if the risk committee is composed solely of independent directors and zero otherwise. *Independent Chair RC*, is an indicator variable that equals one if the chair of the risk committee is

an independent director and zero otherwise. *Active RC*, is an indicator variable equal to one if the bank has a risk committee that met more frequently than the median risk committee in 2021 and zero otherwise. *RC Expert*, is an indicator variable equal to one if at least one member of the risk committee is designated as a qualified financial expert and zero otherwise. *CRO*, is an indicator variable that equals one if the bank has an executive designated as a Chief Risk Officer and zero otherwise. *CRO Named*, is an indicator variable that equals one if the CRO is explicitly named in bank filings and zero otherwise. *CRO Tenure*, is an indicator variable that equals one if the CRO has been serving in the CRO role at the bank longer than the median CRO and zero otherwise. *CRO Pay Reported*, is an indicator variable that equals one if the bank reports the pay for the CRO and zero otherwise. *CRO Top Pay*, is an indicator variable equal to one if the ratio of CRO pay to CEO pay is above the median and zero otherwise. In instances where CRO pay is unreported I proxy for the CRO pay ratio using the ratio of CFO to CEO pay.⁴⁹

I obtain bank financial data from the Research Information Systems (RIS) database provided by the FDIC. The RIS database draws its data from quarterly filed bank Call Reports and creates consistent time series of reported items and commonly used financial ratios to alleviate the need to map Call Report items across time and filing type.⁵⁰ Institutional ownership and bank stock return data come from the Thompson Reuters 13-F database and the Compustat daily stock return file respectively. I also download data on deposit betas from Philipp Schnabl's website and collected data on the federal funds rate from the Federal Reserve.⁵¹ For all non-risk management variables I collect data where available from January 1st, 2021 to September 30th, 2023 and winsorize all financial and stock variables at the 1st and 99th percentile.

I merge the risk management data with data on bank financials, institutional ownership, deposit betas, the federal funds rate and bank stock returns to construct the final sample of 298 publicly traded U.S. banks.⁵² Summary statistics for key variables are reported in Table VIII.

⁴⁹ For those banks that report both CRO and CFO pay the average and median difference between the CRO/CEO pay ratio and CFO/CEO pay ratio is about 6 percentage points.

⁵⁰ The RIS is a publicly available dataset published by the FDIC using publicly available Call Report data. The RIS data can be found at <https://www.fdic.gov/foia/ris/index.html>. The data dictionary is available at <https://www7.fdic.gov/DICT/app/templates/Index.html#!/Main>.

⁵¹ Deposit beta data can be accessed at https://pages.stern.nyu.edu/~pschnabl/data/data_deposit_beta.htm.

⁵² I exclude the top 4 banks in terms of assets as these banks face increased regulatory scrutiny that other large banks do not which may influence both risk management practices and outcomes during the SVB crisis.

Statistics for *RMI* and its eleven indicator variable components are presented unconditionally to reflect index construction where banks without CROs (RCs) have zeros imputed for CRO (RC) strength measures. Below each indicator variable I present the conditional underlying variables that the indicator variable is based on.

Across the sample of 298 banks, 210 (70%) banks have at least one risk management characteristic with 123 (41%) banks having both a RC and CRO. Given that only 10% of banks are governed by the updated regulation requiring both a RC and CRO these statistics show that many publicly traded U.S. banks have voluntarily adopted risk management practices related to RCs and CROs. The unconditional average *RMI* for banks in my sample is 0.397 which indicates that on average banks have around four of the eleven index components. For banks that have at least one risk management characteristic the average (median) *RMI* rises to 0.563 (0.636), indicating that conditional on having some form of risk management governance practices, banks have on average six of the eleven components.

Over half of banks (54%) have appointed a board-level risk committee. The median risk committee is composed of five members where 100% of members are independent. In line with the large number of independent risk committee members, the chair of the risk committee is overwhelmingly independent. The average (median) risk management committee met 5.9 (5) times in 2021. The adoption rate of Chief Risk Officers is similar to that of risk committees with 58% of banks having a CRO appointed at the end of 2021. Average (median) CRO tenure is 3.5 (2) years with 27 banks appointing CROs in 2021. Disclosure of CRO pay is sparse, with only 43 (25%) of banks with CROs reporting CRO pay. The average (median) CRO with available pay data earned \$948K (\$688K) in 2021 and has a ratio of 0.391 (0.364) compared to CEO pay.

In terms of financial variables, the average (median) bank in the sample has \$31 (\$6) billion assets as of December 31st, 2021. The smallest bank in the sample has \$350 million in assets while the largest bank excluding the top four banks has \$565 billion in assets. Banks in the sample are largely funded by deposits, with an average deposit to asset ratio 85%, and are well capitalized, with an average tier 1 capital ratio of 9.3%.

2.2 Methodology

Throughout the paper I examine the effect of risk management characteristics on bank performance and behavior using various specifications of the following cross-section model:

$$Y_i = \alpha + \beta_1 RMI_{i,2021} + X_{i,2021} + \delta + \varepsilon_i, \quad (4)$$

where Y_i refers to a measure of bank behavior or performance such as a bank's change in deposits during the crisis or the ratio of a bank's interest rate hedging contracts to available for sale securities before the crisis; $RMI_{i,2021}$ is the risk management index for bank i measured as of December 31st, 2021; $X_{i,2021}$ is a vector of bank-level controls that includes the natural log of assets (*Size*), *ROA*, *Deposits-to-assets*, *Tier 1 capital-to-assets*, *Loan-to-assets*, *Bad loans-to-assets*, *Noninterest income-to-income*, *Trading derivatives-to-assets*, *Annual stock return*, *Tail risk*, *Institutional ownership %*, and *Board Independence* all measured as of December 31st, 2021⁵³. Controls were chosen based on the control variables used in existing studies on risk management (e.g. Ellul and Yerramilli (2013); Balasubramanyan et al. (2024)). To control for unobserved differences among banks of different sizes in a cross-section setting, I include size decile fixed effects based on a bank's total assets at the end of 2021.

3. Empirical Results

3.1 Risk Management and Performance During the SVB Crisis

To examine how risk management impacts bank performance during the SVB crisis I estimate Equation (4) on various measures of financial and stock market performance during the crisis. I present results for buy and hold stock returns in Table IX. Buy and hold returns are calculated using the daily closing stock prices from March 8th, 2023 to day t . In the afternoon of March 8th, SVB announced the need to raise \$2.25 billion in equity to cover a \$1.8 billion loss in its investment portfolio.⁵⁴ The closing price on March 8th represents the price before the news release that jumpstarted the crisis and thus serves as the base for the buy and hold return calculations. Figure IV shows the average buy and hold return for banks during the crisis. The

⁵³ Bank financial data is aggregated from a bank to a bank holding company level using RSSID to RSSDHCR mapping in the FDIC RIS structure data files. Annual stock return and tail risk are calculated from the Compustat Daily Stock Price file. Institutional Ownership % is computed from 13-F filings. Board Independence is calculated from BoardEx. Table VIII presents summary statistics for all outcome and control variables.

⁵⁴ See "The Banking Crisis: A Timeline of Key Events," May 11, 2023 by Candice Choi published by the WSJ.

average bank experienced a buy and hold return of -4.6% on the initial day of SVB's collapse and was down on average 26.6% by May 5th as shown in Panel A. Panel B of Figure IV shows the average returns for large and small banks separately. Large banks, defined as those with more than ten billion in assets, are represented by the solid line, and small banks, defined as those with less than ten billion in assets, are represented by the dashed line. Consistent with the focus of the crisis being large regional banks, large banks on average suffered worse returns over the crisis. I present the average buy and hold return during the crisis for banks split by above and below median *RMI* in Panel C of Figure IV. Banks with above median *RMI* experience visually worse returns, as demonstrated by the solid line, than banks with below median *RMI*. On average above median *RMI* banks lose 28% of stock value over the crisis compared to an average loss of 25% for banks with below median *RMI*. Panel B and Panel C of Figure IV look remarkably similar and highlight an important fact of risk management in banks. *RMI* is positively correlated with bank size, having a correlation coefficient of 0.63. To account for this correlation, I control explicitly for bank size as well as include size decile fixed effects in all regressions. I also perform regressions separately for large and small banks in addition to the regressions across the full sample of banks. Results throughout the paper are generally consistent across banks of different sizes.

Table IX presents estimations of Equation (4) using buy and hold returns for several periods representing important events during the crisis including: March 9th ($t+1$), the first day of the crisis; March 10th ($t+2$), when regulators seized SVB; March 17th ($t+7$), when SVB filed for bankruptcy; April 24th ($t + 32$), when First Republic announced restructuring plans; and May 1st ($t+37$), when regulators seized First Republic. *Crisis Return* represents the buy and hold return from March 8th, 2023 to May 5th, 2023 which marks the end of the week First Republic Bank was sold to JP Morgan. Results in Panel A show no discernable differences in stock returns during the crisis for banks with higher *RMI* after controlling for bank size and other bank characteristics. Splitting the sample between large and small banks in Panel B and C respectively show similar insignificant differences in bank stock returns.

Perhaps banks with stronger risk management performed better financially during the crisis even though this performance was not reflected in stock market returns. To explore this, I estimate Equation (4) using the percent change in key bank financials from Q4 2022 to Q1 2023. Results are presented in Table X. For the full sample of banks reported in Panel A, there is no association

between risk management and uninsured deposit outflows, capital changes or profitability during the crisis. Results for large and small banks presented in Panels B and C show similar results. These results suggest that the lack of observed differences in stock returns accurately reflect differences in the underlying financial performance of banks during the crisis.

The results in this section raise an important question about the value of risk management functions during the SVB crisis. Why did banks with stronger risk management perform the same as banks with weaker risk management? A plausible explanation is that there was no material difference in the way banks responded to rising interest rate risks in 2022. I directly test this explanation in the following sections by estimating Equation (4) on bank financials that are thought to measure a bank's exposure to interest rate and deposit outflow risk.

3.2 Risk Management and Interest Rate Hedging

One of the ways banks can protect against interest rate risk is through the use of derivative instruments including interest rate swaps (Acharya et al. (2023); Drechsler et al. (2023); Infante et al. (2018); Purnanandam, (2005)). Banks are required to report the gross notional value of interest rate derivative contracts used for hedging as well as interest rate swaps used for hedging where the bank pays the fixed rate portion. As of December 31st, 2022, 74.5% (41.6%) of banks in the sample utilize interest rate derivatives (swaps) for hedging respectively. Panel A of Figure V shows the percent of banks utilizing interest rate derivatives for hedging across the sample. Bank utilization of interest rate derivatives for hedging, is relatively stable throughout the sample with a range of 74% to 76%. Panel B compares the percent of banks with above and below median *RMI* that use interest rate derivatives for hedging. The main takeaway from Panel B is that across the sample, banks with above median *RMI* are more likely to utilize interest rate derivatives for hedging than banks with below median *RMI*. On average 85% of banks with above median *RMI* utilize interest rate derivatives for hedging compared to 65% of banks with below median *RMI*. The other salient point to take away from Figure V is absence of a strong visual change in the utilization of interest rate hedges in the three quarters after the SVB crisis. This indicates at least at the extensive margin; banks did not change their hedging behavior in response to the crisis.

Regression results in this section and subsequent sections use outcome variables measured as of December 31st, 2022. Measuring outcome variables at the end of 2022 captures differences

in banks before the crisis, to avoid any potential influence of the crisis on bank behavior, while being close enough to the start of the crisis to reasonably proxy for each bank's protections against interest rate and deposit outflow risk. Table XI Panel A reports results for the utilization of interest rate derivatives for hedging and fixed rate swap contracts for hedging in columns (1) and (4) respectively. After controlling for bank size and other financial variables, banks with stronger risk management practices are more likely to utilize fixed rate interest rate swaps for hedging. The coefficient in column (4) shows that a one standard deviation higher *RMI* (0.313) is associated with a 7.6 percentage point higher likelihood that a bank utilizes interest rate swaps for hedging.⁵⁵ A positive but insignificant difference in the likelihood of banks with stronger risk management to utilize interest rate derivatives for hedging is observed in column (1).

Turning to the level of derivatives for hedging utilized by banks, columns (2) and (5) report results from tests using the ratio of interest rate derivatives (interest rate swaps) for hedging to assets. Columns (3) and (6) present similar tests using the ratio of interest rate derivatives (interest rate swaps) to available-for-sale (AFS) securities. I test both ratios because while the majority banking assets have some exposure to interest rate risk, AFS securities exposure to interest rate risk and were a focal point of the problems at SVB. AFS securities, which are often held for liquidity purposes, are marked to market on the balance sheet meaning that as interest rates rise the reported value of AFS securities falls reducing bank assets and capital. In addition, banks use AFS securities as a source of liquidity to meet large deposit outflow requests. This means that as interest rates rise, the liquidity stored in AFS securities held by banks falls which may lead banks to need external financing. Across the sample, banks have interest rate derivatives for hedging equal to 6.3% (63.8%) of assets (AFS securities) on average as of December 31st, 2022. For comparison, SVB had interest rate derivatives for hedging to AFS securities ratio of 1.9% at the end of 2022 after reducing hedge positions over 2022 from a high of 55% in late 2021. First Republic bank did not have any active interest rate derivatives for hedging purposes reported in their Q4 2022 Call Report.

Results across the full sample of banks, presented in Panel A of Table XI, show that higher *RMI* is associated with a significantly higher ratio of interest rate swaps-to-assets. The coefficient

⁵⁵ The effect is calculated as $[(0.313 \times 0.244)/0.416]$.

in column (5), *Swaps-to-assets*, indicates that banks with a one standard deviation higher *RMI* have a 34% higher ratio of interest rate swaps for hedging to assets than banks with average *RMI*. These differences in interest rate hedging using derivatives are concentrated in smaller banks with higher *RMI* as reported in Panel C. For small banks, those under ten billion in assets, higher *RMI* is associated with both higher interest rate derivatives for hedging and interest rate swaps for hedging to assets.

3.2 Risk Management, Liquidity and Securities Management

In addition to direct hedging of interest rate risk through derivatives, banks can indirectly hedge against interest rate risk by increasing protections against deposit outflow risk. Deposits tend to flow out of the banking system following increases in interest rates as depositors face rising costs and the opportunity costs of holding deposits rise (Bernanke and Blinder (1992)). The more severe and sudden the rate increases, the more deposits are expected to exit the banking system. Based on the deposit sensitivity work of Drechsler et al. (2017), a 100-basis point increase in the federal funds rate results in an average deposit outflow of 0.86%.⁵⁶ The 450-basis point increase in interest rates over 2022 would suggest a deposit outflow of around 3.87% of deposits. Deposit outflows can lead to a bank run if banks have insufficient capital and liquidity or a large portion of depositors withdraw their funds (Diamond and Dybvig (1983)). To protect against deposit outflows and reduce the probability of bank runs, banks can increase their capital holdings and access to liquidity.

Table XII reports results from the estimation of Equation (4) on measures of capital, liquidity, and securities management. In column (1), I present the results on bank's tier 1 capital ratio. Tier 1 capital, often referred to as "going concern" capital by regulators, is meant to absorb unexpected losses such as those incurred when banks are forced to sell AFS securities at a discount to meet larger than normal deposit redemptions. Strong risk management practices could lead banks to increase their holdings of tier 1 capital as interest rates rise in anticipation of future deposit withdrawals. Banks, on average, had tier 1 capital ratios of 9.8% as of December 31st, 2022. Results

⁵⁶ See Drechsler et al. (2017) pages 23 and 24 for an estimation of deposit outflows per 100 basis point increase in federal funds rate.

in Panel A, column (1) and across banks sizes in Panel B and C do not suggest that banks with higher risk management held more tier 1 capital before the crisis.

Banks can also protect against deposit outflow risk by increasing their holdings of liquid assets, such as short-term treasuries. When interest rates rise, short-term treasury securities provide banks with access to liquidity and maintain their value better than longer-term securities which typically experience large decreases in value when interest rates rise. Liquid assets such as cash and federal funds sold provide immediate sources of funds for banks to meet deposit withdrawal requests. Columns (2) and (3) of Table XII examine whether banks with higher *RMI* held larger holdings of liquid assets and short-term securities before the crisis. Column (2) presents the results for the ratio of liquid assets-to-assets where liquid assets is the sum of cash, federal funds and repos sold, and securities with a remaining maturity of less than three months. I present results for the ratio of short-term treasuries, defined as treasury and other government securities with remaining maturity of less than three months, to total securities in column (3). The results show no link between higher *RMI* and increased holdings of liquid assets or short-term treasuries before the crisis.

Results presented in columns (4) through (6) focus on differences in securities management. Column (4) presents the results for the ratio of AFS securities to total securities. Column (5) examines if banks with stronger risk management practices are less likely to reclassify AFS securities as held to maturity (HTM) during 2022. Granja (2023) shows that banks facing higher interest rate risks are more likely to reclassify securities from AFS to HTM to prevent having to recognize the falling value of AFS securities on their balance sheet. Following Granja (2023), I construct an indicator variable, *reclassified*, that equals one if a bank reclassified securities from AFS to HTM during 2022.⁵⁷ In my sample, 13% of banks engaged in reclassification of AFS to HTM securities at levels large enough to represent attempts by banks to shield their balance sheets from losses. Column (5) in Panel A suggests no relationship between the strength of a bank's risk management function and the likelihood to reclassify securities before the crisis.

⁵⁷ Reclassifications are identified by large movements of securities from AFS designation to HTM designation without corresponding increases in the overall level of securities. Computation of reclassification follows the method used in Granja (2023).

Banks with stronger risk management may not hold a larger portion of short-term treasuries, but may take other steps to decrease the overall maturity of their security portfolio. Shifting from longer-term maturities to mid-and short-term securities early in the cycle of interest rate hikes while discounts are still relatively low can help banks avoid large losses and shore up liquidity for future needs. To explore this, I calculate the value weighted maturity in years of a bank's securities portfolio following Drechsler et al. (2021).⁵⁸ The results, presented in column (6) show no difference in the average maturity of securities across banks with varying levels of risk management.

3.3 Risk Management and Deposit Franchise

The value of a bank's deposit franchise measures the stickiness of deposits and attempts to explain why consumers keep deposits at banks that pay lower deposit rates. Banks with higher value deposit franchises, either through competition or product differentiation, face lower deposit outflows when interest rates rise (Drechsler et al. 2017). Banks with stronger risk management may be better equipped to understand this dynamic and take steps to increase the value of their deposit franchise during periods of rising interest rates. It is difficult to directly measure deposit franchise value, however, existing literature (e.g., Drechsler et al. 2017, 2021) has established some proxies for deposit franchise value.

In Table XIII, I examine whether banks with higher risk management have higher deposit franchise values before the crisis. To begin, I study the funding structure of banks at the end of 2022. Banks with a larger proportion of funding from uninsured deposits, as measured by the ratio of uninsured deposits to total deposits, have weaker deposit franchise values as uninsured deposits are known to be highly sensitive to changes in interest rates. In addition, banks with larger proportions of time deposit funding are thought to have stronger deposit franchise values. Time deposits are associated with higher deposit franchise values as they lock in deposits for a pre-specified period of time and create predictable deposit outflow schedules. Results for the

⁵⁸ Banks report the maturity of securities in buckets ranging from less than 3 months, 3 to 12 months, and 1 to 3 years to 10+ years. To calculate the value weighted maturity, I multiply each bank's holding of each bucket of securities by a time factor equal to 0 for securities with less than 3 months of remaining maturity and equal to the midpoint of the period covered by each bucket for other securities. Securities with maturity of 10+ years are assigned a maturity of 10 years. Results are similar if different time factors such as beginning or end of period are used.

proportion of deposit, uninsured deposit and time deposit funding are presented in columns (1) through (3). Across the full sample of banks, results show no relationship between funding structure and risk management. However, within large banks, stronger risk management is associated with a greater reliance on time deposits for funding. Banks with a one standard deviation higher *RMI* have 18% more time deposits on average than banks with average *RMIs*.⁵⁹

Columns (4) through (7) more directly measure a banks deposit franchise value. *Deposit Beta*, measures the sensitivity of the interest rate paid on deposits to changes in the federal funds rate. As discussed in Drechsler et al. (2017, 2021), banks who have weaker deposit franchises must increase their deposit rate more when the federal funds rate rises than banks with stronger deposit franchises or face large deposit outflows. Deposit beta is decreasing in deposit franchise strength and represents regressions of the changes in the federal funds rate on the change in a banks deposit rate spread. Data for deposit betas is downloaded from Phillip Schnabl's website and represents long-term estimations of deposit betas using data from 1984 to 2022. Since deposit betas reflect the long-term average strength of the deposit franchise, I also estimate a shorter version of deposit betas based on the change in bank deposit interest rates over 2022. *Deposit Rate Ratio (DRR)* represents the change in a bank's interest rate on deposits from Q4 2021 to Q4 2022 divided by the change in federal funds rate (4.5%). A *DRR* of one would indicate that the bank raised its average interest rate paid on deposits by 4.5 percentage points over 2022 matching the increase in the federal funds rate. The average *DRR* across the sample of banks is 0.05 indicating that banks raised average deposit rates by 22 basis points across 2022. This is in line with the changes in the average national deposit rate on savings products reported by the FDIC. As of December 19th, 2022 the reported average deposit rate was 30 basis points, up from 6 basis points in January 2022 representing an increase of 24 basis points.⁶⁰ *Deposit Rate*, is the average interest rate paid on deposits as of Q4 2022 calculated as the trailing twelve-month interest expense on deposits divided by total interest-bearing deposits. As a final measure of deposit franchise value, I also calculate the estimated deposit maturity of each bank. *Deposit Maturity*, is the value-weighted maturity in years of deposits calculated similar to *Security Maturity* with time deposits assigned a time factor

⁵⁹ The average time deposits-to-assets for large banks is 13.6%. [$18\% = (0.081 \times 0.313) / 0.136$]

⁶⁰ Current and historical average savings rates are publicly available via the FDIC and can be accessed at <https://www.fdic.gov/resources/bankers/national-rates/index.html>.

equal to the average expected maturity of their reporting bucket and uninsured and savings deposits having an expected maturity of zero. Results presented in columns (4) through (7) of Panel A show no differences in the deposit franchise value across banks with differing risk management before the crisis. Aligning with the results on funding structure presented above, in large banks higher *RMI* is associated with higher deposit rates and longer value-weighted deposit maturity.⁶¹ No such differences are reported in small banks.

Combined with the analysis of other protective behaviors presented in the previous two sections a couple points emerge. First, there is limited evidence that higher risk management is associated with increased protective behaviors before the SVB crisis, although this evidence is sensitive to bank size and is largely concentrated in direct hedging behaviors using interest rate derivatives. Second, any differences in behavior before the crisis did not manifest in better, less negative, performance during the crisis for banks with stronger risk management practices.

3.4 Risk Management and High Risk Banks

Recent work analyzing the SVB crisis and its determinates has illustrated that banks vary substantially in their exposure to interest rate and deposit outflow risk (Acharya et al. (2023); Drechsler et al. (2023); Jiang et al. (2023)). Risk management practices in banks with higher interest rate risk or more exposure to uninsured deposits (run risk) may be better positioned to identify and hedge risks than banks with weaker risk management practices who are also exposed to high interest rate and run risk. To test this hypothesis, I perform two additional sets of tests. First, I regress bank performance during the crisis on three proxies for interest rate and deposit outflow risk exposure. Second, I examine whether banks with stronger risk management experience better performance during the crisis in the subsample of banks with higher risk exposure.

To measure exposure to deposit outflow risk I use the percent of uninsured deposit funding for a bank, defined as the ratio of uninsured deposits to total deposits, and bank-level deposit betas. The percent of uninsured deposits to total deposits measures the likelihood of high deposit

⁶¹ Higher deposit rates and deposit maturity are likely driven by the increased reliance on time deposit funding, as time deposits have longer maturity than other deposits and are known for paying higher deposit rates in exchange for locking up deposits for a prespecified period of time.

outflows during the crisis. Uninsured deposit outflows served as the main catalyst for bank failure during the SVB crisis with uninsured deposits engaging in a flight to safety away from regional banks to large banks exceeding \$250 billion in assets (Caglio, Dlugosz and Rezende (2024)). Deposit betas as discussed in the previous section are one indication of the strength of a bank's deposit franchise. Higher deposit betas indicate weaker deposit franchises as banks must raise their deposit rates more to keep deposits from leaving. To measure a bank's exposure to rising interest rate risk I adopt the methodology used by Jiang et al. (2023) which measures a bank's exposure to interest rate risk through the expected mark to market loss of assets between during 2022 based on changes in the value of MBS and Treasury ETFs with similar maturities.⁶²

I examine whether banks with higher risk exposure perform worse during the crisis without conditioning on risk management. To test this, I estimate Equation (4) using a subset of stock market and financial performance variables from Tables IX and X regressed on one of the three risk exposure proxies. I present results for the performance of banks with differing risk exposures in Table XIV. Results in Panel A show that banks with a higher proportion of uninsured deposit funding experience lower stock returns and greater deposit outflows during the SVB crisis. Recall from Figure IV that the average bank had a stock return of -26% from March 8th to May 5th. Banks with one standard deviation greater reliance on uninsured deposit funding experienced a 14% lower stock market return during the crisis.⁶³ Similarly banks with greater reliance on uninsured deposits faced significantly higher uninsured deposit outflows and reductions in tier one capital during the crisis. Panel B presents the results for banks based on deposit betas. Banks with weaker deposit franchises, as proxied for by higher deposit betas, did not experience worse stock returns during the crisis, but did face significantly larger uninsured deposit outflows. Results for the expected mark-to-market losses are reported Panel C. Results show that banks with higher expected mark-to-market losses earn significantly lower stock returns and experience larger

⁶² Specifically, Jiang et al. (2023) calculate the expected mark-to-market losses by multiplying the assets in each category of treasury maturity and mortgage-backed securities and mortgages by the change in prices of widely traded MBS ETFs and Treasury ETFs with similar maturities. They further adjust the mortgage and MBS security values by a factor that considers the prepayment risk of mortgages. These values are then summed across asset classes to arrive at an expected loss. See Jiang et al. (2023) for additional detail.

⁶³ The average bank had an uninsured deposit to deposits ratio of 35% as of Q4 2022. A one standard deviation greater reliance (16.2%) represents a ratio of 51.2%. Based on these statistics the average crisis return is 14% lower $[(-0.222 \times 0.162) / 0.26]$.

decreases in capital and profitability during the crisis. Surprisingly there is also evidence that banks with greater exposure to interest rate risk have lower liquidity reductions during the crisis, which may be the result of reducing security holdings to increase available cash to meet deposit withdrawals. In general, the results in Table XIV demonstrate that banks with higher risk exposure performed worse during the crisis.

I then turn to an analysis of whether risk management practices impact bank performance during the crisis in the subset of banks with the greatest risk exposure. For each of the three risk exposure measures, I estimate Equation (4) across a subsample of banks with above median risk exposure. Table XV Panel A presents the results for banks with above median uninsured deposit funding. Results in Panel A do not suggest any differences in crisis performance for high-risk banks with stronger risk management except for initial buy and hold returns on the first day of the crisis. In this case the results indicate that in banks with above median uninsured deposits-to-deposits, banks with stronger risk management experienced worse stock market returns on March 9th, 2023 after controlling for size and other financial characteristics. Panel B of Table XV presents the results for the subsample of banks with above median deposit beta, i.e. weaker deposit franchises. Results show that within banks with weaker deposit franchises stronger risk management is associated with less total deposit outflows during the crisis but no difference uninsured deposit outflow. Results show no association between risk management and stock market return for banks with weaker deposit franchises. Results for banks with above median interest rate risk exposure, presented in Panel C, do not show any significant differences in bank performance during the crises based on risk management. Overall, results in this section show that while the performance of banks during the SVB crisis varied based on different levels of risk exposure, there is little evidence that bank performance in the most at risk banks was mitigated by risk management practices.

4. Conclusion

The collapses of Silicon Valley Bank, Signature Bank and First Republic Bank in the spring of 2023, collectively known as the SVB crisis, highlighted the dangers of poor risk management at banks and renewed discussion on widespread bank risk management regulation (Acharya et al. (2023)). Motivated by these discussions and the mixed evidence on the effectiveness of risk

management in existing literature, in this paper I study how bank risk management impacted bank performance during the SVB crisis. Using a unique dataset that measures both the presence and the strength of risk management characteristics I document the widespread adoption of risk management across banks. The adoption of risk management practices is common among banks that are subject to regulatory mandates as well as smaller banks whose appointment of Chief Risk Officers and risk committees is voluntary.

Examining bank stock market and financial performance during the crisis I find no evidence that banks with stronger risk management practices performed better or faced lower deposit outflows during the crisis. Evidence suggests that banks with stronger risk management engaged in more direct hedging of interest rate risk before the crisis using interest rate derivatives but this did not result in any differences in crisis performance. In general, there is also no evidence that banks with stronger risk management had more capital, access to liquidity, or stronger deposit franchises before the crisis. Examining the subset of banks with the highest exposure to interest rate and deposit outflow risk, I document that greater risk exposure pre-crisis leads to lower stock returns and larger deposit outflows during the crisis. However, this effect is not mitigated by risk management.

While my findings do not highlight any differences in performance during the SVB crisis based on risk management I caution readers that these results do not imply a lack of value to bank risk management in general. It could be the case that the unique nature of the crisis exposed a situation where the value of risk management is not easily observed either due to data constraints or the non-financial benefits of risk management. It is also important to remember that some studies highlight benefits to risk management in banks in other types of crises (Ellul and Yerramilli (2013)) and during non-crisis times (Adams et al. (2024)). Given those caveats, the results do raise important questions about the role risk management played in the leadup to and during the SVB crisis. For instance, do we not observe performance differences across levels of risk management because the crisis was acute compared to previous crises like the GFC? Or do we not observe performance differences during and protective behavior difference before the crisis because all banks were able to conceptually understand the underlying risks but underestimated the severity of these risks? Ultimately, further research is needed to fully understand the relationship between bank behavior, risk management and performance during crises.

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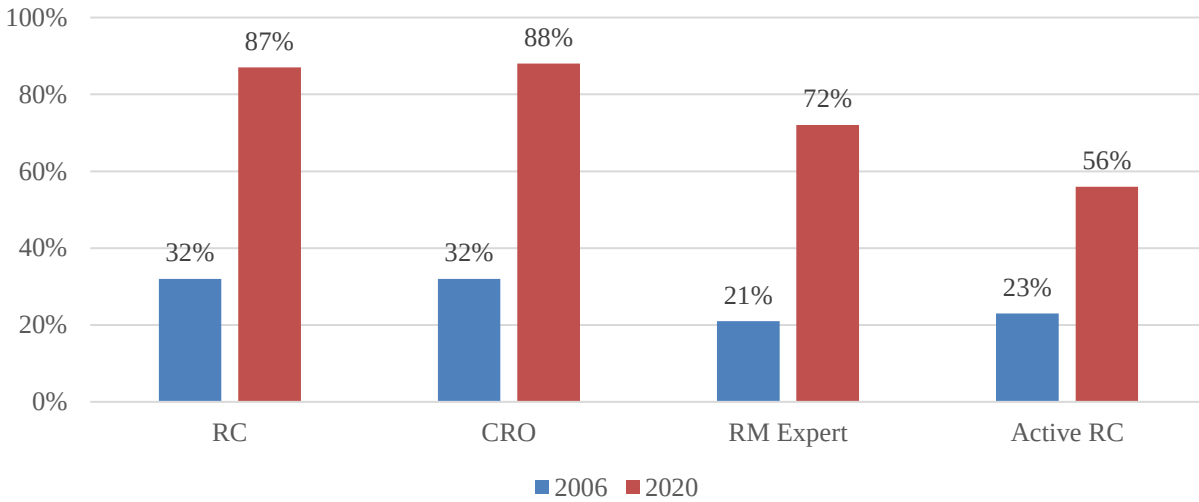
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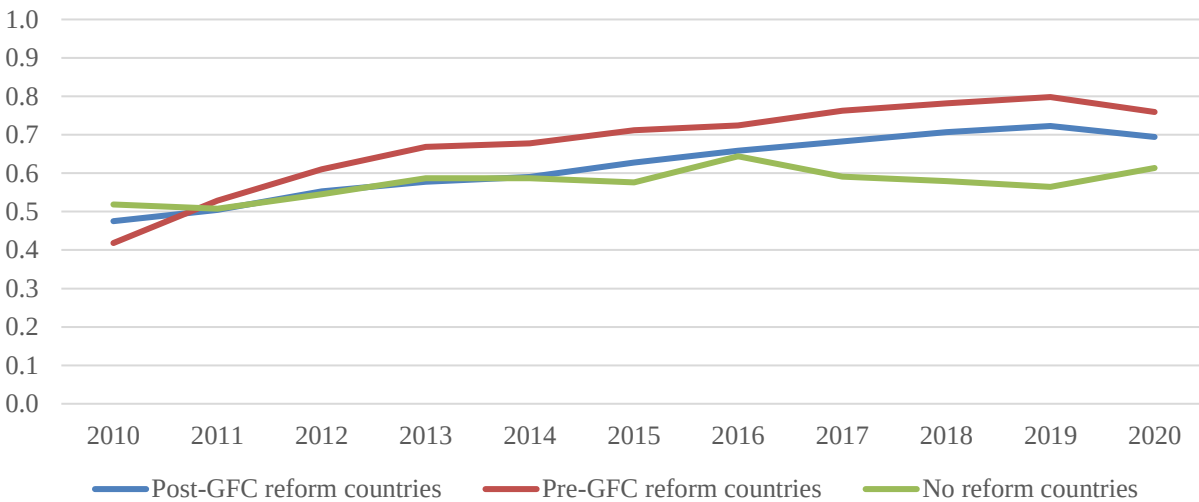
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Appendices

Appendix A. Figures



Panel A. Risk Management Practices in 2006 versus 2020.



Panel B. Evolution of *RMI* in the post-GFC period.

Figure I. Risk Management Practices over Time.

Panel A compares the prevalence of various risk management practices from the pre-GFC period (2006) to the end of the sample period (2020) for a constant sample of banks. Panel B shows the evolution of the risk management index, *RMI*, in the post-GFC period (2010 to 2020) for banks in countries that implemented risk management reforms during the sample period (2002 to 2020) to that of banks in countries without such reforms. *RMI* is a risk management index that represents the proportion of four risk management characteristics that are present within each bank: 1) *RC* – an indicator variable that equals one if the bank’s board has a risk committee and zero otherwise; 2) *CRO* – an indicator variable that equals one if the bank has an executive who is designated as a Chief Risk Officer and zero otherwise; 3) *RM expert* – an indicator equal to one if *RC* equals one and at least one independent member of the audit committee is classified as a financial expert; and 4) *Active RC* – an indicator equal to one if *RC* equals one and the bank’s board of directors meets more frequently than the median board of directors in the same country each year.

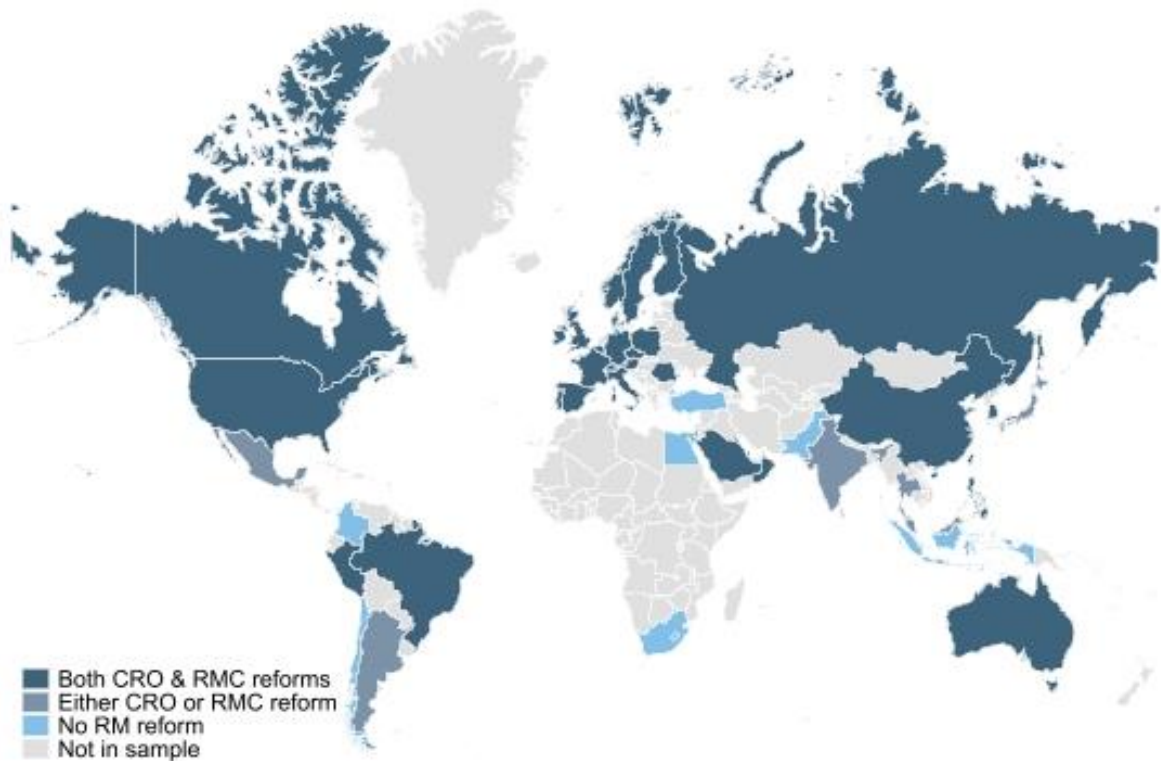


Figure II. International Bank Risk Management Reforms.

This figure shows the countries that enacted risk management reforms in the post-GFC period (2010-2020). Light grey countries are outside our sample. Light blue countries did not pass a risk management reform targeting Chief Risk Officers or risk committees in the post-GFC period. Medium grey countries passed a risk management reform targeting either CROs or RCs but not both in the post-GFC period. Deep blue-grey countries passed a risk management reform targeting both CROs and RCs in the post-GFC period.

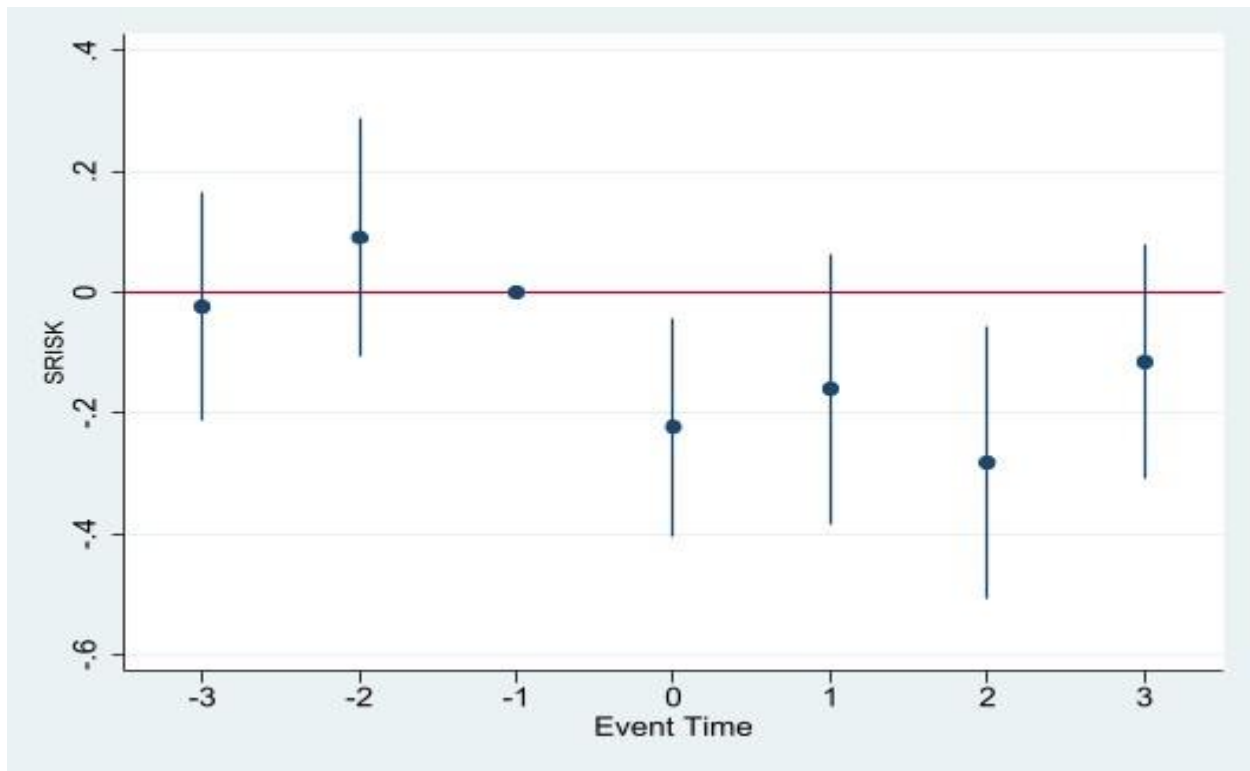
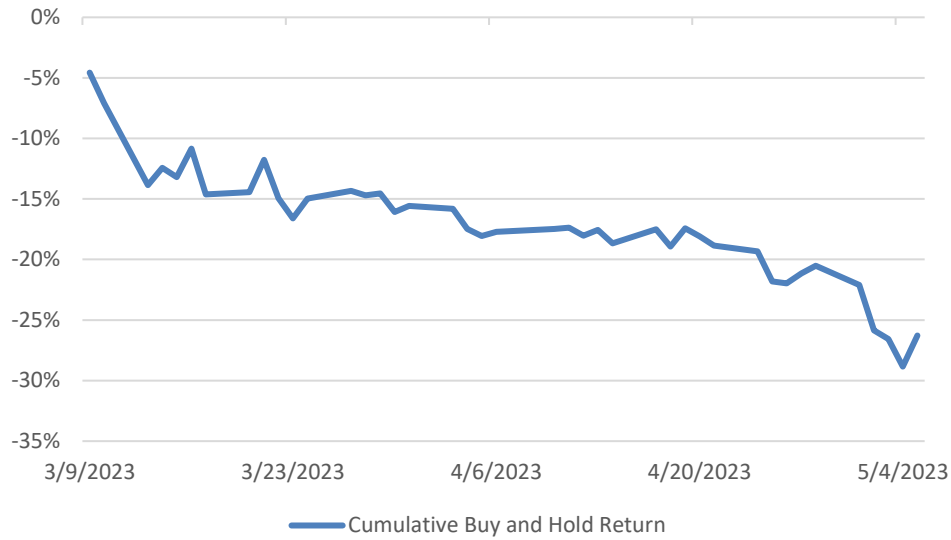
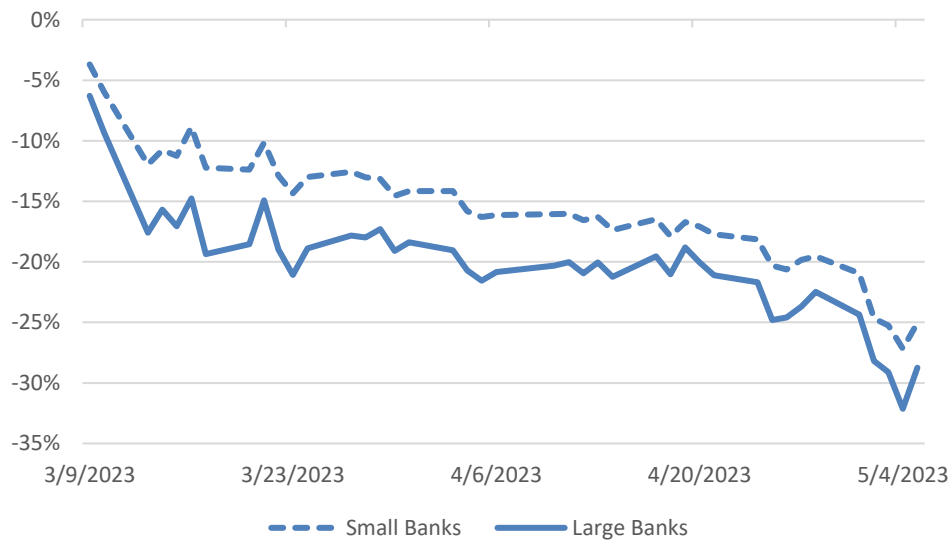


Figure III. Diagnostic Test of Parallel Trends Assumption.

This figure plots the coefficients on the interaction terms between the timing indicators (t-3, to t+3) and indicators for our treatment group (Treat) of banks in countries that adopt risk management reforms after 2010. The dependent variable is *SRISK* – the bank’s expected capital shortfall (in US\$ million) when the country’s stock market is in the 5% left tail of returns scaled by market capitalization. We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), and banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). Bank-by-cohort and year-by-cohort fixed effects are included in all regressions. Standard errors are clustered at the country-by-cohort level. We include all controls used in Table V. The solid dots represent the point estimates, and the lines represent the 95% confidence intervals. *Year -1* is chosen as the benchmark period.



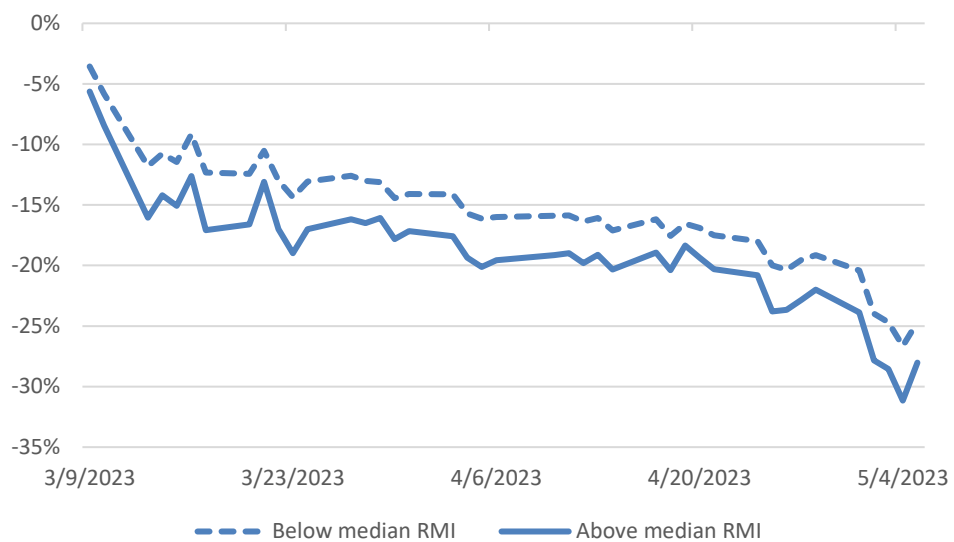
Panel A. Average Buy-and-Hold Return During the SVB Crisis.



Panel B. Average Buy-and-Hold Return During the SVB Crisis by Bank Size.

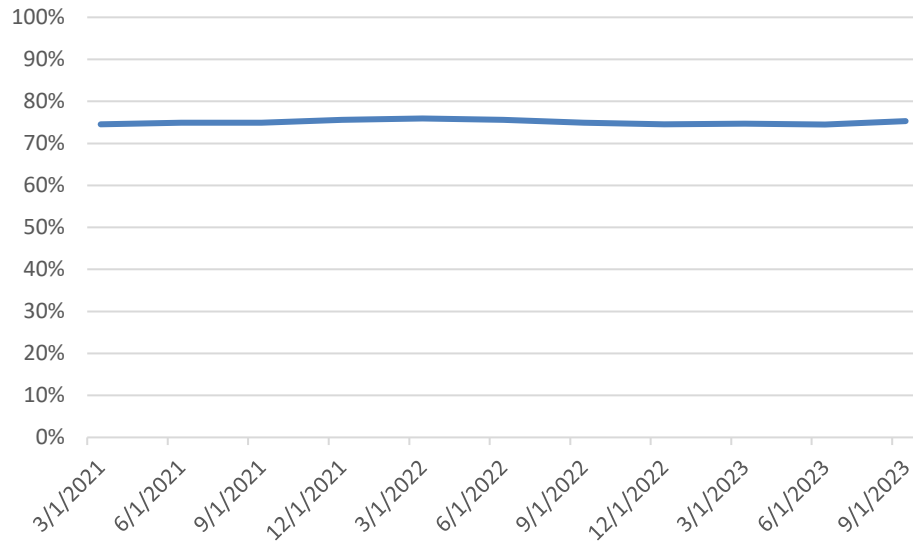
Figure IV. Risk Management and Buy-and-Hold Stock Returns During the SVB Crisis.

This figure plots the average buy-and-hold stock return for banks during the SVB crisis. Buy-and-hold return is measured from the close of March 8th, 2023 to the close of day *t*. Panel A presents the average return across the full sample of 298 banks. Panel B compares the average return between large and small banks. Large banks are defined as those banks with assets exceeding ten billion as of Q4 2021. Small banks are defined as those banks with assets below ten billion as of Q4 2021. Panel C compares the average return between banks with above and below median *RMI*. *RMI*, a risk management index that represents the proportion of eleven risk management characteristics that are present within each bank: 1.) *RC*; 2.) *RC Size*; 3.) *Independent RC*; 4.) *Independent RC Chair*; 5.) *Active RC*; 6.) *RC Expert*; 7.) *CRO*; 8.) *CRO Named*; 9.) *CRO Tenure*; 10.) *CRO Pay Reported*; and 11.) *CRO Top Pay*.

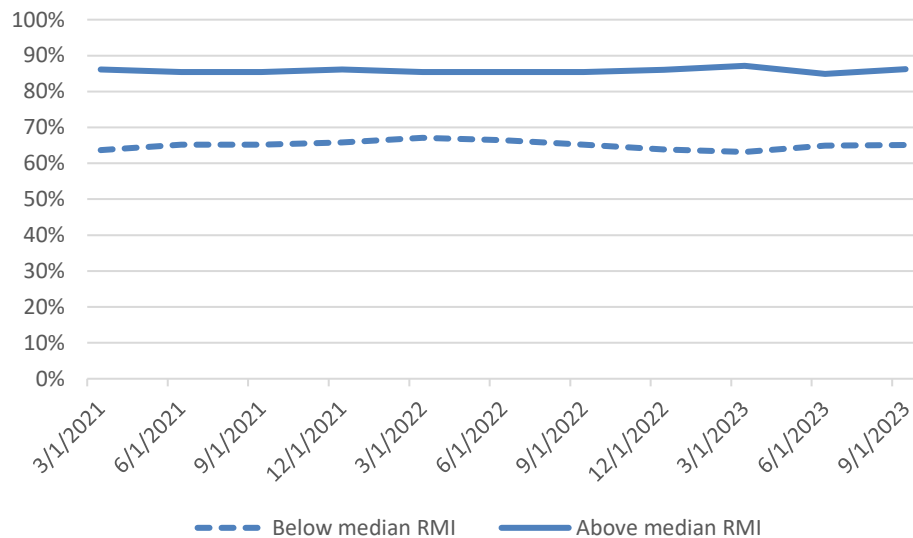


Panel C. Average Buy-and-Hold Return During the SVB Crisis by Risk Management.

Figure IV. Risk Management and Buy-and-Hold Stock Returns During the SVB Crisis. Continued.



Panel A. Percent of Banks Utilizing Interest Rate Derivates for Hedging.



Panel B. Percent of Banks Utilizing Interest Rate Derivates for Hedging by Risk Management.

Figure V. Risk Management and Bank Utilization of Interest Rate Derivatives for Hedging.

This figure plots the percent of banks using interest rate derivative for hedging by quarter from Q1 2021 to Q3 2023. A bank is considered to be using interest rate derivatives for hedging if they report a non-zero amount for the notional value of interest rate contracts held for purposes other than trading on quarterly Call Reports. Panel A presents the utilization rate for the full sample of 298 banks. Panel B compares the utilization rate between banks with above and below median *RMI*. *RMI*, a risk management index that represents the proportion of eleven risk management characteristics that are present within each bank: 1.) *RC*; 2.) *RC Size*; 3.) *Independent RC*; 4.) *Independent RC Chair*; 5.) *Active RC*; 6.) *RC Expert*; 7.) *CRO*; 8.) *CRO Named*; 9.) *CRO Tenure*; 10.) *CRO Pay Reported*; and 11.) *CRO Top Pay*.

Appendix B. Tables

Table I. Sample Distribution. Chapter One.

This table shows the distribution of sample banks by country. Banks are those in the WorldScope database with two-digit SIC of 60 (or classified as banks using the industry group classification from Thomson Reuters) and a deposits-to-assets ratio > 10%. Financial data are obtained from WorldScope and data on risk management are obtained from banks' annual reports and NRG Metrics. We exclude banks missing data on assets or negative book value of equity, and countries with gaps in the data, or less than four years of data. Reform year is the first year in which a country enacts a risk management reform. Countries without risk management reforms from 2002 to 2020 are denoted by "N/A." *RMI* is a risk management index that represents the proportion of four risk management characteristics present within a bank: 1) *RC* – an indicator that equals one if the bank has a risk committee and zero otherwise; 2) *CRO* – an indicator that equals one if the bank has an executive who is designated as a Chief Risk Officer and zero otherwise; 3) *RM expert* – an indicator equal to one if *RC* equals one and at least one independent member of the audit committee is classified as a financial expert; and 4) *Active RC* – an indicator equal to one if *RC* equals one and the bank's board of directors meets more frequently than the median board of directors in the same country each year. Coverage refers to the average yearly % of a country's total banking assets reflected by the assets of the sample banks. The last row reports the total number of unique banks and bank-year observations, along with the overall average *RMI* and asset coverage %, across all banks in the sample.

Country	Banks	# of obs.	Reform year	RMI	Coverage	Country	Banks	# of obs.	Reform year	RMI	Coverage
Argentina	6	24	2011	0.708	45%	Mexico	5	48	N/A	0.474	47%
Australia	8	111	2014	0.815	98%	Norway	6	31	2013	0.629	70%
Austria	3	37	2013	0.646	66%	Oman	6	42	2012	0.827	70%
Belgium	2	33	2013	0.341	74%	Pakistan	3	12	N/A	0.917	35%
Brazil	6	66	2017	0.160	85%	Peru	2	8	2008	0.250	27%
Canada	8	130	2012	0.642	92%	Philippines	4	45	2012	0.744	56%
Chile	6	51	N/A	0.485	46%	Poland	10	107	2013	0.596	77%
China	19	163	2016	0.654	77%	Portugal	2	35	2013	0.279	63%
Colombia	5	39	N/A	0.457	58%	Qatar	3	27	2015	0.444	61%
Czech Republic	2	17	2013	0.583	66%	Romania	2	8	2013	0.750	98%
Denmark	5	55	2013	0.547	88%	Russia	4	38	2015	0.178	67%
Egypt	2	13	N/A	0.577	39%	Saudi Arabia	9	33	2014	0.654	45%
Finland	3	28	2013	0.545	88%	Singapore	3	51	2010	0.781	99%
France	4	69	2010	0.442	77%	South Africa	6	72	N/A	0.833	76%
Germany	7	69	2013	0.630	51%	South Korea	7	62	2015	0.641	67%
Hong Kong	6	68	2011	0.540	73%	Spain	12	130	2013	0.318	84%
India	14	121	2017	0.758	51%	Sweden	3	54	2013	0.546	94%
Indonesia	6	65	N/A	0.735	61%	Switzerland	10	104	2016	0.527	58%
Ireland	4	43	2010	0.647	80%	Taiwan	11	112	N/A	0.329	77%
Israel	4	45	2009	0.850	76%	Thailand	7	79	2009	0.396	78%
Italy	16	190	2013	0.347	81%	Turkey	6	76	N/A	0.296	62%
Japan	30	366	2015	0.204	52%	United Kingdom	19	173	2009	0.639	72%
Kuwait	2	25	2013	0.417	31%	United States	297	1,821	2010	0.487	88%
Malaysia	8	94	2013	0.757	89%						
TOTAL						613	5,090	AVERAGE	0.554	68%	

Table II. Descriptive Statistics. Chapter One.

This table shows descriptive statistics for the main variables used in chapter one. The sample consists of 613 banks from 47 countries that meet the criteria and data requirements described in the notes to Table I. *RMI* is a risk management index that represents the proportion of four risk management characteristics that are present within each bank: 1) *RC* – an indicator that equals one if the bank has a risk committee and zero otherwise; 2) *CRO* – an indicator that equals one if the bank has an executive who is designated as a Chief Risk Officer and zero otherwise; 3) *RM expert* – an indicator equal to one if the bank has a risk committee and at least one independent member of the audit committee is classified as a financial expert; 4) *Active RC* – an indicator equal to one if the bank has a risk committee and its board of directors meets more frequently than the median board of directors in its country each year (see Appendix C for further details). *SRISK* is the expected capital shortfall (in US\$ million) of a bank conditional on a crisis event, scaled by market capitalization; *MES* is the average bank return during the worst 5% of market return days in a year (multiplied by -1); and *LVG* is market leverage, the market value of equity plus the book value of liabilities, scaled by the market value of equity. *Size* is the log of book value of assets (in US\$ 000s); *Institutional ownership* is the fraction of shares owned by institutional investors; *Board independence* is the proportion of independent directors on the board; *Return* is the annualized buy-and-hold stock return; *ROA* is net income divided by total assets; *MTB* is the ratio of the market value of equity to the book value of equity; *Tobin's q* is the market-to-book value of assets, where the market value of assets is the sum of the market value of equity and book value of liabilities; *Deposits-to-assets* is the ratio of deposits to total assets; *ST funding* - short-term debt/(deposits + short-term debt); *Noninterest income* is non-interest income scaled by total income; *Capital ratio* is the ratio of total equity to total assets; *Equity volatility* is the annualized standard deviation of weekly stock returns; *Tail risk* is the negative of the average return on the bank's stock during the 5% worst days for the bank's stock over the year; *Z-score* is the log of Z-score, estimated as $(ROA + Equity/Assets)/\sigma ROA$; *MPI* is the updated macroprudential policy index that describes the extent of use of 12 macroprudential instruments from Cerutti et al. (2017); *Regulatory quality* is the first principal component of four bank regulatory indices: *Restrictions*, *Supervisory power*, *Private monitoring*, and *Capital stringency*; additional country-level controls include: *GDP growth*, *Market return*, *Volatility*, and *Inflation*. All variables are defined in Appendix C.

	N	Mean	p25	Median	p75	Std. dev.
<i>Key variables:</i>						
RMI	5,090	0.508	0.250	0.500	0.750	0.376
RC	5,090	0.580	0.000	1.000	1.000	0.494
CRO	5,090	0.623	0.000	1.000	1.000	0.485
Active RC	4,455	0.375	0.000	0.000	1.000	0.484
RM expert	5,090	0.464	0.000	0.000	1.000	0.499
<i>Systemic Risk Proxies:</i>						
SRISK	5,072	0.572	0.000	0.085	0.654	1.083
MES %	5,074	2.865	1.564	2.278	3.539	1.937
LVG	5,072	14.009	6.277	9.104	15.926	13.714
<i>Bank-level characteristics:</i>						
Size	5,090	17.848	16.543	17.844	19.006	1.799
Size ²	5,090	321.771	273.668	318.401	361.243	64.738
Institutional Ownership %	5,018	41.250	16.891	36.551	64.754	27.974
Board Independence %	4,922	59.706	38.890	66.670	83.330	27.341
Return	5,089	0.073	-0.125	0.054	0.246	0.307
ROA %	5,090	2.406	1.251	1.937	3.122	1.710
MTB	5,087	1.397	0.883	1.261	1.750	0.742
Tobin's q	5,087	1.038	0.991	1.022	1.065	0.070
Deposits-to-assets %	5,090	66.147	55.965	70.005	79.178	16.574
ST funding %	5,090	12.893	3.188	8.771	18.361	12.980
Noninterest income %	5,087	27.640	17.544	25.718	35.683	14.347
Capital ratio %	5,090	8.932	6.264	8.665	11.206	3.598
Equity volatility	5,090	0.305	0.201	0.256	0.359	0.159
Tail risk	5,004	4.241	2.817	3.535	4.859	2.300
Z-score	4,910	3.447	2.785	3.419	4.104	0.967

Table II. Descriptive Statistics. Chapter One. Continued.

	N	Mean	p25	Median	p75	Std. dev.
<i>Country-level variables:</i>						
MPI	4,519	3.446	3.000	3.000	4.000	1.770
Regulatory quality (PCA)	5,090	0.475	-0.032	0.559	1.287	1.091
Supervisory power	5,090	11.689	11.000	12.000	13.000	1.866
Restrictions	5,090	7.138	6.000	7.000	8.000	1.755
Private monitoring	5,090	9.024	8.000	9.000	10.000	1.189
Capital stringency	5,090	6.794	6.000	7.000	8.000	1.540
GDP growth %	5,083	1.953	1.143	2.256	2.980	3.126
Market return	5,090	0.106	-0.009	0.119	0.217	0.193
Volatility	5,090	0.172	0.120	0.151	0.210	0.081
Inflation %	5,090	2.312	1.022	1.812	2.677	3.352

Table III. Determinants of Bank Risk Management Practices.

This table shows results from regressions assessing the determinants of bank risk management practices. The dependent variable is *RMI*, a risk management index that represents the proportion of four risk management characteristics that are present within each bank; 1) *RC*; 2) *CRO*; 3) *RM expert*; and 4) *Active RC*. *Developed* is an indicator equal to one for countries included in the MSCI developed market index and zero otherwise. *Post-GFC* is an indicator equal to one for the years 2010 and after. In Panel B we show results for the period 2010-2020, including an indicator variable, *Low GFC return*, equal to one for banks with GFC return in the bottom tercile of the distribution in their country. *GFC return* is computed as the buy-and-hold return from July 2007 through December 2008. *Large* is an indicator equal to one for banks with assets above the country median in a year. *G-SIB* is an indicator equal to one for banks classified as Globally Systemically Important Banks. Bank-level controls include *Board independence*; *Institutional ownership*; *Size*, *Size*²; *ROA*; *MTB*; *Return*; *Deposits-to-assets*; *Capital Ratio*; *Loans-to-assets*; *Noninterest income*; and *Z-score*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. In columns (1) through (3) of Panel A we show results using country and year fixed effects; Columns (4)-(6) of Panel A include bank and year fixed effects, instead. Results in Panel B use country and year fixed effects. Robust *t*-statistics with standard errors clustered at the country level are reported in parentheses. Controls are included but not shown in Panel B to conserve space. The last row shows *p*-values from *F*-tests for the significance of the sum of the coefficients [*Post GFC* x *Developed* + *Developed*]. All variables are defined in Appendix C.

Table III. Determinates of Bank Risk Management Practices. Continued.

Panel A. Determinants of Risk Management, 2002-2020.						
Dependent variable:	RMI					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Post GFC [A]</i>	0.203*** (3.97)	0.245*** (4.38)	0.103 (1.45)	0.247*** (4.66)	0.266*** (4.63)	0.144* (1.97)
<i>Post GFC x Developed [B]</i>			0.152** (2.38)			0.132** (2.47)
<i>Board independence</i> $t-1$	0.001 (1.20)	0.000 (0.65)	0.000 (0.60)	-0.000 (-0.16)	-0.000 (-0.14)	-0.000 (-0.18)
<i>Institutional ownership</i> $t-1$		0.002*** (5.37)	0.002*** (5.48)		0.001* (1.69)	0.001* (1.77)
<i>Size</i> $t-1$	0.093*** (6.70)	0.088*** (10.25)	0.088*** (10.31)	-0.046 (-0.84)	-0.039 (-0.86)	-0.036 (-0.80)
<i>ROA</i> $t-1$	-0.003 (-0.21)	-0.005 (-0.44)	-0.004 (-0.36)	-0.018* (-1.89)	-0.016 (-1.53)	-0.015 (-1.46)
<i>MTB</i> $t-1$	-0.031 (-1.48)	-0.034 (-1.62)	-0.036* (-1.69)	-0.027* (-1.87)	-0.033** (-2.14)	-0.035** (-2.30)
<i>Deposits-to-assets</i> $t-1$	0.001 (1.57)	0.001 (0.66)	0.001 (0.57)	0.001 (0.96)	0.001 (0.74)	0.001 (0.43)
<i>Capital ratio</i> $t-1$	0.011*** (3.09)	1.065*** (2.91)	1.046*** (2.80)	-0.009 (-1.54)	-0.943 (-1.52)	-0.935 (-1.53)
<i>Noninterest income</i> $t-1$	0.001* (1.86)	0.000 (0.42)	0.000 (0.32)	-0.001 (-0.89)	-0.000 (-0.44)	-0.001 (-0.68)
<i>Size</i> ² $t-1$		-0.008** (-2.46)	-0.008** (-2.47)		-0.018** (-2.10)	-0.017** (-2.05)
<i>Return</i> $t-1$		-0.015 (-0.76)	-0.014 (-0.73)		0.005 (0.20)	0.006 (0.22)
<i>Loans-to-assets</i> $t-1$		-0.001 (-0.51)	-0.001 (-0.51)		0.000 (0.06)	0.000 (0.24)
<i>Z-Score</i> $t-1$		-0.025*** (-2.91)	-0.026*** (-2.92)		-0.014 (-1.44)	-0.014 (-1.48)
<i>Regulatory quality</i>	0.003 (0.23)	-0.006 (-0.45)	-0.006 (-0.45)	-0.010 (-1.01)	-0.010 (-0.97)	-0.010 (-1.03)
<i>GDP growth</i> $t-1$	0.009* (1.77)	0.010* (1.97)	0.009* (1.93)	0.006 (1.43)	0.004 (1.20)	0.004 (1.18)
<i>Market return</i> $t-1$	0.113** (2.10)	0.129** (2.18)	0.121** (2.11)	0.107* (2.00)	0.103 (1.44)	0.099 (1.41)
<i>Volatility</i> $t-1$	-0.059 (-0.19)	-0.190 (-0.61)	-0.260 (-0.87)	-0.133 (-0.66)	-0.210 (-1.02)	-0.267 (-1.32)
<i>Inflation</i> $t-1$	-0.001 (-0.32)	0.002 (0.40)	0.001 (0.28)	0.000 (0.06)	0.001 (0.17)	0.000 (0.07)
Observations	4,468	4,266	4,266	4,435	4,236	4,236
Adjusted R ²	0.393	0.405	0.407	0.727	0.728	0.729
Country fixed effects	Yes	Yes	Yes	No	No	No
Bank fixed effects	No	No	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>p</i> -value <i>F</i> -test [A+B=0]			0.000			0.000

Table III. Determinates of Bank Risk Management Practices. Continued.

Panel B. GFC performance and Risk Management in the post-GFC period.			
Dependent variable:	<i>RMI</i>		
	(1)	(2)	(3)
<i>Low GFC return [A]</i>	0.019 (0.95)	-0.023 (-0.85)	0.001 (0.02)
<i>Low GFC return x Large [B]</i>		0.085** (2.14)	
<i>Large</i>		0.118*** (3.40)	
<i>Low GFC return x G-SIB [B]</i>			0.219** (2.24)
<i>G-SIB</i>			0.067 (0.98)
Controls	Yes	Yes	Yes
Observations	3,313	3,313	3,313
Adjusted R ²	0.382	0.353	0.324
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
<i>p</i> -value <i>F</i> -test [A+B=0]		0.076	0.028

Table IV. Impact of Risk Management on Systemic Risk.

This table shows results from regressions assessing the impact of bank risk management on systemic risk. The dependent variables are: *SRISK*, the expected capital shortfall (in US\$ million) of a bank conditional on a crisis event, scaled by market capitalization; *MES*, the average bank return during the worst 5% of market return days in a year (multiplied by -1); and *LVG*, the market value of equity plus the book value of liabilities, scaled by the market value of equity. The key dependent variable is *RMI*, a risk management index that represents the proportion of four risk management characteristics that are present within each bank: 1) *RC*; 2) *CRO*; 3) *RM expert*; and 4) *Active RC*. *Post-GFC* is an indicator equal to one for the years 2010 and after. *Developed* is an indicator variable equal to one for countries included in the MSCI developed market index and zero otherwise. Bank-level controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. All regressions include bank and year fixed effects. Robust *t*-statistics with standard errors clustered at the country level are reported in parentheses. All variables are defined in Appendix C.

Dependent variable:	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>
	(1)	(2)	(3)
<i>RMI</i> _{<i>t-1</i>} x <i>Post GFC</i> [<i>A</i>]	-0.580*** (-3.14)	-0.521* (-1.76)	-6.555*** (-3.08)
<i>RMI</i> _{<i>t-1</i>} [<i>B</i>]	0.272 (1.54)	0.293 (1.14)	3.249 (1.61)
<i>Size</i> _{<i>t-1</i>}	0.091 (0.79)	0.728*** (5.77)	1.325 (0.94)
<i>ROA</i> _{<i>t-1</i>}	-0.017 (-0.50)	0.019 (0.41)	-0.203 (-0.48)
<i>MTB</i> _{<i>t-1</i>}	-0.304*** (-3.05)	-0.023 (-0.38)	-4.298*** (-3.70)
<i>Deposits-to-assets</i> _{<i>t-1</i>}	-0.011** (-2.12)	-0.009* (-1.86)	-0.115* (-1.84)
<i>Capital ratio</i> _{<i>t-1</i>}	-0.080*** (-3.18)	-0.015 (-0.64)	-1.100*** (-3.29)
<i>Noninterest income</i> _{<i>t-1</i>}	0.001 (0.27)	-0.013*** (-3.32)	0.021 (0.53)
<i>Regulatory quality</i>	0.050 (0.84)	0.010 (0.16)	0.692 (0.98)
<i>GDP growth</i> _{<i>t-1</i>}	0.007 (0.41)	0.002 (0.09)	0.064 (0.28)
<i>Market return</i> _{<i>t-1</i>}	-0.021 (-0.10)	1.079** (2.45)	-0.728 (-0.31)
<i>Volatility</i> _{<i>t-1</i>}	0.204 (0.18)	7.791*** (4.73)	-1.578 (-0.12)
<i>Inflation</i> _{<i>t-1</i>}	-0.017 (-0.93)	0.006 (0.19)	-0.196 (-0.92)
<i>MPI</i> _{<i>t-1</i>}	0.023 (0.49)	-0.012 (-0.23)	0.297 (0.53)
Observations	4,956	4,958	4,956
Adjusted R ²	0.661	0.690	0.696
Bank fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
p-value of F-test [<i>A+B</i>] = 0	0.014	0.030	0.035

Table IV. Impact of Risk Management on Systemic Risk. Continued.

Dependent variable:	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>
	(4)	(5)	(6)
<i>RMI</i> _{<i>t</i>-1} x <i>Post GFC</i> [<i>A</i>]	-0.046 (-0.27)	0.427 (1.08)	-0.191 (-0.10)
<i>RMI</i> _{<i>t</i>-1} x <i>Post GFC</i> x <i>Developed</i> [<i>C</i>]	-0.671** (-2.20)	-1.298** (-2.34)	-7.861** (-2.29)
<i>RMI</i> _{<i>t</i>-1} x <i>Developed</i> [<i>D</i>]	0.701* (1.76)	0.930 (1.53)	8.572* (1.82)
<i>Post GFC</i> x <i>Developed</i>	0.087 (0.45)	-0.361 (-0.58)	1.854 (0.86)
<i>RMI</i> _{<i>t</i>-1} [<i>B</i>]	-0.286 (-1.02)	-0.350 (-0.75)	-3.716 (-1.14)
<i>Size</i> _{<i>t</i>-1}	0.080 (0.73)	0.681*** (5.74)	1.245 (0.92)
<i>ROA</i> _{<i>t</i>-1}	-0.022 (-0.67)	-0.001 (-0.02)	-0.253 (-0.61)
<i>MTB</i> _{<i>t</i>-1}	-0.298*** (-3.00)	-0.004 (-0.07)	-4.237*** (-3.66)
<i>Deposits-to-assets</i> _{<i>t</i>-1}	-0.010* (-1.96)	-0.006 (-1.38)	-0.109* (-1.73)
<i>Capital ratio</i> _{<i>t</i>-1}	-0.082*** (-3.27)	-0.019 (-0.83)	-1.122*** (-3.36)
<i>Noninterest income</i> _{<i>t</i>-1}	0.001 (0.30)	-0.012*** (-2.98)	0.021 (0.53)
<i>Regulatory quality</i>	0.051 (0.87)	0.011 (0.18)	0.714 (1.01)
<i>GDP growth</i> _{<i>t</i>-1}	0.008 (0.43)	0.008 (0.34)	0.061 (0.27)
<i>Market return</i> _{<i>t</i>-1}	-0.001 (-0.00)	1.169** (2.55)	-0.567 (-0.24)
<i>Volatility</i> _{<i>t</i>-1}	0.308 (0.27)	8.300*** (4.95)	-0.855 (-0.06)
<i>Inflation</i> _{<i>t</i>-1}	-0.014 (-0.81)	0.016 (0.56)	-0.178 (-0.84)
<i>MPI</i> _{<i>t</i>-1}	0.020 (0.43)	-0.031 (-0.73)	0.281 (0.50)
Observations	4,956	4,958	4,956
Adjusted R ²	0.663	0.694	0.697
Bank fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
p-value of F-test [<i>A</i> + <i>B</i>] = 0	0.200	0.744	0.235
p-value of F-test [<i>A</i> + <i>B</i> + <i>C</i> + <i>D</i>] = 0	0.029	0.001	0.058

Table V. Risk Management Reforms and Risk Management Practices.

This table presents results from event-based stacked regressions around the adoption of risk management reforms in the post-GFC period. In column (1), the dependent variable is *RMI*, a risk management index that represents the proportion of four risk management characteristics that are present within each bank; 1) *RC*; 2) *CRO*; 3) *RM expert*; and 4) *Active RC*. In columns (2)-(5) we use each of the components of *RMI* as dependent variables. The treatment group consists of banks from countries that enact reforms targeting bank risk management in the post-GFC period (after 2010). We form cohorts of treatment banks (those in countries that enact reforms targeting bank risk management in the post-GFC period) and control banks in countries that have not yet (*Not yet treated*) or have never (*Never treated*) enacted risk management reforms. *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. In Panel B, we show results including interactions with *Most Impacted*, an indicator variable equal to one for banks that do not have a CRO or a risk committee as of $t-1$ relative to enactment of the risk management reform and zero otherwise. Controls (not shown in Panel B to conserve space) include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Panel A. Event-based stacked regressions.					
Dependent variable:	<i>RMI</i>	<i>CRO</i>	<i>RC</i>	<i>Active RC</i>	<i>RM Expert</i>
	(1)	(2)	(3)	(4)	(5)
Control group:	Not yet treated & never treated				
<i>Post x Treat</i>	0.071*** (3.65)	0.070*** (2.79)	0.111*** (3.53)	0.085*** (3.38)	0.013 (0.42)
<i>Size</i> $t-1$	-0.085*** (-3.33)	0.066* (1.90)	-0.151*** (-4.49)	-0.210*** (-4.41)	-0.110*** (-3.09)
<i>ROA</i> $t-1$	0.003 (0.70)	0.012 (1.64)	-0.004 (-0.65)	-0.011 (-1.46)	0.012 (1.55)
<i>MTB</i> $t-1$	-0.018*** (-2.68)	-0.021** (-2.03)	-0.016* (-1.82)	-0.007 (-0.57)	-0.015 (-1.37)
<i>Capital ratio</i> $t-1$	-0.020*** (-4.49)	-0.013 (-1.45)	-0.020*** (-3.58)	-0.033*** (-4.06)	-0.020*** (-2.93)
<i>Deposits-to-assets</i> $t-1$	0.001 (1.18)	0.001 (1.10)	0.003** (2.22)	-0.003 (-1.25)	0.001 (0.89)
<i>Noninterest income</i> $t-1$	-0.002*** (-2.77)	-0.002*** (-2.75)	-0.002** (-2.00)	0.001 (0.52)	-0.002 (-1.31)
<i>Post BASEL</i>	0.005 (0.40)	-0.014 (-0.79)	-0.010 (-0.47)	-0.013 (-0.50)	0.053** (2.11)
<i>Regulatory quality</i>	0.010 (1.55)	0.034*** (4.32)	-0.011 (-1.11)	0.005 (0.57)	0.010 (0.93)
<i>GDP growth</i> $t-1$	0.002 (1.15)	0.002 (1.23)	0.002 (0.90)	-0.003 (-1.15)	0.004 (1.50)
<i>Market return</i> $t-1$	0.049*** (3.16)	0.082*** (3.85)	0.056** (2.42)	0.087*** (2.81)	0.012 (0.40)
<i>Volatility</i> $t-1$	0.037 (0.46)	0.121 (0.97)	-0.101 (-0.94)	-0.160 (-0.94)	0.242* (1.84)
<i>Inflation</i> $t-1$	-0.008*** (-3.36)	-0.012*** (-3.87)	-0.002 (-0.49)	-0.002 (-0.63)	-0.013*** (-4.00)
<i>MPI</i> $t-1$	0.008 (1.34)	-0.002 (-0.23)	0.009 (1.02)	0.028*** (3.26)	-0.001 (-0.07)
Observations	4,223	4,223	4,223	3,204	4,223
Adjusted R ²	0.851	0.806	0.902	0.598	0.785
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes

Table V. Risk Management Reforms and Risk Management Practices. Continued.

Panel B. Event-based stacked regressions. Most Impacted.					
Dependent variable:	<i>RMI</i>	<i>CRO</i>	<i>RC</i>	<i>Active RC</i>	<i>RM Expert</i>
	(1)	(2)	(3)	(4)	(5)
Control group:	Not yet treated & never treated				
<i>Post x Treat</i>	0.046** (2.38)	0.041 (1.48)	0.070** (2.49)	0.075*** (2.77)	0.005 (0.13)
<i>Post x Treat x Most Impacted</i>	0.151** (2.60)	0.187*** (2.75)	0.236** (2.29)	0.099* (1.80)	0.061 (1.02)
<i>Post x Most Impacted</i>	-0.067*** (-5.09)	-0.089*** (-4.90)	-0.073*** (-4.03)	-0.046** (-2.08)	-0.057*** (-3.23)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	4,090	4,090	4,090	3,115	4,090
Adjusted R ²	0.851	0.800	0.903	0.597	0.784
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes

Table VI. Risk Management Reforms and Systemic Risk.

This table presents results from event-based stacked regressions around the adoption of risk management reforms in the post-GFC period. The dependent variables are measures of systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management in the post-GFC period (after 2010). We form cohorts of treatment banks (those in countries that enact reforms targeting bank risk management in the post-GFC period) and control banks in countries that have not yet (Not yet treated) or have never (Never treated) enacted risk management reforms. *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Columns (1)-(3) show baseline results. Columns (4)-(6) show results including interactions with *Most Impacted*, an indicator variable equal to one for banks that do not have a CRO or a risk committee as of $t-1$ relative to enactment of the risk management reform and zero otherwise. In Panel B we show results using interactions between *Treat* and timing indicators ($t-3$, $t+3$) relative to the effective year of the reform, using $t-1$ as the benchmark year. Controls (omitted in Panel B to conserve space) include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Table VI. Risk Management Reforms and Systemic Risk. Continued.

Panel A. Event-based stacked regressions.						
Dependent variable:	SRISK	MES	LVG	SRISK	MES	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Control group:	Not yet treated & never treated			Not yet treated & never treated		
<i>Post x Treat</i>	-0.222*** (-2.79)	-0.455*** (-3.29)	-2.396** (-2.54)	-0.167* (-1.95)	-0.394*** (-2.73)	-1.713* (-1.70)
<i>Post x Treat x Most Impacted</i>				-0.316** (-2.29)	-0.648*** (-3.29)	-3.806** (-2.18)
<i>Post x Most Impacted</i>				0.272*** (3.25)	0.675*** (5.59)	3.032*** (2.88)
<i>Size_{t-1}</i>	0.534*** (4.07)	-0.293 (-1.49)	7.218*** (4.35)	0.614*** (4.16)	-0.225 (-1.18)	8.233*** (4.40)
<i>ROA_{t-1}</i>	0.005 (0.17)	0.025 (0.69)	0.027 (0.08)	0.020 (0.65)	0.022 (0.63)	0.189 (0.49)
<i>MTB_{t-1}</i>	-0.215*** (-5.21)	0.282*** (5.75)	-2.975*** (-5.84)	-0.173*** (-4.57)	0.310*** (6.41)	-2.490*** (-5.31)
<i>Capital ratio_{t-1}</i>	-0.001 (-0.02)	-0.048 (-1.60)	-0.095 (-0.25)	0.006 (0.20)	-0.031 (-1.06)	-0.029 (-0.07)
<i>Deposits-to-assets_{t-1}</i>	-0.004 (-1.06)	-0.012** (-2.16)	-0.018 (-0.45)	-0.005 (-1.30)	-0.009* (-1.79)	-0.033 (-0.72)
<i>Noninterest income_{t-1}</i>	0.005 (1.19)	0.008** (2.35)	0.045 (0.95)	0.004 (1.07)	0.007** (2.02)	0.038 (0.84)
<i>Post BASEL</i>	-0.059 (-0.96)	-0.260** (-2.19)	-1.020 (-1.32)	-0.058 (-0.85)	-0.286*** (-2.65)	-1.007 (-1.17)
<i>Regulatory quality</i>	-0.013 (-0.48)	0.093*** (2.66)	-0.290 (-0.84)	-0.004 (-0.14)	0.088*** (2.77)	-0.146 (-0.41)
<i>GDP growth_{t-1}</i>	0.017** (2.55)	0.026** (2.15)	0.138* (1.66)	0.021*** (3.22)	0.028** (2.48)	0.191** (2.32)
<i>Market return_{t-1}</i>	0.234*** (2.67)	0.813*** (5.45)	1.620 (1.55)	0.221** (2.44)	0.778*** (5.46)	1.525 (1.42)
<i>Volatility_{t-1}</i>	0.906** (2.07)	-0.729 (-1.17)	11.068** (2.01)	0.644 (1.42)	-0.817 (-1.27)	7.881 (1.38)
<i>Inflation_{t-1}</i>	-0.010 (-0.62)	0.072*** (3.22)	-0.164 (-0.79)	-0.005 (-0.29)	0.074*** (3.34)	-0.096 (-0.46)
<i>MPI_{t-1}</i>	0.022 (0.94)	0.172*** (4.16)	0.130 (0.45)	0.028 (1.20)	0.189*** (4.57)	0.204 (0.68)
Observations	4,206	4,208	4,206	4,080	4,082	4,080
Adjusted R ²	0.761	0.633	0.785	0.792	0.632	0.812
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table VI. Risk Management Reforms and Systemic Risk. Continued.

Panel B. Parallel trends tests. Benchmark year is t-1.			
Dependent variable:	SRISK	MES	LVG
	(1)	(2)	(3)
Control group:	Not yet treated & never treated		
<i>t-3 x Treat</i>	-0.024 (-0.26)	0.044 (0.24)	-0.002 (-0.00)
<i>t-2 x Treat</i>	0.091 (0.91)	0.274 (1.19)	1.102 (0.85)
<i>t=0 x Treat</i>	-0.223** (-2.44)	-0.457* (-1.93)	-2.462** (-2.17)
<i>t+1 x Treat</i>	-0.160 (-1.41)	-0.281 (-1.08)	-1.493 (-1.20)
<i>t+2 x Treat</i>	-0.282** (-2.48)	-0.501** (-2.20)	-2.871** (-2.08)
<i>t+3 x Treat</i>	-0.115 (-1.16)	-0.089 (-0.46)	-1.056 (-0.88)
Observations	4,206	4,208	4,206
Controls	Yes	Yes	Yes
Adjusted R ²	0.761	0.635	0.785
Bank x cohort fixed effects	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes

Table VII. Bank Risk Management, Stand-Alone Risk, Funding Structure, and Performance.

This table shows results from regressions assessing the impact of bank risk management on bank stand-alone risk, funding structure, and performance. The dependent variables are: *Tail risk*, the average bank return during its worst 5% return days in a year (multiplied by -1); *Equity volatility*, the annualized standard deviation of weekly stock returns; *Deposits-to-assets*; *ST funding*, short term debt/(deposits + short-term debt); *Tobin's q*, the market-to-book value of assets, where the market value of assets is the sum of the market value of equity and book value of liabilities; and *ROA*. Panel A presents results from event-based stacked regressions around the adoption of risk management reforms. Panel B presents results including interactions with *Most Impacted*, an indicator variable equal to one for banks that do not have a CRO or a risk committee as of *t-1* relative to enactment of the risk management reform and zero otherwise. We restrict the sample period to *t-3*, to *t+3* around year of the risk management reform (*t=0*) and exclude years before 2010 to avoid picking up the impact of the GFC. We form cohorts of treatment countries and use as controls *Not yet treated* and *Never treated* banks. *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Bank-level controls include *Size*; *ROA*, *MTB*; *Capital ratio*; and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. Regressions include bank-by-cohort and year-by-cohort fixed effects. Robust *t*-statistics with standard errors clustered at the country-by-cohort level are reported in parentheses.

Panel A. Event-based stacked regressions.

Dependent variable:	Tail risk	Equity vol.	Deposits-to-assets	ST funding	Tobin's q	ROA
	(1)	(2)	(3)	(4)	(5)	(6)
Control group:	Not yet treated & never treated					
<i>Post x Treat</i>	-0.400*	-0.028	1.542**	-0.703	0.012***	-0.459***
	(-1.89)	(-1.63)	(2.17)	(-0.64)	(2.87)	(-3.81)
<i>Size</i> _{<i>t-1</i>}	-0.420	-0.054***	-5.818***	4.309***	-0.014*	-0.443***
	(-1.44)	(-2.64)	(-6.34)	(4.41)	(-1.88)	(-3.58)
<i>ROA</i> _{<i>t-1</i>}	-0.085	-0.009**	0.056	0.843***	0.002*	
	(-1.44)	(-2.27)	(0.31)	(3.54)	(1.81)	
<i>MTB</i> _{<i>t-1</i>}	0.155**	-0.001	1.432***	-0.965***		0.033
	(2.20)	(-0.22)	(4.94)	(-3.06)		(0.67)
<i>Capital ratio</i> _{<i>t-1</i>}	-0.024	-0.008***	-0.406***	-0.026	0.001	-0.079***
	(-0.65)	(-3.17)	(-3.43)	(-0.20)	(0.80)	(-3.53)
<i>Deposits-to-assets</i> _{<i>t-1</i>}	-0.016**	-0.001***			0.000	-0.014***
	(-2.49)	(-2.89)			(0.81)	(-2.78)
<i>Noninterest income</i> _{<i>t-1</i>}	-0.002	0.000	0.023	0.024	0.000	-0.013***
	(-0.51)	(0.03)	(1.04)	(0.98)	(1.07)	(-4.35)
<i>Post BASEL</i>	-0.244**	-0.017*	0.710	0.422	0.016***	0.002
	(-2.05)	(-1.92)	(1.32)	(0.57)	(3.97)	(0.03)
<i>Regulatory quality</i>	0.067	0.009*	-0.630***	0.458**	0.002	0.065*
	(1.17)	(1.94)	(-3.97)	(2.22)	(1.31)	(1.71)
<i>GDP growth</i> _{<i>t-1</i>}	0.017	-0.001	0.002	0.049	0.001	-0.024*
	(1.26)	(-0.64)	(0.04)	(0.82)	(1.06)	(-1.95)
<i>Market return</i> _{<i>t-1</i>}	0.653***	0.030*	0.403	0.169	0.034***	-0.201*
	(3.21)	(1.96)	(0.62)	(0.21)	(6.42)	(-1.93)
<i>Volatility</i> _{<i>t-1</i>}	-2.514***	-0.040	-7.518***	17.023***	0.087**	1.428**
	(-2.81)	(-0.61)	(-2.76)	(3.97)	(2.33)	(2.35)
<i>Inflation</i> _{<i>t-1</i>}	0.025	0.003*	-0.035	-0.297***	-0.002***	0.064***
	(1.20)	(1.87)	(-0.49)	(-3.44)	(-2.74)	(2.85)
<i>MPI</i> _{<i>t-1</i>}	0.328***	0.027***	-0.545***	0.312	-0.002	0.081**
	(3.51)	(3.69)	(-2.75)	(1.26)	(-1.15)	(2.51)
Observations	4,124	4,216	4,223	4,223	4,214	4,223
Adjusted R ²	0.626	0.602	0.957	0.880	0.904	0.943
Bank x cohort fixed	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed	Yes	Yes	Yes	Yes	Yes	Yes

Table VII. Bank Risk Management, Stand-Alone Risk, Funding Structure, and Performance. Continued.

Panel B. Event-based stacked regressions. Most Impacted.						
Dependent variable:	Tail risk	Equity vol.	Deposits-to-assets	ST funding	Tobin's q	ROA
	(1)	(2)	(3)	(4)	(5)	(6)
Control group:	Not yet treated & never treated					
<i>Post x Treat x Most Impacted</i>	-0.365 (-1.39)	-0.041* (-1.86)	3.636*** (2.67)	-4.088** (-2.40)	0.010** (2.41)	-0.082 (-0.43)
<i>Post x Treat</i>	-0.415* (-1.75)	-0.026 (-1.41)	1.018* (1.77)	-0.130 (-0.13)	0.015** (2.53)	-0.457*** (-3.70)
<i>Post x Most Impacted</i>	0.742*** (6.50)	0.054*** (6.27)	-2.490*** (-5.44)	2.755*** (4.33)	-0.014*** (-3.06)	0.125 (1.31)
<i>Size_{t-1}</i>	-0.291 (-1.00)	-0.048** (-2.30)	-6.540*** (-7.18)	4.978*** (4.87)	-0.017** (-2.24)	-0.379*** (-3.10)
<i>ROA_{t-1}</i>	-0.088 (-1.50)	-0.010** (-2.34)	0.089 (0.50)	0.812*** (3.53)	0.003** (2.03)	
<i>MTB_{t-1}</i>	0.202*** (2.91)	0.002 (0.43)	1.501*** (5.44)	-1.011*** (-3.42)		0.033 (0.67)
<i>Capital ratio_{t-1}</i>	-0.008 (-0.22)	-0.007*** (-2.68)	-0.501*** (-4.36)	0.058 (0.45)	0.001 (0.65)	-0.094*** (-4.00)
<i>Deposits-to-assets_{t-1}</i>	-0.013** (-2.16)	-0.001** (-2.38)			0.000 (0.47)	-0.012** (-2.41)
<i>Noninterest income_{t-1}</i>	-0.003 (-0.70)	-0.000 (-0.46)	0.042* (1.75)	0.005 (0.20)	0.000 (1.14)	-0.010*** (-3.58)
<i>Post BASEL</i>	-0.270** (-2.33)	-0.020** (-2.32)	0.547 (1.22)	0.543 (0.81)	0.016*** (4.12)	-0.002 (-0.02)
<i>Regulatory quality</i>	0.067 (1.22)	0.009** (2.02)	-0.625*** (-4.20)	0.446** (2.26)	0.002 (1.11)	0.067* (1.75)
<i>GDP growth_{t-1}</i>	0.023* (1.71)	-0.000 (-0.39)	-0.011 (-0.23)	0.067 (1.21)	0.000 (0.91)	-0.026** (-2.17)
<i>Market return_{t-1}</i>	0.629*** (3.12)	0.029* (1.91)	0.165 (0.28)	0.399 (0.53)	0.034*** (6.66)	-0.183* (-1.95)
<i>Volatility_{t-1}</i>	-3.088*** (-3.50)	-0.077 (-1.18)	-7.629*** (-2.86)	16.333*** (3.88)	0.086** (2.34)	1.653*** (2.65)
<i>Inflation_{t-1}</i>	0.028 (1.38)	0.003* (1.81)	-0.038 (-0.53)	-0.300*** (-3.57)	-0.003*** (-2.91)	0.065*** (2.90)
<i>MPI_{t-1}</i>	0.344*** (3.74)	0.028*** (3.87)	-0.578*** (-3.12)	0.343 (1.42)	-0.003 (-1.38)	0.087*** (2.67)
Observations	4,018	4,090	4,090	4,090	4,088	4,090
Adjusted R ²	0.630	0.609	0.958	0.881	0.906	0.944
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table VIII. Descriptive Statistics. Chapter Two.

This table presents the summary statistics for the variables used in chapter two. *RMI*, a risk management index that represents the proportion of eleven risk management characteristics that are present within each bank: 1.) *RC*; 2.) *RC Size*; 3.) *Independent RC*; 4.) *Independent RC Chair*; 5.) *Active RC*; 6.) *RC Expert*; 7.) *CRO*; 8.) *CRO Named*; 9.) *CRO Tenure*; 10.) *CRO Pay Reported*; and 11.) *CRO Top Pay*. Below each risk management characteristic, I present the underlying variable used to calculate the indicator component of *RMI*. Key outcome variables are: *Return* $[0, +t]$, is the buy and hold stock return computed using daily closing prices from March 8th, 2023 to day t , where t is a number of trading days; and *Crisis Return*, is the buy and hold stock return computed using daily closing prices from March 8th, 2023 to May 5th, 2023. *% Δ Assets*, is the percent change in total assets; *% Δ Deposits*, is the percentage change in total deposits; *% Δ Uninsured Deposits*, is the percentage change in uninsured deposits; *% Δ Tier 1 Capital*, is the percentage change in reported tier 1 capital; *% Liquid Assets*, is the percentage change in liquid assets, where liquid assets are measured as the sum of cash, federal funds and repos sold, and securities with a remaining maturity of less than three months; *% Δ AFS Securities*, is the percentage change in available-for-sale securities; and *% Δ NIM*, is the percentage change in net interest. All *% Δ* variables are calculated as the percentage change between March 31st, 2023 and December 31st, 2022. *Hedger*, is an indicator variable equal to one if a bank utilizes any interest rate derivative contracts for hedging; *Hedge-to-assets*, is the ratio of interest rate derivative contracts for hedging to total assets; *Hedge-to-AFS securities*, is the ratio of interest rate derivative contracts for hedging to available-for-sale securities; *Swapper*, is an indicator variable equal to one if a bank utilizes any interest rate swaps for hedging; *Swap-to-assets*, is the ratio of interest rate swaps for hedging to total assets; and *Swap-to-AFS securities*, is the ratio of interest rate swaps for hedging to available-for-sale securities. *Tier 1 Capital Ratio*, is the ratio of reported tier 1 capital to total assets; *Liquid Assets-to-assets*, is the ratio of liquid assets, where liquid assets are measured as the sum of cash, federal funds and repos sold, and securities with a remaining maturity of less than three months; *Short-term Treasuries-to-securities*, is the ratio of treasury securities with a remaining maturity of less than three months to total securities; *AFS Securities-to-securities*, is the ratio of available-for-sale securities to total securities; *Reclassified*, is an indicator variable equal to one if a bank reclassified available-for-sale securities to held-to-maturity securities during 2022 where reclassification is based on the definition in Granja (2023); and *Security Maturity*, is the value-weighted average maturity in years of securities. *Deposits-to-assets*, is the ratio of total deposits to total assets; *Uninsured Deposits-to-deposits*, is the ratio of uninsured deposits to total deposits; *Time Deposits-to-assets*, is the ratio of time deposits to total assets; *Deposit Beta*, is the coefficient from a regression of bank-level changes in deposit interest rates on changes in the Federal Funds Rate from 1984 to 2022 from Drechsler et al. (2017; 2021) downloaded from Philipp Schnabl's website; *Deposit Rate Ratio*, is the ratio of the change in deposit interest rate to the change in the Federal Funds Rate in 2022; *Deposit Rate*, is the rate of interest paid on bank deposits calculated as the interest paid on deposits divided by the total interest bearing deposits; *Deposit Maturity*, is the value-weighted average maturity in years of deposits. All variables of interest are measured as of December 31st, 2022 unless otherwise specified. Bank-level control variables include *Size*, *ROA*, *Deposits-to-assets*, *Tier 1 Capital-to-assets*, *Loans-to-assets*, *Bad-loans-to-assets*, *Noninterest income to income*, *Trading Derivatives to assets*, *Annual stock return*, *Tail risk*, *Institutional ownership %*, and *Board independence %*. Risk Management variables and firm controls are measured as of December 31st 2021. Financial and performance variables are winsorized at the 1st and 99th percentile. All variables are defined in Appendix F.

Variable	<i>N</i>	<i>Mean</i>	<i>P</i> (25)	<i>Median</i>	<i>P</i> (75)	<i>Std. Dev.</i>
	(1)	(2)	(3)	(4)	(5)	(6)
Risk Management Variables:						
<i>RMI</i>	298	0.397	0.000	0.364	0.727	0.313
<i>RC</i>	298	0.540	0.000	1.000	1.000	0.499
<i>RC Size</i>	298	0.339	0.000	0.000	1.000	0.474
<i>RC Members</i>	161	5.385	4.000	5.000	6.000	2.202
<i>Independent RC</i>	298	0.349	0.000	0.000	1.000	0.477
<i>RC Independence %</i>	161	0.913	0.833	1.000	1.000	0.150
<i>Independent RC Chair</i>	298	0.503	0.000	1.000	1.000	0.501
<i>Active RC</i>	298	0.299	0.000	0.000	1.000	0.458
<i>RC Meetings</i>	155	5.955	4.000	5.000	7.000	3.094
<i>RC Expert</i>	298	0.386	0.000	0.000	1.000	0.488

Table VIII. Descriptive Statistics. Chapter Two. Continued.

Variable	<i>N</i>	<i>Mean</i>	<i>P</i> (25)	<i>Median</i>	<i>P</i> (75)	<i>Std. Dev.</i>
	(1)	(2)	(3)	(4)	(5)	(6)
Risk Management Variables Continued:						
<i>CRO</i>	298	0.577	0.000	1.000	1.000	0.495
<i>CRO Named</i>	298	0.530	0.000	1.000	1.000	0.499
<i>CRO Tenure</i>	298	0.406	0.000	0.000	1.000	0.492
<i>CRO Tenure in Year</i>	156	3.513	1.000	2.000	5.000	3.632
<i>CRO Pay Reported</i>	298	0.144	0.000	0.000	0.000	0.352
<i>CRO Top Pay</i>	298	0.289	0.000	0.000	1.000	0.454
<i>CRO Pay Ratio</i>	43	0.391	0.309	0.364	0.453	0.134
Variables of Interest:						
<i>Return [0,+1]</i>	295	-0.046	-0.06	-0.046	-0.029	0.027
<i>Return [0,+2]</i>	295	-0.071	-0.087	-0.065	-0.046	0.048
<i>Return [0,+3]</i>	295	-0.139	-0.156	-0.123	-0.090	0.087
<i>Return [0,+7]</i>	295	-0.146	-0.166	-0.131	-0.097	0.095
<i>Return [0,+32]</i>	295	-0.193	-0.226	-0.186	-0.137	0.108
<i>Return [0,+37]</i>	294	-0.221	-0.271	-0.208	-0.154	0.123
<i>Crisis Return</i>	294	-0.266	-0.326	-0.258	-0.187	0.130
<i>% Δ Assets</i>	297	0.021	0.002	0.020	0.041	0.118
<i>% Δ Deposits</i>	297	0.005	-0.026	0.003	0.032	0.121
<i>% Δ Uninsured Deposits</i>	283	-0.017	-0.121	-0.064	0.006	0.348
<i>% Δ Tier 1 Capital</i>	297	0.011	0.004	0.016	0.027	0.091
<i>% Δ Liquid Assets</i>	297	0.463	-0.043	0.195	0.693	0.939
<i>% Δ AFS Securities</i>	297	-0.003	-0.025	-0.006	0.013	0.164
<i>% Δ NIM</i>	297	0.033	0.012	0.041	0.072	0.122
<i>Hedger</i>	298	0.745	0.000	1.000	1.000	0.437
<i>Hedge-to-assets</i>	298	0.063	0.000	0.016	0.091	0.096
<i>Hedge-to-AFS securities</i>	297	0.638	0.000	0.132	0.695	1.419
<i>Swapper</i>	298	0.416	0.000	0.000	1.000	0.494
<i>Swap-to-assets</i>	298	0.021	0.000	0.000	0.019	0.045
<i>Swap-to-AFS securities</i>	297	0.184	0.000	0.000	0.116	0.482
<i>Tier 1 Capital Ratio</i>	298	0.098	0.089	0.097	0.104	0.015
<i>Liquid Assets-to-assets</i>	298	0.06	0.025	0.042	0.066	0.064
<i>Short-term Treasuries-to-securities</i>	298	0.065	0.005	0.024	0.072	0.102
<i>AFS Securities-to-securities</i>	298	0.786	0.610	0.892	1.000	0.253
<i>Reclassified</i>	298	0.131	0.000	0.000	0.000	0.338
<i>Security Maturity</i>	298	8.672	6.993	8.96	10.983	2.970
<i>Deposits-to-assets</i>	298	0.832	0.796	0.833	0.869	0.052
<i>Uninsured Deposits-to-assets</i>	298	0.293	0.207	0.292	0.382	0.139
<i>Time Deposits-to-assets</i>	298	0.12	0.058	0.101	0.157	0.085
<i>Deposit Beta</i>	298	0.323	0.275	0.359	0.432	0.169
<i>Deposit Rate Ratio</i>	298	0.054	0.013	0.045	0.080	0.054
<i>Deposit Rate (Basis points)</i>	298	53.443	30.995	47.580	70.228	30.555
<i>Deposit Maturity</i>	298	0.136	0.062	0.110	0.182	0.106

Table VIII. Descriptive Statistics. Chapter Two. Continued.

Variable	<i>N</i>	<i>Mean</i>	<i>P</i> (25)	<i>Median</i>	<i>P</i> (75)	<i>Std. Dev.</i>
	(1)	(2)	(3)	(4)	(5)	(6)
Control Variables:						
<i>Ln(Asset)</i>	298	15.792	14.653	15.606	16.603	1.494
<i>ROA</i>	298	0.013	0.010	0.012	0.014	0.004
<i>Tier 1 Capital-to-assets</i>	298	0.850	0.830	0.859	0.880	0.042
<i>Deposit-to-assets</i>	298	0.093	0.084	0.092	0.101	0.014
<i>Loans-to-assets</i>	298	0.638	0.562	0.663	0.729	0.139
<i>Bad Loans-to-assets</i>	298	0.004	0.001	0.003	0.005	0.003
<i>Noninterest income-to-income</i>	298	0.214	0.123	0.195	0.270	0.125
<i>Trading derivative-to-assets</i>	298	0.125	0.000	0.000	0.027	0.708
<i>Annual return</i>	298	0.359	0.195	0.323	0.471	0.270
<i>Tail risk</i>	298	0.040	0.035	0.038	0.042	0.009
<i>Institutional Ownership %</i>	298	0.558	0.383	0.585	0.738	0.234
<i>Board Independence %</i>	298	0.839	0.800	0.857	0.909	0.088

Table IX. Bank Risk Management and Stock Market Performance During the SVB Crisis.

This table shows results from cross-sectional regressions assessing the impact of bank risk management on bank stock returns during the SVB crisis. The dependent variables are: *Return* $[0, +t]$, is the buy and hold stock return computed using daily closing prices from March 8th, 2023 to day t , where t is a number of trading days; and *Crisis Return*, is the buy and hold stock return computed using daily closing prices from March 8th, 2023 to May 5th, 2023. The key independent variable is *RMI*, a risk management index that represents the proportion of eleven risk management characteristics that are present within each bank: 1.) *RC*; 2.) *RC Size*; 3.) *Independent RC*; 4.) *Independent RC Chair*; 5.) *Active RC*; 6.) *RC Expert*; 7.) *CRO*; 8.) *CRO Named*; 9.) *CRO Tenure*; 10.) *CRO Pay Reported*; and 11.) *CRO Top Pay*. In Panel A I show results for the full sample of publicly traded U.S. banks. In Panel B I show results for large banks, defined as banks with greater than \$10 billion in assets. In Panel C I show results for small banks, defined as banks with less than \$10 billion in assets. Bank-level controls (omitted to conserve space) include *Size*, *ROA*, *Deposits-to-assets*, *Tier 1 Capital-to-assets*, *Loans-to-assets*, *Bad-loans-to-assets*, *Noninterest income-to-income*, *Trading derivatives-to-assets*, *Annual stock return*, *Tail Risk*, *Institutional Ownership %*, and *Board Independence %*. *RMI* and control variables are measured as of December 31st, 2021. Regressions include size decile fixed effects. Financial and performance variables are winsorized at the 1st and 99th percentile. All variables are defined in Appendix F.

Panel A. All Banks.							
Dependent variable:	<i>Return</i> $[0, +1]$	<i>Return</i> $[0, +2]$	<i>Return</i> $[0, +3]$	<i>Return</i> $[0, +7]$	<i>Return</i> $[0, +32]$	<i>Return</i> $[0, +37]$	<i>Crisis</i> <i>Return</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>RMI</i>	-0.004 (-0.80)	-0.001 (-0.08)	-0.010 (-0.68)	-0.012 (-0.73)	0.006 (0.31)	-0.012 (-0.49)	-0.013 (-0.50)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	295	295	295	295	295	294	294
Adjusted R ²	0.558	0.425	0.405	0.449	0.292	0.277	0.291
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B. Large Banks.							
Dependent variable:	<i>Return</i> $[0, +1]$	<i>Return</i> $[0, +2]$	<i>Return</i> $[0, +3]$	<i>Return</i> $[0, +7]$	<i>Return</i> $[0, +32]$	<i>Return</i> $[0, +37]$	<i>Crisis</i> <i>Return</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>RMI</i>	-0.004 (-0.28)	-0.009 (-0.34)	-0.022 (-0.52)	-0.035 (-0.86)	-0.023 (-0.43)	-0.029 (-0.45)	-0.003 (-0.04)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	99	99	99	99	99	99	+99
Adjusted R ²	0.461	0.555	0.489	0.576	0.457	0.443	0.444
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel C. Small Banks.							
Dependent variable:	<i>Return</i> $[0, +1]$	<i>Return</i> $[0, +2]$	<i>Return</i> $[0, +3]$	<i>Return</i> $[0, +7]$	<i>Return</i> $[0, +32]$	<i>Return</i> $[0, +37]$	<i>Crisis</i> <i>Return</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>RMI</i>	-0.007 (-1.44)	-0.006 (-0.75)	-0.016 (-1.16)	-0.020 (-1.25)	-0.002 (-0.09)	-0.026 (-1.00)	-0.031 (-1.07)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	196	196	196	196	196	195	195
Adjusted R ²	0.550	0.324	0.325	0.223	0.229	0.239	0.259
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table X. Bank Risk Management and Financial Performance During the SVB Crisis.

This table shows results from cross-sectional regressions assessing the impact of bank risk management on bank financial performance during the SVB crisis. The dependent variables are: % Δ Assets, is the percent change in total assets; % Δ Deposits, is the percentage change in total deposits; % Δ Uninsured Deposits, is the percentage change in uninsured deposits; % Δ Tier 1 Capital, is the percentage change in reported tier 1 capital; % Liquid Assets, is the percentage change in liquid assets, where liquid assets are measured as the sum of cash, federal funds and repos sold, and securities with a remaining maturity of less than three months; % Δ AFS Securities, is the percentage change in available-for-sale securities; and % Δ NIM, is the percentage change in net interest. All dependent variables are calculated as the percentage change between March 31st, 2023 and December 31st, 2022. The key independent variable is *RMI*, a risk management index that represents the proportion of eleven risk management characteristics that are present within each bank: 1.) *RC*; 2.) *RC Size*; 3.) *Independent RC*; 4.) *Independent RC Chair*; 5.) *Active RC*; 6.) *RC Expert*; 7.) *CRO*; 8.) *CRO Named*; 9.) *CRO Tenure*; 10.) *CRO Pay Reported*; and 11.) *CRO Top Pay*. In Panel A I show results for the full sample of publicly traded U.S. banks. In Panel B I show results for large banks, defined as banks with greater than \$10 billion in assets. In Panel C I show results for small banks, defined as banks with less than \$10 billion in assets. Bank-level controls (omitted to conserve space) include *Size*, *ROA*, *Deposits-to-assets*, *Tier 1 Capital-to-assets*, *Loans-to-assets*, *Bad-loans-to-assets*, *Noninterest income-to-income*, *Trading derivatives-to-assets*, *Annual stock return*, *Tail Risk*, *Institutional Ownership %*, and *Board Independence %*. *RMI* and control variables are measured as of December 31st, 2021. Regressions include size decile fixed effects. Financial and performance variables are winsorized at the 1st and 99th percentile. All variables are defined in Appendix F.

Panel A. All Banks.							
Dependent variable:	% Δ Assets	% Δ Deposits	% Δ Uninsured Deposits	% Δ Tier 1 Capital	% Δ Liquid Assets	% Δ AFS Securities	% Δ NIM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>RMI</i>	0.006 (0.28)	0.010 (0.47)	0.050 (0.48)	-0.004 (-0.28)	0.201 (0.93)	-0.001 (-0.03)	-0.021 (-0.99)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	297	297	283	297	297	297	297
Adjusted R ²	0.187	0.219	0.180	0.208	0.117	0.141	0.135
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B. Large Banks.							
Dependent variable:	% Δ Assets	% Δ Deposits	% Δ Uninsured Deposits	% Δ Tier 1 Capital	% Δ Liquid Assets	% Δ AFS Securities	% Δ NIM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>RMI</i>	-0.039 (-0.55)	-0.010 (-0.15)	-0.066 (-0.65)	-0.057 (-0.97)	0.206 (0.44)	-0.019 (-0.22)	-0.135 (-1.28)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	99	99	98	99	99	99	99
Adjusted R ²	0.359	0.402	0.310	0.380	0.230	0.363	0.252
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table X. Bank Risk Management and Financial Performance During the SVB Crisis. Continued.

Panel C. Small Banks.							
Dependent variable:	% Δ Assets	% Δ Deposits	% Δ Uninsured Deposits	% Δ Tier 1 Capital	% Δ Liquid Assets	% Δ AFS Securities	% Δ NIM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>RMI</i>	0.001 (0.04)	-0.004 (-0.21)	0.058 (0.41)	-0.005 (-0.66)	0.293 (1.20)	-0.016 (-0.57)	-0.014 (-1.10)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	198	198	185	198	198	198	198
Adjusted R ²	0.119	0.123	0.139	0.091	0.097	0.071	0.185
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table XI. Bank Risk Management and Interest Rate Derivatives for Hedging.

This table shows results from cross-sectional regressions assessing the impact of bank risk management on bank interest rate derivatives for hedging usage before the SVB crisis. The dependent variables are: *Hedger*, is an indicator variable equal to one if a bank utilizes any interest rate derivative contracts for hedging; *Hedge-to-assets*, is the ratio of interest rate derivative contracts for hedging to total assets; *Hedge-to-AFS securities*, is the ratio of interest rate derivative contracts for hedging to available-for-sale securities; *Swapper*, is an indicator variable equal to one if a bank utilizes any interest rate swaps for hedging; *Swap-to-assets*, is the ratio of interest rate swaps for hedging to total assets; and *Swap-to-AFS securities*, is the ratio of interest rate swaps for hedging to available-for-sale securities. All dependent variables are measured as of December 31st, 2022. The key independent variable is *RMI*, a risk management index that represents the proportion of eleven risk management characteristics that are present within each bank: 1.) *RC*; 2.) *RC Size*; 3.) *Independent RC*; 4.) *Independent RC Chair*; 5.) *Active RC*; 6.) *RC Expert*; 7.) *CRO*; 8.) *CRO Named*; 9.) *CRO Tenure*; 10.) *CRO Pay Reported*; and 11.) *CRO Top Pay*. In Panel A I show results for the full sample of publicly traded U.S. banks. In Panel B I show results for large banks, defined as banks with greater than \$10 billion in assets. In Panel C I show results for small banks, defined as banks with less than \$10 billion in assets. Bank-level controls (omitted to conserve space) include *Size*, *ROA*, *Deposits-to-assets*, *Tier 1 Capital-to-assets*, *Loans-to-assets*, *Bad-loans-to-assets*, *Noninterest income-to-income*, *Trading derivatives-to-assets*, *Annual stock return*, *Tail Risk*, *Institutional Ownership %*, and *Board Independence %*. *RMI* and control variables are measured as of December 31st, 2021. Regressions include size decile fixed effects. Financial and performance variables are winsorized at the 1st and 99th percentile. All variables are defined in Appendix F.

Panel A. All Banks.						
Dependent variable:	<i>Hedger</i>	<i>Hedge-to-assets</i>	<i>Hedge-to-AFS securities</i>	<i>Swapper</i>	<i>Swaps-to-assets</i>	<i>Swaps-to-AFS securities</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i>	0.121 (1.19)	0.026 (1.42)	0.081 (0.31)	0.244** (2.02)	0.023** (2.31)	0.167 (1.52)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	298	298	297	298	298	297
Adjusted R ²	0.333	0.252	0.155	0.245	0.167	0.154
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Panel B. Large Banks.						
Dependent variable:	<i>Hedger</i>	<i>Hedge-to-assets</i>	<i>Hedge-to-AFS securities</i>	<i>Swapper</i>	<i>Swaps-to-assets</i>	<i>Swaps-to-AFS securities</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i>	-0.025 (-0.27)	-0.004 (-0.08)	0.341 (0.53)	0.296 (1.08)	0.005 (0.21)	0.171 (0.95)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	99	99	99	99	99	99
Adjusted R ²	0.233	0.270	0.243	0.120	0.108	0.140
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XI. Bank Risk Management and Interest Rate Derivatives for Hedging. Continued.

Panel C. Small Banks.						
Dependent variable:	<i>Hedger</i>	<i>Hedge-to-assets</i>	<i>Hedge-to-AFS securities</i>	<i>Swapper</i>	<i>Swaps-to-assets</i>	<i>Swaps-to-AFS securities</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i>	0.200 (1.61)	0.040** (2.26)	0.117 (0.38)	0.217 (1.65)	0.023** (2.09)	0.126 (0.95)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	199	199	198	199	199	198
Adjusted R ²	0.350	0.295	0.216	0.282	0.325	0.256
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XII. Bank Risk Management, Capital, Liquidity and Securities Management.

This table shows results from cross-sectional regressions assessing the impact of bank risk management on bank capital, liquidity and securities management before the SVB crisis. The dependent variables are: *Tier 1 Capital Ratio*, is the ratio of reported tier 1 capital to total assets; *Liquid Assets-to-assets*, is the ratio of liquid assets, where liquid assets are measured as the sum of cash, federal funds and repos sold, and securities with a remaining maturity of less than three months; *Short-term Treasuries-to-securities*, is the ratio of treasury securities with a remaining maturity of less than three months to total securities; *AFS Securities-to-securities*, is the ratio of available-for-sale securities to total securities; *Reclassified*, is an indicator variable equal to one if a bank reclassified available-for-sale securities to held-to-maturity securities during 2022 where reclassification is based on the definition in Granja (2023); and *Security Maturity*, is the value-weighted average maturity in years of securities. All dependent variables are measured as of December 31st, 2022. The key independent variable is *RMI*, a risk management index that represents the proportion of eleven risk management characteristics that are present within each bank: 1.) *RC*; 2.) *RC Size*; 3.) *Independent RC*; 4.) *Independent RC Chair*; 5.) *Active RC*; 6.) *RC Expert*; 7.) *CRO*; 8.) *CRO Named*; 9.) *CRO Tenure*; 10.) *CRO Pay Reported*; and 11.) *CRO Top Pay*. In Panel A I show results for the full sample of publicly traded U.S. banks. In Panel B I show results for large banks, defined as banks with greater than \$10 billion in assets. In Panel C I show results for small banks, defined as banks with less than \$10 billion in assets. Bank-level controls (omitted to conserve space) include *Size*, *ROA*, *Deposits-to-assets*, *Tier 1 Capital-to-assets*, *Loans-to-assets*, *Bad-loans-to-assets*, *Noninterest income-to-income*, *Trading derivatives-to-assets*, *Annual stock return*, *Tail Risk*, *Institutional Ownership %*, and *Board Independence %*. *RMI* and control variables are measured as of December 31st, 2021. Regressions include size decile fixed effects. Financial and performance variables are winsorized at the 1st and 99th percentile. All variables are defined in Appendix F.

Panel A. All Banks.						
Dependent variable:	<i>Tier 1 Capital Ratio</i>	<i>Liquid Assets-to-assets</i>	<i>Short-term Treasuries-to-securities</i>	<i>AFS Securities-to-securities</i>	<i>Reclassified</i>	<i>Security Maturity</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i>	-0.000 (-0.09)	-0.019 (-1.40)	-0.001 (-0.05)	0.040 (0.68)	0.000 (0.01)	0.478 (0.64)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	298	298	298	298	298	298
Adjusted R ²	0.714	0.465	0.092	0.193	0.106	0.082
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Panel B. Large Banks.						
Dependent variable:	<i>Tier 1 Capital Ratio</i>	<i>Liquid Assets-to-assets</i>	<i>Short-term Treasuries-to-securities</i>	<i>AFS Securities-to-securities</i>	<i>Reclassified</i>	<i>Security Maturity</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i>	-0.001 (-0.36)	-0.016 (-0.49)	-0.016 (-0.28)	0.103 (0.77)	0.104 (0.42)	0.742 (0.40)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	99	99	99	99	99	99
Adjusted R ²	0.741	0.647	0.110	0.068	0.233	0.280
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XII. Bank Risk Management, Capital, Liquidity and Securities Management. Continued.

Panel C. Small Banks.						
Dependent variable:	<i>Tier 1 Capital Ratio</i>	<i>Liquid Assets- to-assets</i>	<i>Short-term Treasuries-to- securities</i>	<i>AFS Securities-to- securities</i>	<i>Reclassified</i>	<i>Security Maturity</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i>	-0.001 (-0.27)	-0.023 (-1.56)	0.001 (0.04)	0.013 (0.19)	-0.025 (-0.33)	0.426 (0.50)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	199	199	199	199	199	199
Adjusted R ²	0.711	0.199	0.119	0.143	0.118	0.082
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XIII. Bank Risk Management and Deposit Franchise Value.

This table shows results from cross-sectional regressions assessing the impact of bank risk management on bank deposit funding and deposit franchise before the SVB crisis. The dependent variables are: *Deposits-to-assets*, is the ratio of total deposits to total assets; *Uninsured Deposits-to-deposits*, is the ratio of uninsured deposits to total deposits; *Time Deposits-to-assets*, is the ratio of time deposits to total assets; *Deposit Beta*, is the coefficient from a regression of bank-level changes in deposit interest rates on changes in the Federal Funds Rate from 1984 to 2022 from Drechsler et al. (2017; 2021) downloaded from Philipp Schnabl's website; *Deposit Rate Ratio*, is the ratio of the change in deposit interest rate to the change in the Federal Funds Rate in 2022; *Deposit Rate*, is the rate of interest paid on bank deposits calculated as the interest paid on deposits divided by the total interest bearing deposits; *Deposit Maturity*, is the value-weighted average maturity in years of deposits. All dependent variables are measured as of December 31st, 2022. The key independent variable is *RMI*, a risk management index that represents the proportion of eleven risk management characteristics that are present within each bank: 1.) *RC*; 2.) *RC Size*; 3.) *Independent RC*; 4.) *Independent RC Chair*; 5.) *Active RC*; 6.) *RC Expert*; 7.) *CRO*; 8.) *CRO Named*; 9.) *CRO Tenure*; 10.) *CRO Pay Reported*; and 11.) *CRO Top Pay*. In Panel A I show results for the full sample of publicly traded U.S. banks. In Panel B I show results for large banks, defined as banks with greater than \$10 billion in assets. In Panel C I show results for small banks, defined as banks with less than \$10 billion in assets. Bank-level controls (omitted to conserve space) include *Size*, *ROA*, *Deposits-to-assets*, *Tier 1 Capital-to-assets*, *Loans-to-assets*, *Bad-loans-to-assets*, *Noninterest income-to-income*, *Trading derivatives-to-assets*, *Annual stock return*, *Tail Risk*, *Institutional Ownership %*, and *Board Independence %*. *RMI* and control variables are measured as of December 31st, 2021. Regressions include size decile fixed effects. Financial and performance variables are winsorized at the 1st and 99th percentile. All variables are defined in Appendix F.

Panel A. All Banks.							
Dependent variable:	<i>Deposits-to-assets</i>	<i>Uninsured Deposits-to-deposits</i>	<i>Time Deposits-to-assets</i>	<i>Deposit Beta</i>	<i>Deposit Rate Ratio</i>	<i>Deposit Rate</i>	<i>Deposit Maturity</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>RMI</i>	-0.002 (-0.26)	-0.000 (-0.01)	0.019 (1.09)	-0.026 (-0.63)	-0.002 (-0.17)	-0.002 (-0.03)	-0.003 (-0.14)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	298	298	298	298	298	298	298
Adjusted R ²	0.620	0.292	0.485	0.185	0.393	0.392	0.459
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B. Large Banks.							
Dependent variable:	<i>Deposits-to-assets</i>	<i>Uninsured Deposits-to-deposits</i>	<i>Time Deposits-to-assets</i>	<i>Deposit Beta</i>	<i>Deposit Rate Ratio</i>	<i>Deposit Rate</i>	<i>Deposit Maturity</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>RMI</i>	0.010 (0.53)	0.069 (1.15)	0.081*** (3.20)	-0.026 (-0.23)	0.034 (1.43)	0.230* -1.67	0.072*** (2.78)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	99	99	99	99	99	99	99
Adjusted R ²	0.553	0.277	0.635	0.174	0.454	0.456	0.682
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table XIII. Bank Risk Management and Deposit Franchise Value. Continued.

Panel C. Small Banks.							
Dependent variable:	<i>Deposits- to-assets</i>	<i>Uninsured Deposits-to- deposits</i>	<i>Time Deposits- to-assets</i>	<i>Deposit Beta</i>	<i>Deposit Rate Ratio</i>	<i>Deposit Rate</i>	<i>Deposit Maturity</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>RMI</i>	-0.010 (-1.20)	-0.009 (-0.22)	-0.000 (-0.02)	-0.021 (-0.45)	-0.008 (-0.64)	-0.05 (-0.70)	-0.029 (-1.02)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	199	199	199	199	199	199	199
Adjusted R ²	0.725	0.336	0.428	0.206	0.280	0.363	0.397
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table XIV. Bank Risk Exposure and Performance During the SVB Crisis.

This table shows results from cross-sectional regressions assessing the impact of bank risk exposure on bank performance during the SVB crisis. The dependent variables are: *Return* $[0, +t]$, is the buy and hold stock return computed using daily closing prices from March 8th, 2023 to day t , where t is a number of trading days; *Crisis Return*, is the buy and hold stock return computed using daily closing prices from March 8th, 2023 to May 5th, 2023; % Δ *Deposits*, is the percentage change in total deposits; % Δ *Uninsured Deposits*, is the percentage change in uninsured deposits; % Δ *Tier 1 Capital*, is the percentage change in reported tier 1 capital; % Δ *Liquid Assets*, is the percentage change in liquid assets, where liquid assets are measured as the sum of cash, federal funds and repos sold, and securities with a remaining maturity of less than three months; and % Δ *NIM*, is the percentage change in net interest. All financial dependent variables are calculated as the percentage change between March 31st, 2023 and December 31st, 2022. The key independent variables are: *Uninsured deposits-to-deposits*, is the ratio of uninsured deposits to total deposits measured as of December 31st, 2021; *Deposit Beta*, is the coefficient from a regression of bank-level changes in deposit interest rates on changes in the Federal Funds Rate from 1984 to 2022 from Drechsler et al. (2017; 2021) downloaded from Philipp Schnabl's website; and *Expected Mark-to-Market Losses*, is the expected change in a bank's asset value in 2022 due to rising interest rates calculated following the procedure in Jiang et al. (2023). *Expected Mark-to-Market Losses* is multiplied by negative one to be increasing in expected loss. In Panel A I show results for tests using the ratio of *Uninsured Deposits-to-deposits*. In Panel B I show results for tests using *Deposit Beta*, where higher values represent weaker deposit franchise values. In Panel C I show results for tests using *Expected Mark-to-Market Losses*. Bank-level controls (omitted to conserve space) include *Size*, *ROA*, *Deposits-to-assets*, *Tier 1 Capital-to-assets*, *Loans-to-assets*, *Bad-loans-to-assets*, *Noninterest income-to-income*, *Trading derivatives-to-assets*, *Annual stock return*, *Tail Risk*, *Institutional Ownership %*, and *Board Independence %*. Control variables are measured as of December 31st, 2021. Regressions include size decile fixed effects. Financial and performance variables are winsorized at the 1st and 99th percentile. All variables are defined in Appendix F.

Panel A. Uninsured Deposits-to-deposits.								
Dependent variable:	<i>Return</i> $[0, +1]$	<i>Return</i> $[0, +3]$	<i>Crisis</i> <i>Return</i>	% Δ <i>Deposits</i>	% Δ <i>Uninsured</i> <i>Deposits</i>	% Δ <i>Tier 1</i> <i>Capital</i>	% Δ <i>Liquid</i> <i>Assets</i>	% Δ <i>NIM</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Uninsured deposits-to-deposits</i>	-0.016*	-0.089***	-0.222***	-0.158***	-0.842***	-0.104**	-0.335	-0.092
	(-1.86)	(-2.89)	(-4.33)	(-2.92)	(-4.78)	(-2.13)	(-0.91)	(-1.28)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	295	295	294	297	283	297	297	297
Adjusted R ²	0.564	0.425	0.348	0.252	0.279	0.234	0.117	0.145
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B. Deposit Beta.								
Dependent variable:	<i>Return</i> $[0, +1]$	<i>Return</i> $[0, +3]$	<i>Crisis</i> <i>Return</i>	% Δ <i>Deposits</i>	% Δ <i>Uninsured</i> <i>Deposits</i>	% Δ <i>Tier 1</i> <i>Capital</i>	% Δ <i>Liquid</i> <i>Assets</i>	% Δ <i>NIM</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Deposit Beta</i>	0.001	0.030	-0.052	-0.028	-0.230**	-0.016	-0.215	0.054
	(0.17)	(1.13)	(-1.05)	(-0.75)	(-1.97)	(-0.70)	(-0.66)	(1.26)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	295	295	294	297	283	297	297	297
Adjusted R ²	0.557	0.407	0.295	0.220	0.189	0.209	0.116	0.138
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table XIV. Bank Risk Exposure and Performance During the SVB Crisis. Continued.

Panel C. Expected Mark-to-Market Losses.								
Dependent variable:	<i>Return [0,+1]</i>	<i>Return [0,+3]</i>	<i>Crisis Return</i>	<i>% Δ Deposits</i>	<i>% Δ Uninsured Deposits</i>	<i>% Δ Tier 1 Capital</i>	<i>% Δ Liquid Assets</i>	<i>% Δ NIM</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Expected Mark-to-Market Losses</i>	-0.043 (-0.93)	-0.217 (-1.36)	-0.665** (-2.48)	-0.330 (-1.48)	0.233 (0.45)	-0.346** (-2.04)	3.629** (2.06)	-0.784*** (-3.11)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	295	295	294	297	283	297	297	297
Adjusted R ²	0.558	0.409	0.312	0.225	0.179	0.220	0.126	0.166
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table XV. Bank Risk Management, Risk Exposure and Performance During the SVB Crisis.

This table shows results from cross-sectional regressions assessing the impact of bank risk management on bank performance during the SVB crisis across subsamples of bank risk exposure. The dependent variables are: *Return* $[0, +t]$, is the buy and hold stock return computed using daily closing prices from March 8th, 2023 to day t , where t is a number of trading days; *Crisis Return*, is the buy and hold stock return computed using daily closing prices from March 8th, 2023 to May 5th, 2023; % Δ *Deposits*, is the percentage change in total deposits; % Δ *Uninsured Deposits*, is the percentage change in uninsured deposits; % Δ *Tier 1 Capital*, is the percentage change in reported tier 1 capital; % *Liquid Assets*, is the percentage change in liquid assets, where liquid assets are measured as the sum of cash, federal funds and repos sold, and securities with a remaining maturity of less than three months; and % Δ *NIM*, is the percentage change in net interest. All financial dependent variables are calculated as the percentage change between March 31st, 2023 and December 31st, 2022. The key independent variable is *RMI*, a risk management index that represents the proportion of eleven risk management characteristics that are present within each bank: 1.) *RC*; 2.) *RC Size*; 3.) *Independent RC*; 4.) *Independent RC Chair*; 5.) *Active RC*; 6.) *RC Expert*; 7.) *CRO*; 8.) *CRO Named*; 9.) *CRO Tenure*; 10.) *CRO Pay Reported*; and 11.) *CRO Top Pay*. In Panel A I show results for tests in the subsample of banks with above median *Uninsured Deposits-to-deposits*, which is the ratio of uninsured deposits to total deposits measured as of December 31st, 2021. In Panel B I show results for tests in the subsample of banks with above median *Deposit Beta*, which is the coefficient from a regression of bank-level changes in deposit interest rates on changes in the Federal Funds Rate from 1984 to 2022 from Drechsler et al. (2017; 2021) downloaded from Philipp Schnabl's website and where higher values represent weaker deposit franchise values. In Panel C I show results for tests in the subsample of banks with above median *Expected Mark-to-Market Losses*, which is the expected change in a bank's asset value in 2022 due to rising interest rates calculated following the procedure in Jiang et al. (2023). *Expected Mark-to-Market Losses* is multiplied by negative one to be increasing in expected loss. Bank-level controls (omitted to conserve space) include *Size*, *ROA*, *Deposits-to-assets*, *Tier 1 Capital-to-assets*, *Loans-to-assets*, *Bad-loans-to-assets*, *Noninterest income-to-income*, *Trading derivatives-to-assets*, *Annual stock return*, *Tail Risk*, *Institutional Ownership %*, and *Board Independence %*. *RMI* and control variables are measured as of December 31st, 2021. Regressions include size decile fixed effects. Financial and performance variables are winsorized at the 1st and 99th percentile. All variables are defined in Appendix F.

Panel A. Above Median Uninsured Deposits-to-deposits Banks.								
Dependent variable:	<i>Return</i> $[0, +1]$	<i>Return</i> $[0, +3]$	<i>Crisis</i> <i>Return</i>	% Δ <i>Deposits</i>	% Δ <i>Uninsured</i> <i>Deposits</i>	% Δ <i>Tier 1</i> <i>Capital</i>	% Δ <i>Liquid</i> <i>Assets</i>	% Δ <i>NIM</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>RMI</i>	-0.017* (-1.96)	-0.042 (-1.54)	-0.018 (-0.45)	0.008 (0.20)	-0.011 (-0.19)	-0.019 (-0.61)	0.128 (0.43)	-0.022 (-0.52)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	147	147	147	147	147	147	147	147
Adjusted R ²	0.530	0.465	0.374	0.346	0.263	0.366	0.132	0.259
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B. Above Median Deposit Beta Banks.								
Dependent variable:	<i>Return</i> $[0, +1]$	<i>Return</i> $[0, +3]$	<i>Crisis</i> <i>Return</i>	% Δ <i>Deposits</i>	% Δ <i>Uninsured</i> <i>Deposits</i>	% Δ <i>Tier 1</i> <i>Capital</i>	% Δ <i>Liquid</i> <i>Assets</i>	% Δ <i>NIM</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>RMI</i>	-0.010 (-1.35)	-0.008 (-0.41)	-0.010 (-0.29)	0.057* (1.78)	0.000 (0.00)	0.015 (0.65)	0.533 (1.35)	-0.000 (-0.00)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	150	150	149	150	144	150	150	150
Adjusted R ²	0.565	0.448	0.326	0.316	0.263	0.383	0.190	0.260
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table XV. Bank Risk Management, Risk Exposure and Performance During the SVB Crisis. Continued.

Panel C. Above Median Expected Mark-to-Market Losses Banks.								
Dependent variable:	<i>Return [0,+1]</i>	<i>Return [0,+3]</i>	<i>Crisis Return</i>	<i>% Δ Deposits</i>	<i>% Δ Uninsured Deposits</i>	<i>% Δ Tier 1 Capital</i>	<i>% Δ Liquid Assets</i>	<i>% Δ NIM</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>RMI</i>	0.003 (0.51)	-0.001 (-0.03)	-0.020 (-0.53)	-0.030 (-0.97)	-0.156 (-1.23)	-0.033 (-1.55)	-0.360 (-1.37)	-0.027 (-0.99)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	145	145	144	147	138	147	147	147
Adjusted R ²	0.718	0.486	0.352	0.241	0.241	0.166	0.201	0.188
Size decile fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Appendix C. Variable Definitions. Chapter One

Variables	Description	Source
Variables of interest		
<i>RMI</i>	A risk management index that represents the proportion of four risk management characteristics that are present within each bank: <i>CRO</i> ; <i>RC</i> ; <i>Active RC</i> , and <i>RM expert</i> .	Bank annual reports and proxy statements; NRG Metrics; BoardEx; Eikon; ISS Global.
<i>CRO</i>	An indicator variable that equals one if the bank has a Chief Risk Officer and zero otherwise.	Bank annual reports and proxy statements; NRG Metrics; BoardEx; Eikon; ISS Global.
<i>RC</i>	An indicator variable that equals one if the bank has a board-level risk committee and zero otherwise.	Bank annual reports and proxy statements; NRG Metrics; BoardEx; Eikon; ISS Global.
<i>Active RC</i>	An indicator equal to one if <i>RC</i> equals one and its board of directors meets more frequently than the median board of directors in its country each year.	Bank annual reports and proxy statements; NRG Metrics; BoardEx; Eikon; ISS Global.
<i>RM expert</i>	An indicator that equals one if <i>RC</i> equals one and at least one independent member of the audit committee is classified as a financial expert.	Bank annual reports and proxy statements; NRG Metrics; BoardEx; Eikon; ISS Global.
Systemic risk proxies		
<i>SRISK</i>	SRISK, scaled by market capitalization. SRISK is the expected capital shortfall (US\$ million) when the country's stock market is in the 5% left tail of returns. LRMES is the long-run marginal expected shortfall. $LRMES = 1 - \exp(-18 \times MES)$; <i>W</i> is the market value of equity, and <i>k</i> is the prudential capital ratio (set to 8%), and <i>D</i> is the book value of debt.	DataStream; Fitch Fundamentals Financial data; Authors' calculations.
<i>MES</i>	The negative of the average stock return of the bank when the country's stock market is in the 5% left tail of returns.	DataStream; Authors' calculations.
<i>LVG</i>	Market leverage. The market value of equity plus the book value of liabilities, scaled by the market value of equity.	DataStream/WorldScope; Authors' calculations.
Other bank-level variables		
<i>Size</i>	The log of the book value of assets (in US \$000s).	WorldScope.
<i>Size²</i>	The square of the log of book value of assets.	Authors' calculations.
<i>Institutional ownership</i>	Fraction of shares owned by institutional investors.	Refinitiv's Eikon database.
<i>Board independence</i>	The percentage of independent directors on the board.	Refinitiv's ESG database.
<i>ROA</i>	Net income plus interest expense divided by book value of assets.	WorldScope.
<i>MTB</i>	Market-to-book value of equity.	DataStream/WorldScope.
<i>Deposits-to-assets</i>	The ratio of total deposits to the book value of assets.	WorldScope.

Appendix C. Variable Definitions. Chapter One. Continued.

Variables	Description	Source
<i>Loans-to-assets</i>	The ratio of loans to the book value of assets.	WorldScope.
<i>Noninterest income</i>	Noninterest income-to-total income ratio.	WorldScope.
<i>Capital ratio</i>	The ratio of total equity to total assets.	WorldScope.
<i>Return</i>	Annualized buy-and-hold stock return.	DataStream; Authors' calculations.
<i>Z-Score</i>	The log of Z-Score, estimated as $(ROA + Equity/Assets)/\sigma ROA$. (σROA uses the preceding four years of data).	DataStream; Authors' calculations.
<i>Tail risk</i>	The negative of the average return on the bank's stock during the 5% worst return days for the bank's stock over the year.	Ellul and Yerramilli (2013); Authors' calculations.
<i>Low GFC return</i>	An indicator variable equal to one for banks with GFC return in the bottom tercile of the distribution in their country. GFC return is defined as the buy-and-hold returns from July 2007 through December 2008.	Fahlenbrach and Stulz (2011); Authors' calculations.
<i>Large</i>	An indicator variable equal to one if a bank's size is above the median bank size in its country each year.	Authors' calculations.
<i>Global Systemically Important Banks (GSIBs)</i>	Banks identified by the Financial Stability Board (FSB) as having the potential to cause significant disruption to the global economy upon failure or distress.	FSB G-SIB lists.
Country-level variables		
<i>Regulatory quality</i>	The first principal component of four regulatory indices; <i>Capital Stringency</i> , <i>Restrictions</i> , <i>Supervisory Power</i> , and <i>Private Monitoring</i> as set forth in Barth, et al (2013).	Barth, et al. (2013); World Bank's Bank Regulation and Supervision Surveys.
<i>Supervisory power</i>	Index measuring whether supervisory entities have authority to take action to prevent and correct problems. The index ranges from 0-16, with higher values indicating greater power.	Barth, et al. (2013); World Bank's Bank Regulation and Supervision Surveys.
<i>Restrictions</i>	Index measuring regulatory impediments to banks engaging in securities market activities, insurance activities, and real estate activities. The index ranges from 3-12, with higher values indicating more restrictions.	Barth, et al. (2013); World Bank's Bank Regulation and Supervision Surveys.
<i>Capital stringency</i>	Index measuring the stringency of regulations regarding how much capital banks must hold, as well as the sources of funds that count as regulatory capital. The index ranges from 0-10, with higher values indicating greater stringency.	Barth, et al. (2013); World Bank's Bank Regulation and Supervision Surveys.
<i>Private monitoring</i>	Index measuring whether there exist incentives/ability for the private monitoring of banks. The index ranges from 0 to 12, with higher values indicating more private oversight.	Barth, et al. (2013); World Bank's Bank Regulation and Supervision Surveys.
<i>GDP growth</i>	Annual growth rate of real GDP.	IMF World Development Indicators
<i>Inflation</i>	Percent change in Consumer Price Index (CPI). If CPI is unavailable, we use the annual change in GDP deflator.	IMF World Development Indicators

Appendix C. Variable Definitions. Chapter One. Continued.

Variables	Description	Source
<i>Market return</i>	Annual stock market return for the country. To compute returns we use the DataStream market index. If unavailable, we use the corresponding MSCI index.	DataStream; Authors' calculations.
<i>Volatility</i>	Annualized standard deviation of weekly local stock market index returns. We use the DataStream market index. If unavailable, we use the corresponding MSCI index.	DataStream; Authors' calculations.
<i>MPI</i>	A macroprudential policies index covering 12 macroprudential policies as laid out in Cerutti, et al. (2017).	Cerutti, et al. (2017); Eugenio Cerutti's website.
<i>Developed</i>	An indicator equal to one for countries that are included in Morgan Stanley Capital International's developed market index and zero otherwise.	MSCI Developed market index.
<i>Post Basel</i>	Equal to one if year is after a country has adopted at least two of the following four Basel III standards: 1) Countercyclical capital buffer (CCyB); 2) Risk-based capital (RBC 2013); 3) Monitoring tools for intraday liquidity management (IDL); and 4) LCR disclosure (DISC LCR).	Authors' calculations; Bank for International Settlements RCAP: Basel III implementation dashboard.

Appendix D. Worldwide Risk Management Reforms

Country	Reform	Year	Description. Reference
Argentina	RC	2011	The Central Bank of Argentina requires banks to appoint an independent risk committee. <i>Central Bank of Argentina Communication “A”5203 “Risk Management Guidelines for Financial Institutions”</i>
Australia	RC/CRO	2014	The Australian Prudential Regulation Authority requires that banks appoint a Chief Risk Officer with direct access to the board of directors and risk committee. The requirements also specify that the Chief Risk Officer should be solely associated with the bank’s risk function and the CRO cannot be the head of the audit, finance, or executive function of the bank. <i>Australia Prudential Standard CPS 220 Risk Management</i> .
Austria	RC/CRO	2013	The Austrian Financial Market Authority implemented Capital Requirements Directive 2013/36/EU (CRD IV) through the Regulation on Credit Institution Risk Management in 2013 and its amendment in 2014 according to the International Monetary Fund Country Report No.20/67 Technical Note report on Austria under the Financial Sector Assessment Program. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Belgium	RC/CRO	2013	Belgium implemented Capital Requirements Directive 2013/36/EU (CRD IV) as part of the 2014 Banking Act according to the Banking Regulation in Belgium: Overview by Thomson Reuters Practical Law. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Brazil	RC/CRO	2017	The Central Bank of Brazil requires banks to appoint a Chief Risk Officer who is independent of other banking functions and has a direct line of reporting to the board of directors, risk committee and Chief Executive Officer. Furthermore, banks must disclose the individual appointed to Chief Risk Officer directly to the Central Bank and dismissal requires approval of the board of directors and must be disclosed on the bank’s public website. Banks also must appoint a risk committee composed of at least three members, a majority of which cannot have been the banks CRO, employees or relatives of employees within the past six months. <i>Resolution CMN 4,557 of February 23, 2017 Chapter V Section I Articles 43-45</i> .
Canada	RC/CRO	2012	The Office of the Superintendent of Financial Institutions requires banks to create a board level risk committee composed of only non-executives and to appoint a Chief Risk Officer who operates independent of the bank’s revenue generating businesses. <i>Office of the Superintendent of Financial Institutions – Corporate Governance Guideline January 2013 Section IV</i> . (accessed through the WayBack Machine)
China	RC/CRO	2016	China Banking Regulatory Commission (CBRC) published the Comprehensive Risk Management Guidelines which requires large banks to appoint an independent Chief Risk Officer. Appointment and dismissal of the Chief Risk Officer is subject to approval by the CBRC and must be publicly released. Large banks are also required to create a risk committee. Information on risk management reforms in China comes from the IMF Country Report No. 17/403 Financial Sector Assessment Program on the People’s Republic of China.

Appendix D. Worldwide Risk Management Reforms. Continued.

Country	Reform	Year	Description. Reference
Czech Republic	RC/CRO	2013	The Czech National Bank adopted the Capital Requirements Directive 2013/36/EU (CRD IV) as evidenced by their FAQs – the Capital Requirement Directive (CRD IV) and the Capital Requirements Regulation (CRR) which can be found at cnb.cz/en/faq/ . CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Denmark	RC/CRO	2013	According to the IMF Country Report No. 14/352 Financial Sector Assessment Program – Denmark, Capital Requirements Directive 2013/36/EU (CRD IV) was being implemented in Denmark through a legislative bill in spring of 2014. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Finland	RC/CRO	2013	Finland implemented the Capital Requirements Directive 2013/36/EU (CRD IV) through the Act on Credit Institutions (610/2014) as detailed in the Thomson Reuters Practical Law Banking Regulation in Finland: Overview. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
France	CRO	2010	France requires banks to set up a risk department within banks lead by a Chief Risk Officer. The CRO requirements are introduced in the Ministerial Order of 19 January 2010 with an English summary being provided by the Journal of Regulation and Compliance.
	RC	2013	France implemented the Capital Requirements Directive 2013/36/EU (CRD IV) through the Ministerial Order no. 2014-158. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Germany	RC/CRO	2013	Germany implemented the Capital Requirements Directive 2013/36/EU (CRD IV) through a legislative act in June 2013 according to an article titled “Germany: German Legislator Decides to Cap Bonuses for Bank Staff- CRD IV Implementation Act Adopted” published by Mayer Brown written by Nicolas Rossler and Guido Zeppenfeld. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Hong Kong	CRO	2011	The Hong Kong Monetary Authority requires banks to appoint a Chief Risk Officer who has a reporting line to the board of directors. <i>Hong Kong Monetary Authority Supervisory Policy Manual IC-1 General Risk Management Controls Version 2.12/31/2010 Section 4.1.4 – 4.1.6.</i>
	RC	2012	The Hong Kong Monetary Authority has recommended banks to create a risk committee since the update to IC-1 referenced above, however, the requirement for a risk committee was introduced in the revision to CG-1 “Corporate Governance of Locally Incorporated Authorized Institutions” <i>Hong Kong Monetary Authority Circular B1/21C, B1/20C, B1/15C</i> dated August 3 rd , 2012.
India	CRO	2017	The Reserve Bank of India issued updated guidelines on Chief Risk Officers requiring that the CRO be independent of other business segments of the banks, be appointed by the board of directors and that removal of the CRO requires board approval. <i>Reserve Bank of India Notification 2016-17/294 dated April 27th, 2017.</i>

Appendix D. Worldwide Risk Management Reforms. Continued.

Country	Reform	Year	Description. Reference
Ireland	CRO	2013	The Central Bank of Ireland requires banks to appoint a Chief Risk Officer with direct access to the board of directors and the board chairperson. The CRO should be independent of other business segments and have previous experience or qualifications in risk management. <i>The Central Bank of Ireland. Corporate Governance Code for Credit Institutions and Insurance Undertakings 2013. Section 12.</i>
	RC	2010	The Central Bank of Ireland requires banks to set up a stand-alone risk committee unless the board is five or fewer members in which case the committee may be joint with the audit committee. The risk committee requirements are described as being in the November 2010 update to the Corporate Governance Code for Credit Institutions and Insurance Undertakings. Information on the Corporate Governance Code is obtained indirectly through an article published by Mason Hayes Curran in 2011 written by Rowena Fitzgerald.
Israel	CRO	2009	In the Letter of the Supervisor of Banks published as part of Israel's Banking System – Annual Survey 2009, Rony Hizkiyahu, Supervisor of Banks, states that they “instructed each bank to appoint a chief risk officer who would direct an independent risk-management function.”. This requirement was more formally specified in the Proper Conduct of Banking Business Regulation 310 as described in the 2012 Annual Report for Mizrahi Tefahot Bank Ltd.
	RC	2012	The Supervisor of Banks required banks to establish a risk committee through the issuance of the Proper Conduct of Banking Business Regulation 310 as detailed in the 2012 Annual Report for Mizrahi Tefahot Bank Ltd.
Italy	RC/CRO	2013	The Banca D'Italia implemented the Capital Requirements Directive 2013/36/EU (CRD IV) through Circular n. 285 titled “Transposition of CRD IV into Italian Law” dated December 17 th , 2013. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Japan	CRO	2015	According to the World Bank Regulation and Supervision Survey Japan requires banks to have a Chief Risk Officer and has issued the Corporate Governance Code in 2015.
Kuwait	RC/CRO	2013	The Central Bank of Kuwait requires banks to establish a risk committee as well as a head of risk management which should be independent of the bank's business units and report directly to the board of directors. <i>The Central Bank of Kuwait Circular No 2/FS, IFS312/2013 Pillar Two Section 6 and Pillar Four Section 2.</i>
Malaysia	RC	2013	The Central Bank of Malaysia requires banks and holding companies to create a risk committee composed of at least three non-executive directors with an independent director serving as committee chair. <i>Guidelines on Corporate Governance for Licensed Institutions (BNM/RH/GL 001-1) Section 2.18 and Appendix A items 9-12.</i>
Norway	RC/CRO	2013	Norway is a member of the European Economic Area agreement whose members, while not EU member states traditionally adopt the directives of the EU. Norway began adopting parts of the CRD IV regulation as early as 2013 as evidenced by IMF Country Report No. 15/258: Norway: Financial Sector Assessment Program. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Oman	RC/CRO	2012	Banks in Oman should establish an independent Operation Risk Committee which should be placed under either the Risk Committee or Chief Risk Officer, and banks should have a Chief Risk Officer with a direct reporting line to the board of directors or risk committee. <i>Central Bank of Oman Islamic Banking Regulatory Framework.</i>

Appendix D. Worldwide Risk Management Reforms. Continued.

Country	Reform	Year	Description. Reference
Peru	RC/CRO	2008	Banks in Peru are required to establish a board level risk committee and appoint a Chief Risk Officer according to the IMF Country Report No. 18/366 Financial Sector Assessment Program – Peru. The regulation cited by the IMF report is the Comprehensive Risk Management Regulation GIR – Resolution SBS No 37-2008.
Philippines	RC/CRO	2012	The Central Bank of the Philippines requires banks to establish a risk oversight committee made up of at least three members including a non-executive chairperson and an independent member. Banks must also appoint a Chief Risk Officer who is independent of the revenue generating functions. Appointment and removal of the Chief Risk Officer requires approval of the board of directors. <i>Central Bank of the Philippines Circular No. 749. Guidelines in Strengthening Corporate Governance in BSP Supervised Financial Institutions.</i>
Poland	RC/CRO	2013	Poland was in the process of implementing the Capital Requirements Directive 2013/36/EU (CRD IV) in early 2015 with the expectation that its official adoption would occur in mid-2015 according to an article published by Norton Rose Fulbright on banking reforms in Poland. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Portugal	RC/CRO	2013	Banco de Portugal adopted Capital Requirements Directive 2013/36/EU (CRD IV) in Decree-Law No 157/2014. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Qatar	RC/CRO	2015	Qatar Central Bank requires banks to appoint a Chief Risk Officer to oversee an independent risk function. Risk committee or board of directors' approval is required to remove Chief Risk Officers. Banks are also required to create an independent risk committee comprised of at least three members. <i>Qatar Central Bank Circular No. 68-2015 Principle 4: Board's Committees Item 2 and Principle 6: Risk Management Item 2.</i>
Romania	RC/CRO	2013	The National Bank of Romania implemented the Capital Requirements Directive 2013/36/EU (CRD IV) at least partially through Regulation 5/2013 according to the IMF Country Report No. 18/171 Financial Sector Assessment Program – Romania. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Russia	RC/CRO	2015	Russian banks are required to appoint a head of risk management who oversees the risk management functions of the bank. <i>Instruction of Central Bank of the Russian Federation of April 15, 2015 No.3624-U.</i>
Saudi Arabia	RC/CRO	2014	The Saudi Arabian Monetary Agency requires banks to create a board level risk committee and to appoint a Chief Risk Officer. The CRO is required to have direct access to the CEO and the board of directors and removal of the CRO requires board approval. <i>Saudi Arabian Monetary Agency Principles of Corporate Governance for Banks Operating in Saudi Arabia Item 44 and 78.</i>
Singapore	RC/CRO	2010	Singapore requires banks to create a risk committee consisting of at least 3 members a majority of which should be non-executive directors. In addition, the chair of the risk committee should be a non-executive director. Changes in the composition of the risk committee must be reported to the banking regulatory authority. Banks are also required to have a chief risk officer who is subject to terms limited to three years and are subject to approval from the banking regulator. <i>Banking (Corporate Governance) (Amendment) Regulations 2010 New Regulation 17 A and Amendment of Regulation 18.</i>

Appendix D. Worldwide Risk Management Reforms. Continued.

Country	Reform	Year	Description. Reference
South Korea	RC/CRO	2015	In accordance with the Act on Corporate Governance on Financial Companies, banks in South Korea are required to establish a risk committee and appoint an independent risk manager. <i>Act on Corporate Governance on Financial Companies Article 27 and Article 16.</i>
Spain	RC/CRO	2013	The Central Bank of Spain implemented Capital Requirements Directive 2013/36/EU (CRD IV) through Royal Decree-law 14/2013 and Circular 2/2014 of the Central Bank of Spain and the National Securities Market Commission as described in the IMF Country Report No. 17/321 Financial System Stability Assessment – Spain. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Sweden	RC/CRO	2013	Sweden implemented Capital Requirements Directive 2013/36/EU (CRD IV) through several legislative acts in 2014 as detailed in footnote 1 of the Economic Commentary provided by Sveriges Riksbank titled “The banking package – on its way to Sweden” by Camilla Ferenius and Tomas Edlund. CRD IV requires banks to establish a risk committee and appoint a head of risk management. See the CRD IV footnote below for more detail.
Switzerland	RC/CRO	2016	Swiss Financial Market Supervisory Authority (FINMA) requires that large banks defined as those in supervisory category 1 to 3 (15 billion CHF assets as of 2022 based on FINMA public category designation guidelines at finma.ch/en/supervision) to establish a risk committee comprised of a majority of independent members. FINMA further requires that the chair of the risk committee be different from the chair of the board and audit committee. Banks in categories 1 to 3 as well as other systemically important institutions must also appoint a Chief Risk Officer. <i>FINMA Circular 2017/1 Corporate governance – banks. Section IV Subsection D and Section VII Subsection B.a Items 67-68.</i>
Thailand	RC	2009	The Bank of Thailand requires that banks (“financial institutions”) establish a risk committee consisting of at least five members from the board of directors and executive suite. <i>Notification of the Bank of Thailand No. FPG. 13/2552 Corporate Governance of Financial Institutions. Section 5.7.2 Subsection 2.</i>
United Kingdom	RC/CRO	2009	FTSE 100-listed banks are required to establish a board level risk committee that is distinct from the audit committee. A Chief Risk Officer who is independent from other bank functions should be appointed by banks. The CRO cannot be removed without approval of the board of directors and should have direct access to the board risk management committee. <i>The Walker Report – A review of corporate governance in UK banks and other financial industry entities: Final recommendations. Recommendation 23 and 24.</i>
United States	RC/CRO	2010	Banks with more than \$10 billion in assets are required to create a board level risk committee. The risk committee must include at least one risk management expert and have an independent director serve as chair of the committee. Banks with more than \$50 billion in assets are required to appoint Chief Risk Officers with previous risk management experience. <i>Dodd-Frank Wall Street Reform and Consumer Protection Act. Public Law 111-203-July 21, 2010 Section 165 (h) and Federal Register Vol. 79, No. 59 Section III Subsection B.</i>

Appendix D. Worldwide Risk Management Reforms. Continued.

Country	Reform	Year	Description. Reference
European Union	RC/CRO	2013	Capital Requirements Directive 2013/36/EU (CRD IV) Sub-Section 2 Article 76 Item 3 states that “Member States shall ensure that institutions that are significant in terms of their size, internal organization and the nature, scope and complexity of their activities establish a risk committee composed of members of the management body who do not perform any executive function in the institution concerned.” Sub-Section 2 Article 76 item 5 states that “The head of the risk management function shall be an independent senior manager with distinct responsibility for the risk management function. ... The head of the risk management function shall not be removed without prior approval of the management body in its supervisory function and shall be able to have direct access to the management body in its supervisory function where necessary.”

Appendix E. Romano-Wolf Multiple-Hypotheses Correction

In this appendix we document our Romano-Wolf (RW) p -value adjustment to address the multiple-hypotheses concerns raised in Heath, Ringgenberg, Samadi, and Werner (2023). We first identify existing papers that use the reforms in our sample as shocks in their econometric setting. We then reconstruct the outcome variables from these papers within the constraints of our data. This process yielded 26 total outcome variables, 10 of which are used in our study. Table XVI documents the outcome variables and the papers they come from in addition to ours.⁶⁴

The outcome variables come from four key papers, one utilizing the same Federal Register document containing the U.S. risk management reforms (Belghitar and Gontarek (2018)); one examining the impact of the corporate governance reforms in Japan on non-financial firms (Mielcarz, Osiichuk and Pulawska (2023)); and two examining the cap on bank executive variable compensation in the EU and the UK (Colonnello, Koetter, and Wagner (2023); Kleymenova and Tuna (2021)). The variables include some of our existing risk measures (“variables of interest”), corporate governance measures such as board independence and director tenure, and other financial measures such as productivity, operating profit margin and asset turnover. We include the outcome variables from these studies in Table XVI for completeness. It is important to highlight that our key results from the paper, those presented in Table IV, do not include the U.S. or U.K reforms as they overlap with the Global Financial Crisis (GFC) period. Furthermore, we also run robustness tests, presented in the internet appendix, excluding the EU countries due to the largescale nature of the CRD reforms and confirm our findings.

Before we conduct the RW corrections we examine the robustness of our findings in an OLS setting by constructing a $[-3, +3]$ sample of reform countries compared with control countries. We do this so that we can show the robustness of our results to the RW corrections under both the traditional staggered DiD with two-way fixed effects (TWFE) and the stacked DiD frameworks. Results from the estimation of the standard staggered DiD with bank and year fixed effects are shown in Table XVII. The results confirm those of our more stringent stacked DiD framework from the main paper.

⁶⁴ As this procedure requires identifying papers that use at least one of our 39 reforms as part of their econometric setup and not simply part of the paper motivation, it is possible that there are papers and outcome variables we were unable to identify during our research on the reforms and our search for academic articles related these reforms. We believe that the currently assembled variable set, which spans governance, financial, performance, and risk variables from both banking and non-financial firms, is representative of the true set of outcome variables.

Next, we perform the RW correction procedure for both our standard and stacked DiD models. We utilize the RW STATA package (Clarke, Romano, and Wolf, 2020) to perform our analysis. Because some of our outcome variables are also controls in our main regressions and thus need to be excluded from the test, we set up STATA code to bootstrap our sample 10,000 times to generate coefficient and standard error estimates. We then take the bootstrapped values and feed them into the RW STATA command (*rwolf*) to perform the final *p*-value adjustment. The adjusted *p*-values are presented in Table XVIII. Across both models, OLS in column (1) and Stacked DiD in column (2), our key risk management and systemic risk variables remain significant at the 1% level for the *post reform x reform country* coefficient. Our channel variables from our Table VII analysis also remain significant and mirror the findings reported in the main paper. These results lend confidence that our main findings are not subject to concerns regarding the reuse of some reforms.

Table XVI. Reform Related Outcome Variables and Respective Sources.

Variables	Description	Source
<i>Variables of interest</i>		
<i>RMI</i>	A risk management index that represents the proportion of four risk management characteristics that are present within each bank: <i>CRO</i> ; <i>RMC</i> ; <i>Active RC</i> , and <i>RM expert</i> .	Variable of Interest.
<i>SRISK %</i>	SRISK, scaled by market capitalization. SRISK is the expected capital shortfall (US\$ million) when the country's stock market is in the 5% left tail of returns.	Variable of Interest; Colonnello, et al. (2023); Kleymenova and Tuna (2021).
	LRMES is the long-run marginal expected shortfall. $LRMES = 1 - \exp(-18 \times MES)$; W is the market value of equity, and k is the prudential capital ratio (set to 8%), and D is the book value of debt.	
<i>MES %</i>	The negative of the average stock return of the bank when the country's stock market is in the 5% left tail of returns.	Variable of Interest.
<i>LVG</i>	Market leverage. The market value of equity plus the book value of liabilities, scaled by the market value of equity.	Variable of Interest; Kleymenova and Tuna (2021).
<i>Tail risk</i>	The negative of the average return on the bank's stock during the 5% worst return days for the bank's stock over the year.	Variable of Interest; Belghitar and Gontarek (2018).
<i>Z-Score</i>	The log of Z-Score, estimated as $(ROA + Equity/Assets) / \sigma ROA$. (σROA uses the preceding four years of data).	Variable of Interest; Kleymenova and Tuna (2021).
<i>Deposits-to-assets</i>	The ratio of total deposits to the book value of assets.	Variable of Interest.
<i>Capital ratio</i>	The ratio of total equity to total assets.	Variable of Interest.
<i>MTB</i>	Market-to-book value of equity.	Variable of Interest.
<i>ROA</i>	Net income plus interest expense divided by book value of assets.	Variable of Interest; Colonnello, et al. (2023).
<i>Other Outcome Variables</i>		
<i>Board independence</i>	The percentage of independent directors on the board.	Mielcarz, Osiichuk, and Pulawska (2023).
<i>Compensation committee independence</i>	The percentage of independent directors on the compensation committee of the board of directors.	Mielcarz, Osiichuk, and Pulawska (2023).
<i>Tenure</i>	The average age in years of the directors on the board.	Mielcarz, Osiichuk, and Pulawska (2023).
<i>Idiosyncratic volatility</i>	The standard deviation of residuals from regressions of daily stock returns on the local stock market index return.	Kleymenova and Tuna (2021).
<i>Tier 1 capital ratio</i>	The ratio of tier 1 capital to risk weighted assets.	Kleymenova and Tuna (2021).

Table XVI. Reform Related Outcome Variables and Respective Sources. Continued.

Variables	Description	Source
<i>Risk weighted assets-to-assets</i>	The ratio of risk weighted assets to total assets.	Kleymenova and Tuna (2021)
<i>Loan loss provision-to-loans</i>	The ratio of loan loss provisions to total loans.	Kleymenova and Tuna (2021)
<i>Commercial & industrial loans-to-loans</i>	The percentage of total loans held in commercial and industrial loans.	Kleymenova and Tuna (2021)
<i>Non-performing loans-to-loans</i>	The ratio of non-performing loans to total loans.	Kleymenova and Tuna (2021)
<i>ROE</i>	The ratio of net income to total equity.	Kleymenova and Tuna (2021); Colonnello, et al. (2023); Belghitar and Gontarek (2018)
<i>Productivity</i>	The ratio of total revenue divided by the number of full-time equivalent employees. Computed for banks as (interest income + non-interest income)/employees.	Mielcarz, Osiichuk, and Pulawska (2023)
<i>Operating profit margin</i>	The ratio of operating profit to total revenues.	Mielcarz, Osiichuk, and Pulawska (2023)
<i>LRMES</i>	LRMES is the long-run marginal expected shortfall. $LRMES = 1 - \exp(-18 \times MES)$.	Kleymenova and Tuna (2021)
<i>Asset turnover</i>	The ratio of total revenue to total assets computed for banks as (interest income + non-interest income)/total assets.	Mielcarz, Osiichuk, and Pulawska (2023)
<i>Change in cash</i>	The year over year change in cash and balances due from depository institutions as a percent of assets.	Mielcarz, Osiichuk, and Pulawska (2023)
<i>Dividend payout ratio</i>	The ratio of dividends paid to net income.	Mielcarz, Osiichuk, and Pulawska (2023)

Table XVII. Risk Management Reforms and Systemic Risk. OLS.

This table presents results from regressions around the adoption of risk management reforms in the post-GFC period. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management in the post-GFC period (after 2010). We use as controls, banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank and year fixed effects, and standard errors are clustered by country.

Dependent variable:	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>
	(1)	(2)	(3)
	Not yet treated & never treated		
Post x Treat	-0.204** (-2.63)	-0.408*** (-3.00)	-2.303** (-2.56)
Size $t-1$	0.372** (2.17)	0.223 (0.93)	5.140** (2.43)
ROA $t-1$	0.061 (1.41)	0.019 (0.32)	0.851 (1.59)
MTB $t-1$	-0.249*** (-3.21)	0.394*** (3.35)	-3.614*** (-3.84)
Capital ratio $t-1$	-0.067*** (-2.99)	-0.018 (-0.43)	-0.948*** (-3.43)
Deposits-to-assets $t-1$	-0.008 (-1.22)	0.004 (0.41)	-0.086 (-1.16)
Noninterest income $t-1$	-0.003 (-0.77)	0.008 (1.11)	-0.039 (-0.91)
Post BASEL	0.078 (0.76)	-0.415** (-2.72)	0.718 (0.60)
Regulatory quality	0.017 (0.50)	0.063 (1.07)	0.119 (0.29)
GDP growth $t-1$	0.029** (2.57)	0.057** (2.18)	0.295** (2.16)
Market return $t-1$	0.022 (0.09)	0.364 (0.94)	-0.464 (-0.17)
Volatility $t-1$	0.295 (0.50)	-0.787 (-0.59)	2.493 (0.35)
Inflation $t-1$	0.014 (0.68)	0.014 (0.40)	0.138 (0.50)
MPI $t-1$	0.006 (0.11)	0.078 (1.04)	0.098 (0.16)
Observations	1,327	1,329	1,327
Adjusted R ²	0.803	0.665	0.821
Bank fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes

Table XVIII. Romano-Wolf Multiple Hypotheses P-Value Correction.

This table presents results from the Romano-Wolf (RW) multiple hypotheses *p*-value correction procedure. Coefficient estimates and standard errors are estimated from a bootstrapped sample with 10,000 replications. Column (1) presents the OLS model that mirrors Table XVII by constructing a sample of [-3,+3] observations for treatment countries and comparing them to non-treated countries. Column (1) includes Bank and year fixed effects, and standard errors are clustered by country. Column (2) presents the stacked DiD model that mirrors the main results in Table VI Panel A and include bank-by-cohort and year-by-cohort fixed effects as well as country-by-cohort clustering. Our treatment group consists of banks from countries that enact reforms targeting bank risk management in the post-GFC period (after 2010). We restrict the sample period to *t*-3, to *t*+3 around year of the risk management reform (*t*=0) for treated countries but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. The outcome variables are taken from existing literature utilizing country level reforms that included risk management reforms. Details on the outcome variables can be found in Table C1. *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. Controls in the base regressions include *Size*, *ROA*, *MTB*; *Deposits-to-assets*, *Capital Ratio*; and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. Significant outcomes from our main variables of interest at the 10% level are bolded.

Baseline model:	<i>Post Reform x Treat (Reform Country)</i>	
	OLS	Stacked DiD
	<i>p-value</i>	<i>p-value</i>
	(1)	(2)
Variables of Interest:		
<i>RMI</i>	0.0074	0.0001
<i>SRISK %</i>	0.0083	0.0006
<i>MES</i>	0.0015	0.0001
<i>LVG</i>	0.0101	0.0022
<i>Tail risk</i>	0.1229	0.0315
<i>Log Z-score</i>	0.9421	0.9997
<i>Deposits-to-assets</i>	0.3205	0.0096
<i>Capital ratio</i>	0.9822	0.9997
<i>MTB</i>	0.0024	0.0001
<i>ROA</i>	0.0079	0.0001
Additional Outcome Variables:		
<i>Board Independence</i>	0.2464	0.9997
<i>Compensation committee independence</i>	0.9389	0.9997
<i>Idiosyncratic volatility</i>	0.6354	0.9415
<i>Tier 1 Capital ratio</i>	0.6848	0.0144
<i>Risk weighted assets-to-assets</i>	0.9421	0.6042
<i>Loan loss provision-to-loans</i>	0.9932	0.9971
<i>Commercial & industrial loans-to-loans</i>	0.0101	0.9924
<i>Non-performing loans-to-loans</i>	0.1971	0.5106
<i>Average director tenure</i>	0.1971	0.0032
<i>ROE</i>	0.6899	0.9997
<i>Productivity</i>	0.6717	0.8709
<i>Operating profit margin</i>	0.9852	0.9997
<i>LRMES</i>	0.0007	0.0001
<i>Asset turnover</i>	0.2417	0.0193
<i>Change in cash</i>	0.9932	0.8672
<i>Dividend payout ratio</i>	0.1971	0.9997

Appendix F. Variable Definitions. Chapter Two

Variables	Description	Source
<i>Risk Management Variables</i>		
<i>RMI</i>	A risk management index that represents the proportion of eleven risk management characteristics that are present within each bank: 1.) <i>RC</i> ; 2.) <i>RC Size</i> ; 3.) <i>Independent RC</i> ; 4.) <i>Independent RC Chair</i> ; 5.) <i>Active RC</i> ; 6.) <i>RC Expert</i> ; 7.) <i>CRO</i> ; 8.) <i>CRO Named</i> ; 9.) <i>CRO Tenure</i> ; 10.) <i>CRO Pay Reported</i> ; and 11.) <i>CRO Top Pay</i> .	Bank annual reports and proxy statements; BoardEx
<i>RC</i>	An indicator variable that equals one if the bank has a board-level standalone risk committee and zero otherwise.	Bank annual reports and proxy statements; BoardEx
<i>RC Size</i>	An indicator variable equal to one if the size of the risk committee is larger than the median risk committee size and zero otherwise.	Bank annual reports and proxy statements; BoardEx
<i>RC Members</i>	The number of members on the risk committee.	Bank annual reports and proxy statements; BoardEx
<i>Independent RC</i>	An indicator variable equal to one if the risk committee is fully independent and zero otherwise.	Bank annual reports and proxy statements; BoardEx
<i>RC Independence %</i>	The percentage of independent directors on the risk committee.	Bank annual reports and proxy statements; BoardEx
<i>Active RC</i>	An indicator variable equal to one if the risk committee met more often than the median risk committee in 2021 and zero otherwise.	Bank annual reports and proxy statements; BoardEx
<i>RC Meetings</i>	The number of risk committee meetings.	Bank annual reports and proxy statements; BoardEx
<i>RC Expert</i>	An indicator variable equal to one if at least one member of the risk committee is a qualified financial expert and zero otherwise.	Bank annual reports and proxy statements; BoardEx
<i>CRO</i>	An indicator variable equal to one if the bank has an executive in charge of the risk management function and zero otherwise.	Bank annual reports and proxy statements; BoardEx
<i>CRO Named</i>	An indicator variable equal to one if the Chief Risk Officer is explicitly named in bank filings and zero otherwise.	Bank annual reports and proxy statements; BoardEx
<i>CRO Tenure</i>	An indicator variable equal to one if the CRO has a longer tenure in their current CRO role than the median CRO and zero otherwise.	Bank annual reports and proxy statements; BoardEx
<i>CRO Tenure in Years</i>	The number of years a CRO has served in their current role.	Bank annual reports and proxy statements; BoardEx
<i>CRO Pay Reported</i>	An indicator variable equal to one if the bank reports CRO compensation, and zero otherwise.	Bank annual reports and proxy statements; BoardEx
<i>CRO Top Pay</i>	An indicator variable equal to one if the ratio of CRO to CEO pay or CFO to CEO pay in the absence of reported CRO pay is greater than the median pay ratio and zero otherwise.	Bank annual reports and proxy statements; BoardEx

Appendix F. Variable Definitions. Chapter Two. Continued.

Variables	Description	Source
<i>CRO Pay Ratio</i>	The ratio of the fixed pay of the CRO or CFO to the fixed pay reported for the CEO.	Bank annual reports and proxy statements; BoardEx
Variables of Interest		
<i>Return [0, +t]</i>	The buy and hold stock return computed using daily closing prices from March 8 th , 2023 to day t, where t is the number of trading days.	Compustat data; Authors' calculations.
<i>Crisis Return</i>	The buy and hold stock return computed using daily closing prices from March 8 th , 2023 to May 5 th , 2023	Compustat data; Authors' calculations.
<i>% Δ Assets</i>	The percentage change in total assets from Q4 2022 to Q1 2023.	RIS database; Authors' calculations.
<i>% Δ Deposits</i>	The percentage change in total deposits from Q4 2022 to Q1 2023.	RIS database; Authors' calculations.
<i>% Δ Uninsured Deposits</i>	The percentage change in uninsured deposits from Q4 2022 to Q1 2023.	RIS database; Authors' calculations.
<i>% Δ Tier 1 Capital</i>	The percentage change in reported tier 1 capital from Q4 2022 to Q1 2023.	RIS database; Authors' calculations.
<i>% Δ Liquid Assets</i>	The percentage change in liquid assets from Q4 2022 to Q1 2023. Where liquid assets are the sum of cash, federal funds sold, repos sold, and securities with a remaining maturity of three or less months.	RIS database; Authors' calculations.
<i>% Δ AFS Securities</i>	The percentage change in available-for-sale securities from Q4 2022 to Q1 2023.	RIS database; Authors' calculations.
<i>% Δ NIM</i>	The percentage change in net interest income from Q4 2022 to Q1 2023.	RIS database; Authors' calculations.
<i>Hedger</i>	An indicator variable equal to one if a bank utilizes any interest rate derivative contracts for hedging and zero otherwise.	RIS database; Authors' calculations.
<i>Hedge-to-assets</i>	The ratio of the notional value of interest rate derivative contracts for hedging to total assets.	RIS database; Authors' calculations.
<i>Hedge-to-AFS securities</i>	The ratio of the notional value of interest rate derivative contracts for hedging to available-for-sale securities.	RIS database; Authors' calculations.
<i>Swapper</i>	An indicator variable equal to one if a bank utilizes any fixed rate interest rate swaps for hedging and zero otherwise.	RIS database; Authors' calculations.
<i>Swaps-to-assets</i>	The ratio of the notional value of interest rate swap contracts for hedging to total assets.	RIS database; Authors' calculations.
<i>Swaps-to-AFS securities</i>	The ratio of the notional value of interest rate swap contracts for hedging to available-for-sale securities.	RIS database; Authors' calculations.
<i>Tier 1 Capital Ratio</i>	The ratio of reported tier 1 capital to total assets.	RIS database; Authors' calculations.
<i>Liquid Assets-to-assets</i>	The ratio of liquid assets to total assets, where liquid assets are the sum of cash, federal funds sold, repos sold, and securities with a remaining maturity of three or less months.	RIS database; Authors' calculations.
<i>Short-term Treasuries-to-securities</i>	The ratio of treasury securities with a remaining maturity of three or less months to total securities.	RIS database; Authors' calculations.
<i>AFS Securities-to-securities</i>	The ratio of available for sale securities to total securities.	RIS database; Authors' calculations.

Appendix F. Variable Definitions. Chapter Two. Continued.

Variables	Description	Source
<i>Reclassified</i>	An indicator variable equal to one if a bank reclassified available-for-sale securities to held-to-maturity securities during 2022 where reclassification is based on the definition in Granja (2023)	RIS database; Authors' calculations.
<i>Security Maturity</i>	Is the value-weighted average maturity in years of securities.	RIS database; Authors' calculations.
<i>Deposits-to-assets</i>	The ratio of total deposit to assets.	RIS database; Authors' calculations.
<i>Uninsured Deposits-to-assets</i>	The ratio of uninsured deposits to assets.	RIS database; Authors' calculations.
<i>Time Deposits-to-assets</i>	The ratio of time deposits to assets.	RIS database; Authors' calculations.
<i>Deposit Beta</i>	The coefficient from a regression of bank-level changes in deposit interest rates on changes in the Federal Funds Rate from 1984 to 2022 from Drechsler et al. (2017, 2021).	Drechsler et al. (2017, 2021).
<i>Deposit Rate Ratio</i>	The ratio of the change in deposit interest rate to the change in Federal Funds Rate in 2022.	RIS database; Authors' calculations.
<i>Deposit Rate (basis points)</i>	The ratio of interest paid on deposits over the trailing twelve months to the total interest-bearing deposits.	RIS database; Authors' calculations.
<i>Deposit Maturity</i>	The value-weighted average maturity in years of deposits.	RIS database; Authors' calculations.
Additional Control Variables		
<i>Size</i>	The log of the book value of assets (in US \$000s).	RIS database; Authors' calculations.
<i>ROA</i>	Net income plus interest expense divided by book value of assets.	RIS database; Authors' calculations.
<i>Loans-to-assets</i>	The ratio of total loans to assets.	RIS database; Authors' calculations.
<i>Bad loans-to-assets</i>	The ratio of non-performing loans to assets.	RIS database; Authors' calculations.
<i>Noninterest income-to-income</i>	The ratio of noninterest income to income.	RIS database; Authors' calculations.
<i>Trading derivatives-to-assets</i>	The ratio derivatives held for trading purposes to assets.	RIS database; Authors' calculations.
<i>Annual Return</i>	The annual return for a bank's stock in 2021.	Compustat data; Authors' calculations.
<i>Tail Risk</i>	The negative of the average return on the bank's stock during the 5% worst return days in 2021.	Compustat data; Authors' calculations.
<i>Institutional Ownership</i>	Fraction of shares owned by institutional investors.	Thompson Reuters 13-F database.
<i>Board Independence</i>	The percentage of independent directors on the board.	BoardEx. Author's calculations.

Appendix G. Robustness Tests. Chapter One

Table XIX. Impact of Risk Management on Systemic Risk. Chief Risk Officer Named.

The table shows results from regressions assessing the impact of bank risk management on systemic risk. The dependent variables are: *SRISK*, the expected capital shortfall (in US\$ million) of a bank conditional on a crisis event, scaled by market capitalization; *MES*, the average bank return during the worst 5% of market return days in a year (multiplied by -1); and *LVG*, the market value of equity plus the book value of liabilities, scaled by the market value of equity. The key dependent variable is *RMI*, a risk management index that represents the proportion of four risk management characteristics that are present within each bank: 1) *RC*; 2) *CRO Named* is an indicator variable equal to one if a bank has an executive who is designated as a Chief Risk Officer and that individual is named and zero otherwise; 3) *RM expert*; and 4) *Active RC*. *Post-GFC* is an indicator equal to one for the years 2010 and after. *Developed* is an indicator variable equal to one for countries included in the MSCI developed market index and zero otherwise. Bank-level controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. Regressions include bank and year fixed effects. Robust *t*-statistics with standard errors clustered at the country level are reported in parentheses. All variables are defined in Appendix C.

Dependent variable:	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i> _{<i>t</i>-1} x <i>Post GFC</i> [A]	-0.573*** (-3.13)	-0.499 (-1.65)	-6.440*** (-3.04)	-0.031 (-0.18)	0.679* (1.72)	0.068 (0.04)
<i>RMI</i> _{<i>t</i>-1} x <i>Post GFC</i> x <i>Developed</i> [C]				-0.703** (-2.25)	-1.609*** (-2.85)	-8.303** (-2.38)
<i>RMI</i> _{<i>t</i>-1} x <i>Developed</i> [D]				0.639* (1.71)	1.401** (2.30)	7.671* (1.76)
<i>Post GFC</i> x <i>Developed</i>				0.081 (0.44)	-0.311 (-0.49)	1.850 (0.89)
<i>RMI</i> _{<i>t</i>-1} [B]	0.257 (1.53)	0.293 (1.13)	3.040 (1.57)	-0.235 (-0.94)	-0.704 (-1.51)	-3.018 (-1.06)
<i>Size</i> _{<i>t</i>-1}	0.092 (0.80)	0.729*** (5.76)	1.340 (0.94)	0.083 (0.75)	0.683*** (5.73)	1.285 (0.93)
<i>ROA</i> _{<i>t</i>-1}	-0.017 (-0.51)	0.019 (0.41)	-0.205 (-0.49)	-0.023 (-0.70)	-0.003 (-0.06)	-0.264 (-0.65)
<i>MTB</i> _{<i>t</i>-1}	-0.305*** (-3.03)	-0.023 (-0.38)	-4.309*** (-3.68)	-0.298*** (-2.97)	-0.002 (-0.04)	-4.233*** (-3.63)
<i>Deposits-to-assets</i> _{<i>t</i>-1}	-0.011** (-2.15)	-0.009* (-1.89)	-0.117* (-1.87)	-0.010* (-1.97)	-0.006 (-1.36)	-0.109* (-1.74)
<i>Capital ratio</i> _{<i>t</i>-1}	-0.080*** (-3.15)	-0.015 (-0.64)	-1.098*** (-3.26)	-0.081*** (-3.18)	-0.019 (-0.89)	-1.111*** (-3.28)
<i>Noninterest income</i> _{<i>t</i>-1}	0.001 (0.29)	-0.013*** (-3.32)	0.022 (0.54)	0.001 (0.33)	-0.012*** (-2.98)	0.022 (0.55)
<i>Regulatory quality</i>	0.048 (0.82)	0.009 (0.15)	0.678 (0.96)	0.050 (0.84)	0.012 (0.20)	0.698 (0.99)
<i>GDP growth</i> _{<i>t</i>-1}	0.007 (0.41)	0.002 (0.08)	0.064 (0.28)	0.008 (0.44)	0.006 (0.26)	0.063 (0.28)
<i>Market return</i> _{<i>t</i>-1}	-0.021 (-0.10)	1.077** (2.46)	-0.732 (-0.31)	0.000 (0.00)	1.164** (2.56)	-0.544 (-0.23)
<i>Volatility</i> _{<i>t</i>-1}	0.202 (0.18)	7.797*** (4.73)	-1.594 (-0.12)	0.315 (0.28)	8.352*** (5.00)	-0.792 (-0.06)
<i>Inflation</i> _{<i>t</i>-1}	-0.016 (-0.91)	0.006 (0.20)	-0.193 (-0.90)	-0.014 (-0.77)	0.015 (0.54)	-0.168 (-0.80)
<i>MPI</i> _{<i>t</i>-1}	0.025 (0.53)	-0.011 (-0.21)	0.314 (0.56)	0.021 (0.46)	-0.029 (-0.67)	0.291 (0.52)
Observations	4,956	4,958	4,956	4,956	4,958	4,956
Adjusted R ²	0.661	0.690	0.696	0.663	0.695	0.697
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
p-value of F-test [A+B] = 0	0.008	0.026	0.022			
p-value of F-test [A+B+C+D] = 0				0.018	0.015	0.038

Table XX. Impact of Risk Management on Systemic Risk. Excluding Active RC.

The table shows results from regressions assessing the impact of bank risk management on systemic risk. The dependent variables are: *SRISK*, the expected capital shortfall (in US\$ million) of a bank conditional on a crisis event, scaled by market capitalization; *MES*, the average bank return during the worst 5% of market return days in a year (multiplied by -1); and *LVG*, the market value of equity plus the book value of liabilities, scaled by the market value of equity. The key dependent variable is *RMI*, a risk management index that represents the proportion of three risk management characteristics that are present within each bank: 1) *RC*; 2) *CRO*; 3) *RM expert*. *Post-GFC* is an indicator equal to one for the years 2010 and after. *Developed* is an indicator variable equal to one for countries included in the MSCI developed market index and zero otherwise. Bank-level controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. Regressions include bank and year fixed effects. Robust *t*-statistics with standard errors clustered at the country level are reported in parentheses. All variables are defined in Appendix C.

Dependent variable:	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i> _{<i>t</i>-1} x <i>Post GFC</i> [<i>A</i>]	-0.615*** (-3.25)	-0.549* (-1.88)	-6.911*** (-3.15)	-0.055 (-0.35)	0.357 (0.93)	-0.230 (-0.14)
<i>RMI</i> _{<i>t</i>-1} x <i>Post GFC</i> x <i>Developed</i> [<i>C</i>]				-0.693** (-2.30)	-1.204** (-2.19)	-8.155** (-2.41)
<i>RMI</i> _{<i>t</i>-1} x <i>Developed</i> [<i>D</i>]				0.724* (1.80)	0.990 (1.64)	8.888* (1.87)
<i>Post GFC</i> x <i>Developed</i>				0.116 (0.59)	-0.391 (-0.62)	2.206 (1.00)
<i>RMI</i> _{<i>t</i>-1} [<i>B</i>]	0.274 (1.54)	0.338 (1.26)	3.212 (1.59)	-0.314 (-1.08)	-0.375 (-0.83)	-4.121 (-1.22)
<i>Size</i> _{<i>t</i>-1}	0.095 (0.83)	0.732*** (5.83)	1.367 (0.97)	0.084 (0.77)	0.680*** (5.75)	1.290 (0.95)
<i>ROA</i> _{<i>t</i>-1}	-0.017 (-0.52)	0.019 (0.40)	-0.211 (-0.51)	-0.023 (-0.69)	-0.000 (-0.01)	-0.261 (-0.63)
<i>MTB</i> _{<i>t</i>-1}	-0.302*** (-3.06)	-0.021 (-0.34)	-4.280*** (-3.71)	-0.296*** (-3.01)	-0.004 (-0.08)	-4.217*** (-3.68)
<i>Deposits-to-assets</i> _{<i>t</i>-1}	-0.011** (-2.11)	-0.009* (-1.87)	-0.114* (-1.83)	-0.010* (-1.96)	-0.006 (-1.42)	-0.109* (-1.73)
<i>Capital ratio</i> _{<i>t</i>-1}	-0.079*** (-3.13)	-0.014 (-0.60)	-1.088*** (-3.25)	-0.081*** (-3.22)	-0.019 (-0.83)	-1.110*** (-3.31)
<i>Noninterest income</i> _{<i>t</i>-1}	0.001 (0.24)	-0.013*** (-3.33)	0.020 (0.49)	0.001 (0.26)	-0.012*** (-2.98)	0.020 (0.48)
<i>Regulatory quality</i>	0.049 (0.83)	0.010 (0.16)	0.681 (0.98)	0.051 (0.87)	0.010 (0.17)	0.706 (1.02)
<i>GDP growth</i> _{<i>t</i>-1}	0.008 (0.43)	0.002 (0.09)	0.069 (0.30)	0.008 (0.45)	0.008 (0.33)	0.067 (0.29)
<i>Market return</i> _{<i>t</i>-1}	-0.019 (-0.10)	1.077** (2.44)	-0.707 (-0.31)	-0.002 (-0.01)	1.164** (2.55)	-0.586 (-0.25)
<i>Volatility</i> _{<i>t</i>-1}	0.185 (0.17)	7.776*** (4.73)	-1.791 (-0.14)	0.278 (0.25)	8.299*** (4.96)	-1.206 (-0.09)
<i>Inflation</i> _{<i>t</i>-1}	-0.016 (-0.91)	0.006 (0.20)	-0.192 (-0.91)	-0.014 (-0.79)	0.016 (0.54)	-0.173 (-0.82)
<i>MPI</i> _{<i>t</i>-1}	0.023 (0.50)	-0.011 (-0.21)	0.299 (0.54)	0.020 (0.43)	-0.030 (-0.72)	0.276 (0.49)
Observations	4,956	4,958	4,956	4,956	4,958	4,956
Adjusted R ²	0.662	0.690	0.697	0.664	0.694	0.698
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
p-value of F-test [<i>A</i> + <i>B</i>] = 0	0.006	0.011	0.016			
p-value of F-test [<i>A</i> + <i>B</i> + <i>C</i> + <i>D</i>] = 0				0.011	0.011	0.023

Table XXI. Determinants of Bank Risk Management Practices. Random Year Fixed Effects.

The table shows results from regressions assessing the determinants of bank risk management practices. The dependent variable *RMI*, a risk management index that represents the proportion of four risk management characteristics that are present within a bank; 1) *RC*; 2) *CRO*; 3) *RM expert*; and 4) *Active RC*. *Developed* is an indicator variable equal to one for countries included in MSCI developed market index and zero otherwise. *Post-GFC* is an indicator equal to one for the years 2010 and after. Bank-level controls include *Board independence*; *Institutional ownership*; *Size*, *Size*²; *ROA*; *MTB*; *Return*; *Deposits-to-assets*; *Capital Ratio*; *Loans-to-assets*; *Noninterest income*; and *Z-score*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. In columns (1) through (3) of Panel A we show results using country and year fixed effects; Columns (4) through (6) of Panel A include bank and year fixed effects, instead. Robust *t*-statistics with standard errors clustered at the country level are reported in parentheses. The last row shows *p*-values from *F*-tests for the significance of the sum of the coefficients [*Post GFC Developed* + *Developed*]. All variables are defined in Appendix C.

Dependent variable:	<i>RMI</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Post GFC [A]</i>	0.436*** (6.15)	0.474*** (8.22)	0.325*** (4.18)	0.644*** (8.13)	0.617*** (7.91)	0.487*** (5.57)
<i>Post GFC x Developed [B]</i>			0.152** (2.38)			0.132** (2.47)
<i>Board independence</i> _{<i>t</i>-1}	0.001 (1.20)	0.000 (0.65)	0.000 (0.60)	-0.000 (-0.16)	-0.000 (-0.14)	-0.000 (-0.18)
<i>Institutional ownership</i> _{<i>t</i>-1}		0.002*** (5.37)	0.002*** (5.48)		0.001* (1.69)	0.001* (1.77)
<i>Size</i> _{<i>t</i>-1}	0.093*** (6.70)	0.088*** (10.25)	0.088*** (10.31)	-0.046 (-0.84)	-0.039 (-0.86)	-0.036 (-0.80)
<i>ROA</i> _{<i>t</i>-1}	-0.003 (-0.21)	-0.005 (-0.44)	-0.004 (-0.36)	-0.018* (-1.89)	-0.016 (-1.53)	-0.015 (-1.46)
<i>MTB</i> _{<i>t</i>-1}	-0.031 (-1.48)	-0.034 (-1.62)	-0.036* (-1.69)	-0.027* (-1.87)	-0.033** (-2.14)	-0.035** (-2.30)
<i>Deposits-to-assets</i> _{<i>t</i>-1}	0.001 (1.57)	0.001 (0.66)	0.001 (0.57)	0.001 (0.96)	0.001 (0.74)	0.001 (0.43)
<i>Capital ratio</i> _{<i>t</i>-1}	0.011*** (3.09)	0.011*** (2.91)	0.010*** (2.80)	-0.009 (-1.54)	-0.009 (-1.52)	-0.009 (-1.53)
<i>Noninterest income</i> _{<i>t</i>-1}	0.001* (1.86)	0.000 (0.42)	0.000 (0.32)	-0.001 (-0.89)	-0.000 (-0.44)	-0.001 (-0.68)
<i>Size</i> ² _{<i>t</i>-1}		-0.008** (-2.46)	-0.008** (-2.47)		-0.018** (-2.10)	-0.017** (-2.05)
<i>Return</i> _{<i>t</i>-1}		-0.015 (-0.76)	-0.014 (-0.73)		0.005 (0.20)	0.006 (0.22)
<i>Loans-to-assets</i> _{<i>t</i>-1}		-0.001 (-0.51)	-0.001 (-0.51)		0.000 (0.06)	0.000 (0.24)
<i>Z-Score</i> _{<i>t</i>-1}		-0.025*** (-2.91)	-0.026*** (-2.92)		-0.014 (-1.44)	-0.014 (-1.48)
<i>Regulatory quality</i>	0.003 (0.23)	-0.006 (-0.45)	-0.006 (-0.45)	-0.010 (-1.01)	-0.010 (-0.97)	-0.010 (-1.03)
<i>GDP growth</i> _{<i>t</i>-1}	0.009* (1.77)	0.010* (1.97)	0.009* (1.93)	0.006 (1.43)	0.004 (1.20)	0.004 (1.18)
<i>Market return</i> _{<i>t</i>-1}	0.113** (2.10)	0.129** (2.18)	0.121** (2.11)	0.107* (2.00)	0.103 (1.44)	0.099 (1.41)
<i>Volatility</i> _{<i>t</i>-1}	-0.059 (-0.19)	-0.190 (-0.61)	-0.260 (-0.87)	-0.133 (-0.66)	-0.210 (-1.02)	-0.267 (-1.32)
<i>Inflation</i> _{<i>t</i>-1}	-0.001 (-0.32)	0.002 (0.40)	0.001 (0.28)	0.000 (0.06)	0.001 (0.17)	0.000 (0.07)
Observations	4,468	4,266	4,266	4,435	4,236	4,236
Adjusted R ²	0.393	0.405	0.407	0.727	0.728	0.729
Country fixed effects	Yes	Yes	Yes	No	No	No
Bank fixed effects	No	No	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>p</i> -value <i>F</i> -test [<i>A+B=0</i>]			0.022			0.018

Table XXII. Determinants of Risk Management Practices. Risk Management Components.

The table shows results from regressions assessing the determinants of bank risk management practices. The dependent variables are the components of *RMI*; 1) *RC*; 2) *CRO*; 3) *RM expert*; and 4) *Active RC*. *Developed* is an indicator variable equal to one for countries included in the MSCI developed market index and zero otherwise. *Post-GFC* is an indicator equal to one for the years 2010 and after. Panel A shows results for *RMC*. Panel B shows results for *CRO*. Panel C shows results for *RM expert*. Panel D shows results for *Active RC*. Controls (omitted for brevity) include bank-level controls include *Board independence*; *Institutional ownership*; *Size*, *Size²*; *ROA*; *MTB*; *Return*; *Deposits-to-assets*; *Capital Ratio*; *Loans-to-assets*; *Noninterest income*; and *Z-score*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. In columns (1) through (3) of each panel we show results using country and year fixed effects; Columns (4)-(6) of each panel include bank and year fixed effects, instead. Robust *t*-statistics with standard errors clustered at the country level are reported in parentheses. The last row shows *p*-values from *F*-tests for the significance of the sum of the coefficients [*Post GFC* x *Developed* + *Developed*]. All variables are defined in Appendix C.

Panel A. Determinants of Risk Committees						
Dependent variable:	<i>RC</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Post GFC</i> [A]	0.130*	0.195**	0.054	0.184**	0.216***	0.104
	(1.70)	(2.45)	(0.47)	(2.43)	(2.72)	(1.01)
<i>Post GFC</i> x <i>Developed</i> [B]			0.054			0.104
			(0.47)			(1.01)
Observations	4,468	4,266	4,266	4,435	4,236	4,236
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.373	0.398	0.399	0.755	0.758	0.759
Country fixed effects	Yes	Yes	Yes	No	No	No
Bank fixed effects	No	No	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>p</i> -value <i>F</i> -test [A+B=0]			0.014			0.009
Panel B. Determinants of Chief Risk Officer						
Dependent variable:	<i>CRO</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Post GFC</i> [A]	0.264***	0.274***	0.133	0.265***	0.256***	0.072
	(3.66)	(3.63)	(1.62)	(4.72)	(4.21)	(0.95)
<i>Post GFC</i> x <i>Developed</i> [B]			0.151***			0.198***
			(2.71)			(3.70)
Observations	4,468	4,266	4,266	4,435	4,236	4,236
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.280	0.267	0.267	0.702	0.700	0.702
Country fixed effects	Yes	Yes	Yes	No	No	No
Bank fixed effects	No	No	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>p</i> -value <i>F</i> -test [A+B=0]			0.000			0.000
Panel C. Determinants of Risk Management Expert						
Dependent variable:	<i>RM Expert</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Post GFC</i> [A]	0.361***	0.409***	0.224*	0.419***	0.463***	0.337***
	(4.29)	(5.43)	(1.93)	(4.24)	(4.52)	(2.76)
<i>Post GFC</i> x <i>Developed</i> [B]			0.198**			0.136*
			(2.12)			(1.73)
Observations	4,468	4,266	4,266	4,435	4,236	4,236
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.346	0.362	0.363	0.666	0.670	0.670
Country fixed effects	Yes	Yes	Yes	No	No	No
Bank fixed effects	No	No	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>p</i> -value <i>F</i> -test [A+B=0]			0.000			0.000

Table XXII. Determinants of Risk Management Practices. Risk Management Components. Continued.

Panel D. Determinants of Active Risk Committees						
Dependent variable:	<i>Active RC</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Post GFC [A]</i>	0.083	0.107	-0.036	0.127*	0.126*	0.023
	(1.06)	(1.18)	(-0.41)	(1.85)	(1.76)	(0.26)
<i>Post GFC x Developed [B]</i>			0.156**			0.113*
			(2.25)			(1.92)
Observations	3,995	3,832	3,832	3,962	3,801	3,801
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	0.142	0.148	0.148	0.491	0.497	0.497
Country fixed effects	Yes	Yes	Yes	No	No	No
Bank fixed effects	No	No	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>p-value F-test [A+B=0]</i>			0.196			0.070

Table XXIII. Impact of Risk Management on Systemic Risk. Governance Controls.

The table shows results from regressions assessing the impact of bank risk management on systemic risk. The dependent variables are: *SRISK*, the expected capital shortfall (in US\$ million) of a bank conditional on a crisis event, scaled by market capitalization; *MES*, the average bank return during the worst 5% of market return days in a year (multiplied by -1); and *LVG*, the market value of equity plus the book value of liabilities, scaled by the market value of equity. The key dependent variable is *RMI*, a risk management index that represents the proportion of four risk management characteristics that are present within each bank: 1) *RC*; 2) *CRO*; 3) *RM expert*; and 4) *Active RC*. *Post-GFC* is an indicator equal to one for the years 2010 and after. *Developed* is an indicator variable equal to one for countries included in the MSCI developed market index and zero otherwise. Bank-level controls include *Institutional Ownership*, *Board Independence*, *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. Regressions include bank and year fixed effects. Robust *t*-statistics with standard errors clustered at the country level are reported in parentheses. All variables are defined in Appendix C.

Dependent variable:	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i> _{<i>t-1</i>} x <i>Post GFC</i> [A]	-0.562** (-2.59)	-0.437 (-1.22)	-6.468** (-2.52)	-0.367* (-1.80)	1.122** (2.39)	-4.716** (-2.06)
<i>RMI</i> _{<i>t-1</i>} x <i>Post GFC</i> x <i>Developed</i> [C]				-0.227 (-0.72)	-1.931*** (-3.11)	-1.915 (-0.55)
<i>RMI</i> _{<i>t-1</i>} x <i>Developed</i> [D]				0.481 (1.19)	1.540** (2.22)	5.462 (1.13)
<i>Post GFC</i> x <i>Developed</i>				-0.327 (-1.55)	-0.395 (-0.54)	-3.317 (-1.41)
<i>RMI</i> _{<i>t-1</i>} [B]	0.331 (1.46)	0.207 (0.65)	4.125 (1.55)	-0.041 (-0.16)	-1.020* (-1.81)	-0.179 (-0.06)
<i>Board Independence</i> _{<i>t-1</i>}	0.000 (0.15)	0.001 (0.38)	0.009 (0.31)	0.000 (0.20)	0.001 (0.52)	0.010 (0.36)
<i>Institutional Ownership</i> _{<i>t-1</i>}	-0.007*** (-3.23)	0.006*** (3.14)	-0.080*** (-3.02)	-0.007*** (-3.41)	0.006*** (3.11)	-0.082*** (-3.17)
<i>Size</i> _{<i>t-1</i>}	0.099 (0.71)	0.589*** (4.16)	1.487 (0.87)	0.088 (0.67)	0.581*** (4.55)	1.367 (0.84)
<i>ROA</i> _{<i>t-1</i>}	-0.016 (-0.54)	0.049 (0.89)	-0.241 (-0.63)	-0.020 (-0.66)	0.033 (0.65)	-0.273 (-0.71)
<i>MTB</i> _{<i>t-1</i>}	-0.360*** (-3.48)	-0.085 (-1.12)	-4.952*** (-4.12)	-0.356*** (-3.42)	-0.051 (-0.73)	-4.931*** (-4.07)
<i>Deposits-to-assets</i> _{<i>t-1</i>}	-0.007 (-1.27)	-0.011** (-2.23)	-0.065 (-0.97)	-0.006 (-1.08)	-0.007 (-1.53)	-0.056 (-0.83)
<i>Capital ratio</i> _{<i>t-1</i>}	-0.084*** (-3.07)	-0.037 (-1.35)	-1.120*** (-3.13)	-0.085*** (-3.20)	-0.037 (-1.42)	-1.135*** (-3.26)
<i>Noninterest income</i> _{<i>t-1</i>}	0.001 (0.29)	-0.011*** (-2.90)	0.022 (0.57)	0.001 (0.44)	-0.010** (-2.38)	0.027 (0.69)
<i>Regulatory quality</i>	0.038 (0.68)	-0.018 (-0.27)	0.571 (0.84)	0.041 (0.73)	-0.010 (-0.15)	0.599 (0.89)
<i>GDP growth</i> _{<i>t-1</i>}	0.003 (0.14)	0.002 (0.08)	-0.004 (-0.02)	0.003 (0.15)	0.008 (0.33)	-0.007 (-0.03)
<i>Market return</i> _{<i>t-1</i>}	-0.090 (-0.47)	1.071** (2.48)	-1.630 (-0.75)	-0.091 (-0.48)	1.104** (2.61)	-1.669 (-0.77)
<i>Volatility</i> _{<i>t-1</i>}	-0.351 (-0.33)	7.164*** (4.88)	-8.341 (-0.67)	-0.141 (-0.13)	7.662*** (5.16)	-6.188 (-0.48)
<i>Inflation</i> _{<i>t-1</i>}	-0.010 (-0.50)	-0.007 (-0.20)	-0.118 (-0.52)	-0.009 (-0.51)	0.005 (0.15)	-0.124 (-0.58)
<i>MPI</i> _{<i>t-1</i>}	0.031 (0.79)	-0.004 (-0.07)	0.401 (0.84)	0.025 (0.63)	-0.032 (-0.65)	0.352 (0.72)
Observations	4,282	4,284	4,282	4,282	4,284	4,282
Adjusted R ²	0.694	0.701	0.724	0.695	0.706	0.725
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
p-value of F-test [A+B] = 0	0.091	0.021	0.165			
p-value of F-test [A+B+C+D] = 0				0.254	0.011	0.413

Table XXIV. Impact of Risk Management on Systemic Risk. Non-U.S. Banks.

The table shows results from regressions assessing the impact of bank risk management on systemic risk excluding US banks. The dependent variables are: *SRISK*, the expected capital shortfall (in US\$ million) of a bank conditional on a crisis event, scaled by market capitalization; *MES*, the average bank return during the worst 5% of market return days in a year (multiplied by -1); and *LVG*, the market value of equity plus the book value of liabilities, scaled by the market value of equity. The key dependent variable is *RMI*, a risk management index that represents the proportion of four risk management characteristics that are present within each bank: 1) *RC*; 2) *CRO*; 3) *RM expert*; and 4) *Active RC*. *Post-GFC* is an indicator equal to one for the years 2010 and after. *Developed* is an indicator variable equal to one for countries included in the MSCI developed market index and zero otherwise. Bank-level controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. Regressions include bank and year fixed effects. Robust *t*-statistics with standard errors clustered at the country level are reported in parentheses. All variables are defined in Appendix C.

Dependent variable:	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i> _{<i>t-1</i>} x <i>Post GFC</i> [A]	-0.595*** (-2.86)	-0.368 (-1.20)	-6.959*** (-2.90)	-0.028 (-0.14)	0.472 (1.12)	0.004 (0.00)
<i>RMI</i> _{<i>t-1</i>} x <i>Post GFC</i> x <i>Developed</i> [C]				-0.761** (-2.23)	-1.219* (-1.98)	-9.200** (-2.46)
<i>RMI</i> _{<i>t-1</i>} x <i>Developed</i> [D]				0.803* (1.75)	0.569 (0.97)	10.165* (1.91)
<i>Post GFC</i> x <i>Developed</i>				0.125 (0.60)	0.352 (0.85)	2.075 (0.88)
<i>RMI</i> _{<i>t-1</i>} [B]	0.241 (1.08)	0.323 (1.11)	2.937 (1.13)	-0.358 (-1.28)	-0.117 (-0.26)	-4.733 (-1.51)
<i>Size</i> _{<i>t-1</i>}	0.148 (0.92)	0.591*** (3.10)	1.970 (0.99)	0.131 (0.83)	0.564*** (3.05)	1.822 (0.92)
<i>ROA</i> _{<i>t-1</i>}	-0.020 (-0.47)	-0.009 (-0.18)	-0.180 (-0.34)	-0.028 (-0.67)	-0.024 (-0.47)	-0.262 (-0.51)
<i>MTB</i> _{<i>t-1</i>}	-0.460*** (-5.46)	-0.034 (-0.41)	-6.007*** (-5.67)	-0.453*** (-5.28)	-0.019 (-0.23)	-5.921*** (-5.46)
<i>Deposits-to-assets</i> _{<i>t-1</i>}	-0.008 (-1.27)	-0.005 (-0.87)	-0.090 (-1.15)	-0.008 (-1.16)	-0.003 (-0.55)	-0.082 (-1.05)
<i>Capital ratio</i> _{<i>t-1</i>}	-0.090** (-2.42)	0.003 (0.08)	-1.303*** (-2.78)	-0.094** (-2.56)	0.000 (0.01)	-1.348*** (-2.92)
<i>Noninterest income</i> _{<i>t-1</i>}	-0.003 (-0.70)	-0.010** (-2.45)	-0.019 (-0.39)	-0.003 (-0.73)	-0.010** (-2.24)	-0.021 (-0.45)
<i>Regulatory quality</i>	0.063 (1.03)	0.045 (0.68)	0.745 (1.04)	0.066 (1.09)	0.049 (0.78)	0.770 (1.08)
<i>GDP growth</i> _{<i>t-1</i>}	0.017 (0.86)	0.012 (0.58)	0.177 (0.74)	0.016 (0.86)	0.013 (0.65)	0.169 (0.72)
<i>Market return</i> _{<i>t-1</i>}	0.228 (1.28)	0.473 (1.52)	2.096 (0.98)	0.246 (1.40)	0.509 (1.64)	2.263 (1.07)
<i>Volatility</i> _{<i>t-1</i>}	0.995 (0.95)	6.779*** (4.02)	8.224 (0.67)	1.082 (1.03)	6.817*** (4.27)	8.886 (0.72)
<i>Inflation</i> _{<i>t-1</i>}	-0.032* (-1.95)	-0.002 (-0.06)	-0.379* (-1.96)	-0.030* (-1.85)	0.005 (0.20)	-0.358* (-1.87)
<i>MPI</i> _{<i>t-1</i>}	-0.022 (-0.59)	-0.076** (-2.35)	-0.174 (-0.37)	-0.023 (-0.61)	-0.075** (-2.27)	-0.182 (-0.39)
Observations	3,137	3,139	3,137	3,137	3,139	3,137
Adjusted R ²	0.661	0.635	0.684	0.662	0.637	0.685
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
p-value of F-test [A+B] = 0	0.023	0.687	0.038			
p-value of F-test [A+B+C+D] = 0				0.075	0.028	0.116

Table XXV. Impact of Risk Management on Systemic Risk. PCA Measure.

The table shows results from regressions assessing the impact of bank risk management on systemic risk. The dependent variables are: *SRISK*, the expected capital shortfall (in US\$ million) of a bank conditional on a crisis event, scaled by market capitalization; *MES*, the average bank return during the worst 5% of market return days in a year (multiplied by -1); and *LVG*, the market value of equity plus the book value of liabilities, scaled by the market value of equity. The key dependent variable is *RMI*, a risk management index that represents the first principal component of three risk management characteristics that are present within each bank: 1) *RC*; 2) *CRO*; and 3) *RM expert*. *Post-GFC* is an indicator equal to one for the years 2010 and after. *Developed* is an indicator variable equal to one for countries included in the MSCI developed market index and zero otherwise. Bank-level controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. Regressions include bank and year fixed effects. Robust *t*-statistics with standard errors clustered at the country level are reported in parentheses. All variables are defined in Appendix C.

Dependent variable:	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>	<i>SRISK</i>	<i>MES</i>	<i>LVG</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>RMI</i> _{<i>t-1</i>} x <i>Post GFC</i> [A]	-0.189*** (-2.97)	-0.154 (-1.66)	-2.177*** (-2.90)	-0.093* (-1.93)	0.158 (1.04)	-1.093* (-1.91)
<i>RMI</i> _{<i>t-1</i>} x <i>Post GFC</i> x <i>Developed</i> [C]				-0.111 (-1.28)	-0.383* (-1.96)	-1.227 (-1.24)
<i>RMI</i> _{<i>t-1</i>} x <i>Developed</i> [D]				0.137 (1.23)	0.312 (1.45)	1.635 (1.18)
<i>Post GFC</i> x <i>Developed</i>				-0.284** (-2.65)	-1.192 (-1.65)	-2.526* (-1.97)
<i>RMI</i> _{<i>t-1</i>} [B]	0.093 (1.55)	0.089 (1.02)	1.137 (1.63)	-0.024 (-0.33)	-0.164 (-0.92)	-0.270 (-0.29)
<i>Size</i> _{<i>t-1</i>}	0.101 (0.75)	0.591*** (4.83)	1.467 (0.89)	0.090 (0.69)	0.547*** (4.44)	1.361 (0.85)
<i>ROA</i> _{<i>t-1</i>}	-0.004 (-0.12)	0.020 (0.37)	-0.049 (-0.12)	-0.007 (-0.23)	0.004 (0.09)	-0.083 (-0.21)
<i>MTB</i> _{<i>t-1</i>}	-0.339*** (-3.40)	-0.137* (-1.96)	-4.679*** (-4.05)	-0.335*** (-3.38)	-0.117* (-1.79)	-4.639*** (-4.03)
<i>Deposits-to-assets</i> _{<i>t-1</i>}	-0.010* (-1.75)	-0.010* (-1.98)	-0.105 (-1.50)	-0.010 (-1.68)	-0.007 (-1.62)	-0.101 (-1.45)
<i>Capital ratio</i> _{<i>t-1</i>}	-0.095*** (-3.41)	-0.051** (-2.14)	-1.258*** (-3.42)	-0.096*** (-3.48)	-0.053*** (-2.18)	-1.266*** (-3.47)
<i>Noninterest income</i> _{<i>t-1</i>}	0.001 (0.28)	-0.010*** (-2.84)	0.023 (0.51)	0.001 (0.32)	-0.009** (-2.45)	0.023 (0.52)
<i>Regulatory quality</i>	0.052 (0.86)	0.035 (0.60)	0.704 (0.98)	0.053 (0.88)	0.034 (0.57)	0.713 (1.00)
<i>GDP growth</i> _{<i>t-1</i>}	0.010 (0.49)	0.007 (0.29)	0.087 (0.35)	0.011 (0.54)	0.013 (0.56)	0.091 (0.37)
<i>Market return</i> _{<i>t-1</i>}	-0.082 (-0.41)	1.095** (2.40)	-1.509 (-0.64)	-0.085 (-0.42)	1.103** (2.50)	-1.553 (-0.66)
<i>Volatility</i> _{<i>t-1</i>}	-0.041 (-0.03)	7.444*** (4.87)	-5.144 (-0.37)	0.054 (0.04)	7.790*** (5.19)	-4.234 (-0.30)
<i>Inflation</i> _{<i>t-1</i>}	-0.008 (-0.40)	-0.006 (-0.19)	-0.094 (-0.41)	-0.006 (-0.31)	0.005 (0.14)	-0.080 (-0.35)
<i>MPI</i> _{<i>t-1</i>}	0.024 (0.55)	-0.020 (-0.39)	0.304 (0.58)	0.021 (0.48)	-0.037 (-0.86)	0.284 (0.53)
Observations	4,376	4,378	4,376	4,376	4,378	4,376
Adjusted R ²	0.673	0.700	0.704	0.673	0.703	0.705
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
p-value of F-test [A+B] = 0	0.013	0.024	0.028			
p-value of F-test [A+B+C+D] = 0				0.028	0.017	0.052

Table XXVI. Risk Management Reforms and Systemic Risk. Bad-controls Correction.

This table presents results from event-based stacked regressions around the adoption of risk management reforms. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management in the post-GFC period (after 2010). We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Columns (1)–(3) show baseline results. Columns (4)–(6) show results including interactions with *Most Impacted*—an indicator variable equal to one for banks that do not have a CRO or a risk committee as of $t-1$ relative to enactment of the risk management reform and zero otherwise. Controls (measured as of the year before the reform to address the “bad controls” issue (Angrist and Pischke, 2009)) include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Dependent variable:	SRISK	MES	LVG	SRISK	MES	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Control group:	Not yet treated & never treated					
Post x Treat	-0.273*** (-3.09)	-0.385** (-2.51)	-3.071*** (-2.73)	-0.177* (-1.88)	-0.321** (-2.13)	-1.874 (-1.60)
Post x Treat x Most Impacted				-0.442*** (-3.21)	-0.646*** (-3.24)	-5.414*** (-3.14)
Post x Most Impacted				0.210** (2.49)	0.686*** (5.08)	2.235** (2.11)
Size pre-reform x Post	-0.093*** (-2.83)	-0.024 (-0.71)	-1.186*** (-2.87)	-0.079** (-2.47)	-0.012 (-0.34)	-1.030** (-2.58)
ROA pre-reform x Post	0.073*** (2.75)	0.002 (0.05)	0.903*** (2.81)	0.072*** (2.87)	-0.017 (-0.45)	0.911*** (2.98)
MTB pre-reform x Post	-0.049 (-0.96)	-0.057 (-1.00)	-0.623 (-0.97)	-0.038 (-0.71)	-0.020 (-0.36)	-0.519 (-0.77)
Capital ratio pre-reform x Post	-6.323** (-2.53)	-0.265 (-0.17)	-75.779** (-2.46)	-5.836** (-2.43)	0.742 (0.47)	-70.578** (-2.38)
Deposits-to-assets pre-reform x Post	0.009*** (3.79)	0.005 (1.33)	0.099*** (3.51)	0.009*** (3.66)	0.005 (1.44)	0.096*** (3.38)
Noninterest income pre-reform x Post	0.004 (1.39)	0.008** (2.01)	0.047 (1.23)	0.001 (0.51)	0.007* (1.86)	0.011 (0.37)
Post BASEL	-0.100* (-1.89)	-0.219* (-1.76)	-1.638** (-2.44)	-0.101* (-1.84)	-0.247** (-2.14)	-1.639** (-2.34)
Regulatory quality	-0.037 (-1.26)	0.109*** (2.83)	-0.623* (-1.67)	-0.025 (-0.88)	0.099*** (2.81)	-0.456 (-1.26)
GDP growth $t-1$	0.010 (1.57)	0.025** (2.10)	0.055 (0.68)	0.014** (2.34)	0.026** (2.26)	0.107 (1.39)
Market return $t-1$	-0.036 (-0.44)	0.952*** (5.42)	-1.970** (-1.98)	-0.018 (-0.22)	0.923*** (5.26)	-1.736* (-1.77)
Volatility $t-1$	0.187 (0.38)	-0.244 (-0.35)	1.561 (0.26)	0.047 (0.10)	-0.266 (-0.39)	-0.233 (-0.04)
Inflation $t-1$	-0.005 (-0.33)	0.070*** (2.67)	-0.091 (-0.47)	-0.002 (-0.11)	0.066*** (2.64)	-0.048 (-0.25)
MPI $t-1$	0.077*** (2.66)	0.186*** (4.43)	0.819** (2.22)	0.076** (2.61)	0.205*** (4.96)	0.802** (2.18)
Observations	3,981	3,983	3,981	3,936	3,938	3,936
Adjusted R ²	0.764	0.629	0.784	0.790	0.631	0.807
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XXVII. Risk Management Reforms and Systemic Risk. Lagged Systemic Risk Controls.

This table presents results from event-based stacked regressions around the adoption of risk management reforms. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management. We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Columns (1)-(3) show baseline results. Columns (4)-(6) show results including interactions with *Most Impacted*— an indicator variable equal to one for banks that do not have a CRO or a risk committee as of $t-1$ relative to enactment of the risk management reform and zero otherwise. Controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, *Noninterest income*, and the lagged value of the systemic risk measure. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Dependent variable:	SRISK	MES	LVG	SRISK	MES	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Control group:	Never treated					
Post x Treat	-0.186*** (-2.75)	-0.461*** (-3.24)	-1.857** (-2.28)	-0.127* (-1.87)	-0.405*** (-2.72)	-1.171 (-1.44)
Post x Treat x Most				-0.282** (-2.22)	-0.624*** (-3.06)	-3.182** (-2.00)
Post x Most Impacted				0.172** (2.36)	0.684*** (5.65)	1.771* (1.91)
Size $t-1$	0.471*** (4.56)	-0.271 (-1.35)	6.302*** (4.86)	0.527*** (4.55)	-0.198 (-1.01)	7.019*** (4.83)
ROA $t-1$	0.029 (1.50)	0.032 (0.86)	0.368 (1.50)	0.043* (1.92)	0.028 (0.80)	0.512* (1.81)
MTB $t-1$	-0.111*** (-3.56)	0.271*** (5.54)	-1.184*** (-2.97)	-0.075** (-2.60)	0.300*** (6.21)	-0.759*** (-2.02)
Capital ratio $t-1$	0.022 (1.01)	-0.049 (-1.65)	0.327 (1.15)	0.026 (1.16)	-0.033 (-1.14)	0.363 (1.24)
Deposits-to-assets $t-1$	0.000 (0.15)	-0.013** (-2.41)	0.020 (0.52)	-0.001 (-0.39)	-0.010** (-2.05)	-0.001 (-0.03)
Noninterest income $t-1$	0.007** (2.26)	0.009** (2.59)	0.068* (1.91)	0.006** (2.27)	0.008** (2.13)	0.066* (1.93)
Post BASEL	-0.053 (-0.97)	-0.281** (-2.36)	-1.037 (-1.49)	-0.049 (-0.83)	-0.303*** (-2.80)	-0.993 (-1.32)
Regulatory quality	-0.007 (-0.34)	0.095*** (2.66)	-0.203 (-0.84)	0.003 (0.16)	0.089*** (2.74)	-0.056 (-0.23)
GDP growth $t-1$	0.018*** (3.12)	0.027** (2.21)	0.161** (2.21)	0.021*** (3.75)	0.029** (2.54)	0.199*** (2.80)
Market return $t-1$	0.234*** (3.05)	0.823*** (5.44)	1.745* (1.91)	0.220*** (2.81)	0.785*** (5.46)	1.656* (1.77)
Volatility $t-1$	0.517 (1.16)	0.300 (0.36)	10.913** (2.02)	0.310 (0.66)	0.163 (0.19)	8.456 (1.47)
Inflation $t-1$	-0.012 (-0.90)	0.073*** (3.28)	-0.197 (-1.21)	-0.007 (-0.50)	0.074*** (3.37)	-0.134 (-0.83)
MPI $t-1$	0.013 (0.55)	0.184*** (4.25)	0.081 (0.25)	0.018 (0.70)	0.201*** (4.65)	0.133 (0.40)
SRISK $t-1$	0.352*** (6.25)			0.355*** (6.36)		
MES $t-1$		-0.057** (-2.12)			-0.053** (-1.99)	
LVG $t-1$			0.383*** (6.25)			0.388*** (6.40)
Observations	4.201	4.203	4.201	4.076	4.078	4.076
Adjusted R ²	0.782	0.634	0.806	0.814	0.633	0.834
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XXVIII. Risk Management Reforms and Systemic Risk. Capital and Liquidity Controls.

This table presents results from event-based stacked regressions around the adoption of risk management reforms in the post-GFC period. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management in the post-GFC period (after 2010). We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Columns (1)-(3) show baseline results. Columns (4)-(6) show results including interactions with *Most Impacted*—an indicator variable equal to one for banks that do not have a CRO or a risk committee as of $t-1$ relative to enactment of the risk management reform and zero otherwise. Controls include *Tier 1 risk-based capital ratio*, *Liquid assets-to-assets*, *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Table XXVIII. Risk Management Reforms and Systemic Risk. Capital and Liquidity Controls. Continued.

Dependent variable:	SRISK	MES	LVG	SRISK	MES	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Control group:	Not yet treated & never treated					
Post x Treat	-0.231** (-2.53)	-0.616*** (-3.74)	-2.237** (-2.06)	-0.186* (-1.85)	-0.567*** (-3.41)	-1.660 (-1.39)
Post x Treat x Most Impacted				-0.363*** (-2.62)	-0.509** (-2.23)	-4.515*** (-2.67)
Post x Most Impacted				0.215*** (2.73)	0.638*** (4.99)	2.262** (2.24)
Tier 1 risk-based capital ratio $t-1$	-1.418 (-1.33)	-1.897 (-1.37)	-21.130 (-1.59)	-1.476 (-1.36)	-1.844 (-1.36)	-21.830 (-1.61)
Liquid assets-to-assets $t-1$	0.139 (0.42)	1.971*** (3.83)	0.503 (0.13)	0.073 (0.22)	1.893*** (3.73)	-0.205 (-0.05)
Size $t-1$	0.760*** (5.31)	-0.297 (-1.18)	9.947*** (5.52)	0.787*** (5.13)	-0.254 (-1.04)	10.250*** (5.35)
ROA $t-1$	-0.007 (-0.19)	-0.056 (-1.22)	-0.104 (-0.25)	-0.001 (-0.02)	-0.055 (-1.26)	-0.032 (-0.08)
MTB $t-1$	-0.187*** (-4.37)	0.321*** (5.43)	-2.617*** (-5.05)	-0.175*** (-4.13)	0.327*** (5.60)	-2.460*** (-4.82)
Capital ratio $t-1$	0.026 (0.53)	-0.030 (-0.98)	0.230 (0.39)	0.029 (0.59)	-0.028 (-0.92)	0.263 (0.44)
Deposits-to-assets $t-1$	-0.003 (-0.77)	-0.008 (-1.35)	-0.032 (-0.60)	-0.003 (-0.65)	-0.007 (-1.17)	-0.026 (-0.47)
Noninterest income $t-1$	0.001 (0.38)	0.010** (2.03)	0.006 (0.14)	0.001 (0.31)	0.010* (1.94)	0.004 (0.08)
Post BASEL	-0.054 (-0.60)	-0.406*** (-4.30)	-0.727 (-0.66)	-0.069 (-0.73)	-0.426*** (-4.68)	-0.884 (-0.77)
Regulatory quality	-0.043 (-1.07)	0.120*** (2.68)	-0.629 (-1.25)	-0.036 (-0.88)	0.104** (2.50)	-0.526 (-1.03)
GDP growth $t-1$	0.024*** (2.71)	0.032** (2.33)	0.226** (2.01)	0.028*** (3.18)	0.033** (2.44)	0.281** (2.47)
Market return $t-1$	0.320** (2.52)	0.732*** (4.14)	2.997** (2.00)	0.326** (2.56)	0.680*** (3.87)	3.112** (2.09)
Volatility $t-1$	1.191** (2.26)	0.197 (0.23)	13.343*** (2.03)	0.660 (1.15)	0.036 (0.04)	6.899 (0.97)
Inflation $t-1$	0.009 (0.54)	0.080*** (3.39)	0.095 (0.44)	0.009 (0.51)	0.079*** (3.37)	0.088 (0.41)
MPI $t-1$	0.012 (0.44)	0.248*** (5.15)	-0.032 (-0.10)	0.011 (0.43)	0.260*** (5.36)	-0.048 (-0.15)
Observations	3,243	3,245	3,243	3,191	3,193	3,191
Adjusted R ²	0.784	0.647	0.801	0.788	0.649	0.804
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XXIX. Impact of Risk Management on Systemic Risk. Hedging Analysis.

The table shows results from regressions assessing the impact of bank risk management on bank-level hedging. The dependent variables are: *Hedger*, an indicator variable equal to one for banks with non-zero values on derivative contracts used for hedging and zero otherwise; and *Ln(Hedge)*, is the natural logarithm of (1 + fair value of derivatives used for hedging). The key dependent variable is *RMI*, a risk management index that represents the proportion of four risk management characteristics that are present within each bank: 1) *RC*; 2) *CRO*; 3) *RM expert*; and 4) *Active RC*. *Post-GFC* is an indicator equal to one for the years 2010 and after. *Developed* is an indicator variable equal to one for countries included in the MSCI developed market index and zero otherwise. Bank-level controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, and *Inflation*. Regressions include bank and year fixed effects. Robust *t*-statistics with standard errors clustered at the country level are reported in parentheses. All variables are defined in Appendix C.

Dependent variable:	<i>Hedger</i>	<i>Ln(Hedge)</i>	<i>Hedger</i>	<i>Ln(Hedge)</i>
	(1)	(2)	(3)	(4)
<i>RMI</i> _{<i>t-1</i>} x <i>Post GFC</i> [A]	0.163** (2.14)	2.081*** (3.01)	0.139 (1.39)	0.574 (0.64)
<i>RMI</i> _{<i>t-1</i>} x <i>Post GFC</i> x <i>Developed</i> [C]			0.033 (0.25)	1.986 (1.59)
<i>RMI</i> _{<i>t-1</i>} x <i>Developed</i> [D]			0.046 (0.35)	-1.200 (-1.01)
<i>Post GFC</i> x <i>Developed</i>			-0.052 (-0.51)	-0.116 (-0.14)
<i>RMI</i> _{<i>t-1</i>} [B]	-0.092** (-2.19)	-1.298*** (-2.81)	-0.127 (-1.05)	-0.398 (-0.37)
<i>Size</i> _{<i>t-1</i>}	0.077 (1.65)	0.241 (0.62)	0.074 (1.67)	0.268 (0.72)
<i>ROA</i> _{<i>t-1</i>}	-0.041* (-1.88)	-0.260 (-1.44)	-0.042* (-1.94)	-0.241 (-1.38)
<i>MTB</i> _{<i>t-1</i>}	0.010 (0.51)	0.092 (0.49)	0.009 (0.46)	0.068 (0.35)
<i>Deposits-to-assets</i> _{<i>t-1</i>}	0.001 (0.55)	-0.008 (-0.40)	0.001 (0.57)	-0.011 (-0.58)
<i>Capital ratio</i> _{<i>t-1</i>}	0.006 (1.24)	0.004 (0.09)	0.006 (1.17)	0.006 (0.17)
<i>Noninterest income</i> _{<i>t-1</i>}	0.001 (0.67)	0.020 (1.25)	0.001 (0.68)	0.019 (1.20)
<i>Regulatory quality</i>	-0.011 (-0.65)	-0.039 (-0.25)	-0.011 (-0.64)	-0.043 (-0.28)
<i>GDP growth</i> _{<i>t-1</i>}	-0.021*** (-2.85)	-0.150*** (-2.75)	-0.021*** (-2.89)	-0.155*** (-2.85)
<i>Market return</i> _{<i>t-1</i>}	-0.178 (-1.55)	-0.700 (-0.80)	-0.178 (-1.60)	-0.787 (-0.95)
<i>Volatility</i> _{<i>t-1</i>}	0.651* (1.90)	3.865 (1.52)	0.675* (1.96)	3.522 (1.34)
<i>Inflation</i> _{<i>t-1</i>}	0.000 (0.05)	0.005 (0.07)	0.000 (0.00)	-0.010 (-0.15)
<i>MPI</i> _{<i>t-1</i>}	0.065*** (2.75)	0.575** (2.55)	0.064*** (2.82)	0.594** (2.64)
Observations	4,882	4,882	4,882	4,882
Adjusted R ²	0.316	0.196	0.327	0.237
Bank fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
p-value of F-test [A+B] = 0	0.316	0.196		
p-value of F-test [A+B+C+D] = 0			0.327	0.237

Table XXX. Risk Management Reforms and Systemic Risk. Hedging Analysis.

This table presents results from event-based stacked regressions around the adoption of risk management reforms in the post-GFC period. The dependent variables are measures of bank-level hedging activity: *Hedger*, and *Ln(Hedge)*. *Hedger*, is an indicator variable equal to one for banks with non-zero values on derivative contracts used for hedging and zero otherwise. *Ln(Hedge)*, is the natural logarithm of (1 + fair value of derivatives used for hedging). The treatment group consists of banks from countries that enact reforms targeting bank risk management in the post-GFC period (after 2010). We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Columns (1)-(2) show baseline results. Columns (3)-(4) show results including interactions with *Most Impacted*—an indicator variable equal to one for banks that do not have a CRO or a risk committee as of $t-1$ relative to enactment of the risk management reform and zero otherwise. Controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Dependent variable:	<i>Hedger</i>	<i>Ln(Hedge)</i>	<i>Hedger</i>	<i>Ln(Hedge)</i>
	(1)	(2)	(3)	(4)
Not yet treated & never treated				
Post x Treat	0.102*	0.787*	0.090	0.903**
	(1.71)	(1.90)	(1.52)	(2.06)
Post x Treat x Most Impacted			0.125	-0.224
			(1.35)	(-0.36)
Post x Most Impacted			-0.126***	-0.775**
			(-2.68)	(-2.23)
Size $t-1$	0.148***	0.154	0.129***	-0.030
	(3.28)	(0.46)	(2.94)	(-0.09)
ROA $t-1$	-0.063***	-0.293***	-0.061***	-0.256**
	(-5.06)	(-2.90)	(-4.69)	(-2.38)
MTB $t-1$	-0.046**	-0.310*	-0.053**	-0.370**
	(-2.20)	(-1.94)	(-2.55)	(-2.33)
Capital ratio $t-1$	0.020***	-0.019	0.018**	-0.042
	(2.76)	(-0.37)	(2.40)	(-0.78)
Deposits-to-assets $t-1$	0.006***	0.050***	0.005***	0.049***
	(3.51)	(4.78)	(3.43)	(4.94)
Noninterest income $t-1$	-0.002	0.002	-0.002	0.007
	(-1.03)	(0.11)	(-0.72)	(0.43)
Post BASEL	-0.077***	-0.309	-0.075***	-0.293
	(-2.87)	(-1.39)	(-2.86)	(-1.34)
Regulatory quality	-0.033***	-0.250**	-0.032**	-0.239**
	(-2.63)	(-2.47)	(-2.49)	(-2.30)
GDP growth $t-1$	-0.021***	-0.108***	-0.022***	-0.113***
	(-4.50)	(-2.85)	(-4.62)	(-2.95)
Market return $t-1$	-0.125	-0.544	-0.119	-0.496
	(-1.50)	(-0.88)	(-1.45)	(-0.80)
Volatility $t-1$	-0.073	-2.615	-0.022	-2.331
	(-0.29)	(-1.49)	(-0.08)	(-1.29)
Inflation $t-1$	0.018**	0.101**	0.017**	0.092*
	(2.58)	(2.03)	(2.46)	(1.83)
MPI $t-1$	0.078***	0.587***	0.077***	0.585***
	(3.75)	(3.65)	(3.72)	(3.63)
Observations	4,098	4,098	3,992	3,992
Adjusted R ²	0.726	0.707	0.724	0.707
Bank x cohort fixed effects	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes

Table XXXI. Risk Management Reforms and Systemic Risk. Never Treated.

This table presents results from event-based stacked regressions around the adoption of risk management reforms. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management. We form cohorts of treatment countries and use as controls banks in countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Columns (1)-(3) show baseline results. Columns (4)-(6) show results including interactions with *Most Impacted*—an indicator variable equal to one for banks that do not have a CRO or a risk committee as of $t-1$ relative to enactment of the risk management reform and zero otherwise. Controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Dependent variable:	SRISK	MES	LVG	SRISK	MES	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Control group:	Never treated					
Post x Treat	-0.193*** (-2.89)	-0.284** (-2.06)	-2.283*** (-2.94)	-0.184** (-2.50)	-0.317** (-2.20)	-2.108** (-2.46)
Post x Treat x Most				-0.091 (-0.80)	0.138 (0.80)	-1.448 (-1.01)
Post x Most Impacted						
Size $t-1$	0.319** (2.57)	0.172 (0.85)	4.740*** (3.08)	0.336*** (2.70)	0.167 (0.84)	4.932*** (3.22)
ROA $t-1$	0.058* (1.97)	-0.070 (-1.33)	0.781** (2.12)	0.068** (2.11)	-0.055 (-1.05)	0.897** (2.20)
MTB $t-1$	-0.140*** (-3.22)	0.441*** (5.83)	-2.202*** (-4.21)	-0.130*** (-2.99)	0.455*** (6.23)	-2.116*** (-4.05)
Capital ratio $t-1$	-0.053*** (-3.03)	0.029 (0.82)	-0.812*** (-3.75)	-0.054*** (-2.91)	0.042 (1.18)	-0.833*** (-3.65)
Deposits-to-assets $t-1$	-0.006 (-1.41)	0.007 (1.07)	-0.065 (-1.31)	-0.006 (-1.32)	0.006 (0.93)	-0.060 (-1.19)
Noninterest income $t-1$	-0.002 (-0.60)	0.003 (0.61)	-0.026 (-0.79)	-0.001 (-0.56)	0.004 (0.84)	-0.023 (-0.73)
Post BASEL	0.127** (2.30)	-0.555*** (-4.93)	1.287* (1.89)	0.135** (2.41)	-0.540*** (-4.79)	1.377* (1.99)
Regulatory quality	-0.014 (-0.65)	0.077 (1.54)	-0.158 (-0.60)	-0.005 (-0.25)	0.071 (1.49)	-0.039 (-0.15)
GDP growth $t-1$	0.015** (2.00)	0.016 (0.79)	0.121 (1.44)	0.015** (2.06)	0.021 (1.04)	0.124 (1.46)
Market return $t-1$	0.119 (0.75)	0.367 (1.01)	0.524 (0.29)	0.120 (0.75)	0.362 (1.02)	0.581 (0.31)
Volatility $t-1$	-0.084 (-0.20)	-1.755 (-1.50)	-1.711 (-0.33)	-0.221 (-0.46)	-1.975 (-1.65)	-3.237 (-0.55)
Inflation $t-1$	0.020 (1.34)	0.061** (2.08)	0.228 (1.22)	0.019 (1.24)	0.063** (2.16)	0.210 (1.13)
MPI $t-1$	0.039 (1.08)	0.145** (2.25)	0.442 (1.05)	0.037 (1.02)	0.139** (2.12)	0.416 (0.99)
Observations	2,252	2,254	2,252	2,179	2,181	2,179
Adjusted R ²	0.817	0.669	0.840	0.821	0.667	0.844
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XXXII. Risk Management Reforms and Systemic Risk. Non-EU Countries.

This table presents results from event-based stacked regressions around the adoption of risk management reforms in the post-GFC period excluding EU countries. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management in the post-GFC period (after 2010). We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Columns (1)-(3) show baseline results. Columns (4)-(6) show results including interactions with *Most Impacted*—an indicator variable equal to one for banks that do not have a CRO or a risk committee as of $t-1$ relative to enactment of the risk management reform and zero otherwise. Controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Dependent variable:	SRISK	MES	LVG	SRISK	MES	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Control group:	Not yet treated & never treated					
Post x Treat	-0.099* (-1.76)	-0.208* (-1.89)	-1.085 (-1.56)	-0.066 (-1.08)	-0.093 (-0.83)	-0.721 (-0.96)
Post x Treat x Most				-0.303*** (-2.72)	-1.007*** (-4.53)	-3.520** (-2.54)
Post x Most Impacted				0.282*** (2.96)	0.616*** (4.93)	3.294*** (2.73)
Size $t-1$	0.605*** (4.43)	-0.431** (-2.04)	8.191*** (4.77)	0.700*** (4.20)	-0.376* (-1.85)	9.440*** (4.49)
ROA $t-1$	0.018 (0.63)	0.015 (0.38)	0.114 (0.32)	0.027 (0.88)	0.002 (0.05)	0.204 (0.52)
MTB $t-1$	-0.151*** (-4.15)	0.309*** (6.61)	-2.204*** (-4.89)	-0.118*** (-3.67)	0.329*** (7.08)	-1.808*** (-4.57)
Capital ratio $t-1$	0.024 (0.72)	-0.034 (-1.02)	0.183 (0.44)	0.030 (0.85)	-0.022 (-0.67)	0.246 (0.56)
Deposits-to-assets $t-1$	-0.002 (-0.67)	-0.015** (-2.55)	-0.001 (-0.04)	-0.003 (-0.93)	-0.013** (-2.52)	-0.016 (-0.36)
Noninterest income $t-1$	0.007 (1.42)	0.006 (1.56)	0.069 (1.21)	0.006 (1.42)	0.004 (0.94)	0.064 (1.21)
Post BASEL	-0.054 (-0.86)	-0.235* (-1.82)	-0.993 (-1.26)	-0.053 (-0.74)	-0.268** (-2.32)	-0.962 (-1.08)
Regulatory quality	-0.023 (-0.78)	0.085** (2.35)	-0.374 (-0.98)	-0.022 (-0.73)	0.087*** (2.63)	-0.335 (-0.86)
GDP growth $t-1$	0.018*** (3.45)	0.012 (1.02)	0.166** (2.45)	0.021*** (3.68)	0.015 (1.33)	0.201*** (2.80)
Market return $t-1$	0.221*** (3.67)	0.656*** (4.76)	1.560** (2.11)	0.197*** (3.05)	0.627*** (4.89)	1.341* (1.70)
Volatility $t-1$	-0.200 (-0.58)	-1.085* (-1.81)	-1.830 (-0.40)	-0.125 (-0.37)	-1.053* (-1.74)	-1.017 (-0.22)
Inflation $t-1$	-0.003 (-0.16)	0.079*** (3.44)	-0.057 (-0.27)	0.004 (0.22)	0.082*** (3.55)	0.026 (0.12)
MPI $t-1$	-0.001 (-0.04)	0.121*** (3.03)	-0.116 (-0.43)	0.009 (0.41)	0.137*** (3.40)	-0.009 (-0.03)
Observations	3,618	3,618	3,618	3,515	3,515	3,515
Adjusted R ²	0.724	0.606	0.762	0.767	0.600	0.799
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XXXIII. Risk Management Reforms and Systemic Risk. Low Capital and Liquidity Banks.

This table presents results from event-based stacked regressions around the adoption of risk management reforms. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management. We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Columns (1)-(3) show results including interactions with *Low Capital* – an indicator variable equal to one if a bank is in the bottom tercile of tier 1 capital to assets in the country in the year prior to the reform and zero otherwise. Columns (4)-(6) show results including interactions with *Low Liquidity* – an indicator variable equal to one for banks that are in the bottom tercile of *Liquid Assets-to-Assets* in a country in the year prior to the reform and zero otherwise. Controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Table XXXIII. Risk Management Reforms and Systemic Risk. Low Capital and Liquidity Banks. Continued.

Dependent variable:	SRISK	MES	LVG	SRISK	MES	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Controls:	Not yet treated & never treated					
	Tier 1 Capital to Assets			Liquid Assets to Assets		
Post x Treat x Bottom Tercile	-0.107 (-1.02)	-0.264 (-1.56)	-1.030 (-0.83)	0.291* (1.74)	-0.058 (-0.35)	3.717* (1.87)
Post x Treat	-0.191** (-2.25)	-0.402*** (-2.82)	-2.064** (-2.03)	-0.259*** (-2.89)	-0.454*** (-3.22)	-2.873*** (-2.70)
Post x Bottom Tercile	0.123* (1.67)	0.189* (1.90)	1.218 (1.37)	-0.200* (-1.80)	0.049 (0.66)	-2.587* (-1.92)
Size _{t-1}	0.577*** (4.31)	-0.315 (-1.58)	7.842*** (4.59)	0.576*** (4.37)	-0.309 (-1.56)	7.820*** (4.67)
ROA _{t-1}	0.019 (0.65)	0.023 (0.65)	0.183 (0.49)	0.028 (1.00)	0.026 (0.72)	0.288 (0.82)
MTB _{t-1}	-0.181*** (-4.48)	0.291*** (5.89)	-2.573*** (-5.16)	-0.182*** (-4.61)	0.290*** (5.99)	-2.590*** (-5.29)
Capital ratio _{t-1}	0.003 (0.08)	-0.040 (-1.33)	-0.069 (-0.18)	-0.001 (-0.04)	-0.040 (-1.32)	-0.117 (-0.32)
Deposits-to-assets _{t-1}	-0.006* (-1.80)	-0.012** (-2.31)	-0.048 (-1.15)	-0.007** (-2.15)	-0.012** (-2.27)	-0.058 (-1.49)
Noninterest income _{t-1}	0.005 (1.18)	0.009** (2.59)	0.046 (0.94)	0.005 (1.19)	0.010*** (2.67)	0.046 (0.95)
Post BASEL	-0.049 (-0.77)	-0.257** (-2.19)	-0.896 (-1.12)	-0.033 (-0.56)	-0.252** (-2.11)	-0.703 (-0.96)
Regulatory quality	-0.004 (-0.15)	0.091*** (2.67)	-0.151 (-0.43)	-0.002 (-0.09)	0.094*** (2.73)	-0.134 (-0.38)
GDP growth _{t-1}	0.021*** (3.33)	0.027** (2.30)	0.186** (2.37)	0.021*** (3.31)	0.027** (2.27)	0.189** (2.38)
Market return _{t-1}	0.218** (2.51)	0.783*** (5.24)	1.501 (1.45)	0.239*** (2.72)	0.802*** (5.50)	1.734* (1.66)
Volatility _{t-1}	0.646 (1.41)	-0.801 (-1.25)	7.897 (1.36)	0.644 (1.40)	-0.789 (-1.24)	7.852 (1.35)
Inflation _{t-1}	-0.004 (-0.23)	0.076*** (3.37)	-0.084 (-0.41)	-0.007 (-0.43)	0.074*** (3.33)	-0.121 (-0.61)
MPI _{t-1}	0.021 (0.90)	0.170*** (4.09)	0.124 (0.41)	0.021 (0.91)	0.170*** (4.06)	0.128 (0.43)
Observations	4,080	4,082	4,080	4,080	4,082	4,080
Adjusted R ²	0.791	0.628	0.811	0.792	0.627	0.812
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XXXIV. Risk Management Reforms and Systemic Risk. Full Reform Sample.

This table presents results from event-based stacked regressions around the adoption of risk management reforms. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management. We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around the year of the risk management reform ($t=0$). *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. Columns (1)-(3) show baseline results. Columns (4)-(6) show results including interactions with *Most Impacted*—an indicator variable equal to one for banks that do not have a CRO or a risk committee as of $t-1$ relative to enactment of the risk management reform and zero otherwise. Controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Dependent variable:	SRISK	MES	LVG	SRISK	MES	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Control group:	Not yet treated & never treated					
Post x Treat	-0.339*** (-4.07)	-0.757*** (-3.25)	-3.687*** (-3.89)	-0.274*** (-3.23)	-2.853*** (-3.02)	-0.707*** (-2.75)
Post x Treat x Most				-0.317** (-2.25)	-4.016** (-2.42)	-0.450* (-1.93)
Post x Most Impacted				0.346*** (3.64)	4.079*** (3.62)	0.528*** (4.62)
Size $t-1$	0.471*** (3.85)	-0.034 (-0.19)	6.471*** (4.14)	0.516*** (4.13)	7.059*** (4.42)	0.023 (0.13)
ROA $t-1$	0.013 (0.65)	-0.057 (-1.17)	0.213 (0.82)	0.020 (0.94)	0.279 (1.02)	-0.063 (-1.27)
MTB $t-1$	-0.228*** (-5.81)	0.142** (2.44)	-3.088*** (-6.32)	-0.191*** (-5.18)	-2.645*** (-5.78)	0.163*** (2.80)
Capital ratio $t-1$	-0.026 (-1.59)	-0.054** (-2.16)	-0.439** (-2.11)	-0.016 (-0.94)	-0.318 (-1.48)	-0.047* (-1.78)
Deposits-to-assets $t-1$	-0.002 (-0.61)	-0.019*** (-3.41)	0.007 (0.19)	-0.002 (-0.79)	0.001 (0.02)	-0.016*** (-2.88)
Noninterest income $t-1$	0.004 (1.59)	-0.002 (-0.59)	0.058** (1.99)	0.003 (1.24)	0.049 (1.58)	-0.001 (-0.17)
Post BASEL	0.042 (0.60)	-0.073 (-0.56)	0.089 (0.11)	0.028 (0.39)	-0.075 (-0.08)	-0.102 (-0.83)
Regulatory quality	0.006 (0.16)	0.023 (0.47)	0.027 (0.06)	0.016 (0.41)	0.162 (0.35)	0.025 (0.52)
GDP growth $t-1$	0.000 (0.03)	-0.012 (-0.92)	-0.034 (-0.43)	0.005 (0.85)	0.028 (0.35)	-0.009 (-0.74)
Market return $t-1$	0.086 (0.97)	0.770*** (3.93)	0.291 (0.27)	0.074 (0.81)	0.130 (0.12)	0.783*** (4.06)
Volatility $t-1$	2.403*** (3.75)	2.648** (2.46)	26.561*** (3.56)	2.046*** (3.21)	22.159*** (2.98)	2.453** (2.23)
Inflation $t-1$	-0.031** (-2.54)	0.016 (0.84)	-0.376** (-2.45)	-0.026** (-2.10)	-0.313** (-2.01)	0.020 (1.04)
MPI $t-1$	-0.065** (-2.48)	0.051 (1.03)	-0.812*** (-2.65)	-0.045* (-1.86)	-0.586** (-2.03)	0.076 (1.64)
Observations	7,041	7,043	7,041	6,740	6,740	6,742
Adjusted R ²	0.734	0.688	0.755	0.759	0.777	0.691
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XXXV. Risk Management Reforms and Systemic Risk. Full reform Sample. Non-U.S. Banks.

This table presents results from event-based stacked regressions around the adoption of risk management reforms outside the US. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management. We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around the year of the risk management reform ($t=0$). *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. We exclude US banks. Columns (1)-(3) show baseline results. Columns (4)-(6) show results including interactions with *Most Impacted*—an indicator variable equal to one for banks that do not have a CRO or a risk committee as of $t-1$ relative to enactment of the risk management reform and zero otherwise. Controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Dependent variable:	SRISK	MES	LVG	SRISK	MES	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Control group:	Not yet treated & never treated					
Post x Treat	-0.286*** (-3.43)	-0.403*** (-2.88)	-3.298*** (-3.19)	-0.214*** (-2.62)	-2.411** (-2.38)	-0.343** (-2.30)
Post x Treat x Most				-0.392*** (-2.65)	-4.827*** (-2.68)	-0.552** (-2.52)
Post x Most Impacted				0.347*** (3.57)	4.066*** (3.54)	0.544*** (4.40)
Size $t-1$	0.485*** (3.54)	-0.125 (-0.70)	6.696*** (3.83)	0.527*** (3.73)	7.276*** (4.03)	-0.092 (-0.51)
ROA $t-1$	0.005 (0.24)	0.007 (0.19)	0.097 (0.34)	0.016 (0.64)	0.200 (0.65)	0.005 (0.15)
MTB $t-1$	-0.250*** (-6.09)	0.167*** (3.11)	-3.327*** (-6.45)	-0.215*** (-5.60)	-2.902*** (-6.05)	0.190*** (3.53)
Capital ratio $t-1$	-0.023 (-1.21)	-0.025 (-1.09)	-0.439* (-1.80)	-0.013 (-0.63)	-0.318 (-1.25)	-0.014 (-0.61)
Deposits-to-assets $t-1$	-0.002 (-0.76)	-0.016*** (-3.35)	-0.001 (-0.04)	-0.003 (-0.95)	-0.009 (-0.22)	-0.013*** (-2.87)
Noninterest income $t-1$	0.005* (1.78)	-0.004 (-1.00)	0.069** (2.15)	0.004 (1.58)	0.064* (1.88)	-0.003 (-0.65)
Post BASEL	0.041 (0.58)	-0.110 (-0.91)	0.107 (0.13)	0.029 (0.39)	-0.037 (-0.04)	-0.140 (-1.25)
Regulatory quality	0.010 (0.27)	0.015 (0.31)	0.078 (0.17)	0.020 (0.51)	0.212 (0.45)	0.017 (0.33)
GDP growth $t-1$	-0.001 (-0.19)	0.000 (0.02)	-0.055 (-0.70)	0.004 (0.58)	0.004 (0.04)	0.003 (0.23)
Market return $t-1$	0.136 (1.54)	0.541*** (3.84)	0.927 (0.87)	0.122 (1.33)	0.751 (0.68)	0.553*** (4.00)
Volatility $t-1$	2.509*** (3.76)	2.343** (2.10)	28.024*** (3.60)	2.146*** (3.22)	23.569*** (3.03)	2.116* (1.87)
Inflation $t-1$	-0.034*** (-2.72)	0.029 (1.50)	-0.418*** (-2.65)	-0.030** (-2.30)	-0.357** (-2.24)	0.032* (1.71)
MPI $t-1$	-0.072*** (-2.66)	0.052 (1.06)	-0.893*** (-2.83)	-0.052** (-2.08)	-0.663** (-2.24)	0.079* (1.72)
Observations	6,586	6,588	6,586	6,306	6,306	6,308
Adjusted R ²	0.737	0.664	0.757	0.762	0.779	0.668
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XXXVI. Risk Management Reforms and Systemic Risk. Alternate Most Impacted.

This table presents results from event-based stacked regressions around the adoption of risk management reforms. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management. We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. *Most Impacted*—an indicator variable equal to one for banks that do not have either a CRO, columns (1)-(3), or a risk committee, columns (4)-(6), as of $t-1$ relative to enactment of the risk management reform and zero otherwise. Controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Dependent variable:	SRISK	MES	LVG	SRISK	MES	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
	Most Impacted CRO			Most Impacted RC		
Control group:	Not yet treated & never treated			Not yet treated & never treated		
Post x Treat x Most Impacted	-0.153 (-1.11)	-0.542*** (-2.99)	-1.617 (-0.99)	-0.142 (-1.09)	-0.594*** (-2.61)	-1.566 (-0.98)
Post x Treat	-0.178** (-2.05)	-0.360** (-2.46)	-1.888* (-1.83)	-0.178* (-1.80)	-0.321** (-2.16)	-1.882 (-1.61)
Post x Most Impacted	0.141 (1.62)	0.457*** (4.36)	1.356 (1.28)	0.157** (2.07)	0.507*** (3.43)	1.654* (1.77)
Size $t-1$	0.586*** (4.27)	-0.302 (-1.60)	7.933*** (4.53)	0.603*** (4.09)	-0.263 (-1.35)	8.105*** (4.34)
ROA $t-1$	0.017 (0.55)	0.014 (0.39)	0.165 (0.42)	0.022 (0.75)	0.031 (0.88)	0.211 (0.57)
MTB $t-1$	-0.176*** (-4.55)	0.306*** (6.17)	-2.525*** (-5.28)	-0.177*** (-4.53)	0.302*** (6.04)	-2.535*** (-5.24)
Capital ratio $t-1$	0.005 (0.16)	-0.032 (-1.11)	-0.044 (-0.11)	0.006 (0.18)	-0.030 (-1.04)	-0.035 (-0.09)
Deposits-to-assets $t-1$	-0.005 (-1.44)	-0.009* (-1.82)	-0.040 (-0.88)	-0.006* (-1.66)	-0.011** (-2.24)	-0.045 (-1.05)
Noninterest income $t-1$	0.004 (1.15)	0.008** (2.29)	0.044 (0.93)	0.004 (1.12)	0.008** (2.16)	0.042 (0.90)
Post BASEL	-0.053 (-0.79)	-0.278** (-2.50)	-0.933 (-1.12)	-0.049 (-0.74)	-0.261** (-2.34)	-0.896 (-1.09)
Regulatory quality	-0.004 (-0.14)	0.089*** (2.73)	-0.148 (-0.42)	-0.007 (-0.25)	0.081** (2.56)	-0.182 (-0.51)
GDP growth $t-1$	0.021*** (3.33)	0.029** (2.47)	0.191** (2.39)	0.020*** (3.19)	0.026** (2.31)	0.181** (2.27)
Market return $t-1$	0.221** (2.54)	0.771*** (5.30)	1.535 (1.49)	0.193** (2.18)	0.678*** (4.27)	1.235 (1.19)
Volatility $t-1$	0.662 (1.45)	-0.750 (-1.16)	8.080 (1.41)	0.659 (1.44)	-0.762 (-1.15)	8.033 (1.40)
Inflation $t-1$	-0.004 (-0.23)	0.077*** (3.45)	-0.085 (-0.42)	-0.005 (-0.31)	0.074*** (3.31)	-0.097 (-0.47)
MPI $t-1$	0.020 (0.88)	0.170*** (4.24)	0.118 (0.40)	0.026 (1.10)	0.187*** (4.48)	0.174 (0.59)
Observations	4,080	4,082	4,080	4,080	4,082	4,080
Adjusted R ²	0.791	0.631	0.811	0.791	0.632	0.811
Bank x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table XXXVII. Risk Management Reforms and Systemic Risk. Regulatory Quality.

This table presents results from event-based stacked regressions around the adoption of risk management reforms. The dependent variables are measures of bank-level systemic risk: *SRISK*, *MES*, and *LVG*. The treatment group consists of banks from countries that enact reforms targeting bank risk management. We form cohorts of treatment countries and use as controls banks in countries that have not yet implemented risk management reforms (*Not yet treated*), or banks in eight countries that did not enact risk management reforms during our sample period (*Never treated*). *Post BASEL* is an indicator equal to one for years after BASEL III was implemented in the country and zero otherwise. We restrict the sample period to $t-3$, to $t+3$ around year of the risk management reform ($t=0$) but exclude years before 2010 to avoid picking up the impact of the GFC. *Post* is an indicator equal to one starting the year of the risk management reform and zero otherwise. *Treat* is an indicator equal to one for banks in risk management reform countries and zero otherwise. *Regulatory Quality*– is the principal component index of the strength of regulation based on Barth, Caprio and Levine (2013) in the year before the reform. Controls include *Size*, *ROA*, *MTB*, *Deposits-to-assets*, *Capital Ratio*, and *Noninterest income*. Country-level controls include *Regulatory quality*, *GDP growth*, *Market return*, *Volatility*, *Inflation*, and *MPI*. All regressions include bank-by-cohort and year-by-cohort fixed effects, and standard errors are clustered by country-cohort.

Dependent variable:	SRISK	MES	LVG
	(1)	(2)	(3)
Control group:	Not yet treated & never treated		
Post x Treat x Reg Quality	0.027 (0.39)	0.171 (1.39)	0.396 (0.46)
Post x Treat	-0.215** (-2.59)	-0.514*** (-3.39)	-2.338** (-2.38)
Post x Regulatory Quality	0.039 (1.64)	-0.117** (-2.31)	0.410 (1.40)
Size $t-1$	0.529*** (3.94)	-0.280 (-1.47)	7.239*** (4.24)
ROA $t-1$	0.008 (0.28)	0.028 (0.75)	0.070 (0.19)
MTB $t-1$	-0.209*** (-4.95)	0.267*** (5.63)	-2.910*** (-5.56)
Capital ratio $t-1$	-0.004 (-0.11)	-0.035 (-1.24)	-0.126 (-0.32)
Deposits-to-assets $t-1$	-0.003 (-0.96)	-0.014*** (-2.73)	-0.016 (-0.38)
Noninterest income $t-1$	0.004 (1.08)	0.009** (2.39)	0.042 (0.84)
Post BASEL	-0.040 (-0.64)	-0.249** (-2.18)	-0.790 (-1.00)
Regulatory quality	-0.003 (-0.12)	0.077** (2.25)	-0.167 (-0.49)
GDP growth $t-1$	0.018*** (2.76)	0.027** (2.32)	0.159* (1.87)
Market return $t-1$	0.223** (2.40)	0.802*** (5.46)	1.492 (1.35)
Volatility $t-1$	0.873* (1.84)	-0.765 (-1.17)	10.637* (1.79)
Inflation $t-1$	-0.007 (-0.44)	0.077*** (3.26)	-0.127 (-0.63)
MPI $t-1$	0.004 (0.14)	0.193*** (4.44)	-0.079 (-0.24)
Observations	3,983	3,985	3,983
Adjusted R ²	0.761	0.637	0.784
Bank x cohort fixed effects	Yes	Yes	Yes
Year x cohort fixed effects	Yes	Yes	Yes

Vita

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