Market Reactions to the Announcements of Financial Risk Regulation from Basel II.5 to Basel IV: What Do Shareholders and Creditors Perceive?

(September 29, 2023)

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Abstract

Following the start of the global financial crisis in 2007, the Basel Committee on Banking Supervision (BCBS) initiated a comprehensive overhaul, bolstering regulations governing financial risks encompassing market, credit, and liquidity. This paper employs event study methodology to analyze the impact of 15 market events, 26 credit events, and 13 liquidity events on both European and U.S. bank stocks and credit default swap (CDS) spreads. European banks exhibit adverse stock market reactions to announcements of market and credit risk regulation. In the CDS market, credit risk regulation leads to higher CDS spreads for European banks, indicating heightened risk. Divergent market responses can be attributed to bank- and country-specific characteristics. Regarding market regulation, the adverse European stock market response is chiefly attributed to banks located in Greece, Italy, Ireland, Portugal and Spain (GIIPS), while higher capitalization correlates with reduced CDS spreads. Examining stock market reactions to credit risk regulation, a bank's capitalization initially exerts a positive influence but eventually becomes negative at a certain point. Moreover, a bank's credit risk negatively affects returns, while higher capitalization leads to a reduction in CDS spreads. Lower funding mismatches decrease returns and more liquid balance sheets and higher charter values decrease CDS spreads under liquidity regulation. European banks are more negatively impacted in stock market reactions compared to U.S. banks, possibly due to more preexisting liquidity in U.S. banks.

Keywords:
Basel Banking Regulation, Event Study, European Capital Market Reaction, U.S. Capital Market Reaction

JEL Classification: G01, G14, G21, G28

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Acknowledgment: I thank participants of the 2023 financial colloquium at Heinrich Heine University Düsseldorf and the 2023 PhD seminar at Ruhr University Bochum sponsored by Unicredit for helpful suggestions.

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I. Introduction

The regulation of financial risk has undergone a complete revision since the recent financial crisis in 2007. The Basel Committee on Banking Supervision (BCBS) has significantly tightened regulation for the three financial risks—market, credit and liquidity risk—via the Basel II.5, Basel III and Basel IV[1] Accords, with the liquidity risk being globally addressed for the first time. Although the Basel Accords also contain other aspects, this paper focuses on the changes in the regulation of the three financial risks.

The most pressing problems regarding the treatment of market risk, with massive trading losses for banks during the financial crisis, were directly approached with Basel II.5. A first step was an additional incremental risk charge (IRC) that has to be calculated for unsecuritized credit instruments in the trading book to mitigate regulatory arbitrage between the trading book and the banking book. Furthermore, the models to calculate capital charges had to be calibrated on a period of significant stress. The BCBS initiated further elaboration of a framework for market risk with the Fundamental Review of the Trading Book (FRTB), with the latest changes published under Basel IV. In addition to increasing the quality and quantity of capital for market risk, revised internal and standard approaches were also tightened, and the boundary between the banking book and the trading book was sharpened.

Credit risk has undergone a comparable holistic revision. Analogous to market risk, the quality and quantity of capital has been increased, and the internal and standard approaches for calculating the capital to be held have been tightened. In addition, further capital buffers (capital conservation buffer and countercyclical capital buffer) were introduced, and in particular, securitizations and resecuritizations were subject to stricter regulation, which also applies to margin requirements for noncentrally cleared derivatives and bank exposures to central counterparties. Furthermore, an output floor was implemented for the internal models in relation to the standardized approach. These changes are specified in Basel III and Basel IV.

The financial crisis provides evidence for the independence of liquidity risk because even solvent institutions ran out of liquidity. In response, the BCBS introduced the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR), which are designed to ensure sufficient liquidity on the asset side of the bank under 30-day stress and to prevent a funding mismatch over one year. These ratios are defined in Basel III.

These extensive regulatory changes raise the issue of the actual implications for regulated banks. Regulation of market, credit and liquidity risk entails far-reaching changes to proprietary trading, lending and term structure and funding (NSFR) as well as asset selection (LCR). Although various scenario analyses and simulations, as well as impact studies, have been conducted by the BCBS to carry out the hypothetical impact of regulating the three financial risks, it is reasonable to examine the reactions of market participants. This allows an investigation independent of any assumptions because market participants price in new information with at least semistrong information efficiency. The effects of the regulatory changes are examined for European and U.S. banks by means of an event study. Both stocks and credit default swap (CDS) spreads are included, which has the eminent advantage of examining not only the position of the bank's owners but also that of its creditors. This approach allows us to analyze whether the intended effect of risk reduction associated with regulation actually succeeds from the creditors' perspective. The analysis is limited to Europe and the U.S. because only there are sufficiently long time series of bank CDSs available. Because regulatory initiatives have a prospective impact on a bank's profitability as well as its risk, returns and CDS spread changes reflect these effects. Against this background, two strands of literature show a

[1] Officially, Basel IV is referred to as the finalization of the Basel III reforms. It is often referred to as Basel IV by bank representatives because of extensive changes to the Basel III rules. To better distinguish the Basel Accords, this paper uses the term Basel IV.

controversial opinion, whereby a market reaction can be expected in both cases but with different signs. The public interest theory according to Needham (1983) postulates that the regulator acts in the public interest as a social planner who maximizes overall welfare—in this case, at the expense of the banks. Of course, a banking system of integrity and functioning, in which banks can adequately perform their transformational functions, serves the public interest (Bruno et al., 2018).

The capture theory by Stigler (1971) argues the opposite. Here, regulated industries influence the regulator via appropriate lobbying in such a way that regulatory privileges can be achieved. Indeed, such tendencies can also be found in the regulatory process of the banking industry with the occasional significant weakening of regulatory proposals during the course of the consultation process.

The analysis of market reactions to regulatory changes in the banking sector has a long tradition, especially in the U.S., mainly due to several deregulatory measures (Dann and James, 1982; James, 1983; Allen and Wilhelm, 1988; Cornett and Tehranian, 1989; Slovin et al., 1990; Cornett and Tehranian, 1990; Brook et al., 1998; Carow and Heron, 1998; Bhargava and Fraser, 1998; Mamun et al., 2004; Yildirim et al., 2006). For a general and more detailed overview of U.S. deregulation of the financial market, see Carow and Kane (2002). The bottom line is that, depending on the design of the regulatory changes, investors' return expectations, the risk of the individual bank and the banking system as a whole, and the competitive situation of banks may change if certain banks are sanctioned or privileged, implying a redistribution of wealth. The studies presented thus far refer to the U.S. In the following section, literature is presented that considers not only U.S banks. but also European banks and banks from various countries, as well as CDS spreads as a measure of change in the valuation of default risk for creditors.

Horváth and Huizinga (2015) examine market reactions to the announcements of establishing the European Financial Stability Facility (EFSF) on bank CDS spreads and stocks as well as sovereign CDSs. The ESFS was created to provide eurozone countries with loans that have refinancing problems. The authors find that bank creditors benefited in the form of lower CDS spreads, which analogously applies to sovereign CDSs of countries whose banking systems are heavily exposed to southern European countries and Ireland. Moenninghoff et al. (2015) analyze the stock market reactions of large banks regarding the announcements leading to the regulation of global systemically important banks (G-SIBs). The authors observe that the new regulation negatively affects the value of the regulated bank, while official classification as a G-SIB has a partly offsetting positive wealth effect. Schäfer et al. (2016) examine market reactions to announcements for four regulatory reforms in the aftermath of the financial crisis from 2007, namely, the Dodd-Frank Act in the U.S., the reforms proposed by the Vickers report in the UK, the restructuring law and bank levy in Germany, and the too-big-to-fail regulation in Switzerland. The authors use bank stocks and CDSs and find that expectations of bank profitability have been reduced in all countries, while CDS spreads have partially increased in all countries. Announcements on the implementation of the banking union in Europe are examined by Pancotto et al. (2020) using CDSs, stocks, and stock futures. The authors find evidence for an increase in CDS spreads and a negative wealth effect for shareholders.

Generally, the literature on assessing the effectiveness of policy responses to the financial crisis is quite scarce (Fiordelisi and Ricci, 2016), which holds especially for the literature on market reactions to the Basel Accords. This scarcity is probably also because event study methodology poses problems in analyzing regulatory changes (Lamdin, 2001). Examples include anticipation effects due to ongoing debates and, as a result, the precise determination of events, confounding events, and a reasonable determination of estimation and event periods. Solutions to these problems are presented at appropriate points within this paper.

The literature on market reactions to the Basel Accords starts with Basel I. Basel I was published in 1988 and required international capital requirements for credit risk for the first time, with the framework being extended to market risk in 1996. Basel I was intended to create a level playing field for capital adequacy in the leading industrial countries and to eliminate the funding advantages of Japanese banks that arose from different national bank-capital ratios. Eyssell and Arshadi (1990) analyze the effects of the Basel I announcements on the stocks of 27 U.S. banks and find evidence for decreasing equity values. A similar analysis is carried out by Cooper et al. (1991). The authors identify negative wealth effects for banks in the U.S., Canada, the UK and Japan, whereby the effect is the greatest in the U.S. While the previous two papers determine the market reaction of Basel I for large banks, Lu et al. (1999) examine it for small commercial banks and find a positive reaction. The authors argue that small banks already had a sufficient capital base ex ante, implying that their competitive situation improved. Wagster (1996) examines the achievement of the objectives via an event study and concludes that Japanese banks' funding advantages have not been eliminated; thus, Basel I is unable to reach an international level playing field.

However, the literature for Basel Accords II, II.5, III and IV is scant. This finding is astonishing because the global regulatory changes in response to the financial crisis permanently changed the regulatory treatment of market, credit and liquidity risk. Liquidity regulation is a novel part of Basel III, and its impact on the banking sector is analyzed for a European sample by Simion et al. (2016) and Bruno et al. (2018). The former paper examines the impact on creditors of large European banks, and the authors suggest that default risk has increased. The second paper conducts a similar study but analyzes European bank stocks. In contrast to all presented studies, Bruno et al. (2018) quantify the overall regulatory effect without addressing individual events. Using the methodology developed by Armstrong et al. (2010), the authors find that stock markets negatively reacted to liquidity regulation. If those liquidity announcements that were announced simultaneously with other parts of Basel III are excluded, the isolated effect is smaller and only weakly significant. The authors conclude that due to enormous lobbying, markets do not assume the announced liquidity regulation to be binding.

This paper joins previous literature in analyzing market reactions to regulatory announcements. While national deregulations have been extensively investigated in the U.S. and the impact of certain regulatory measures and parts of the Basel Accords in Europe have also been addressed, to the best of the author's knowledge, there is a lack of studies about market reactions to Basel's financial risk regulation. This paper extends previous analyses of market reactions to include the important aspects of market and credit risk regulation following the financial market crisis and involves not only European stocks and CDSs but also U.S. stocks and CDSs. This is a relevant and current topic, as the regulatory process of all three risk types is now fully completed via Basel II.5, Basel III and Basel IV, rendering an evaluation of the overall impact feasible. Although liquidity announcements for CDS and stock markets have already been examined by Simion et al. (2016) and Bruno et al. (2018) for Europe, the U.S. market is missing in both analyses. Furthermore, the second paper includes only events up to January 2013, with the second liquidity ratio, the NSFR, only being subsequently published. Therefore, liquidity regulation is also included in the analysis.

The overall effect of European and U.S. stock and CDS market reactions to 15 market announcements, 26 credit announcements and 13 liquidity announcements by the BCBS and its significance is calculated in a first step. Subsequently, a cross-sectional analysis is conducted to identify bank- and country-specific drivers of the potentially heterogeneous market reactions within the sample, as it cannot be assumed that all banks react in the same way to the regulation. The main results of the study are briefly presented, starting with the overall stock and CDS market reactions. With regard to market risk regulation, the European stock market shows a significant negative reaction, implying a wealth loss for shareholders. The U.S. stock market as well as the U.S. and European CDS markets show no significant reaction. Credit risk regulation leads to a significantly negative European stock market reaction. Although the U.S. stock market reaction is also clearly negative, significance cannot be clearly proven here. U.S. and European creditors perceive higher risks and react with rising CDS spreads, with only the European reaction reaching significance. Liquidity regulation has no significant impact on European and U.S. bank shareholders and creditors.

Cross-sectional analysis reveals that bank- and country-specific characteristics explain heterogeneity in shareholder and creditor reactions. Analyzing the stock market reaction to market risk regulation reveals a distinctly negative effect for banks in Greece, Italy, Ireland, Portugal and Spain (GIIPS), suggesting that the overall negative European stock market reaction is mainly driven by these banks. Banks with higher capitalization experience lower CDS spreads, indicating a risk reduction. A bank's capitalization initially has a positive effect on the stock market reaction to credit risk regulation, with additional capital becoming too expensive after a certain point and having a negative effect. A higher credit risk of a bank also has a negative effect. With regard to the CDS market reaction, the capitalization of a bank has a decreasing effect on CDS spreads because more capital lowers the probability of default (PD). The analysis of the stock market reaction to liquidity regulation shows that a lower funding mismatch has a negative effect on returns, whereas banks with a higher charter value and more liquid balance sheets experience lower CDS spreads. There is also evidence that European banks are negatively affected compared to U.S. banks regarding the stock market reaction, which could be because U.S. banks already had more liquidity ex ante.

The remainder of this paper is structured as follows: Section II summarizes the main changes of Basel II.5, Basel III and Basel IV to the regulatory treatment of market, credit and liquidity risk. The event selection and evaluation are illustrated. Section III discusses hypotheses on aggregated market reactions as well as bank- and country-specific determinants of heterogeneous market reactions. Section IV presents the event study methodology, employed block bootstrap significance test, cross-sectional analysis and handling of confounding events. Section V contains the results and their discussion. Section VI addresses further robustness checks and limitations. Section VII concludes the paper.

II. Regulatory Background and Event Dates

A. Regulation of Financial Risks from Basel II.5 to Basel IV

The regulation of the three financial risks under review considerably changed in the wake of the financial market crisis of 2007 and, with regard to liquidity risk, was only addressed globally as a reaction. Although a detailed description of the regulatory changes is not given, the regulatory path of the three financial risks from Basel II.5 via Basel III to Basel IV will nevertheless be briefly outlined in the following sections. Although a cursory overview of the regulation of the three financial risks is provided, note that only the outcome of the regulatory process is presented here. Tab. 1, Tab. 2 and Tab. 3 include not only the final outcome but also any significant changes to previous proposals. Basel II.5 can be understood as the BCBS's immediate crisis response, addressing banks' market risk and, to that extent, their trading books' capitalization, risk management and disclosure requirements. The market risk framework that was valid until the crisis in 2007 is the 1996 Amendment to supplement Basel I, which until 1996 only covered credit risk. During the crisis, it becomes apparent that some core aspects of the framework are inadequate and, in some cases, set incorrect incentives for banks. As an example, credit-dependent instruments were preferentially held in the banking book due to lower capital requirements. As the risk of such instruments is not captured by the existing VaR framework of the trading book and to mitigate the incentive for arbitrage between the trading book and the banking book, an additional IRC must be calculated for unsecuritized credit positions, which includes default and migration risk. Since the VaR framework for quantifying trading book capital has been determined on the basis of the previous year's period, it is not surprising that even at the beginning of the financial crisis, the calculated capital was insufficient to absorb losses. To adjust the regulatory capital with regard to a crisis scenario, banks are required to additionally calculate a stressed VaR calibrated on a one-year stress period, which at least doubles the capital requirements. For securitizations, the capital charges of the banking book apply. These changes were implemented by December 31, 2011.

The BCBS had previously explained that these changes only focus on the most pressing issues and that a systematic revision of the entire framework is still pending—the FRTB. In May 2012, the first consultative document on the FRTB was published; it was finalized after further consultative documents and standards in 2019, with the rules to be complied with beginning January 1, 2022. The FRTB includes further measures to reduce regulatory arbitrage and changes to the previous VaR framework to an expected shortfall framework to account for tail risk. Furthermore, the models of both the standardized approach and the internal models are to be calibrated on a stress period, and it is to be ensured that the newly developed standardized approach can be a credible fallback of the internal model. A brief description and assessment of the market events are provided in Tab. 1.

The regulatory treatment of credit risk has also undergone a significant tightening. Two capital buffers above the regulatory minimum capital are implemented. The capital conservation buffer serves to build up additional capital in good times, which may be utilized during periods of stress. In addition, to prevent procyclicality, national supervisors may require a countercyclical capital buffer to be built up when there are signs of a credit bubble. Due to significant losses on resecuritizations during the financial crisis, the risk weights under both the standardized approach and internal ratings-based approach (IRBA) were increased, as was the case for credit risk exposures resulting from derivatives, repos and securities financing transactions. While under Basel II, bank exposures to central counterparties were not subject to any capital requirement; under Basel III, a risk weight of 2 % is set. To encourage more derivatives settlement via central counterparties, the BCBS has implemented margin requirements for noncentrally cleared derivatives to reflect the general higher inherent risk. Having already tightened the capital requirements for resecuritizations, the framework for securitizations is also being strengthened. The standardized approach for securitizations is tightened, and with regard to the IRBA, the calculated capital requirements may not fall below a floor in relation to the standardized approach.

The standardized approach for credit risk will be revised to be more risk-sensitive and more closely aligned with the IRBA. Furthermore, the mechanistic reliance on external ratings for borrower assessment and risk weighting is restricted. Thus, external ratings may only be applied to banks and corporate exposures. Similarly, the use of the advanced and foundational IRBA is also restricted. The advanced IRBA may no longer be utilized for credit exposures to banks, other financial firms, and large corporations. Both IRBAs may not be employed for equities. The output floor of both IRBAs is now set to the higher of IRBA RWAs or 72.5 % of the RWAs of the standardized approach. In Tab. 2, a brief description and assessment of the credit events is given.

While credit and market risk were covered by regulation before the financial market crisis, liquidity regulation is a novelty of Basel III and can be considered a consequence of the crisis that clearly demonstrated its significance. Due to a lack of confidence, the interbank market came to a standstill, the issuance of new debt became difficult, and banks were forced to sell assets to generate liquidity, which caused their prices to fall and led to write-downs and thus contagion among other market participants. This finding illustrates that liquidity risk is closely linked to credit and market risks. In addition to two quantitative metrics (Pillar 1), supervisory monitoring (Pillar 2) and disclosure and market discipline (Pillar 3) were also tightened, as in the other two financial risks. In temporary terms, short-term and structural liquidity shall be ensured with the LCR and NSFR under Pillar 1. A brief description and assessment of the liquidity events are provided in Tab. 3.

In the next section, the event identification process and all market, credit and liquidity events are presented.

B. Event Identification and Classification

The use of event studies to evaluate the information content of events dates to Fama et al. (1969) and has a long tradition with respect to regulatory events. As Lamdin (2001) discusses in detail, there are some issues regarding the use of this method for regulatory changes that have to be appropriately addressed. A major concern is the exact definition of the event period because ongoing debates may leak information or market participants can anticipate them (Binder, 1985). Such uncertainty of the event window reduces the power of tests to reject the null hypothesis of no effect (Lamdin, 2001). Therefore, all event days exclusively refer to official BCBS announcements involving consultative documents, standards, sound practices and guidelines for the relevant market, capital or liquidity risk regulation and thus cover initiatives related to Basel II.5, Basel III and Basel IV. This approach ensures that only true information and no rumors or debates influence the calculations to prevent noise. All publications[2] are filtered with the topics market, credit and liquidity risk in the period from the beginning of the financial crisis in 2007 to December 2019. The selected end of the search period allows that all relevant changes in regulation can be taken into account and that the coronavirus pandemic starting in 2020 does not affect the results. Furthermore, all press releases[3] are checked in the same period to avoid missing significant information in the analysis, which would reduce the power of the tests. All events are evaluated in terms of their information content and their implications for the capital market, whether they tighten or weaken the existing regulatory framework. Note that the evaluation of each event depends on the prior event since the former proposal or announcement can be changed, i.e., tightened or weakened. Events that simply redescribe changes that have already been announced are removed to prevent noise. If the announcement of an event occurred on a weekend, the first available trading day is used as the event date.

Because the events for market, credit and liquidity regulation are partly and simultaneously announced, establishing a causal effect of the specific regulatory announcement type might be misleading. Therefore, analogous to Bruno et al. (2018), tests are performed for the three types of regulation that exclude events that coincide simultaneously with regulatory announcements of the two other types. These tests are referred to as market-only events, credit-only events and liquidity-only events. Although the definition of regulatory capital equally determines the market reaction for credit and market price risk, events that only affect the composition of regulatory capital are removed for this reason to establish causal effects.

To further mitigate the influence of noise via nonsignificant events, the information content of all events is investigated by means of a media analysis. Using LexisNexis, international media (Wall Street Journal, Wall Street Journal Europe, Financial Times, International Herald Tribune, International New York Times, American Banker, and The Guardian) is checked to ensure that the events convey new information to the market.[4] To reduce concerns about capital market anticipations, the media analysis is amplified to the week prior to each event.

Table 1
Market Events and Predicted Impact on Regulation

[2] See https://www.bis.org/bcbs/publications.htm.
[3] See https://www.bis.org/press/pressrels.htm.
[4] Several keywords are used to evaluate international press coverage of the BCBS announcements; see Tab. A.12.

This table presents 15 announcements of market risk regulation by the BCBS, an assessment of whether this will tighten or weaken regulation, and a brief description.

Event	Type and Name	Impact	Short Description
1 October 12, 2007	**Consultative**: Guidelines for Computing Capital for Incremental Default Risk in the Trading Book	Tightened	Stricter guidelines for calculating incremental default risk charge (IDRC) for trading book positions.
2 July 22, 2008	**Press release**: Computing Capital for Incremental Risk in the Trading Book **Consultative**: Guidelines for Computing Capital for Incremental Risk in the Trading Book[5] **Consultative**: Proposed revisions to the Basel II market risk framework	Tightened	IDRC is to be replaced by incremental risk charge (IRC), which takes into account not only default risk of credit-dependent instruments in the trading book but also losses due to changes in credit ratings, credit spreads and liquidity. The capital requirements for these instruments in particular is to be increased in order to prevent regulatory arbitrage between the banking and the trading book.
3 January 16, 2009	**Consultative**: Guidelines for computing capital for incremental risk in the trading book **Consultative**: Revisions to the Basel II market risk framework	Tightened	IRC includes default risk and migration risk and has to be calculated for unsecuritised credit products. For securitised instruments, the capital requirements of the banking book have to be applied. The capital framework of the trading book is supplemented by a VaR based on a one-year historical stress period. This at least doubles regulatory capital. Furthermore, the BCBS proposes to remove the 4 % preferential treatment of specific risks of liquid and diversified equity portfolios, so that 8 % would be required.
4 July 13, 2009	**Standards**: Guidelines for computing capital for incremental risk in the trading book **Standards**: Revisions to the Basel II market risk framework	Tightened	Rules are adopted as standards without significant changes. Although the capital requirements of the banking book apply to securitized products, banks may calculate a comprehensive risk measure (CRM) for so-called correlation trading activities with the permission of the supervisory authority. This would replace the IRC and specific risk charge for those portfolios, but is subject to strict requirements, stress tests and a floor given by the banking book capital requirement.
5 June 18, 2010	**Press release**: Adjustments to the Basel II market risk framework announced by the Basel Committee	Weakened	BCBS grants nine-month extension to implement rules adopted in July 2009. Furthermore, net long and short positions of non-correlation trading securitization positions can be offset during the subsequent two-year transition period after the implementation of the market risk framework on December 31, 2011. The floor for the correlation trading securitization positions is set to 8 % of the standard method.
6 May 3, 2012	**Consultative**: Fundamental review of the trading book	Tightened	BCBS proposes a more strict boundary between the banking and the trading book to reduce regulatory arbitrage. VaR models shall be replaced by expected shortfall models that incorporate tail risk. A revised standard approach should be constructed that is risk sensitive and a credible fallback for internal models. The calculation of the standard approach should be mandatory, if necessary as a floor or surcharge for internal models. In the internal model, the possibility of taking diversification into account is to be reduced, with hedging and diversification being more closely aligned in both approaches. Consistent with the stressed VaR approach from Basel II.5, a revised framework in both the internal models-based and the standardized approach should be calibrated on a period of significant financial stress.

[5] The BCBS information concerning the publication date differs between July 22, 2008 and July 23, 2008. July 22, 2008 is defined as event day with the corresponding press release.

7 Otober 31, 2013	**Consultative**: Fundamental review of the trading book: A revised market risk framework	Tightened	The points raised in the first consultation paper have now been elaborated in more detail and incorporated into a draft text for the new market risk framework.
8 December 19, 2014	**Consultative**: Fundamental review of the trading book: outstanding issues	Weakened	Development for a treatment of internal risk transfers from the banking to the trading book. There are simplifications for the standard approach, which, in addition to the cash-flow-based approach, also includes a sensitivity-based. Furthermore, revisions to the internal models approach with varying liquidity horizons facilitate implementation, which is easier for banks to implement due to internal systems.
9 June 8, 2015	**Consultative**: Interest rate risk in the banking book	Tightened	BCBS proposes two potential options for dealing with interest rate risk in the banking book to ensure that banks have enough capital to deal with losses due to an interest rate increase, especially in times of very low interest rates. The first option involves a minimum Pillar 1 capital requirement, whereas the second proposal involves a quantitative disclosure against the background of Pillar 2.
10 January 14, 2016	**Standards**: Minimum capital requirements for the trading book	Weakened	New market risk framework comes into force on January 1, 2019.
11 April 21, 2016	**Standards**: Interest rate risk in the banking book	Weakened	BCBS decides against capital requirements for interest rate risk in the banking book. Only disclosure requirements and management guidelines will be tightened.
12 June 29, 2017	**Consultative**: Simplified alternative to the standardized approach to market risk capital requirements	Weakened	BCBS proposes a simplified standardized approach for smaller banks that significantly lowers operational hurdles. Furthermore, under this approach, vega and curvature risk do not have to be backed by capital. The calculation is simplified and comes with reduced risk factor granularity correlation scenarios. As an alternative, the BCBS proposes to use a modified version of the Basel II.5 standardized approach.
13 December 7, 2017	**Press release**: Governors and Heads of Supervision finalise Basel III reforms	Weakened	Implementation of the market risk framework is postponed by three years to January 1, 2022.
14 March 22, 2018	**Consultative**: Revisions to the minimum capital requirements for market risk	Weakened	BCBS proposes refinements to the standardized approach, including less conservative consideration of liquid FX pairs and correlation scenarios and changes to non-linear instruments. Furthermore, BCBS proposes to reduce the risk weights for the general interest rate risk class by 20-40 %, and equity and FX risk classes by 25-50 %. As an alternative to the standardized approach for small banks, the Basel II.5 standardized approach with a more conservative calibration is proposed.
15 January 14, 2019	**Standard**: Minimum capital requirements for market risk	Tightened	The market risk framework was adopted without significant changes. Compared to Basel II.5, a weighted average increase of 22 % in market risk capital is estimated.

Table 2

Credit Events and Predicted Impact on Regulation

This table presents 26 announcements of credit risk regulation by the BCBS, an assessment of whether this will tighten or weaken regulation, and a brief description.

Event	Type and Name	Impact	Short Description
1 November 17, 2008	**Press release:** Nout Wellink: The Importance of Banking Supervision in Financial Stability	Tightened	The BCBS proposes to increase regulatory capital for credit risk and the quality of Tier 1. A capital buffer is proposed that banks need to build up in "good times" and that can be drawn in periods of stress.

2 January 16, 2009	**Consultative:** Proposed enhancements to the Basel II framework	Tightened	The BCBS proposes higher capital requirements for resecuritisations in the banking book.
3 July 13, 2009	**Standards:** Enhancements to the Basel II framework	Tightened	Higher risk weights for resecuritisations are suggested. These regulations are flanked by stricter risk management and stronger disclosure requirements.
4 September 7, 2009	**Press release:** Comprehensive response to the global banking crisis	Tightened	The Group of Central Bank Governors and Heads of Supervision reach agreement. The introduction of a framework for countercyclical capital buffers is planned. Tier 1 capital shall include predominantly common shares and retained earnings.
5 December 17, 2009	**Consultative:** Strengthening the resilience of the banking sector	Tightened	Tier 1 capital predominantly includes common equity and retained earnings, which could hit European banks using hybrid capital particularly hard, since hybrid capital will be phased out completely. Furthermore, the BCBS proposes to strengthen capital requirements for counterparty credit risk exposures resulting from derivatives, repos and securities financing transactions. A capital conservation buffer shall force banks to build up Tier 1 capital that can be drawn in periods of stress. The countercyclical capital buffer shall dampen procyclicality and will likely be implemented at the jurisdiction level, if necessary.
6 July 16, 2010	**Consultative:** Countercyclical capital buffer proposal	Tightened	In normal times, the buffer is set at zero. If the national regulator detects signs of a credit bubble, it can force banks to comply with the buffer within twelve months. Tier 1 capital must be used.
7 July 26, 2010	**Press release**: The Group of Governors and Heads of Supervision reach broad agreement on Basel Committee capital and liquidity reform package	Weakened	An annex to the press release is published. Minority stakes in bank subsidiaries qualify as regulatory capital. Banks are allowed to include holdings in unconsolidated financial institutions, mortgage servicing rights and deferred tax assets up to 10 % of the common equity component of tier one capital.
8 September 13, 2010	**Press release:** Group of Governors and Heads of Supervision announces higher global minimum capital standards[6]	Weakened	The capital adequacy rules will not be introduced until 2013 and then with a generous transition period until 2019. The capital conservation buffer will be phased in only from 2016. Furthermore, it is unclear when and how the countercyclical capital buffer will be introduced. Capital instruments that no longer qualify as regulatory capital are phased out over ten years only from 2013.
9 December 16, 2010	**Standards:** Basel III: A global regulatory framework for more resilient banks and banking systems	Tightened	Proposed rules are adopted as standards without significant changes. Countercyclical capital buffer is to be met with CET1 and set between 0 and 2.5 % by national authorities, depending on excessive credit growth. It is phased in with the capital conservation buffer.
10 November 2, 2011	**Consultative:** Capitalisation of bank exposures to central counterparties[7]	Tightened	There is only relief for smaller banks that clear through larger banks. The BCBS does not change the original proposal for a two percent risk weighting of exposures to central counterparties, which, according to the banks, counteracts the BCBS' desire for central clearing.
11 July 6, 2012	**Consultative:** Margin requirements for non-centrally-cleared derivatives	Tightened	Issued draft proposes margin requirements and a framework for non-centrally derivatives to promote the use of CCPs.
12 July 25, 2012	**Standards:** Capital requirements for bank exposures to central counterparties	Tightened	The former proposal is reaffirmed as standard. Furthermore, banks can choose between a simplified and a risk sensitive approach to determine their capital required for exposures to default funds.

[6] The publication is dated Sunday, September 12, 2010 and the next trading day is set as the event day.

[7] An initial consultation paper dated December 20, 2010 is excluded because its event window would overlap with the event window of event 9.

13 December 18, 2012	**Consultative:** Revisions to the Basel Securitization Framework	Tightened	After resecuritizations were already given a higher risk weight in the standard of July 13, 2009, the securitization framework is now being completely revised. The risk weight floor for internal models will initially be raised from 7 % to 20 %. Both internal and standard approaches are to be revised so that they are more closely aligned. Furthermore, reliance on external ratings is to be reduced.
14 February 15, 2013	**Consultative:** Margin requirements for non-centrally cleared derivatives	Weakened	The initial draft is eased, since a universal initial margin threshold of €50 million is now proposed. Furthermore, after a transition phase (depending on the notional amount of non-centrally cleared derivatives), the rules do not have to be applied by everyone until 2019. Contrary to the previous proposal, the BCBS is seeking market participants' advice on whether financial firms should be permitted to reuse collateral that has been used as margin.
15 June 28, 2013	**Consultative:** Capital requirements for bank exposures to central counterparties	Tightened	The BCBS argues that an interim standard was implemented and that it needs an overhaul.
16 September 2, 2013	**Standards:** Margin requirements for non-centrally cleared derivatives	Weakened	The standard introduced excludes foreign exchange derivatives from initial margin requirements.Furthermore, subject to strict requirements, a unique re-hypothecation of initial margin collateral is permitted
17 December 19, 2013	**Consultative:** Revisions to the securitization framework	Weakened	The hierrachy of the securitization framework is designed similar to that of the credit risk one and therefore simplified to the initial proposal, which results in substantial reductions in capital. The risk-weight floor for the internal ratings based approach is set to 15 %, instead of 20 % from the previous proposal.
18 April 10, 2014	**Standards:** Capital requirements for bank exposures to central counterparties - final standard	Tightened	There is a new approach to determining capital requirements for bank exposures to qualifying central counterparties as well as a limit on the capital requirement compared to non-qualifying central counterparties. The standard will become mandatory as of January 01, 2017.
19 December 11, 2014	**Standards:** Revisions to the securitization framework	Tightened	The prior proposal is finalized as standard without significant changes. The securitization framework will be implemented in January 2018.
20 December 22, 2014	**Consultative:** Revisions to the standardized approach for credit risk	Tightened	The draft proposes to reduce banks' reliance on external ratings and thus to tighten their own risk management with respect to the standardized approach for credit risk.
21 March 18, 2015	**Standards:** Margin requirements for non-centrally cleared derivatives	Weakened	The beginning of the four-year phase-in period is postponed from December 1, 2015 to September 1, 2016.
22 December 10, 2015	**Consultative:** Revisions to the Standardized Approach for credit risk	Weakened	The complete ban on the use of external ratings is rescinded. They can still be used for exposures to companies and banks, although the mechanistic nature shall be mitigated.
23 March 24, 2016	**Consultative:** Reducing variation in credit risk-weighted assets - constraints on the use of internal model approaches	Tightened	The use of the advanced and foundation internal ratings-based approach (IRBA) is to be prohibited for credit exposures to banks, other financial companies as well as large companies (total assets $>$ €50 billion) and equities. Furthermore, a minimum input floor for the IRBA parameters is given. The BCBS proposes an output floor of the IRB approaches calibrated in the range of 60 % to 90 % in relation to the standardized approach.
24 July 11, 2016	**Standards:** Revisions to the securitization framework	Weakened	Compared to the November 2015 consultation paper, the risk weights of STC securitisations are lowered and the risk floor for senior exposures has been reduced from 15 % to 10 %.

25 December 7, 2017	**Standards:** Basel III: Finalising post-crisis reforms	Weakened	Contrary to the previous consultative document, the foundation IRBA may be used for exposures to banks, large and medium-sized enterprises and other financial companies. The previously discussed capital output floor for the IRB approaches lied in the range of 60 % to 90 % and is now set to the higher of IRBA RWAs or 72.5 % of the RWAs under the standardized approach. A transitional agreement for the output floor is agreed so that it is obligatory on January 1, 2027. The risk weights under the standardized approach have also been weakened compared with the consultation paper. The revised standardized and the IRB approaches will not be implemented before January 1, 2022.
26 July 23, 2019	**Standards:** Margin requirements for non-centrally cleared derivatives	Weakened	The last implementation phase for institutions with the lowest threshold (notional derivative amount of more than €8 billion) is delayed by one year.

Table 3

Liquidity Events and Predicted Impact on Regulation

This table presents 13 announcements of liquidity risk regulation by the BCBS, an assessment of whether this will tighten or weaken regulation, and a brief description.

Event	Type and Name	Impact	Short Description
1 February 21, 2008	**Sound practices**: Liquidity Risk: Management and Supervisory Challenges	Tightened	Summary of the main findings of a BCBS working group on liquidity risk, assessing how banks deal with and manage it, also in light of the financial crisis.
2 June 17, 2008	**Consultative**: Principles for Sound Liquidity Risk Management and Supervision	Tightened	BCBS proposes stronger liquidity risk management framework for banks and enhanced supervisory oversight. This consultative paper is a substantial revision of guidelines from 2000.
3 September 25, 2008	**Guidelines**: Principles for Sound Liquidity Risk Management and Supervision	Tightened	The final version of the previous consultation paper is published without significant changes.
4 December 17, 2009	**Consultative**: International framework for liquidity risk measurement, standards and monitoring	Tightened	The BCBS proposes two new liquidity metrics, the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). While the former metric aims to ensure that banks have sufficient high quality liquid assets (HQLA) over a 30-day period under stress, the goal of the NSFR is to ensure stable funding of long-term and illiquid assets over a one-year period.
5 July 26, 2010	**Press release**: The Group of Governors and Heads of Supervision reach broad agreement on Basel Committee capital and liquidity reform package	Weakened	An annex to the press release is published and both liquidity metrics are alleviated. For the LCR, run-off factors of retail and small and medium enterprise (SME) deposits are reduced. The definition of HQLA is relaxed, which now also qualifies certain high-quality corporate bonds, for example. Retail and SME deposits receive a higher available stable funding (ASF) factor, with the required stable funding (RSF) factor for residential mortgages being reduced. Furthermore, the BCBS announces that some refinements to both metics might be possible.
6 December 16, 2010	**Standards**: Basel III: International framework for liquidity risk measurement, standards and monitoring	Tightened	The BCBS publishes the Basel III rules text and results of a quantitative impact study (QIS). Furthermore, the final standards for liquidity management are published, no significant changes have been made compared to the annex of July 26, 2010.

7 January 07, 2013	**Standards**: Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools	Weakened	Final standard of the LCR is issued by the BCBS, with the metric being phased in from January 1, 2015 (60 %) until January 1, 2019 (100 %). The scope of assets that can be used as HQLA is expanded. Furthermore, some inflow and outflow rates are recalibrated (see Annex 2 *Complete set of agreed changes to the formulation of the Liquidity Coverage Ratio published in December 2010* for concrete changes).
8 July 19, 2013	**Consultative**: Liquidity coverage ratio disclosure standards	Tightened	The BCBS proposes disclosure requirements for the LCR.
9 January 13, 2014[8]	**Standards**: Liquidity Coverage Ratio disclosure standards **Consultative**: Basel III: the Net Stable Funding Ratio	Weakened	The BCBS issues the standard for the LCR disclosure requirements. In the second document, the BCBS relaxes the NSFR with respect to a broader recognition and higher ASF factor for deposits, while increasing consistency with the LCR. In addition, cliff effects in the measurement of ASF and RSF shall be mitigated.
10 October 31, 2014	**Standards**: Basel III: the net stable funding ratio	Tightened	The standard of the NSFR is finalized. BCBS makes only minor changes to the RSF. The standard will be implemented as of January 01, 2018.
11 December 9, 2014	**Consultative**: Net Stable Funding Ratio disclosure standards	Tightened	For reasons of market discipline and transparency, the BCBS proposes that banks need to disclose their NSFR according to a given template.
12 June 22, 2015	**Standards**: Net Stable Funding Ratio disclosure standards	Tightened	The BCBS is introducing the disclosure requirements for the NSFR as a standard in parallel with its introduction on January 01, 2018.
13 October 6, 2017	**Standards**: Implementation of net stable funding ratio and treatment of derivative liabilities	Weakened	The BCBS allows countries to lower the RSF factor for derivative liabilities from 20 % to as low as 5 %. In this respect, countries have discretion in setting a floor, which should simplify the implementation of the NSFR as of January 01, 2018.

III. Theoretical Background

A. *Hypotheses of Aggregated Market Reactions*

As previously explained and indicated by the literature presented in the introduction, it is conceivable that the regulatory changes by the BCBS affect banks' stock prices and CDS spreads by changing expectations of future profits and risks. In the following section, hypotheses about aggregated market reactions for the three regulated financial risks are presented and discussed, with a further step to deduce the determinants of a potentially heterogeneous market reaction in the sample. This second step of analysis is important because it cannot be assumed that all banks will respond similarly to regulation. To avoid confusion about the regulatory impact, the terms *negative* and *positive* are used to indicate the *direction* of the market reaction, although this should be clearly distinguished from the interpretation because the interpretation diverges for the same direction of the market effect in stock and CDS markets. A negative stock market reaction implies a wealth loss for shareholders, whereas this represents a reduction not only in CDS spreads but also in risk for creditors. In contrast, a positive reaction for the stock market implies increasing returns and a wealth gain for shareholders, whereas for the CDS market, it implies rising spreads and thus an increase in risk. For the sake of clarity, potential stock and CDS market reactions are separately explained. It is easier to formulate hypotheses for the CDS market because CDSs quantify creditor risk isolated. In contrast, from shareholders' point of view, risk considerations are included in calculus in addition to expected returns.

[8] Event date is set to January 13, 2014, because both annoucements are made on Sunday January 12, 2014.

A.1. Market and Credit Risk

Because the regulatory treatment of market and credit risk is comparable via the application of higher capital ratios, possible market responses are collectively presented. Only if a distinction in the market reaction is necessary is one of the risks specifically addressed. The stock market reactions are considered first.

Standard financial theory suggests that better capitalized banks with less leverage are subject to lower equity volatility, which results in lower expected returns on bank debt and common stock via reduced risk (Sarin and Summers, 2016). The negative reaction and its mechanism described above can initially be assumed from this neoclassical point of view because risk-taking for credit and market risk is restricted, which limits future profits. Ceteris paribus, this implies lower returns. With regard to market and credit risk regulation, increased capital requirements, stricter risk management and supervision come into play, which should theoretically lead to the aforementioned result. Another argument is that equity is more expensive than debt due to the tax deductibility of interest, in contrast to dividends paid to common equity holders, which ultimately reduces profitability (Moenninghoff et al., 2015). It is also conceivable that higher capital requirements reduce lending in the interbank market so that financing could be impaired for banks. This negative reaction could arise if banks expect a shortage of liquid funds on the interbank market and higher liquidity spreads in the future. It is also feasible that banks will pass on their increased costs when granting loans. This approach would result in higher interest rates, which in turn could lead to less demand for loans. Thus, in the long term, bank sales and profits could decline. Ben Naceur et al. (2018) show that higher capital ratios have a negative impact on bank lending growth for large European banks.

Higher equity and thus less leverage additionally leads to more "skin in the game" for bank owners, which reduces moral hazard and thus the "too big to fail" paradigm. In this context, it is conceivable that bailout expectations will be reduced and that shareholders' risk increases. A reduction in this implicit government protection could unsettle shareholders and lead to a negative reaction, which would be desirable from a social perspective. Even though rules (including additional equity) have been implemented, especially for G-SIBs, to reduce the "too big to fail" paradigm, higher equity is able to mitigate the problems by the described mechanism. Furthermore, the internal implementation of the regulatory initiatives has operational costs and committed resources. Thus, there tend to be fewer funds available for dividend payments.

In contrast, there are plausible arguments pointing to a positive stock market reaction. The recent financial market crisis provides evidence of excessive risk-taking via proprietary trading and lending with subsequent securitization and sales in the market. Through various contagion channels, the insolvency of one institution spilled over to other institutions, ultimately resulting in a systemic crisis with high costs for bank owners due to collapsing stock prices and failure to pay dividends. Limiting proprietary trading and increasing capital for credit and market risk thus not only reduces the probability of failure of an individual bank but also increases the resilience of the banking sector. Laeven et al. (2016) provide evidence that systemic risk grows with bank size and is inversely related to bank capital. Therefore, higher equity might mitigate this issue. If shareholders perceive the probability of occurrence and higher cost of a crisis (Miles et al. (2013); Barth and Miller (2018); Basel Committee on Banking Supervision (2019) for costs and benefits of bank capital) in which they face losses to be reduced by judiciously limiting too much risk, they might positively respond.

The fact that a global level playing field is being created also speaks in favor of a positive reaction. The Volcker Rule already created by the Dodd-Frank Act restricts proprietary trading for U.S. institutions. Thus, there are ex ante country-specific differences in the regulation of market risk. The possibility that the benefits of limiting risk-taking, as well as the associated stronger resilience of the banking sector outweigh possible costs of regulation, may also be because additional capital is not more costly for banks. Although the assumptions of the Modigliani and Miller (1958) theorem are questionable in reality, it provides theoretical evidence against higher funding costs, which could avoid a negative reaction.[9] Contrary to the neoclassical argument that equity lowers performance, empirical evidence shows that banks can increase their profitability by increasing equity, especially in times of crisis, which would even argue for a positive stock market reaction (Berger and Bouwman, 2013).

After explaining possible stock market reactions, potential reactions of the CDS market are now discussed, starting with the causes of a negative reaction with falling CDS spreads. The neoclassical mechanism via lower leverage should lead to a negative CDS market reaction because risks are limited. Given that creditors view credit and market risk regulation as an adequate way to reduce the spillover effects discussed in the banking sector and thus as a means of strengthening resilience, a negative CDS market reaction is likely to follow.

Seeming counterintuitive at first, there are plausible arguments for a positive CDS market reaction with rising CDS spreads. If creditors perceive the increased regulatory requirements as unduly harsh, such that prospectively, a bank's profitability and thus its business could be jeopardized, then they could positively react. Furthermore, Sarin and Summers (2016) provide evidence for increased CDS spreads in the U.S. in the aftermath of the financial crisis and attribute this to lowered expectations of a bailout. These findings are supported by Schäfer et al. (2016). The authors find increased CDS spreads for various financial sector reforms after the financial crisis, with the effect being largest for the Volcker rule of the Dodd-Frank Act. The authors attribute it to the lowered expectation of a bailout. Following this, it can be argued that the implicit bailout guarantee by governments in Europe and the U.S. may have dropped, not only because of more equity but also because of the introduction of bail-in capable debt and regulatory frameworks for bank resolution. The theorem of Modigliani and Miller (1958) also states in this case that the pricing of the risk does not change; thus, no CDS market reaction is expected.

A.2. Liquidity Risk

Although no capital requirements are demanded with respect to the regulation of liquidity risk, it is plausible that the new liquidity regulation will change the expectations of investors and creditors. Again, the stock market reaction is addressed first. A negative reaction could intuitively result because banks choose their assets and funding on the basis of profit maximization, which is counteracted by liquidity regulation (Bruno et al., 2018). This approach leads to (opportunity) costs, since banks need to hold lower-yielding government bonds or the like instead of profitable loans or capital market products to comply with the two liquidity metrics. Another argument is given by Myers and Rajan (1998) via their analysis of the "dark side" of liquidity. The authors develop a model and show that holding more liquid assets results in a higher liquidation value, which reduces a firm's ability to commit to a specific strategy that protects creditors.

Nevertheless, there are arguments pointing toward a positive stock market reaction. The recent financial crisis provides evidence of the severity of liquidity risk in the form of systemic risk and spillover effects on other banks, which shall be addressed with the LCR and NSFR (Basel Committee on Banking Supervision, 2013, 2014a). In this context, it became evident that liquidity risk is a standalone risk, independent of an institution's credit rating, because even solvent banks were exposed to illiquidity. Given that the liquidity risks are adequately controlled, a positive stock market reaction is conceivable. Another argument relates to the convergence benefits achieved with global standards (Bruno et al., 2018).

Having discussed possible stock market reactions, the CDS market reaction is addressed in a further step. The causes of the reaction are comparable in the stock and CDS markets, which is why those from the

[9] See Admati et al. (2013) for a further discussion of whether bank equity is costly.

previous discussion are resumed. Several arguments point to a negative CDS market reaction with falling CDS spreads. If the risks of rampant profit maximization are reduced by introducing liquidity regulation, then a negative CDS market reaction can be assumed. This premise analogously applies if the original regulatory objectives of reducing systemic risk by liquidity shortages and spillover effects from the creditor perspective are achieved. The discussed "dark side" of liquidity is one argument for why creditors could perceive higher risks and positively react, resulting in increasing CDS spreads. Previously, it was discussed that reducing the profit maximization calculus can lead to a negative reaction. However, a positive effect is equally conceivable, namely, if profitability were to be reduced to such an extent that creditworthiness would be jeopardized (King, 2013). Considering potential stock and CDS market reactions, it is apparent that both a positive market response and negative market response are plausible with regard to all three financial risks. How the market responds in each case depends on how creditors and shareholders evaluate regulation when weighing positive and negative consequences against each other.

Beyond how markets react as a whole, in a further step, the cross-sectional analysis highlights whether certain bank- and country-specific variables have a positive or negative effect on stock and CDS market reactions. Regarding the terminology *negative* and *positive*, it must once again be carefully differentiated between stock market reactions and CDS market reactions, where negative and positive refer again to the actual direction of the effect and not to its interpretation. A negative impact of a variable on the stock market reaction implies lower returns and therefore a negative wealth effect for shareholders, whereby a negative effect on the CDS market reaction is associated with a reduction in CDS spread changes and therefore less risk. This applies vice versa for a positive impact.

The hypotheses and variables that explain heterogeneous market reactions are derived below for the three financial risks.

B. Hypotheses of Cross-Sectional Analyses

B.1. Market and Credit Risk

The potential determinants of heterogeneous market responses for market and credit risk are somewhat similar because the regulatory treatment is partially consistent via higher capital ratios for RWAs. To avoid redundancy, the variables are jointly explained for both types of risk. Only in cases where a variable is explicitly used to explain market or credit risk is a separate note made. Since both returns and CDS spread changes are closely related by risk, the same variables are utilized to explain the heterogeneity in the banks' reaction. First, the bank-specific variables are operationalized before the country-specific variables are presented.

The Tier 1 regulatory capital ratio, TIER1_RAT, is the ratio of Tier 1 capital to total risk-weighted assets and is used as a proxy for bank capitalization. The larger this ratio is, the lower the probability of insolvency, which is why it should have a negative effect on the CDS market reaction. Regarding the stock market, a positive effect can be expected because less additional equity needs to be acquired to meet regulatory limits, which implies less costs and effort to meet new rules. However, it is assumed that the positive effect of a higher TIER1_RAT turns negative above a certain level because then the additional costs of equity exceed its benefits. For this reason, an additional quadratic term is included in the estimations of the stock market reaction.

$H1_{m,c}$: *Bank equity has a positive but decreasing impact on the stock market reaction and a negative impact on the CDS market reaction.*

Since banks' risk-taking behavior has a significant impact on their ability to generate shareholder value, banks' market risk is used to explain the heterogeneous market responses of banks to market regulation. Consistent with Fiordelisi and Molyneux (2010), market risk is proxied by SEC_TO_ASSET, which is the ratio of the total amount of marketable security investments to total assets. It is assumed that higher market risk has a negative impact on the stock market reaction because, in the future, profitability will be reduced by taking less risk. To fulfill capital requirements, banks with higher market risk must acquire more capital or restructure their portfolio. If a bank is exposed to higher market risks, it can be assumed that the management has a strategy to generate profits from securities, implying that the business model of such banks is torpedoed by market regulation. Hence, a negative impact on the stock market reaction is expected. Regarding the CDS market, a positive impact is predicted because those banks nevertheless face higher risks.

$H2_m$: *Market risk has a negative impact on the stock market reaction and a positive impact on the CDS market.*

Since credit risk is directly regulated by the BCBS, a proxy is constructed to test its impact. Consistent with Athanasoglou et al. (2008); Brissimis et al. (2008), it is operationalized as the ratio of loan-loss provisions to total loans: PROV_LOAN. The assumption is that banks with higher credit risk have to acquire more equity to meet capital ratios. Furthermore, risk-taking is more clearly limited by the new rules, limiting future profits. Hence, a negative impact on the stock market reaction is expected. For the CDS market, a positive relationship is predicted because of a higher credit risk.

$H2_c$: *Higher credit risk has a negative impact on the stock market reaction and a negative impact on the CDS market.*

In response to the financial market crisis, the Financial Stability Board (FSB) issued a list of G-SIBs in 2011 that are required to hold additional capital and that are subject to stronger supervision. This list is updated annually with new additions and deletions. A dummy variable, which is 1 for G-SIBs and 0 otherwise, is utilized.[10] Since G-SIBs must hold additional capital anyway, shareholders could negatively react to the general tightening of market and credit regulation for all credit institutions. In the case of market regulation, it is conceivable that G-SIBs engage in more proprietary trading anyway, which could provoke a negative reaction of shareholders. Regarding the CDS market, the risk of G-SIBs is a priori higher, suggesting a positive impact.

$H3_{m,c}$: *G-SIBs experience a negative impact on the stock market reaction and a positive impact on the CDS market.*

After discussing bank-specific hypotheses, in the following section, hypotheses based on country-specific differences in the U.S. and European market reactions are analyzed. Considering Europe reveals that peripheral GIIPS countries in particular are affected by the sovereign debt crisis. To account for this heterogeneity of European banks, a split into GIIPS banks and non-GIIPS banks is made to examine the differences with U.S. banks, starting with a discussion of European non-GIIPS banks and market risk regulation. The Volcker Rule, which was passed in the U.S. with the Dodd-Frank Act in 2010, restricts proprietary trading of U.S. banks. Increased CDS spreads and decreased returns around the announcement days document the importance for the U.S. banking system (Schäfer et al., 2016). U.S. banks are already subject to stricter regulation, so additional Basel rules may have less impact on their risk-return profile; on the other hand, the Basel rules mitigate the competitive advantage of European banks. A dummy variable, EUROPE_ex_GIIPS, which is 1 for European banks not located in GIIPS countries and 0 otherwise, is included. A negative impact on the stock market and a positive impact on the CDS market are predicted because the market risk is a priori higher.

$H4_m$: *European non-GIIPS banks experience a negative impact on the stock market reaction and a positive*

[10] In general, there are different buckets in which the G-SIBs are classified. No distinction is made in the context of this work. For consistency, the identified G-SIBs in 2011 are classified as G-SIBs prior to 2011.

impact on the CDS market compared to U.S. banks.
Regarding credit risk regulation, the expected effect is consistent, but the mechanism is different. The U.S. financial system is a market-oriented system in which financial intermediaries and their services are less important because companies finance themselves over the capital market, e.g., via the issuance of stocks and bonds. In contrast, Europe's financial systems are primarily characterized as bank-oriented, with banks playing an important role in financing companies. This finding implies that lending in Europe plays a greater role, suggesting that European non-GIIPS banks experience a negative effect on the stock market reaction. Because the credit business is of particular importance to European banks and therefore their credit risk is a priori higher, a positive impact on the CDS market is predicted.

H4$_c$: *European non-GIIPS banks experience a negative impact on the stock market reaction and a positive impact on the CDS market compared to U.S. banks.*
In a further step, potentially different market reactions between GIIPS and U.S. banks are analyzed. The hypotheses are consistent with those where the differences between European non-GIIPS and U.S. banks are examined. However, the effect size is assumed to be more pronounced because GIIPS banks and European non-GIIPS banks are different. Acharya et al. (2014) provide evidence for a two-way feedback loop between sovereign risk and bank credit risk, demonstrating that a stressed banking sector leads to government bailouts, which increases sovereign credit risk. This outcome, in turn, weakens the banking system because the value of government guarantees and government bonds implicitly decreases. Because domestic bonds capture the majority of banks' sovereign exposure (Gennaioli et al., 2018), GIIPS banks are particularly affected. Thus, higher credit risk compared to banks not located in GIIPS implies higher refinancing costs and a higher PD. This, of course, also affects the response to market risk regulation because more equity is demanded. The discussion starting in 2015 on the abolition of the preferential treatment of sovereign exposures in the banking and trading books could also contribute to a tightening of the market reaction of GIIPS banks (Basel Committee on Banking Supervision, 2017).[11] One aspect that specifically addresses the response to market risk regulation is rooted in fire sales. In Europe, fire sales of sovereign bonds are identified as a key driver of systemic risk (Greenwood et al., 2015). Because GIIPS banks hold riskier sovereign bonds and are riskier a priori, they could try to sell their sovereign bonds in a crisis, which could be exacerbated by market risk regulation, thus increasing their PD. Furthermore, GIIPS banks may find it difficult to find counterparties for derivatives due to their sovereign exposure. The dummy variable GIIPS is 1 if the bank is located in a GIIPS country and 0 otherwise. A negative impact on the stock market is predicted, while a positive impact on the CDS market is assumed because of the higher risk of banks in GIIPS countries.

H5$_{m,c}$: *Banks located in GIIPS countries experience a negative impact on the stock market reaction and a positive impact on the CDS market compared to U.S. banks.*
By including the dummy variables EUROPE_ex_GIIPS and GIIPS, U.S. banks form the reference category.

B.2. Liquidity risk

Following Simion et al. (2016) and Bruno et al. (2018), the determinants and hypotheses of a heterogeneous market reaction to the announcements of liquidity regulation are elaborated.

In contrast to the regulation of market and credit risk, especially by means of capital ratios, the BCBS is breaking new ground with the two liquidity metrics LCR and NSFR, stricter liquidity management requirements and its supervision. Since the hypotheses test the economic intuition and effect of regulation, they diverge in the case of liquidity regulation because there are no capital requirements for liquidity risks. Rather,

[11] In the end, these considerations were not realized. Only disclosure requirements for sovereign exposures were implemented, only mandatory when required by national supervisors.

the LCR ensures a bank's short-term liquidity via sufficient liquid assets, whereas the NSFR is intended to counteract a structural funding mismatch. To this extent, the hypotheses are formulated against the backdrop of these metrics and their characteristics before a further step is taken to identify country-specific differences. As shown in Tab. 3, the liquidity events cover the period from February 2008 to October 2017. The LCR was introduced in January 2015 with corresponding publication requirements (Basel Committee on Banking Supervision, 2014b). The NSFR was initially introduced in 2018 with corresponding publication requirements (Basel Committee on Banking Supervision, 2015), although this was subsequently postponed in both the U.S. and Europe until 2021. Consequently, both ratios are not reported by banks for all liquidity events. In addition, since for the earlier events, the data needed to calculate the ratios were not yet published in the balance sheets, plausible approximations of the ratios and their properties must be applied over all events for consistency reasons (Bruno et al., 2018).

First, the mechanism behind the LCR is examined. The variable LCR_PROXY is formed from the ratio of liquid assets to demand deposits and short-term funding and is used to test the hypothesis. Banks with more liquid assets are in a better position to comply with the LCR. Thus, they are under less pressure to restructure their assets. Hence, a higher LCR_PROXY should positively influence stock market reactions and negatively influence CDS market reactions. This assumed response can be further justified by the notion that banks with higher liquid assets are better able to withstand liquidity shocks and have a competitive advantage over their peers.

$H1_l$: *Banks with more liquid balance sheets experience a positive impact on stock market reaction and a negative impact on the CDS market.*

In a further step, the influence of the NSFR on the market reaction is analyzed. This ratio conceptually corresponds to the "golden rule of banking" in that it limits the maturity transformation of institutions. According to the NSFR, such a situation arises if the stability and long-term nature of the liability structure is sufficient to cover the outflows of assets. As shown in Art. 26 Basel Committee on Banking Supervision (2014a), regulatory capital is eligible as available stable funding at 100 %, which also applies to demand deposits of retail and small business customers in a range of 90 % to 95 %. In particular, banks with a large share of short-term wholesale funding in their liabilities will have difficulty matching the NSFR because these positions are considered to be significantly less stable. Compliance with the ratio is also more difficult for banks that hold minimal regulatory capital. Such banks consequently need to raise more equity and restructure their funding, which is expensive and constitutes a competitive disadvantage. The variable NSFR_PROXY is formed by the ratio of the sum of total equity, long-term funding and customer deposits to total assets. The larger the ratio, the smaller the funding mismatch. A positive impact on the stock market and a negative impact on the CDS market is assumed because banks with a smaller funding mismatch are subject to lower illiquidity risk. A smaller funding mismatch also implies a competitive advantage and lower costs to achieve new rules.

$H2_l$: *A lower funding mismatch has a positive impact on the stock market reaction and a negative impact on the CDS market.*

The charter value of a bank can be defined as the value that would be foregone due to insolvency and includes, e.g., benefits from reputation, monopoly rents, economies of scale and superior information (Acharya, 1996). Since those values cannot be sold if a bank is insolvent, banks with higher charter values have a lower incentive to risk failure (Keeley, 1990). Ratnovski (2009) analyzes the connection between the liquidity choices of banks and their charter values. It can be derived that the liquidity of banks positively correlates with its charter value, implying that banks preserve their charter values by sufficient liquidity (Bruno et al., 2018). Since banks base their liquidity on the likelihood of a bailout (generate short-term bailout rents with low liquidity level vs. preservation of charter value with high liquidity and long-term rents) and liquidity regulation reduces this probability, banks with higher charter values will choose higher liquidity (Bruno et al., 2018). Higher charter values should have a positive impact on the stock market reaction and a negative impact on the CDS market reaction because the PD decreases with higher levels of liquidity. As a proxy of a banks' charter value, the ratio of customer deposits to total assets is employed (Keeley, 1990; Goyal, 2005)

$H3_l$: *A higher charter value has a positive impact on the stock market reaction and a negative impact on the CDS market.*

In a further step, country-specific hypotheses are formulated. As in the previous section, the European sample is divided into GIIPS banks and European non-GIIPS banks to analyze differences in European and U.S. market reactions. In addition to the fact that all relevant liquidity events are published, a further contribution of this paper with regard to the analysis of liquidity risk is the inclusion of U.S. banks. This inclusion allows the empirical investigation of whether there are differences in market reactions between U.S. banks and European banks. For this purpose, the dummy variable EUROPE_EX_GIIPS, which is 1 for European non-GIIPS banks and 0 otherwise, is employed. Although the liquidity position and funding of U.S. banks was advantageous compared to European institutions (European Banking Authority, 2012), so that they are under less pressure to meet ratios, it is worthwhile to empirically examine this issue. Illiquidity risk is a priori lower and U.S. banks are less forced to issue equity or change their assets and funding, which is costly. Hence, EUROPE_EX_GIIPS might have a negative impact on stock market reactions. A positive impact on CDS market responses is predicted because of higher illiquidity risk.

$H4_l$: *European non-GIIPS banks experience a negative impact on the stock market reaction and a positive impact on the CDS market compared to U.S. banks.*

As stated in the previous section, banks located in GIIPS countries are particularly affected by the sovereign debt crisis in Europe, with the described implications. The dummy GIIPS that is utilized is 1 for banks located in GIIPS countries and 0 otherwise. A negative impact on the stock market reaction and a positive impact on the CDS market are assumed.

$H5_l$: *Banks located in GIIPS countries experience a negative impact on the stock market reaction and a positive impact on the CDS market compared to U.S. banks.*

U.S. banks form the reference category.

IV. Methodology

A. Data

To capture capital market reactions in the U.S. and Europe, daily stock prices and CDS spreads of all available banks are gathered using Thomson Reuters Eikon and Bloomberg. Exchange rates, market capitalization and stock and CDS indices are also obtained from these sources, which also holds for the bank-specific variables used in the cross-sectional analysis. To illustrate the effects on debt, it is also possible to use bonds. Nevertheless, the use of CDS spreads is recommended for several reasons, e.g., Longstaff et al. (2005); Bessembinder et al. (2009); Ericsson et al. (2009); Andres et al. (2021). The problem is that bonds with different maturities, ratings and liquidity exist. Although there are CDSs with different maturities, those with five years are the most widely traded and most liquid, which is why they are discussed in this paper. Furthermore, CDSs are more liquid than bonds, so new information is more quickly reflected in them. Moreover, only one security of a bank needs to be priced using a CDS instead of analyzing diverse bonds of a bank with different trading activity. CDSs measure default risk in a more isolated way because bonds are more sensitive to interest rate risk. The European and U.S. CDS are written on senior unsecured debt with a term of five years. In both cases, the end-of-day mid-spread is selected. Although CDS are traded over the counter (OTC), the contracts are standardized by the International Swaps and Derivatives Association (ISDA). With regard to stocks, daily closing prices are used.

The initial sample of bank stock price and CDS spread time series is illustrated in Tab. 4. To generate

Table 4
Initial Subsamples

This table presents the initial number of bank stocks and CDSs from Europe and the U.S.

	Europe	U.S.	Total
Stocks	213	867	1080
CDS spreads	66	17	83

a sufficiently representative and reliable sample, only banks' stocks that meet both of the following criteria are considered: (1) returns must be available every day in the event window and (2) the sum of nonavailable observations and zero returns must not exceed 50 % of the estimation window. A bank's CDS spread changes are only considered if (1) they are available in the event window each day and (2) and nonavailable observations do not exceed 50 % of the estimation window.[12] The criterion for inclusion in the test portfolio is slightly weakened for CDS spread changes compared to returns because zero changes in CDS spreads are not problematic in the estimation window. A zero change in stock returns suggests that the stock price has not changed due to nontrading, with CDS spreads only being available on a day when a new contract has been closed. A zero change in CDS spreads therefore does not imply that no CDSs are traded but rather that the risk has not changed from the creditor's perspective.

In a further step, insolvent and nationalized banks (e.g., Dexia, AIB Group, Permanent TSB and Banca Italease) are removed. After the banks that fulfill the above requirements have been identified for each event, the intersection is formed for each regulatory category to generate balanced panels of bank returns and CDS spread changes. This process leads to a significant reduction in sample size, but with an unbalanced panel, the aggregation of portfolio returns and CDS spread changes could not be properly performed. The result of the selection process for each regulatory category is provided in Tab. 5.

Table 5
Number of Included Banks per Regulatory Category and Financial Instrument

This table presents the number of included banks for each regulatory category and financial instrument in Europe and the U.S. after applying the liquidity criteria.

Type	**Europe**		**U.S.**	
	Stocks	CDS spreads	Stocks	CDS spreads
Credit Risk	96	30	218	8
Market Risk	90	22	220	8
Liquidity Risk	98	20	222	8

B. Event Study Design

To examine the capital market reactions, an event study approach is employed. Following the methodological literature, e.g., Fama et al. (1969); Brown and Warner (1985); MacKinlay (1997), abnormal returns $AR_{i,t}$ are calculated using the market model[13] (Sharpe, 1963). $AR_{i,t}$ is the abnormal return of bank i at

[12] Returns and CDS spread changes are computed as continuous changes, i.e., as logarithmic differences of the stock prices and CDS spreads, respectively.

[13] The market model is not extended with further regressors to form a multifactor model because they have only marginal explanatory power (MacKinlay, 1997).

time t in the event window and is calculated as follows:

$$AR_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_{1,i} R_{m,t}), \tag{1}$$

where $R_{i,t}$ is the actual return of bank i at time t and $R_{m,t}$ is the return of a market index. The subtrahend corresponds to the expected returns with parameters calculated in the corresponding estimation window using ordinary least squares (OLS). A decision for a stock index has to be made, which may have a significant impact on the results. Supranational and broad stock indices are less subject to bias than national indices because of a reduced correlation of financial and nonfinancial firms within a specific country and the correlation of banks in different countries (Ongena et al., 2003). Therefore, the effect of bank regulation should be less visible because the influence of banks is less due to the wide diversification and more constituents. Thus, the abnormal effect due to regulatory announcements can be determined in a more isolated way. Based on these considerations, the MSCI World is used for the stock markets. To exclude a dependency of the results on the choice of the index, the analyses are additionally carried out in Europe with the MSCI Europe and in the U.S. with the MSCI USA.

In contrast, there is evidence in the literature that many factors, mainly macroeconomic factors (Collin-Dufresne et al., 2001; Ericsson et al., 2009), provide explanatory power for CDS spreads. Therefore, consistent with Andres et al. (2021), a factor model is used to estimate abnormal CDS spread changes $\Delta AS_{i,t}$ of bank i at time t in the event window

$$\Delta AS_{i,t} = \Delta S_{i,t} - (\hat{\alpha}_i + \hat{\beta}_{1,i} \Delta S_{index,t} + \hat{\beta}_{2,i} Level_t + \hat{\beta}_{3,i} Slope_t + \hat{\beta}_{4,i} \Delta Vola_t). \tag{2}$$

The minuend $\Delta S_{i,t}$ corresponds to the actual CDS spread change of bank i at time t. The subtrahend reflects the calculation of the expected CDS spreads of bank i at time t, whereby the parameters are estimated in the estimation window using OLS. The change in the CDS market index is $\Delta S_{index,t}$.[14] Unfortunately, there is no global CDS index. Hence, the iTraxx Europe 5-years is selected for the European CDS market, and the iTraxx CDX IG 5-years is selected for the U.S. CDS market. Since both indices suffer from missing values, the last observation carried forward method is selected to close data gaps up to five missing observations before the index returns are calculated. $Level_t$ is the level of the risk-free interest rate (proxied by the 5-year interest rate swap rate with reference to the 3M Euribor in Europe and the 5-year interest rate swap rate with reference to the 3M Libor in the U.S.). It is assumed that there is an inverse relationship between $Level_t$ and $\Delta S_{i,t}$. Theoretically, increasing the drift of the risk-free interest rate increases the risk-neutral drift of the firm value process; thus, the risk-neutral PD and CDS spreads decrease (Longstaff and Schwartz, 1995). Empirically, it can be argued that low interest rates often occur in times of crisis with increased insolvencies (Alexander and Kaeck, 2008). $Slope_t$ is the slope of the risk-free interest rate (proxied by the difference in the 10- and 2-year swap rate with the above specification in Europe and the U.S.), whereby the relationship of $Slope_t$ and $\Delta S_{i,t}$ is the same as in the previous case. No government bonds are utilized as a proxy of the risk-free interest rate because the choice is difficult against the background of various government bonds in Europe. Furthermore, swaps are more liquid than government bonds, and it is also empirically shown that they are a better proxy of the risk-free interest rate in credit derivative markets (Houweling and Vorst, 2005). Higher equity volatility increases the PD of debt; hence, it implies rising CDS spreads. $\Delta Vola_t$ is the daily change in the equity implied volatility (proxied by the VSTOXX in Europe and the VIX in the U.S.,

[14] For reasons of robustness, $\Delta AS_{i,t}$ are additionally calculated using the standard single-index model as follows: $\Delta AS_{i,t} = \Delta S_{i,t} - (\hat{\alpha}_i + \hat{\beta}_{1,i} \Delta S_{index,t})$.

respectively).

Because events are considered over several years and the estimated parameters are unlikely to be stable over time, a separate estimation window is constructed for each event, including 150 days. There is a trade-off in the choice of an appropriate estimation window because as the period increases, the accuracy of the model parameters increases while also increasing the probability that these same parameters have changed and overlapping events occur. Given that events are simultaneous to the financial crisis and the European sovereign debt crisis, an estimation window of 150 days prior to each event window is used to strike a reasonable balance of statistical accuracy and avoid bias in β_i by confounding events.

To further account for such a bias in the results due to β_i, market-adjusted abnormal returns $MAR_{i,t}$ and CDS spread changes $\Delta MAS_{i,t}$ are additionally computed using a market-adjusted model that directly calculates the abnormal effect in the event period (Fuller et al., 2002). Market-adjusted abnormal returns and CDS spread changes are calculated as the difference of bank's i return $R_{i,t}$ and the return $R_{m,t}$ of a market index as well as the bank's CDS spread change $\Delta S_{i,t}$ and the CDS spread change of the CDS index $\Delta S_{index,t}$

$$MAR_{i,t} = R_{i,t} - R_{m,t}, \tag{3}$$

$$\Delta MAS_{i,t} = \Delta S_{i,t} - \Delta S_{index,t}. \tag{4}$$

Although no estimation window is required and only the first liquidity criterion of section A would be binding, the same banks are considered for reasons of comparability.

Confounding events in the event window are more concerning because they directly bias the calculation of the abnormal effect. Since the problem of confounding events increases with a larger event window, it is limited to three days ranging from t_{-1} to t_{+1} centered around the event date t_0. Using a short event window with daily data raises the power of the significance tests so that the probability of a type II error is reduced (Schäfer et al., 2016). A type II error implies that the null hypothesis of no capital market reaction cannot be rejected, although the effect actually differs from zero. In the event window, the corresponding cumulative abnormal returns $CAR_{i,t}$, cumulative market adjusted returns $CMAR_{i,t}$, cumulative abnormal CDS spread changes $\Delta CAS_{i,t}$ and cumulative market adjusted CDS spread changes $\Delta CMAS_{i,t}$ are calculated for each participating bank as follows:

$$CAR_{i,t} = \sum_{i=t_{-1}}^{t_{+1}} AR_{i,t}, \tag{5}$$

$$CMAR_{i,t} = \sum_{i=t_{-1}}^{t_{+1}} MAR_{i,t}, \tag{6}$$

$$\Delta CAS_{i,t} = \sum_{i=t_{-1}}^{t_{+1}} AS_{i,t}, \tag{7}$$

$$\Delta CMAS_{i,t} = \sum_{i=t_{-1}}^{t_{+1}} MAS_{i,t}. \tag{8}$$

C. Aggregated Market Reactions and Block Bootstrap Significance Test

The starting point of the calculation of aggregated market reactions and their significance with respect to the three types of regulation are $CAR_{i,t,x}$, $CMAR_{i,t,x}$, $\Delta CAS_{i,t,x}$ and $\Delta CMAS_{i,t,x}$, with $x \in \{m, c, l\}$ (m = market risk, c = credit risk and l = liquidity risk). To avoid redundancies, the further procedure is only explained on the basis of $CAR_{i,t,x}$, beginning with calculating the overall effects. For each event and separately for each type of regulation, the average cumulative abnormal return $\overline{CAR}_{x,e}$ is calculated based on equally and market-weighted portfolios. The latter method gives more weight to larger banks, and the $CAR_{i,t,x}$ are weighted with their proportional market value in the portfolio as of the last trading day of the previous quarter (Armstrong et al., 2010). For the European samples, the market values in the respective national currency are first converted into Euros.

To correctly capture the market reaction, the events inducing a reduction in regulatory intensity compared to the initial proposal are multiplied by -1 following Armstrong et al. (2010). For example, such a situation could cause returns to increase. In this respect, it is not appropriate to aggregate the untreated $\overline{CAR}_{x,e}$ over several events. Per type of regulation, the sum of the $\overline{CAR}_{x,e}$ is calculated over all events to capture the overall effect of market, credit and liquidity regulation. The total effect, summed over all events of a regulatory category, is described as $\sum \overline{CAR}_x$. Again, this sum is calculated on both an equally weighted based and market-weighted basis.

Because the number of events of the three regulatory types is never greater than 26, the significance of the total market reaction cannot be reliably evaluated using common tests. Therefore, following Armstrong et al. (2010), significance is tested using block bootstrap simulations, which is explained in the following section using market risk regulation and the European stock market as an example.

All days that fall in a range of t_{-2} to t_{+2} to the actual events are excluded from the simulation of nonevent days. This approach ensures that only nonevent trading days are considered with corresponding nonevent windows that do not overlap with the actual event windows.[15] Therefore, the simulated data fit the distribution under the null hypothesis that no market risk regulation occurs. Because return distributions are often nonstationary (Bey (1983); Hsu (1984)), 15 nonevent days are randomly drawn in such a way that they mimic the year-by-year distribution of market events (Armstrong et al., 2010) and that the nonevent windows do not overlap. This finding implies that one nonevent day is drawn from 2007, one nonevent day is drawn from 2008, two nonevent days are drawn from 2009, etc.; see Tab. 1. After constructing the three-day nonevent window as well as the 150-day estimation window for each of the simulated nonevent days, the $\overline{CAR}_{m,e}$ are computed for each nonevent, again based on equally weighted and market-weighted portfolios. Then, the assumed pattern regarding the tightening and weakening of regulation is applied to the nonevents. This simulation of 15 nonevents is repeated 1000 times. The sum of the $\overline{CAR}_{m,e}$ over all 15 nonevents is computed for each of the 1000 simulations to form 1000 nonevent $\sum \overline{CAR}_m$. This procedure does not rely on any distributional assumption, and a two-sided test is performed because no clear statement can be made about the direction of the expected reactions; see subsection A. For this purpose, p values are calculated on the basis of the number of cases for which the actual event $\sum \overline{CAR}_m$ is larger or smaller than the 1000 nonevent $\sum \overline{CAR}_m$.

Regulatory announcements for market, credit and liquidity risk are also simultaneously announced. The bootstrap procedure of the market-only events is analogously performed, with the exception that market events that are simultaneously announced with credit and liquidity events are excluded. Thus, market events 3, 4, 8 and 13 are removed, leaving eleven market-only events. In this respect, only the pattern of the annual distribution changes, and the number of events decreases from 15 to eleven, which also holds for the (market-only) nonevents.

To statistically rule out anticipation effects by information leakage and to prevent the results from being

[15] Since a three-day nonevent window is constructed from the simulated nonevent days, t_{-2} and t_{+2} of the actual events need to be excluded. If t_{-2} (t_{+2}) were drawn, then the constructed nonevent window would contain t_{-1} (t_{+1}) and thus overlap with the actual event window.

driven by overall short-run trends in the market around the event days, following Bruno et al. (2018), placebo events are additionally constructed five trading days before the actual events and tested for significance with the same procedure.

D. Cross-Sectional Analysis

In a further step, it is examined which firm- and country-specific characteristics explain the variation in market responses. To avoid redundancy, the models are explained using only $CAR_{i,t}$ and $\Delta CAS_{i,t}$, with the regressions analogously calculated using $CMAR_{i,t}$ and $\Delta CMAS_{i,t}$ as dependent variables. Per type of regulation, $CAR_{i,t}$ and $\Delta CAS_{i,t}$ are regressed on a vector of firm- ($\mathbf{BANK}_{i,t}$) and country-specific ($\mathbf{COUNTRY}_{i,t}$) variables, whereby the variables of the former vector depend on the type of regulation, which is why the regressions are separately run for each type of regulatory announcement.[16] With regard to the bank-specific accounting variables, the most recent available data before the event are drawn in USD. For the majority of banks, this means that the quarterly figures can be used. For banks publishing only once a year, annual values are used. In addition to the variables of interest, the vector $\mathbf{CONTROLS}_{i,t}$ includes the control variables, leading to the following model specifications:

$$CAR_{i,t,m,r} = \alpha_{m,r} + \boldsymbol{\beta}'_{m,r}\mathbf{BANK}_{i,t,m} + \boldsymbol{\gamma}'_{m,r}\mathbf{COUNTRY}_i + \boldsymbol{\delta}'_{m,r}\mathbf{CONTROLS}_{i,t} + \epsilon_{i,t,m,r}, \quad (9)$$

$$\Delta CAS_{i,t,m,s} = \alpha_{m,s} + \boldsymbol{\beta}'_{m,s}\mathbf{BANK}_{i,t,m} + \boldsymbol{\gamma}'_{m,s}\mathbf{COUNTRY}_i + \boldsymbol{\delta}'_{m,s}\mathbf{CONTROLS}_{i,t} + \epsilon_{i,t,m,s}, \quad (10)$$

$$CAR_{i,t,c,r} = \alpha_{c,r} + \boldsymbol{\beta}'_{c,r}\mathbf{BANK}_{i,t,c} + \boldsymbol{\gamma}'_{c,r}\mathbf{COUNTRY}_i + \boldsymbol{\delta}'_{c,r}\mathbf{CONTROLS}_{i,t} + \epsilon_{i,t,c,r}, \quad (11)$$

$$\Delta CAS_{i,t,c,s} = \alpha_{c,s} + \boldsymbol{\beta}'_{c,s}\mathbf{BANK}_{i,t,c} + \boldsymbol{\gamma}'_{c,s}\mathbf{COUNTRY}_i + \boldsymbol{\delta}'_{c,s}\mathbf{CONTROLS}_{i,t} + \epsilon_{i,t,c,s}, \quad (12)$$

$$CAR_{i,t,l,r} = \alpha_{l,s} + \boldsymbol{\beta}'_{l,s}\mathbf{BANK}_{i,t,l} + \boldsymbol{\gamma}'_{l,s}\mathbf{COUNTRY}_i + \boldsymbol{\delta}'_{l,s}\mathbf{CONTROLS}_{i,t} + \epsilon_{i,t,l,r}, \quad (13)$$

$$\Delta CAS_{i,t,l,s} = \alpha_{l,s} + \boldsymbol{\beta}'_{l,s}\mathbf{BANK}_{i,t,l} + \boldsymbol{\gamma}'_{l,s}\mathbf{COUNTRY}_i + \boldsymbol{\delta}'_{l,s}\mathbf{CONTROLS}_{i,t} + \epsilon_{i,t,l,s}. \quad (14)$$

Depending on the type of regulation, $\mathbf{BANK}_{i,t,x}$ with $x \in \{m, c, l\}$ contains the variables described in B. $\mathbf{COUNTRY}_i$ is the same for all equations and includes the dummies EUROPE_ex_GIIPS and GIIPS. EUROPE_ex_GIIPS is a dummy variable that is 1 for European banks not located in GIIPS and 0 otherwise. GIIPS is a dummy variable that is 1 for banks located in GIIPS and 0 otherwise. The reference category is U.S. banks.

$\mathbf{CONTROLS}_{i,t}$ is the same in all specifications. It includes the control variables' level of profitability (measured as the return on assets (ROA)) and level of cost efficiency (measured by the cost-to-income ratio (COST_INC)); see Fiordelisi and Molyneux (2010). Furthermore, to control for the size (SIZE) of a bank, the natural logarithm of bank total assets is included. To capture a potentially different impact of the different phases of the financial and sovereign debt crisis, the categorical variable TIME_t is used, which divides the sample period into four subperiods. Consistent with Aït-Sahalia et al. (2012); Ricci (2015), the first period is labeled the "subprime crisis" and includes all events until 09/14/2008, the day before the bankruptcy of Lehman Brothers. The second period is referred to as the "global financial crisis" and ranges from 09/15/2008 to 05/01/2010, which is the day before the start of the European sovereign debt crisis with the € 110 billion bailout package for Greece. The third period starts on 05/02/2010 and ends on 08/20/2018. On that day, the third and final rescue program of the European Stability Mechanism (ESM) expired. This period is labeled the "sovereign debt crisis". The fourth and last period is labeled "ex post crisis" and ranges from 08/21/2018

[16] Analyzing the cross-sectional determinants of abnormal returns and CDS spread changes using a 2-stage approach is a common procedure in finance literature; e.g. Moenninghoff et al. (2015); Simion et al. (2016); Carboni et al. (2017); Bruno et al. (2018); Pancotto et al. (2020).

to the last event. Because the events for market, credit, and liquidity regulation were announced at different times, not all time periods occur for all regulatory categories. One period is omitted from each regression to avoid perfect multicollinearity. As in the calculation of aggregated market responses, the dependent variable is multiplied by -1 if the corresponding event is associated with a reduction in regulatory intensity. The absence of multicollinearity is checked using variance inflation factors (VIFs).[17] Equations are estimated using a random effects model, because time-invariant variables (EUROPE_ex_GIIPS, GIIPS) are included. Descriptive statistics of independent variables are provided in Appendix B. Clustered standard errors at the bank level are used to generate reliable inferences.

E. Handling Confounding Events

As in any event study, there are two types of issues to be particularly aware of that can bias results. These issues are the correct selection of events (especially in event studies for regulatory changes) and the avoidance of bank-specific confounding events in the event window. The former type of problem is mitigated due to careful event selection (see subsection B). Regarding the latter problem, all event windows are checked for bank-specific news with LexisNexis.[18] During many events, bank-specific news occurs that may be relevant to owners and creditors. Therefore, bank-specific confounding events affect both the aggregated market reactions and the results of the cross-sectional analysis.

To validate the results of the cross-sectional analysis, the regressions are recomputed, omitting banks in each event with confounding news. This process does not change the conclusions, and the results of the robust cross-sectional analysis can be provided upon request. The impact on aggregated market reactions is difficult to account for because balanced stock and CDS portfolios are constructed for market, credit, and liquidity regulation to properly sum the total effect. This finding implies that a bank would no longer be part of the portfolio even if it is missing only in one event due to bank-specific news (because the intersection of banks is formed over all events), which leads to a significant reduction in sample size, especially the greater the number of events. Bank-specific confounding events are likely to play a minor role in the calculation of overall effects, given that messages randomly occur and the sample is sufficiently large. Against this background, the results for stock markets should be sufficiently robust given their sample size. However, for CDS markets, due to smaller samples, especially for U.S. portfolios with a maximum of eight banks, and the higher responsiveness of professional creditors, it is important to pay close attention to whether the overall effect is driven by bank-specific confounding events. Due to the higher sensitivity of the CDS market, outliers are more likely, which, combined with a smaller sample size over which the effect is averaged, introduces a greater risk that the overall effect is biased. Close attention is given to this when discussing CDS market reactions.

V. Discussion

A. Overall Market Reaction

Regarding the stock market, the results calculated with the MSCI World are employed. Only in the case of significant deviations are the results with the MSCI Europe and MSCI USA as proxies for the stock market portfolio also discussed (see Appendix C). The European CDS market reaction is computed using the iTraxx

[17] Calculated VIFs indicate the absence of multicollinearity, with the exception of TIER1_RAT and TIER1_RAT^2, which is not a problem. Results can be provided upon request.

[18] Consistent with Bruno et al. (2018), the following keywords are utilized: dividends, earnings, CEO, losses, write-downs, restatement, downgrade, rating, fraud, annual report, manipulate, inspection, restructuring, M&A, merger, acquisition, stock split, dilution, fired, restructuring, issue, and takeover.

Europe 5-years, whereby the iTraxx CDX IG 5-years index is selected for the U.S. reaction. For the CDS market response, the results with the single-index model are reported only in the case of differences.

A.1. Market Risk

Starting with market risk regulation, it can be observed that the European stock market reacts in a clearly negative manner. Considering 15 market events, the overall effect for equally weighted portfolios is -0.1003 ($\sum \overline{CMAR}_{m\_ew}$) and -0.0771 ($\sum \overline{CAR}_{m\_ew}$), with market-weighted reactions being more negative. $\sum \overline{CMAR}_{m\_mw}$ is -0.1792, and $\sum \overline{CAR}_{m\_mw}$ is -0.1504, implying that larger banks more negatively react. One explanation is that larger banks are more likely to engage in proprietary trading. The overall market-weighted effect is significant at the 5 % level for both methods of return calculation, with the equally weighted effect only being significant at the 10 % level for $\sum \overline{CMAR}_{m\_ew}$.[19] In a further step, market events that were simultaneously announced with credit and liquidity events are excluded. Events 3, 4, 8 and 13 are removed, so eleven market-only events remain. Thus, no value for the market-only events is significant, although probably not because market risk regulation is irrelevant for shareholders of European banks. Rather, the excluded market events that are described are essential for the regulation of market risk. They were published at the beginning of the regulatory treatment of market risk, i.e., at a stage when the impending regulation was nervously awaited. Furthermore, the events include significant changes to market risk regulation and are accompanied by a large media presence. Events 3 and 4 contain changes in the capital for incremental risk in the trading book, and additionally, the market risk framework is supplemented by a VaR measure that has to be calibrated on a one-year historical stress period, which at least doubles the capital requirements. In comparison, credit events 2 and 3, which are parallel to the two market events 3 and 4, are less important in the process of regulating credit risk because resecuritizations are given higher risk weights. To support this argumentation with figures, the market reaction is recalculated with only the four market events excluded from the market-only events (events 3, 4, 8 and 13). Computed with the MSCI World, distinct negative reactions with -0.0668 ($\sum \overline{CMAR}_{m\_ew}$), -0.0687 ($\sum \overline{CAR}_{m\_ew}$, -0.1540 ($\sum \overline{CMAR}_{m\_mw}$) and -0.1517 ($\sum \overline{CAR}_{m\_mw}$) are observed. The equally weighted reactions are significant at the 5 % level, while the market-weighted reactions are significant at the 1 % level. A deeper analysis shows that event 3 is almost responsible for the total effect of the four events. In this event, which shocks the market, the BCBS announces changes to the IRC and, through stressed VaR, at least a doubling of capital for market risk. In light of this outcome, BCBS should cautiously consider the market environment and the stability of the financial system when announcing such events. It is prudently concluded that shareholders in European banks are suffering a loss of wealth.

In contrast, the stock market reaction in the U.S. is not significant for either equally weighted portfolios or market-weighted portfolios, which also holds for the market-only events. All placebo events remain insignificant for European and U.S. stock markets, implying the absence of anticipation effects. The significant difference in stock market valuations between European banks and U.S. banks suggests that U.S. shareholders are less affected by market risk regulation. The Volcker rule, which was implemented as part of the Dodd-Frank Act in 2010, has severely restricted proprietary trading for U.S. banks. Therefore, the risk-return profile of U.S. banks is not significantly altered by Basel's market risk regulation, and the pressure to comply with the rules is smaller. Thus, the ex ante competitive advantage of European banks is reduced. Furthermore, the U.S. sample includes many small and regional banks that do not engage in significant proprietary trading due to their business model.

[19] Effect size and significance are more pronounced for calculations with the MSCI Europe.

The European CDS market reaction is negative for all market and market-only events, none of which is significant. Hence, European creditors are indifferent. Examining the placebo events five trading days before the actual events, positive abnormal CDS spread changes of 0.3546 ($\sum \overline{\Delta CMAS}_{m\_ew}$), 0.4190 ($\sum \overline{\Delta CAS}_{m\_ew}$), 0.5707 ($\sum \overline{\Delta CMAS}_{m\_mw}$), and 0.5547 ($\sum \overline{\Delta CAS}_{m\_mw}$) occur. $\sum \overline{\Delta CAS}_{m\_ew}$ is significant at the 5 % level, while the three other values are significant at the 1 % level. The analysis of market-only placebo events provides consistent results. Considering individual events reveals that these values are primarily driven by placebo event 12. Analyzing bank-specific confounding events reveals a report by Commerzbank announcing that its restructuring plan with thousands of cancellations is much less costly than previously assumed. This is a positive signal for the creditors of the banks in the sample because the risk of contagion from the ailing Commerzbank has decreased, as reflected in falling CDS spread changes at the level of individual banks. However, because placebo event 12 is associated with a reduction in regulatory intensity, the corresponding values are multiplied by -1, resulting in positive abnormal CDS spread changes.

The CDS market reaction in the U.S. is basically negative, with market-weighted reactions being slightly more pronounced. All market-only events are also negative. The placebo events are consistently positive. However, none of the above values are significant. In summary, it is concluded that both European creditors and U.S. creditors are indifferent to market risk regulation. There is no evidence of a reduction in risk intended by regulation, either in Europe or in the U.S.

Table 6

Market Reaction to Announcements Regarding Market Risk Regulation

This table presents aggregated European and U.S. stock and CDS market reactions to 15 regulatory announcements of market risk by the Basel Committee on Banking Supervision (BCBS). Cumulative abnormal returns $CAR_{i,t}$, cumulative market-adjusted returns $CMAR_{i,t}$, cumulative abnormal CDS spread changes $\Delta CAS_{i,t}$ and cumulative market-adjusted CDS spread changes $\Delta CMAS_{i,t}$ are calculated according to Eq. (1) - Eq. (8). The MSCI World is employed as a proxy for the stock market portfolio. The iTraxx Europe 5-years and iTraxx CDX IG 5-years are selected as proxies for the European and U.S. CDS market portfolio. For each of the 15 market events (m), average values $\overline{CAR}_m$, $\overline{CMAR}_m$, $\overline{\Delta CAS}_m$, $\overline{\Delta CMAS}_m$ are computed based on equally weighted (ew) and market-weighted (mw) portfolios. These values are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The stock market reaction is reported as the sum of cumulative average abnormal returns $\sum \overline{CAR}_m$ and the sum of cumulative average market-adjusted returns $\sum \overline{CMAR}_m$ over 15 events. The CDS market reaction is reported as the sum of cumulative average abnormal CDS spread changes $\sum \overline{\Delta CAS}_m$ and the sum of cumulative average market-adjusted CDS spread changes $\sum \overline{\Delta CMAS}_m$ over 15 events. In addition, aggregated market reactions are calculated for market-only events, i.e., four market events are excluded (events 3, 4, 8, and 13) that are announced simultaneously with credit and liquidity events. Abnormal stock and CDS market reactions are computed for placebo events five trading days prior to the actual events to assess potential information leakage and market anticipation. All values are tested for significance using a block bootstrap significance test (see subsection C). p values are computed based on a two-sided significance test: *p<0.1; **p<0.05; ***p<0.01.

	$\sum \overline{CMAR}_{m\_ew}$	$\sum \overline{CAR}_{m\_ew}$	$\sum \overline{CMAR}_{m\_mw}$	$\sum \overline{CAR}_{m\_mw}$
Panel A: European Market Reaction				
Actual Events				
Sum (all events)	-0.1003*	-0.0771	-0.1792**	-0.1504**
p value (all events)	0.061	0.147	0.021	0.040
Sum (market-only events)	-0.0317	-0.0102	-0.0275	0.0036
p value (market-only events)	0.515	0.831	0.666	0.954
Placebo Events				
Sum (all events)	-0.0193	0.0006	-0.0002	0.0338
p value (all events)	0.727	0.990	0.998	0.651
Sum (market-only events)	-0.0523	-0.0214	-0.0657	-0.0375
p value (market-only events)	0.264	0.644	0.322	0.540
Panel B: U.S. Market Reaction				
Actual Events				
Sum (all events)	0.0671	0.0733	-0.0358	-0.0711

p value (all events)	0.261	0.236	0.719	0.469
Sum (market-only events)	0.0526	0.0688	0.0741	0.0616
p value (market-only events)	0.263	0.151	0.269	0.344
Placebo Events				
Sum (all events)	0.0044	0.0318	0.0339	0.0672
p value (all events)	0.955	0.625	0.731	0.495
Sum (market-only events)	0.0268	0.0464	0.1029	0.0905
p value (market-only events)	0.567	0.330	0.138	0.177

	$\sum \overline{\Delta CMAS}_{m\_ew}$	$\sum \overline{\Delta CAS}_{m\_ew}$	$\sum \overline{\Delta CMAS}_{m\_mw}$	$\sum \overline{\Delta CAS}_{m\_mw}$
Panel A: European Market Reaction				
Actual Events				
Sum (all events)	-0.0162	-0.0615	-0.0328	-0.0338
p value (all events)	0.922	0.703	0.859	0.853
Sum (market-only events)	-0.1532	-0.1870	-0.2009	-0.2034
p value (market-only events)	0.255	0.226	0.172	0.220
Placebo Events				
Sum (all events)	0.4686***	0.4190**	0.5707***	0.5547***
p value (all events)	0.001	0.021	0.000	0.004
Sum (market-only events)	0.3492**	0.3161*	0.4251***	0.4002**
p value (market-only events)	0.014	0.050	0.005	0.023
Panel B: U.S. Market Reaction				
Actual Events				
Sum (all events)	-0.1224	-0.1593	-0.1353	-0.2006
p value (all events)	0.513	0.433	0.493	0.376
Sum (market-only events)	-0.0693	-0.1117	-0.0892	-0.1395
p value (market-only events)	0.607	0.466	0.541	0.409
Placebo Events				
Sum (all events)	0.3013	0.2453	0.3401	0.2993
p value (all events)	0.134	0.236	0.107	0.183
Sum (market-only events)	0.1468	0.0348	0.1557	0.0364
p value (market-only events)	0.337	0.824	0.324	0.830

A.2. Credit Risk

In a next step, market reactions to credit risk regulation are discussed. The European stock market reaction is distinctly negative. For the equally weighted portfolio, the overall effect is -0.1462 ($\sum \overline{CMAR}_{c\_ew}$) and -0.1539 ($\sum \overline{CAR}_{c\_ew}$), with the values being significant at the 5 % level. For the market-weighted portfolio, there is a stronger negative effect of -0.3794 ($\sum \overline{CMAR}_{c\_mw}$) and -0.3223 ($\sum \overline{CAR}_{c\_mw}$), revealing that larger banks are more affected. Both values are significant at the 1 % level. Subsequently, credit events that were announced simultaneously with liquidity and market events are excluded. Hence, events 2, 3, 5, 7, 9, 19, 20 and 25 are removed, leaving 18 credit-only events. The credit-only analysis supports the initial results and moves in the same direction, but only $\sum \overline{CMAR}_{c\_mw}$ with -0.1458 is significant at the 10 % level. The results of the credit-only analysis are more pronounced when using the MSCI Europe as a stock market portfolio proxy. In this case, both market-weighted responses (-0.1580 $\sum \overline{CMAR}_{c\_mw}$, -0.1330 $\sum \overline{CAR}_{c\_mw}$) are significant at the 5 % level. Altogether, this finding suggests that owners of European banks, especially those of larger banks, suffer a loss in shareholder value. All placebo events remain insignificant.

The U.S. stock market reaction moves in a similar direction, whereby the market reactions are not as distinct as in Europe. While the equally weighted responses are small in magnitude, with -0.0705 ($\sum \overline{CAR}_{c\_mw}$) and -0.0353 ($\sum \overline{CMAR}_{c\_mw}$), and insignificant, the reactions are again more pronounced for market-weighted portfolios with -0.2560 ($\sum \overline{CMAR}_{c\_mw}$) and -0.2741 ($\sum \overline{CAR}_{c\_mw}$), respectively, with the values being significant at the 10 % and 5 % levels. Although the effect size remains at a similar level when using the MSCI

USA as proxy for the U.S. stock market portfolio, both market-weighted values are significant at the 5 % level. The credit-only analysis reveals consistent negative results, but no value is significant. All placebo events remain insignificant. It becomes apparent that a differentiation must be made between large banks and small banks. The difference in the effect size of equally weighted and market-weighted market responses and their significance suggests that credit regulation is not relevant for smaller U.S. banks. Although at first glance the shareholders of larger banks are suffering a significant wealth loss, it must be stated that all credit-only events are insignificant. Therefore, the relevance of the eight credit events that had to be excluded from the credit-only analysis (events 2, 3, 5, 7, 9, 19, 20 and 25) is analyzed. While equally weighted reactions are positive and close to zero with 0.0003 ($\sum \overline{CMAR}_{c\_ew}$) and 0.0051 ($\sum \overline{CAR}_{c\_ew}$), market-weighted reactions are distinctly negative with -0.1302 ($\sum \overline{CAR}_{c\_mw}$) and -0.1158 ($\sum \overline{CMAR}_{c\_mw}$). However, no value is significant using the MSCI World. Calculating market responses with the MSCI USA reveals slightly more pronounced negative reactions, but only $\sum \overline{CAR}_{c\_mw}$ with -0.1757 is significant at the 5 % level. Because the credit-only events are insignificant and the eight excluded events are only significant for the MSCI USA in one of eight cases, the argument for a significantly negative US stock market reaction, also for the market-weighted reactions, cannot be maintained.

The European CDS market is reacting to the tightening of credit risk regulation with an increased perception of risk. Positive abnormal CDS spread changes of 0.2442 ($\sum \overline{\Delta CMAS}_{c\_ew}$), 0.3527 ($\sum \overline{\Delta CAS}_{c\_ew}$), 0.3128 ($\sum \overline{\Delta CMAS}_{c\_mw}$) and 0.4045 ($\sum \overline{\Delta CAS}_{c\_mw}$) occur. The third value is significant at the 10 % level, whereby the second and last values are significant at the 5 % level. The credit-only analysis supports the direction of the effect; however, the effect size significantly decreases, and no value is significant. Placebo values are insignificant. To analyze the distinct difference in market reactions between all credit events and credit-only events, the CDS market reaction for the eight omitted events (events 2, 3, 5, 7, 9, 19, 20 and 25) is calculated. The eight events lead to positive market reactions of 0.2416 $\sum \overline{\Delta CMAS}_{c\_ew}$, 0.2533 $\sum \overline{\Delta CAS}_{c\_ew}$, 0.2868 $\sum \overline{\Delta CMAS}_{c\_mw}$, and 0.2983 $\sum \overline{\Delta CAS}_{c\_mw}$, with the first two values being significant at the 5 % level, while the third and last values are significant at the 1 % and 5 % levels, respectively. This finding shows that the eight omitted events explain much of the market reaction, so it is comprehensible that the credit-only events are not significant. It is difficult to assess how the eight credit events account for the effect size and significance because they occur simultaneously with market and liquidity regulation events. However, it should be emphasized that the European CDS markets do not show any significant reaction to market and liquidity regulation, which tends to suggest that the markets are reacting to credit regulation.

For the U.S. CDS market reaction, exclusively positive reactions can be observed for all credit and credit-only events, whereby no value is significant. All placebo events remain insignificant, which suggests that creditors of U.S. banks are indifferent.

Table 7

Market Reaction to Announcements Regarding Credit Risk Regulation

This table presents aggregated European and U.S. stock and CDS market reactions to 26 regulatory announcements of credit risk by the Basel Committee on Banking Supervision (BCBS). Cumulative abnormal returns $CAR_{i,t}$, cumulative market-adjusted returns $CMAR_{i,t}$, cumulative abnormal CDS spread changes $\Delta CAS_{i,t}$ and cumulative market-adjusted CDS spread changes $\Delta CMAS_{i,t}$ are calculated according to Eq. (1) - Eq. (8). The MSCI World is selected as a proxy for the stock market portfolio. The iTraxx Europe 5-years and iTraxx CDX IG 5-years are employed as proxies for the European and U.S. CDS market portfolio. For each of the 26 credit events (c), average values $\overline{CAR}_c$, $\overline{CMAR}_c$, $\overline{\Delta CAS}_c$, $\overline{\Delta CMAS}_c$ are computed based on equally weighted (ew) and market-weighted (mw) portfolios. These values are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The stock market reaction is reported as the sum of cumulative average abnormal returns $\sum \overline{CAR}_c$ and the sum of cumulative average market-adjusted returns $\sum \overline{CMAR}_c$ over 26 events. The CDS market reaction is reported as the sum of cumulative average abnormal CDS spread changes $\sum \overline{\Delta CAS}_c$ and the sum of cumulative average market-adjusted CDS spread changes $\sum \overline{\Delta CMAS}_c$ over 26 events. In addition, aggregated market reactions are calculated for credit-only events, i.e., eight credit events that are announced simultaneously with market and liquidity events are excluded (events 2, 3, 5, 7, 9, 19, 20, and 25). Abnormal stock and CDS market reactions are computed for placebo events five trading days prior to the actual events to assess potential information leakage and market anticipation. All values are tested for significance using a block bootstrap significance test (see subsection C). p values are computed based on a two-sided significance test: *p<0.1; **p<0.05; ***p<0.01.

	$\sum \overline{CMAR}_{c\_ew}$	$\sum \overline{CAR}_{c\_ew}$	$\sum \overline{CMAR}_{c\_mw}$	$\sum \overline{CAR}_{c\_mw}$
Panel A: European Market Reaction				
Actual Events				
Sum (all events)	−0.1539**	−0.1462**	−0.3794***	−0.3223***
p value (all events)	0.022	0.046	0.000	0.001
Sum (credit-only events)	-0.0448	-0.0468	−0.1458*	-0.1099
p value (credit-only events)	0.463	0.445	0.095	0.17
Placebo Events				
Sum (all events)	0.0441	0.0397	0.0533	0.0274
p value (all events)	0.520	0.604	0.619	0.775
Sum (credit-only events)	0.0196	0.0181	0.0002	-0.0444
p value (credit-only events)	0.753	0.759	0.999	0.573
Panel B: U.S. Market Reaction				
Actual Events				
Sum (all events)	-0.0353	-0.0705	−0.2560*	−0.2741**
p value (all events)	0.632	0.368	0.087	0.047
Sum (credit-only events)	-0.0404	-0.0708	-0.1402	-0.1439
p value (credit-only events)	0.521	0.222	0.153	0.132
Placebo Events				
Sum (all events)	0.0405	0.0773	-0.0152	0.0252
p value (all events)	0.587	0.320	0.909	0.870
Sum (credit-only events)	0.0019	0.0250	-0.0340	-0.0489
p value (credit-only events)	0.976	0.693	0.702	0.581
	$\sum \overline{\Delta CMAS}_{c\_ew}$	$\sum \overline{\Delta CAS}_{c\_ew}$	$\sum \overline{\Delta CMAS}_{c\_mw}$	$\sum \overline{\Delta CAS}_{c\_mw}$
Panel A: European Market Reaction				
Actual Events				
Sum (all events)	0.2442	0.3527**	0.3128*	0.4045**
p value (all events)	0.127	0.040	0.064	0.039
Sum (credit-only events)	0.0026	0.0994	0.0259	0.1062
p value (credit-only events)	0.985	0.469	0.852	0.505
Placebo Events				
Sum (all events)	0.1823	0.2012	0.1686	0.1911
p value (all events)	0.255	0.254	0.323	0.341
Sum (credit-only events)	0.1467	0.0603	0.1434	0.0655
p value (credit-only events)	0.226	0.657	0.289	0.666
Panel B: U.S. Market Reaction				
Actual Events				
Sum (all events)	0.2814	0.3706	0.3473	0.4164

p value (all events)	0.267	0.202	0.191	0.184
Sum (credit-only events)	0.1525	0.1999	0.1847	0.2289
p value (credit-only events)	0.408	0.369	0.350	0.319
Placebo Events				
Sum (all events)	0.2383	0.4041	0.3504	0.5002
p value (all events)	0.328	0.160	0.188	0.101
Sum (credit-only events)	0.2205	0.2685	0.2779	0.3301
p value (credit-only events)	0.249	0.227	0.169	0.159

A.3. Liquidity Risk

Market reactions are considered for liquidity risk. It can be seen that both the European stock market (-0.0559 $\sum \overline{CMAR}_{l\_ew}$, -0.0336 $\sum \overline{CAR}_{l\_ew}$, -0.0834 $\sum \overline{CMAR}_{l\_mw}$, -0.0461 $\sum \overline{CAR}_{l\_mw}$) and U.S. stock market (0.0236 $\sum \overline{CMAR}_{l\_ew}$, 0.0279 $\sum \overline{CAR}_{l\_ew}$, 0.0801 $\sum \overline{CMAR}_{l\_mw}$, 0.0944 $\sum \overline{CAR}_{l\_mw}$) show no significant reaction, which also holds for liquidity-only events (events 4, 5, 6 and 11 are removed). All placebo reactions remain insignificant. While the European reaction is negative, the U.S. reaction is positive. This finding suggests that U.S. shareholders do not perceive the introduction of liquidity regulation as a potential threat to returns, which could result from the notion that their liquidity position is better than that of their European peers. Therefore, they are under less pressure to restructure their assets and funding to comply with new rules. This hypothesis is tested in the regression analysis. The European stock market reaction is not significant, but the direction of the effect is the same as that computed by Bruno et al. (2018). Although the authors only include seven events due to the timing of the publication of their paper, it is evident that the six additional events considered in this paper lead to a consistent result regarding the effect direction. This finding suggests that the six following events can be regarded as noise events, which can be explained by the fact that a habituation effect sets in on the market and the information content of regulatory events for the market tends to decrease over time.

The European CDS market indicates positive but insignificant reactions (0.2129 $\sum \overline{\Delta CMAS}_{l\_ew}$, 0.1093 $\sum \overline{\Delta CAS}_{l\_ew}$, 0.1409 $\sum \overline{\Delta CMAS}_{l\_mw}$, and 0.0381 $\sum \overline{\Delta CAS}_{l\_mw}$). The liquidity-only analysis reveals an ambiguous picture with positive and negative values, where no significance occurs. The reaction of the U.S. CDS market is distinctly positive, with 0.4532 ($\sum \overline{\Delta CMAS}_{l\_ew}$), 0.3444 ($\sum \overline{\Delta CAS}_{l\_ew}$), 0.1311 ($\sum \overline{\Delta CMAS}_{l\_mw}$), and 0.1132 ($\sum \overline{\Delta CAS}_{l\_mw}$), indicating higher perceived credit risk. The first and last values are significant at the 1 % level, with the third value being significant at the 5 % level. The analysis of the liquidity-only events points in the same direction, but only $\sum \overline{\Delta CMAS}_{l\_mw}$ with 0.0878 is significant at the 5 % level. All placebo events remain insignificant.

The analysis of the single events reveals that the total value of rising U.S. CDS spreads is primarily driven by events 3 and 4. The third event shows that due to panic in the market after the bankruptcy of Lehman Brothers, hedge funds withdrew almost one-third of their assets in their prime brokerage from Morgan Stanley, as announced by the Financial Times on September 25, 2008. Furthermore, on September 29, 2008, Morgan Stanley announces that Mitsubishi UFJ Financial Group invests USD 9 billion to obtain a 21 % stake. On the same day, it became public that Citigroup was taking over Wachovia because the latter major bank had run into difficulties. Although September 29, 2008, is not an event date, a leak of this information may be contributing to this reaction. Even though the remaining U.S. banks also respond with rising CDS spreads, the values for Morgan Stanley are 0.8162 ΔCAS and 0.8755 $\Delta CMAS$, resulting in a significant bias for event 3 with only eight banks in the sample over which the effect is averaged. On December 17, 2009, during event 4, Morgan Stanley reveals a quarterly loss of USD 2.2 billion, which induces rising CDS spreads. In light of these two bank-specific confounding events and because the positive aggregated U.S. CDS market responses are driven almost exclusively by these events, it is concluded that the U.S. CDS market does not exhibit an event-induced response to the liquidity risk regulation.

Table 8

Market Reaction to Announcements Regarding Liquidity Risk Regulation

This table presents aggregated European and U.S. stock and CDS market reactions to 13 regulatory announcements of liquidity risk by the Basel Committee on Banking Supervision (BCBS). Cumulative abnormal returns $CAR_{i,t}$, cumulative market-adjusted returns $CMAR_{i,t}$, cumulative abnormal CDS spread changes $\Delta CAS_{i,t}$ and cumulative market-adjusted CDS spread changes $\Delta CMAS_{i,t}$ are calculated according to Eq. (1) - Eq. (8). The MSCI World is selected as a proxy for the stock market portfolio. The iTraxx Europe 5-years and iTraxx CDX IG 5-years are employed as proxies for the European and U.S. CDS market portfolio. For each of the 13 liquidity events (l), average values $\overline{CAR}_l$, $\overline{CMAR}_l$, $\overline{\Delta CAS}_l$, $\overline{\Delta CMAS}_l$ are computed based on equally weighted (ew) and market-weighted (mw) portfolios. These values are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The stock market reaction is reported as the sum of cumulative average abnormal returns $\sum \overline{CAR}_l$ and the sum of cumulative average market-adjusted returns $\sum \overline{CMAR}_l$ over 13 events. The CDS market reaction is reported as the sum of cumulative average abnormal CDS spread changes $\sum \overline{\Delta CAS}_l$ and the sum of cumulative average market-adjusted CDS spread changes $\sum \overline{\Delta CMAS}_l$ over 13 events. In addition, aggregated market reactions are calculated for liquidity-only events, i.e., four liquidity events that are announced simultaneously with market and credit events are excluded (events 4, 5, 6, and 11). Abnormal stock and CDS market reactions are computed for placebo events five trading days prior to the actual events to assess potential information leakage and market anticipation. All values are tested for significance using a block bootstrap significance test (see subsection C). p values are computed based on a two-sided significance test: *p<0.1; **p<0.05; ***p<0.01.

	$\sum \overline{CMAR}_{l\_ew}$	$\sum \overline{CAR}_{l\_ew}$	$\sum \overline{CMAR}_{l\_mw}$	$\sum \overline{CAR}_{l\_mw}$
Panel A: European Market Reaction				
Actual Events				
Sum (all events)	-0.0559	-0.0336	-0.0834	-0.0461
p value (all events)	0.296	0.499	0.291	0.514
Sum (liquidity-only events)	-0.0218	-0.0051	0.0140	0.0168
p value (liquidity-only events)	0.650	0.928	0.835	0.792
Placebo Events				
Sum (all events)	-0.0615	-0.0480	-0.0281	-0.0479
p value (all events)	0.249	0.327	0.732	0.496
Sum (liquidity-only events)	-0.0581	-0.0485	-0.0405	-0.0523
p value (liquidity-only events)	0.222	0.278	0.538	0.409
Panel B: U.S. Market Reaction				
Actual Events				
Sum (all events)	0.0236	0.0279	0.0801	0.0944
p value (all events)	0.712	0.683	0.458	0.396
Sum (liquidity-only events)	-0.0025	-0.0016	0.0764	0.0675
p value (liquidity-only events)	0.962	0.986	0.374	0.425
Placebo Events				
Sum (all events)	0.0415	0.0547	0.1444	0.1030
p value (all events)	0.509	0.408	0.224	0.353
Sum (liquidity-only events)	0.0175	0.0190	0.0549	0.0122
p value (liquidity-only events)	0.722	0.732	0.516	0.903
	$\sum \overline{\Delta CMAS}_{l\_ew}$	$\sum \overline{\Delta CAS}_{l\_ew}$	$\sum \overline{\Delta CMAS}_{l\_mw}$	$\sum \overline{\Delta CAS}_{l\_mw}$
Panel A: European Market Reaction				
Actual Events				
Sum (all events)	0.2129	0.1093	0.1409	0.0381
p value (all events)	0.182	0.577	0.371	0.855
Sum (liquidity-only events)	0.0752	-0.0590	0.0102	-0.1038
p value (liquidity-only events)	0.564	0.714	0.947	0.525
Placebo Events				
Sum (all events)	0.1380	0.0903	0.0997	0.0710
p value (all events)	0.357	0.621	0.550	0.724

Sum (liquidity-only events)	0.1195	0.0497	0.0848	0.0328
p value (liquidity-only events)	0.369	0.761	0.550	0.867
Panel B: U.S. Market Reaction				
Actual Events				
Sum (all events)	0.4532**	0.3444	0.1311***	0.1132**
p value (all events)	0.022	0.119	0.004	0.023
Sum (liquidity-only events)	0.2856	0.1198	0.0878**	0.0624
p value (liquidity-only events)	0.196	0.489	0.042	0.127
Placebo Events				
Sum (all events)	0.0853	-0.1173	-0.0261	-0.0625
p value (all events)	0.603	0.564	0.460	0.136
Sum (liquidity-only events)	0.1689	-0.0337	-0.0054	-0.0379
p value (liquidity-only events)	0.240	0.827	0.852	0.288

B. Cross-Sectional Analysis

After discussing aggregated stock and CDS market responses, the next step is to analyze the determinants of the heterogeneous responses for market, credit, and liquidity risk. For the stock market, the regressions in which dependent variables $CAR_{i,t}$ and $CMAR_{i,t}$ are calculated using the MSCI World are utilized. The dependent variables $\Delta CAS_{i,t}$ and $\Delta CMAS_{i,t}$ are calculated using the iTraxx Europe 5-years and iTraxx CDX IG 5-years for the European sample and U.S. sample, respectively (Table B.1, Table B.2, Table B.3).

For the stock market, in the case of significant deviations, the regressions in which the dependent variables are computed with MSCI Europe and MSCI USA are also discussed. Regarding the CDS market, only in the case of significant deviations, the regression results where the abnormal CDS spread changes are calculated with the single-index model are also presented (Table Appendix C, Table Appendix C, Table Appendix C).

B.1. Market Risk

Considering the stock market, it appears that higher capitalization, proxied by TIER1_RAT, has no significant impact, whereas it shows a negative effect on abnormal CDS spread changes (Market events: -0.823 ΔCAS, -0.371 $\Delta CMAS$/market-only: -0.948 ΔCAS, -0.394 $\Delta CMAS$). The first and third coefficients are significant at the 1 % level, the second coefficient is significant at the 5 % level, and the last coefficient is significant at the 10 % level. H1$_m$ is rejected for the stock market but cannot be rejected for the CDS market.

The proxy for a bank's market risk SEC_TO_ASSET has no explanatory power for stock and CDS market reactions. H2$_m$ is rejected for both the stock and CDS markets.

The same holds for the classification of a bank as a G-SIB because all eight coefficients are insignificant. Therefore, G-SIBs are not affected differently by market risk regulation from the perspective of shareholders and creditors. H3$_m$ is rejected for both the stock market and CDS market.

The next step is to examine potential differences between European banks and U.S. banks. The European sample is split into GIIPS banks and European non-GIIPS banks, with the analysis of European non-GIIPS and U.S. banks being addressed first. The dummy variable EUROPE_EX_GIIPS is 1 for European banks not located in GIIPS and 0 otherwise. The analysis reveals insignificance for stock market reactions, meaning that there are no different reactions between European non-GIIPS banks and U.S. banks. With regard to the CDS market, there is a positive effect of EUROPE_EX_GIIPS (market events: 0.037 ΔCAS, 0.021 $\Delta CMAS$/market-only: 0.028 ΔCAS, 0.012 $\Delta CMAS$). The first value is significant at the 1 % level, while the second and third are significant at the 10 % level. This finding means lower risk for U.S. banks compared to European non GIIPS banks. H4$_m$ is rejected for the stock market and cannot be rejected for the CDS market.

A bank's origin in a GIIPS country significantly affects stock market reactions compared to U.S. banks. All four coefficients of GIIPS are negative and significant at the 1 % level (market events: -0.018 CAR, -0.021 CMAR/market-only: -0.024 CAR, -0.023 CMAR). This finding implies that shareholders of GIIPS banks face higher wealth losses induced by market risk regulation than U.S. institutions. That the dummy variable GIIPS is significantly negative while the dummy variable EUROPE_EX_GIIPS is completely insignificant suggests that the aggregate negative European stock market reaction is primarily driven by the GIIPS banks in the sample. However, regarding the CDS market, GIIPS does not have any impact. $H5_m$ is rejected for the CDS market and cannot be rejected for the stock market.

Table 9

Determinants of Stock and CDS Market Reaction to Market Risk Regulation

This table presents the variables explaining heterogeneous reactions in cumulative abnormal returns CAR, cumulative market-adjusted retuns CMARs, cumulative abnormal CDS spread changes ΔCASs and cumulative market-adjusted CDS spread changes $\Delta CMAS$s for 15 market events. These values are calculated according to Eq. (1) - Eq. (8). Dependent variables are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The MSCI World is used as proxy for the stock market portfolio. The iTraxx Europe 5-years and the iTraxx CDX IG 5-years are used as proxies for the European and U.S. CDS market portfolio. For so-called market-only events, market events are exluded (events 3, 4, 8, 13) that are announced simultaneously with credit and liquidity events. Bank-specific variables are TIER1_RAT, SEC_TO_ASSET and G_SIB. TIER1_RAT is the ratio of Tier 1 capital to total risk-weighted assets. SEC_TO_ASSET is the ratio of the total amount of marketable security investments to total assets. G_SIB is a dummy variable that is 1 for global systemically important banks and 0 otherwise. Country-specific variables are EUROPE_ex_GIIPS and GIIPS. EUROPE_ex_GIIPS is a dummy variable that is 1 for European banks not located in Greece, Italy, Ireland, Portugal or Spain (GIIPS) and 0 otherwise. GIIPS is a dummy variable that is 1 for banks located in GIIPS and 0 otherwise. Control variables are SIZE, COST_INC, ROA and TIME. SIZE is the natural logarithm of bank total assets. COST_INC is the cost-to-income ratio. ROA is the return on assets. TIME is a factor variable capturing different phases of the financial and sovereign debt crises (subprime crisis, global financial crisis, sovereign debt crisis and ex post crisis). Ex post crisis is omitted due to multicollinearity. Regressions are estimated using a random effects model with clustered standard errors at bank level reported in parentheses. Note *p<0.1; **p<0.05; ***p<0.01.

	Stock Market				*CDS Market*			
	Market Events		*Market-Only*		*Market Events*		*Market-Only*	
	CAR	CMAR	CAR	CMAR	ΔCAS	$\Delta CMAS$	ΔCAS	$\Delta CMAS$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TIER1_RAT	−0.031	−0.007	−0.063	−0.009	−0.823***	−0.371**	−0.948***	−0.394*
	(0.062)	(0.058)	(0.077)	(0.067)	(0.182)	(0.183)	(0.220)	(0.237)
TIER1_RAT^2	0.020	−0.030	0.129	−0.023				
	(0.146)	(0.138)	(0.184)	(0.163)				
SEC_TO_ASSET	−0.002	0.001	0.005	0.008*	0.016	0.011	0.045	0.071
	(0.006)	(0.006)	(0.005)	(0.005)	(0.038)	(0.044)	(0.041)	(0.054)
G_SIB	−0.002	−0.003	−0.002	−0.002	0.025	0.0003	0.032	−0.004
	(0.003)	(0.003)	(0.002)	(0.002)	(0.031)	(0.021)	(0.043)	(0.027)
EUROPE_ex_GIIPS	−0.001	−0.003	0.0002	−0.001	0.037***	0.021*	0.028*	0.012
	(0.002)	(0.002)	(0.002)	(0.002)	(0.014)	(0.011)	(0.017)	(0.016)
GIIPS	−0.018***	−0.021***	−0.024***	−0.023***	0.013	0.013	−0.013	−0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.016)	(0.016)	(0.018)	(0.016)
SIZE	−0.001**	−0.001*	0.0002	0.00001	−0.018	−0.012	−0.032**	−0.022*
	(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.011)	(0.010)	(0.015)	(0.012)

COST_INC	−0.004	−0.009***	0.001	−0.005	−0.035	−0.018	−0.012	0.002
	(0.003)	(0.003)	(0.002)	(0.004)	(0.029)	(0.025)	(0.026)	(0.024)
ROA	−0.101	−0.147*	−0.056	−0.089	1.774***	1.639**	0.961	1.250
	(0.080)	(0.076)	(0.105)	(0.107)	(0.621)	(0.748)	(0.840)	(0.941)
global financial crisis	−0.018***	−0.012***			0.035**	0.055***		
	(0.004)	(0.004)			(0.014)	(0.016)		
sovereign debt crisis	0.005***	0.007***	0.003**	0.005***	0.024**	0.016*	0.020**	0.012
	(0.001)	(0.001)	(0.001)	(0.001)	(0.010)	(0.009)	(0.010)	(0.009)
subprime crisis	0.011***	0.012***	−0.017***	−0.016***	−0.113***	−0.062***	−0.099***	−0.056**
	(0.003)	(0.003)	(0.002)	(0.003)	(0.017)	(0.020)	(0.023)	(0.028)
Constant	0.018**	0.015**	0.005	0.003	0.313**	0.178	0.515***	0.306*
	(0.008)	(0.008)	(0.009)	(0.008)	(0.155)	(0.149)	(0.197)	(0.179)
Observations	4,217	4,217	2,837	2,837	414	414	280	280
R^2	0.045	0.038	0.043	0.052	0.285	0.193	0.141	0.058

B.2. Credit Risk

A positive and decreasing impact of a bank's capitalization on stock market reactions is evident in the estimates for all credit events. TIER1_RAT enters regressions significantly at the 10 % level with a positive sign (Credit events: 0.071 CAR, 0.076 CMAR), while the quadratic term is negative (Credit events: -0.170 CAR, -0.184 CMAR), with the latter value being significant at the 10 % level. Because the coefficients for the credit-only events are insignificant, the inference is too weak to confirm this relationship. However, the regressions where dependent variables are computed with the MSCI Europe and the MSCI USA support the hypothetical relationship. All coefficients are positive for TIER1_RAT (Credit events: 0.083 CAR, 0.087 CMAR / credit-only: 0.059 CAR, 0.074 CMAR), with the first two coefficients being significant at the 5 % level, while the last one is significant at the 10 % level. Regarding the quadratic term, all coefficients are negative (Credit events: -0.199 CAR, -0.211 CMAR / credit-only: -0.138 CAR, -0.186 CMAR), with the first two coefficients being significant at the 10 % and 5 % level, while the last coefficient is significant at the 10 % level. Because of the more significant inference and significance in an estimate of credit-only events, it is concluded that a banks' capitalization has a positive and decreasing impact on stock market reactions. Regarding the regressions for all credit events (dependent variable calculated with MSCI World), the turnaround value (maximum) is 0.2089 and 0.2054, respectively, i.e., up to this value the Tier 1 ratio has a positive impact on the abnormal stock market reaction and a negative one thereafter.[20] TIER1_RAT has a consistently negative effect on CDS market reactions (Credit events: -0.422 ΔCAS, -0.187 $\Delta CMAS$ / credit-only: -0.252 ΔCAS, -0.082 $\Delta CMAS$). The first and third value are significant at the 1 % level, while the second is significant at the 5 % level. This is consistent with the expectation that higher capitalization lowers an institution's PD, so creditors of those banks face a lower risk. $H1_c$ cannot be rejected for the stock and CDS market.

Credit risk of a bank is modeled as the ratio of loan-loss provisions to total loans, expressed as

[20] Nearly the same turnaround values result in caculations where dependent variables are computed with the MSCI Europe and the MSCI USA.

PROV_LOAN. Higher credit risk has a negative effect on stock market reactions, with all four coefficients being significant at the 1 % level. Although this is in line with predictions, the effect size of the coefficients is quite small (Credit events: -0.001 CAR, -0.001 CMAR / credit-only: -0.001 CAR, -0.001 CMAR). This might be attributed to the fact that determinants of loan-loss provision reporting and their capital market effect depend on a number of factors (Ryan, 2011; Beatty and Liao, 2014; López-Espinosa et al., 2021), e.g. the economic condition, the distinction between discretionary and nondicretionary loan-loss provisions or the lone type. However, regarding the CDS market, PROV_LOAN is only in one estimation significant at the 10 % level (Credit events: 0.271 ΔCAS), implying a negligle role. $H2_c$ cannot be rejected for the stock market, but is rejected for the CDS market.

The classification of a bank as a G-SIB does not explain CDS market reactions. With respect to the stock market, only one coefficient is significant at the 5 % level (Credit events: -0.005 CAR). Hence, $H3_c$ is rejected for the stock and CDS market.

To analyze potentially different market reactions in Europe and the U.S., dummy variables GIIPS and EUROPE_ex_GIIPS are included, starting with the discussion of the impact of the latter one. Regarding the stock market, all four coefficients are positive (Credit events: 0.002 ΔCAS, 0.003 $\Delta CMAS$ / credit-only: 0.004 ΔCAS, 0.006 $\Delta CMAS$), with the first two coefficients being significant at the 10 % level while the last two coefficients are significant at the 1 % level. This means that shareholders of European non-GIIPS banks react positively compared to U.S. banks. Regarding the CDS market, only one coefficient (Credit-only: -0.013 $\Delta CMAS$) is significant at the 1 % level suggesting a negligible role. $H4_c$ is rejected for both the stock and CDS market.

Dummy variable GIIPS has no significant impact on stock market reactions, meaning that banks loacted in GIIPS countries are not affected differently by credit risk regulation than U.S. banks. Regarding the CDS market, only one coefficient (Credit events: 0.011 $\Delta CMAS$) is significant at the 10 % level, which reveals that the differentiation between GIIPS and U.S. banks is not meaningful. $H5_c$ is rejected both for the stock and CDS market reaction.

Table 10

Determinants of Stock and CDS Market Reaction to Credit Risk Regulation

This table presents the variables explaining heterogeneous reactions in cumulative abnormal returns CAR, cumulative market-adjusted retuns CMARs, cumulative abnormal CDS spread changes ΔCASs and cumulative market-adjusted CDS spread changes $\Delta CMAS$s for 26 credit events. These values are calculated according to Eq. (1) - Eq. (8). Dependent variables are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The MSCI World is used as proxy for the stock market portfolio. The iTraxx Europe 5-years and the iTraxx CDX IG 5-years are used as proxies for the European and U.S. CDS market portfolio. For so-called credit-only events, credit events are exluded (events 2, 3, 5, 7, 9, 19, 20, 25) that are announced simultaneously with market and liquidity events. Bank-specific variables are TIER1_RAT, PROV_LOAN and G_SIB. TIER1_RAT is the ratio of Tier 1 capital to total risk-weighted assets. PROV_LOAN is the ratio of loan-loss provisions to total loans. G_SIB is a dummy variable that is 1 for global systemically important banks and 0 otherwise. Country-specific variables are EUROPE_ex_GIIPS and GIIPS. EUROPE_ex_GIIPS is a dummy variable that is 1 for European banks not located in Greece, Italy, Ireland, Portugal or Spain (GIIPS) and 0 otherwise. GIIPS is a dummy variable that is 1 for banks located in GIIPS and 0 otherwise. Control variables are SIZE, COST_INC, ROA and TIME. SIZE is the natural logarithm of bank total assets. COST_INC is the cost-to-income ratio. ROA is the return on assets. TIME is a factor variable capturing different phases of the financial and sovereign debt crises (global financial crisis, sovereign debt crisis and ex post crisis). Ex post crisis is omitted due to multicollinearity. Regressions are estimated using a random effects model with clustered standard errors at bank level reported in parentheses. Note *p<0.1; **p<0.05; ***p<0.01.

	Stock Market				*CDS Market*			
	Credit Events		*Credit-Only*		*Credit Events*		*Credit-Only*	
	CAR	CMAR	CAR	CMAR	ΔCAS	$\Delta CMAS$	ΔCAS	$\Delta CMAS$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

TIER1_RAT	0.071*	0.076*	−0.004	0.012	−0.422***	−0.187**	−0.252***	−0.082
	(0.041)	(0.039)	(0.045)	(0.043)	(0.083)	(0.079)	(0.067)	(0.080)
TIER1_RAT^2	−0.170	−0.184*	0.002	−0.044				
	(0.105)	(0.099)	(0.109)	(0.107)				
PROV_LOAN	−0.001***	−0.001***	−0.001***	−0.001***	0.271*	0.138	−0.120	−0.051
	(0.00005)	(0.0001)	(0.0001)	(0.0001)	(0.162)	(0.135)	(0.182)	(0.139)
G_SIB	−0.005**	−0.005	−0.003	−0.003	0.004	−0.0004	−0.006	−0.008
	(0.003)	(0.003)	(0.003)	(0.003)	(0.013)	(0.010)	(0.006)	(0.007)
EUROPE_ex_GIIPS	0.002*	0.003**	0.004***	0.006***	0.011	−0.00003	−0.005	−0.013***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.008)	(0.006)	(0.004)	(0.004)
GIIPS	−0.002	−0.004	0.004	0.003	0.011	0.011*	−0.005	−0.005
	(0.003)	(0.003)	(0.003)	(0.004)	(0.008)	(0.006)	(0.005)	(0.006)
SIZE	−0.001***	−0.002***	−0.001**	−0.002***	0.006	0.009**	0.006*	0.009**
	(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.005)	(0.004)	(0.003)	(0.004)
COST_INC	0.0001	0.00000	0.0001	0.0002	−0.002	−0.002	0.001	−0.0001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)
ROA	0.016	0.038	0.177**	0.157**	0.909***	0.307	0.279	−0.124
	(0.069)	(0.062)	(0.084)	(0.075)	(0.344)	(0.318)	(0.211)	(0.303)
global financial crisis	−0.008***	−0.006***	−0.023***	−0.016***	0.006	0.041***	0.011	0.025**
	(0.002)	(0.002)	(0.003)	(0.003)	(0.009)	(0.007)	(0.011)	(0.011)
sovereign debt crisis	0.007***	0.004**	0.008***	0.005***	−0.007	0.022***	−0.008	0.021***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.008)	(0.007)	(0.007)	(0.007)
Constant	−0.003	0.007	−0.003	0.008	−0.028	−0.116**	−0.022	−0.117**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.061)	(0.056)	(0.043)	(0.055)
Observations	7,361	7,361	5,126	5,126	917	917	641	641
R^2	0.024	0.017	0.069	0.035	0.072	0.061	0.044	0.023

B.3. Liquidity Risk

Lastly, determinants of variation in stock and CDS market responses to liquidity risk regulation are examined. The variable LCR_PROXY mimics the mechanism of a banks' LCR. It turns out that more liquid balance sheets have no significant impact on stock market reactions. Its effect on CDS market reactions is consistently negative, with all coeffcients (Liquidity events: -0.026 ΔCAS, -0.021 $\Delta CMAS$ / liquidity-only: -0.018 ΔCAS, -0.019 $\Delta CMAS$) being significant at the 1 % level. It implies that more liquid balance sheets have a risk reducing effect, which can be explained by the higher resilience to liquidity shocks. $H1_l$ is rejected for the stock market and cannot be rejected for the CDS market.

The coefficients of NSFR_PROXY, mimicking the intuition of the NSFR, enter the regressions in all four estimations of the stock market with a negative sign (Liquidity events: -0.016 CAR, -0.017 CMAR / liquidity-only: -0.027 CAR, -0.027 CMAR) and significantly at the 10 % level. Contrary to the expectation, a lower funding mismatch (expressed by higher NSFR_PROXY) has a negative effect on a bank's stock market reaction. However, this is consistent with the results of Bruno et al. (2018), which also find a negative effect in their cross-sectional analysis of seven events. Analogously, pecking-order theory serves as an explanation here (Myers and Majluf, 1984), because NSFR_PROXY contains expensive equity, so capital costs increase as the funding mismatch decreases. Because well-capitalized banks with a lower funding mismatch face lower liquidity risk anyway, they may be less willing to bear the additional costs of adjusting assets and liabilities (Bruno et al., 2018). The smaller effect size in comparison, as well as the lower significance and the insignificance in regressions where the dependent variables are calculated with the MSCI Europe and the MSCI USA, can be attributed to the fact that the additional six events in this paper are of little relevance. NSFR_PROXY has a consistently positive effect on abnormal CDS market reactions, but only one coefficient is significant at the 5 % (Liquidity-only: 0.066 ΔCAS). $H2_l$ is rejected for the stock and CDS market.

The charter value of a bank, DEP_TO_ASSET, is proxied by the ratio of customer deposits to total assets. All four coefficients explaining stock market reactions are insignificant. In contrast, all four coefficients explaining CDS market reactions enter regressions in line with expectations with a negative sign (Liquidity events: -0.127 ΔCAS, -0.057 $\Delta CMAS$ / liquidity-only: -0.074 ΔCAS, -0.026 $\Delta CMAS$). The first and third coefficient are significant at the 5 % and 1 % level, respectively. To verify this, additionally the regressions are considered where the dependent variable is calculated with the single-index model. The conclusions remain unchanged. A bank's charter value has a negative impact on CDS market reactions, implying a risk reduction for banks with higher charter values. $H3_l$ is rejected for the stock market, but cannot be rejected for the CDS market.

In a next step potentially different reactions from European and U.S. institutions are adressed. The European sample is again split into GIIPS (dummy variable that is 1 for banks located in GIIPS and 0 otherwise) and European non-GIIPS banks (dummy variable EUROPE_EX_GIIPS that is 1 for European banks not located in GIIPS and 0 otherwise). Regarding the stock market, all four coefficients of EUROPE_ex_GIIPS are negative in line with expectations (Liquidity events: -0.006 CAR, -0.005 CMAR / liquidity-only: -0.004 ΔCAS, -0.005 $\Delta CMAS$), with the first two coefficients being significant at the 1 % and 5 % level, respectively. The last coefficient is significant at the 10 % level. It means that European non-GIIPS banks are negatively affected compared to U.S. banks. This can be explained by the ex ante higher liquidity of U.S. banks, implying that European non-GIIPS banks have to restructure their assets and liabilities induced by liquidity regulation. Contrary to the hypothesis, EUROPE_ex_GIIPS has a consistent negative impact on CDS market reactions (Liquidity events: -0.012 ΔCAS, -0.02 $\Delta CMAS$ / Liquidity-only: -0.006 ΔCAS, -0.015 $\Delta CMAS$), with the first two values being significant at the 10 % and 1 % level. However, no coefficient in the estimates of liquidity-only events is significant. The negative impact on CDS spread changes compared with U.S. banks may be due to creditors perceiving liquidity regulation to be desirable in the presence of higher liquidity risk for European non-GIIPS banks. $H4_l$ is rejected for the CDS market and cannot be rejected for the stock market.

GIIPS has a negative and at the 10 % and 5 % level significant effect on the stock market reaction for all liquidity events (-0.006 CAR, -0.008 CMAR), while the coefficients are positive and insignificant in the case of liquidity-only events. Regarding the CDS market reactions, all coeffcients are negative (Liquidity events: -0.023 ΔCAS, -0.018 $\Delta CMAS$ / liquidity-only: -0.013 ΔCAS, -0.019 $\Delta CMAS$). The first two coefficients are significant at the 1 % level, while the last one is significant at the 5 % level. Contrary to expectations, creditors of GIIPS banks perceive a lower default risk induced by liquidity regulation compared to U.S. banks. In this respect, liquidity regulation may be desirable from the perspective of these creditors. $H5_l$ is rejected for the CDS market and cannot be rejected for the stock market.

Table 11

Determinants of Stock and CDS Market Reaction to Liquidity Risk Regulation

This table presents the variables explaining heterogeneous reactions in cumulative abnormal returns CAR, cumulative market-adjusted returns CMARs, cumulative abnormal CDS spread changes ΔCASs and cumulative market-adjusted CDS spread changes $\Delta CMAS$s for 13 liquidity events. These values are calculated according to Eq. (1) - Eq. (8). Dependent variables are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The MSCI World is used as proxy for the stock market portfolio. The iTraxx Europe 5-years and the iTraxx CDX IG 5-years are used as proxies for the European and U.S. CDS market portfolio. For so-called liquidity-only events, liquidity events are excluded (events 4, 5, 6, 11) that are announced simultaneously with market and credit events. Bank-specific variables are LCR_PROXY, NSFR_PROXY and DEP_TO_ASSET. LCR_PROXY is a proxy for a bank's liquidity coverage ratio (LCR). NSFR_PROXY is a proxy for a bank's net stable funding ratio (NSFR). DEP_TO_ASSET is the ratio of customer deposits to total assets. Country-specific variables are EUROPE_ex_GIIPS and GIIPS. EUROPE_ex_GIIPS is a dummy variable that is 1 for European banks not located in Greece, Italy, Ireland, Portugal or Spain (GIIPS) and 0 otherwise. GIIPS is a dummy variable that is 1 for banks located in GIIPS and 0 otherwise. Control variables are SIZE, COST_INC, ROA and TIME. SIZE is the natural logarithm of bank total assets. COST_INC is the cost-to-income ratio. ROA is the return on assets. TIME is a factor variable capturing different phases of the financial and sovereign debt crises (subprime crisis, global financial crisis, sovereign debt crisis). Global financial crisis is omitted due to multicollinearity. Regressions are estimated using a random effects model with clustered standard errors at bank level reported in parentheses. Note *p<0.1; **p<0.05; ***p<0.01.

	Stock Market				*CDS Market*			
	Liquidity Events		*Liquidity-Only*		*Liquidity Events*		*Liquidity-Only*	
	CAR	CMAR	CAR	CMAR	ΔCAS	$\Delta CMAS$	ΔCAS	$\Delta CMAS$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LCR_PROXY	0.0001	0.0002	0.0002	0.0002	−0.026***	−0.021***	−0.018***	−0.019***
	(0.0003)	(0.0002)	(0.0003)	(0.0003)	(0.008)	(0.006)	(0.005)	(0.006)
NSFR_PROXY	−0.016*	−0.017*	−0.027*	−0.027*	0.072	0.001	0.066**	0.001
	(0.009)	(0.009)	(0.014)	(0.015)	(0.045)	(0.041)	(0.026)	(0.042)
DEP_TO_ASSET	0.009	0.008	−0.001	0.001	−0.127**	−0.057	−0.074***	−0.026
	(0.009)	(0.010)	(0.013)	(0.014)	(0.054)	(0.041)	(0.028)	(0.037)
EUROPE_ex_GIIPS	−0.006***	−0.005**	−0.004	−0.005*	−0.012*	−0.020***	−0.006	−0.015
	(0.002)	(0.002)	(0.003)	(0.003)	(0.007)	(0.006)	(0.009)	(0.010)
GIIPS	−0.006*	−0.008**	0.004	0.003	−0.023***	−0.018***	−0.013	−0.019**
	(0.003)	(0.003)	(0.004)	(0.004)	(0.007)	(0.006)	(0.009)	(0.009)
SIZE	0.00004	−0.001*	−0.001*	−0.001	0.006	0.003	0.002	−0.004
	(0.0004)	(0.0004)	(0.001)	(0.001)	(0.004)	(0.004)	(0.002)	(0.003)
COST_INC	0.0002	0.0002	0.0003	0.0003	−0.010	−0.004	0.007	0.009
	(0.001)	(0.001)	(0.001)	(0.001)	(0.012)	(0.008)	(0.010)	(0.007)
ROA	0.013	0.164	0.308	0.323	−0.648	−0.833**	−0.815*	−0.821***
	(0.107)	(0.104)	(0.195)	(0.197)	(0.494)	(0.337)	(0.440)	(0.303)
sovereign debt crisis	−0.010***	−0.011***	0.001	−0.002	−0.037***	−0.036***	−0.064***	−0.056***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.009)	(0.009)	(0.017)	(0.017)
subprime crisis	−0.024***	−0.025***	−0.016***	−0.019***	−0.098***	−0.086***	−0.105***	−0.097***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.011)	(0.009)	(0.016)	(0.017)
Constant	0.020**	0.027***	0.036***	0.034***	0.010	0.065	0.029	0.144***

	(0.008)	(0.008)	(0.013)	(0.013)	(0.064)	(0.062)	(0.045)	(0.055)
Observations	3,570	3,570	2,466	2,466	246	246	166	166
R^2	0.030	0.033	0.035	0.038	0.215	0.215	0.241	0.273

VI. Further Robustness and Limitations

In the main chapter, abnormal stock and CDS market reactions are calculated using different models and indices to avoid dependency on exogenous decisions. Nevertheless, the results could be biased because of event-induced volatility as well as cross-sectional and serial correlation (Hippert and Uhde, 2021). To account for volatility clustering and autoregressive heteroscedasticity in the time series of returns and CDS spread changes, which is even more important during periods of financial stress, abnormal stock and CDS market reactions are recalculated using a generalized autoregressive conditional heteroscedasticity (GARCH) model (Farruggio et al., 2013). Hence, Eq. (1), Eq. (2) and the CDS single-index model are estimated using a GARCH(1,1) model, revealing that signs and effect sizes of aggregated stock and CDS market reactions remain comparable in most cases. In the next step, cross-sectional regressions are recalculated with dependent variables calculated with the GARCH(1,1) model. Conclusions remain consistent in most cases.[21]

A limiting aspect of the analysis of CDS market reactions is the comparatively small sample size in the U.S., with only eight banks. Although the influence of confounding events is considered when interpreting the results, note that the sample reflects only the largest U.S. banks. This limitation is problematic in that the U.S. banking sector is characterized by many smaller institutions that cannot be considered in the analysis of creditor response. However, the eight banks that were analyzed represent the available market sample.

VII. Conclusion

In response to the financial crisis, the BCBS substantially revamped and strengthened the regulatory framework governing banks' financial risks—market, credit, and liquidity. With the adoption of Basel IV and its components, it is now feasible to comprehensively assess the regulatory impact on these three risk categories. This study employs event study methodology to quantify the collective impact of BCBS-announced financial risk regulations across 15 market events, 26 credit events, and 13 liquidity events. The analysis covers European and U.S. bank stocks and CDSs.

Regarding market risk regulation, the European stock market experiences a wealth decrease for shareholders, unlike the U.S. stock market and U.S. and European CDS markets, which do not show any reaction. Credit risk regulation triggers negative reactions in the European and U.S. stock markets, with significance primarily seen in the European context. U.S. and European creditors react with increased CDS spreads, with significance proven only for the European response. Liquidity regulation, however, leaves European and U.S. bank shareholders and creditors untouched.

The cross-sectional analysis unveils that heterogeneous reactions of shareholders and creditors can be explained by specific characteristics of banks and countries. In the context of market risk regulation, a notably adverse impact is observed for banks in the GIIPS countries, suggesting that these banks are primarily responsible for the overall negative reaction in the European stock market. Furthermore, banks with greater capitalization experience lower CDS spreads, indicating reduced risk. In response to credit risk regulation,

[21] Analyses can be provided upon request.

higher bank capitalization initially increases returns, with additional capital becoming too expensive after a specific point and having a detrimental effect, i.e., reducing returns. Additionally, the higher credit risk of a bank has a negative effect on returns. In the CDS market, greater bank capitalization reduces CDS spreads by lowering the PD. Analysis of stock market reactions to liquidity regulation indicates that a smaller funding mismatch negatively affects returns, while banks with a higher charter value and more liquid balance sheets experience lower CDS spreads. Moreover, European banks appear to be more adversely affected in the stock market compared to U.S. banks, possibly due to the superior preexisting liquidity positions of U.S. banks.

Regardless of the risk type, there is no significant positive stock market reaction that supports the capture theory of Stigler (1971). Although lobbying by the banking industry has weakened regulatory proposals, the stock market reactions and the overall tightening of regulation of market, credit and liquidity risk argue in favor of the public interest theory according to Needham (1983). However, examining CDS market reactions, the ultimate success of bank regulation in achieving its core aim of risk reduction remains uncertain because no negative and significant CDS market reaction can be observed. This finding neither inherently implies that the intended risk reduction has been unsuccessful, nor does it suggest that regulation inadvertently amplifies a bank's default risk. From a creditor's viewpoint, bank regulation generates two opposing dynamics. First, there is the sought-after risk reduction, which, ceteris paribus, should lower CDS spreads. However, reduced expectations of creditor bailouts due to regulation could actually raise CDS spreads. In this context, it is plausible that the latter factor takes precedence in the eyes of creditors.

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Appendix A. Keywords for Checking International Media Coverage

Table A.12

Keywords for Checking International Media Coverage

This table presents the keywords used to evaluate international media coverage for regulatory annoucements of the Basel Committee on Banking Supervision (BCBS) for 15 market, 26 credit and 13 liquidity events using LexisNexis.

Market Risk	Credit Risk	Liquidity Risk
bank regulation	bank regulation	bank regulation
BIS	BIS	BIS
Bank for International Settlements	Bank for International Settlements	Bank for International Settlements
BCBS	BCBS	BCBS
Basel Committee	Basel Committee	Basel Committee
Basel Committee on Banking Supervision	Basel Committee on Banking Supervision	Basel Committee on Banking Supervision
banking supervision	Basel III	Basel III
Basel IV	Basel 3	Basel 3
Basel 4	banking supervision	banking supervision
Basel 2.5	Basel IV	liquidity risk
Basel II.5	Basel 4	liquidity coverage ratio
capital requirements	capital requirements	LCR
Tier 1	Tier 1	net stable funding ratio
additional Tier 1	additional Tier 1	NSFR
Tier 2	Tier 2	liquidity regulation
Incremental default risk	capital conservation buffer	high quality liquid assets
IRC	countercyclical buffer	HQLA
market risk	counterparty credit risk	available stable funding
trading book	central counterparties	ASF
incremental risk charge	credit risk	required stable funding
IRC	securitization framework	RSF
market framework	mortgage insurance	
internal model	standardized approach	
fundamental review of the trading book	margin requirements	
FRTB	internal ratings based approach	
standardized approach	IRBA	
interest rate risk		

Appendix B. Descriptive Statistics

Table B.13
Descriptive Statistics of Independent Variables of the Entire Dataset

This table presents descriptive statistics for the independent variables for the entire data set. TIER1_RAT is the ratio of Tier 1 capital to total risk-weighted assets. SEC_TO_ASSET is the ratio of the total amount of marketable security investments to total assets. PROV_LOAN is the ratio of loan-loss provisions to total loans. LCR_PROXY is a proxy for a bank's LCR. NSFR_PROXY is a proxy for a bank's NSFR. DEP_TO_ASSET is the ratio of customer deposits to total assets. G_SIB is a dummy variable that is 1 for global systemically important banks and 0 otherwise. EUROPE_ex_GIIPS is a dummy variable that is 1 for European banks not located in Greece, Italy, Ireland, Portugal or Spain (GIIPS) and 0 otherwise. GIIPS is a dummy variable that is 1 for banks located in GIIPS and 0 otherwise. SIZE is the natural logarithm of bank total assets. COST_INC is the cost-to-income ratio. ROA is the return on assets. More precise descriptive statistics of the dependent variables used in the regressions for market, credit, and liquidity risk for the stock and CDS markets can be provided upon request, as can the frequency of the TIME factor variable in the estimates.

	Mean	25 %	50 %	75 %	Std.
TIER1_RAT	0.138	0.112	0.130	0.155	0.044
TIER1_RAT_2	0.021	0.013	0.017	0.024	0.018
SEC_TO_ASSET	0.169	0.088	0.144	0.218	0.132
PROV_LOAN	0.014	0.001	0.003	0.007	0.519
LCR_PROXY	0.648	0.127	0.240	0.453	7.204
NSFR_PROXY	0.889	0.860	0.948	0.979	0.142
DEP_TO_ASSET	0.693	0.613	0.751	0.815	0.170
G_SIB	0.062	0	0	0	0.241
EUROPE_ex_GIIPS	0.240	0	0	0	0.427
GIIPS	0.074	0	0	0	0.262
SIZE	9.270	7.578	8.866	10.489	2.195
COST_INC	0.636	0.533	0.612	0.695	4.477
ROA	0.008	0.005	0.009	0.012	0.011

Appendix C. Market Reactions Using Other Supranational Indices

Table C.14
Market Reaction to Announcements Regarding Market Risk Regulation

This table presents aggregated European and U.S. stock and CDS market reactions to 15 regulatory announcements of market risk by the Basel Committee on Banking Supervision (BCBS). Cumulative abnormal returns $CAR_{i,t}$ and cumulative market-adjusted returns $CMAR_{i,t}$ are calculated according to Eq. (1), Eq. (3), Eq. (5) and Eq. (6). Cumulative abnormal CDS spread changes $\Delta CAS_{i,t}$ are calculated according to the single-index model and Eq. (7). The MSCI Europe and MSCI USA are employed as proxies for the stock market portfolio. The iTraxx Europe 5-years and iTraxx CDX IG 5-years are selected as proxies for the European and U.S. CDS market portfolio. For each of the 15 market events (m), average values $\overline{CAR}_m$, $\overline{CMAR}_m$ and $\overline{\Delta CAS}_m$ are computed based on equally weighted (ew) and market-weighted (mw) portfolios. These values are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The stock market reaction is reported as the sum of cumulative average abnormal returns $\sum \overline{CAR}_m$ and the sum of cumulative average market-adjusted returns $\sum \overline{CMAR}_m$ over 15 events. The CDS market reaction is reported as the sum of cumulative average abnormal CDS spread changes $\sum \overline{\Delta CAS}_m$ over 15 events. In addition, aggregated market reactions are calculated for market-only events, i.e., market events that are announced simultaneously with credit and liquidity events are excluded (events 3, 4, 8, and 13). Abnormal stock and CDS market reactions are computed for placebo events five trading days prior to the actual events to assess potential information leakage and market anticipation. All values are tested for significance using a block bootstrap significance test (see subsection C). *p* values are computed based on a two-sided significance test: *p<0.1; **p<0.05; ***p<0.01.

	$\sum \overline{CMAR}_{m\_ew}$	$\sum \overline{CAR}_{m\_ew}$	$\sum \overline{CMAR}_{m\_mw}$	$\sum \overline{CAR}_{m\_mw}$
Panel A: European Market Reaction				
Actual Events				
Sum (all events)	-0.0970**	-0.0950**	-0.1758**	-0.1787***
p value (all events)	0.032	0.039	0.012	0.003
Sum (market-only events)	-0.0521	-0.0406	-0.0479	-0.0436
p value (market-only events)	0.167	0.278	0.372	0.368
Placebo Events				
Sum (all events)	-0.0273	-0.0231	-0.0082	0.0018
p value (all events)	0.528	0.606	0.907	0.979
Sum (market- only events)	-0.0163	-0.0176	-0.0297	-0.0330
p value (market-only events)	0.673	0.621	0.581	0.487
Panel B: U.S. Market Reaction				
Actual Events				
Sum (all events)	0.0258	0.0473	-0.0770	-0.1169
p value (all events)	0.641	0.419	0.454	0.208
Sum (market-only events)	0.0237	0.0571	0.0452	0.0441
p value (market-only events)	0.587	0.192	0.461	0.436
Placebo Events				
Sum (all events)	-0.0294	0.0167	0.0002	0.0394
p value (all events)	0.593	0.750	0.998	0.658
Sum (market- only events)	-0.0186	0.0211	0.0574	0.0522
p value (market-only events)	0.666	0.608	0.342	0.343

	$\sum \overline{\Delta CAS}_{m\_ew}$	$\sum \overline{\Delta CAS}_{m\_mw}$
Panel A: European Market Reaction		
Actual Events		
Sum (all events)	-0.0744	-0.0697
p value (all events)	0.624	0.689
Sum (market-only events)	-0.2006	-0.2342
p value (market-only events)	0.166	0.144
Placebo Events		
Sum (all events)	0.3546**	0.4761**
p value (all events)	0.040	0.013
Sum (market- only events)	0.2730*	0.3537**
p value (market-only events)	0.057	0.031
Panel B: U.S. Market Reaction		
Actual Events		
Sum (all events)	-0.1896	-0.2043
p value (all events)	0.332	0.328
Sum (market-only events)	-0.1398	-0.1586
p value (market-only events)	0.353	0.326
Placebo Events		
Sum (all events)	0.1876	0.2291
p value (all events)	0.337	0.280
Sum (market-only events)	0.0348	0.0417
p value (market-only events)	0.817	0.780

Table C.15

Market Reaction to Announcements Regarding Credit Risk Regulation

This table presents aggregated European and U.S. stock and CDS market reactions to 26 regulatory announcements of credit risk by the Basel Committee on Banking Supervision (BCBS). Cumulative abnormal returns $CAR_{i,t}$ and cumulative market-adjusted returns $CMAR_{i,t}$ are calculated according to Eq. (1), Eq. (3), Eq. (5) and Eq. (6). Cumulative abnormal CDS spread changes $\Delta CAS_{i,t}$ are calculated according to the single-index model and Eq. (7). The MSCI Europe and MSCI USA are utilized as proxies for the stock market portfolio. The iTraxx Europe 5-years and iTraxx CDX IG 5-years are employed as proxies for the European and U.S. CDS market portfolio. For each of the 26 credit events (c), average values $\overline{CAR}_c$, $\overline{CMAR}_c$ and $\overline{\Delta CAS}_c$ are computed based on equally weighted (ew) and market-weighted (mw) portfolios. These values are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The stock market reaction is reported as the sum of cumulative average abnormal returns $\sum \overline{CAR}_c$ and the sum of cumulative average market-adjusted returns $\sum \overline{CMAR}_c$ over 26 events. The CDS market reaction is reported as the sum of cumulative average abnormal CDS spread changes $\sum \overline{\Delta CAS}_c$ over 26 events. In addition, aggregated market reactions are calculated for credit-only events, i.e., credit events that are announced simultaneously with market and liquidity events are excluded (events 2, 3, 5, 7, 9, 19, 20, and 25). Abnormal stock and CDS market reactions are computed for placebo events five trading days prior to the actual events to assess potential information leakage and market anticipation. All values are tested for significance using a block bootstrap significance test (see subsection C). p values are computed based on a two-sided significance test: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

	$\sum \overline{CMAR}_{c\_ew}$	$\sum \overline{CAR}_{c\_ew}$	$\sum \overline{CMAR}_{c\_mw}$	$\sum \overline{CAR}_{c\_mw}$
Panel A: European Market Reaction				
Actual Events				
Sum (all events)	-0.1669^{***}	-0.1739^{***}	-0.3923^{***}	-0.3630^{***}
p value (all events)	0.004	0.009	0.000	0.000
Sum (credit-only events)	-0.0570	-0.0619	-0.1580^{**}	-0.1330^{**}
p value (credit-only events)	0.277	0.243	0.035	0.040
Placebo Events				
Sum (all events)	-0.0095	0.0147	-0.0003	-0.0133
p value (all events)	0.878	0.827	0.997	0.873
Sum (credit-only events)	0.0018	0.0214	-0.0176	-0.0440
p value (credit-only events)	0.966	0.664	0.810	0.489
Panel B: U.S. Market Reaction				
Actual Events				
Sum (all events)	-0.0519	-0.0757	-0.2726^{**}	-0.2851^{**}
p value (all events)	0.439	0.264	0.056	0.023
Sum (credit-only events)	-0.0249	-0.0488	-0.1246	-0.1094
p value (credit-only events)	0.633	0.352	0.163	0.180
Placebo Events				
Sum (all events)	0.0463	0.0748	-0.0094	0.0247
p value (all events)	0.475	0.268	0.937	0.842
Sum (credit-only events)	0.0121	0.0324	-0.0238	-0.0286
p value (credit-only events)	0.809	0.547	0.770	0.697
		$\sum \overline{\Delta CAS}_{c\_ew}$		$\sum \overline{\Delta CAS}_{c\_mw}$
Panel A: European Market Reaction				
Actual Events				
Sum (all events)		0.3159^{**}		0.3752^{**}
p value (all events)		0.039		0.039
Sum (credit-only events)		0.0822		0.0886
p value (credit-only events)		0.518		0.521
Placebo Events				
Sum (all events)		0.1417		0.1254
p value (all events)		0.381		0.489
Sum (credit-only events)		0.0621		0.0655
p value (credit-only events)		0.634		0.648
Panel B: U.S. Market Reaction				
Actual Events				
Sum (all events)		0.4071		0.4627

p value (all events)	0.130	0.100
Sum (credit-only events)	0.2569	0.2858
p value (credit-only events)	0.205	0.185
Placebo Events		
Sum (all events)	0.2942	0.3984
p value (all events)	0.247	0.158
Sum (credit-only events)	0.1999	0.2569
p value (credit-only events)	0.310	0.228

Table C.16

Market Reaction to Announcements Regarding Liquidity Risk Regulation

This table presents aggregated European and U.S. stock and CDS market reactions to 13 regulatory announcements of liquidity risk by the Basel Committee on Banking Supervision (BCBS). Cumulative abnormal returns $CAR_{i,t}$ and cumulative market-adjusted returns $CMAR_{i,t}$ are calculated according to Eq. (1), Eq. (3), Eq. (5) and Eq. (6). Cumulative abnormal CDS spread changes $\Delta CAS_{i,t}$ are calculated according to the single-index model and Eq. (7). The MSCI Europe and MSCI USA are employed as proxies for the stock market portfolio. The iTraxx Europe 5-years and iTraxx CDX IG 5-years are selected as proxies for the European and U.S. CDS market portfolio. For each of the 13 liquidity events (l), average values $\overline{CAR_l}$, $\overline{CMAR_l}$ and $\overline{\Delta CAS_l}$ are computed based on equally weighted (ew) and market-weighted (mw) portfolios. These values are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The stock market reaction is reported as the sum of cumulative average abnormal returns $\sum \overline{CAR_l}$ and the sum of cumulative average market-adjusted returns $\sum \overline{CMAR_l}$ over 13 events. The CDS market reaction is reported as the sum of cumulative average abnormal CDS spread changes $\sum \overline{\Delta CAS_l}$ over 13 events. In addition, aggregated market reactions are calculated for liquidity-only events, i.e., liquidity events that are announced simultaneously with market and credit events (events 4, 5, 6, and 11) are excluded. Abnormal stock and CDS market reactions are computed for placebo events five trading days prior to the actual events to assess potential information leakage and market anticipation. All values are tested for significance using a block bootstrap significance test (see subsection C). p values are computed based on a two-sided significance test: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

	$\sum \overline{CMAR_l}\_{ew}$	$\sum \overline{CAR_l}\_{ew}$	$\sum \overline{CMAR_l}\_{mw}$	$\sum \overline{CAR_l}\_{mw}$
Panel A: European Market Reaction				
Actual Events				
Sum (all events)	-0.0662	-0.0466	-0.0937	-0.0649
p value (all events)	0.136	0.271	0.174	0.273
Sum (liquidity-only events)	-0.0285	-0.0055	0.0073	0.0171
p value (liquidity-only events)	0.445	0.877	0.870	0.719
Placebo Events				
Sum (all events)	-0.0261	-0.0287	0.0073	-0.0185
p value (all events)	0.534	0.497	0.905	0.781
Sum (liquidity-only events)	-0.0044	-0.0118	0.0132	0.0023
p value (liquidity-only events)	0.907	0.742	0.808	0.949
Panel B: U.S. Market Reaction				
Actual Events				
Sum (all events)	-0.0075	0.0002	0.0490	0.0491
p value (all events)	0.880	0.997	0.617	0.592
Sum (liquidity-only events)	-0.0163	-0.0122	0.0626	0.0467
p value (liquidity-only events)	0.684	0.765	0.414	0.494
Placebo Events				
Sum (all events)	0.0282	0.0477	0.1310	0.1049
p value (all events)	0.603	0.377	0.223	0.265
Sum (liquidity-only events)	0.0188	0.0253	0.0546	0.0358
p value (liquidity-only events)	0.650	0.564	0.465	0.607

	$\sum \overline{\Delta CAS_l}\_{ew}$	$\sum \overline{\Delta CAS_l}\_{mw}$
Panel A: European Market Reaction		
Actual Events		

Sum (all events)	0.1601	0.0983
p value (all events)	0.332	0.598
Sum (liquidity-only events)	-0.0010	-0.0462
p value (liquidity-only events)	0.996	0.756
Placebo Events		
Sum (all events)	0.1302	0.0963
p value (all events)	0.430	0.607
Sum (liquidity-only events)	0.1049	0.0728
p value (liquidity-only events)	0.447	0.617
Panel B: U.S. Market Reaction		
Actual Events		
Sum (all events)	0.4139*	0.1256***
p value (all events)	0.051	0.007
Sum (liquidity-only events)	0.1952	0.0745*
p value (liquidity-only events)	0.196	0.068
Placebo Events		
Sum (all events)	-0.0298	-0.0476
p value (all events)	0.833	0.217
Sum (liquidity-only events)	0.0638	-0.0226
p value (liquidity-only events)	0.609	0.425

Table C.17

Determinants of Stock and CDS Market Reaction to Market Risk Regulation

This table presents the variables that explain the heterogeneous reactions in cumulative abnormal returns CAR, cumulative market-adjusted returns CMARs and cumulative abnormal CDS spread changes ΔCASs for 15 market events. CAR and CMAR are calculated according to Eq. (1), Eq. (3), Eq. (5) and Eq. (6). ΔCAS is calculated according to the single-index model and Eq. (7). Dependent variables are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The MSCI Europe and MSCI USA are employed as proxies for the stock market portfolio. The iTraxx Europe 5-years and iTraxx CDX IG 5-years are utilized as proxies for the European and U.S. CDS market portfolio. For market-only events, market events that are announced simultaneously with credit and liquidity events are excluded (events 3, 4, 8, and 13). Bank-specific variables are TIER1_RAT, SEC_TO_ASSET and G_SIB. TIER1_RAT is the ratio of Tier 1 capital to total risk-weighted assets. SEC_TO_ASSET is the ratio of the total amount of marketable security investments to total assets. G_SIB is a dummy variable that is 1 for global systemically important banks and 0 otherwise. Country-specific variables are EUROPE_ex_GIIPS and GIIPS. EUROPE_ex_GIIPS is a dummy variable that is 1 for European banks not located in Greece, Italy, Ireland, Portugal or Spain (GIIPS) and 0 otherwise. GIIPS is a dummy variable that is 1 for banks located in GIIPS and 0 otherwise. The control variables are SIZE, COST_INC, ROA and TIME. SIZE is the natural logarithm of bank total assets. COST_INC is the cost-to-income ratio. ROA is the return on assets. TIME is a factor variable that captures different phases of the financial and sovereign debt crises (subprime crisis, global financial crisis, sovereign debt crisis and ex post crisis). Ex post crisis is omitted due to multicollinearity. Regressions are estimated using a random effects model with clustered standard errors at the bank level reported in parentheses. Note that *p<0.1; **p<0.05; ***p<0.01.

	Stock Market				*CDS Market*	
	Market Events		*Market-Only*		*Market Events*	*Market-Only*
	CAR	CMAR	CAR	CMAR	ΔCAS	
	(1)	(2)	(3)	(4)	(5)	(6)
TIER1_RAT	−0.056	−0.008	−0.077	−0.0002	−0.716***	−0.845***
	(0.064)	(0.059)	(0.079)	(0.068)	(0.165)	(0.207)
TIER1_RAT^2	0.065	−0.032	0.171	−0.038		
	(0.154)	(0.140)	(0.189)	(0.167)		

SEC_TO_ASSET	−0.004	0.001	0.004	0.007	0.037	0.094**
	(0.006)	(0.006)	(0.005)	(0.005)	(0.037)	(0.042)
G_SIB	−0.002	−0.003	−0.003	−0.002	0.007	0.007
	(0.003)	(0.003)	(0.002)	(0.002)	(0.024)	(0.032)
EUROPE_ex_GIIPS	0.0001	−0.0002	−0.001	0.001	0.033***	0.029*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.013)	(0.016)
GIIPS	−0.017***	−0.017***	−0.026***	−0.021***	0.016	−0.013
	(0.003)	(0.003)	(0.003)	(0.003)	(0.017)	(0.020)
SIZE	−0.001***	−0.001	0.00002	−0.0001	−0.013	−0.031**
	(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.010)	(0.013)
COST_INC	−0.003	−0.008***	0.002	−0.004	−0.023	−0.016
	(0.003)	(0.003)	(0.002)	(0.004)	(0.024)	(0.026)
ROA	−0.006	−0.095	0.031	−0.048	1.806***	1.041
	(0.085)	(0.079)	(0.108)	(0.111)	(0.666)	(0.787)
global financial crisis	−0.023***	−0.016***			0.034**	
	(0.004)	(0.004)			(0.014)	
sovereign debt crisis	0.003**	0.006***	0.001	0.002	0.022**	0.014
	(0.001)	(0.001)	(0.001)	(0.001)	(0.009)	(0.009)
subprime crisis	0.011***	0.014***	−0.014***	−0.011***	−0.099***	−0.100***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.019)	(0.025)
Constant	0.022***	0.012	0.007	0.001	0.225	0.486***
	(0.008)	(0.008)	(0.009)	(0.008)	(0.139)	(0.177)
Observations	4,217	4,217	2,837	2,837	414	280
R^2	0.058	0.047	0.035	0.030	0.257	0.142

Table C.18

Determinants of Stock and CDS Market Reaction to Credit Risk Regulation

This table presents the variables explaining heterogeneous reactions in cumulative abnormal returns CAR, cumulative market-adjusted returns CMARs and cumulative abnormal CDS spread changes ΔCASs for 26 credit events. CAR and CMAR are calculated according to Eq. (1), Eq. (3), Eq. (5) and Eq. (6). ΔCAS is calculated according to the single-index model and Eq. (7). Dependent variables are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The MSCI Europe and MSCI USA are employed as proxies for the stock market portfolio. The iTraxx Europe 5-years and iTraxx CDX IG 5-years are selected as proxies for the European and U.S. CDS market portfolio. For credit-only events, credit events that are announced simultaneously with market and liquidity events are excluded (events 2, 3, 5, 7, 9, 19, 20, and 25). Bank-specific variables are TIER1_RAT, PROV_LOAN and G_SIB. TIER1_RAT is the ratio of Tier 1 capital to total risk-weighted assets. PROV_LOAN is the ratio of loan-loss provisions to total loans. G_SIB is a dummy variable that is 1 for global systemically important banks and 0 otherwise. Country-specific variables are EUROPE_ex_GIIPS and GIIPS. EUROPE_ex_GIIPS is a dummy variable that is 1 for European banks not located in Greece, Italy, Ireland, Portugal or Spain (GIIPS) and 0 otherwise. GIIPS is a dummy variable that is 1 for banks located in GIIPS and 0 otherwise. The control variables are SIZE, COST_INC, ROA and TIME. SIZE is the natural logarithm of bank total assets. COST_INC is the cost-to-income ratio. ROA is the return on assets. TIME is a factor variable that captures different phases of the financial and sovereign debt crises (global financial crisis, sovereign debt crisis and ex post crisis). Ex post crisis is omitted due to multicollinearity. Regressions are estimated using a random effects model with clustered standard errors at the bank level reported in parentheses. Note that *p<0.1; **p<0.05; ***p<0.01.

	Stock Market				*CDS Market*	
	Credit Events		*Credit-Only*		*Credit Events*	*Credit-Only*
	CAR	CMAR	CAR	CMAR	ΔCAS	
	(1)	(2)	(3)	(4)	(5)	(6)
TIER1_RAT	0.083**	0.087**	0.059	0.074*	−0.252***	−0.085
	(0.040)	(0.038)	(0.046)	(0.045)	(0.072)	(0.061)
TIER1_RAT^2	−0.199*	−0.211**	−0.138	−0.186*		
	(0.102)	(0.094)	(0.115)	(0.112)		
PROV_LOAN	−0.001***	−0.001***	−0.002***	−0.002***	0.003	−0.197
	(0.00005)	(0.00003)	(0.00005)	(0.0001)	(0.135)	(0.135)
G_SIB	−0.005*	−0.005	−0.003	−0.001	0.004	−0.003
	(0.003)	(0.003)	(0.003)	(0.004)	(0.011)	(0.006)
EUROPE_ex_GIIPS	0.002	0.004***	0.002**	0.006***	−0.001	−0.013***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.006)	(0.003)
GIIPS	−0.002	−0.003	0.003	0.003	0.005	−0.008*
	(0.003)	(0.003)	(0.003)	(0.004)	(0.006)	(0.004)
SIZE	−0.001***	−0.002***	−0.001**	−0.002***	0.004	0.003
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.004)	(0.003)
COST_INC	0.00000	−0.0002	0.0001	0.0001	−0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
ROA	0.029	0.065	0.111	0.134*	0.422	0.024
	(0.069)	(0.063)	(0.083)	(0.077)	(0.259)	(0.182)
global financial crisis	−0.009***	−0.009***	−0.014***	−0.009***	−0.003	−0.009
	(0.002)	(0.002)	(0.003)	(0.003)	(0.008)	(0.009)
sovereign debt crisis	0.004**	−0.0004	0.005***	0.001	−0.009	−0.009

	(0.002)	(0.002)	(0.002)	(0.002)	(0.007)	(0.007)
Constant	−0.001	0.009	−0.005	0.010	−0.007	−0.003
	(0.006)	(0.006)	(0.006)	(0.006)	(0.055)	(0.046)
Observations	7,361	7,361	5,126	5,126	917	641
R^2	0.022	0.016	0.032	0.013	0.028	0.011

Table C.19

Determinants of Stock and CDS Market Reaction to Liquidity Risk Regulation

This table presents the variables that explain heterogeneous reactions in CAR, cumulative market-adjusted returns CMARs and cumulative abnormal CDS spread changes ΔCASs for 13 liquidity events. CAR and CMAR are calculated according to Eq. (1), Eq. (3), Eq. (5) and Eq. (6). ΔCAS is calculated according to the single-index model and Eq. (7). Dependent variables are multiplied by -1 if the event is associated with a reduction in regulatory intensity. The MSCI Europe and MSCI USA serve as proxies for the stock market portfolio. The iTraxx Europe 5-years and iTraxx CDX IG 5-years are selected as proxies for the European and U.S. CDS market portfolio. For liquidity-only events, liquidity events that are announced simultaneously with market and credit events are excluded (events 4, 5, 6, and 11). Bank-specific variables are LCR_PROXY, NSFR_PROXY and DEP_TO_ASSET. LCR_PROXY is a proxy for a bank's liquidity coverage ratio (LCR). NSFR_PROXY is a proxy for a bank's net stable funding ratio (NSFR). DEP_TO_ASSET is the ratio of customer deposits to total assets. Country-specific variables are EUROPE_ex_GIIPS and GIIPS. EUROPE_ex_GIIPS is a dummy variable that is 1 for European banks not located in Greece, Italy, Ireland, Portugal or Spain (GIIPS) and 0 otherwise. GIIPS is a dummy variable that is 1 for banks located in GIIPS and 0 otherwise. The control variables are SIZE, COST_INC, ROA and TIME. SIZE is the natural logarithm of bank total assets. COST_INC is the cost-to-income ratio. ROA is the return on assets. TIME is a factor variable that captures different phases of the financial and sovereign debt crises (subprime crisis, global financial crisis, and sovereign debt crisis). The global financial crisis is omitted due to multicollinearity. Regressions are estimated using a random effects model with clustered standard errors at the bank level reported in parentheses. Note that *p<0.1; **p<0.05; ***p<0.01.

	Stock Market				*CDS Market*	
	Liquidity Events		*Liquidity-Only*		*Liquidity Events*	*Liquidity-Only*
	CAR	CMAR	CAR	CMAR	ΔCAS	
	(1)	(2)	(3)	(4)	(5)	(6)
LCR_PROXY	0.0001	0.0002	0.0002	0.0002	−0.025***	−0.019***
	(0.0003)	(0.0002)	(0.0002)	(0.0003)	(0.007)	(0.006)
NSFR_PROXY	−0.010	−0.013	−0.018	−0.023**	0.051	0.038
	(0.009)	(0.009)	(0.011)	(0.011)	(0.038)	(0.032)
DEP_TO_ASSET	0.012	0.009	−0.003	−0.0001	−0.113***	−0.051*
	(0.009)	(0.009)	(0.011)	(0.011)	(0.044)	(0.030)
EUROPE_ex_GIIPS	−0.004*	−0.005**	−0.004	−0.008***	−0.017***	−0.011
	(0.002)	(0.002)	(0.003)	(0.003)	(0.006)	(0.009)
GIIPS	−0.005*	−0.007**	0.001	−0.001	−0.022***	−0.014*
	(0.003)	(0.003)	(0.004)	(0.004)	(0.006)	(0.008)
SIZE	0.0001	−0.0002	−0.0002	0.0005	0.005	0.002
	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.004)	(0.003)
COST_INC	0.0003	0.0003	0.0002	0.0003	−0.006	0.010

	(0.001)	(0.001)	(0.001)	(0.001)	(0.012)	(0.009)
ROA	0.092	0.221**	0.441**	0.436**	−0.619	−0.863**
	(0.110)	(0.103)	(0.179)	(0.182)	(0.443)	(0.362)
sovereign debt crisis	−0.002	−0.002	0.014***	0.009***	−0.036***	−0.072***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.008)	(0.017)
subprime crisis	−0.010***	−0.010***	0.002	−0.001	−0.084***	−0.102***
	(0.003)	(0.003)	(0.004)	(0.004)	(0.010)	(0.017)
Constant	0.002	0.008	0.005	0.005	0.024	0.056
	(0.008)	(0.008)	(0.010)	(0.010)	(0.061)	(0.049)
Observations	3,570	3,570	2,466	2,466	246	166
R^2	0.008	0.010	0.034	0.024	0.189	0.254