# Limits of Contingent Convertible Bonds: Evidence from the Credit Suisse Collapse*

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**Abstract**

In the aftermath of the Global Financial Crisis, regulators encouraged banks to issue contingent convertible bonds ("CoCos") to improve the issuing bank's stability. Banks around the world have issued more than $1 trillion worth of CoCos to date. Yet it is unclear whether CoCos have achieved their intended goal of improving stability. Leveraging the unexpected banking panic in March 2023, we show that issuing banks fared worse—as measured by abnormal equity returns and probabilities of default. We also examine market dynamics after 2023 and find that the largest banks have continued to issue CoCos with similar contractual terms, though issuer characteristics are changing.

**JEL Codes:** G01, G14, G18, G21, G23, K22

## 1 Introduction

Following the 2007-08 Global Financial Crisis, regulators around the world sought to design a new framework that would result in "bail-ins" instead of "bailouts" of large financial institutions. One important tool in that framework was a debt-equity hybrid instrument: "contingent convertible bonds," or "CoCos." Regulators encouraged banks to issue CoCos as liabilities on their balance sheets in order to increase their regulatory capital buffers. If banks fell into financial trouble, CoCos could be "triggered" and either convert to equity or be written down to zero. The goal was to improve the issuing banks' stability in times of stress. In response, international banks have issued over $1 trillion dollars' worth of CoCos over the past fifteen years.

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This regulatory framework was put to a serious test in March 2023. In the matter of a few days, shockwaves emitting from the failure of Silicon Valley Bank in the United States were felt around the world Choi and Zhang (2025). The shock spread to Switzerland and, in particular, to Credit Suisse. Even though Credit Suisse held billions of CoCos on its balance sheet prior to the panic, the Swiss government had to engineer an emergency bailout to merge it with UBS. CoCos were unable to save Credit Suisse from failure.

Using the Credit Suisse collapse as a quasi-natural experiment, we attempt to address two important sets of questions. First, were banks with more CoCos perceived by the market as safer, on average, than banks with fewer (or no) CoCos? In other words, we aim to provide a systematic analysis of the market reaction to banks that held CoCos during March 2023. In doing so, we hope to shed light on the efficacy of CoCos during a time of true financial panic. Second, given the extreme stress placed on banks during the spring of 2023, how has the CoCos market evolved afterward? Have banks changed the contractual terms of newly issued CoCos to, for example, make themselves safer or to make CoCos more attractive to investors? Has the composition of issuing banks changed?

We explore the first set of questions through a two-part approach: an event study with abnormal returns of common stocks and panel regressions with probabilities of default (based on credit default swap spreads). The results suggest that holding additional CoCos was not associated with better outcomes during the March 2023 panic. Higher levels of CoCos were associated with worse equity performance and greater probability of default. If the market had more confidence in CoCos, one would expect to see more positive reactions. Yet our results are more consistent with the market realizing that CoCos were not providing the stability benefit that was originally anticipated.

We also check for the possibility of selection bias—that is, whether (inherently) weaker banks issued more CoCos to begin with. We find that issuance prior to 2023 was not significantly associated with weaker bank characteristics. Indeed, earlier research has shown that weaker banks—those with more volatile assets, with greater leverage—were the ones that issued *fewer* CoCos Goncharenko et al. (2021). Similarly, Avdjiev et al. (2020) find that better-capitalized banks had a higher propensity to issue CoCos, and Abdallah and Rodríguez Fernandez (2022) show that less risky banks are generally more likely to issue CoCos. Consistent with these earlier findings, our results show that the negative market reaction to CoCos are less likely to be driven by the market realizing that the issuers are weaker.

Changing market perceptions of CoCos may explain the negative results. If CoCos fulfill their intended purpose, they can create an "insurance effect," as described by Flannery (2005) and Fiordelisi et al. (2020). When triggered to absorb losses while the bank remains a going concern, CoCos can recapitalize the institution and cushion declines in equity value, offering shareholders a form of insurance against financial distress, a mechanism described by Avdjiev et al. (2020). Although CoCos were designed to absorb losses before insolvency, the collapse of Credit Suisse raised

doubts about whether they can effectively mitigate bank distress. If investors began to question whether CoCos provide insurance against bank failure, banks that issued more CoCos could have experienced negative market reactions, consistent with our results.

With respect to our second set of questions, we utilize data (including hand-coded data) on contractual terms. While we observe *some* changes to non-price terms,[1] we do not observe any systematic patterns. Moreover, an individual bank's experience during March 2023 does not seem to predict the bank's adjustment of subsequent contract terms. Interestingly, however, we find some changes in issuer characteristics. New issuers are less liquid than their predecessors, and they are mostly concentrated in Europe. In comparison, banks in India have pulled back from the CoCos market and Chinese banks have largely stopped issuing CoCos.

Our paper contributes to the broader literature on the CoCos regulatory experiment. Since the experiment's inception, analysis by both finance and legal scholars has leaned in favor of CoCos. Flannery (2005, 2015) and Culp (2009) argue that CoCos could be valuable in recapitalizing banks during times of stress since their conversion or write down would reduce banks' liabilities. Others describe how CoCos could incentivize banks to improve risk management and raise capital promptly. See Bolton and Samama (2012) and Calomiris and Herring (2013). CoCos were also billed as a mechanism that could impose greater market discipline on banks Flannery (2005), Crawford (2017), and possibly avoid future government bailouts Coffee (2011).

Subsequent empirical analysis suggests that CoCos might have positive effects for banks and the financial system at large. Avdjiev et al. (2020) find that CoCos can generate risk-reduction benefits and lower costs of debt for their issuers, as shown by declines in issuers' CDS spreads. Kund and Petras (2023) find that, after adjusting for CoCos' accounting treatment, CoCo issuance can reduce the financial system's overall systemic risk. Likewise, Gupta et al. (2021) use a balance sheet network model to argue that CoCo debt conversion can mitigate systemic risk. Going further, Feinstein and Hurd (2023)'s theoretical results of a financial network model in Europe show that CoCos could replace unsecured interbank debt in the European Union, resulting in lower systemic risk and higher bank shareholder value.

In contrast, our study lends support to the view that the benefits from issuing CoCos may be less than expected. Sundaresan and Wang (2015) critique commonly used market-based triggers, arguing that they could lead to multiple equilibria and self-fulfilling bank runs. Chan and van Wijnbergen (2014) find that CoCos might even raise the probability of a bank run, impose a negative externality on other banks, and disincentivize equity holders to provide additional capital in times of stress. Avgouleas and Goodhart (2015) argue that CoCos were unlikely to eliminate the need for public bailouts. Admati et al. argue that CoCos are poor "substitutes" for equity in capital

[1]For instance, BNP Paribas, one of the largest issuers of CoCos, shifted from issuing write-down CoCos before March 2023 to conversion CoCos after March 2023. Some other banks, such as UBS, appear to have changed terms as well.

regulation and present a host of implementation issues.

Finally, our research is part of a growing literature investigating the Credit Suisse collapse in March 2023. Bolton et al. (2023) support FINMA's decision to trigger and write down Credit Suisse's CoCos, arguing that the write-down saved Swiss taxpayers and was preferable to larger government bailouts. Valbuena and Eidenmueller (2023) analyze the legal mechanics of the write-down, concluding that bondholders' legal challenges are unlikely to be successful. Ellingsæter (2024) notes that Credit Suisse's CoCos differed from those issued in other countries, suggesting that a Credit Suisse write-down is unlikely for EU banks. In its report on the 2023 banking turmoil, the Basel Committee on Banking Supervision (2023) acknowledge that investors and markets did not internalize the trigger events that can lead to losses for bondholders and suggested that there may be merit in further assessment of the "complexity, transparency, and understanding of AT1 instruments in a holistic manner." To our knowledge, our paper is the first to (1) analyze how all CoCo issuers reacted during the events of March 2023 and (2) document how issuers and buyers of CoCos adapted (or not) in the aftermath.

The remainder of our article proceeds as follows. Section 2 provides the regulatory origin story of CoCos and briefly explains the underlying theory for why CoCos might underperform in times of stress. The section also provides summary statistics on CoCos issuance as well as the data used in our subsequent statistical analyses. Section 3 explores our financial stability question, first with an event study that uses abnormal stock returns and then with a panel regression setup that uses a bank's probability of default. Section 4 provides our analysis of the contractual language in CoCos and shows how the terms have (and have not) changed since March 2023. Section 4 also explores how the composition of issuers has changed (if at all) in subsequent years. Section 5 concludes.

## 2 Background and Data

In this section, we summarize the origins of the CoCos regulatory experiment, which arose in the aftermath of the Global Financial Crisis. We then present high-level data on the evolution of the CoCos market in recent years. Readers will see that the experiment has resulted in hundreds of billions of dollars' worth of issuance by large banks around the world, including more than $185 billion of issuance following the March 2023 panic (through January 2026). Overall, notwithstanding the Credit Suisse failure, the CoCos market has not shown any signs of slowing down.

### 2.1 Regulatory Origins and Theories

As regulators convened in Switzerland to develop Basel III, their objective was to improve the resiliency of banks and prevent taxpayers from having to shoulder the bill the next time a large

bank collapsed. CoCos were born as part of this collective effort. CoCos are hybrid capital securities that can absorb losses when converted based on a pre-determined metric or on regulatory discretion. These securities are considered to be hybrid instruments because they are neither traditional liabilities nor traditional equities.

Banks in many countries have issued CoCos with the glaring exception of banks in the United States. Because the Basel Accords are non-binding international agreements, jurisdictions have discretion in how they treat CoCos for their domestic regulatory purposes. Compared to the positive view of CoCos from Asian and European banking regulators, CoCos were met with a mixed reception in the United States. As described by Choi and Zhang (2025): "During the evaluation of new regulatory tools following the financial crisis, some U.S. officials like Federal Reserve Bank of New York President William Dudley expressed interest in promoting CoCos. Eric Rosengren, President of the Federal Reserve Bank of Boston, went even further by strongly endorsing the idea of requiring banks to hold CoCos. Other officials, including Treasury Secretary Tim Geithner, were more doubtful." In the end, U.S. regulators did not allow U.S. banks to count CoCos toward their regulatory capital requirements, and U.S. banks have not issued any.

In jurisdictions that allow for CoCos to be treated as regulatory capital, CoCos act as a loss absorbing mechanism by converting to equity or being written down to zero when they are "triggered." And, regardless of conversion or write down, the bank's liability stack decreases (by the face value of CoCos), which improves the bank's debt to equity ratio. The trigger itself is designed to keep the bank a "going concern," as the debt will convert prior to the bank's insolvency. (There is another type of long-term debt that provides "gone concern" contingent capital—converting only when the bank becomes insolvent.)

Regulators can keep the CoCo-issuing bank a going concern using a mechanical or discretionary trigger. If the trigger is mechanical, it can be based on the bank's book value (e.g., based on regulatory capital levels) or market value (e.g., based on stock price or CDS spread). If the trigger is discretionary, regulators have the authority to decide when conversion or write-down would be most appropriate. A discretionary trigger event, also referred to as the "point of nonviability," gives regulators the ability to bypass issues arising from the timeliness or unreliability of market-based measures.

While the origin story is intuitive, Choi and Zhang (2025) present two fundamental reasons why CoCos might not stabilize a bank's health during a panic. First, based on financial theory, bank runs occur because of a liquidity crisis. Once a liquidity crisis is set in motion, only more liquidity—typically of an amount provided by the central bank—can prevent the bank's failure. Increasing the equity on a bank's balance sheet, which is what CoCos are designed to do, will not stop the run. It does nothing to address the bank's liquidity problem. Second, one must consider the importance of opacity during a panic. If investors and depositors can identify which bank is experiencing trouble, this could trigger a liquidity crisis, eventually leading to the bank's

failure. Triggering CoCos ironically can send a signal to investors and depositors that the bank is in desperate need of help and therefore precipitate the very spiral it seeks to avoid. Nevertheless, a broader empirical question over whether CoCos can actually stabilize banks remains, and the primary goal of this paper is to shed light on that important question.

### 2.2 Issuance of CoCos

To study the impact of CoCos, we combine information for both CoCos and their issuing banks from a number of datasets. Foremost, we pull information on individual CoCos from Bloomberg using the SRCH@COCO command, starting with the entire universe of contingent convertible fixed income instruments issued through January 2026. We only keep bonds designated as Additional Tier 1 for Basel III purposes. The resulting sample yields 1,405 instruments issued by 406 banks since May 11, 2009.

We obtain additional bond characteristics from Bloomberg, including each instrument's issuance date, coupon, maturity date, first call date, currency, and amount issued. Bloomberg also provides us with information unique to CoCos. The variable *CapTypeCoCoAction* contains the CoCo's loss absorption mechanism, the mechanism that gets triggered when the bank is in distress. This mechanism is either a write-down (writing down the debt partially or completely) or a conversion (to equity). Write-downs are further categorized as permanent, partially permanent, or temporary. The *CoCoInitialTrigger* is the balance sheet metric that mechanical triggers are based on. For most CoCos, the trigger level is based on the bank's Common Equity Tier 1 (CET1) Ratio. The *CoCoTriggerLevel* is the predetermined numerical level at which the write down or conversion occurs. In practice, this means that most CoCos are triggered when the issuing bank's CET1 ratio falls below the *CoCoTriggerLevel*. The *CapitalTriggerType* describes whether the instrument is triggered mechanically or via another mechanism. In our sample, all CoCos with available *CapitalTriggerType* are mechanically triggered. For each bank, we also sum the amount issued for each category of *CapTypeCoCoAction*.

Banks began issuing CoCos in 2010, with issuance picking up in earnest starting in 2014, as shown by Figure 1. The largest total amount issued in a single year was in 2019. Issuance declined following that spike until 2023, when there was a slight increase. Following the collapse of Credit Suisse, there was brief lull, but issuance resumed in 2024. Somewhat surprising is that the second highest level of annual issuance came the year after the write-down of Credit Suisse's CoCos, which motivates the second part of our research project (on changes to contractual terms). The average CoCo amount issued is over half a billion dollars, with the largest single issuance reaching twelve billion dollars.

As shown in Table 1, over three-quarters of CoCos utilize a write-down as their form of loss absorption, accounting for almost 53% of the total amount issued. Less than a quarter use an equity

conversion as their form of loss absorption. And 54 bonds do not specify their precise mechanism for loss absorption. Table 1 also shows the breakdown of trigger levels. Most bonds have triggers set to 5.125%, the minimum required for the CoCo to qualify as regulatory capital (namely, Additional Tier 1 capital) under Basel III rules.

### 2.3 Issuers of CoCos

Through LSEG's Workspace platform, we use each CoCo instrument's unique ISIN to identify the issuing bank and then pull the bank's balance sheet and share price data. To account for banks that have not issued CoCos, we supplement the universe of CoCo-issuing banks with non-CoCo-issuing banks from the list of the largest 150 global banks, as well as all GSIBs. Because we are interested in analyzing the effect of CoCos on banks during the Credit Suisse collapse, we restrict our sample for the main part of our analysis to banks that issued CoCos before 2022 Q4, the quarter before the collapse (though we gather information for subsequent issuers to be used later in our analysis). In addition, because we utilize bank share returns in our event study analysis, we further restrict our sample to publicly traded institutions. Of the 394 banks with available balance sheet data from LSEG, 226 are publicly traded and have at least some available data to run our analysis, namely with the event studies, within the relevant time frame of interest.

From LSEG, we pull standard balance sheet variables, including the bank's total assets, total liabilities, income, debt, and return on assets. We also pull detailed information on the bank's capital levels. Using this information, we calculate the bank's log assets, debt ratio, and return on assets. Table 2 displays summary statistics for both CoCo issuers and non-issuers.

In addition, we use the bank share returns to create a measure of business model similarity to Credit Suisse. We do this by calculating the correlation between each bank's daily share return and the daily share return of Credit Suisse over the course of 2022, the full year before that bank's collapse. We call this measure the bank's *Correlation*, described as,

$$\text{Correlation}_i = \text{Corr}(R_{i,t},\, R_{CS,t}) \quad \text{for } t = 1, 2, \ldots, T \tag{1}$$

where $R_{i,t}$ represents the daily share return of bank $i$ on day $t$, $R_{CS,t}$ represents the daily share return of Credit Suisse on day $t$, and $T$ represent the total number of trading days in 2022. As shown in Figure 2, the majority of banks are (at least weakly) positively correlated with Credit Suisse, with a mean correlation of 0.29. The observation of 1.00 is Credit Suisse itself.

# 3 Consequences for Financial Stability

In this section, we present our empirical analysis of whether CoCos provided a meaningful stability benefit during the maelstrom of March 2023. The analysis proceeds in two parts. First, we seek to understand how equity prices changed for banks that held CoCos on their balance sheets. We do so using abnormal stock returns. Second, we examine the banks' probabilities of default during that same period. Both sets of analyses suggest that holding more CoCos did not yield a measurable benefit.

## 3.1 Baseline Results with Abnormal Returns

To measure the market reaction to the collapse of Credit Suisse, we generate bank-level abnormal returns using the Wharton Research Data Service (WRDS) event study tool. We run event studies on days in March 2023 for banks that issued CoCos prior to year-end 2022, the quarter before Credit Suisse's collapse.

We use the Fama-French Three-Factor model as our baseline. This model takes into account the market risk premium, size premium, and book-to-market premium. The market risk premium is defined as the difference between the expected return of the market and the risk-free rate. The size premium, referred to as Small Minus Big (SMB), is derived from the historic excess returns of small-cap companies over large-cap companies. The book-to-market premium, called High Minus Low (HML), is derived from the historic excess return of low book-to-market ratio stocks ("value stocks") over high book-to-market ratio stocks ("growth stocks").

The Fama-French Three-Factor model available through WRDS only uses banks with shares traded in the United States, leading to a sample of 62 banks. This model uses an estimation window of 100 trading days, with a gap of 50 days between the estimation window and the start of the event window. The mathematical representation of the Fama-French Three-Factor Model is:

$$R_{i,t} - R_{f,t} = \alpha + \beta_1\big(R_{m,t} - R_{f,t}\big) + \beta_2\, SMB_t + \beta_3\, HML_t + \varepsilon_{i,t} \tag{2}$$

where $R_{i,t}$ is the return of the stock or portfolio, $R_{f,t}$ is the risk-free rate, $R_{m,t}$ is the return of the market portfolio, $\alpha$ is the abnormal return, $\beta_1$, $\beta_2$, and $\beta_3$ are the factor loadings for the market risk premium, SMB, and HML factors, respectively, and $\varepsilon_{i,t}$ is the error term.

In our regressions, we examine these abnormal returns on March 15, 2023. On that day, the chairman of Saudi National Bank (Credit Suisse's largest shareholder) went on Bloomberg TV and explicitly stated that Credit Suisse would not receive any more of their money, causing a massive sell-off in the market. Shares of Credit Suisse ended the day down more than 20 percent. Presumably, the Saudi National Bank chairman's statement provided information to the market

that the failure of Credit Suisse was much more likely. At the same time, to the extent that other banks were "similar" to Credit Suisse (including whether and how much CoCos they have issued), the higher likelihood of Credit Suisse's failure should have provided new information about those other banks as well.

In Table 3 below, we present the results of our baseline regressions using CoCos as a percentage of a bank's assets, and we include balance sheet controls such as a bank's total assets, return on assets, cash ratio, capital ratio, and the bank's similarity with Credit Suisse. The coefficient of interest in the specification below is $\beta$.

$$AR_{i,t} = \alpha + \beta\, CoCos_{i,t} + \gamma\, Controls_{i,t} + \varepsilon_{i,t} \tag{3}$$

We first present the coefficient of interest by itself, without any controls and without any fixed effects. The sign on $\beta$ is negative. The magnitude suggests that if $CoCos/Assets$ were one percentage point higher, the abnormal returns would be roughly 2.3 percentage points lower. In other words, holding more CoCos was not associated with a better market outcome. As we add more controls to the regression, the sign stays negative, and the magnitude stays similar. Indeed, going from column (2) to column (7), the controls include the natural logarithm of a bank's assets, a bank's cash or cash equivalents as a proportion of its assets, a bank's return on assets, a bank's common equity tier 1 as a proportion of its assets, a bank's equity correlation with Credit Suisse (to proxy business model similarities), and country fixed effects (to control for different regulatory environments).[2] In every column, the coefficient on $CoCos/Assets$ is negative. That is not the sign that one would expect if one expected to see a systematic benefit from holding more CoCos.

To address concerns that alternative measures of capital could explain our results, we control for two other types of capital in Table 4. First, we control for Tier 1 capital divided by total assets. Tier 1 captures both CET1, controlled for above, as well as Additional Tier 1. Second, we control for the ratio of Tier 1 capital minus CoCos over total assets. The coefficient on CoCos/Assets remains negative and significant in columns (1) and (3), the no-fixed-effects specification for each alternative capital measure. Like in Table 3, the coefficient on CoCos/Assets remains negative but is not significant once country fixed effects are included.

### 3.2 Increasing the Sample Size

To be sure, we recognize that a concern with using the Fama-French Three-Factor model is the limited sample size of 62 international banks. We therefore attempt to enlarge our sample size as a first robustness check. In order to expand our sample, we use a different method to calculate abnormal returns: the Market Adjusted Model. In this case, the abnormal return is defined as the

[2] We also run variations of this specification using different definitions of regulatory capital. See tables B4 and B5 in the Appendix. Our baseline results are robust.

difference between daily stock return and the country market return. The Market Adjusted Model can be represented by:

$$R_{i,t} = R_{m,t} + \varepsilon_{i,t} \tag{4}$$

where $R_{i,t}$ is the return of stock $i$ at time $t$, $R_{m,t}$ is the overall market return at time $t$, and $\varepsilon_{i,t}$ is the idiosyncratic component of the stock return, representing firm-specific factors not captured by the market return. In this model, the expected return for the stock during the event window is equal to the market return. Thus, the abnormal return for bank $i$ and time $t$, which represents the deviation of the actual stock return from its expected return, is calculated as:

$$AR_{i,t} = R_{i,t} - \mathbb{E}[R_{i,t}] = R_{i,t} - R_{m,t} \tag{5}$$

Because the model uses national-level market returns, we run the event for institutions within each of the 30 home countries of banks in our sample, yielding abnormal returns for 225 banks.

In Table 5 below, we show the results of our regressions using CoCos as a percentage of a bank's assets, and we include the same set of balance sheet controls such as a bank's assets, return on assets, capital ratio, etc. The estimated coefficient of interest remains negative, regardless of which control variables are added. By column (7), the regression contains the full battery of control variables as well as country fixed effects. The coefficient of interest remains negative, which suggests that holding more CoCos did not improve market outcomes during the March 2023 panic. The magnitude suggests that if $CoCos/Assets$ were one percentage point higher, then abnormal returns would be nearly five percentage points lower.

### 3.3 Checking for Outliers Across Geography and Time

We next conduct a series of additional regressions to examine potential issues involving: (1) the impact of leaving Credit Suisse in the sample, because it is the one outlier that actually failed; (2) whether having U.S. banks in the sample matters, since they do not issue CoCos to begin with; and (3) whether estimating abnormal returns across March 2023 would paint a different picture than analyzing March 15 alone. In short, across all these robustness checks, we still find results consistent with our baseline findings.

First, we ask whether the presence of Credit Suisse in our regressions might have an outsized (outlier) effect. Since the CoCos-related shock was due to Credit Suisse's demise in March 2023, one may naturally wonder if our baseline results would still hold if the failing institution itself were removed from our sample. Indeed, the abnormal returns for Credit Suisse were so significant in March 2023 that they could potentially make the result look worse than it is. But our analysis shows that excluding Credit Suisse from the sample does not make a difference. The coefficient of interest is still uniformly negative, which is the "wrong" sign if one believed that more CoCos

would be associated with a more positive market reaction. If anything, the coefficient of interest is even larger in magnitude. See Table B1 in the Appendix.

Second, we check to see if having U.S. banks in the sample is problematic. Recall that U.S. banks did not, and do not, issue CoCos like European and Asian banks since they cannot obtain similar regulatory benefits. Thus, all of their CoCos levels are essentially capped at zero by regulation. We confirm that our results also hold even when U.S. banks are removed from the sample. Again, if anything the coefficient of interest is larger in magnitude. See Table B2 in the Appendix.

Third, we check to see what our estimates look like on days other than March 15, 2023, to obtain a more comprehensive picture of the March 2023 turmoil. Below is a timeline of the events leading up to and following March 15, 2023, showing other days that the market learned relevant information about Credit Suisse's condition.

- March 8: Credit Suisse delays its annual report because of questions it received from the U.S. Securities and Exchange Commission.
- March 10: The California Department of Financial Protection and Innovation seized Silicon Valley Bank and placed it under the receivership of the Federal Deposit Insurance Corporation.
- March 14: In its annual report, Credit Suisse admits to material weaknesses in its financial controls. Global markets are already on edge because of the banking panic in the United States.
- March 15: Bloomberg TV asks the chairman of the Saudi National Bank, one of the largest investors of Credit Suisse, whether it would offer additional support to Credit Suisse. "Absolutely not." Shares of Credit Suisse tumble.
- March 16: The Swiss National Bank enters the picture with an emergency liquidity infusion for Credit Suisse, but it becomes clear that the liquidity infusion is not sufficient.
- March 19: UBS agrees to take over Credit Suisse with sweeteners from the Swiss government, and $17 billion of Credit Suisse's CoCos are written down to zero. Credit Suisse's shareholders receive a bailout while the CoCos bondholders are wiped out.

Figure 3 plots our coefficient of interest—along with the corresponding 95% confidence interval—for regressions with country fixed effects run across a series of trading days in March. Prior to the shock on March 15, the coefficients are negative but not significantly different from zero. On March 15, the estimate turns more negative and becomes statistically significant, which suggests that the Bloomberg TV interview genuinely took investors by surprise—and not in a good way. Of note, the magnitude of the coefficient is the largest and most negative on the dates that were associated with the worst news with respect to Credit Suisse, namely, on March 15 and March 20. However, the coefficient on Monday, March 20, is not statistically significant. That likely reflects a large distribution of outcomes when markets reopened since the weekend of March 18 and 19 contained an extraordinary range of emergency government interventions aimed at stopping a banking crisis.

### 3.4 Conversion CoCos versus Write-down CoCos

Next, we explore whether different "types" of CoCos had more (or less) of an impact on our findings. We do so using data on whether certain CoCos were "conversion CoCos" or "write-down CoCos." In theory, both types of CoCos should provide the same "boost" in terms of increasing a bank's equity stack, but the market could have viewed write-down CoCos as easier to implement and more stability-enhancing. This may be so, since, for a write-down bond, the regulator "simply" has to wipe out the outstanding CoCos; whereas, for a conversion bond, the regulator (based on the contract terms) needs to figure out how much equity they will have to issue to the investors of CoCos, which can introduce additional layer of complexity. Furthermore, while conversion CoCos will dilute existing equity, putting further downward pressure on its price, write-down CoCos might boost the equity price.

We re-run our baseline regressions with CoCos split into these two types. Regardless of the type, we observe that banks with more CoCos did not experience a better market outcome. Interestingly, what we see in Table 6 is that conversion CoCos were associated with more negative abnormal returns. This result suggests that equity investors were not only concerned with the banks' stability issues but also with the possibility of being diluted if/when CoCos were triggered. In other words, equity investors were facing the "twin shocks" of (1) a failing bank and (2) being diluted.

### 3.5 Probabilities of Default: CDS Spreads

Given the perception of "twin shocks" to equity holders, we now attempt to isolate the impact on the bank's underlying health by looking at CDS prices. While stock prices can provide much information about the market's perception of the bank, the downside is that stock market reactions may capture more than the perceived safety and soundness of a bank. The market could also be reacting to a spike in uncertainty with respect to the possible conversion of CoCos, which would have implications for shareholders. Indeed, this is what we see in Table 6 above when comparing conversion CoCos with write-down CoCos. Thus, by examining the probability of default of banks in our sample, we can more precisely pinpoint what the impact is to the safety and soundness of the institution.

We obtain the estimated probability of default for each bank from Markit CDS via the Wharton Research Data Service. Credit Default Swaps (CDS) are agreements where the seller will compensate the buyer in the event that the reference entity (the bank) defaults. The implied default probability can be derived from the CDS spread and other factors such as the recovery rate. Increases in CDS spreads indicate that the market perceives the bank as likelier to default, leading to a higher default probability. We use the default probability calculated for the 5 Year tenor for Senior Unsecured Debt, the default tier. This measure is calculated daily and exists for 73 banks in our sample.

We begin by visually illustrating the change in our probability of default measure from February through April of 2023. See Figures 4 and 5, where the first (leftmost) red vertical line corresponds to March 10, the second to March 15, and the third (rightmost) to March 20. The average probability of default in our sample held steady until early March, when troubles at Silicon Valley Bank and Credit Suisse emerged. The trend continued into late March. The peak in the time series occurred just as Credit Suisse collapsed on March 20, 2023. The series stayed elevated, but held steady, through the end of April.

To better answer our research question, we divide the sample into U.S. banks and non-U.S. banks. Recall that U.S. banks do not receive the same regulatory benefit when it comes to issuing CoCos. They are free to do so, but they cannot count their issued CoCos as part of additional tier 1 capital. Using these two samples, we attempt to measure the difference in their reaction to the tumult in March 2023. To be clear, we understand that this setup is not a traditional difference-in-differences setup. While we do have two groups, both groups are impacted by the same global shock. Thus, what we run are panel regressions with a before-and-after variable plus a series of controls.

$$CDS_{i,t} = \alpha + \beta_1\, Post_t + \beta_2\, (Post_t \times NonUS_i) + \beta_3\, (Post_t \times NonUS_i \times CoCos_{i,t}) + \gamma\, Controls_{i,t} + \varepsilon_{i,t} \tag{6}$$

In the above specification, the $CDS_{i,t}$ refers to our probability of default series. There is a before-and-after time comparison in the "post" binary variable, which is set to switch from "0" to "1" on March 15 for the baseline model. The "NonUS" binary variable tags banks in non-U.S. jurisdictions. $\beta_3$ is our coefficient of interest because it seeks to measure the impact of CoCos among the cohort of non-U.S. banks that were able to issue CoCos.

Table 7 presents our results. Regression analyses on equity prices taught us that the banks with more CoCos (as measured by $CoCos/Assets$) suffered a larger, negative abnormal shock (compared to those with less CoCos) in response to the news surrounding the Credit Suisse failure. The results in Table 7 are consistent with the results on equity prices. While we see that non-U.S. banks had lower CDS spreads post-March 15 than U.S. banks, the result differs across their holdings of CoCos. Specifically, non-U.S. banks that held more CoCos fared worse than non-U.S. banks with fewer CoCos.

Across every specification, the signs on $\beta_3$ are positive and statistically significant, which suggests that holding more CoCos was associated with a higher probability of default among non-U.S. banks. The magnitude of the coefficients actually increases in some specifications as more balance sheet control variables are included. From column (2) through column (6), we added the natural logarithm of a bank's assets, the bank's cash and cash equivalents as a percentage of its assets, the bank's return on assets, its common equity tier 1 as a percentage of its assets, and its equity price correlation with Credit Suisse.

### 3.6 Characteristics of Issuers Prior to 2023

As we wrap up our analysis on the first half of our research project, we return to the question of whether CoCos were issued by "weaker" banks to begin with. If so, that could explain why we systematically observe worse results for banks that held more CoCos during March 2023.

We undertake an assessment of the characteristics of CoCo-issuing banks prior to 2023. To do this, we regress the natural logarithm of CoCos issued in a particular quarter on the bank-issuer's characteristics to test whether issuers differ from their non-issuer peers. Table 8 contains the results. Columns 1 through 4 regress the natural logarithm of the amount of CoCos issued in a given quarter on various bank characteristics. Column 5 uses an indicator variable for CoCo issuance that is "1" if the bank issued CoCos in a quarter, and "0" otherwise.

$$CoCos_{i,t} = \alpha + \beta\, Controls_{i,t} + \varepsilon_{i,t} \tag{7}$$

What we observe is that larger and more liquid banks tend to issue more CoCos, and this result is robust across all specifications. After including all bank characteristics and controlling for the quarter of issuance and the bank's country of headquarters, we observe that CoCo-issuing banks are similar to their non-issuing peers in terms of their Return on Assets and CET1 capital. These results imply that CoCo issuers were not weaker, on average, prior to the collapse of Credit Suisse. These results are robust even when using an indicator variable for CoCo issuance in column 5. These findings are broadly consistent with those in the literature, including Goncharenko et al. (2021) and Avdjiev et al. (2020) which show that larger and more liquid banks tend to issue more CoCos. In sum, it is not the case that issuing banks were weaker, on average, than their non-issuing counterparts.

To strengthen this claim, we also compare how the market reacted to "stronger" banks issuing CoCos versus "weaker" counterparts. We start by calculating each issuing bank's cumulative abnormal returns for the seven days before the date of issuance using the one factor model. (Using the longer window allows us to capture the market's reaction to the announcement, not just the issuance.) Across our four measures of bank structure and health (Assets, ROA, CET1/Assets, and Cash/Assets), we split these issuing banks into quartiles. We then calculate the mean cumulative abnormal return for both the "high" and "low" quartiles, and we run a two-sample t-test to compare the returns for the two groups. This allows us to compare the market's reaction to the largest 25% of banks issuing CoCos versus the smallest 25% of banks, the 25% with the highest returns on assets versus the 25% with the lowest returns on assets, and so on.

As shown in Table 9, we find that the abnormal returns derived from the one factor model for the highest and lowest quartiles of bank characteristics are not statistically different. For instance, the market's reaction to issuance by banks in the top quartile of capital levels, which all else equal implies a stronger bank, is not statistically different from a bank in the lowest quartile. The fact

that the market reacted similarly prior to March 2023 to both strong and weak banks issuing CoCos suggests that our measures of bank health do not alone explain the variation in abnormal returns on those days.

## 4 CoCo Issuance after Credit Suisse

After witnessing Credit Suisse's CoCos get wiped out, an important question is whether the CoCos market has adjusted and, if so, to what extent. Somewhat surprisingly, the year 2024 saw some of the largest issuance volumes on record, and data suggest investor demand for CoCos remains high. In this section, we attempt to tease out any market adjustments after the Credit Suisse collapse along several dimensions.

First and foremost, we observe as a baseline result that, by and large, CoCos terms stayed the same post-Credit Suisse's collapse.[3]

Second, we find that a bank's performance during March 2023 is *not* a strong predictor of whether a bank changed its contractual terms. Taken together, our first two findings are consistent with the literature that show how contractual terms, even those that give rise to problems down the road, tend to be "sticky." For example, in the insurance context, drafters retain poor language because parties prefer clauses that have well-understood meanings, even if other terms could lead to more desirable outcomes for both the insurer and the insured Boardman (2006). In other words, this could be a case of "better to stick with the devil you know."

Third, we ask whether the characteristics of CoCo issuers have changed. Comparing banks that continued issuing CoCos with banks that stopped issuing after March 2023, we do not find evidence that the post-March 2023 issuers were stronger from a purely balance sheet perspective. Recall that our analysis above, coupled with the existing literature, shows that CoCos were not issued by weaker banks. What we find post-2023 is suggestive evidence of an adverse selection effect. Moreover, we see that the issuers' country of origin has changed. While banks in Europe have continued to issue, those in China have stopped almost entirely.

Thus, what we observe is that CoCo contracts have not changed in a structural sense in the aftermath of Credit Suisse's collapse. But issuer characteristics are starting to shift in terms of balance sheet risk factors and geographic risk factors. While these shifts may be priced into newly

[3]As discussed below, our baseline results are derived from Bloomberg data. However, we also put on our lawyer hats and analyzed many contracts manually. Specifically, we gathered contracts written in English from banks that issued CoCos both in the three years preceding March 15, 2023, and the years since then. Our search netted 118 contracts from 23 banks. We then compared language from before and after March 2023. We compiled the language from eight terms: loss absorption mechanism, the status of the securities, redemption, substitution and variation terms, trigger language, liquidation language, the loss absorption term, and the governing law. Our analysis from this smaller set of English contracts is wholly consistent with our more comprehensive analysis.

issued CoCos, they might not be the best news from a regulatory-risk perspective. If CoCos are indeed analogous to "insurance" for issuing banks, then an increase in the "selection problem" (whether selection of weaker banks or more geographically concentrated banks) might cause an even greater negative reaction the next time a panic occurs.

### 4.1 Lack of Contractual Changes

We begin our analysis using data from Bloomberg, consisting of 134 banks that issued CoCos both before and after March 15, 2023 (through January 2026). Within that universe, 79 banks exist in the sample used in the regression analysis above and have sufficient data for analysis. To determine if a contract change occurred, we compare the last bond issued before March 15, 2023, with the first bond issued after that date.

Data from Bloomberg allow us to observe changes for CoCo coupons, trigger levels, and loss absorption mechanisms. For this last feature, we distinguish between changes from write-down to conversions, and vice versa. Bloomberg uses five categories to identify the loss absorption mechanism. Our measure of the loss absorption mechanism indicates any change in Bloomberg's listing. The "write-down to conversion" identifies a bank that issued a write-down immediately before the collapse and then a conversion immediately after. Likewise, "conversion to write-down" reflects the opposite change.

Table 10 shows the share of banks that changed their contractual terms, both in the entire universe of issuers from Bloomberg, and in the sample of banks from the analysis above. All banks in the sample changed their coupon payments, and over a fifth altered their loss absorption mechanism in the first CoCo issued after March 2023. Less than half of banks that changed their CoCos' loss absorption mechanism switched to the other major mechanism. Of the 33 banks with loss absorption mechanism changes, only 5 that formerly used conversions now use write-downs. Six banks that formerly used a write down now have a loss absorption mechanism listed as "Equity Conversion/Write Down." An assessment of contracts from one bank (Swedbank) reveals that this combined language is identical to that of an equity conversion.

Only six banks in the universe of dual-issuer banks adjusted their trigger levels. Of these, four increased and two decreased the trigger level. Within the sample of banks that issued bonds in both periods, every bank with available coupon data changed the coupon offered on the bond. The average increase from these banks is over 66 basis points between the last bond issued before March 2023, and the first bond issued after.

We compare these changes for individual bonds to the aggregate statistics of instruments issued before and after March 15, 2023. We restrict our window to bonds issued after January 1, 2020, to have roughly even windows on both sides. Table 11 contains statistics covering the overall groups.

The two groups of bonds are generally similar. In terms of amount issued for a single bond, the more recently issued bonds are slightly larger, on average. Their current yields as of Janunary 2026, on average, are almost identical. For those two measures, our simple t-tests do not provide us with evidence of any statistically significant difference across the two issuance periods, as seen in Table 11. Other aspects, including the trigger level issued and the coupon offered for a given bond, have changed. The average trigger level has decreased from just over 5.7 percent to 5.54 percent and CoCo coupons have increased, on average, from 6.33 to 6.88 percent.

### 4.2 Contractual Changes and Performance During March 2023

To better understand whether certain banks altered their terms in response to the Credit Suisse event, we regress measures of contractual changes on measures of a bank's performance during March 2023. We focus on changes to three contract terms: coupons, trigger levels, and loss absorption mechanisms. [4] We construct an aggregate indicator *ContractualChanges* by summing up whether banks that issued CoCos before and after March 15 made each change, where each of the three contract terms gets counted as a "1." For example, a bank that adjusted its coupon and trigger level, but not its loss absorption mechanism, would be labeled a "2." The index ranges from 0 to 3. On the right-hand side, we focus on the bank's abnormal returns generated by the market adjusted model on March 15. We also include the difference in default probability calculated using CDS spreads. Like the regressions in section 3, we include various controls and country fixed effects.

A bank's performance during March 2023 can provide at least some evidence of whether a bank will change its terms, as seen in Table 12. In one specification, column 1, the negative coefficient indicates that banks with lower abnormal returns implemented more contractual changes. In column 3, which includes all controls and country fixed effects, the coefficient is still negative, though not statistically significant. The signs on the CDS results tell a less conclusive story. The positive coefficients on *CDS* in columns 4 and 5 suggest that banks with larger increases in their default probability in March 2023, indicating they are weaker than their peers, may have made more contractual changes, although none of the estimated coefficients are statistically significant. [5]

### 4.3 Issuer Characteristics Post-Credit Suisse Collapse

Aside from asking whether the bonds themselves changed, a related question is whether the banks that continued to issue CoCos after the failure of Credit Suisse are similar to the banks that issued

[4] We treat the instrument's coupon as a non-price terms because although the coupon affects the bond's price, the price will change over time while the coupon must be determined prior to issuance.

[5] We also tested the same specifications, using the measure of contractual change, controls, fixed effects, with a Poisson regression. The coefficients were largely of similar direction and magnitude, although the coefficient in column 1 became less significant.

CoCos prior. There are many reasons why a bank might continue to issue CoCos or hold off, and the statistics of the two groups could point to changing dynamics in the market.

We perform the comparison by regressing issuance on our measures of bank characteristics. We use two measures of issuance. First, we calculate the natural logarithm of the total amount issued by a bank in each quarter (columns 1 through 4). Second, we use an indicator variable for whether a bank issued CoCos in a given quarter, starting in 2023 Q2 (column 5).

$$\text{CoCo Issuance}_{i,t} = \alpha + \beta\ BankControls_{i,t} + \varepsilon_{i,t} \tag{8}$$

The results are shown in Table 13. We find that the predictors of issuance have largely remained similar since before March 2023, and the recently issuing banks are not necessarily stronger than prior issuers. After March 2023, issuers still tend to be larger, but we do not observe that liquidity, returns on assets, or capital ratios become stronger predictors of issuance.

Furthermore, we observe that the location of CoCos issuers have changed. We compare the "country share" of total issuance before and after March 15, 2023, as measured by the bank's country of headquarters variable in LSEG. Table 14 contains the number of bonds and total amount issued in each country during the two periods, as well as the relative share for each country.

The results show a shifting geography. China went from being the largest source of CoCos issued, to practically exiting from the market—specifically, going from over 19 percent to almost zero percent in terms of the total dollar amount of issuance. Chinese banks went from issuing 35 CoCos to only issuing one. Similarly, banks in India went from issuing almost 12 percent of individual instruments to issuing less than 3 percent.

On the other side, Japan has become a larger source of issuance, going from 8 and a half percent to over 16 percent of issuance in terms of total dollar amounts. Banks from European countries have also *increased* their issuance share. Banks from the United Kingdom, France, Spain, Germany, Italy, Norway, and Austria have all taken up a larger share of the CoCos market. Turkish banks have also increased their issuance. Interestingly, banks from Switzerland also increased their share despite the collapse of Credit Suisse. In sum, we see that issuance remains widespread in Europe.

## 5 Conclusion

In the post-Global Financial Crisis era, regulators around the world allowed for the issuance of CoCos to strengthen the resilience of banks and prevent taxpayers from shouldering the bill the next time a large, systemically important bank collapsed. Using the financial panic in March 2023 as a quasi-natural experiment, we show that banks which had more CoCos on their balance sheets did not have better market outcomes or better stability outcomes. In fact, the banks with more

CoCos appear to have fared worse in response to the collapse of Credit Suisse. With respect to the change in the CoCos market, newly issued CoCos have generally kept the same contractual terms in the aftermath of the panic. What's different are issuer characteristics. New issuers do not appear to be as liquid, on average, and they are more geographically concentrated in Europe, which is a cautionary sign for the next time CoCos are triggered to boost an ailing bank.

There are at least a few less than fully resolved issues that we intend to tackle in the future. While we have used the collapse of Credit Suisse as a quasi-natural experiment, like all event studies, whether the Credit Suisse collapse was indeed a "shock" to the market can be debated. Nonetheless, given the robustness of our results, we can be more confident that the market was indeed responding to the Credit Suisse shock. Another issue is that of selection on unobservables: whether the results are driven by the inherent weakness of banks that are not captured by the observables. Although we have tried to tackle this issue as much as we can—and our findings are consistent with the existing research—we intend to uncover more granular data to more accurately control for selection in follow-up research. Finally, the changes in the composition of banks before and after the Credit Suisse failure present an interesting problem. In order to better appreciate where these changes are coming from, we intend to conduct more research on banking policies at the country level.

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# Appendix A: Figures and Tables

Figure 1: CoCo Bonds Issued Per Year

This figure plots the total amount of CoCo bonds issued per year, measured by aggregated principal amount in billions of USD. The sample includes bonds classified as Additional Tier 1 (AT1) capital under Basel III. Data source: Bloomberg.

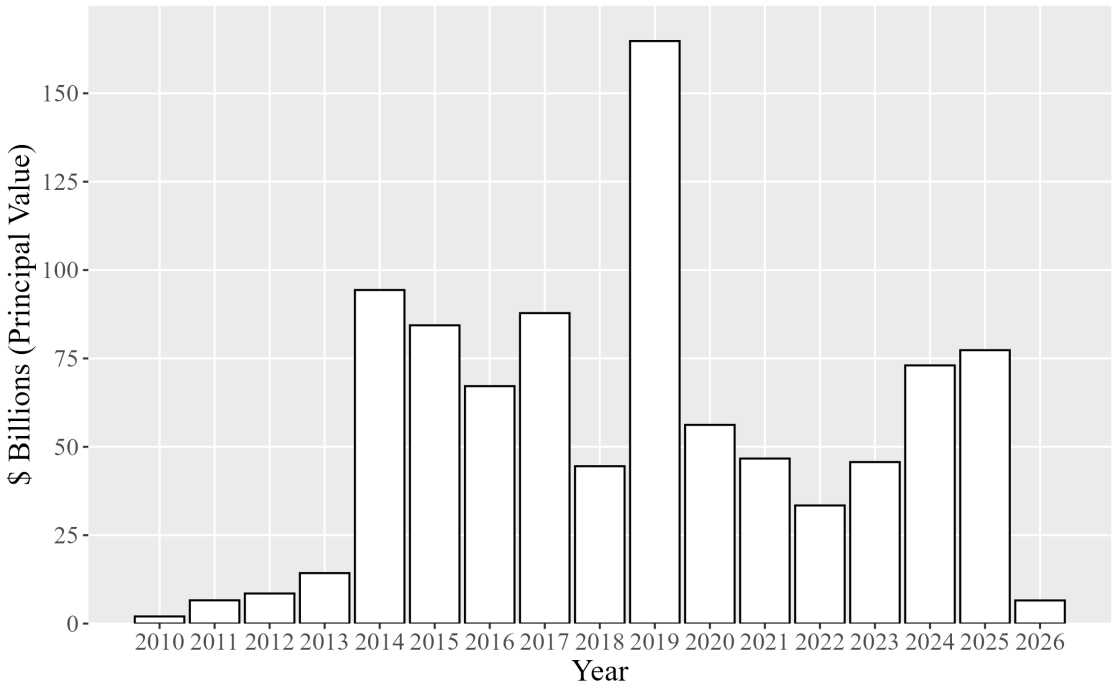


Figure 2: Bank Stock Price Correlation with Credit Suisse

This figure presents the distribution of correlations between individual bank stock returns and Credit Suisse stock returns. Correlations are computed using daily returns over the sample period. The distribution illustrates the degree of commonality in stock price movements between Credit Suisse and other banks in the sample. Data source: LSEG.

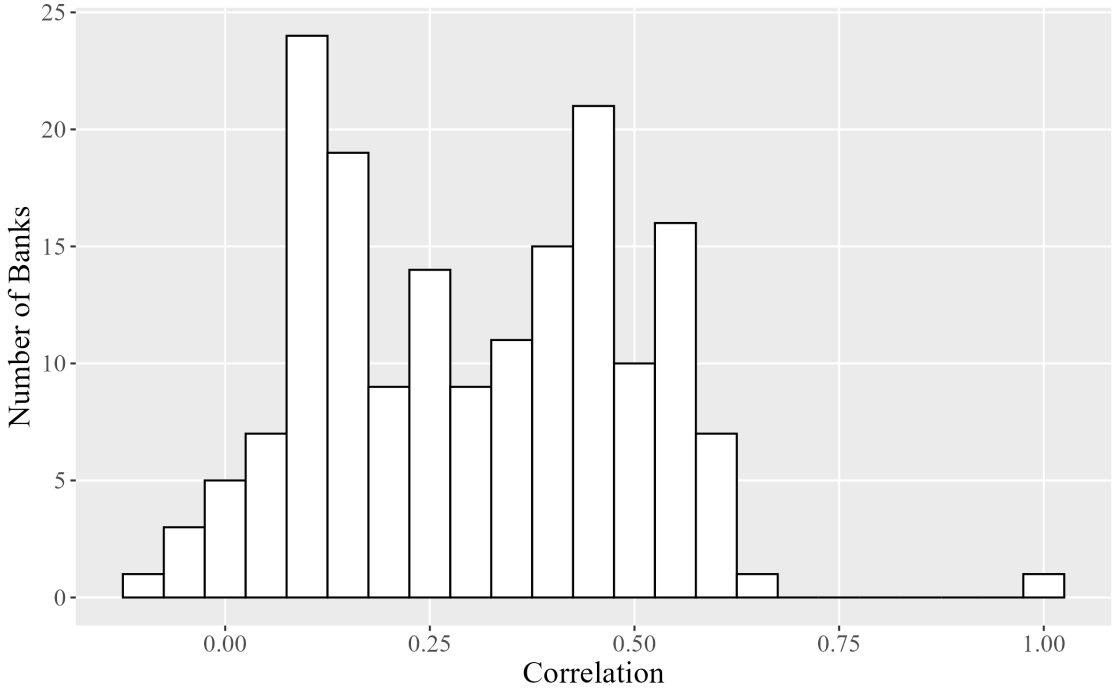


Figure 3: Coefficient of Interest Estimated Across March 2023

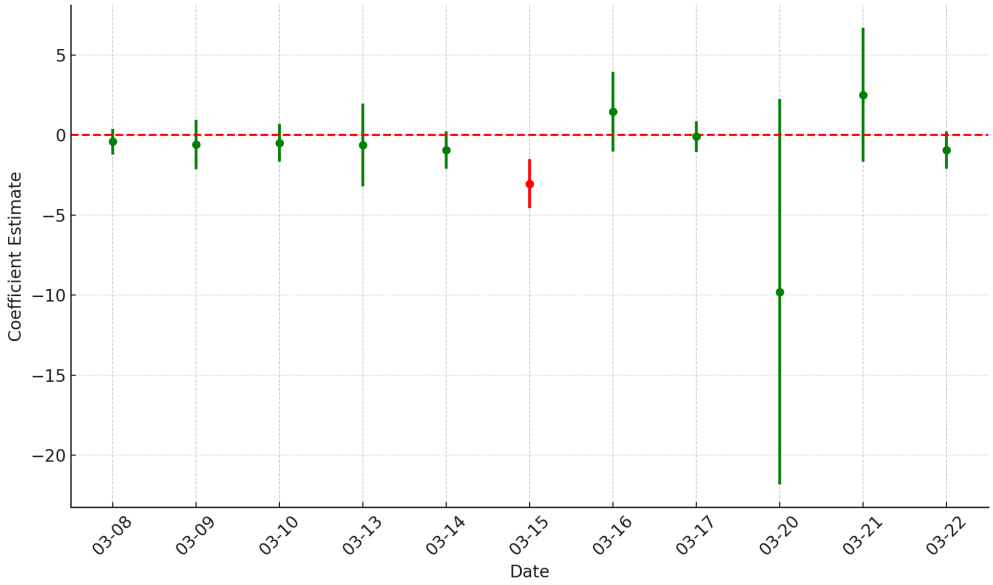


Figure 4: Average CDS-Implied Default Probability

This figure plots the daily average five-year CDS-implied default probability across banks in the sample from February to April 2023. Vertical red lines indicate key events during the March 2023 banking crisis: March 10 (Silicon Valley Bank stock collapse), March 15 (Credit Suisse CDS spike), and March 20 (UBS acquisition of Credit Suisse announced). Default probabilities are derived from CDS spreads using standard recovery rate assumptions. Data source: Bloomberg.

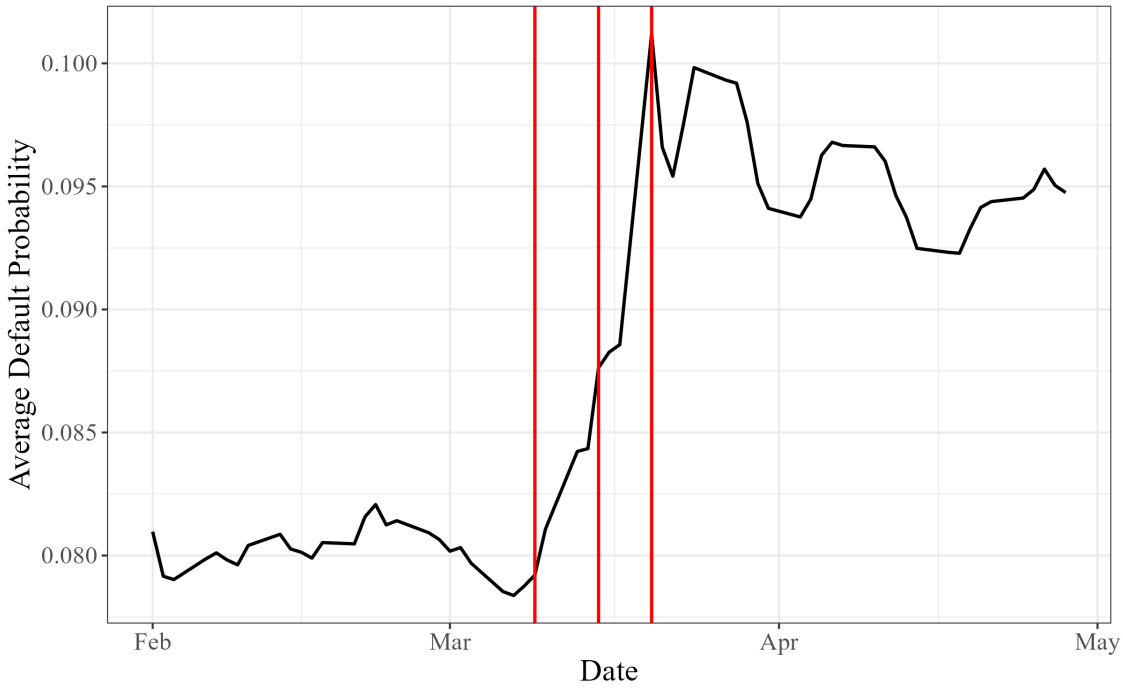


Figure 5: CDS-Implied Default Probabilities: U.S. vs. Non-U.S. Banks

This figure compares the daily average five-year CDS-implied default probability for U.S. banks (dashed line) versus non-U.S. banks (solid line) from February to April 2023. Vertical red lines indicate key crisis events: March 10, March 15, and March 20. The figure illustrates the divergent default risk dynamics between U.S. and international banks during the crisis, with U.S. banks experiencing a sharper increase in perceived default risk following the regional bank failures. Data source: Bloomberg.

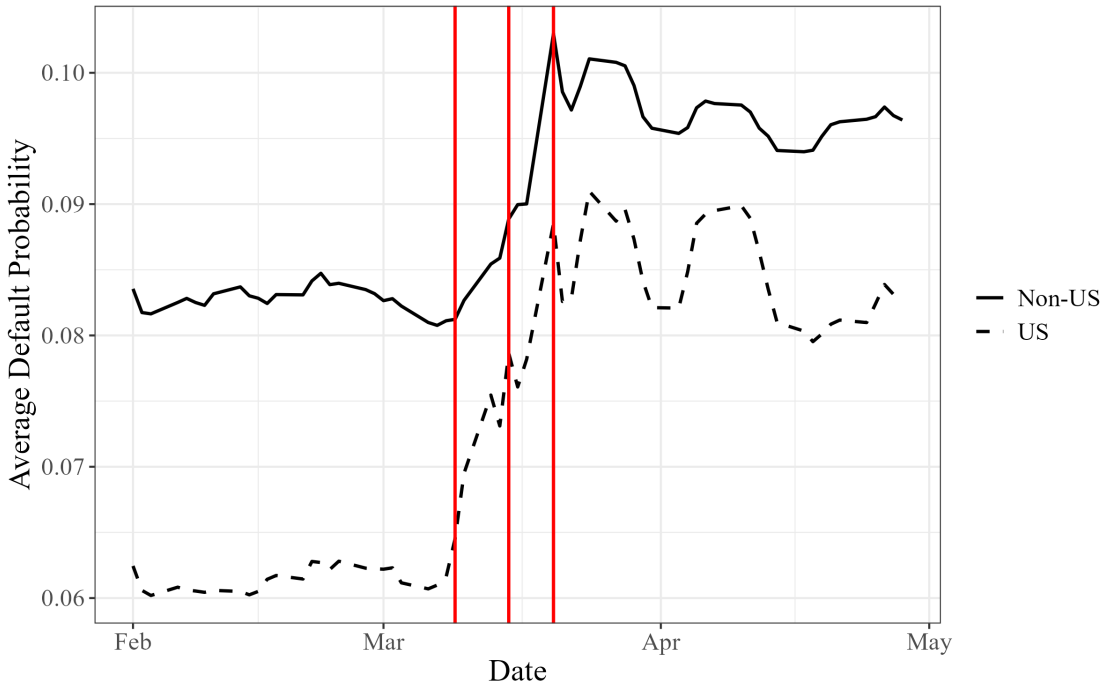


Table 1: CoCo Summary by Region, Loss Absorption Mechanism, Trigger, and G-SIB Status

This table reports the distribution of CoCo bond issuance by region and by characteristic. Values are in billions of USD, with the number of instruments in parentheses. Loss absorption mechanisms are broken down by write-down, conversion, and unspecified mechanisms. Trigger categories are based on contractual thresholds. Bank status distinguishes G-SIBs and non-G-SIBs, and is based on designations from the Financial Stability Board. Bond-level data comes from Bloomberg, and the bank country of headquarters information comes from LSEG .

| **Region** | **Loss Absorption Mechanism** | | | **Trigger** | | | | **Bank Status** | | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|
| | Write-Down | Conversion | Unspecified | All Levels | $\leq$ 5.125 | $>$ 5.125 | Not Specified | G-SIB | Non-G-SIB | |
| Advanced economies | 263.7 | 235 | 27.3 | 522.2 | 317.1 | 205.1 | 3.8 | 317 | 209 | 526 |
| | (480) | (210) | (33) | (722) | (520) | (202) | (1) | (261) | (462) | (723) |
| Euro area | 143.9 | 79.9 | 0.1 | 220.1 | 198.3 | 21.8 | 3.8 | 120.9 | 102.9 | 223.9 |
| | (163) | (72) | (2) | (236) | (209) | (27) | (1) | (98) | (139) | (237) |
| Non-euro area Europe | 20.6 | 10.2 | 0.1 | 30.9 | 24.2 | 6.7 | 0 (0) | 0 (0) | 30.9 | 30.9 |
| | (186) | (20) | (2) | (208) | (186) | (22) | | | (208) | (208) |
| Switzerland | 42.5 | 17.8 | 0.5 | 60.8 | 11.8 | 49 | 0 (0) | 53.9 | 6.9 | 60.8 |
| | (56) | (16) | (1) | (73) | (23) | (50) | | (46) | (27) | (73) |
| United Kingdom | 1.4 | 125.7 | 0.6 | 127.7 | 0 (0) | 127.7 | 0 (0) | 88.5 | 39.3 | 127.7 |
| | (2) | (100) | (1) | (103) | | (103) | | (63) | (40) | (103) |
| Non-European AEs | 55.2 | 1.4 | 26.1 | 82.7 | 82.7 | 0 (0) | 0 (0) | 53.7 | 29 | 82.7 |
| | (73) | (2) | (27) | (102) | (102) | | | (54) | (48) | (102) |
| Emerging market econ. | 219.5 | 164.1 | 3.6 | 387.1 | 323.2 | 63.9 | 0.1 | 66.3 | 320.9 | 387.2 |
| | (580) | (81) | (21) | (681) | (460) | (221) | (1) | (13) | (669) | (682) |
| Emerging Asia | 99.8 | 34.7 | 0.7 | 135.3 | 106.7 | 28.6 | 0 (0) | 66.3 | 69 | 135.3 |
| | (151) | (13) | (5) | (169) | (53) | (116) | | (13) | (156) | (169) |
| Other EMEs | 119.7 | 129.3 | 2.9 | 251.8 | 216.5 | 35.3 | 0.1 | 0 (0) | 251.9 | 251.9 |
| | (429) | (68) | (16) | (512) | (407) | (105) | (1) | | (513) | (513) |
| Total | 483.2 | 399 | 31 | 909.3 | 640.3 | 269.1 | 3.9 | 383.3 | 529.9 | 913.3 |
| | (1060) | (291) | (54) | (1403) | (980) | (423) | (2) | (274) | (1131) | (1405) |

Table 2: Bank Summary Statistics (as of 2022 Q4)

This table presents summary statistics for banks in our sample as of 2022 Q4, separated by CoCo issuance status. The top panel reports statistics for banks that have issued CoCo bonds, while the bottom panel reports statistics for non-issuers. Variables include total assets, CET1 capital ratio, leverage ratio, cash-to-assets ratio, debt ratio, return on assets (ROA), and stock-market correlation. The correlation measure is computed as the correlation between daily bank stock returns and a broad market index over the sample period. Amount issued represents total CoCo issuance in USD billions. Bank-level data comes from LSEG, bond issuance data from Bloomberg, and G-SIB designations from the Financial Stability Board.

| | | Banks | | | Total Assets (USD bn) | | | CET1 | Lev. | Cash/ | Debt | ROA | Corr. | Amt. Issued |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Panel | Region | Total | G-SIB | Non-G-SIB | Avg | Min | Max | (%) | (%) | Assets (%) | Ratio | (%) | | (USD bn) |
| Issuers | Euro area | 36 | 6 | 30 | 485.65 | 4.71 | 2850.76 | 6.31 | 5.97 | 10.18 | 0.14 | 0.22 | 0.45 | 223.87 |
| | Non-euro Europe | 57 | 0 | 57 | 46.65 | 0.25 | 545.66 | 7.69 | 7.45 | 5.30 | 0.22 | 0.43 | 0.29 | 35.47 |
| | Switzerland | 10 | 2 | 8 | 201.73 | 8.25 | 1104.36 | 6.65 | 5.04 | 14.80 | 0.23 | 0.27 | 0.51 | 60.81 |
| | United Kingdom | 12 | 3 | 9 | 670.48 | 3.21 | 2949.29 | 12.09 | 5.99 | 12.04 | 0.23 | 0.16 | 0.47 | 127.75 |
| | Non-European AEs | 8 | 3 | 5 | 1101.48 | 77.11 | 2985.18 | 4.81 | 5.10 | 20.21 | 0.28 | 0.12 | 0.13 | 82.72 |
| | Emerging Asia | 44 | 5 | 39 | 753.97 | 0.87 | 5742.93 | 9.24 | 6.85 | 7.45 | 0.11 | 0.28 | 0.13 | 137.67 |
| | Other EMEs | 6 | 0 | 6 | 108.31 | 1.75 | 186.43 | 9.36 | 7.80 | 4.97 | 0.15 | 0.39 | 0.28 | 3.40 |
| | **Total** | 173 | 19 | 154 | 421.05 | 0.25 | 5742.93 | 7.97 | 6.50 | 8.58 | 0.18 | 0.30 | 0.30 | 671.68 |
| Non-Issuers | United States | 17 | 7 | 10 | 1027.72 | 182.91 | 3665.74 | 8.12 | 7.35 | 8.43 | 0.13 | 0.24 | 0.39 | 0.00 |
| | Non-European AEs | 22 | 2 | 20 | 653.98 | 188.18 | 1729.93 | 5.98 | 5.44 | 10.26 | 0.16 | 0.23 | 0.23 | 0.00 |
| | Emerging Asia | 10 | 0 | 10 | 525.56 | 10.33 | 1343.54 | 7.55 | 6.34 | 5.50 | 0.19 | 0.18 | 0.12 | 0.00 |
| | Other EMEs | 1 | 0 | 1 | 302.30 | 302.30 | 302.30 | 9.09 | 6.95 | 22.82 | 0.12 | 0.22 | −0.01 | 0.00 |
| | **Total** | 51 | 9 | 42 | 748.33 | 10.33 | 3665.74 | 7.09 | 6.54 | 8.94 | 0.16 | 0.23 | 0.26 | 0.00 |
| Grand Total | | 224 | 28 | 196 | 494.43 | 0.25 | 5742.93 | 7.77 | 6.51 | 8.66 | 0.17 | 0.29 | 0.29 | 671.68 |

Table 3: Relationship between CoCos and Abnormal Returns (Three-Factor Model)

This table presents results on CoCos and bank performance surrounding the collapse of Credit Suisse. The dependent variable is the bank's abnormal return from the WRDS U.S. daily event study tool, using March 15, 2023 as the event day with a $[0, 0]$ window. CoCos/Assets is calculated as the total amount of CoCos issued by a bank divided by its total assets as of 2022 Q4. Correlation refers to the correlation between the issuer's equity price and Credit Suisse's share price in 2022. Balance-sheet characteristics are from LSEG and are as of 2022Q4 and have been winsorized at the 1st and 99th percentiles. Issuers are identified using the Organization Permanent ID in LSEG. Country fixed effects are based on the bank's country of headquarters. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| *CoCos/Assets* | -2.275*** | -2.273*** | -2.097*** | -1.934*** | -2.342*** | -1.670** | -3.628 |
| | (0.626) | (0.628) | (0.679) | (0.627) | (0.504) | (0.750) | (3.119) |
| *Log(Assets)* | | -0.001 | -0.000 | 0.000 | -0.002 | -0.001 | 0.004 |
| | | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) | (0.005) |
| *Cash/Assets* | | | -0.059* | -0.053 | -0.050 | -0.076 | -0.052 |
| | | | (0.032) | (0.036) | (0.044) | (0.050) | (0.075) |
| *ROA* | | | | 2.253 | 5.474* | 5.286* | 6.043 |
| | | | | (3.898) | (2.894) | (2.889) | (4.628) |
| *CET1/Assets* | | | | | -0.508** | -0.567** | 0.041 |
| | | | | | (0.228) | (0.223) | (0.657) |
| *Correlation* | | | | | | -0.039 | -0.038 |
| | | | | | | (0.028) | (0.115) |
| Country F.E. | No | No | No | No | No | No | Yes |
| N | 62 | 62 | 62 | 60 | 53 | 53 | 53 |
| $R^2$ | 0.204 | 0.205 | 0.228 | 0.235 | 0.383 | 0.403 | 0.700 |

Table 4: Relationship between CoCos and Abnormal Returns (Three-Factor Model) with Tier 1 Capital Control

This table replicates the main specifications of Table 3 using Tier1/Assets in place of CET1/Assets as the regulatory capital control. The dependent variable is the three-factor (FF3F) market-adjusted abnormal return on March 15, 2023. Abnormal returns are sourced from the Wharton Research Data Service. Standard errors are clustered at the country level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

| | (1) | (2) | (3) |
|---|---|---|---|
| *CoCos/Assets* | −2.194*** | −1.674** | −4.482 |
| | (0.479) | (0.736) | (2.771) |
| *Log(Assets)* | −0.001 | −0.001 | 0.004 |
| | (0.002) | (0.003) | (0.005) |
| *Cash/Assets* | −0.055 | −0.071 | −0.023 |
| | (0.037) | (0.046) | (0.067) |
| *ROA* | 4.948* | 4.923* | 5.927 |
| | (2.763) | (2.814) | (4.579) |
| *Tier1/Assets* | −0.484** | −0.482** | 0.370 |
| | (0.183) | (0.198) | (0.547) |
| *Correlation* | | −0.030 | −0.043 |
| | | (0.025) | (0.112) |
| Country F.E. | No | No | Yes |
| $R^2$ | 0.372 | 0.387 | 0.706 |
| $N$ | 57 | 56 | 56 |

Table 5: Relationship between CoCos and Abnormal Returns (Market Adjusted Model)

This table presents results on CoCos and bank performance surrounding the collapse of Credit Suisse. The dependent variable is the bank's abnormal return from the WRDS Market-Adjusted model daily event study tool, using March 15, 2023 as the event day with a $[0, 0]$ window. CoCos/Assets is calculated as the total amount of CoCos issued by a bank divided by its total assets as of 2022 Q4. Balance-sheet characteristics are from LSEG and are as of 2022 Q4 and are winsorized at the 1st and 99th percentile. Correlation refers to the correlation between the issuer's equity price and Credit Suisse's share price in 2022. Issuers are identified using the Organization Permanent ID in LSEG. Country fixed effects are based on the bank's country of headquarters. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| *CoCos/Assets* | -4.814** | -6.513*** | -6.648*** | -7.757*** | -8.678*** | -6.244*** | -6.763** |
| | (1.915) | (1.849) | (1.846) | (2.060) | (2.468) | (2.199) | (3.155) |
| *Log(Assets)* | | -0.022*** | -0.023*** | -0.024*** | -0.022*** | -0.020*** | -0.016** |
| | | (0.004) | (0.004) | (0.004) | (0.005) | (0.005) | (0.007) |
| *Cash/Assets* | | | -0.055 | 0.047 | 0.039 | -0.030 | 0.182 |
| | | | (0.103) | (0.110) | (0.122) | (0.099) | (0.152) |
| *ROA* | | | | 0.149 | 5.935 | 5.749 | 17.636* |
| | | | | (3.090) | (4.002) | (3.885) | (10.229) |
| *CET1/Assets* | | | | | 0.605 | 0.027 | -0.744 |
| | | | | | (0.430) | (0.434) | (0.670) |
| *Correlation* | | | | | | -0.308*** | -0.427*** |
| | | | | | | (0.043) | (0.098) |
| Country F.E. | No | No | No | No | No | No | Yes |
| N | 225 | 225 | 224 | 185 | 156 | 155 | 155 |
| $R^2$ | 0.085 | 0.277 | 0.293 | 0.315 | 0.400 | 0.544 | 0.726 |

Table 6: Baseline Model of Abnormal Returns with Varying Conversion Types

This table presents results on CoCos and bank performance surrounding the collapse of Credit Suisse with added variables for the CoCo conversion type. The dependent variable is the bank's abnormal return from the WRDS Fama–French Three Factor model daily event study tool, using March 15, 2023 as the event day with a $[0, 0]$ window. CoCos/Assets is calculated as the total amount of CoCos issued by a bank prior to 2022 Q4 divided by the bank's total assets as of 2022 Q4. Balance-sheet characteristics are from LSEG and are as of 2022 Q4 and have been winsorized at the 1st and 99th percentiles. Country fixed effects are based on the bank's country of headquarters. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *CoCos/Assets* | -3.628 | | | |
| | (3.119) | | | |
| *Conversion CoCos/Assets* | | -5.310** | | -5.521* |
| | | (2.563) | | (2.739) |
| *Write-down CoCos/Assets* | | | -0.862 | -1.525 |
| | | | (2.505) | (2.349) |
| *Log(Assets)* | 0.004 | 0.005 | 0.003 | 0.005 |
| | (0.005) | (0.005) | (0.005) | (0.005) |
| *Cash/Assets* | -0.052 | -0.051 | -0.086 | -0.046 |
| | (0.075) | (0.067) | (0.061) | (0.071) |
| *ROA* | 6.043 | 8.474* | 5.855 | 7.949* |
| | (4.628) | (4.228) | (5.155) | (4.535) |
| *CET1/Assets* | 0.041 | 0.021 | -0.241 | 0.076 |
| | (0.657) | (0.551) | (0.550) | (0.611) |
| *Correlation* | -0.038 | -0.077 | -0.094 | -0.060 |
| | (0.115) | (0.086) | (0.110) | (0.102) |
| Country F.E. | Yes | Yes | Yes | Yes |
| N | 53 | 53 | 53 | 53 |
| $R^2$ | 0.700 | 0.715 | 0.676 | 0.719 |

Table 7: Relationship between CoCos and Probability of Default

This table presents results on CoCos and bank performance surrounding the collapse of Credit Suisse with added variables for the CoCo conversion type. The dependent variable is the daily default probability derived from spreads on default probability calculated for the 5 Year tenor for Senior Unsecured Debt, the default tier. CDS data comes from Markit CDS, sourced via the Wharton Research Data Service. Balance-sheet characteristics are from LSEG and are as of 2022 Q4 and have been winsorized at the 1st and 99th percentiles. Issuers are identified using the Organization Permanent ID in LSEG. Country fixed effects are based on the bank's country of headquarters. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| *Post* | 0.022*** | 0.022*** | 0.022*** | 0.022*** | 0.022*** | 0.022*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) |
| *Post* × *NonUS* | -0.011* | -0.100*** | -0.101*** | -0.129*** | -0.140*** | -0.142*** |
| | (0.006) | (0.032) | (0.032) | (0.040) | (0.044) | (0.044) |
| *Post* × *NonUS* × *CoCos/Assets* | 0.627* | 0.715** | 0.712** | 0.865** | 0.901** | 0.730* |
| | (0.342) | (0.324) | (0.310) | (0.402) | (0.405) | (0.366) |
| *Log(Assets)* | | 0.003*** | 0.003*** | 0.004*** | 0.005*** | 0.004*** |
| | | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) |
| *Cash/Assets* | | | 0.025 | 0.025 | 0.018 | 0.021 |
| | | | (0.025) | (0.026) | (0.024) | (0.023) |
| *ROA* | | | | 0.713* | 1.198** | 1.112** |
| | | | | (0.387) | (0.573) | (0.551) |
| *CET1/Assets* | | | | | -0.120 | -0.031 |
| | | | | | (0.112) | (0.103) |
| *Correlation* | | | | | | 0.015 |
| | | | | | | (0.011) |
| Country F.E. | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 73 | 73 | 73 | 67 | 61 | 61 |
| $R^2$ | 0.480 | 0.506 | 0.508 | 0.518 | 0.516 | 0.521 |

Table 8: Determinants of CoCo Issuance before March 2023

This table presents results on CoCos issuance and bank characteristics prior to the collapse of Credit Suisse in March 2023. The dependent variable for columns 1 through 4 is the bank's amount of CoCos issued in a quarter. The dependent variable for column 5 is a dummy variable for whether the bank issued CoCos in a given quarter. Country fixed effects are based on the bank's country of headquarters. US banks are excluded from all specifications. Standard errors are clustered at the bank level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| *Log(Assets)* | 0.360*** | 0.366*** | 0.504*** | 0.721*** | 0.034*** |
| | (0.034) | (0.034) | (0.051) | (0.089) | (0.004) |
| *Cash/Assets* | | 3.409*** | 4.966*** | 4.990** | 0.255** |
| | | (0.897) | (1.299) | (2.037) | (0.101) |
| *ROA* | | | 16.876 | 85.718 | 4.517 |
| | | | (24.759) | (53.754) | (2.777) |
| *CET1/Assets* | | | | -4.191 | -0.276 |
| | | | | (7.183) | (0.367) |
| Country F.E. | Yes | Yes | Yes | Yes | Yes |
| Quarter F.E. | Yes | Yes | Yes | Yes | Yes |
| N | 13,262 | 12,885 | 7,975 | 3,452 | 3,452 |
| $R^2$ | 0.070 | 0.072 | 0.093 | 0.108 | 0.102 |

Table 9: Abnormal Returns at Issuance by Bank Characteristics before March 2023

This table presents cumulative abnormal returns (CARs) for CoCo bond issuers, broken down by quartile of bank characteristics. CARs are estimated using a market-adjusted model over the $[-7, 0]$ window, extending seven days prior to the issuance date to capture pre-announcement price drift, following Avdjiev et al. (2020). Banks are assigned to high and low quartiles for each balance sheet characteristic measured as of the quarter of issuance. Only CoCos issued before March 15, 2023 are considered. The T-statistic and p-value are from a two-sample $t$-test comparing the high and low quartile groups. Abnormal returns are from WRDS; balance sheet data are from LSEG.

| Variable | High Quartile Mean | $N$ | Low Quartile Mean | $N$ | T-Stat | P-Value |
|---|---|---|---|---|---|---|
| *Log(Assets)* | 0.0046 | 134 | 0.0048 | 134 | -0.0563 | 0.9552 |
| *ROA* | -0.0013 | 117 | 0.0098 | 118 | -1.4850 | 0.1390 |
| *CET1/Assets* | 0.0074 | 85 | 0.0079 | 86 | -0.0763 | 0.9393 |
| *Cash/Assets* | 0.0033 | 131 | 0.0067 | 132 | -0.6102 | 0.5423 |

Table 10: Summary of Observable Contractual Term Changes

This table presents a summary of contractual changes in CoCo bonds issued before and after March 15, 2023. The analysis includes only banks that issued bonds both before and after that date. "First Post" compares the last CoCo issued before that date to the first CoCo issued after. "Any Post" captures any change observed across all post-collapse issuances relative to the last pre-collapse bond. "All Banks" includes all CoCo issuers meeting the dual-issuance criterion, while "Sample Banks" restricts to banks with sufficient data for inclusion in our regression sample. Data source: Bloomberg.

| | **All Banks** | | | | **Sample Banks** | | | |
|---|---|---|---|---|---|---|---|---|
| | First Post | | Any Post | | First Post | | Any Post | |
| Type of Change | N | % | N | % | N | % | N | % |
| Trigger Level | 6 | 4.5 | 6 | 4.5 | 2 | 2.5 | 2 | 2.5 |
| Coupon | 134 | 100 | 134 | 100 | 79 | 100 | 79 | 100 |
| Loss Absorption Mechanism | 24 | 17.9 | 33 | 24.6 | 18 | 22.8 | 25 | 31.6 |
| Write-Down → Conversion | 5 | 3.7 | 6 | 4.5 | 4 | 5.1 | 5 | 6.3 |
| Conversion → Write-Down | 3 | 2.2 | 5 | 3.7 | 2 | 2.5 | 4 | 5.1 |

Table 11: Bond Characteristics by Issuance Period

This table presents summary statistics for CoCo bonds issued before and after March 15, 2023, along with two-sample t-tests comparing the two periods. The pre-period includes bonds issued between January 1, 2020 and March 14, 2023; the post-period includes bonds issued on or after March 15, 2023. Amount Issued is reported in millions of USD. CoCo Trigger Level is the CET1 ratio threshold (in percent) at which the bond converts or writes down. Years to First Call measures the time from issuance to the first call date. Data source: Bloomberg. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

| | Issued 1/1/2020 – 3/14/2023 | | | | | Issued on/after 3/15/2023 | | | | | T-Test | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | N | Mean | SD | Min | Max | N | Mean | SD | Min | Max | T Stat | P Value |
| Amount Issued ($m) | 327 | 465.5 | 509.6 | 0.6 | 2820.0 | 384 | 484.8 | 481.1 | 1.3 | 2000.0 | −1.42 | 0.155 |
| CoCo Trigger Level | 326 | 5.70 | 0.89 | 3.25 | 8.00 | 384 | 5.54 | 0.96 | 1.00 | 13.00 | 2.17 | 0.030** |
| Coupon (%) | 318 | 6.33 | 2.45 | 0.85 | 13.75 | 384 | 6.88 | 2.43 | 1.79 | 14.96 | −0.96 | 0.339 |
| Years to First Call | 326 | 5.89 | 1.63 | 4.50 | 11.98 | 382 | 6.15 | 1.82 | 5.00 | 14.99 | −3.36 | 0.001*** |

Table 12: Aggregate Indicator of Contractual Changes

This table presents results from analysis of bank performance during March 2023 and our aggregate measure of contractual changes. The dependent variable is *ContractualChanges*, which takes into account changes in loss absorption mechanism, coupon, or trigger level. Abnormal returns are based on the Market Adjusted Model and are sourced from the Wharton Research Data Service. CDS is the daily default probability derived from spreads on default probability calculated for the 5 Year tenor for Senior Unsecured Debt, the default tier. CDS data comes from Markit CDS, sourced via the Wharton Research Data Service. The other measures are our standard measures of bank characteristics and are measured as of the quarter of issuance. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| *AbnormalReturns* | −1.149** | −0.956 | −1.458 | | | |
| | (0.521) | (0.926) | (1.368) | | | |
| *CDS* | | | | 8.504 | 7.353 | −2.397 |
| | | | | (8.713) | (10.334) | (15.912) |
| *Log(Assets)* | | −0.021 | −0.026 | | 0.020 | 0.027 |
| | | (0.045) | (0.059) | | (0.149) | (0.136) |
| *ROA* | | 49.458 | 81.756 | | −75.890 | −61.417 |
| | | (55.229) | (59.478) | | (60.170) | (198.111) |
| *Correlation* | | 0.361 | −0.210 | | 0.363 | 2.785 |
| | | (0.522) | (0.958) | | (0.485) | (2.381) |
| *Cash/Assets* | | 2.834*** | 1.616 | | 2.762** | 2.077 |
| | | (0.822) | (1.230) | | (1.326) | (2.054) |
| *CET1/Assets* | | −3.214 | −2.166 | | 2.916 | 10.793 |
| | | (2.386) | (3.566) | | (8.078) | (11.622) |
| Country F.E. | No | No | Yes | No | No | Yes |
| N | 80 | 71 | 71 | 35 | 34 | 34 |
| $R^2$ | 0.070 | 0.216 | 0.480 | 0.060 | 0.192 | 0.590 |

Table 13: Determinants of CoCo Issuance Before and After March 2023

The dependent variable is Log(CoCos) for columns (1)–(4) and (6)–(9), and a binary indicator for CoCo issuance in columns (5) and (10). Banks headquartered in the US are dropped. Standard errors are clustered at the bank level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

| | Pre (2020–2022 Q4) | | | | | Post (2023 Q2+) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| *Log(Assets)* | 0.559*** | 0.571*** | 0.725*** | 0.643*** | 0.030*** | 0.719*** | 0.736*** | 0.995*** | 0.884*** | 0.041*** |
| | (0.069) | (0.070) | (0.103) | (0.133) | (0.007) | (0.108) | (0.108) | (0.184) | (0.242) | (0.012) |
| *Cash/Assets* | | 0.051 | -0.768 | -1.899 | -0.062 | | 4.887* | 6.188 | 9.508 | 0.461 |
| | | (1.594) | (2.669) | (3.319) | (0.172) | | (2.543) | (5.095) | (7.761) | (0.381) |
| *ROA* | | | -86.032 | -113.730 | -4.871 | | | -61.094 | -200.811 | -9.169 |
| | | | (56.234) | (128.448) | (6.704) | | | (117.887) | (218.859) | (11.078) |
| *CET1 / Assets* | | | | -5.003 | -0.368 | | | | -9.116 | -0.702 |
| | | | | (12.071) | (0.631) | | | | (20.583) | (1.060) |
| Num. Obs. | 3,325 | 3,220 | 2,148 | 1,312 | 1,312 | 1,878 | 1,832 | 959 | 587 | 587 |
| $R^2$ | 0.094 | 0.097 | 0.123 | 0.138 | 0.130 | 0.114 | 0.118 | 0.151 | 0.208 | 0.202 |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Table 14: CoCo Issuance by Country: Pre vs. Post

This table summarizes CoCo bond issuance by the issuing bank's country of headquarters, comparing issuance before and after the Credit Suisse collapse on March 15, 2023. "Pre" refers to bonds issued before 2023 Q2, and "Post" refers to bonds issued from 2023 Q2 onward. Total Amount is reported in billions of USD. Number of Bonds (%) and Total Amount (%) represent each country's share of total issuance in the respective period. The "Other" category aggregates issuance from countries not listed individually. Bond-level data comes from Bloomberg, and bank country of headquarters information comes from LSEG.

| | Number of Bonds | | Total Amount ($ bil) | | Number of Bonds (%) | | Total Amount (%) | |
|---|---|---|---|---|---|---|---|---|
| Country | Pre | Post | Pre | Post | Pre | Post | Pre | Post |
| China | 35 | 1 | 119.643 | 0.071 | 3.543 | 0.261 | 19.450 | 0.038 |
| United Kingdom | 85 | 38 | 103.721 | 32.474 | 8.603 | 9.922 | 16.861 | 17.451 |
| Japan | 51 | 53 | 52.653 | 29.798 | 5.162 | 13.838 | 8.559 | 16.013 |
| Switzerland | 69 | 19 | 48.858 | 17.010 | 6.984 | 4.961 | 7.942 | 9.141 |
| France | 44 | 17 | 48.776 | 18.830 | 4.453 | 4.439 | 7.929 | 10.119 |
| Spain | 45 | 16 | 44.134 | 16.686 | 4.555 | 4.178 | 7.175 | 8.967 |
| Netherlands | 28 | 8 | 27.302 | 6.504 | 2.834 | 2.089 | 4.438 | 3.495 |
| India | 117 | 10 | 27.114 | 3.452 | 11.842 | 2.611 | 4.408 | 1.855 |
| Italy | 39 | 16 | 24.053 | 10.711 | 3.947 | 4.178 | 3.910 | 5.756 |
| Germany | 39 | 15 | 20.593 | 10.660 | 3.947 | 3.916 | 3.348 | 5.728 |
| Sweden | 43 | 20 | 10.473 | 2.648 | 4.352 | 5.222 | 1.703 | 1.423 |
| Ireland | 18 | 5 | 7.840 | 2.948 | 1.822 | 1.305 | 1.274 | 1.584 |
| Denmark | 32 | 6 | 7.137 | 1.052 | 3.239 | 1.567 | 1.160 | 0.565 |
| Norway | 186 | 73 | 6.516 | 2.519 | 18.826 | 19.060 | 1.059 | 1.354 |
| Austria | 27 | 8 | 6.474 | 5.124 | 2.733 | 2.089 | 1.052 | 2.754 |
| Portugal | 3 | 1 | 4.788 | 0.434 | 0.304 | 0.261 | 0.778 | 0.233 |
| Turkey | 2 | 13 | 0.850 | 5.800 | 0.202 | 3.394 | 0.138 | 3.117 |
| Other | 125 | 64 | 54.220 | 19.367 | 12.652 | 16.710 | 8.814 | 10.407 |

## Appendix B: Additional Baseline Results

Table B1: Baseline Model of Abnormal Returns without Credit Suisse in the Sample

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| *CoCos/Assets* | -1.283** | -1.419** | -1.262** | -1.294** | -2.000** | -1.668** | -3.702* |
| | (0.631) | (0.605) | (0.608) | (0.611) | (0.762) | (0.782) | (2.020) |
| *Log(Assets)* | | -0.002 | -0.001 | -0.001 | -0.002 | -0.001 | 0.007 |
| | | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.006) |
| *Cash/Assets* | | | -0.062** | -0.056* | -0.047 | -0.072* | -0.147** |
| | | | (0.028) | (0.030) | (0.031) | (0.038) | (0.054) |
| *ROA* | | | | -0.066 | 0.446 | 0.742 | -1.860 |
| | | | | (0.787) | (0.955) | (0.970) | (3.421) |
| *CET1/Assets* | | | | | -0.320 | -0.363 | -0.041 |
| | | | | | (0.234) | (0.239) | (0.397) |
| *Correlation* | | | | | | -0.042 | -0.276 |
| | | | | | | (0.031) | (0.168) |
| Country F.E. | No | No | No | No | No | No | Yes |
| N | 59 | 59 | 59 | 56 | 54 | 54 | 54 |
| $R^2$ | 0.064 | 0.076 | 0.107 | 0.105 | 0.161 | 0.194 | 0.529 |

Table B2: Baseline Model of Abnormal Returns without U.S. Banks in the Sample

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| *CoCos/Assets* | -2.367*** | -2.405*** | -2.350*** | -2.404*** | -2.738*** | -2.117** | -4.654* |
| | (0.716) | (0.690) | (0.721) | (0.746) | (0.788) | (0.936) | (2.175) |
| *Log(Assets)* | | -0.001 | -0.001 | -0.002 | -0.002 | -0.002 | 0.014 |
| | | (0.002) | (0.002) | (0.003) | (0.003) | (0.002) | (0.011) |
| *Cash/Assets* | | | -0.028 | -0.016 | 0.011 | -0.018 | -0.073 |
| | | | (0.042) | (0.045) | (0.069) | (0.062) | (0.386) |
| *ROA* | | | | -0.157 | 0.338 | 0.608 | -7.611 |
| | | | | (1.056) | (1.715) | (1.138) | (4.291) |
| *CET1/Assets* | | | | | -0.430 | -0.465 | 0.259 |
| | | | | | (0.263) | (0.307) | (0.939) |
| *Correlation* | | | | | | -0.033 | -0.202 |
| | | | | | | (0.035) | (0.153) |
| Country F.E. | No | No | No | No | No | No | Yes |
| N | 43 | 43 | 43 | 40 | 40 | 38 | 38 |
| $R^2$ | 0.233 | 0.241 | 0.245 | 0.246 | 0.246 | 0.363 | 0.749 |

Table B3: Baseline Model of Abnormal Returns with Propensity Score Matching, 3 Nearest Neighbors

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| *Average Treatment Effect of Holding CoCos* | -0.005<br>(0.009) | -0.008<br>(0.009) | -0.012<br>(0.011) | -0.010<br>(0.011) | -0.008<br>(0.012) |
| *Log(Assets)* | -0.251<br>(0.175) | -0.344*<br>(0.188) | -0.311<br>(0.198) | -0.368*<br>(0.223) | -0.381*<br>(0.229) |
| *Cash/Assets* | | 5.878<br>(3.817) | 6.182<br>(3.898) | 7.635*<br>(4.117) | 8.799**<br>(4.329) |
| *ROA* | | | -23.854<br>(106.098) | 56.196<br>(114.731) | 68.971<br>(114.706) |
| *CET1/Assets* | | | | -37.975**<br>(16.727) | -36.631**<br>(16.904) |
| *Correlation* | | | | | 10.808*<br>(6.319) |
| N | 60 | 60 | 57 | 55 | 55 |
| $R^2$ | 0.026 | 0.059 | 0.054 | 0.142 | 0.159 |

Table B4: Analysis of (FF3) Abnormal Returns and Various Regulatory Capital Measures

Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| *CoCos/Assets* | -1.953*** | -1.473 | -1.875*** | -2.998 | -1.933*** | -2.145 |
| | (0.682) | (2.904) | (0.562) | (2.656) | (0.566) | (3.201) |
| *Log(Assets)* | 0.000 | -0.003 | -0.001 | -0.002 | 0.000 | -0.002 |
| | (0.003) | (0.005) | (0.002) | (0.005) | (0.002) | (0.005) |
| *Cash/Assets* | -0.083 | -0.144 | -0.083* | -0.066 | -0.089* | -0.091 |
| | (0.054) | (0.107) | (0.042) | (0.069) | (0.046) | (0.103) |
| *ROA* | 1.042 | 1.879 | 2.643** | 0.981 | 2.751** | 2.171 |
| | (1.411) | (3.506) | (1.156) | (3.842) | (1.210) | (4.306) |
| *CET1/RWA* | 0.109 | 0.106 | | | | |
| | (0.105) | (0.241) | | | | |
| *Tier 1/Assets* | | | -0.448** | 0.574 | | |
| | | | (0.199) | (0.675) | | |
| *Capital/Assets* | | | | | -0.378** | 0.154 |
| | | | | | (0.172) | (0.709) |
| *Correlation* | -0.039 | -0.163 | -0.036 | -0.197 | -0.038 | -0.166 |
| | (0.032) | (0.130) | (0.025) | (0.127) | (0.025) | (0.117) |
| Country F.E. | No | Yes | No | Yes | No | Yes |
| N | 47 | 47 | 47 | 47 | 47 | 47 |
| $R^2$ | 0.364 | 0.792 | 0.427 | 0.798 | 0.421 | 0.789 |

Table B5: Analysis of Probability of Default and Various Regulatory Capital Measures

Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

| | (1) | (2) | (3) |
|---|---|---|---|
| *Post* | 0.022*** | 0.022*** | 0.022*** |
| | (0.005) | (0.005) | (0.005) |
| *Post × NonUS* | -0.169*** | -0.195*** | -0.207*** |
| | (0.040) | (0.045) | (0.045) |
| *Post × NonUS × CoCos/Assets* | 1.697** | 1.619** | 1.426* |
| | (0.749) | (0.740) | (0.735) |
| *Log(Assets)* | 0.005*** | 0.006*** | 0.006*** |
| | (0.001) | (0.001) | (0.001) |
| *Cash/Assets* | 0.041 | 0.033 | 0.042 |
| | (0.029) | (0.027) | (0.027) |
| *ROA* | 1.408* | 1.209 | 1.159 |
| | (0.827) | (0.815) | (0.820) |
| *CET1/RWA* | -0.046** | | |
| | (0.021) | | |
| *Tier 1/Assets* | | 0.018 | |
| | | (0.121) | |
| *Capital/Assets* | | | 0.055 |
| | | | (0.088) |
| *Correlation* | 0.007 | 0.006 | 0.015 |
| | (0.012) | (0.013) | (0.012) |
| N | 53 | 53 | 52 |
| $R^2$ | 0.560 | 0.554 | 0.558 |

## Appendix C: Examples of Contractual Term Changes

Despite the fact that most post-2023 CoCos closely resembling their pre-2023 counterparts, our analysis uncovered several banks that altered contractual terms. For example, one bank that changed its contractual terms is BNP Paribas. It is one of the largest European banks and a major issuer of CoCos. The most significant alteration was changing the loss absorption mechanism from a write-down to a conversion. All BNP Paribas CoCos issued prior to March 2023 used write-down mechanisms, and all CoCos issued since employ conversions.

BNP issued a CoCo on February 28, 2023 (ISIN: FR001400G6X6), just before Credit Suisse collapsed, with a write-down term:

> 6.1 Write-Down: If a Trigger Event occurs, the Issuer shall (i) immediately notify the Relevant Regulator of the occurrence of the Trigger Event, (ii) give a Write-Down Notice to Noteholders (in accordance with Condition 14 (Notices)) and the Principal Paying Agent, and (iii) irrevocably (without the need for the consent of Noteholders), reduce on the Write-Down Date the then Prevailing Outstanding Amount of each Note by the relevant Write-Down Amount (such reduction being referred to as a "Write-Down", and "Written Down" being construed accordingly).

Less than six months later, the bank issued another CoCo on August 14, 2023 (ISIN: US05565A5R02), but now with a conversion mechanism:

> 6.1 Conversion upon Trigger Event: (i) If a Trigger Event occurs, the Notes shall be converted, in whole and not in part, into new fully paid Ordinary Shares of the Issuer (the "Conversion Shares"), at the Conversion Ratio described in Condition 6.2 (Conversion Shares and Conversion Ratio) below, on the date specified in the Conversion Notice delivered in accordance with the procedures described in Condition 6.3 (Conversion Procedure) below as the date on which the Conversion shall take place (the "Conversion Date")...

The bank also had to pay a higher interest rate (coupon rate). The February 28th bond stated:

> The rate of interest for each Interest Period from (and including) the Issue Date to (but excluding) the First Call Date is 5.90 per cent. per annum.

CoCos issued six months later, by comparison, stated:

> The Notes will bear interest from (and including) the Issue Date to (but excluding) the First Call Date at the rate of 8.500% per annum...

In addition, all CoCos issued by BNP Paribas now include a substitution/variation provision which permits the bank to substitute all notes or vary the terms of the notes so they remain compliant AT1 securities.

> 7.5 Substitution/Variation: Following the occurrence of a Special Event, the Issuer may, at any time, without the consent of the Noteholders and subject to (i) the prior permission of the Relevant Regulator, if required, and (ii) having given no less than fifteen (15) nor more than forty-five (45) calendar days' notice to the Fiscal Agent and the Noteholders (in accordance with Condition 16 (Notices)) either (x) substitute new notes for the Notes whereby such new notes shall replace the Notes or (y) vary the terms of the Notes, so that the Notes may become or remain Compliant Securities.

BNP Paribas even altered the trigger event definition for its August issuance, effectively making it easier to trigger the CoCos:

> "Trigger Event" shall occur if, at any time, the Group CET1 Ratio is less than the Trigger Level;

> "Trigger Event" shall occur if, at any time, the Group CET1 Ratio is equal to or less than the Trigger Level;

## C.1 Individual Banks that Changed Certain Contractual Terms

Table C1: Banks that Changed between Write-down and Conversion Mechanisms

| CoCo Issuer | Old Mechanism | New Mechanism |
|---|---|---|
| *Alliance Islamic Bank Bhd* | Permanent Write Down | Equity Conversion/Write Down |
| *ASR Nederland NV* | Equity Conversion | Temporary Write Down |
| *AXA Bank Belgium SA* | Equity Conversion | Temporary Write Down |
| *BNP Paribas SA* | Temporary Write Down | Equity Conversion |
| *Coventry Building Society* | Equity Conversion | Equity Conversion/Write Down |
| *Gjensidige Forsikring ASA* | Permanent Write Down | Equity Conversion/Write Down |
| *Hong Leong Islamic Bank Bhd* | Equity Conversion/Write Down | Permanent Write Down |
| *Julius Baer Group Ltd* | Permanent Write Down | Equity Conversion |
| *Nationwide Building Society* | Equity Conversion | Equity Conversion/Write Down |
| *Swedbank AB* | Equity Conversion | Equity Conversion/Write Down |
| *UBS Group AG* | Permanent Write Down | Equity Conversion |

Table C2: Banks that Changed Trigger Levels

| Bank | Old Trigger | New Trigger |
|---|---|---|
| *Aareal Bank AG* | 7 | 5.125 |
| *Alliance Islamic Bank Bhd* | 5.125 | 5.75 |
| *AXA Bank Belgium SA* | 5.125 | 7.5 |
| *Skagerrak Sparebank* | 5.25 | 5.125 |
| *Storebrand Bank ASA* | 5.125 | 7.5 |