

Contingent Convertible (CoCo) Bond Issuance and Investors' Preference on European Banks

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Abstract

This study examines the investors' preference on the CoCo bond-issuing European banks in relation to the CoCo bond and issuing banks' characteristics. I find that investors mostly prefer the CoCo bonds to have low trigger level and equity conversion mechanism. Additionally, I find that the issuing banks are preferred to have low risk, undervaluation, high tier 1 capital ratio, good ethical behavior, but with high economic uncertainty. Therefore, the investors prefer the issuing bank to have low risk, undervaluation, good ethical behavior, and the CoCo bond not to convert while keeping the economic uncertainty high.

Keywords: CoCo bond, event study, issue announcements, placements

JEL Codes: G14, G18

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I. Introduction

A contingent convertible (CoCo) bond is a fixed-income security that provides coupon payments to investors until it converts into equity or suffers a write-down of its face value when the bank's capital level breaches a predetermined lower trigger threshold (De Spiegeleer et al., 2014). CoCo bonds have recently become one of the most commonly used financial solutions for satisfying the financial regulations strengthened by the Bank of International Settlements (BIS) and for protecting banks from insolvency. Consequently, CoCo bond issuance has been steadily increasing, with banks issuing \$450 billion in CoCo bonds globally from January 2009 to September 2015. In addition, the European Central Bank's October 2014 asset quality review (AQR) reported that CoCo bonds accounted for 32 billion Euros of the total of 92 billion Euros in new security issues from July 2013 to August 2014 (Avdjiev et al., 2015).

CoCo bonds add flexibility to banks' capital structures. Since they are typically treated as debt, they allow banks to take advantage of the benefits of debt financing. Then, when the lower trigger threshold is breached during a crisis period, the banks can quickly, easily and effectively convert the bonds into equity or write down their principles (Raviv, 2004; Flannery, 2005, 2009; Squam Lake Working Group, 2009; McDonald, 2013, Pennacchi et al., 2014; Avdjiev et al., 2015). Thus, CoCo bonds act as automatic bankruptcy protection devices, which may be positive news for investors. Regulators have advocated the use of CoCo bonds because they absorb losses without using taxpayers' money (De Spiegeleer et al., 2014). In addition, CoCo bonds constitute banks' tier 2 capital and add to its tier 1 capital for meeting Basel III requirements. For all of these reasons, banks are increasingly issuing CoCo bonds.

However, one of the main disadvantages of CoCo bonds is the high coupon rate the issuing firm must bear. CoCo bonds are also complex and their loss-absorbing capacity is insufficient (Admati et al., 2013; Avdjiev et al., 2015). Furthermore, the bonds suffer from pricing complexities, a high correlation with systematic economic events (Avdjiev et al., 2015) and potential shareholder dilution. It is possible that the relative advantages and disadvantages of CoCo bonds will generate equity market reactions. Given the increasing issuance of CoCo bonds, understanding these potential market reactions has recently become more important. I investigate the equity market reactions to CoCo bond issuance and their relations to the characteristics of CoCo bonds and their issuing banks.

There have been few event study literature on CoCo bond issuance. Avdjiev et al. (2015) and Vallee (2016) find a significantly negative credit default swap (CDS) spread reactions but an insignificant equity market reactions to CoCo bond issuance. However, they do not investigate the CoCo bond issue announcements' periods. Later on, Ammann et al. (2017) find that significant reductions in CDS spread in the CoCo bonds' post-issue announcements while discovering significantly positive equity market reactions in these periods. Liao et al. (2017) find significantly negative equity market reactions in these post-issue announcements contrary to Ammann et al. (2017) while showing different equity market reactions on each country level.

This study shows how the equity market reactions to CoCo bond issue announcements and placements are different depending on the CoCo bond-issuing European banks grouped by different characteristics and the CoCo bonds' properties. I find that the investors prefer the CoCo bond issuing banks to have low internal risks measured by leverage, implied CDS spread, and tier 1 capital ratio, but with high external risk, such as economic uncertainty, undervaluation, and good ethical behavior. Most of them also prefer the CoCo bonds to have low trigger level and equity conversion mechanism. The CoCo bond issuance indicates an increase in leverage, showing negative sign on the balance sheet (Avdjiev et al., 2015). Accordingly, investors tend to prefer CoCo bond-issuing banks to have low leverage, showing significantly positive CARs with low-leverage banks. Besides, low leverage also indicates low risk which can also be measured by implied CDS spread and tier 1 capital ratio where investors show the similar reactions to prefer low risk banks. However, they prefer the economic uncertainty to be high when the banks issue CoCo bonds which can otherwise be less useful even when compared to straight debt. A high Tobin's Q implies overoptimistic market valuation, which encourages the issuing banks' managers to satisfy this high expectation (Dong et al., 2012). It shows that the investors dislike overvalued (i.e. high Tobin's Q) banks when they issue CoCo bonds.

The trigger level and conversion mechanism are the most sensitive CoCo bond features to the investors. The low trigger level implies less likeliness of equity conversion of CoCo bonds so that the existing shareholders' stakes are less likely to be diluted. The preference of equity conversion mechanism over the principle write-down procedure indicates the investors' preference on non-discretionary bankruptcy protection and transparency of CoCo bonds which relates to their positive reactions towards the banks' good ethical behaviors.

II. Related Research and Hypothesis Development

Event Study Literature with Bonds

Numerous event studies have examined convertible bonds, straight bonds etc. However, to the best of my knowledge, there are four studies on market reactions to CoCo bond issuances. Avdjiev et al. (2015) and Vallee (2016) find that CoCo bond issuance reduces the CDS spread but has an insignificant effect on the equity prices of CoCo bond issuers. On the other hand, Ammann et al. (2017) and Liao et al. (2017) show mixed results finding significantly positive and negative equity market reactions, respectively. Most of the event studies on convertible bonds show negative abnormal returns on the issue dates¹. Dann and Mikkelsen (1984), Mikkelsen and Partch (1986) and Eckbo (1986) argue that convertible bond issuance conveys unfavorable firm information, generating an overpricing signal leading to negative abnormal returns. However, Fields and Mais (1991) assert that, unlike public placements of convertible bonds, private placements of convertible bonds convey favorable firm information, producing significant positive abnormal returns. Dutordoir et al. (2014) add that weak corporate governance quality within a firm increases the possibility of convertible bond issuances and that stockholder reactions to these announcements are relatively favorable. They argue that the convertible bond prevents both overinvestment and underinvestment incentives, which reduces the agency and adverse selection costs. Thus, the firms with weak corporate governance quality are relatively favorable to convertible bond issuances since they are regarded as substitutes for high quality governance mechanisms. There also exist several event studies on convertible bond calls. Bechmann et al. (2014) and Grundy et al. (2014) find significantly negative abnormal returns from in-the-money convertible bond call announcements. Bechmann et al. (2014) argue that in-the-money calls aim to force a conversion whose value is higher than the call payment to avoid redeeming the bond with cash later. They also find that the market reactions to in-the-money calls are not immediate and are slower than those of out-of-the-money calls. Accordingly, they conclude that negative market reactions to in-the-money calls are driven by short-selling from the arbitrageurs who purchase these called convertible bonds to eliminate their equity risk

¹ Convertible bond announcements or issuances have been shown to produce negative abnormal returns in the U.S. (Dann and Mikkelsen, 1984; Mikkelsen and Partch, 1986; Eckbo, 1986; Brick et al., 2007; Duca et al., 2012), the UK (Abhyankar and Dunning, 1999), France (Burlacu, 2000), Australia (Magennis et al., 1998) and Continental Europe (Ammann et al., 2006; Dutordoir and Van de Gucht, 2007). Only the Japanese market shows positive or neutral abnormal returns for the convertible bond issue (Kang et al., 1995; Christensen et al., 1996; Dutordoir et al., 2016).

exposure while waiting for the conversions. This is called the “pressure effect”. On the other hand, out-of-the money calls have significantly positive abnormal returns and immediate market reactions. This is a positive signal for investors, showing that firms are not avoiding bond redemptions by making early repayments, which can dilute existing shareholders. This is known as the “signaling effect”. Li et al. (2016) find that banks show less negative abnormal returns than non-banks following convertible bond offerings. They argue that since banks are heavily regulated, the market is less likely to interpret their convertible bond issuances as signals of firm overvaluation.

The evidence on market reactions to straight bond issuances is mixed. For example, Eckbo (1986), Shyam-Sunder (1991) and Howton et al. (1998) find that straight bond issuance has non-positive, zero and negative abnormal returns, respectively. However, Johnson (1995) argues that the market reaction to straight bond issue announcements are positive for firms with low growth and low dividend payouts. He also finds a significantly negative relation between cross-sectional share price response and dividend payouts. He argues that debt and dividends are substitutes, suggesting that straight bonds provide free cash flow or signaling benefits significant only for firms with low levels of substitutes. Chandra and Nayar (2008) find positive abnormal stock returns for private placements of straight non-bank bonds by publicly traded firms when the long-run stock price performance is lower than the benchmark. They argue that private debt is usually issued before the decline in a firm’s profitability and that such debt discloses over-optimistic information prior to its offering that does not benefit equity investors. In the international context, Dutordoir et al. (2016) find that Japanese convertible bonds have more favorable announcement effects than comparable bonds from other countries, such as Australia, Canada, France, Germany, the Netherlands, Switzerland, the UK and the U.S. They support this by arguing that Japanese disclosure standards require higher levels of detail on state uses of proceeds than U.S. standards.

CoCo Bond Literature

The extant literature on CoCo bonds is currently limited, but emerging. The existing CoCo bond literature has concentrated mostly on four main areas: developments, properties, designs and effects on firms and investors. The literature on CoCo bond developments discusses pre-versions of CoCo bonds that highly resemble CoCo bonds. With respect to pre-version models, Flannery

(2005) proposes a reverse convertible debenture (RCD) that automatically converts into common equity when the market capital ratio falls below a certain threshold, which is determined by the current share price. His work provides critical insight into market triggers as a mandatory conversion method, using stock prices as a tool for converting from bond to equity. Flannery (2009) proposes a contingent capital certificate that also uses the market trigger to convert debt into equity. Both of his works discuss a concept very similar to that of CoCo bonds. Raviv (2004) introduces a debt-for-equity swap (DES) contract that pays its holder a fixed payment upon maturity unless the bank's asset falls below a certain pre-determined conversion threshold; otherwise, it converts into common equity. Squam Lake Working Group (2009) suggests a regulatory hybrid security approach that remains long-term debt during normal periods and converts into equity when both the financial market and the issuing bank suffer financial distress. Glasserman and Nouri (2012) propose a contingent capital concept with a capital-ratio trigger with partial and on-going conversion. The capital ratio is based on accounting or book values designed to approximate regulatory capital requirements. The partial and on-going conversion process enables firms to convert just enough debt into equity to meet the regulatory capital requirements each time the capital ratio breaches the minimum threshold. Finally, Pennacchi et al. (2014) suggest the call option-enhanced reverse convertible (COERC) approach, which resembles a CoCo bond except that shareholders have the option to buy back converted shares from COERC investors at the bonds' par values.

Later, Albul et al. (2013) present the formal model of the CoCo bond, which starts the discussion on CoCo bond properties. They maintain that the CoCo bond provides most tax benefits as a straight debt, while offering the same protection as equity. This protection increases as the bond's conversion trigger level increases. The Squam Lake Group (Baily et al. 2013) stresses that financial authorities should encourage banks to issue CoCo bonds. In the Bank for International Settlements' (BIS) Quarterly Review, Avdjiev et al. (2013) provide an official explanation of a CoCo bond. They emphasize the importance of the trigger level (mechanical or discretionary)² and the loss-absorbing mechanism (conversion to equity or principal write down)³.

² Mechanical: conversion is automatically activated when the capital ratio falls below a pre-defined threshold.
Discretionary: conversion to equity is based on supervisors' judgement about the firm's solvency.

³ Conversion to equity: converts to equity at a pre-defined conversion rate.
Principal write-down: raises equity by incurring either a full or partial write-down.

In CoCo bond design-related research, Pennacchi (2010) argues that early conversion during financial distress minimizes the default risk at a lower cost. Himmelberg and Tsyplakov (2012) find that the principal write-down conversion method generates incentives for banks to have high leverage, increasing the cost of financial distress and the cost of capital compared to the equity conversion method. Koziol and Lawrenz (2012) suggest using devices together with CoCo bonds to control risk-shifting incentives to prevent manipulations of the bonds' risk control technologies and/or contracts. As another suggestion, Calomiris and Herring (2013) argue that banks should hold significant quantities of CoCo bonds and use market value triggers with 90-day moving average equity market values. Davis et al. (2014) test hypothetical CoCo bond data under three different trigger regime scenarios: a fixed-trigger regime, a regulator regime and a prediction-market regime⁴. They conclude that CoCo bonds have relatively fewer conversion errors and are less subject to manipulation under fixed-trigger and prediction-market regimes than under regulator regimes. McDonald (2013) suggests that the CoCo bond should use a dual trigger incorporating the firm's stock price and the financial institution's index as the determinants for its threshold. This approach simultaneously considers both micro and macro financial conditions. As another enhancement, Corcuera et al. (2014) propose a coupon cancellable contingent capital (Coca CoCo) bond, which cancels its coupon when a pre-defined barrier higher than the conversion barrier is breached. This discourages speculative short-selling activities and significantly reduces the death spiral effect⁵. Hilscher and Raviv (2014) argue that there is a conversion point at which shareholders become indifferent towards risk-taking⁶. Yang and Zhao (2014) introduce contingent capital, a contingent convertible security (CCS) that repeatedly converts between debt and equity depending on the firm's financial situation: that is, if the firm falls into (recovers from) recession, it converts from debt (equity) to equity (debt). Yang and Zhao (2015) enhance this CCS by incorporating an asset jump risk. This new type of CCS dynamically adjusts the firm's capital structure without incurring adjustment costs and does

⁴ Fixed-trigger regime: crossing a publicly known price threshold triggers a mandatory conversion.

Regulator regime: an imperfectly informed, but socially motivated regulator makes conversion decisions based on price.

Prediction-market regime: supplements the information available to agents (both regulators and traders) with traders' perceptions of the likelihood of a conversion (Davis et al., 2014).

⁵ The death spiral effect is the reinforced fall in stock price that forces investors to sell more shares when the stock price weakens (Corcuera et al., 2014).

⁶ A low conversion ratio, such that the CoCo transforms into equity in very low amounts, gives shareholders high incentives to increase risk. By contrast, a high conversion ratio, which converts CoCo into equity in large amount, forces shareholders to reduce risk (Hilscher and Raviv, 2014).

not suffer from debt overhang or risk-shifting incentive problems. Sundaresan and Wang (2015) prove that using market triggers is inappropriate because such triggers involve price uncertainty, market manipulation, inefficient capital allocation and frequent conversion errors with no unique equilibrium. Thus, regulators reacting to market prices may not gain the financial information they need, since their interventions themselves may affect firms' security prices (Birchler and Facchinetti, 2007; Bond et al., 2010; Davis et al., 2011).

Chen et al. (2013) investigate the effect side of CoCo bonds. They argue that CoCo bonds benefit the issuing firm if the conversion trigger is not set too low. However, when the CoCo bond-issuing firm takes excessive risk, promoting a debt-induced collapse, the CoCo bond can become junior straight debt and the equity value may suddenly drop. Avdjiev et al. (2015) insist that the contract design of a CoCo bond and the characteristics of the issuing firm are significantly deterministic for its effect. However, they argue that such bonds' beneficial effects on loss absorbency and risk-taking incentives are rather weak. On the other hand, Gründl and Niedrig (2015) advocate the benefits of CoCo bonds, stating that they are effective in reducing risk-shifting towards taxpayers and enhancing banks' stability. They add that the current Solvency II standard formula for market risk, which relies on highly crude risk weights, needs to improve because it fails to estimate the full risk of CoCo bonds. Song and Yang (2016) find that the risk-taking incentives and agency cost of debt increase if shareholders are allowed to choose their optimal CoCo bond conversion barriers by themselves. Contrarily, they also stress that the risk-taking incentives and agency cost of debt decrease if the CoCo bond has an exogenously imposed conversion barrier.

Hypotheses Development

These studies show that the design of the CoCo bond and the financial situation of its issuing bank determine the relative influences on the investors. Avdjiev et al. (2015) list three potential reasons for the insignificant equity market reaction to CoCo bond issuance, as follows:

- (1) CoCo bond issuance can suggest negative news about the issuing bank's balance sheet, although such issuance is less negative than equity issuance;
- (2) If investors perceive the trigger level of a CoCo bond to be too low to spark a conversion, the bonds may be seen as simply more leverage, resulting in an ambiguous effect on stock price. Thus, as the trigger level increases, the bankruptcy

protection increases (Albul et al., 2013), while the shareholders' risk-taking incentive decreases to avoid conversions; and

- (3) The terms of the CoCo bond contract (e.g., equity conversion or principal write-down provisions) can have different effects on existing shareholder dilution, thereby influencing the equity market.

In contrast, Ammann et al. (2017) show positive stock price reactions to CoCo bond issue announcements, since

- (1) CoCo bonds rank higher in the pecking order than equity benefiting its holders;
- (2) CoCo bonds enjoy favorable tax treatment, providing cost advantages over equity in most jurisdictions; and
- (3) CoCo bonds help to avoid debt overhang by reestablishing adequate capital ratios to attract investors again.
- (4) A reduction in CDS spread is expected since CoCo bonds reduce the bankruptcy probability of a bank with additional layer of capital and
- (5) CoCo bonds may reduce the risk-taking incentives of existing shareholders who are reluctant to have their stakes diluted by the new shareholders from CoCo bond equity conversions. Of course, the equity holders' risk-taking incentive may also increase if the CoCo bond is less likely to convert, while decreasing the default probability significantly. These two opposing situations depend highly on the CoCo bond design.

I develop my hypotheses regarding these thoughts of Avdjiev et al. (2015) and Ammann et al. (2017) based on the premise that banks have been issuing CoCo bonds mostly to satisfy the regulatory pressure to increase loss-absorbing capital. Firstly, I expect the CoCo bonds issued by banks with high risk are likely to induce negative equity market reactions leading to the following hypotheses based on leverage, implied CDS spread, and tier 1 capital ratio.

H1: The equity market reaction to the CoCo bond-issuing banks with low (high) leverage at the issue announcements and placements is significantly positive (not significantly positive).

H2: The equity market reaction to the CoCo bond-issuing banks with low (high) CDS spread at the issue announcements and placements is significantly positive (not significantly positive).

H3: The equity market reaction to the CoCo bond–issuing banks with high (low) tier 1 capital ratio at the issue announcements and placements is significantly positive (not significantly positive).

In relation to CoCo bonds' characteristics, I expect the investors prefer the CoCo bonds with high trigger level since it indicates increase in bankruptcy protections although it may also imply reduced shareholders' risk-taking behavior to avoid conversions.

H4: The equity market reaction to the CoCo bonds with high (low) triggers level at the issue announcements and placements is significantly positive (not significantly positive).

Additionally, I expect the CoCo bonds with equity conversion mechanism are more preferred by the investors than those with principle write-down procedures since the former is automatic and certain while the latter is subject to managers' discretion leading to increased uncertainties.

H5: The equity market reaction to the CoCo bonds with equity conversion (principle write-down) mechanism at the issue announcements and placements is significantly positive (not significantly positive).

Then I expect the CoCo bonds issued by the banks with high economic uncertainty and good ethical behavior to have positive equity market reactions. The economic uncertainty necessitates the reason behind CoCo bond issuance to protect against unexpected loss by the banks. A good ethical behavior of the banks are also preferred by the investors since it indicates managers are less likely to unnecessarily issue CoCo bonds and intentionally force equity conversion to manipulate the stock price for their own profit maximizations. In other words, the bank with unethical managers can speculate on stock trading by issuing CoCo bonds and intentionally converting into equity although unnecessary to make profits by sacrificing the existing shareholders' stakes.

H6: The equity market reaction to the CoCo bonds by banks under high (low) economic uncertainty at the issue announcements and placements is significantly positive (not significantly positive).

H7: The equity market reaction to the CoCo bonds by banks with good (bad) ethical behavior at the issue announcements and placements is significantly positive (not significantly positive).

I analyze the equity market reactions to CoCo bond issuance primarily focusing on the above seven hypotheses in this study.

III. Data and Methodology

I collect CoCo bond data from Bloomberg using the SRCH@COCO command as of November 1, 2016. This yields an initial sample of 386 CoCo bonds from all over the world. The total issuing countries and issue amounts as of November 1, 2016 are shown in Figures 1 and 2, respectively. As shown in Figure 1, the majority of CoCo bonds (with the exception of those issued by China) have been issued by European countries, which are my focus. Figure 2 shows the increasing issuance of CoCo bonds over time since the 2007/2008 global financial crisis.

Figure 1 Here

Figure 2 Here

Of the collected 386 CoCo bonds, 375 have loss-absorbing properties. Then, I confine my CoCo bond data to CoCo bonds issued by firms in Europe; this yields 288 CoCo bonds from 17 European countries, including the corresponding issuing firm tickers. Using these tickers, I collect the financial data including daily stock return with dividends, total assets, book values of equity, market values of equity, leverage, implied CDS spreads and tier 1 capital ratio. As for my economic uncertainty indicator, I collect the Global Economic Policy Uncertainty Index (<http://www.policyuncertainty.com/>) for the corresponding CoCo bond issue announcements and placements' dates to my sample. Then I collect the ethical behavior of firms' scores corresponding to each country from *The Global Competitiveness Report 2016-2017* (by Klaus Schwab and Xavier Sala-i-Martin) listed in the World Economic Forum website (<https://www.weforum.org/>) to measure the firms' ethical behaviors. I lag the accounting numbers by six months to avoid hindsight bias. However, the market value of equity, implied CDS spread, economic uncertainty index, and ethics score variables are the latest ones available

at the event date. I also collect the corresponding CoCo bond data, including issue announcement dates, placement dates, maturities, trigger levels, contract types (e.g., equity conversion or principal write-down) and amounts issued. All data are in U.S. dollars for consistency in analysis. However, not all CoCo bonds and issuing banks provide all corresponding financial data. Therefore, I discard CoCo bonds for which the corresponding issuing firms do not provide the necessary financial data and select only those CoCo bonds that have all financial data. I count multiple issue announcements or placements on the same date as one event. Then, I remove the CoCo bond data that include overlapping issue announcements and placements on the same date (15 issue announcements and 20 placements) to analyze only the pure, non-overlapping issue announcements and placements, since overlaps could contaminate the effects. Finally, I confine my data set to CoCo bonds issued by banks. Together, these steps yield a data set of 131 and 130 CoCo bonds from 14 European countries, for pure issue announcements and pure placements, respectively, from 96 and 93 different issuing banks, respectively. Table 1 shows the data description and Table 2 presents the summary statistics of the CoCo bonds and their issuing banks.

Table 1 Here

Table 2 Here

In Table 2, I exclude overlapping events between issue announcements and placements to perform an event study analysis using only pure issue announcements and placements. The European countries and corresponding market indices, the number of CoCo bonds and the number of banks in issue announcements and placements are shown in the following Table 3.

Table 3 Here

With these data, I use the traditional market model event study method as follows.

$$AR_{i,t}^{\text{market model}} = r_{i,t} - (\hat{\alpha}_{i,t} + \hat{\beta}_{i,t}r_{m,t}) \quad (1)$$

$$CAR_{i,t}^{\text{market model}} = \sum_{t=t_1}^{t_2} AR_{i,t}^{\text{market model}} \quad (2)$$

I run the regression over a period from -250 days to -10 days relative to each issue announcement and placement using the country-specific market return $r_{m,t}$ at time t and the total index return (percentage) $r_{i,t}$ of bank i at time t to derive the corresponding intercept $\hat{\alpha}_{i,t}$ and slope $\hat{\beta}_{i,t}$ for every event. The $r_{m,t}$ is always the country market return corresponding to each bank's return $r_{i,t}$. The times t_1 and t_2 specify the event windows in days. $AR_{i,t}^{\text{market model}}$ and $CAR_{i,t}^{\text{market model}}$ are the abnormal return and the cumulative abnormal return, respectively, for firm i at time t using the market model method.

I use three event windows, (-15, 5), (-15, -1) and (0, 5), to measure the CAR effects on the entire, pre, and post period of the event, respectively. These chosen event windows are followed by Avdjiev et al. (2015). According to Avdjiev et al. (2015), the bank's intention to issue CoCo bond is revealed to a small group of investors usually two weeks prior to the issuance and the value-relevant information (e.g. over-subscription status) is released at or shortly after the issuance. I run a one-sample two-tailed t-test using the mean, standard deviation and sample size of the CARs to test whether the CARs are significantly different from zero at the 90%, 95% and 99% confidence levels where I show them from Table 4 to 9 later on.

Then, I regress the CARs at the CoCo bond issue announcements and placements with respect to the bank and CoCo bond characteristics to analyze their relationships with the CARs.

$$\begin{aligned}
CAR_{(t_1,t_2)} = & \alpha_{(t_1,t_2)} + \beta_1 x_{(t_1,t_2), \text{maturity}} + \beta_2 x_{(t_1,t_2), \text{trigger level}} + \beta_3 x_{(t_1,t_2), \text{conversion method}} \\
& + \beta_4 x_{(t_1,t_2), \text{amount issued}} + \beta_5 x_{(t_1,t_2), \text{leverage}} + \beta_6 x_{(t_1,t_2), \text{Tobin's Q}} \\
& + \beta_7 x_{(t_1,t_2), \text{implied CDS spread}} + \beta_8 x_{(t_1,t_2), \text{tier 1 Capital ratio}} + \beta_9 x_{(t_1,t_2), \text{Economic Uncertainty}} \\
& + \beta_{10} x_{(t_1,t_2), \text{Ethics}} + u_{(t_1,t_2)}
\end{aligned} \tag{3}$$

I choose ten independent variables from the CoCo bond and bank characteristics data. $CAR_{(t_1,t_2)}$ refers to the CARs in the event window from time t_1 to t_2 . $x_{(t_1,t_2),j}$ is the independent variable in the event window (t_1, t_2) for variable j , which includes maturity, trigger level, conversion method, amount issued, leverage, Tobin's Q, implied CDS spread, tier 1 capital ratio, economic uncertainty, and ethics. The descriptions for these variables are provided in Table 1. β is the beta for each corresponding independent variable. $\alpha_{(t_1,t_2)}$ is the intercept and $u_{(t_1,t_2)}$ is the error term from the regression. All fall in the event window (t_1, t_2) . The linear least square or ordinary least

square (OLS) regressions are subject to distortions when outliers exist. Thus, I winsorize all the explanatory data at the 90th percentile 5% each for top and bottom.

IV. Empirical Results

I provide the CoCo bond event study results at the CoCo bond issue announcements and placements in three event windows, $(-15, 5)$, $(-15, -1)$ and $(0, 5)$, to measure the entire, pre, and post event periods, respectively. For this event study⁷, I use the issue announcements and placements that do not overlap on the same date. Avdjiev et al. (2015) and Vallee (2016) also find insignificant CARs at the aggregate level of CoCo bond placements; however, they do not provide an event study on CoCo bond issue announcements. The findings of Ammann et al. (2017) and Liao et al. (2017) are mixed, where they find significantly positive and negative equity market reactions, respectively, at the CoCo bond issue announcements. I find insignificant CARs at both the overall CoCo bond issue announcements and the placements (Table 4).

Table 4 Here

I rank the CoCo bond-issuing banks according to high and low levels in leverage, implied CDS spread, tier 1 capital ratio, economic uncertainty, and ethical behavior score. Then I find significant CARs from CoCo bond issue announcements and placements in either high or low ranked group of banks compared to their peers mostly apparent in the post event periods. This indicates that the value-relevant information release in the post event periods matters significantly more to the investors than the banks' intention-related information to issue CoCo bond released prior to the issue announcements and placements.

Leverage

In Table 5, as expected, the low and high leveraged banks show positive and negative CARs in the post periods, respectively. As mentioned earlier, CoCo bond issuance increases leverage, which is a negative sign on the balance sheets of the issuing banks (Avdjiev et al., 2015). Thus, investors tend to prefer the CoCo bond-issuing banks to have low leverage and vice versa.

⁷ I mostly discuss the event study results that show significantly strong CARs (i.e., p -values ≤ 0.05). Weakly significant CARs (i.e., $0.05 < p$ -values < 0.10) align almost exactly with strongly significant CARs, but I do not actively discuss these in this paper.

Therefore, I confirm my first hypothesis that investors prefer the CoCo bond issuing banks to have low risk in relation to their leverage level. This behavior is more apparent especially during the post periods of CoCo bond issuance. The investors apparently regard CoCo bond issuance itself as a sign of increase in leverage of the issuing banks.

Table 5 Here

Credit Risk

On the other hand, the investors show weak preference towards high credit risk banks during the post-issue announcements according to Table 6. However, the median CAR is negative and the number of negative CARs are greater than the positive ones. This indicates that several few CAR observations significantly raised the average CAR to be overall positive. Thus, the investors' preference towards low risk banks still weakly exists as shown in its 10% significance level while few strongly positive CARs raise the overall average CAR to be positive. However, the overall investors preference towards the CoCo bond issuing banks' credit risks is not significant enough. Their preference for low credit risk becomes more apparent in the later regression analysis.

Table 6 Here

Bank Capital

Tier 1 capital, which is bank capital, is another measure of risk in CoCo bond issuing banks. As expected, I find significantly positive CARs for high tier 1 capital ratio banks especially in the post-issue announcement periods as shown in Table 7. On the other hand, there is again weak preference towards banks with low tier 1 capital ratio in the post-placements. The financial regulation, particularly Basel III, officially regards CoCo bonds as tier 2 and additional tier 1 capital. However, according to this study, investors still prefer the banks to have sufficient bank capital (i.e. tier 1 capital) to absorb the unexpected losses although CoCo bond itself also suffices this role. Thus, the investors tend to perceive CoCo bond issuing banks with low risk (in relation to leverage, credit risk, and tier 1 capital ratio) positively in general as expected.

Table 7 Here

Economic Uncertainty

While the above shows that the investors dislike high internal risks measured by leverage, credit risk, and tier 1 capital ratio of the issuing banks, I find that the investors prefer these banks to have high external risks measured by the economic uncertainty index (Table 8). These are pronounced mostly at the entire and pre CoCo bond issue announcement periods. Thus, the information regarding banks' intention to issue CoCo bonds prior to announcements is more sensitive to the external risks rather than the internal ones which are mostly significant in the post-periods as shown before. In other words, the external risk are highly sensitive to both banks' issuance intention and (bank or CoCo bond's) value-relevant information while and internal risks are sensitive mostly to the latter.

Table 8 Here

Ethical Behavior

Furthermore, the investors tend to prefer the CoCo bond issuing banks to have good ethical behavior during the issue announcements and placements (Table 9). The CoCo bonds can be abused if the banks issue them for their own speculative purposes. For instance, the bank can support their short-selling activities by CoCo bond issuance and equity conversions to reduce the stock price further, which may damage the existing shareholders' stake and cause the death spiral effect explained earlier. This negative aspect can be amplified if the CoCo bond has a principle write-down rather than equity conversion mechanism.

Table 9 Here

Regression Analysis

I analyze the effects of the characteristics of issuing banks and CoCo bonds on the CARs for issue announcements and placements using ordinary least squares (OLS) regressions with the 90% winsorized data (Table 10). As previously discussed, I use maturity, trigger level, conversion method, issue amount, leverage, Tobin's Q, implied CDS spread, tier 1 capital ratio, economic uncertainty index, and ethics score for the independent variables and CARs from the

entire, pre, and post-issue announcements and placements for the dependent variables. I mostly regard the event study results that show significantly strong p-values (≤ 0.05) rather than the weakly significant ones.

In terms of CoCo bonds' characteristics, the trigger level mostly shows significantly negative relation to the CARs at the placement periods which contradicts with my hypothesis expectations. Thus, it can be inferred that the investors are more sensitive towards the negative aspect from increased risk-taking incentives by the banks, which may dilute the existing shareholders' stake, rather than the increased bank protection when the trigger level increases. The investors also tend to prefer the CoCo bonds to have equity conversion mechanism rather than principle write-down procedure mostly apparent at the post-placement periods. This confirms my expectation that the investors dislike the increased uncertainty arising from the managers' discretion from the principle write-down feature.

In relation to the CoCo bond issuing banks' characteristics, the overall directions tend to be consistent with my earlier findings. The investors prefer the banks to have low leverage, low Tobin's Q (undervaluation), low implied CDS spread (low credit risk), high tier 1 capital ratio (large bank capital), but with high economic uncertainty (high external risk). The investors show negative behavior towards overvalued (high Tobin's Q) banks issuing CoCo bonds. Overoptimistic market valuation (i.e., high Tobin's Q) of the banks encourages their managers to take actions to meet such expectations (Dong et al., 2012). The CoCo bond issuance is regarded as such actions to satisfy the overoptimistic market behavior, since it implies raising more capital and fortifying the bankruptcy protection, despite its high coupon rates and increase in leverage. The ethics score also tend to show positive relations to the CARs but are not significant enough according to this regression analysis. Overall, I find more significant results spread out across the entire periods except ethics score compared to the previous two tailed t-test CAR significance analyses. Then I investigate the multicollinearity problem using the variance inflation factor (VIF) test in Table 11. I find no multicollinearity issue since the VIF values for all regressions are below 5.

Table 10 Here

Table 11 Here

V. Conclusion

The issuance of CoCo bonds have increased with the regulatory pressure to boost the loss-absorbing capital but there have not been enough literature investigating the equity market reaction to CoCo bond issuance. This study reveals significantly positive and negative equity market reactions to CoCo bond issue announcements and placements when CoCo bond-issuing European banks are grouped by their characteristics and investigates the relationship with the CoCo bonds' features. The investors prefer the banks to have low internal risks (measured by leverage, implied CDS spread, and tier 1 capital ratio) while having high external risk (i.e. economic uncertainty), undervaluation (i.e. low Tobin's Q), and good ethical behavior. Furthermore, they prefer the CoCo bonds to have low trigger level to have lower probability of dilutions in the existing shareholders' stakes. They also prefer the CoCo bonds to have equity conversion mechanism to avoid any possible managers' abuse of CoCo bonds for their own speculative purpose, such as short-selling, rather than satisfying regulatory requirements. This behavior is reflected in their preference on CoCo bond issuing banks with good morality.

This study can enhance the understanding of investors' preference towards CoCo bonds and their issuing banks for the investors, banks, and regulators. The investors and banks can have a better chance of increasing their wealth by having more knowledge about equity market reactions to CoCo bond issuance in relation to the characteristics of CoCo bonds and the issuing banks. The regulators can better face the reality of CoCo bonds they are advocating and may improve the designs of CoCo bonds and the corresponding regulatory schemes accordingly.

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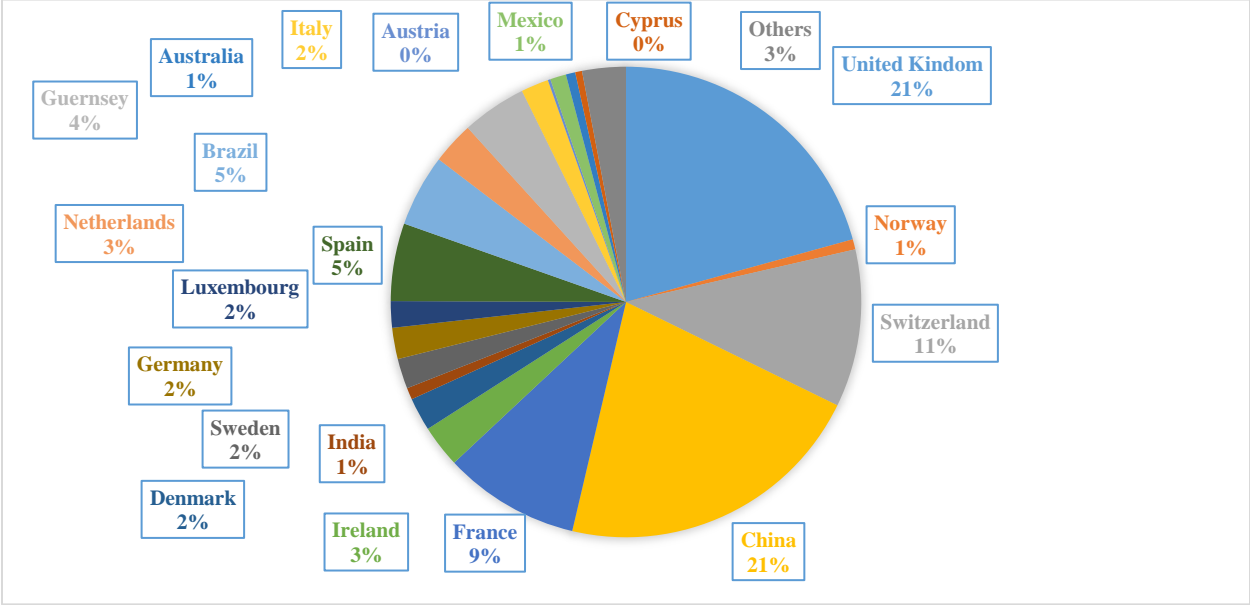
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Figure 1. CoCo Bond Issuing Countries.

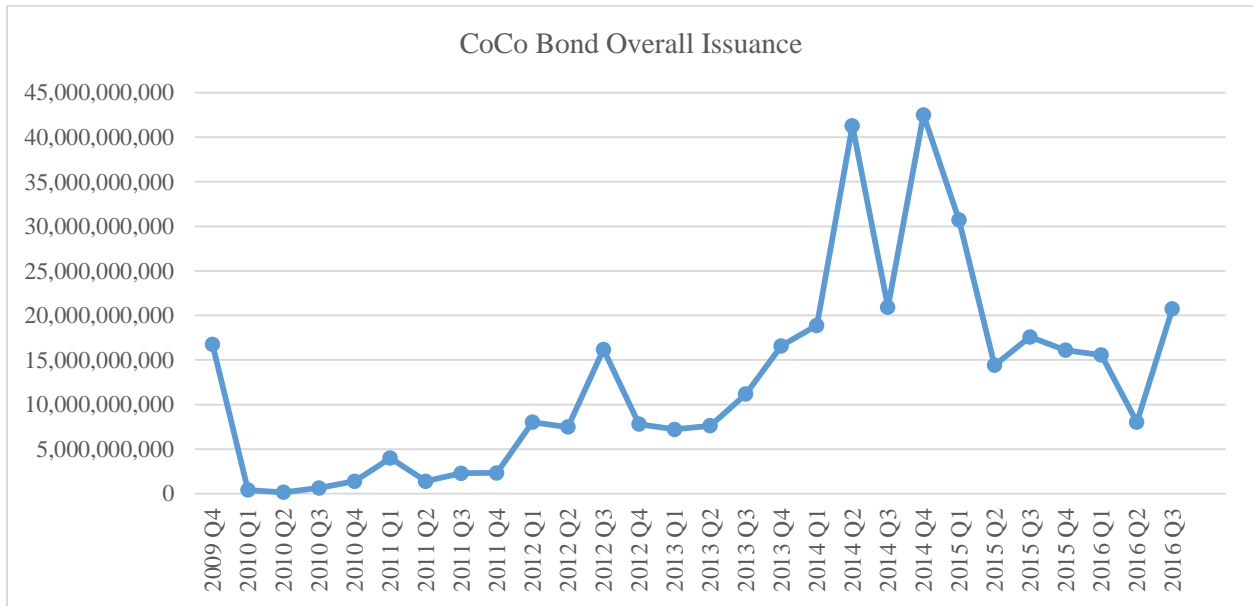
The following figure shows the CoCo bond issuing countries. The percentage for each country is that country's issue amount relative to the total issue amount as of November 1, 2016.



Source: Bloomberg

Figure 2. CoCo Bond Total Issue Amount.

The following figure shows the total CoCo bond issue amount as of the third quarter of 2016. Q denotes quarter, and issue amounts are in U.S. dollars.



Source: Bloomberg

Table 1. Data descriptions.

This table shows the descriptions of all variables used in this event study. Some variable descriptions are sourced from Bloomberg.

Daily stock returns including dividends (%)	It is a total return index for each bank's stock including gross dividends.
Maturity	Dummy variable that equals 1 in the event of perpetual maturity and 0 otherwise
Trigger level (%)	An accounting trigger, the common equity tier 1 (CET1) ratio ($=\frac{\text{common equity tier 1 capital}}{\text{risk-weighted assets}} \times 100$) or a solvency trigger based on a predetermined solvency ratio.
Contract type	Dummy variable that equals 1 in the event of equity conversion and 0 in the event of a permanent write-down, a partial permanent write-down, a temporary write-down etc.
Amount issued (U.S. \$)	Cumulative amount issued from the original security pricing date through to the current date for debt securities, denoted as U.S. dollars.
Total assets (million U.S. \$)	The total of all short- and long-term assets as reported on the balance sheet, denoted in million U.S. dollars.
Book value of equity (million U.S. \$)	Firm's total assets minus its total liabilities, denoted as million U.S. dollars.
Market value of equity (million U.S. \$)	Total current market value of all of a company's outstanding shares stated in the pricing currency, denoted as million U.S. dollars.
Leverage (%)	$\frac{\text{average total asset}}{\text{average total common equity}} \times 100$, where average is the average of the beginning period balance and the ending same-period balance.
Tobin's q	$\frac{\text{total asset} - \text{book value of equity} + \text{market value of equity}}{\text{total asset}}$, where only the market value of equity is the current value, while all other variables are six-month lagged ones.
Implied CDS spread (bps)	Five-year CDS spread for the company implied by the Bloomberg Issuer Default Risk Model Likelihood of Default. The unit is in basis points.
Tier 1 Capital Ratio (%)	The ratio of a bank's core equity capital to its total risk-weighted assets (RWA).
Economic Uncertainty Index	Global Economic Policy Uncertainty Index collected from http://www.policyuncertainty.com/ .

Firm's Ethical Behavior Score	The scores of "Ethical behavior of firms" collected from <i>The Global Competitiveness Report 2016–2017</i> (by Klaus Schwab and Xavier Sala-i-Martin) listed in the World Economic Forum website (https://www.weforum.org/).
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Table 2. Financial data for banks.

The following table shows the minimum (min), maximum (max), mean, median and number of samples (N) for data of CoCo bonds and their issuing banks in CoCo bond issue announcements and placements. These data include maturity, trigger level, conversion method, amount issued, total assets, book value of equity, market value of equity, leverage, implied CDS spread, tier 1 capital ratio, economic uncertainty index, and firm's ethical behavior score.

Panel A. Banks and CoCo Bonds' Data at Issue Announcements					
	Min	Max	Mean	Median	N
Event Dates	07/14/2010	09/07/2016			
Maturity	0.00	1.00	0.89	1.00	96
Trigger Level (%)	2.00	7.00	5.64	5.13	96
Conversion Method	0.00	1.00	0.33	0.00	96
Amount Issued (USD)	15.55	22.56	20.45	21.07	96
Total Asset (million U.S. \$)	6.78	14.83	12.99	13.81	96
Book Value of Equity (million U.S. \$)	4.42	12.21	10.13	10.94	96
Market Value of Equity (million U.S. \$)	3.23	12.23	9.89	10.65	96
Leverage (%)	7.58	46.54	19.83	18.69	96
Implied CDS Spread (bps)	45.00	427.00	119.50	99.50	96
Tier 1 Capital Ratio (%)	8.20	22.10	13.84	13.30	96
Economic Uncertainty Index	82.56	254.93	127.92	115.81	96
Firm's Ethical Behavior Score	3.50	6.70	5.30	5.60	96

Panel B. Banks and CoCo Bonds' Data at Placements					
	Min	Max	Mean	Median	N
Event Dates	07/21/2010	09/16/2016			
Maturity	0.00	1.00	0.88	1.00	93
Trigger Level (%)	2.00	7.00	5.63	5.13	93
Conversion Method	0.00	1.00	0.33	0.00	93
Amount Issued (USD)	15.98	22.56	20.53	21.11	93
Total Asset (million U.S. \$)	6.64	491605.33	13019.94	13.91	93
Book Value of Equity (million U.S. \$)	4.35	51969.92	1416.85	10.98	93
Market Value of Equity (million U.S. \$)	3.93	72634.33	1552.65	10.68	93
Leverage (%)	7.58	46.54	19.94	18.48	93
Implied CDS Spread (bps)	46.00	412.00	120.41	101.00	93
Tier 1 Capital Ratio	8.20	22.10	13.78	13.30	93
Economic Uncertainty Index	82.56	254.93	129.94	115.65	93
Firm's Ethical Behavior Score	3.50	6.70	5.28	5.60	93

Table 3. Market indices and corresponding European countries.

The following table shows the European countries and corresponding market indices, the number of CoCo bonds and the number of different banks for CoCo bond issue announcements and placements. All the event study data belong to these European market indices.

European Country	Market Indices	Issue Announcements		Placements	
		Number of Different Banks	Number of CoCo Bonds	Number of Different Banks	Number of CoCo Bonds
Austria	Vienna Stock Exchange Austrian Traded Index	3	3	3	3
Belgium	BEL 20 Index	1	1	1	1
Denmark	OMX Copenhagen 20 Index	6	7	6	7
France	CAC 40 Index	14	25	14	25
Germany	Deutsche Boerse AG German Stock Index DAX	4	6	4	6
Ireland	Irish Stock Exchange Overall Index	2	2	2	2
Italy	FTSE MIB Index	6	6	6	6
Netherlands	AEX-Index	1	2	1	2
Norway	Oslo Stock Exchange OBX Index	6	7	5	6
Russia	MICEX Index	4	6	4	6
Spain	IBEX 35 Index	11	11	11	11
Sweden	OMX Stockholm 30 Index	6	10	5	10
Switzerland	Swiss Market Index	16	20	16	20
United Kingdom	FTSE 100 Index	16	25	15	25
Total		96	131	93	130

Table 4. Overall CARs for CoCo bond issue announcements and placements.

The tables present the overall CARs for CoCo bond issue announcements and placements using three event windows of (-15, 5), (-15, -1) and (0, 5) with market model methodology. It shows the mean, median, standard deviation (std.), total number of CARs (N), t-value, number of positive CARs (+) and number of negative CARs (-). * Represents significance at the 10% significance level, ** represents significance at the 5% significance level and *** represents significance at the 1% significance level.

Panel A. Overall announcements CARs			
Event Windows	(-15,5)	(-15,-1)	(0,5)
Mean	-0.05%	-0.38%	0.32%
Median	0.01%	-0.23%	0.22%
Std.	7.14%	7.78%	3.79%
N	96	96	96
t-value	-0.07	-0.48	0.84
+	48	44	50
-	48	52	46

Panel B. Overall placements CARs			
Event Windows	(-15,5)	(-15,-1)	(0,5)
Mean	-0.90%	-0.33%	-0.58%
Median	-0.31%	-0.45%	-0.49%
Std.	7.29%	5.46%	3.73%
N	93	93	93
t-value	-1.19	-0.59	-1.50
+	46	42	39
-	47	51	54

Table 5. CARs for CoCo bond issuing banks with high/low leverage at issue announcements and placements.

The table presents the CARs of high/low leveraged banks at their CoCo bond issue announcements and placements using three event windows of (-15, 5), (-15, -1) and (0, 5) with market model methodology. It shows the mean, median, standard deviation (std.), total number of CARs (N), t-value, number of positive CARs (+) and number of negative CARs (-). * Represents significance at the 10% significance level, ** represents significance at the 5% significance level and *** represents significance at the 1% significance level.

Panel A. Issue announcements CARs for high/low leveraged banks						
Event Windows	(-15,5)		(-15,-1)		(0,5)	
	High	Low	High	Low	High	Low
Leverage	High	Low	High	Low	High	Low
Mean	-0.567%	0.427%	-0.030%	-0.701%	-0.537%	1.114%
Median	-1.169%	0.766%	-0.434%	-0.153%	-0.888%	0.495%
Std.	6.263%	7.890%	4.421%	9.961%	3.737%	3.696%
N	46	50	46	50	46	50
t-value	-0.614	0.382	-0.046	-0.497	-0.974	2.131**
+	20	28	21	23	20	30
-	26	22	25	27	26	20

Panel B. Placements CARs for high/low leveraged banks						
Event Windows	(-15,5)		(-15,-1)		(0,5)	
	High	Low	High	Low	High	Low
Leverage	High	Low	High	Low	High	Low
Mean	-1.180%	-0.624%	-0.140%	-0.526%	-1.041%	-0.132%
Median	-0.663%	0.778%	-0.478%	-0.453%	-0.798%	0.035%
Std.	6.143%	8.317%	4.742%	6.124%	3.035%	4.296%
N	46	47	46	47	46	47
t-value	-1.303	-0.514	-0.200	-0.589	-2.326**	-0.210
+	21	25	20	22	15	24
-	25	22	26	25	31	23

Table 6. CARs for CoCo bond issuing banks with high/low implied CDS spread at issue announcements and placements.

The table presents the CARs of banks with high/low implied CDS spread at their CoCo bond issue announcements and placements using three event windows of (-15, 5), (-15, -1) and (0, 5) with market model methodology. It shows the mean, median, standard deviation (std.), total number of CARs (N), t-value, number of positive CARs (+) and number of negative CARs (-). * Represents significance at the 10% significance level, ** represents significance at the 5% significance level and *** represents significance at the 1% significance level.

Panel A. Issue announcements CARs with high/low implied CDS spread						
Event Windows	(-15,5)		(-15,-1)		(0,5)	
Implied CDS spread	High	Low	High	Low	High	Low
Mean	-0.516%	0.417%	-1.533%	0.774%	1.003%	-0.357%
Median	-0.161%	0.940%	-0.590%	0.277%	-0.204%	0.402%
Std.	7.640%	6.644%	9.786%	4.888%	4.115%	3.335%
N	48	48	48	48	48	48
t-value	-0.468	0.435	-1.085	1.097	1.688*	-0.741
+	23	25	20	24	23	27
-	25	23	28	24	25	21

Panel B. Placements CARs with high/low implied CDS spread						
Event Windows	(-15,5)		(-15,-1)		(0,5)	
Implied CDS spread	High	Low	High	Low	High	Low
Mean	-1.157%	-0.636%	-0.379%	-0.290%	-0.812%	-0.346%
Median	-0.619%	0.718%	-0.724%	0.448%	-0.400%	-0.544%
Std.	8.047%	6.502%	5.860%	5.079%	4.050%	3.410%
N	47	46	47	46	47	46
t-value	-0.985	-0.663	-0.443	-0.387	-1.374	-0.688
+	20	26	18	24	21	18
-	27	20	29	22	26	28

Table 7. CARs for CoCo bond issuing banks with high/low tier 1 capital ratio at issue announcements and placements.

The table presents the CARs of banks with high/low tier 1 capital at their CoCo bond issue announcements and placements using three event windows of (-15, 5), (-15, -1) and (0, 5) with market model methodology. It shows the mean, median, standard deviation (std.), total number of CARs (N), t-value, number of positive CARs (+) and number of negative CARs (-). * Represents significance at the 10% significance level, ** represents significance at the 5% significance level and *** represents significance at the 1% significance level.

Panel A. Issue announcements CARs with high/low tier 1 capital ratio						
Event Windows	(-15,5)		(-15,-1)		(0,5)	
Tier 1 Capital ratio	High	Low	High	Low	High	Low
Mean	0.257%	-0.331%	-1.035%	0.224%	1.292%	-0.568%
Median	0.554%	-0.110%	-0.581%	-0.153%	1.042%	-0.215%
Std.	8.546%	5.612%	10.300%	4.380%	4.435%	2.839%
N	46	50	46	50	46	50
t-value	0.204	-0.418	-0.682	0.361	1.976**	-1.416
+	25	23	21	23	28	22
-	21	27	25	27	18	28

Panel B. Placements CARs with high/low tier 1 capital ratio						
Event Windows	(-15,5)		(-15,-1)		(0,5)	
Tier 1 Capital ratio	High	Low	High	Low	High	Low
Mean	-1.754%	-0.097%	-0.687%	-0.004%	-1.067%	-0.126%
Median	-0.491%	0.177%	-0.719%	-0.267%	-1.209%	0.086%
Std.	8.390%	6.060%	6.577%	4.193%	4.097%	3.338%
N	45	48	45	48	45	48
t-value	-1.403	-0.111	-0.701	-0.007	-1.747*	-0.262
+	22	24	20	22	13	26
-	23	24	25	26	32	22

Table 8. CARs for CoCo bond issuing banks with high/low Economic Uncertainty at issue announcements and placements.

The table presents the CARs of banks with high/low Economic Uncertainty at their CoCo bond issue announcements and placements using three event windows of (-15, 5), (-15, -1) and (0, 5) with market model methodology. It shows the mean, median, standard deviation (std.), total number of CARs (N), t-value, number of positive CARs (+) and number of negative CARs (-). * Represents significance at the 10% significance level, ** represents significance at the 5% significance level and *** represents significance at the 1% significance level.

Panel A. Issue announcements CARs with high/low Economic Uncertainty						
Event Windows	(-15,5)		(-15,-1)		(0,5)	
	High	Low	High	Low	High	Low
Mean	2.029%	-2.043%	1.559%	-2.239%	0.442%	0.209%
Median	1.653%	-1.690%	1.736%	-0.776%	0.489%	-0.491%
Std.	6.540%	7.178%	4.599%	9.610%	3.644%	3.955%
N	47	49	47	49	47	49
t-value	2.127**	-1.992**	2.324**	-1.631	0.832	0.370
+	29	19	28	16	29	21
-	18	30	19	33	18	28

Panel B. Placements CARs with high/low Economic Uncertainty						
Event Windows	(-15,5)		(-15,-1)		(0,5)	
	High	Low	High	Low	High	Low
Mean	-0.181%	-1.601%	0.470%	-1.123%	-0.649%	-0.515%
Median	1.264%	-0.619%	0.503%	-0.874%	-0.174%	-0.544%
Std.	8.511%	5.862%	5.658%	5.193%	4.120%	3.358%
N	46	47	46	47	46	47
t-value	-0.144	-1.873*	0.564	-1.482	-1.069	-1.051
+	25	21	23	19	21	18
-	21	26	23	28	25	29

Table 9. CARs for CoCo bond issuing banks with high/low Ethical Behavior at issue announcements and placements.

The table presents the CARs of banks with high/low Ethical Behavior at their CoCo bond issue announcements and placements using three event windows of (-15, 5), (-15, -1) and (0, 5) with market model methodology. It shows the mean, median, standard deviation (std.), total number of CARs (N), t-value, number of positive CARs (+) and number of negative CARs (-). * Represents significance at the 10% significance level, ** represents significance at the 5% significance level and *** represents significance at the 1% significance level.

Panel A. Issue announcements CARs with high/low Ethical Behavior						
Event Windows	(-15,5)		(-15,-1)		(0,5)	
	High	Low	High	Low	High	Low
Mean	2.187%	-1.452%	1.642%	-1.647%	0.545%	0.184%
Median	1.433%	-0.475%	0.836%	-0.592%	0.713%	-0.128%
Std.	5.772%	7.586%	4.612%	9.040%	2.615%	4.382%
N	37	59	37	59	37	59
t-value	2.305**	-1.470	2.166**	-1.400	1.268	0.322
+	22	26	20	24	22	28
-	15	33	17	35	15	31

Panel B. Placements CARs with high/low Ethical Behavior						
Event Windows	(-15,5)		(-15,-1)		(0,5)	
	High	Low	High	Low	High	Low
Mean	1.184%	-2.156%	0.987%	-1.132%	0.197%	-1.051%
Median	1.221%	-1.001%	0.696%	-0.767%	-0.332%	-0.492%
Std.	5.106%	8.119%	4.822%	5.700%	3.327%	3.912%
N	35	58	35	58	35	58
t-value	1.371	-2.022**	1.211	-1.513	0.350	-2.046**
+	23	23	19	23	16	23
-	12	35	16	35	19	35

Table 10. Regression analysis on the CARs.

The table presents the OLS regression results using the CARs from CoCo bond issue announcements and placements and the winsorized independent variables including maturity, trigger level, conversion method, amount issued, leverage, Tobin's Q, implied CDS spread, tier 1 capital ratio, economic uncertainty index, and ethics score. The corresponding multicollinearity check is shown in Table 11. * Represents significance at the 10% significance level, ** represents significance at the 5% significance level and *** represents significance at the 1% significance level.

	Issue Announcements			Placements		
	CAR (-15,-5)	CAR (-15,-1)	CAR (0,5)	CAR (-15,-5)	CAR (-15,-1)	CAR (0,5)
Intercept	0.9665 ^{***} (3.245)	1.039 ^{***} (3.171)	-0.0801 (-0.482)	1.2454 ^{***} (3.861)	0.3531 (1.364)	0.8889 ^{***} (5.658)
Maturity	-0.0169 (-0.673)	-0.036 (-1.3)	0.0197 (1.402)	-0.0249 (-0.935)	-0.0216 (-1.011)	-0.0027 (-0.206)
Trigger Level	-0.0102 (-1.237)	-0.0179 [*] (-1.969)	0.0078 [*] (1.69)	-0.0199 ^{**} (-2.279)	-0.0087 (-1.243)	-0.0109 ^{**} (-2.57)
Conversion Method	0.0094 (0.521)	0.0267 (1.352)	-0.0175 [*] (-1.745)	0.0305 (1.599)	0.0119 (0.775)	0.0188 ^{**} (2.02)
Amount Issued	0.0073 (1.33)	0.0066 (1.104)	0.0007 (0.225)	0.0016 (0.262)	0.0066 (1.341)	-0.0051 [*] (-1.697)
Leverage	-0.0001 (-0.056)	0.0009 (0.797)	-0.001 [*] (-1.664)	0.0004 (0.314)	0.0002 (0.173)	0.0002 (0.407)
Tobin's Q	-1.131 ^{***} (-4.599)	-1.0744 ^{***} (-3.973)	-0.0515 (-0.375)	-1.1831 ^{***} (-4.58)	-0.4699 ^{**} (-2.266)	-0.7101 ^{***} (-5.644)
Implied CDS Spread	-0.0003 ^{**} (-2.247)	-0.0005 ^{***} (-3.498)	0.0002 ^{***} (2.882)	-0.0003 ^{**} (-2.426)	-0.0002 (-1.378)	-0.0002 ^{***} (-2.794)
Tier 1 Capital ratio	-0.0001 (-0.033)	-0.0042 (-1.247)	0.0041 ^{**} (2.404)	0.0007 (0.195)	-0.0021 (-0.743)	0.0028 (1.63)
Economic Uncertainty Index	0.0006 ^{**} (2.614)	0.0005 ^{**} (2.346)	0 (0.037)	0.0002 (0.892)	0.0002 (1.591)	-0.0001 (-0.757)
Ethics Score	0.0081 (0.637)	0.0076 (0.546)	0.0006 (0.081)	0.0026 (0.193)	0.0097 (0.889)	-0.0072 (-1.091)
N	96	96	96	93	93	93
F-statistics	3.7 ^{***}	3.48 ^{***}	2.55 ^{***}	2.87 ^{***}	1.43	4.05 ^{***}
Adjusted R ²	0.22	0.21	0.14	0.17	0.04	0.25

Table 11. VIF test for the CAR regressions.

The table presents the VIF test results for the independent variables used in the regressions in Table 10 to test the multicollinearity problem. As a rule of thumb, the VIF values below at least 10 or 5 are assumed to be safe from problems of multicollinearity.

	Maturity	Trigger Level	Conversion Method	Amount Issued (USD)	Leverage	Tobin's q	Implied CDS Spread	Tier 1 Capital Ratio	EUI	ETHICS
Issue announcements	1.55	2.21	1.73	1.94	1.60	1.29	2.13	2.04	1.12	3.11
Placements	1.55	2.17	1.70	1.92	1.62	1.26	2.12	2.27	1.12	3.17