A Framework to Discuss the Impact of Conditional Contingent Capital on Banks

Master Thesis in Banking and Finance

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Executive Summary

Background

Conditional Contingent Capital instruments (CoCos) are securities that are structured such that they automatically convert into common equity when the capitalisation of the issuing bank falls below a certain threshold. In the aftermath of the financial crisis, the concept of Conditional Contingent Capital has gained an increasing interest by banking regulators in various countries. In Switzerland, the proposal to employ contingent capital as a regulatory tool is most advanced. The adoption into law is currently passing through the parliamentary consultation. It is planned that the country's two largest banks UBS and Credit Suisse are allowed to make up almost half of their proposed stringent capital requirement in the form of contingent capital. From a regulatory viewpoint, CoCos are seen as a promising instrument to overcome the "too big to fail" problem. Contingent Capital is aimed to allow the recapitalization of a struggled bank without relying on a costly bailout by the taxpayer.

Problem and Approach

This Master Thesis aims to develop a simple framework which allows to price different variants of contingent capital. The framework is afterwards applied to examine the impact of contingent capital on other capital tranches. A particular focus is given on the agency problems related to the presence of contingent capital within the capital structure of a bank. Eventually, incentives for stock market manipulation are discussed.

Following a brief introduction, the thesis starts with a survey of the literature on contingent capital. The fundamental principle of these innovative instruments is uncontested, but the definition of the conversion mechanism and the trigger design are controversially discussed. As of this writing, the empirical experience with contingent capital is very limited. So far, only three major transactions have been observed in the market. Therefore, it is not surprising that valuation models are yet in early stage and untested. A limited number of pricing models has been introduced only recently. In essence, the pricing of contingent capital can happen directly or in the context of a structural credit model. For the aim of examining the heretofore only insufficiently understood coherences between contingent capital and other capital tranches, a structural credit approach provides the benefit that all claims are being priced simultaneously.

The valuation framework developed in this thesis starts from Merton's structural credit risk model. In the context of this well established model, risky debt is treated as a combination of an investment into a risk free bond and a put option written on the firm's assets. First, it is shown that this model can be reformulated such that arbitrarily many debt claims with different liquidation privileges can be represented as call spreads on the asset value. Consequently, a multi-layered capital structure of a firm can be replicated as a cascade of call spreads and a vanilla call option embodying the residual claim of the equity holders. In a following step, the model is further extended to include contingent capital. Compared to conventional debt claims, contingent capital has the additional feature of being automatically convertible into common equity during the lifetime of the instrument if some specific conditions eventuate. To replicate such more complex claims, barrier options need to be deployed. Further, as coupon payments on contingent capital are no longer due from the time the conversion occurs, it becomes necessary to model the interest accruals separately. For that purpose, one-touch options with a binary payout are used. Due to the path-dependent nature of contingent capital, an exogenous payout ratio that comprises both interest and dividend payments needs to be applied in the model. Eventually, the value of a contingent capital claim can be computed as the price of a portfolio consisting of the financial instruments used for the replication of the payout. To price the options deployed in the replication portfolio, established option pricing models are applied.

Within this thesis, three distinct variants of contingent capital are modelled. Type A CoCos refer to contingent capital that converts into a fix number of shares, with the conversion price being determined based on the share price at the time of issue. Type B CoCos convert into a variable and unlimited number of shares that is being fixed based on the share price as prevailing at the time the conversion eventuates. Finally, Type W CoCos refer to contingent capital with a write-down feature. For this instrument, the original notional value reduces to a predefined new amount when a trigger event occurs, but the instrument maintains otherwise its debt attributes. A write-down as well as the therewith related reduction in interest payments are assumed to be of permanent nature.

In the subsequent chapter, the valuation framework is applied to determine the fair new issue yield for the three variants of contingent capital as well as for subordinated debt. The benchmark case stipulated for that purpose is roughly aligned with the situation of the two large Swiss banks after the new regulatory capital requirements are fully implemented. It is also studied how changes in key input parameters affect the result, followed by an analysis of the term structure. In a next step, the impact of using contingent capital within the existing capital structure of a bank is analysed. As main application, the aggregated Greek letters delta and vega of the option portfolio used for the replication of the contingent capital variants are used to examine the two frequently discussed debt agency problems underinvestment and asset substitution. The underinvestment problem relates to a situation in which the shareholders of a heavily indebted firm are no longer willing to provide funds for the accomplishment of value increasing projects, because the benefits would largely go to the firm's bondholders. This situation is also known as debt overhang problem. Asset substitution refers to the possibility that the shareholders of a firm increase the asset volatility after the issue of debt as they will solely benefit from positive outcomes, whereas the losses are borne by the debt holders. It is examined whether contingent capital provides a helpful mean to overcome this issues or whether it might rather aggravate existing debt agency problems. To conclude that part, possible incentives for the firm to increase the payout ratio after contingent capital has been issued is analysed. In a last paragraph, incentives for stock market manipulation are discussed. A particular focus is given to the frequently cited "dead spirals" example referring to floating-priced convertibles in the U.S. market where coordinated short-selling attacks have been observed around the conversion.

Findings

This thesis develops a simple structural valuation framework for contingent capital that bases on the replication of the payout by the use of standard financial instruments. The novelty of the suggested approach lies in the fact that established methods from asset pricing and the domain of structured products are applied in the context of a structural credit model. A particular benefit of this method is the simplicity to derive aggregated Greek letters for the replication portfolio, which allows a better understanding of the drivers beyond price changes of the main instrument.

The fair new issue yield for contingent capital depends on the specific design of an instrument. The computations performed in this thesis confirm earlier findings within the literature. If contingent capital converts into a variable number of shares that is determined based on the share price at the time of the conversion, the instrument is virtually risk free and yields the risk free rate as long as the number of available shares is unrestricted. However, as an important premise, the par value of the instrument and not the market value needs to be used for the calculation of the number of shares. A conversion mechanism that is based on the market value of contingent capital as observed at the time the conversion eventuates is found to be problematic, because the price may in that case be driven by higher order believes. This is a new finding that could be worthwhile further research. Contingent capital with a write-down feature turns out to require a particular high new issue yield, but this observation should not be generalized. The reason is rather the choice of a relatively high write-down amount than the instrument design as such. Moreover, it is found that the term structure for the examined risky variants of contingent capital is decreasing. This finding can be explained by

the fact that the risk premium for longer dated instruments is spread over a longer period of time, resulting in a lower stated yield to maturity. Notably, contingent capital investors will only be able to benefit from attractive coupon payments until the conversion occurs. Investors are therefore well advised to consider the expected time of the conversion likewise.

When contingent capital is used within an existing capital structure with the aim to replace a certain amount of common equity, the value of the existing debt contracts remains unaffected. For the debt holders the composition of the bank's risk bearing capital is found to be irrelevant. If employed as a substitute for common equity, the contingent capital tranche does not change the default probability and the type of contingent capital used by the firm does not matter for the bondholders. For the use of contingent capital as a replacement of senior debt, it is found that the yield on the remaining debt decreases, resulting in a gain for the bondholders. However, this effect is only due to the decrease in leverage. An identical result can be achieved by replacing senior debt with common equity instead of contingent capital. Again, the type of contingent capital is irrelevant likewise. These results are in correspondence with the existing literature.

This thesis finds that the use of contingent capital within the capital structure of a bank can lead to a serious debt overhang problem. The problem accentuates if contingent capital is designed such that it absorbs a high amount of the firm risk. In contrast, for Type B CoCos which are found to be virtually risk free, there is no incremental impact on the debt overhang problem. The debt overhang problem for contingent capital is found to be particularly high for a short remaining time to maturity and an asset price close from the trigger level if Type A CoCos or Type W CoCos are employed. In that situation, a large part of the firm risk is borne by the holders of contingent capital instead of the firm's shareholders. It is even possible to find some special cases in which the value sensitivity of the equity gets negative, which implies that the shareholders would benefit from a decrease in the asset value. Moreover, it is illustrated that in the presence of an underinvestment problem caused by unconverted contingent capital a bank may no longer be able to issue additional equity capital by the mean of a traditional share issue. Although the conversion finally resolves the debt overhang problem caused by the contingent capital tranche, for low trigger CoCos this may occur at a point where the underinvestment problems are called forth by the senior debt tranche. In the worst case, a bank and its regulator may loose the ability to act until it is too late. Further, the incentives for asset substitution depend on the type of contingent capital employed. As Type B CoCos are almost risk free, there are no incentives towards risk shifting, whereas for Type W CoCos it would always pay out for the equity holders to increase the asset volatility. In the later case, the problem is further augmented by the fact that a write-down is almost painless for the existing shareholders. For Type A CoCos ambiguous results are found. With respect to changes in the payout ratio, Type W CoCos turn out to be highly sensible. The holders of this type of contingent capital bear a significant risk that the firm may devalue their claim by unexpectedly changing the dividend policy towards higher distributions to the shareholders. In summary, Type B CoCos which convert on a value preserving basis into common equity are immune against debt agency problems, while for Type W CoCos already existing agency problems are aggravated. For Type A CoCos, the result is less distinct.

Lastly, this thesis finds that frequently mentioned concerns related to commonalities with the "dead spirals" example observed in the U.S. convertible market are well founded. While as opposed to the described floating priced convertibles the holders of contingent capital have admittedly no option to force the conversion into shares, it is mostly overlooked that for contingent capital the conversion occurs for all investors at the same time. As the investors are presumed to have preferences to hedge their conversion proceeds by short-selling shares when the conversion eventuates, the occurrence of a massive selling wave appears to be highly likely. Such a situation is expected to attract traders and hedge funds which may in the case of a market based trigger start a short-selling attack with the aim to breach the trigger price. The application of an average price to determine the conversion ratio as well as a conversion mechanism that causes the investor at least a minor conversion loss, as often

recommended in literature, appear to be appropriate counter-measures against market manipulation. Type B CoCos which convert on a value neutral basis into an unlimited number of shares are found to be particularly vulnerable to manipulations. Moreover, the recently observed tendency in practice to use triggers which are linked to the risk-weighted BIS Tier 1 capital ratio are not unproblematic. Such trigger levels are found to be no longer objective as they are influenced by the bank's ordinary capital management activities.

In summary, this thesis shows that the use of contingent capital as a regulatory instrument is not that unproblematic at it seemed to be. Despite of may benefits, contingent capital is accompanied with some severe drawbacks too. In particular the identified debt overhang problem may have serious implications as it may exacerbate the timely recapitalization of a struggled bank by the mean of a traditional share placement. At least partially, such difficulties can be avoided by the choice of the specific instrument design.