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Bank stability and market discipline: The effect of contingent capital on risk taking and default probability ☆

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ABSTRACT

This paper investigates the effects of financial institutions issuing contingent capital, a debt security that automatically converts into equity if assets fall below a predetermined threshold. We decompose bank liabilities into sets of barrier options and present closed-form solutions for their prices. We quantify the reduction in default probability associated with issuing contingent capital instead of subordinated debt. We then show that appropriate choice of contingent capital terms (in particular the conversion ratio) can virtually eliminate stockholders' incentives to risk-shift, a motivation that is present when bank liabilities instead include either subordinated debt or additional equity. Importantly, risk-taking incentives continue to be weak during times of financial distress. Our findings imply that contingent capital may be an effective tool for stabilizing financial institutions.

1. Introduction

Bank capital, primarily in the form of common equity, provides banks with a buffer to absorb losses and protect creditors. However, severe negative shocks may result in a shortfall in capital. In the recent financial crisis financial institutions were not able to raise significant new capital in the market and had to rely instead on governments. The considerable amount of implicit guarantees and direct investment of taxpayer money into large financial institutions has been heavily criticized.

One of the most prominent suggested solutions for the shortfall of capital in bad times is the introduction of contingent convertible bonds (often simply referred to as "contingent capital" or "coco") into the capital structure of financial institutions.

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Contingent capital is subordinated debt that automatically converts into equity when a certain stress-related trigger is breached and thus can absorb losses on a going concern basis. Such an automatic debt-to-equity swap or "bail-in" is potentially valuable since it is executed in times of distress.

In recent years, there have been major developments both in the market for contingent capital and in regulations related to introducing it into capital structure requirements. For example, Lloyds, Rabobank, and Barclays have issued coco bonds that are converted or written off if there are specific reductions in consolidated core Tier 1 capital ratios.[2] Meanwhile, regulators and policymakers have advocated using contingent capital as a preferred tool for implementing prudential banking regulations. Swiss regulators have required additional capital for the country's systemically important institutions (Credit Suisse and UBS), stating that it can be issued in the form of contingent capital. In the U.S., the 2010 Dodd–Frank Act calls for a careful analysis of the introduction of contingent capital into the capital structure of systemically important financial institutions (Krainer, 2012). In order to meet higher national capital requirements, the Basel Committee under Basel III requires contingent capital instruments to convert prior to the point of 'non-viability' (distress).[3]

In this paper we analyze the effects of introducing contingent capital into the capital structure. We propose a model of contingent capital that reflects the structure of existing "real-world" issuances. We first derive closed-form solutions for the prices of contingent capital and equity by decomposing capital structure components into sets of barrier options. We then investigate the stabilizing abilities of contingent capital by comparing it to two alternatives: capital structures that instead either include subordinated debt, which does not convert into equity in times of distress, or additional equity.

We show that the inclusion and design of contingent capital can have important effects on banks' financial stability through two channels: bank default probability and incentives for managerial risk taking.[4] We demonstrate that a bank that issues coco will have a lower default probability than one that issues subordinated debt. However, it will have the same default probability as an equivalent volatility bank with additional equity.

The main focus of our paper is the second channel: the effect of coco on risk taking incentives. We show that appropriate choice of coco parameters can entirely eliminate any motivation to increase or decrease risk. The intuition is that appropriate choice of coco parameters can exactly offset costs and benefits to shareholders of increasing the likelihood of conversion. In contrast, incentives to increase risk are present under the two alternatives (subordinated debt or additional equity). Thus, stability is highest for a bank with well-designed coco.[5]

The central parameter governing the motivation to change risk is the conversion ratio, the percentage of the ownership in the post-conversion financial institution that coco holders receive (previous shareholders receive the remainder). If the conversion ratio is zero ("stock-friendly"), contingent capital holders receive nothing and equity holders are faced with a lower level of debt, while a level of one ("coco-friendly") means that previous equity holders receive nothing and coco holders become the post-conversion stockholders.[6] For stock-friendly conversion ratios, stockholders have a motivation to increase asset risk, while they are motivated to decrease asset risk for coco-friendly conversion ratios. Importantly, we show that there is always an intermediate level of the conversion ratio for which the incentives for stockholders to change asset risk are eliminated.

Incentives to change risk remain low for such well-designed coco even if volatility changes or if leverage increases. This is not the case for both alternatives (subordinated debt or additional equity), where risk-shifting incentives increase noticeably with leverage. Furthermore, the presence of weak incentives is robust to changes in other important model parameters: weak incentives can be achieved both for different conversion thresholds and for different regulatory seizing policies.

Introducing contingent capital can thus achieve two goals: a reduction in financial institution default probability and a compensation structure that does not reward excessive risk-taking. It is these two aspects that French et al. (2010) highlight in "The Squam Lake Report."[7] Indeed, we show that it is possible to attribute the two effects of contingent capital introduction to its terms: an increase in face value is related to a reduction in default probability, while the conversion terms (ratio and threshold) are related to risk-taking incentives.[8]

There are several parameters that define a contingent capital contract: (1) conversion timing, (2) conversion trigger, (3) instruments that deliver contingent capital, and (4) assumptions about default.

Our setting is motivated by the structure of existing securities (e.g. the coco bonds issued by Lloyds, Rabobank, and Barclays). Thus we assume that contingent capital is converted into common equity if at any time before maturity the value of assets (or,

[2] The 2009 Lloyds issue converts into ordinary shares if the consolidated core Tier 1 ratio falls below 5%; the 2010 Rabobank issue is written down when regulatory capital falls below 7%; and in 2012 Barclays raised $3 billion that are written off if the Barclays Tier 1 capital drops below 7%.

[3] In this case, contingent capital qualifies as additional capital. Another guideline is the inclusion of a trigger to write off contingent capital at the point of 'non-viability.' See also Pennacchi et al. (2013), Sundaresan and Wang (2014), and Baily et al. (2013).

[4] We assume that stockholders may be able to change the risk profile of the bank's assets in order to maximize the value of their own holding (Galai and Masulis, 1976; Jensen and Meckling, 1976).

[5] Admati et al. (2011) discuss 'fallacies' surrounding the view that high bank leverage is socially desirable. They do not, however, analyze the continued incentives to increase risk that are present even in a bank with a larger equity cushion.

[6] Interestingly, the conversion ratio, even though it varies across recently issued instruments, has tended to be low ("stock-friendly"). The Rabobank and recent Barclays issues both have a conversion ratio of zero. The Lloyds and Credit Suisse issues are converted into the underlying stock at a relatively low or "stock-friendly" conversion ratio.

[7] In an update, Baily et al. (2013) suggest an important role of contingent capital to reduce the risk of costly bailouts.

[8] We consider the effect of issuing a 'reverse warrant' — a security with a zero face value that converts into a fraction of equity if a pre-determined trigger is touched.