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### Tail Risk: Higher Capital is not Enough

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#### **Bank capital and its limits**

Much of the debate in the wake of the recent crisis has rightfully focused on the need for higher bank capital. Bank capital serves as a financial buffer and an incentive mechanism. It forces banks to internalize more losses within the equity tranche, reducing the probability of bank failure, and increases shareholders' "skin in the game". Bank capital is essential for both micro-prudential goals (disciplining shareholders against opportunistically increasing risk) and macro-prudential policy (controlling counterparty risk and contagion).

Yet it is important to recognize that higher bank capital, while essential, is not a panacea against all risks and agency problems in banks. The literature has identified important limitations of bank capital. It is now accepted that capital charges based on individual bank risk are ineffective in dealing with correlation risks (Acharya, 2009), systemic externalities of unstable funding (Perotti and Suarez, 2010), or when shareholders lack control over bank risk-taking (Dewatripont and Tirole, 1993).

[In our recent work](#) (Perotti, Ratnovski and Vlahu, 2011), we highlight another important limitation of bank capital. While capital is effective in dealing with "well-distributed" risks of traditional banking, we show that it is potentially ineffective in addressing tail risk present in modern market-based and wholesale banking, and may sometimes be counter-productive.

#### **Tail risk**

In traditional banking, where small loans are financed by retail deposits, both asset-side and withdrawal risks' distributions generally satisfy the law of large numbers, leading to an unimodal close-to-normal risk distribution for equity value. In contrast, with financial innovation, banks and other financial institutions have the ability to manufacture skewed risk profiles. Investment strategies can generate a high frequency of positive returns, counterbalanced by a significant mass in the extreme left tail of the return distribution. So bankers can claim superior returns at

the expense of large infrequent losses. Examples from the recent crisis include excessive reliance on short-term wholesale funding (Gorton, 2010), the underwriting of contingent liabilities on tail risk (Acharya and Richardson, 2009), and undiversified housing exposures (Shin, 2009). A useful review of such strategies is provided by Acharya et al. (2009); IMF (2010) highlights the importance of recognizing tail risk in financial stability analysis.

Our work shows that high bank capitalization may be ineffective in dealing with tail risk because their realization can wipe out almost any plausible value of initial capital, shifting extreme losses to creditors. Tail risk fully undermines the buffer effect of capital, and weakens its incentive “skin in the game” effects. High initial capital can contain the second moment (variance) in the risk distribution, but may not discourage tail risk creation at the expense of creditors, and ultimately financial stability.

To complete the picture, we identify a possible unintended effect of bank capital when financial innovation enables the creation of extremely skewed return profiles. When a bank has a significant capital buffer above the minimum, that may *enable* the bank to take tail risk, because a bank with high capital is less likely to breach the minimal capital ratio in case of smaller shocks. This finding is consistent with the observation that before the crisis, seemingly well-capitalized banks and insurers chose to gamble with contingent liabilities by taking skewed risk strategies (Angora et al., 2009; Berger et al., 2008). A case in point is represented by UBS, which lost its entire equity buffer on supposedly triple AAA mortgage backed securities, which turned out to be subject to tail risk once the real estate bubble burst.

### **Policy choices**

A general conclusion is that since tail risk emerges in response to risk shifting incentives, it needs to be discouraged by regulations affecting returns or admissible strategies in good times. In contrast, tail risk cannot be addressed by capital charges based on traditional risk weights. First, tail events are rare and not easily statistically measurable, so risk weights will be imperfect. Second, unlike “well-distributed” risks, tail risk is often generated by correlated investment or funding strategies. Thus economically correct charges for tail risk should depend not just on the risk of individual exposures, but on the diffusion of the exposure within the financial system (similar to correlation risk). The existing capital regulation framework is not designed to address such exposures.

It is important to realize that, unlike other low-probability, high-impact events, tail risk cannot be insured *within* the financial system because tail risk is often realized during systemic events. This leads to serious doubts about the economic usefulness of instruments such as CDS on major sovereigns or large banks. More generally, regulators should realize that financial innovation will be constantly opening new avenues for the generation of tail risk, and focus on uncovering new tail exposures before they become widespread.

Regulators should adopt direct tools for dealing with tail risk, including limits on asset and liability-side risk exposures. On the asset side, this may include controls of undiversified assets which have extreme correlation with the market in downturns (Acharya et al., 2010). On the liability side, this should include prudential limits or surcharges on the use of short-term funding (NSFR or tax-based) and on extremely mismatched strategies (Huang and Ratnovski, 2011; Perotti and Suarez, 2009), properly measured to reflect not just individual but aggregate risk buildup. Quite useful may be to investigate contingent recapitalization plans via the issuance of convertible bonds with market-linked triggers, which target risk shifting incentives (Flannery and Perotti, 2011; Haldane, 2011).

In conclusion, our research indicates that not recognizing limitations of bank capital in controlling financial stability risks may lead to a sense of false comfort. Global financial regulation reform should learn to assess tail risk creation in banking as a necessary step forward after implementing Basel III.

*The views expressed in this article are those of the authors and should not be attributed to the Dutch Central Bank or the International Monetary Fund.*

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