Maintaining adequate bank capital: An empirical analysis of the supervision of European banks ☆

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ABSTRACT

During the recent financial crisis, many large banks' losses were absorbed by their sponsoring governments, despite the fact that these banks complied with Basel standards for "adequate" capital. We illustrate a serious supervisory problem by demonstrating that large European banks' reported regulatory capital measures often far exceeded their loss-absorbing capacity during 1997–2011. The cumulative value of government guarantees thereby extended to the largest 25 European banks over that period amounts to nearly €1.4 trillion, corresponding to an average of 28.5% of the banks' equity market values. We show that early regulatory attention to declining equity value can substantially reduce the social cost of dealing with bank losses. This research is particularly relevant for European institutions at the present time, as the European Union deals with joint solvency concerns about its banks and its governments.

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1. Introduction

The Basel Committee on Bank Supervision (BCBS) has designed complex rules for defining sufficient capital at internationally active financial institutions. Pillar II of the Basel Accord recommends that national supervisors to assure continuous compliance with capital standards, which are expressed in terms of book-measured equity accounts. At the end of 2007, the vast majority of EU banks and bank holding companies easily complied with minimum capital requirements. Nevertheless, many European governments subsequently used public funds to support their banks. Between 2008 and 2011, European governments' support of troubled banks included €1084.8 billion (8.6% of EU GDP) of guarantees on banks' bonds and deposits, €322.1 billion (2.5% of EU GDP) of capital contributions, €119.9 (0.9% of EU GDP) of impaired assets purchased, and a €89 billion (0.7% of EU GDP) of liquidity support.[4] Even banks with very high book capital ratios encountered funding difficulties during the financial crisis. For example, the UK government took stakes in Lloyds Banking Group and Royal Bank of Scotland, whose yearend 2007 (2008) Tier 1 capital ratios were 9.5% (8%) and 7.3% (10%), respectively. Dexia's Tier 1 ratio stood at 9.10% at the end of 2007, but the bank was forced to seek government support in October, 2008. Similarly, UBS and Unicredit Group had Tier 1 ratios of 8.80% (11%) and 6.55% (6.81%) in 2007 (2008), but each subsequently turned to its national government for financial support.

How could a system that defined and monitored bank and BHC capital positions so carefully have permitted such catastrophic losses? Although reasons are plentiful, one major cause was the supervisors' reliance on book equity measures, which did not recognize that these accounting numbers do not capture the firms' true ability to absorb losses. GAAP/IFRS and regulatory accounting rules provide managers with substantial discretion in valuing many of their assets and liabilities.[5] They can use discretionary accounting to overstate assets and manage earnings and capital (Moyer, 1990; Collins et al., 1995; Ahmed et al., 1999; Laeven and Majnoni, 2003), and may also under-state risk weighted assets (Acharya et al., 2013; Le Leslé and Avramova, 2012). Banks' incentives to manipulate accounting valuations are strongest as their

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[4] European Commission, State Aid Scoreboard, Autumn Update 2012, page 9.
[5] European banks used local versions of GAAP through the end of 2004, but have been required to use IFRS since 2005.

capital ratios approach mandated minima. Therefore, book equity measures may be least informative when capital value is most relevant to a firm's viability. Huizinga and Laeven (2012) provide evidence that banks used their accounting discretion during the financial crisis to under-state impairments of their real estate loans and MBS and that accounting discretion was more pronounced for large financial institutions.[6] Huizinga and Laeven conclude that even un-weighted book equity ratios may offer "a distorted view of the financial health of the banks" (2012, page. 1). Herring (2010) shows that "banks which required official intervention actually had more capital (in the last reporting period before the intervention took place) than banks that required no government subsidy" and concludes that "capital does not appear to be a very effective regulatory weapon." (page 272).

We therefore contend that supervisors' agreed metric for judging sufficient capital appears to be seriously flawed. One obvious alternative supervisory tool is equity's market value, which recognizes the difference between the market value of assets and liabilities. Yet some observers question the accuracy of market assessments, asserting that banks are uniquely opaque institutions that are difficult for outsiders to value. Moreover, market share values reflect conjectures about supervisory treatment, making them imperfect estimates of banks' net asset values. We argue here that, regardless of their accuracy, market assessments drive both equity values and depositor runs. A bank confronts depositor runs when the market believes it is insolvent, and at that time there is no demand for new equity shares. An imminent run leaves supervisors to choose between providing public support and letting the bank fail. We demonstrate that supervisors have not assured that large European banks continuously maintain market-valued equity cushions that place their solvency beyond question.[7] The legal/regulatory focus on book capital measures makes it difficult for supervisors to force equity additions well in advance of a possible run. The resulting pressure on governments to support their banks has been expensive, but is probably unavoidable under the present regulatory structure.

This study estimates annual default probabilities for large European banks over the period 1997–2011. Section 2 illustrates that capital adequacy depends on both portfolio risk and the period of time for which the initial equity cushion must protect liability-holders from loss (Pennacchi, 1987). Even though the time dimension was recognized in the initial Basel calibration, it has received little subsequent attention – yet the maintenance of adequate capital is central to the definition of adequate capital. After describing how we assess bank solvency in Section 3, we apply the concept of adequate capital to annual data from the largest 25 European banks over the period 1997–2011 in Section 4. Assuming normally-distributed asset returns, the estimated value of government guarantees for the largest European banks averaged 28.49% of the banks' equity market value over the full sample period. We argue that the evidence indicates that supervisory discretion has been unable to maintain adequate capitalization for these banks. We digress briefly from the main theme of our paper in Section 5, to investigate the determinants of a banks' measured default probability. We find some significant accounting indicators of higher default probability, but the book capital ratio is not among them. In other words, we find no evidence that the primary focus of international bank regulation significantly

predicts default probabilities. In Section 6 we return to our main theme by examining the effect of a hypothetical "Timely Recapitalization" policy, which computes (ignoring the Lucas critique) how much additional capital banks should have kept in order to maintain low one-year PDs (below 0.1%, for example) at each yearend. Unsurprisingly, banks would have required a massive amount of additional capital during the crisis in order to reduce the value of government guarantees substantially. Before the crisis (1997–2006), however, Timely Recapitalization would have reduced the average bank's government guarantee value from 7.40% to 0.31% of equity market value. Section 7 considers the prospect for "better" capital regulation in the future, given our evidence that supervisory discretion apparently failed to maintain adequate capital over the 1997–2011 sample period. Specifically, we argue that orderly resolution and "bail-in" debt rely crucially on the same type of supervisory discretion that has performed poorly in the past. The paper concludes by suggesting that definitions of regulatory capital should be expanded to reflect current market assessments of equity value in order to enforce promptly recapitalization of overlevered financial institutions.

2. The concept of adequate capital

Policymakers are justifiably concerned with the level of bank capital because it determines banks' default probabilities and it divides risky outcomes among equity holders, debt holders, and perhaps the government. The Basel II standards imply that supervisors have determined that a bank's capital ratio should correspond to a default probability (PD) <0.1% for a one-year horizon (Basel Committee on Banking Supervision (2006), paragraph 667, Gordy and Howells (2006), page 397, Kupiec (2006), page 8).

Basel's Pillar II addresses the on-going maintenance of adequate bank capital by admonishing national supervisors to assure that their banks have an adequate capital planning process. If supervisors find a deficiency in this process, "(they) should seek to intervene *at an early stage* to prevent capital from falling below the minimum levels required to support the risk characteristics of a particular bank and should require *rapid remedial action if capital is not maintained* or restored" (BCBS (2006), page 212, emphasis added). Among the "range of actions" supervisors should consider is "requiring banks to raise additional capital immediately" (BCBS (2006), p. 212). Even if the problem lies in the bank's risk management or capital planning process, "increased capital might be used as an interim measure while permanent measures to improve the bank's position are being put in place" (BCBS (2006), p. 212). Despite this Pillar II language, instances of large, under-capitalized banks "immediately" raising new equity have been few – perhaps because accounting valuation options permit large banks to avoid reporting inadequate capital.[8] How would adequate capital ratios look if they always provided PD ⩽0.1% for a one-year horizon? Consider a portfolio of long-maturity securities with no prepayment risk, whose annualized return follows a normal diffusion process. The portfolio's equity financing is levered with fixed-maturity debt, and earnings are paid out continuously to the owners. Thus, only the initial capital protects the liability holders from default. The initial equity contribution apportions the risk of loss between the owner (equity holder) and her creditors; more equity makes the debt safer because the owner has agreed to accept more of the downside risk.

Fig. 1 illustrates the initial capital contribution required to provide 99.9% solvency over alternative liability maturities and for

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[6] Huizinga and Laeven (2012), page 615 contend that accounting distortions comprise part of regulatory forbearance: "regulators allow large banks more discretion over asset valuation as part of regulatory forbearance of banks that are considered too big to fail."

[7] Indeed, regulators' reliance on book capital adequacy measures limited their ability to mandate dividend restrictions in 2008, even as the firms' market equity ratios were plunging.

[8] This phenomenon is recognized even by some supervisors. According to the Governor of the Bank of England (Mervyn King), supervisors must "ensure that reported capital ratios do in fact provide an accurate picture of bank's health. *At present there are good reasons to think that they do not.*" (Werdigier (2012), emphasis added).