

MODELING METHODOLOGY

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Measuring Required Economic Capital and Parameterizing the Loss Reference Point

Abstract

When parameterizing an Economic Capital (EC) framework, organizations must consider how losses and gains on principal and coupons/fees are recognized, if they are to ensure appropriate capitalization. The level of loss allowance and capital organizations hold must be sufficient to cover potential losses. This paper outlines how parametrization differs for accrual and securities portfolios. In addition, we relate parametrization approaches with those associated with Basel Advanced-IRB calculations. We conclude that, when measuring an organization's required economic capital buffer, the relevant loss reference point is the accounting value net of loss allowance — losses should be measured in excess of total spread. While seemingly inconsistent with the Basel A-IRB formulation, where losses are measured in excess of expected loss, the difference can be interpreted as loss allowance exactly aligning with expected loss.

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1. Introduction

An Economic Capital (EC) framework allows institutions to manage capital and cover the economic effects of risk-taking activities. Organizations must ensure that their available capital will cover a tolerable level of loss and, in turn, they must ensure the probability of failure remains at an acceptable level.

Crucial determinants of the required capitalization level are the accounting practices that govern the recognition of gains and losses on principal and coupons/fees, and how provisions are set. Differences are driven primarily by factors such as investment type and purpose (e.g. accrual or securities book), as well as the regulatory jurisdiction and accounting standards.

The primary aims of this document are: (i) to outline how the recommended parametrization differs for accrual and securities portfolios, and (ii) to relate the parametrization approaches with those associated with Basel Advanced-IRB calculations.

We find that, when measuring an organization's required economic capital buffer, the relevant loss reference point is its accounting value net loss allowance — losses should be measured in excess of total spread (net of loss allowance). While seemingly inconsistent with the Basel A-IRB formulation, where losses are measured in excess of expected loss (EL), we demonstrate that the exclusion of offsetting interest income in the Basel formula roughly aligns the two approaches.

The remainder of this paper is organized as follows: Section 2 provides an overview of the issue and the rationale behind the parametrization. Section 3 relates parameters that should be used when measuring an economic buffer with those implied by the Basel A-IRB approach. Section 4 concludes.

2. Overview and Rationale for Parametrization

This section provides an overview of parameterizing the loss reference point when measuring economic capital for accrual and securities portfolios. We begin by highlighting that this guidance is a starting point for consideration; it is important to also recognize the specific characteristics of each organization and business line. There may well be additional circumstances that make it necessary to use variations of the parametrizations detailed in this document.

Throughout the discussion, we analyze a single sample portfolio and consider the impact of it representing an accrual book or a securities book.

2.1 Buffering Against Economic Loss for an Accrual Book

When measuring required economic capital for an accrual book, an organization must consider losses that have (and have not) been recognized. Consider an institution with an accrual portfolio valued at \$95 billion in the market, but with an accounting value (sometimes referred to as book value or gross carrying value) of \$100 billion: the \$5 billion difference is due to credit losses not yet recognized. Furthermore, assume that the likelihood of the portfolio market value dropping to \$85 or billion or below is 5bps.

The required buffer depends on whether or not the organization takes an accounting view. In this example, the appropriate buffer required to absorb 99.95% of possible losses, when using the accounting value, is for the organization to set aside \$15 billion: \$5 billion for existing losses (the difference between the \$95 billion market value and the \$100 billion accounting value) and \$10 billion for potential future losses. This example demonstrates that, for an accrual book, today's accounting value should represent the loss reference point for the required buffer.

In practice, organizations set aside provisions that should provide capital relief, however, it is unlikely that the provisions for a portfolio will line-up with the realized economic loss. Continuing with our example, if the organization has provisioned for \$2 billion of losses, the organization should set aside \$13 billion of capital: \$15 billion, less \$2 billion of provisions.

When considering the horizon value distribution, we should remind ourselves that the required economic capital is a measure of the buffer needed to absorb economic loss with a specified target probability (in our example 5bp) at a future horizon. As a side note, it is worth pointing out that the current accounting value of equity is irrelevant for determining future values for portfolio equity; only the economic value distribution at horizon is relevant.

In summary, we recommend setting the loss reference point for measuring the required capital buffer for an accrual book as the current accounting value of the book, net of loss allowance. This figure is equivalent to measuring capital in excess of total spread (TS), if the analysis date value is the accounting value net of loss allowance. Meanwhile, the loss distribution will be parametrized for economic gains and losses in order to measure the likelihood of insolvency (i.e., the likelihood that the economic value of the portfolio falls below the capital threshold). Note, when modeling horizon losses, default, as well as migration risk, must be

accounted for. Doing so allows for recognition that the value of longer-dated assets are typically more sensitive to changes in credit quality and are thus riskier.

It is worth highlighting that, while we recommend using the accounting value net of loss allowance as the loss reference point for measuring the required economic buffer, the analysis date market or modeled value is also extremely useful. It provides a sense of how much the existing buffer has gained or lost at the analysis date.

2.2 Buffering Against Economic Loss for a Securities Book

Gains and losses on securities are either recognized, or they impact provisions. Whether assets are Available for Sale, Held to Maturity, or traded, the logic in Section 2.1 above follows—the relevant loss reference point is the accounting value net of loss allowance; capital in excess of TS (where the analysis date value is the accounting value net of loss allowance). And, as argued above for the accrual book, the economic value distribution at horizon is most relevant for this analysis.

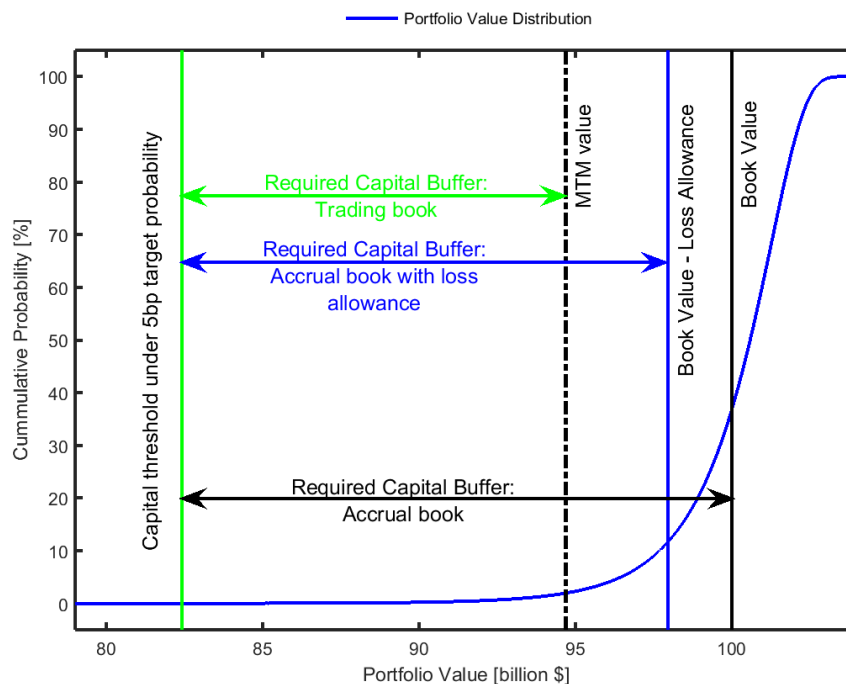
2.3 A Comparison of the Buffering Required for Accrual and Securities Books

In Sections 2.1 and 2.2, we recommend calculating the economic value distribution at horizon using an Economic Capital framework that remains independent of the portfolio's accounting treatment. One should measure an accrual book's economic values the same way as the economic values of a securities book. We recommend that it is only the loss reference point that differs between the two books, even though the loss reference point should be the accounting value net of loss allowance in both cases.

Figure 1 depicts how the loss reference point is impacted by whether the portfolio is accrual or traded, as well as the impact of accounting for loss allowance on the required buffer. A few observations worth highlighting:

- » We see that the portfolio value distribution of the trading book and the banking book is identical, as both contain the instruments in the sample portfolio.
- » The trading book's required capital buffer is smaller in this example, because the mark-to-market (MTM) portfolio value is less than par and, under the trading book treatment, the value at analysis date recognizes the full extent of these MTM losses.

Figure 1 Loss reference point impacted by portfolio type: accrual or traded.



3. Relating Parameters for Measuring an Economic Buffer with Those Implied by Basel A-IRB

Specific rules are very much dependent on the accounting and regulatory jurisdiction. Therefore, this section walks through the simple case of fully-funded, wholesale term loans in the accrual book.

Referencing the above section, the relevant loss reference point when computing an economic capital buffer should be its accounting value net of loss allowance.

We now relate the EC parametrization with the parametrization implicit in the Basel A-IRB capital measure. The model that underlies that calculation focuses entirely on notional loss, does not recognize interest income that can be used to offset loss, and is net of EL¹.

$$K = \left[LGD \cdot N \left(\frac{N^{-1}(PD) + \sqrt{R} \cdot N^{-1}(0.999)}{\sqrt{1-R}} \right) - LGD \cdot PD \right] \cdot \left(\frac{1 + (M - 2.5) \cdot b}{1 - 1.5b} \right)$$

Breaking down the formula, $\left(\frac{1 + (M - 2.5) \cdot b}{1 - 1.5b} \right)$ represents a maturity adjustment and will not be discussed here; for exposition, we assume a one-year maturity.

$LGD \cdot N \left(\frac{N^{-1}(PD) + \sqrt{R} \cdot N^{-1}(0.999)}{\sqrt{1-R}} \right)$ represents loss at a 10bp target probability (1-0.999) and where the reference point is the portfolio notional (i.e., the analysis date accounting value).

$LGD \cdot PD$, a measure of expected loss, represents loss allowance being netted (in the same way that loss allowance is netted for EC).

Thus, the composite term $LGD \cdot N \left(\frac{N^{-1}(PD) + \sqrt{R} \cdot N^{-1}(0.999)}{\sqrt{1-R}} \right) - LGD \cdot PD$ represents loss in excess of EL.

At first, this methodology seems counter to our recommendation above, where the loss reference point is measured in excess of TS. However, Basel regulations implicitly assume that loss allowance equals EL. So, in both cases, the LRP is net of loss allowance.

In general, for performing loans, accounting value net of loss allowance differs from notional net of EL (as measured in, say, RiskFrontier™); loss allowance, depends heavily on factors such as accounting rules, regulations, and asset class.

There is a confusing aspect to this discussion worth highlighting: under usual circumstances, the loss reference point associated with capital in excess of TS (i.e., analysis date value) is less than capital in excess of EL (i.e., the expected value at horizon). After all, interest income should more than offset loss. This is not the case with the Basel framework, where interest income is ignored, and the horizon value will necessarily be lower than the analysis date value. Exclusion of interest, in addition to other differences such as concentration, diversification, and maturity effects, leads to different results between regulatory and economic capital.

In summary, while the Basel formula very much aligns with how one should parametrize an EC framework, and, while it recognizes loss allowance, it also assumes that loss allowance equals EL.

4. Summary

This paper demonstrates how the loss reference point for an EC framework should be parametrized. When measuring an organization's required economic capital buffer, the relevant loss reference point is its accounting value net of loss allowance — losses should be measured in excess of total spread. While seemingly inconsistent with the Basel A-IRB formulation, where losses are measured in excess of EL, we demonstrate that the difference offsets the exclusion of interest income in the Basel framework, allowing for the two approaches to roughly align.

¹ See for example, Basel Committee on Banking Supervision, "International Convergence of Capital Measurement and Capital Standards, A Revised Framework, Comprehensive Version," June 2006, <http://www.bis.org/publ/bcbs128.pdf>.

References

Basel Committee on Banking Supervision, "International Convergence of Capital Measurement and Capital Standards, A Revised Framework, Comprehensive Version." June 2006.

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