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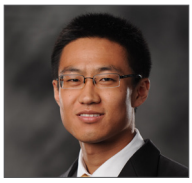

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Credit Risk Management Under Regulatory Capital Constraints

BY DR. AMNON LEVY, DR. PIERRE XU, AND DR. JING ZHANG

This article outlines recent approaches to managing credit risk when facing regulatory capital requirements. We explore how institutions should best allocate capital and make economically-optimized investment decisions under regulatory capital constraints, such as those imposed by Basel or CCAR-style rules.

Introduction

Credit portfolio risk is measured by the required Economic Capital (EC), which reflects diversification, concentration, and other economic risks. In recent years, however, higher capital standards imposed by new stress testing requirements and Basel III have forced organizations to address how to better manage capital to meet regulatory constraints.

While maintaining the required level of Regulatory Capital (RegC) is necessary and indeed mandatory, simply satisfying the requirement does not necessarily align with stakeholders' preferences for optimal capital deployment and investment decisions. In other words, RegC and CCAR-style stress testing are requirements that organizations have to adhere to and likely do not reflect how stakeholders trade off risk and return.

For instance, a typical RegC measure, such as the Basel Risk-Weighted Asset (RWA), does not account for diversification and concentration risk, which are important to stakeholders. In general, regulatory measures such as RWA are not as risk-sensitive as economic measures. This shortcoming of RegC underscores the importance of EC, which better captures risks that reflect stakeholders' preferences.

Ideally, institutions should account for both EC and RegC when making business decisions – including strategic planning, pricing, portfolio management, and performance management. For example, if two potential deals have an identical expected return and RWA but different EC, management should favor the lower EC. Similarly, if two deals have the same EC but different RWA, lower RWA is more desirable.

The challenge lies in quantifying a unifying measure where return, RWA, and EC all enter into a single measure that assesses a deal's profitability – organizations need a unifying EC and RegC measure. Levy, Kaplin, Meng, and Zhang (2012) propose the concept of integrating EC and RegC. They incorporate regulatory capital requirements into a traditional economic framework

underpinning EVA- and RORAC-style decision measures. Xu, Levy, Kaplin, and Meng (2015) provide a practical approach of measuring the degree to which an organization is capital-constrained and the degree to which weight should be placed on RegC in business decisions.

At a high level, RegC should not enter into decision rules when it is not constraining. Organizations do not need to account for the RegC constraint if they meet all RegC requirements regardless of business decisions. Alternatively, a deal that consumes a high level of RegC is particularly unattractive to an organization that is heavily constrained by RegC.

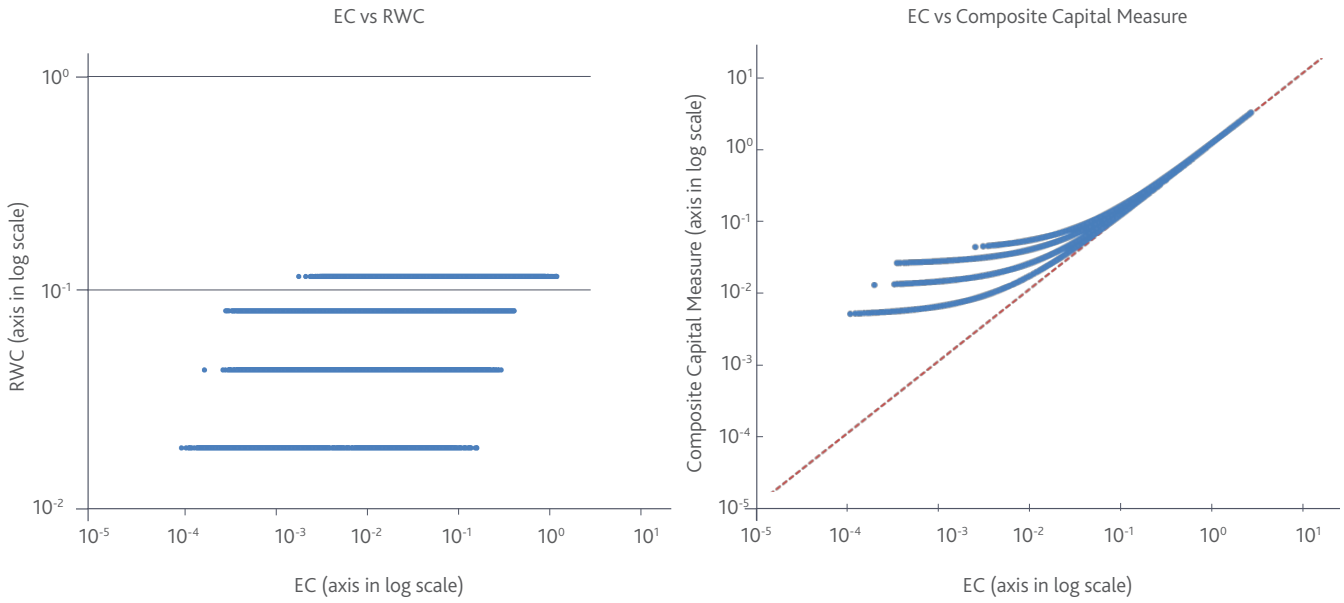
Xu and Levy (2015) extend the work of Levy, Kaplin, Meng, and Zhang and propose a composite capital allocation measure (mostly referred to as composite capital measure, or CCM) integrating EC and RegC. The metric allocates an institution's top-of-the-house capital in a way that accounts for both economic risks and the degree to which RegC is constraining. This article provides an overview of these recently developed approaches and discusses how financial institutions can use them to improve risk management and business decisions.

Capital deployment under regulatory capital constraints

The challenge financial institutions face when managing economic and regulatory capital lies in designing and deploying a capital measure that aligns incentives of both management and stakeholders that account for both economic risks and regulatory constraints. While measuring economic risks and RegC on a stand-alone basis is imperative, a capital charge must ultimately be allocated to align incentives to maximize an organization's value. The approach proposed by Levy, Kaplin, Meng, and Zhang (2012) and Xu and Levy (2015) highlighted above leverages a traditional economic framework, one where an organization's stakeholders maximize returns while recognizing risk. The novelty in the approach is in imposing a regulatory constraint. The formal model produces a composite capital measure; whereby the degree to which an organization's RegC is constraining determines the degree to which weight is placed on RegC.

Figure 1 depicts the relationship between the instrument EC and the required regulatory capitalization rate, also referred to as Risk-Weighted Capital (RWC) (computed by the Basel II standardized approach), on the left side for a typical credit portfolio. In general, RWC is relatively higher for safer instruments, and vice-versa.

Figure 1 EC vs. RWC and composite capital measure



On the left side, instrument RWC plotted against EC. RWC is computed by the Basel II standardized approach. On the right side, instrument CCM plotted against EC. RWC computed by the Basel II standardized approach is used as the input to determine CCM.

Source: Moody's Analytics

Historically, the deleverage ratio attributed to Basel and stress testing requirements, defined as the percentage decrease in leverage, is approximately 15% to 30% for US and European banks. This observed deleveraging speaks to the degree to which RegC is constraining.

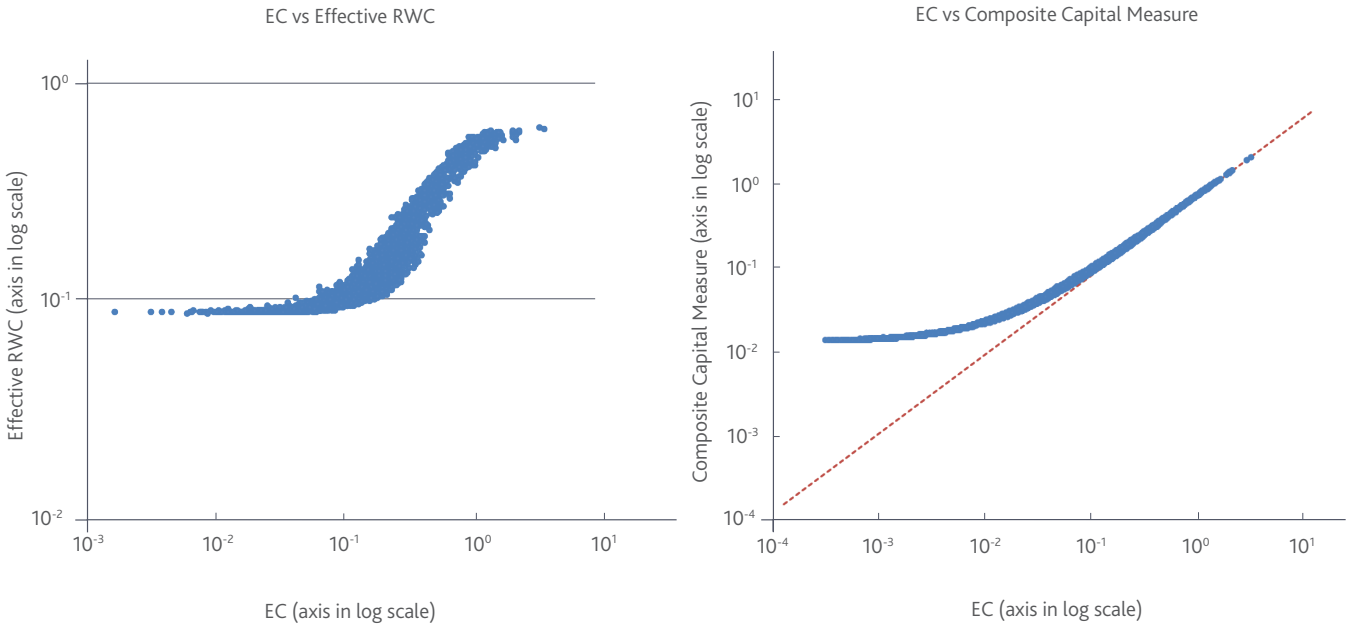
This finding is also true when RWC is determined according to the Advanced Internal Ratings-Based (IRB) approach, as is shown by Xu, Levy, Meng, and Kaplin (2015) and Xu and Levy (2015).

The right side of Figure 1 compares instrument CCM with EC. Note that CCM is generally higher than EC. This finding is not surprising, as the regulatory capital constraint is expected to increase the capital needed on top of traditional EC. Another important observation is that two sets of asymptotes exist in this figure. CCM converges with EC as EC increases to a high level. This asymptote reflects CCM's ability to capture the full spectrum of risk, including diversification and concentration risk unaccounted for by RegC.

As EC decreases, CCM flattens to four levels. Recall, we use the Basel II standardized approach to determine RegC, which results in four unique levels of RWC. Thus, each of the four asymptotes to the left represents the minimum level of capital needed for instruments with a certain RWC level, reflecting CCM's ability to ensure enough capital is allocated to meet RegC requirements.

The difference between RegC and EC brings up a dilemma when financial institutions plan capital allocation. On the one hand, the need to meet the ever-increasing regulatory capital standard pulls institutions toward capital allocation by RegC. On the other hand, a sound risk management system calls for a more appropriate capital allocation measure, such as EC, which accounts for not only default risk, but also diversification and concentration risk. The ideal solution leverages a capital allocation measure such as CCM, which takes into account the full spectrum of risk and, at the same time, ensures that the proper amount of capital is allocated to meet regulatory requirements. What is worth highlighting is the tremendous amount of CCM allocated to high credit quality

Figure 2 EC vs. Effective RWC under CCAR requirements and composite capital measure



On the left side, instrument-effective RWC plotted against EC. Effective RWC computed under the 2015 CCAR severely adverse scenario. On the right side, instrument CCM plotted against EC. CCM computed based on effective RWC under the CCAR severely adverse scenario.

Source: Moody's Analytics

Using RegC-adjusted RORAC, institutions can improve the risk-return attractiveness of the portfolio while meeting RegC requirements ... a 2.5% portfolio turnover rate can increase the expected return of the portfolio by 60 bps, while keeping the required RegC constant. Furthermore, as institutions increase the portfolio turnover rate, the portfolio rate of return on both RegC and EC increases.

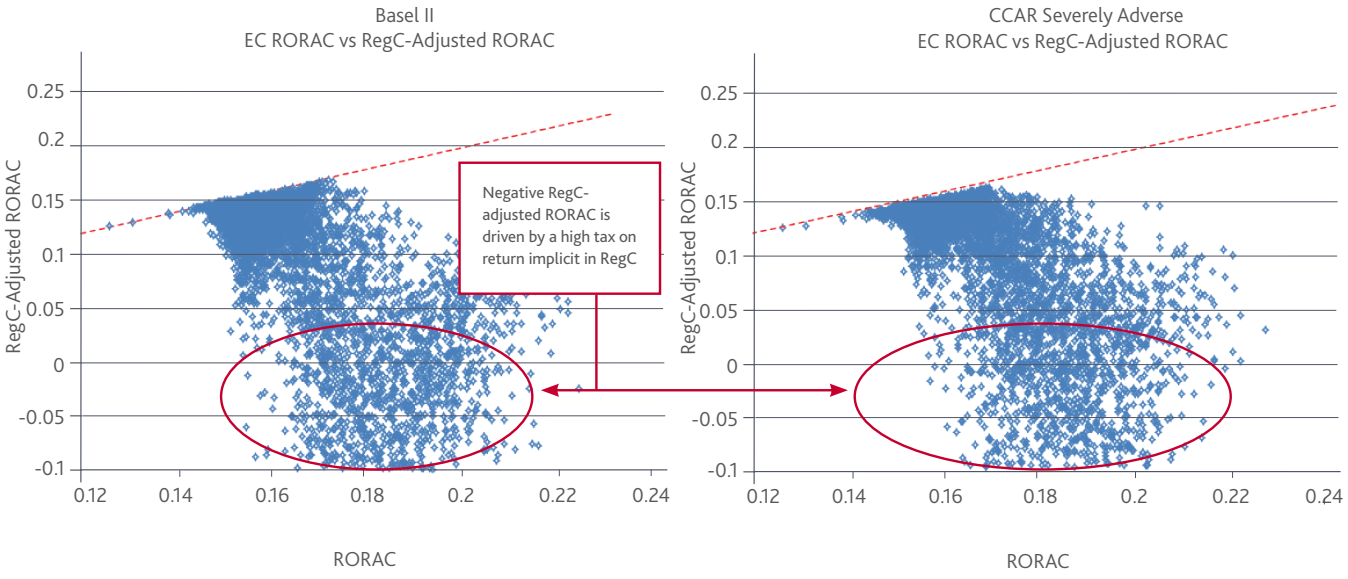
names. While not surprising given the high level of RegC being allocated, the results are striking when compared with EC.

Intuitively, CCM can be regarded as a combination of EC and RWC. The relative weight of EC and RWC in CCM is institution-specific. It is determined by how constraining the RegC requirement is for the institution. As Xu, Levy, Meng, and Kaplin (2015) illustrate, the degree of RegC constraint can be measured by how much the institution must deleverage due to the RegC requirement. Historically, the deleverage ratio attributed to Basel and stress testing requirements, defined as the percentage decrease in leverage, is approximately 15% to 30% for US and European banks. This observed deleveraging speaks to the degree to which RegC is constraining.

Similar to Basel-style rules, CCAR requires adequate capital under severe economic downturns. This boils down to a required capital buffer that adheres to the portfolio's RWC, while accounting for erosion due to stressed expected losses conditioned on the downturn scenario.

The left side of Figure 2 compares instrument EC with effective RWC for a sample portfolio under a severely adverse CCAR scenario. As EC decreases, the effective RWC converges to 8%, which is the minimum RegC required. As EC increases, effective RWC becomes much more correlated with EC; instruments with larger EC are associated with more severe losses during a stressed scenario, requiring more capital buffer and a higher effective RWC. Once we know the instrument-effective RWC, we can compute CCM accordingly.

Figure 3 RegC-adjusted RORAC vs. RORAC



Instrument RegC-adjusted RORAC plotted against unadjusted RORAC under different regulation requirement. On the left, the RegC-adjustment is made under the constraint of the Basel II standardized capital requirement. On the right, the RegC-adjustment is made under the constraint of the CCAR stress testing requirement.

Source: Moody's Analytics

The right side of Figure 2 presents instrument CCM against EC under the CCAR requirement. Similar to CCM under the Basel II capital requirement, instrument CCM under the CCAR requirement also exhibits two asymptotes – CCM converges to EC as EC increases to a high level, and CCM flattens out as EC becomes very small. The intuition behind this pattern is the same as explained previously for CCM under Basel-style capital requirements.

Business decisions under regulatory capital constraints

In practice, stakeholders prefer an institution to deploy capital across the organization and make investment decisions that maximize the institution's overall return-risk trade-off while satisfying regulatory requirements. Integrating EC with RegC allows financial institutions to allocate capital across businesses with a risk metric that accounts for diversification and concentration risk, as well as the regulatory constraints.

In addition, the integrated approach provides decision rules that optimize portfolios from an economic perspective while adhering to RegC requirements. Traditional Return on Risk-Adjusted Capital (RORAC) measures are adjusted to account for investments' RegC burden. Intuitively, the RegC adjustment can be thought of as a tax that lowers an instrument's effective return.

Figure 3 compares RegC-adjusted RORAC with standard RORAC under Basel II and CCAR. The two measures are generally very different. In particular, safe instruments tend to have very low or even negative RegC-adjusted RORAC; the low return of safe instruments is not sufficient to cover the implicit cost of the RegC constraint.

Using RegC-adjusted RORAC, institutions can improve the risk-return attractiveness of the portfolio while meeting RegC requirements.Table 1 illustrates the impact of re-weighting the sample portfolio where instruments with the lowest RegC-adjusted RORAC are traded for those with the highest RegC-adjusted RORAC. What is impressive is that a 2.5% portfolio turnover rate can increase the expected return of the portfolio by 60 bps, while keeping the required RegC constant. Furthermore, as institutions increase the portfolio turnover rate (i.e., trade more instruments according to RegC-adjusted RORAC), the portfolio rate of return on both RegC and EC increases.

Conclusion

Under higher capital standards imposed by new stress testing requirements and Basel III, organizations should account for both economic risk and regulatory constraints when managing capital and making business decisions. CCM and RegC-adjusted RORAC measures help institutions achieve this goal. CCM allocates an institution's top-of-the-house capital in a way that accounts for economic risks, as well as the degree to which RegC is constraining. RegC-Adjusted RORAC helps institutions improve the risk-return attractiveness of their portfolios, while maintaining the required RegC level.

Table 1 Improved portfolio composition using RegC-adjusted RORAC

Portfolio Turnover*	ES	RegC	EC	RegC RORAC	EC RORAC
0.0%	1.06%	7.25%	5.92%	16.6%	19.8%
2.5%	1.12%	7.25%	6.14%	17.4%	20.2%
5.0%	1.16%	7.25%	6.30%	17.9%	20.4%
7.5%	1.20%	7.25%	6.44%	18.6%	20.7%

*Portfolio turnover is defined as the percentage of portfolio rebalanced (sold and reinvested) in terms of notional amount.

Source: Moody's Analytics

[1] Moody's Analytics Quantitative Research Group, *Modeling Credit Portfolios*, 2013.

[2] Amnon Levy, Andrew Kaplin, Qiang Meng, and Jing Zhang, *A Unified Decision Measure Incorporating Both Regulatory Capital and Economic Capital*, 2012.

[3] Pierre Xu, Amnon Levy, Qiang Meng, and Andrew Kaplin, *Practical Considerations When Unifying Regulatory and Economic Capital in Investment Decisions*, 2015.

[4] Pierre Xu and Amnon Levy, *A Composite Capital Allocation Measure Integrating Regulatory and Economic Capital*, 2015.

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