

A Guide to Leveraging Economic Capital to Conduct More Effective Exams

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What is Economic Capital and Why is it Relevant?

Economic capital is a means of quantifying a company's capital needs based on the amount of capital that is necessary to support its risk exposures and execute its business plan. Because economic capital captures more than just the liabilities on a company's balance sheet, it can be a more useful and comprehensive tool for regulators to evaluate a company's capital resiliency in the event of unexpected losses or future uncertainties.

To conduct key aspects of an examination for large insurers, including assessing corporate governance and the Enterprise Risk Management (ERM) function, performing testing around the ORSA, and performing testing around the Capital Management Critical Risk Category in Exhibit DD, examiners need to have a basic understanding of economic capital and what it measures. This is especially true since the economic capital framework varies from company to company, meaning the economic capital figures are not directly comparable like the financial statements. Rather, examiners must form a ground up understanding of the economic capital framework and modeling process to evaluate an insurer's capital adequacy. This article is intended to equip examiners with an understanding of the fundamentals and highlight what aspects of the insurer's processes should be considered or leveraged in key aspects of the exam.

To the extent that smaller insurers have the resources or expertise to employ the use of capital modeling, much of this discussion will be relevant. However, as with larger insurers, the level of reliance examiners can place on these processes for examination purposes will be dependent on the maturity of the insurer's ERM framework, including its ability to identify

and incorporate all material, relevant risks into the capital modeling process. Other considerations include whether examiners can place reliance on the insurer's internal controls, including ITGC and model governance and validation processes. Examiners may also wish to leverage the discussion of external capital models, as these are more likely to be used by smaller insurers with limited modeling capabilities or resources.

What Risks Does Economic Capital Measure?

Economic capital measures financial and non-financial risks in terms of the capital they require, encompassing risks such as credit risk and market risk, as well as strategic risk, operational risk, reputational risk, insurance risk, and so forth. While there certainly can be overlap with the NAIC Exhibit L Branded Risk Classifications, note that companies are not required to use this framework or risk classification system, so it is important to gain an understanding of how a company defines risks within its organization.

While economic capital attempts to quantify the capital needed for a particular risk, note that some risks, such as reputational risk, are difficult to model and companies may rely on judgment instead to allocate a capital charge for the risk.

How is Economic Capital Measured

Key components of measuring or calculating economic capital include the accounting basis, the risk horizon, the security standard, and the diversification benefit. Each of these is touched on below:

Accounting Basis. Economic capital is agnostic of accounting convention and is therefore not measured on a GAAP or SAP basis. Rather, it is measured on an economic basis of accounting intended to measure the realizable value of assets and the realizable cost of disposing of or fulfilling a company's liabilities. A frequent approach employed involves adjusting GAAP financials to remove intangibles and other assets not available to satisfy obligations, then reporting the remaining amounts at mark-to-market to reflect an economic basis of accounting.

Risk Horizon. Risk horizon is the period of time over which capital needs are projected, also commonly referred to as the "time horizon" or "return period." Companies may employ a **one-year**

approach, which projects the balance sheet one year into the future on a mark-to-market basis and assumes that liability positions can be exited at the end of the year. Alternatively, companies may employ a **runoff** approach, which models capital needs through extinguishment of the liabilities and is essentially a cash flow testing approach. Generally, shorter time horizons are more credible as there is more uncertainty around assumptions further into the future, such as what interest rates will be or how equity markets will perform. For this reason, a one-year horizon is becoming the more favored approach and is required by Solvency II.

Security Standard. The security standard is a metric used to measure the risk of insolvency or default at a given probability or confidence level. A few of the most common metrics used to measure economic capital include the following:

- Value-at-Risk (VaR) – This is the most widely used method and measures the amount of capital needed to reduce the probability of insolvency or default to a given confidence level, such as 0.5%.
- Tail Value-at-Risk (TVaR) – TVaR quantifies the expected value of losses (or the severity of the losses) for an event that occurs outside of a given probability level. This is generally more conservative than VaR and is also known as the Conditional Tail Expectation or CTE.
- Expected Shortfall (ES) – ES is also known as the Conditional Tail Value-at-Risk or CVaR, and is more sensitive to the shape of the tail of a loss distribution.

Diversification Benefit. Economic capital is more than just the sum of individual risks within an organization—it also measures the interactions between risks. It is unlikely that every potential adverse scenario will occur in a given year, that all lines of business will experience adverse loss development, or that every investment will result in a default or impairment. Certain risks may be more likely to correlate, but on the whole, there should be some diversification benefit across a company's risk portfolio. Diversity across the lines of business, credit exposures, and other risks in an insurer's portfolio serves to reduce the total amount of capital a company needs in any given year to withstand unexpected losses.

Because simple aggregation of the capital requirements for individual risks assumes that a company will need to hold capital against all the risks occurring in a single year, companies employ various methods to recognize the impact that risk interactions have on economic capital. To account for these interactions and estimate diversification benefits, common methodologies employed by insurers include the use of copulas and correlation matrices. Copulas can be used to capture some of the more complex relationships between extreme stress scenarios in the tail distributions for two risks, particularly where there are non-normal tail distributions; but their use may not always be the most appropriate or practical. Far more commonly, companies employ the use of correlation matrices, or even a combination of both approaches.

Under the most common approach, correlation matrices are used to apply correlation coefficients across individual risks, lines of business, and business units or segments to arrive at the total economic capital for the enterprise, accounting for the diversification benefits that occur at each of these levels. Within this framework, correlation coefficients are assigned ranging from 0 to ± 1 , with 0 representing no correlation (or complete independence), 1 representing 100% (or perfect) correlation, and -1 representing -100% (or perfect inverse) correlation. For any correlations less than 1, the organization will incur some diversification benefit.

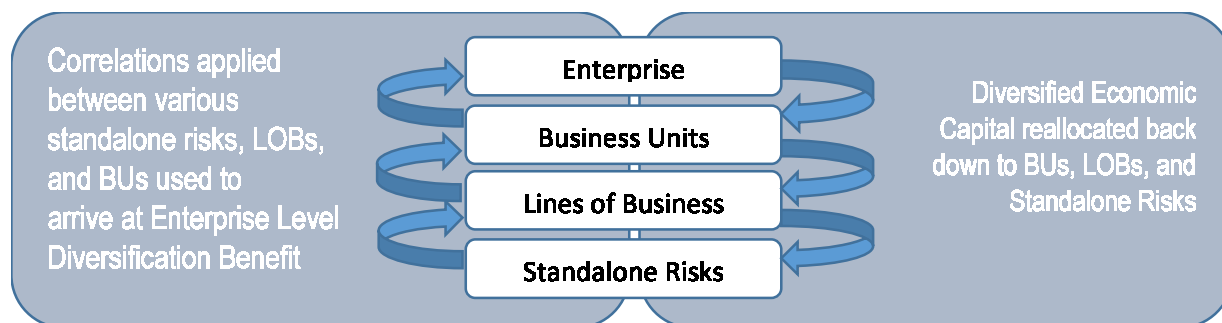
When two risks are independent or when they bear an imperfect correlation (of less than 1), there is a reduced likelihood that the two risks will coincide, meaning that the company can hold less capital against the likelihood of them both occurring in the same year. Even more evident is the diversification benefit arising from perfectly inverse correlations, where if one risk occurs, the other does not. For these scenarios, it does not make sense for a company to charge capital for both risks occurring, and so the capital requirements to support these risks will be offset. The amount of offset recognized contributes to the overall diversification benefit. (To account for concerns over extreme stress scenarios, such as an extreme pandemic that could result in the occurrence of multiple risks which do not normally bear significant correlation outside of these scenarios, companies may utilize stress testing and/or use of copulas in addition to the correlation matrix.)

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For two risks which are perfectly correlated, companies should recognize the full amount of economic capital necessary to support each of the risks occurring, given that these risks will always occur in conjunction with one another.

Generally, correlations between risks will be captured through various risks' response to a common risk driver. One such example may be a decrease in oil prices increasing the risk of default or impairment on investments with exposure to the oil and gas sector, as well as increasing the loss experience on private passenger auto. (This is due to the decrease in oil prices driving an increase in the number of miles driven.) Another such example is the relationship between investment portfolio losses and losses on errors and omissions coverage, each of which are driven by financial market performance.

One important caveat with respect to diversification benefits is that overestimating the total benefit to be taken will result in an understatement of the company's economic capital, which may lead the company to accept more risk than it intends. A company may have robust processes in place around capturing and calculating all of its risk exposures, but those efforts can be undermined if some measure of conservatism is not employed in determining the correlation matrix values. For this reason, companies may rely on the use of industry standard indices or correlations, such as S&P's; but if they instead rely on internally developed correlations, examiners should ensure that sensitivity testing is performed around the correlation matrix values.



Using Economic Capital?

Once the diversification benefit is calculated and an insurer arrives at its enterprise level diversified economic capital output, it may then allocate diversified economic capital back down to the business units, lines of business, products, and individual risks. These amounts may then be used by management to make capital management decisions, such as how much capital to allocate to each of the business units. Companies may also express risk limits for each of the business units, products, etc. in terms of the allocated diversified economic capital, against which actual amounts would be monitored.

Allocating diversified economic capital back down to each level of aggregation also allows companies to evaluate performance in terms of how much revenue a product, a line, or a business unit generates in relation to the risk capital that it requires. This is referred to as capital efficiency or Return on Risk Adjusted Capital (or RORAC), and it plays an important role in management's decisions around business mix. (That is, companies seek to maximize returns without having to assume too much risk or having to hold onto capital that could be more efficiently invested elsewhere in order to generate additional revenues.) Metrics such as RORAC are also used in executive compensation to incent prudent decision making, as it ensures that management is not rewarded for taking extreme risks, even if those risks generate substantial profits.

Other important capital metrics. Other capital metrics used by insurers include **Available Capital**, which is the capital available to satisfy the company's obligations. Companies may define and calculate this figure differently, but it should be adjusted to remove intangibles. Companies may also include capital from long-term debt issuances in this figure. Available capital is calculated to determine the amount of actual capital that is available to support the risk exposures; and companies compare this figure to economic capital to ensure they are adequately capitalized. In performing this comparison, companies calculate **Deployable Capital**, which is the excess of a company's available capital over its economic capital. Deployable capital metrics are important for a company to evaluate how much discretionary capital it has available to pay dividends, engage in share buybacks, and allocate towards new strategic initiatives not already incorporated into its business plan and capital modeling. Deployable capital may also be used by insurers in consideration of potential M&A activity.

Exam Considerations

Economic capital has implications for several key aspects of an examination, including corporate governance and ERM assessments, the ORSA assessment and testing, and testing for the Capital Management Critical Risk Category as follows:

Exhibit M – Corporate Governance

Risk Culture and Governance. Economic capital is a useful tool for management to incorporate a risk management lens or perspective into the strategic planning process. Business decisions should be scrutinized in light of their impact on economic capital in order to ensure that the organization has enough capital to support its business plan; and this process should be iterated throughout the strategic planning process. To complete the feedback loop, strategic plan assumptions should also feed the assumptions in the economic capital model.

Examiners should obtain a sense during interviews of how well management and directors understand economic capital outputs and how to use them to support their decision making, as well as what is driving changes in economic capital from period to period. During review of board and committee package materials, consider any training or educational materials provided to management and the board which facilitate this understanding. Examiners should also leverage review of these materials to ensure there is transparency with the board or its risk committee on the impact that potential strategic initiatives would have on risk capital.

Additional risk culture and governance considerations include the role that RORAC or other economic capital metrics play in determining executive compensation, as well as what role, if any, that stress testing results play in planning or business decisions.

Risk Identification and Prioritization. Within risk identification and prioritization, it's important to ensure that the insurer has a robust process for identifying all material, relevant risks, including emerging risks. Omission of material risks can result in understating economic capital (and thereby the company's risk exposures and capital needs), which can lead management to assume more risk than it intends. Examiners should also consider how frequently risk prioritizations are reassessed and how often emerging risks are incorporated into the modeling results, where possible, so that management has adequate time to respond to changes in the external environment. For risks which are difficult to quantify, either due to the nature of the risk or lack of available credible information, it may be worth having a conversation with the company to understand how the risks are captured and whether the company judgmentally allocates a capital charge for the non-modeled risks.

In prioritizing risks, the NAIC Financial Condition Examiners Handbook¹ (the "Handbook") recommends consideration of whether risk assessments take into account probability, potential impact, and time duration, which economic capital metrics inherently account for.

Risk Appetite, Tolerances and Limits. In order to evaluate the appropriateness of a company's risk appetite and risk tolerance, examiners should evaluate whether they are consistent with the company's business plan and economic capital targets, as management should not accept more risk than it has the capital to support. While there are a variety of ways that a company may express its risk tolerance and limits, economic or risk capital is one such means a company may choose to do so; and this can ensure that the company is making decisions around the acceptance of risk based on the amount of capital those risks will likely require. Because economic capital captures the impact of the business plan on risk capital, it can also facilitate alignment between a company's risk tolerance and its business plan when used in this manner.

Other pertinent considerations include whether stress testing results inform management's decisions around risk tolerance, and Handbook² guidance also suggests evaluating whether the insurer considers legal entity regulations and capital requirements in setting its overall risk appetite.

Risk Management and Controls. In evaluating risk management and controls, obtain an understanding of the actions taken by management to respond to changes in the risk profile that may exceed the economic capital targets or limits. Consider whether management and the board review what is driving changes to economic capital from period to period. For example, are these changes really the result of a change in a specific component of the company's risk profile, or are these the result of changes in the assumptions or methodologies? Controls over the economic capital model, along with any other models which feed its inputs, are imperative in ensuring the integrity of the economic capital outputs. An important aspect of a strong control environment is whether the economic capital model and any model supplying its inputs undergo audits or reviews by internal audit, an independent model validation unit, or external parties.

Risk Reporting and Communication. With respect to risk reporting and communication, if a company expresses its risk limits in terms of economic capital, important considerations include how frequently economic capital is recalculated and reported to management and the board for monitoring. The recalculation and reporting frequency should allow management to respond to breaches of risk limits in a timely fashion. However, there will be tradeoff limitations between the timeliness or frequency of reporting versus the accuracy of the outputs. Handbook³ guidance recommends selecting a sample of ERM information reported to the board for comparison to the ORSA Summary Report in order to validate accuracy and consistency in reporting.

Another key aspect for consideration is whether the economic capital outputs are prepared or reviewed in time to support the strategic planning cycle, and whether they are actually incorporated into the planning and decision-making process by senior management. Strong reporting and communication practices also include disclosing to the board the impact that any proposed initiatives would have on economic capital prior to their signoff or ratification of the initiatives. Finally, management, the board, and anyone who uses the outputs to make business decisions should be formally apprised of the key assumptions and limitations.

ORSA Considerations

Section I – Insurer's ERM Framework

Because Section I of the ORSA is essentially a recapitulation of the Exhibit M ERM considerations, those considerations will not be revisited in depth in this discussion. For ORSA purposes, to support a strong maturity rating which allows examiners to place a high degree of reliance on the insurer's ERM framework and controls, economic capital outputs and other risk management metrics should be used to support strategic planning, capital management and allocation, and other business processes and daily decision making. Economic capital should also be monitored on a periodic basis that allows management to identify and respond to changes in the insurer's risk profile in a timely fashion, with emerging risks incorporated into this calculation where feasible.

Section II – Insurer Assessment of Risk Exposure

Stress Testing. While the Handbook prescribes no particular approach to performing stress testing, examiners should ensure that stress testing is commensurate with the insurer’s risk exposures and complexity, and note whether the approach relies on stochastic, deterministic, or reverse stress testing methodologies. Stochastic approaches, which are dependent on the distribution of outcomes from numerous simulations, should select a more remote return period than that employed in the company’s economic capital modeling in order to obtain the benefit of performing stress testing. For example, a company may choose to apply a 1-in-500 year return period if its economic capital modeling applies a 1-in-200 year return period across various aspects of its business, though examiners should note that the company may not consistently apply the same return period across all lines of business or across the entirety of its risk portfolio.

For deterministic stress testing, which applies the effects of certain parameters determined by the company (say, for example, a 30% equity shock or catastrophic losses commensurate with that of Hurricane Sandy), it is important to consider the rigor applied and determine whether the parameters are comparable to that of historical events. For example, examiners may evaluate whether credit stresses, including assumptions regarding default rates on high yield or investment grade bonds, are commensurate with that in past recessions or economic downturns. Though no specific deterministic scenarios are required by the Handbook or ORSA guidance, a couple which may provide examiners with a strong degree of comfort include a scenario with multiple catastrophic events and a 1970s stagflation scenario, both of which result, oftentimes, in some of the largest impacts on capital of any of the stress scenarios performed by insurers. Companies may also employ the use of the Federal Reserve’s CCAR scenario.

A reverse stress testing approach entails evaluating the severity of an event that would be necessary to reach some threshold, such as eroding earnings and resulting in an impact to capital, or the magnitude of events which would be required in order to result in a ratings downgrade or action level RBC. It is at the company’s discretion to determine which threshold it would like to assess its capital resiliency against. For reverse stress testing, it may be helpful to ask the company for benchmarks for comparison, such as catastrophic wild fire or hurricane losses for a particular year or event with significant losses; and examiners can then evaluate the amount of these losses against the magnitude of the reverse stress scenario. Examiners should note that a company may choose to employ any combination of these stress tests in Section II of the ORSA.

Section III – Group Assessment of Risk Capital

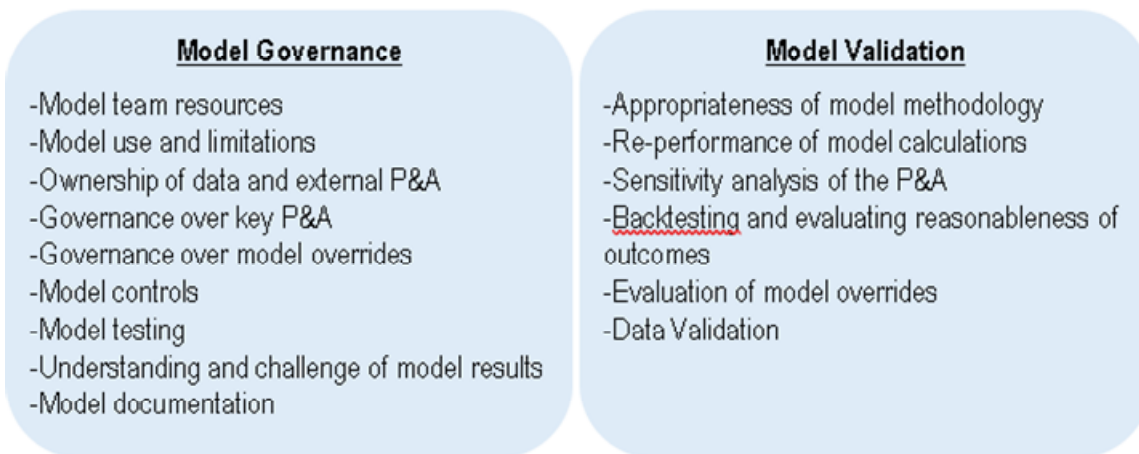
Within Section III of the ORSA, the focus for examiners should be on understanding the process the insurer used to accumulate and present the information provided. The examiner’s approach to doing so will depend on whether the company utilizes an externally developed capital model, such as S&P’s or A.M. Best’s BCAR model, or whether the company utilizes an internally developed capital model.

External models. Per the Handbook⁴, the examiner should consider “what validation efforts have been conducted to allow reliance to be placed on external models.” Furthermore, lead state examiners should “consider whether the insurer applies a reasonable range of stress scenarios to the outputs of these models under a wide range of different scenarios.” External models do not require the same level of independent testing by the examination team as internal models; and testing performed by the examination team should generally focus more on procedures such as validating the model inputs (e.g. through accuracy and completeness testing) and obtaining documentation supporting any judgmental overrides of the model outputs. A key consideration when evaluating external models is that they will not capture an insurer’s idiosyncratic risk since they are calibrated using industry data.

Internal models. For internally developed capital models, additional emphasis should be placed on evaluating the strength of a company’s model validation processes and model governance controls. Due to the “challenges inherent in developing, implementing, and maintaining an effective internal capital model,” the Handbook⁵ states that “[d]epending upon the strength of the insurer’s internal model validation processes, Lead State examiners may need to perform some level of independent testing to review and evaluate the controls over internal model(s) utilized by the insurer for its group economic capital calculation.”

Examiners may find it appropriate to request additional detail supporting the group capital calculations and involve an actuary in the review. Examiners may also find it appropriate to involve an IT specialist to evaluate access controls, change controls, backups, archiving, and other aspects of the ITGC environment for platforms used to run the models, including any platforms or applications which feed the model inputs. Where independent testing is warranted, the Handbook⁶ indicates that testing may consist of procedures to evaluate the appropriateness of assumptions and methodologies used in both: (a) stochastic/deterministic modeling scenarios for individual risks and (b) estimating the amount of diversification benefit realized. In doing so, examiners may need to select a sample of individual risks for review and consideration, again involving the actuaries to assist in the evaluation.

Testing for economic capital models will generally follow that performed around model risk. These tests typically fall under model governance and model validation processes:



Although model governance and model validation processes do not perfectly correspond to Phase 3 and Phase 5 procedures, Model Governance can generally be conceptualized as involving Phase 3 controls over the models and Model Validation as involving a Phase 5 substantive review of the models. Financial examiners should be able to perform testing around the model controls and can involve actuaries in performing the substantive review of the models, such as evaluating the appropriateness of the methodology or reperformance of the calculations. However, a company with a strong risk management function should have controls in place to ensure there is independent validation of its internal capital model(s), whether by internal audit, a dedicated model validation unit, a separate modeling or actuarial unit that is independent from the design and implementation of the models under review, or from a third party engaged to review the models. Where actuarial resources are limited, examiners can perform control tests to ensure that these independent validations occur on a periodic basis and according to the control guidelines. Examiners can also perform accuracy and completeness data testing around the model inputs during Phase 5 procedures.

- **Model Governance.** One of the more critical model governance controls that should be in place is maintenance of model documentation to give context to external parties auditing or validating the model, as well as to anyone who needs to

operate the model in the event of key staff turnover. Aspects of each model which should be documented include the purpose, key assumptions, limitations, model inputs, how outputs are used, the date of the most recent changes to the model (along with version control references), the date of the most recent internal or external validation, and reasons for any model overrides. Each model should also have an owner responsible for maintaining the documentation and validating the model inputs

- **Model Validation.** With respect to Model Validation, backtesting and independent validation are a couple of the more critical validation processes that can provide the most comfort over the reliability of economic capital outputs. Backtesting helps with assessing how reliably the outputs have historically performed on an ex post facto or look-back basis. Independent validation is perhaps the strongest control a company can have in place around a model, and involves having a party which is independent from the design or implementation of a model to perform an independent review of the assumptions and methodologies. Parties performing this review should have the requisite experience and expertise.

Additional model validation procedures that should be performed include a sensitivity analysis of the correlation matrix values used in calculating the diversification benefit, given that overestimation of the diversification benefit will lead to an underestimation of the company's economic capital outputs and capital needs. Companies may also impose parameters on the values in the matrices limiting the amount of diversification benefit that can be taken as a means of exercising some degree of conservatism, or they may also utilize industry correlation indices, such as those available from S&P.

Exhibit DD - Capital Management Considerations

The Capital Management Critical Risk Category encompasses an insurer's ability to assess, manage, and maintain sufficient capital to sustain its business plan and solvency position, which economic capital models inherently capture. Additional considerations include the ability to forecast capital needs or identify contingent sources of additional capital.

Testing performed around an insurer's capital models can be leveraged for ORSA testing, model risk, and Exhibit DD Capital Management risks in order to capitalize on examination efficiencies. This is especially relevant if the company is using economic capital outputs to make decisions around capital management or to support its business plan, which is a requisite for a mature ERM assessment. To coordinate the testing of Capital Management risks with ORSA testing, examiners should forego generic risk statements from the repository (such as "the insurer is not monitoring its capital and surplus needs") given that testing for these risks generally focuses more on vouching the existence of capital modeling processes rather than evaluating their effectiveness. Instead, risk statements should be geared towards whether the company is able to

effectively anticipate its capital needs (thereby focusing on the *accuracy* of model outputs); whether the economic capital model's assumptions and methodologies are appropriate; or whether the diversification benefits are overstated. Whatever the risk statement, it should allow examiners to test the effectiveness of controls and model validation efforts in place over the company's capital modeling process.

Forecasting Capital Needs. In addition to the Model Governance and Validation testing that can be performed to evaluate an insurer's economic capital model (as discussed in ORSA Section III), additional considerations when evaluating a company's Capital Management practices may include the following:

- Whether economic capital projections include key assumptions from the strategic plan, such as growth of particular lines of business, adjustments in investment allocations, shifts in underwriting guidelines or changes in policy limits, and changes in the reinsurance program. Examiners can also review minutes and package materials from management committees, including senior risk committees on which the C-levels sit, to ensure that key business decisions and planning were evaluated in light of the

risk capital they would require. Management should also consider any proposed expenditures, such as M&A activity, in light of the amount of deployable capital available.

- In evaluating its available or deployable capital, management should also consider the fungibility of capital between legal entities. For multi-national insurers subject to Solvency II, foreign capital requirements will impact capital fungibility; and both tax and currency exchange rates will also impact the company's ability to repatriate capital. For US-domiciled insurance subsidiaries, capital fungibility will be subject to minimum surplus and RBC requirements.

Identifying Contingent Sources of Capital. Economic capital models may factor in the capital necessary to maintain a minimum rating agency rating, or this may be evaluated through the use of an additional or separate rating agency model. This is often part of an insurer's consideration of contingent sources of capital, given that a ratings downgrade impacts the ability to make debt offerings or obtain a credit facility, as well as how much it will cost the company to borrow capital.

Further, companies often use deployable capital to make decisions around planned dividend and share buyback activity. Economic capital models often build in assumptions around these activities, as do external capital models such as the S&P model. Oftentimes, companies may plan to suspend or decrease dividend and share buybacks during capital shortages as an additional means of ensuring it has adequate capital.

Capital Modeling Limitations. A capital model is not considered useful for measuring liquidity risks, as holding capital against liquidity is largely viewed as ineffective and inefficient. Capital models also do not necessarily forecast cash flows, as it's more appropriate for cash flow forecasting to be performed using an earnings model or a cash flow model.

Conclusion

Economic capital is one of the most useful tools for evaluating an insurer's capital adequacy and, for large organizations, it plays a central role in many aspects of their operations, from risk management and corporate governance processes, to strategic planning and capital management. For this reason, examiners should have a basic understanding of economic capital to inform their approach to these aspects of the exam. Further, leveraging testing of an insurer's capital models across the Handbook's recommended ORSA testing, Exhibit DD Capital Management testing, and model risk testing, can help examiners achieve exam efficiencies while simultaneously addressing some of the more critical risks to an organization.

Footnotes:

- 1 NAIC Financial Condition Examiners Handbook, 2021 Edition, Exhibit M, page 498
- 2 Financial Condition Examiners Handbook, 2021 Edition, page 164
- 3 Financial Condition Examiners Handbook, 2021 Edition, page 165
- 4 Financial Condition Examiners Handbook, 2021 Edition, page 169
- 5 Financial Condition Examiners Handbook, 2021 Edition, page 169
- 6 Financial Condition Examiners Handbook, 2021 Edition, page 169

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Christine is a Supervising Examiner at Risk & Regulatory Consulting, LLC. Her responsibilities include identifying and assessing risks, participating in C-level interview, completing walkthroughs of various accounting an operation processes, ; and performing control and substantive testing, while conducting risk-focused examinations in accordance with the NAIC Financial Condition Examiners Handbook. Prior to joining RRC, Christine worked as a Financial Examiner for the Texas Department of Insurance of insurance.