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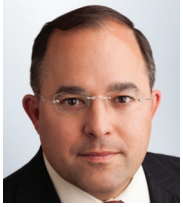

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Advisory focus

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Demystifying life RBC equity charges

Summary

Insurance companies continue to come under increasing pressure to find sources of investment returns. With fixed income yields at historic lows and frequently below the return levels demanded by reserves and pricing, and the looming specter of rising rates driving total returns negative, insurers are increasingly looking to other asset classes for relief.

The key question being asked by insurers is whether allocating investments away from core fixed income into other asset classes is worth the risk, and for U.S.-based Life insurers, one relevant framework for assessing risk is the NAIC's Risk Based Capital (RBC) framework.

Example

Using the total U.S. Life industry equity allocation, companies can assess the actual capital impact as a percent of invested dollars for allocations to non-fixed income. Additionally, focusing exclusively on the gross capital charge for an investment can be misleading, as the net capital charge varies widely depending on the amount of the allocation and the asset class. In the case of equities–despite a specific gross capital charge of 30% (assuming a beta of 1.0), as the equity allocation increases from 1% of total invested assets up to 10% of total invested assets, the final net capital charge can vary from 9.0% to 51.4%.

Risk based capital background

Developed during the 1990's, the RBC framework was designed to provide quantitative assessment of the level of risk being assumed by an insurer (estimated by Required Capital) compared to the actual surplus held (Adjusted Capital). The resulting ratio provides a quantitative assessment of the solvency of a company, and can be compared across companies and over time to assess the solvency of the industry. Although the RBC formula has been criticized for some simplifications, estimates within the model at odds with economic experience and ignoring some key risk variables, it remains the solvency model in the U.S. and similar approaches are used by other countries (and ratings agencies) as well.

The basic RBC model starts from augmented statutory financial data and applies capital charge percentages to financial statement items. The gross capital charges are designed so that, when measured within the covariance calculation, they capture the expected loss from that risk category over a threshold probability over time, targeted at the 95th percentile (1 in 20) loss occurring over a one-year time frame.[1] This is basically

equivalent to the 1-year 95th percent Value at Risk (VaR), but it is a factor, not a statistical VaR calculation. This gross capital charge (30% in the case of Life equities with a "beta" of 1.0) is adjusted for tax effects (assumed to be 35%) and then combined with other risks through a "covariance" equation. The covariance equation gives recognition to the understanding that it is unlikely that all of the risks will occur at the same time, so correlation needs to be considered. The RBC formula accomplishes this by squaring the risk terms, adding and taking the square root (effectively implying a correlation of 0.0).

Use of this covariance formula creates a challenge in assessing the RBC impact of an investment allocation, since the gross capital charge will not be the same as the actual net change in Required Capital, nor the final Risk Based Capital ratio, and will vary depending on its relationship with the other factors. To best estimate the actual impact of an investment allocation on Required Capital and RBC, the actual model for the company needs to be recalculated. To illustrate the non-linearity of the formula, particularly for equities, the following example shows an estimate of the impact on changing equity allocations for the U.S. Life Industry for year-end 2014. Note that the results for a specific company will likely be very different, but this serves as a useful example to demonstrate the impact of non-linearity in capital charges.

Life Industry example—methodology

This example relies on data from the NAIC's annual report on RBC factors for the Life industry for year-end 2014. The basic approach is to take the NAIC's analysis of the total Life industry RBC factors, and examine the impact which changing these factors to reflect investment allocation changes has on a net surplus basis, to determine the net capital charge. Note that only summary information was available, so detailed recalculation of some specific factors could not be done.

NAIC RBC data

The NAIC analyzes the RBC factors for the Life industry as a whole and publishes the report each year, with the most recent reporting being year-end 2014. The summary statistics for the industry in $ '000's, with the investment-related gross capital charge items in red, are:

C0	Asset Risk—affiliates	18,663,110
C1-cs	Asset Risk—non Af CS, non Ins affil.	26,039,253
C1-o	Asset Risk—Other	38,560,998
C1	Asset Risk—Total	64,600,251
C2	Insurance Risk	23,232,226
C3a	Interest Rate Risk	14,530,687
C3b	Health Credit Risk	2,082
C3c	Market Risk	2,224,840
C4a	Business Risk	6,998,502
C4b	Business Risk	647,291
C4	Business Risk	7,645,793
	Adjusted Capital	486,612,659

Source: NAIC "Life Industry RBC Results for 2014" by NAIC Staff (http://naic.org/documents/research_stats_rbc_results_life.pdf)

The actual U.S. Life RBC formula for the year ended 12/31/2014 is:

$$C\text{-}0 + C\text{-}4a + \mathrm{Sqrt}[(C\text{-}1o + C\text{-}3a)^2 + (C\text{-}1cs + C\text{-}3c)^2 + (C\text{-}2)^2 + (C\text{-}3b)^2 + (C\text{-}4b)^2]$$

Using the formula and the data above, Required Capital is $90.1 billion relative to a total industry adjusted capital of $486.6 billion for an RBC ratio of 540%. Note that the Required Capital reported by the NAIC in their report is $99.9 billion, which reflects consolidation and other adjustments that were not disclosed, and so are not used in this analysis.

The key industry investment data from the NAIC's RBC report is total U.S. Life industry invested assets of $3.713 trillion at year-end 2014.

Initializing the model

The C-1cs capital charge is the total charge for non-affiliated equities and for affiliated, non-insurance subsidiaries. The formula charge is a 30% base

[1] "Report of the American Academy of Actuaries' Life Capital Adequacy Subcommittee", January 2011 **(http://www.actuary.org/pdf/life/American_Academy_of_Actuaries_SMI_RBC-Report.pdf) page 59**

charge, multiplied by the beta of the stock relative to the market, and then tax effected at 35% per the RBC model. For these purposes, beta is assumed to be 1.0, so a raw charge of 19.5% is assumed [30% x 1.0 x (1-.35)], implying a common stock value of $133.5 billion ($26.039 billion divided by 0.195). Note this makes a simplifying assumption that all C-1cs capital charges are related to equities, even though other items may be included in the actual industry value, particularly some off-balance sheet items.

If these investment dollars are subtracted from equity and C-1cs, and added to NAIC Class 1 bonds (raw C-1o gross after tax factor of 0.294% / 29.4 basis points), required capital falls from $90.1 billion to $84.0 billion, so the Required Capital needed to maintain a 540% RBC falls by $33.1 billion. This will be our starting point.

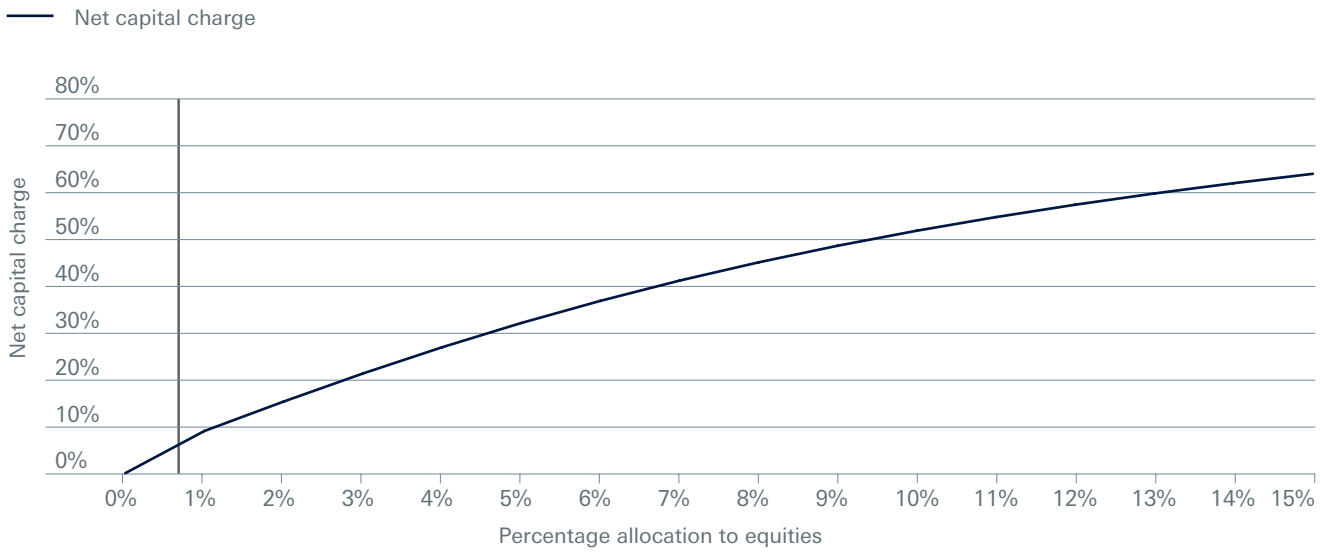
Examine additions to equity

With the C-1cs factor reduced to zero (no equity allocation) and the associated assets put into NAIC 1 bonds, the estimated Required Capital is $84.0 billion, requiring surplus of $453.6 billion to maintain an RBC ratio of 540%. We'll now examine what happens as we allocate investments from NAIC 1 bonds into equities (assuming a beta of 1 giving a pretax raw capital charge of 30%), in 1% increments (approximately $37.1 billion per 1% of invested assets). The formula is recalculated with new C-1o and C-1cs values to reflect the change in equity allocation, the Required Capital is recalculated, and the surplus needed to maintain a 540% ratio is compared to the starting surplus of $453.6 billion.

Figure 1

	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Equity balance ($ billions)	—	37.13	74.26	111.38	148.51	185.64	222.77	259.89	297.02	334.15	371.28
Additional surplus ($ billions)	—	3.36	11.39	23.78	40.05	59.71	82.26	107.22	134.21	162.87	192.92
Effective capital charge		9.0%	15.3%	21.3%	27.0%	32.2%	36.9%	41.3%	45.2%	48.7%	52.0%

As you can see, the increase in surplus is not linear–the additional surplus needed to maintain a constant RBC ratio increases at a faster rate than the increased equity allocation. Graphically, this is shown as:



For illustrative purposes only

Is it worth it?

Taking on increased risk is a concern for any company, but insurance companies are the essence of risk-taking entities—risk is only undesirable if you are not compensated for taking it. For most insurers, a key metric that drives decision making is return on surplus—will I earn enough on an investment to justify the additional surplus I need to hold to balance out the risk? Most companies have an internal measure, either cost-of-capital, return on equity, or some other method of assessing risk/reward that determines which risks are adequately compensated.

In the example, the expected increase in return (expressed as dollars of return) for allocating into equities can be compared to the increased surplus needed to maintain a constant RBC ratio. If the resulting return on additional surplus meets the company's threshold, an argument can be made that the allocation to equities is adding to the return on surplus, so the risk is compensated (at least for an RBC-based measure of risk). However, since the surplus needed to support an equity allocation is non-linear, while the return generated off the balance is linear, the return declines as the allocation increases.

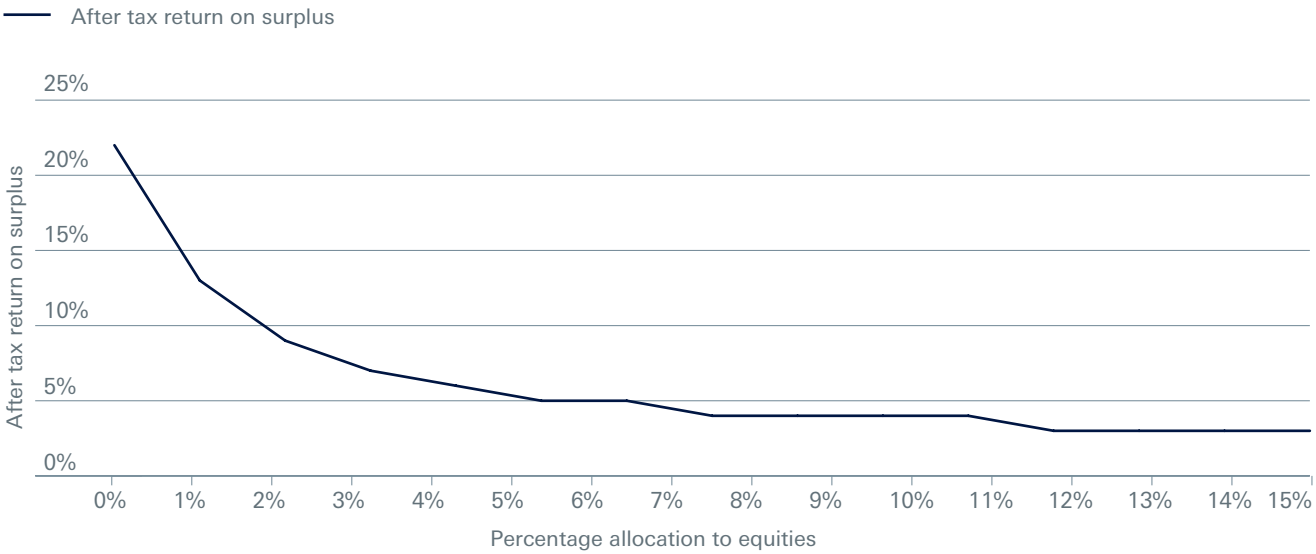
Extending the table from Figure 1 to show the expected increase in return (assuming a 1.95% after tax additional return on equities relative to bonds), the following can be observed:

Figure 2

	Equity allocation										
	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Equity balance ($ billions)	—	37.13	74.26	111.38	148.51	185.64	222.77	259.89	297.02	334.15	371.28
Additional surplus ($ billions)	—	3.36	11.39	23.78	40.05	59.71	82.26	107.22	134.21	162.87	192.92
Effective capital charge		9.0%	15.3%	21.3%	27.0%	32.2%	36.9%	41.3%	45.2%	48.7%	52.0%
Additional annual return, after tax ($ billions)		0.72	1.45	2.17	2.90	3.62	4.34	5.07	5.79	6.52	7.24
After tax return on additional surplus		22%	13%	9%	7%	6%	5%	5%	4%	4%	4%

For illustrative purposes only

Shown graphically, the change in return on surplus looks like this:



For illustrative purposes only

The return on surplus declines dramatically as the allocation increases, which illustrates the danger of focusing on a constant capital charge.

What about other asset classes, such as Real Estate?

Equities hold a unique position within the RBC formula relative to other asset classes, as the capital charges are included as a distinct term, C1-cs (although some off-balance sheet items are also included in C1-cs). This means the net impact of equity allocations can start at very low levels and increase dramatically as investments are allocated to equities. For other non-core fixed income asset classes such as preferred stock, direct real estate, mortgages, and many limited partnership investments, their charges are included in C1-o, and, as a result, they do not exhibit the same variability in asset charges. This is because included in the C1-o charge is the credit charge for core fixed income investments, so most companies will have a substantial starting C1-o charge. Generally, this causes the net capital charge to be higher than the gross capital charge for these asset classes. Consequently, when asset class exposures can be achieved through more than one legal form (such as direct real estate as a C1-o charge versus Real Estate Investment Trusts / REITs as a C1-cs charge), companies need to pay close attention to the legal form of their investments to assess RBC impact.

Conclusion

It is difficult to generalize the impact a specific investment allocation will have on a company's RBC without reviewing the detailed calculation. The nature of the covariance component of the calculation means net capital charge impacts will vary significantly between companies. Note also that changes in the value of assets held at market value on the statutory statements (such as public equities) will also affect RBC over time as their changes in value directly affect the numerator of the ratio—Adjusted Capital. Ultimately, the asset allocation decision is driven by many factors, of which RBC is only one component.

It is worth noting that at least one ratings agency (AM Best) uses a modified version of RBC called Best's Capital Adequacy Ratio (BCAR) that would be expected to show a similar effect for most Life companies.