Putting a price on long-term business

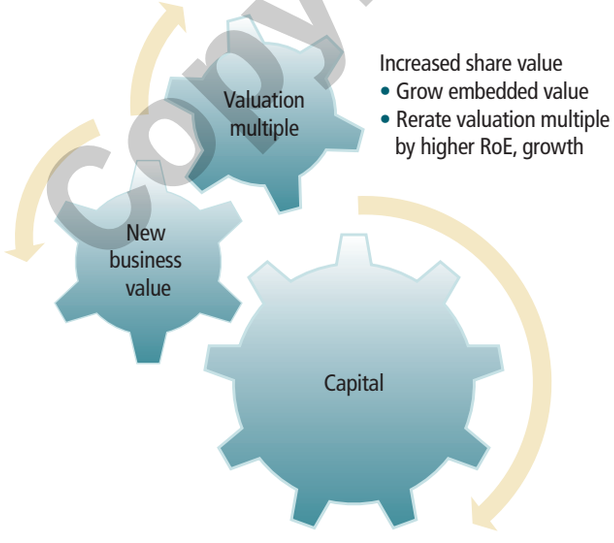
In the first of two articles, Allianz chief risk officer Thomas Wilson re-examines how life insurers measure the true value to the business of capital-intensive long-term products

Balancing earnings and capital is critical for managing the value of long-term life products. For these products, earnings emerge only over time – if at all – and depend on future market and insurance outcomes. In contrast, they cause a very concrete upfront capital strain.

Even more challenging for value managers, the value created by the expected earnings cannot be assessed without recognising the capital strain at an appropriate cost of capital: only earnings in excess of the cost of capital create shareholder value.

Balancing earnings, capital and value is therefore critical. For example, equity analysts from Barclays wrote in a 2011 research note: "Investors have the right to understand how the capital ... is spent ... We are supportive of investment in new business ... [if it generates] IRRs [internal rates of return] above the company's cost of capital and with reasonable payback periods ... [but] business at or sub-9% IRR, which takes nine years to break even ... is not a viable source of value for shareholders."

Getting the right balance is also possible. Redburn, a US independent research provider, stated in a 2012 report: "Most life insurers have significantly improved new business [capital] efficiency ... Put simply, insurers are delivering much greater new business value for the same level of investment. This has been accomplished through a combination of selling more sensible products, taking advantage of market conditions to increase prices and redesigning products."



This first of two articles focuses on the relationship between technical earnings, capital and value creation.

The important insight is that the two most commonly used metrics in the life insurance industry, value of new business (VNB) and new business margin (NBM), are not adequate for managing capital-intensive businesses. Focusing on financial value created, they do not adequately highlight the role of the capital required and, as a consequence, imply excess returns on capital ranging anywhere between zero and infinite, depending on the product's capital intensity. This is a problem because insurers' valuation multiples depend on their return on capital.

A way to remedy this is to use economic capital intensity (ECI) and risk-adjusted performance metrics (RAPM).

This article focuses only on technical earnings, calculated using risk-neutral valuation techniques because these are the only earnings valued by VNB and NBM. Unfortunately, technical earnings represent only a small part of the total earnings from general account savings and investment products, making them even less useful when managing value.

The second article in the series, to be published in the April issue of *Insurance Risk*, therefore extends the RAPM framework to include real-world investment returns, explicitly recognising the value of future expected risk premia and illiquidity premia and the capital required to support them.

Technical earnings, capital intensity and share value

Life insurers underwrite long-term savings and investment products to meet their clients' retirement needs. Writing the policy entails risk that binds the firm's capital for the duration of the contract. This capital must be adequately compensated as long as it is bound.

Since financial market risk can in principle be hedged, the underwriting decision can in principle be taken independently of asset/liability (A/L) management decisions. Based on this logic, two measures are often used that are independent of A/L decisions: VNB, the absolute financial contribution of technical earnings in excess of the cost of capital *as if* the asset/

liability matching were perfect; and NBM, which expresses this contribution as a percentage of premium.

Although commonly used, these measures are not useful for capital-intensive businesses. While €1 VNB represents an incremental contribution to embedded value, in the limit it translates into a return on capital just equal to the cost of capital (for products with very high capital intensity) to an almost infinite return on capital (for products with very low capital intensity).

$$\text{Market value (MV)} = \text{Embedded value (EV)} \times \frac{MV}{EV} \text{ multiplier} \quad (1)$$

VNB/NBM focus on technical earnings

Driven by RoE, dividend policy and growth

This should be a major concern to value managers. Why? There are broadly two ways to increase the value of a company: either increase the embedded value at the existing market multiple (a possibility that VNB/NBM more or less address); or increase (rerate) the firm's valuation multiple. Higher returns on investment generally lead to higher multiples (see figure 1).

This implies that increasing VNB might add embedded value, but managing return on capital can lead to a higher valuation multiple. Improving the firm's multiple not only directly affects share value, it also increases the "currency" with which the firm can acquire other companies. For both reasons, the optimal strategy focuses on both embedded value *and* return on capital since shareholder value depends on both.

Making it precise: Technical.VNB/NBM

The technical value of new business (Technical.VNB[1]) defined by the CFO Forum (2009) values only the underwriting, fee and expense margins – excluding the potential returns from taking any asset/liability mismatch.

Although the goal is complex, the calculation is intuitive: calculate the mark-to-model value of only the fees, underwriting and expense contributions, less the cost of capital required to support these risks over the maturity of the transaction – for example:

$$Technical.VNB = E^{Q}\left[\sum_{t=0}^{T}\left(\frac{P_t - E_t - CL_t + r_{f,t}C^{uw}{}_t}{\prod_{j=0}^{t}\left(1+r_{f,t}\right)}\right) - \sum_{t=0}^{T}\left(\frac{C^{uw}{}_t}{\prod_{j=0}^{t}\left(1+r_{f,t}\right)}\right)CoC^{uw}\right] \quad (2)$$

where P_t is the premium at time 't', E_t is allocated expenses, CL_t is the customer claims or payouts, $C^{uw}{}_t$ the capital required to support underwriting risk[2], r_f the risk-free rate of return, CoC^{uw} the appropriate cost of underwriting risk capital and $E^{Q}[..]$ represents expectations under the Equivalent Martingale Measure used to value financial options and guarantees[3].

1 Relation between RoE and M/B multiplier

Bloomberg, YCharts, October 2014

The first term is the mark-to-model value of all premiums, expenses and customer cash outflows evaluated at the best estimate for mortality, morbidity and longevity as well as behavioural risks such as surrender. The second term represents the present value cost of all future capital requirements for the non-hedgable risks[4].

Also included in the first term is the "capital benefit": Technical.VNB is calculated as if capital is held in a separate account and invested in risk-free assets until it is needed to cover unexpected underwriting losses; the return on the risk free assets backing capital represent the "capital benefit".

The use of $E^{Q}[...]$ and discounting at the risk-free rate ensures that embedded options and guarantees are valued in a manner consistent with the financial markets, implying that the theoretical cost of matching assets and liabilities is covered by the product's economics.

Technical.NBM converts this absolute, financial value into a margin on premiums by dividing VNB by the present value sum of expected lifetime premiums, eg

$$Technical.NBM = Technical.VNB \Big/ E^{Q}\left[\sum_{t=0}^{T}\left(\frac{P_t}{\prod_{j=0}^{t}\left(1+r_{f,t}\right)}\right)\right] \quad (3)$$

Focus on capital: ECI and RAPM

VNB can be rearranged into a return on capital or risk-adjusted performance measure – Wilson (2015) – which puts capital to the forefront. For example:

$$Technical.RAPM = \frac{E^{Q}\left[\sum_{t=0}^{T}\left(\frac{P_t - E_t - CL_t + r_{f,t}C^{uw}{}_t}{\prod_{j=0}^{t}\left(1+r_{f,t}\right)}\right)\right]}{E^{Q}\left[\sum_{t=0}^{T}\left(\frac{C^{uw}{}_t}{\prod_{j=0}^{t}\left(1+r_{f,t}\right)}\right)\right]} \geq CoC^{uw} \quad (4)$$

[1] *Technical.VNB, as opposed to VNB, is used in order to make it clear that it reflects only technical earnings. In the next article, we introduce Total.VNB and Investment.VNB, recognising real-world returns*

[2] *Additional risk loadings may also be added to cover, eg operational and business risk*

[3] *Risk-neutral valuation in the context of hedgeable and non-hedgeable risks is discussed Pelsser (2014) and Keller et al (2012)*

[4] *The cost of capital differs from the definition in CRO Forum (2009) by excluding the frictional cost of required capital (FCReC). CRO Forum (2009) defines VNB = PVFP + TVOG – CNHR – FCReC, where PVFP is the present value of future profits, TVOG is the time value of options & guarantees and CNHR is the cost of non-hedgeable risk. The sum (PVPF+TVOG) is identical to the first term; the second term is identical to CNHR. I have argued elsewhere that including FCReC is not appropriate – Wilson, (2015)*

Technical.RAPM can also be expressed as a function of Technical.NBM:

$$Technical.RAPM = \frac{Technical.NBM}{Technical.ECI^{uw}} + CoC^{uw} \quad (5)$$

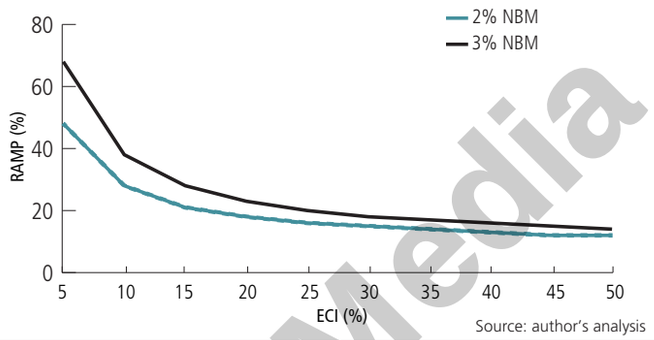
The return on capital is therefore equal to the NBM divided by economic capital intensity (Technical.ECI) plus the cost of capital (CoC^{uw}). Recognition of capital intensity is necessary in order to express value creation relative to capital consumption as opposed to premium. Adding the CoC^{uw} is necessary since Technical.RAPM measures the *total* returns to capital, whereas Technical.NBM measures only *excess* returns above the cost of capital; as a consequence, the deducted cost of capital has to be added back.

Technical economic capital intensity (Technical.ECI) is defined as the ratio of present value of the required capital to present value of premium:

$$Technical.ECI = E^{Q}\left[\sum_{t=0}^{T}\left(\frac{C^{uw}_{\ t}}{\prod_{j=0}^{t}(1+r_{f,j})}\right)\right] \Big/ E^{Q}\left[\sum_{t=0}^{T}\left(\frac{P_t}{\prod_{j=0}^{t}(1+r_{f,j})}\right)\right] \quad (6)$$

ECI generally increases for longer-duration products (because capital is tied up for longer periods) or if there is more non-hedgeable (mortality, morbidity or longevity) risk per period of exposure.

2 Relation between Technical.RAPM, NBM and ECI



Source: author's analysis

VNB/NBM and RAPM both yield the same decision rule: a new policy creates value if VNB/NBM>0 and destroys value otherwise; inspection confirms that RAPM <=> CoC is equivalent to VNB/NBM <=>0.

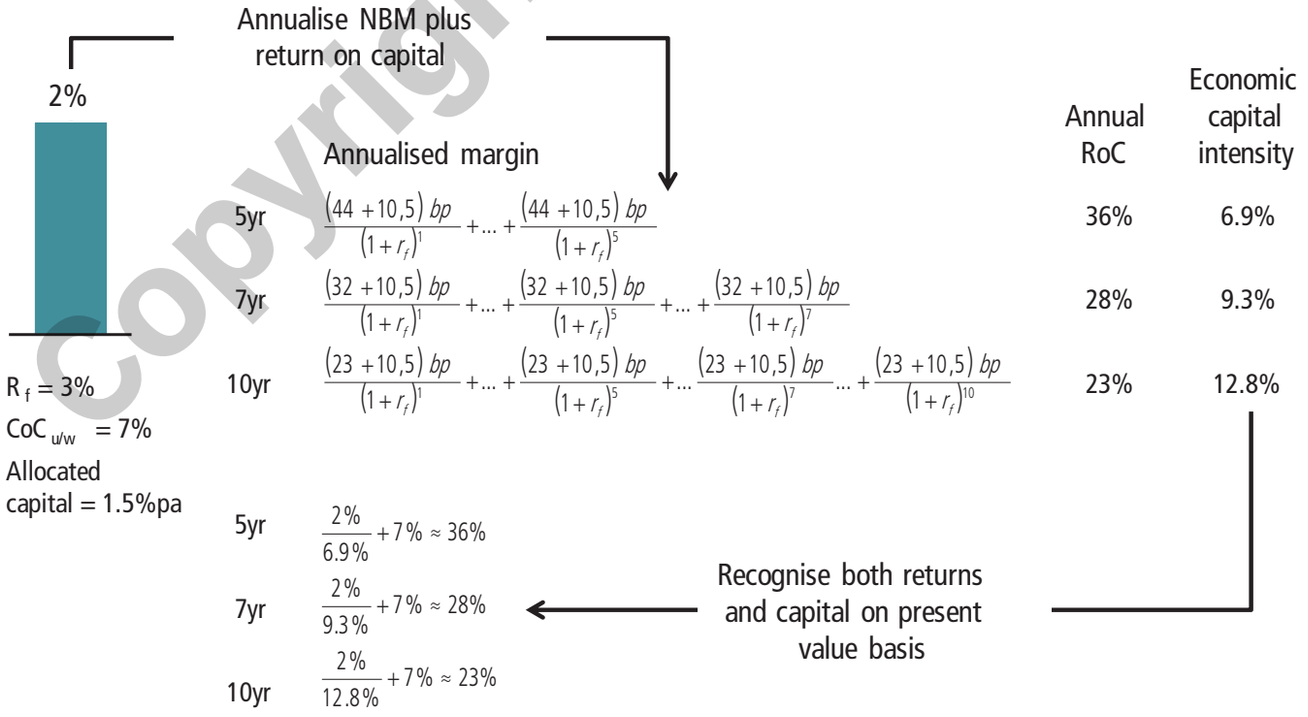
Unfortunately, Technical.VNB and NBM are not useful for managing value in capital-intensive businesses: as illustrated in figure 2, a 2% NBM generates a very different average return on capital depending on the product's ECI, converging to the cost of capital in the limit as ECI increases.

Illustrative examples

Consider three unit-linked products in equation 7. Each of the products offers a 2% NBM, and all three require 1.5% of the premium per annum as

Technical.NBM versus Technical.RAPM (7)

Unit-linked product



Glossary	
Technical.RAPM	Total return to capital from technical earnings: $$Technical.RAPM = \frac{Technical.NBM}{Technical.ECI} + CoC^{uw}$$
Technical economic capital intensity ratio (Technical.ECI)	A measure of expected lifetime capital requirement relative to the present value of premium: $$Technical.ECI = \frac{\sum C^{uw}{}_t / (1+r_f)^t}{\sum P_t / (1+r_f)^t}$$
Payback period	The expected time to recoup the new business capital and expense strain under real-world return assumptions. Longer payback periods are usually associated with longer capital lock-up periods.

capital at a cost of capital of 7%. The only difference between the three is that they mature and bind capital for different durations – for example, five, seven, and 10 years respectively.

It is assumed the insurer completely hedges the future fees from movements in the underlying index using a strip of index forwards, effectively locking in the NBM at inception.

The same 2% NBM emerges as a 44-basis-point/year annuity for the five-year policy versus 23bp a year for the 10-year alternative. The additional 10.5bp a year in the numerator reflects the return on underwriting risk capital (1.5% a year required capital times 7% cost of underwriting capital), which is subtracted when calculating NBM, but added back when calculating the total return on capital.

The 2% NBM emerges faster and stronger for the five-year product, while the capital tied up each year is the same, leading to a higher annualised return on capital equal to 36% for the five-year product versus 23% for the 10-year product.

Equivalently, we can use the RAPM equation directly – for example, dividing the NBM by ECI and adding back the CoC, as illustrated in the lower half of the figure above. All else being equal, the 10-year product will have an ECI about two times that of the five-year product, as its lifetime capital consumption is approximately twice as high.

It is understandable why shareholders would prefer the five-year product over the 10-year product: although both offer the same 2% NBM (and the same absolute VNB), the five-year product requires significantly less cumulative capital over its lifetime and therefore offers a superior average lifetime return on capital.

Complementary metrics

Understanding the connection between technical earnings and capital intensity is critical for managing the value of long-term life businesses. The most popular metrics, VNB and NBM, focus more on embedded value, and all but ignore return on capital.

Value managers balance the two, opening a second powerful lever for increasing share value by influencing the firm's multiple. Achieving this balance requires a critical focus not only on VNB/NBM, but also on the product's capital intensity and return on capital or RAPM.

The glossary above highlights the metrics that are useful complements to VNB and NBM for managing return on capital and capital intensity. ■

Thomas Wilson is chief risk officer of Allianz. This article draws from Value and capital management: a handbook for the finance and risk functions of financial institutions (Thomas C Wilson, 2015, Wiley Finance Series). The views in this article are the author's, and do not necessarily represent the views of Allianz.

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