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Setting a Cost-of-Capital for IFRS 17 – methodology

For IFRS 17, a 'Risk Adjustment' (RA) is part of the valuation of technical liabilities to value non-financial risk. To determine this RA, different approaches are allowed like a Cost-of-Capital (CoC) approach or a (tail) Value-at-Risk approach. We think that for European insurance companies a CoC approach in line with the Solvency II Risk Margin (RM) is a natural choice. In Solvency II, the annual CoC rate of return (the CoC) is set by EIOPA. In this article we propose a methodology for individual insurers to determine the CoC for IFRS 17.

For Solvency II, the CoC is calibrated using an implementation of the Capital Asset Pricing Model (CAPM). We briefly describe this implementation and show its limitations.

A pure CAPM arrives at a very low CoC by allowing for full diversification with *external* 'market risk' (taken on by shareholders). We propose to limit diversification benefits to *internal* diversification with 'financial risk' (taken on by the insurer). We end with a comment on taxes.

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The article is written on a personal title.

INTRODUCTION

The RM is introduced in Solvency II to '*ensure*' that in the future, shareholders will continue to provide the equity (E_q) needed to support the run-off of current long-term technical liabilities. Similarly, the RA is needed in IFRS 17 to provide a *minimal* compensation for the current (and potential future) shareholders for the risk they take with respect to in-force business. The RA captures a minimal 'expected Return on Equity' ($E(RoE)$).

Economic theory, in the form of CAPM, suggests a way to quantify this $E(RoE)$. Shareholders are assumed to be invested in 'the market', where they get an expected equity risk premium $E(R_m)$ on top of the risk-free rate (R_f). CAPM introduces a β as measure of systemic, i.e. non-diversifiable risk:

$$E(RoE) = R_f + \beta \cdot E(R_m) \quad (1)$$

To generate these expected returns, an insurer typically takes financial risk (market risk), say CR_{fr}, and non-financial risk (insurance risk), say, CR_{nfr} [1]. The insurer specifies minimum (before-tax) expected risk premiums for financial risk ($E(R_{fr})$ and for non-financial risk respectively:

$$E_q \cdot E(RoE) = (1-t) \cdot (E_q \cdot R_f + CR_{fr} \cdot E(R_{fr}) + CR_{nfr} \cdot CoC) \quad (2)$$

The CoC is the minimum expected annual risk premium for non-financial risk. Until the section 'taxes', we will assume that the corporate tax rate $t = 0$.

SOLVENCY II

EIOPA (2018) calibrates β (from return regression estimates) for a typical European insurance company at 1,2. The Risk Margin calculation assumes no financial risk ($CR_{fr} = 0$) and a Solvency Ratio of 100% ($Eq = CR_{nfr}$). EIOPA then applies it to obtain the minimum return for non-financial risk[2]. This results in:

$$\widehat{CoC}_{\text{EIOPA}} = 1{,}2 \cdot E(R_m)$$

There are two major issues with this approach, as the assumptions are incorrect:
- The insurers in the regression incur not just non-financial risk, but also financial risk.
- The insurers in the regression do not have a 100% target Solvency Ratio.

Also, there is no mention of taxes.

To understand these two issues, let us look at CAPM in more detail.

In IFRS context an insurer runs two types of risk, financial risk and non-financial risk, but these two have different correlations with the market. In other words the 'systematic risks' of these two are different. The financial risk taken on by an insurance company will have a very high correlation (say '1') with market risks, and will lead to a high systematic risk. On the other hand, as illustrated by the correlations of the Solvency Standard Formula, non-financial risks (mainly underwriting risk) have a low correlation with market risks (say, '0,25'), with low systematic risk. In practice, financial risk is relatively large compared to non-financial risk, so it is difficult to interpret one overall β as reflecting a CoC for non-financial risk.

The Solvency II calibration of the CoC implicitly uses a Solvency Ratio of 100%. In fact, insurers work with much higher Solvency Ratios. Their shares are (far) less risky than a 100% Solvency Ratio suggests (in a sense, insurers have less 'leverage'). The regression β's from Solvency are estimated from these higher actual Solvency ratios. CAPM then suggests that the required returns from the regression are too low when applied to a 100% Solvency Ratio.

These two issues have different directions. The relatively low systematic risk of non-financial risk indicates that EIOPA *overestimates* the CoC. The relatively high Solvency ratio of insurers suggests that EIOPA underestimates the CoC.

Pure CAPM suggests that there is a direct link between the amount of non-financial risk of the insurance company (CR_{nfr}) and the expected return on equity ($E(RoE)$), driven by systematic risk. Attractive as this theory is, it is not realistic in how expected returns to shareholders (weighted costs of capital) are specified (by sell-side analysts) and in how insurance companies specify notional minimum profits (see also Gormson and Huber, 2023).

PROPOSED METHODOLOGY

We propose a methodology to set a CoC. We base it not on a 'pure' CAPM, but a 'practical' approach that captures the essence of CAPM. Concretely, we invert equation (2), and combine it with equation (1) and get:

$$CoC = (E_q \cdot (R_f + \beta \cdot E(R_m)) \,/\, (1-t) - (E_q \cdot R_f + CR_{fr} \cdot E(R_{fr})) \,/\, CR_{nfr} \quad (3)$$

In words: the CoC is the rate of return on non-financial risk needed to meet shareholders' expectations after we correct for the returns on financial risk. All diversification benefits accrue to non-financial risk. We fix the 'risk premium' for shareholders, $\beta \cdot E(R_m)$, as a long-term strategic objective for the insurer or expected by the shareholder. We do not fix a full return target $E(RoE)$, but retain the CAPM role of the risk-free rate.

We are agnostic about how this 'risk premium' is set. The discussion above around Solvency II suggests, however, that it needs to be 'consistent with' the relative amount of financial risk CR_{fr} and with the Solvency ratio. If historical peer returns would be used to specify the risk premium, CAPM suggests we should correct for changes or differences in relative financial risk and Solvency ratio.

If non-financial risk CR_{nfr} changes, we propose to change financial risk (CR_{fr}) and equity (Eq) along CAPM lines to maintain the pre-specified risk premium (to make an unchanged risk premium plausible):
1. An increase in non-financial risk would lower the correlation of the insurance company with market returns, as the relative weight of non-financial risk increases. If an insurer wants strategic $E(RoE)$ targets or β to remain unchanged, financial risk needs to increase in line with non-financial risk to compensate. More specifically, we suggest that the insurer maintains a constant $CR_{fr} \,/\, CR_{nfr}$ ratio.
2. An increase in non-financial risk, combined with an increase in financial risk from 1, would lead to an increase of the $E(RoE)$. It seems logical that we want equity Eq to rise to compensate. More specifically, we suggest that equity Eq rises to keep a constant Solvency Ratio.

This is the thinking behind using the traditional use of CAPM for pricing, requiring the assumption that the business activity to be priced is similar to the current business activities, that the financing mix is similar, and that the required rate of return remains unchanged (ACCA, 2023).

RESULTS

To illustrate how our proposal works, we begin with a 'Solvency' scenario (1) and then show how various 'refinements' affect the CoC (underlying assumptions available on request). All of the outcomes assume a market risk premium $\beta \cdot E(R_m)$ of 4%, as this does not drive the methodology.

Scenario	Target Solvency Ratio	Financial risk CR_{fr} (% non-financial risk CR_{nfr})	Corporate tax-rate t (%)	Risk-free rate R_f	CoC
1	100,0%	0,0%	0,0%	0,0%	4,0%
2	175,0%	0,0%	0,0%	0,0%	7,0%
3	100,0%	100,0%	0,0%	0,0%	0,2%
4	100,0%	0,0%	0,0%	2,0%	4,0%

Table 1: CoC for different scenario's, risk premium β.E(Rm)=4%

Scenario 1 is a 'Solvency' calculation, with 100% target Solvency Ratio, 0% financial risk, corporate tax-rate of 0%, and risk-free rate of 0%. This gives a CoC of 4%, exactly equal to the market risk premium. All of the risk premium to shareholders must come from non-financial risk.

Scenario's 2-4 each change only one of the Solvency assumptions:

- Scenario 2 changes the target Solvency Ratio to 175% (from 100%). Ceteris paribus, the CoC rises from 4% to 7,0%. The target Solvency Ratio acts like a multiplier (=175% x 4%). From a CAPM perspective, the ceteris paribus makes no sense. CAPM suggests that a higher target Solvency Ratio should imply a lower $E(RoE)$. That is why we saw an issue with Solvency applying an $E(RoE)$ from a regression estimate based on high Solvency ratios to a Solvency ratio of 100%. And that is why our methodology suggests a constant Solvency Ratio.

- Scenario 3 allows for diversification benefits from financial risk (ratio CR_{fr} / CR_{nfr} = 100%, an increase from 0%). Ceteris paribus, the CoC falls to 0,2% (the size of the fall depends on the assumed expected returns on financial risk, $E(R_{fr})$). From a CAPM perspective, the ceteris paribus makes no sense. CAPM suggests that higher financial risk should raise $E(RoE)$. That is why we saw an issue with Solvency applying an $E(RoE)$ from a regression of insurers with financial risk to an insurer *without* financial risk. And that is why our methodology suggests a constant ratio financial risk / non-financial risk.

- Scenario 4 allows for an increase in risk-free rates from 0% to 2%. The CoC remains unchanged. Ceteris paribus, the CoC is not affected by the change in risk-free rates.

SPECIAL: TAXES

One may wonder why insurers take financial risk at all. They need to pay corporate taxes on the returns they get. Shareholders may as well take this risk themselves, avoiding the taxes. The missing dimension is risk. Risk typically arises with negative earnings, and there is no *direct* tax compensation. Assuming structural profitability and sufficient carry-back and carry-forward, there is, indirect compensation and, *on average*, taxes reduce losses as well as profits. If so, the reduction of returns due to tax is closely linked to the reduction in risk.

But there is another issue with tax that is not so easily dismissed. This relates to the risk-free rate. As the CoC is about risk, it may seem that the level of the risk-free rate is irrelevant. And, without taxes, that would be the case (see previous section). However, companies pay corporate taxes on the risk-free returns they obtain when investing their equity. If investors are not to pay for these taxes, the CoC may need to rise to compensate.

DISCUSSION

Solvency II calibrates the CoC using CAPM theory. However valuable the theory, implementation and practice make it hard to work with. CAPM is usually used for pricing, under the assumption that 'business structure' and 'finance structure' remain unchanged. Our proposal is to turn these assumptions into drivers of the CoC for insurance companies. This requires making assumptions on 'business structure' (ratio financial / non-financial risk) and on 'finance structure' (leverage / Solvency II ratio), but these are quantities that are understandable for insurers and investors.

A final comment on diversification. An important driver of the proposal is internal diversification between non-financial risk and financial risk. How to handle diversification *within* non-financial risk? According to CAPM, each source of non-financial risk has its own systematic risk. CoC rates can be quantified independently. From our perspective, required expected returns on equity may not sufficiently take account of diversification. This allows internal diversification to reduce the CoC rate. ■

Literature

ACCA, 'CAPM: theory, advantages and disadvantages', https://www.accaglobal.com/gb/en/student/exam-support-resources/fundamentals-exams-study-resources/f9/technical-articles/CAPM-theory.html, viewed feb. 6, 2023.

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1 – CR stands for capital requirement. This terminology is borrowed from Solvency, where risk is measured with 'capital', using a 100% solvency ratio assumption.

2 – There are differences between Solvency II and IFRS 17 definitions of non-financial risk, but they do not matter for the storyline.