MOODY'S ANALYTICS

IFRS 17 Series

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Using Stochastic Scenarios to assess VFA Eligibility

IFRS 17 provides a specific measurement model for insurance contracts with direct participation features. This measurement model has become known as the Variable Fee Approach (VFA), referring to the fact that such contracts characterized by a variable fee that the entity charges in exchange for investment-related services. The variable fee is treated differently under the VFA than under the General Measurement Model (GMM), resulting in different attribution between insurance service and finance results, profit timing and volatility.[1]

Understanding whether existing contracts meet the eligibility criteria for the VFA is therefore of great importance to companies implementing IFRS 17 before 1 January 2022, and on an ongoing basis as new contracts are written.

As with many other decisions in the standard, the criteria for VFA eligibility are not precisely defined and leave room for interpretation by individual entities. This paper discusses the key criteria and how they could be assessed using stochastic scenarios.

What does the standard say?

IFRS 17 Paragraph B101 provides a definition of insurance contracts with direct participation features:

a. The contractual terms specify that the policyholder participates in a share of a clearly identified pool of underlying items;
b. The entity expects to pay the policyholder an amount equal to a substantial share of the fair value returns on the underlying items; and
c. The entity expects a substantial proportion of any changes in the amount to be paid to the policyholder to vary with the change in fair value of the underlying items.

Paragraph 107 provides further guidance as to the interpretation of the characteristics set out in Paragraph 101(b) and 101(c). In particular, according to Paragraph 107(b), an entity shall:

Assess the variability in the amounts in paragraphs B101(b) and B101(c):

i. Over the duration of the group of insurance contracts; and
ii. On a present value probability-weighted average basis, not a best, or worst outcome basis.

Paragraph B108 goes on to discuss the different outcomes that might arise for products containing guarantees, depending on whether the guarantee bites in the particular scenario.

1 Profit Emergence under IFRS 17: The Variable Fee Approach, Steven Morrison, Moody's Analytics (November 2018) https://www.moodysanalytics.com/articles/2018/profit-emergence-under-ifrs17-vfa

Scenario-based modeling

Paragraphs B107(ii) and B108 acknowledge that different scenarios can have different outcomes in terms of the returns on underlying items and the policyholders' share in these returns, and that assessment of the criteria set out in Paragraphs 101(b) and 101(c) should allow for this.

The use of scenarios to assess VFA eligibility has previously been described in an article by Hallema,[2] who suggests potential metrics for assessing policyholder share and variability and quantifies these metrics under three different hand-picked scenarios for the return on underlying items. In this paper, we adopt a similar approach, but use a much-larger number of stochastic scenarios to quantify policyholder share and variability.

The use of stochastic scenarios in this context might appear daunting in terms of operational and computational effort. However, although not prescribed in the standard, stochastic modeling techniques are expected to be widely used in the calculation of fulfilment cash flows for contracts with participation features anyway (see, for example, Paragraphs B37-B38). So the additional effort required to use stochastic scenarios to assess VFA eligibility might be quite manageable.

Description of example contract

The illustrative contract group considered here consists of 100 contracts, with a coverage period of 10 years and a single premium of CU 150 per policy received immediately when the contracts are issued. In return, the contract provides the following benefits:

- On death during the coverage period: The account balance, subject to a guaranteed minimum death benefit. We assume that one policyholder dies each year.
- On survival until the end of the coverage period: The account balance, subject to a guaranteed minimum maturity benefit.

At inception, the account balance is equal to premiums paid, and subsequently evolves each year based on returns on an equity fund, subject to an annual charge to reflect investment services provided[3]. The annual charge is a fixed percentage of the account balance at the end of the year (prior to paying any benefits).

We assume that this contract satisfies the requirement that the policyholder participates in a clearly identified pool of items (the account balance). The question we investigate is whether the level and variability of this participation meets the requirements set out in Paragraphs B101(b) and B101(c).

Eligibility metrics

To assess the criteria in Paragraphs B101(b) and B101(c), we must define metrics that quantify the policyholders' share of the fair value returns on the underlying items and its variability.

One of the challenges with interpreting Paragraph 101(b) is that it refers to the policyholders' share of the fair value returns. However, for many contracts, including the one considered here, the payments to both policyholders and the entity are expressed in terms of the current value of the underlying items, rather than fair value returns.

Note that each year t the account balance evolves according to:

$$AccountBalance(t)=AccountBalance(t\text{-}1)+FairValueReturn(t) - EntityCashFlow(t)\text{-}PolicyholderCashFlow(t)$$

Rearranging:

$$EntityCashFlow(t) + PolicyholderCashFlow(t) = FairValueReturn(t) + AccountBalance(t-1) - AccountBalance(t) \quad \text{[Equation 1]}$$

2 VFA eligibility assessment methodology, E. Hallema, de actuaris (October 2018)

3 The contract is based on that described in Example 9 of "Illustrative examples on IFRS 17 Insurance Contracts" (IFRS Foundation, May 2017) but with modifications to the assumed coverage period and size of annual charges. Here we also assume a minimum guaranteed benefit at maturity as well as on death.

In general, ***AccountBalance(t)≠AccountBalance(t-1)*** so the fair value return each year doesn't naturally decompose into payments to the policyholder & the entity. Part of the payments each year can be attributed to the account balance at the end of the previous year, while some of the account balance is retained to be paid in future years.

However, the account balance is completely distributed at maturity of the contract. Summing over all years up to ***T=10*** years and rearranging shows that the sum of fair value returns conveniently breaks down into two terms, the sum of cash flows to the entity and sum of cash flows to policyholders[4]:

$$\sum_{t=1}^{T} EntityCashFlow(t) + \sum_{t=0}^{T} PolicyholderCashFlow(t) = \sum_{t=1}^{T} FairValueReturn(t)$$

As noted above, different scenarios will result in different outcomes in terms of the returns on underlying items and the cash flows to policyholders. Taking the expectation over all economic scenarios gives[5]:

$$E\left[\sum_{t=1}^{T} EntityCashFlow(t)\right] + E\left[\sum_{t=0}^{T} PolicyholderCashFlow(t)\right] = E\left[\sum_{t=1}^{T} FairValueReturn(t)\right]$$

So one possible measure of the policyholders' share of fair value returns on the underlying items is:

$$Policyholders'\ Share = \frac{E[\sum_{t=0}^{T} PolicyholderCashFlow(t)]}{E[\sum_{t=1}^{T} FairValueReturn(t)]}$$

[Equation 2]

This metric measures the share over the duration of the contact group, so would appear to satisfy the requirement in Paragraph 107(b)(i). Furthermore, the use of probability-weighted averages would appear to at least partly satisfy the requirement in Paragraph 107(b)(ii).

Note that Paragraph B107(b)(ii) refers to a present value probability-weighted average basis, while the metric proposed in Equation 2 is based on undiscounted values. The problem with taking present values is that, as noted above, each year the fair value return do not naturally decompose into payments to the policyholder & the entity. If we discount Equation 1 using a cash account, before summing over the coverage period, we find:

$$\sum_{t=1}^{T} \frac{EntityCashFlow(t)}{CashAccount(t)} + \sum_{t=0}^{T} \frac{PolicyholderCashFlow(t)}{CashAccount(t)}$$

$$= \sum_{t=1}^{T} \frac{FairValueReturn(t)}{CashAccount(t)} - \sum_{t=1}^{T} \left(\frac{CashRate(t-1)}{1 + CashRate(t)} \times \frac{AccountBalance(t-1)}{CashAccount(t-1)} \right)$$

So the sum of discounted fair value returns can't be fully attributed to the policyholder & the entity, unless ***CashRate(t-1)=0*** at all times. As a result, in this paper we choose to work metrics based on undiscounted values.

4 Note that, assuming the account balance is completely distributed at the end of year 10, we have
$AccountBalance(10) - AccountBalance(0) = -Premiums(0) = PolicyholderCashFlow(0)$

5 Here, E[…] denotes the average calculated over all economic scenarios considered.

Considering B101(c), there is a further requirement to quantify the extent to which changes in the amount to be paid to the policyholder varies with the change in fair value of the underlying items. For the contract considered here, the presence of guaranteed benefits means that the total cash flow paid to policyholders is bounded below by some positive amount. In such scenarios, the policyholders' cash flows can be considered fixed and independent of the return on underlying items, while in all other scenarios the cash flows vary with the returns on underlying items.

Therefore, one possible measure of variability is the probability that the sum of policyholders' cash flows exceeds the minimum:[6]

$$Variability = Prob\left[\sum_{t=0}^{T} PolicyholderCashFlow(t) > Min\left(\sum_{t=0}^{T} PolicyholderCashFlow(t)\right)\right]$$

[Equation 3]

Note that these metrics for policyholders' share and variability are just examples and other metrics might be possible.

VFA eligibility assessment of example contract

Here, we estimate the two VFA eligibility metrics for the example contract group described above, under different variations of the contract features. Metrics are estimated using 1,000 stochastic scenarios for the return on underlying items, generated using a "real-world" calibration of the Moody's Analytics Economic Scenario Generator.

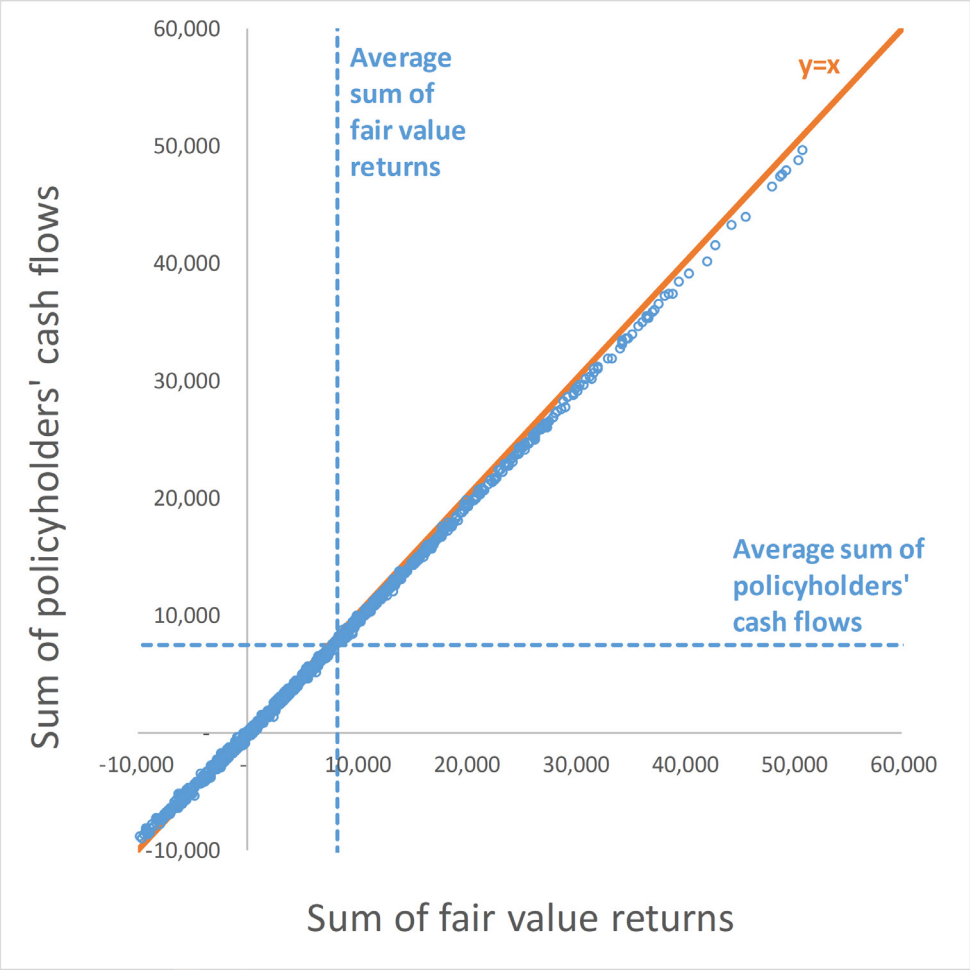
Contract 1: Minimum death benefit = 170; Minimum maturity benefit = 0; Charges = 0.5% p.a.

First, we consider a contract that has a minimum death benefit of CU 170 but no guarantee at maturity. As the level of guaranteed benefits provided are relatively small, the contract is profitable with a relatively modest annual charge (0.5% p.a.). Figure 1 shows the sum of all cash flows to policyholders plotted against the sum of all fair value returns on underlying items, in all 1,000 stochastic scenarios.

The dashed lines show the averages of the sum of cash flows to policyholders (the numerator in Equation 2) and the sum of fair value returns (the denominator in Equation 2), with the solid red line indicating y=x. The closeness of the intersection of the dashed lines to the solid line indicates the level of the policyholders share.

6 Here, Prob[…] denotes the proportion over all economic scenarios considered, and Min(…) denotes the minimum over all economic scenarios considered.

Figure 1: Sum of policyholder cash flows vs. sum of fair value returns (Contract 1)



In this example, the average sum of policyholders' cash flow is estimated as CU 7,464 compared to an average sum of investment returns of CU 8,172. The policyholders' share is therefore estimated as 91%.

The minimum sum of policyholders' cash flows, estimated over all 1,000 scenarios, is CU -10,682. This value is measured in just one scenario (i.e., the sum of policyholder cash flows in 999 scenarios is strictly greater than this), so the variability metric (Equation 3) is estimated as 99.9%.

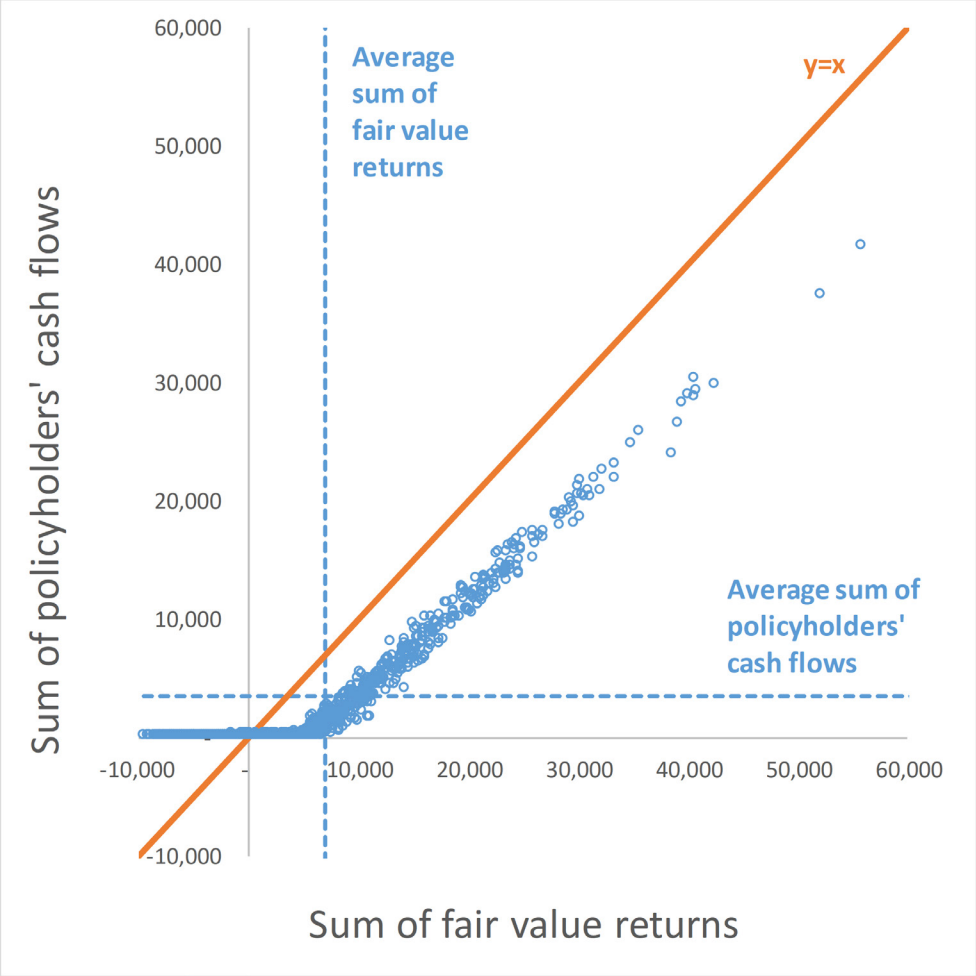
The reason for such a high variability in this case is due to the fact that guarantees are only provided on death. With only one death per year, a significant component of the total policyholders' cash flow is the maturity benefit, which is equal to the outstanding account balance with no minimum guarantee. The theoretical minimum sum of policyholders' cash flows (CU -13,300) is never achieved as it would require the account balance being completely wiped out by year 10.

Contract 2: Guaranteed death benefit = 170; Guaranteed maturity benefit = 150; Charges = 4% p.a.

We now consider a contract which has a minimum maturity benefit of CU 150 in addition to the guaranteed death benefit of CU 170. A significantly larger annual charge is assumed (4% p.a.), to cover the additional cost of providing the maturity guarantee.

Figure 2 shows the sum of all cash flows to policyholders plotted against the sum of all fair value returns on underlying items, in all 1,000 stochastic scenarios.

Figure 2: Sum of policyholder cash flows vs. sum of fair value returns (Contract 2)



In this example, the average sum of policyholders' cash flow is estimated as CU 3,488 compared to an average sum of investment returns of CU 6,863. The policyholders' share is therefore estimated as 51%.

The minimum sum of policyholders' cash flows, estimated over all 1,000 scenarios, is CU 200. This is the theoretically minimum amount, corresponding to all 10 death guarantees biting as well as the maturity guarantee. This minimum sum of cash flows is measured in 329 of the 1,000 stochastic scenarios used, resulting a variability metric of 67%.

Discussion

In this paper, we have described the use of stochastic scenarios to assess whether an insurance contract qualifies as a contract with direct participation features, according to criteria set out in IFRS 17. As with other decisions in the standard, the criteria for VFA eligibility are not precisely defined and leave room for interpretation by individual entities.

In this paper, we have defined candidate metrics that might be used to quantify the degree of participation as a share of the returns on underlying items (the policyholders' share) and the extent to which variation in underlying items results in variation in policyholder cash flows (the variability). According to Paragraphs 101(b) and 101(c), both measures must be "substantial" to qualify for the VFA.

Note that these metrics for policyholders' share and variability are just examples and other metrics are possible. The metrics introduced here, and similar metrics, are also sensitive to subjective assumptions embedded in the scenarios used to calculate them, in particular the assumed growth rates on underlying items. It is quite plausible that different entities could assess that similar contracts have different degrees of policyholder share and variability simply because they have used different metrics and assumptions.

The paper illustrates measurement of the example metrics for a contract with policyholder participation in underlying items subject to minimum guarantees. Two variations on the contract are analysed, with varying levels of annual charges and guarantees offered. Whether the resulting numbers are "substantial" is a further element of subjectivity. Although it is a judgment of individual entities, consensus as to appropriate thresholds might emerge as entities progress with their IFRS 17 preparations.

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