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Application of Actuarial Valuation Method in TFRS 17 Insurance Contracts Standard[1*]

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ABSTRACT

IFRS 17 represents a comprehensive financial reporting standard that aims to enhance transparency, consistency, and comparability across the global insurance industry. The standard introduces a fundamental shift in the accounting of insurance contracts by requiring the discounting of future cash flows to present value, the explicit adjustment for non-financial risks, and the systematic recognition of unearned profits through the Contractual Service Margin (CSM). The implementation of IFRS 17 necessitates the use of actuarial measurement techniques in valuing insurance liabilities, significantly influencing both financial reporting and risk management practices. This study provides a detailed explanation of how actuarial techniques are applied within the three core measurement models of IFRS 17—the General Measurement Model (GMM), the Premium Allocation Approach (PAA), and the Variable Fee Approach (VFA)—through an illustrative example. Furthermore, it examines the crucial roles of actuaries in model development, assumption setting, risk adjustment measurement, and CSM amortization, offering a comprehensive perspective on the practical implementation of the standard.

***Keywords**: Insurance Contracts, Actuarial Valuation Method, General Measurement Model (GMM), Premium Allocation Approach (PAA), Variable Fee Approach (VFA)*

***Jel Classification**: G22, G32, M41*

TFRS 17 Sigorta Sözleşmeleri Standardında Aktüeryal Değerleme Yönteminin Uygulanması

ÖZET

TFRS 17, küresel sigorta sektöründe şeffaflığı, tutarlılığı ve karşılaştırılabilirliği artırmayı amaçlayan kapsamlı bir finansal raporlama standardıdır. Standart, sigorta sözleşmelerinin muhasebeleştirilmesinde köklü bir değişim getirerek, gelecekteki nakit akışlarının bugünkü değerine indirgenmesini, finansal olmayan riskler için ayrı bir risk düzeltmesinin hesaplanmasını ve henüz gerçekleşmemiş kârların Sözleşmesel Hizmet Marjı (Contractual Service Margin – CSM) aracılığıyla sistematik biçimde raporlanmasını öngörmektedir. TFRS 17'nin uygulanması, sigorta yükümlülüklerinin değerlemesinde aktüeryal yöntemlere dayalı ölçüm tekniklerinin kullanılmasını zorunlu kılmakta ve bu durum hem finansal raporlama süreçlerini hem de risk yönetimi uygulamalarını derinden etkilemektedir. Bu çalışma, aktüeryal tekniklerin TFRS 17'nin üç temel ölçüm modeli olan Genel Ölçüm Modeli (General Measurement Model – GMM), Prim Tahsis Yöntemi (Premium Allocation Approach – PAA) ve Değişken Ücret Yöntemi (Variable Fee Approach – VFA) kapsamında nasıl kullanıldığını örnek bir uygulama üzerinden açıklamaktadır. Ayrıca, aktüerlerin model geliştirme, varsayım belirleme, risk düzeltmesinin ölçülmesi ve CSM'nin amortismanının hesaplanması süreçlerindeki kritik rollerine odaklanarak, standardın uygulama boyutuna bütüncül bir bakış sunmaktadır.

***Anahtar Kelimeler**: Sigorta Sözleşmeleri, Aktüeryal Değerleme Yöntemi, Genel Ölçüm Modeli (GMM), Prim Tahsis Yaklaşımı (PAA), Değişken Ücret Yaklaşımı (VFA)*

***JEL Sınıflandırması**: G22, G32, M41*

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1. INTRODUCTION

The Turkish Financial Reporting Standard 17 (TFRS 17), "Insurance Contracts," represents a significant shift in the accounting framework for insurance contracts, replacing TFRS 4 with a principles-based approach effective for annual reporting periods beginning on or after January 1, 2025. For life insurance companies, which manage long-term liabilities with complex cash flows, TFRS 17 introduces rigorous requirements for actuarial valuation to ensure accurate measurement, presentation, and disclosure of insurance contract liabilities. The standard aims to enhance transparency, comparability, and consistency in financial reporting across the global insurance industry. Actuarial valuation methods are central to TFRS 17, particularly for life insurance, where contracts often extend over decades and involve significant uncertainties in mortality, morbidity, lapse rates, and investment returns. This study explores the application of these methods, focusing on life insurance, and is tailored for a general professional audience seeking to understand the technical and practical implications of TFRS 17.

This study is organized into six main sections. The second section provides a conceptual overview of the Turkish Financial Reporting Standard 17 (TFRS 17), presenting its objectives, scope, and core accounting principles. The third section examines in depth the actuarial valuation methods applied under TFRS 17, emphasizing the technical role of actuaries in the processes of measurement, recognition, and disclosure. Within this section, each of the three main valuation models—the General Measurement Model (GMM), Premium Allocation Approach (PAA), and Variable Fee Approach (VFA)—is discussed in detail regarding its actuarial assumptions, discounting methods, and Contractual Service Margin (CSM) calculations. The fourth section provides illustrative applications of these methods through numerical examples, demonstrating the practical implementation of TFRS 17's measurement principles. The fifth section presents the main findings and comparative analysis among the three approaches, while the final section offers concluding remarks and evaluates the broader implications for insurers, actuaries, and financial reporting practices under the new standard.

This study contributes to the literature by offering a comprehensive actuarial perspective on the implementation of TFRS 17, supported by step-by-step quantitative illustrations for each valuation model. While earlier studies (such as those by Oğuz (2019), Çağıl and Tunç (2022),

and Özyiğit and Ekergil (2023)) have primarily focused on the accounting interpretation and regulatory effects of TFRS 17, the present research uniquely integrates actuarial methodology with accounting theory. It emphasizes how actuarial techniques—such as risk adjustment for non-financial risk, stochastic cash-flow projection, and the amortization of CSM—are operationalized within the framework of TFRS 17. By translating these complex theoretical constructs into applied examples, this study bridges the gap between theoretical modelling and practical implementation, thereby serving as a methodological reference for both academics and practitioners in actuarial science and insurance accounting.

2. OVERVIEW OF TFRS 17

2.1. Definition and Objectives of TFRS 17

TFRS 17 is a comprehensive accounting standard issued by the Public Oversight Accounting and Auditing Standards Authority (KGK) in 2019 (effective from 1 January 2025) to replace the older IFRS 4, establishing a unified approach to accounting for insurance contracts. It sets out principles for the recognition, measurement, presentation, and disclosure of insurance contracts within its scope (www.kgk.gov.tr, 2025).

The objective of TFRS 17 is to ensure that entities provide relevant information that faithfully represents their insurance contracts, giving financial statement users a basis to assess how those contracts affect the company's financial position, performance, and cash flows. (www.kgk.gov.tr, 2025). In practice, this means increasing transparency and comparability in insurance accounting. TFRS 17 introduces a consistent framework for all insurance contracts, removing inconsistencies from previous diverse practices and enabling investors and analysts to meaningfully compare insurers across companies and jurisdictions.

2.2. Core Principles of TFRS 17

TFRS 17 is a principle-based standard that fundamentally changes how insurers account for insurance policies. Key principles include (www.kgk.gov.tr, 2025):

Identification and Scope: The standard applies to insurance contracts, defined as contracts under which one party (the insurer) accepts significant insurance risk from another

party (the policyholder) by agreeing to compensate the policyholder if a specified uncertain event (the insured event) adversely affects them.

Insurers must separate certain components from insurance contracts – for example, embedded derivatives, distinct investment components, or distinct service obligations – and account for those under other appropriate standards if required.

Grouping and Measurement: Insurance contracts are aggregated into groups for recognition and measurement to avoid offsetting profits from profitable contracts against losses from onerous ones.

For measurement, TFRS 17 uses a "building-block" approach: each group of contracts is measured at the fulfilment cash flows (the current, risk-adjusted present value of future cash flows expected to fulfil the contracts) plus a Contractual Service Margin (CSM), which represents the unearned profit in the group.

This ensures that estimates reflect up-to-date assumptions (e.g. current discount rates, mortality rates, etc.) and that profit is not recognized Day 1 but deferred as services are provided.

Profit Recognition and Losses: The CSM (unearned profit) is recognized as income over the period the entity provides insurance coverage and is released from risk, reflecting the delivery of service over time.

In other words, insurance revenue is recognized in line with the insurance services provided. If a group of contracts is or becomes onerous (i.e. expected to make a loss), the loss is recognized immediately in profit or loss – there is no deferral of expected losses.

This treatment ensures timely recognition of losses and prevents future profits from being recognized on loss-making portfolios.

Presentation of Results: TFRS 17 requires a clear separation of insurance service results from financial results. Insurers must present insurance revenue and insurance service expenses (essentially the underwriting result) separately from insurance finance income or expenses (the investment result from insurance liabilities) in the financial statements.

This distinct presentation highlights the performance from insurance contracts (underwriting profit or loss) independently of the effects of discount rate changes or investment income/expense on the insurance liabilities. In addition, the standard allows an accounting policy choice on how to present the impact of discount rate changes: an insurer can choose to recognize all insurance finance income/expenses in profit or loss or split the volatility by recognizing part of it in Other Comprehensive Income (OCI). This option can reduce profit or loss volatility by reflecting certain unrealized economic swings in OCI instead.

Disclosure Requirements: To complement the recognition and measurement principles, TFRS 17 mandates extensive disclosures. Companies must disclose information that enables users of financial statements to understand the effect of insurance contracts on the entity's financial position, performance, and cash flows.

This includes reconciliations of carrying amounts, assumptions and methods used in measuring insurance contracts, the effect of newly written contracts, expected profit to be earned in the future (CSM roll-forward), risk exposure and how it's managed, among other details. The goal is to provide insight into the nature and number of risks arising from insurance contracts and the judgments made in applying the standard, thereby enhancing transparency for investors and regulators.

3. ACTUARIAL VALUATION METHODS IN TFRS 17

TFRS 17 uses three actuarial valuation methods — GMM (default, detailed), PAA (simplified for short-term contracts), and VFA (for participating contracts). Each relies heavily on actuarial models to project cash flows, assess risk, and recognize profits correctly.

3.1. Importance of Actuarial Techniques in TFRS 17 Compliance

Actuarial techniques are the backbone of TFRS 17 compliance — ensuring accurate measurement of obligations, transparent profit recognition, robust risk adjustment, and regulatory confidence.

3.1.1. Cash Flow Projections

Actuarial techniques are fundamental for projecting the future cash flows required by TFRS 17. The standard requires unbiased, probability-weighted estimates of all future cash inflows and outflows within the contract boundary. 4Actuaries use statistical models and experience analysis to forecast claims, premiums, expenses, and other cash flows over the life of insurance contracts. By incorporating all reasonable and supportable information about the amount, timing, and uncertainty of these cash flows, actuaries ensure the fulfilment cash flows (present value of future cash flows) are robust and compliant (TFRS 17/33). This actuarial input is critical to accurate initial measurement of insurance liabilities and forms the foundation for subsequent calculations under TFRS 17.

3.1.2. Risk Adjustment for Non-Financial Risk

TFRS 17 explicitly includes a risk adjustment for non-financial risk as a component of the liability, reflecting the uncertainty in insurance cash flows. Paragraph 37 of TFRS 17 requires adding an adjustment to the present value of future cash flows "to reflect the compensation that the entity requires for bearing the uncertainty" in amount and timing of those flows.

Determining this risk adjustment relies on actuarial judgment and techniques. Actuaries quantify the additional margin for insurance risk (e.g. using confidence level, Value-at-Risk, or Cost-of-Capital methods) such that it conveys management's view of uncertainty in line with the standard's principles. They ensure the risk adjustment is neither understated nor overstated, impacting how much insurance contract liability is held for risk. Actuaries also support TFRS 17's disclosure requirements in this area – for example, TFRS 17 paragraph 119 requires entities to disclose the confidence level used or an equivalent measure if another technique is applied. By providing these technical calculations and justifications, actuaries play a key role in implementing the risk adjustment and enhancing transparency around the entity's risk appetite and uncertainty in the financial statements.

3.1.3. Contractual Service Margin (CSM)

The Contractual Service Margin is the component of the insurance liability that represents unearned profit. Actuarial calculations of the CSM ensure that no excess profit is recognized at initial recognition of a contract. In fact, TFRS 17 mandates that the CSM be set so that "no income or expenses" arise at the day a group of contracts is recognized (TFRS 17 para. 38). Practically, actuaries determine the CSM as the equal and opposite amount to the initial expected fulfilment cash flows (including the risk adjustment), deferring any projected profit margin into future periods (EFRAG (2017) – Illustrative Example on Variable Fee Approach, https://www.efrag.org, 2025). This requires extensive actuarial analysis – estimating future profitability, setting assumptions, and ensuring consistency with premium receipts – to calculate the CSM correctly. Actuaries continuously update the CSM for changes related to future service (e.g. assumption updates or experience adjustments), so that revenue recognition over time remains systematic and reflects services provided. Moreover, if contracts are onerous (i.e. expected cash outflows plus risk adjustment exceed the premium), actuaries identify this at inception; in such cases the standard requires an immediate loss instead of a CSM. Through these actions, actuarial techniques ensure the CSM truly captures deferred profit and that losses are promptly recognized, which is vital for faithful representation of insurance contract economics under TFRS 17.

3.1.4. Actuaries' Role in Measurement, Recognition, and Disclosure

Under TFRS 17, actuaries play an indispensable role in measuring insurance contract liabilities, guiding their recognition, and supporting disclosure of key information. They develop and validate the models used for estimating fulfilment cash flows (TFRS 17/33–35) and selecting appropriate discount rates, ensuring that measurements reflect current, credible data. Actuaries are responsible for calculating the risk adjustment (TFRS 17/37) and establishing the methodology behind it, directly influencing liability values and profit emergence. They also calculate and monitor the CSM, guaranteeing that profit is recognized over the coverage period in compliance with the "no day-one gain" rule (TFRS 17/38) and that any onerous losses are recognized immediately (TFRS 17/47).

Beyond measurement, actuarial insight is crucial for recognition decisions – for example, determining contract groupings and identifying onerous contracts require actuarial analysis of profitability. Finally, actuaries underpin the disclosure requirements of TFRS 17. They prepare detailed explanations of assumptions and methods used in valuations and satisfy specific mandates like disclosing the technique and confidence level for the risk adjustment (TFRS 17/119). In summary, actuarial techniques ensure that an insurer's liabilities under TFRS 17 are measured reliably, recognized appropriately in the financial statements, and accompanied by transparent disclosures – all of which uphold the standard's aim of accurate and meaningful representation of insurance contract obligations.

3.2. Key Actuarial Valuation Approaches

TFRS 17 provides three measurement models for insurance contract liabilities, and actuaries play a key role under each. The General Measurement Model (GMM) – also called the Building Block Approach – is the default model for most contracts. The Premium Allocation Approach (PAA) is a simplification allowed for short-duration contracts (typically non-life insurance). The Variable Fee Approach (VFA) is a modified form of the GMM for contracts with direct participation features (e.g. participating or unit-linked life contracts). All three models require actuaries to set assumptions, project cash flows, select discount rates, and determine risk adjustments. The extent and complexity of actuarial involvement, however, differ by model, as summarized below.

3.2.1. General Measurement Model (GMM)

Under the GMM, the insurance liability is valued using explicit "building blocks" that require intensive actuarial analysis. TFRS 17/32 defines the components of the liability at initial recognition as the sum of:

Fulfilment Cash Flows (FCF): an estimate of all future cash inflows and outflows within the contract boundary, on a probability-weighted (expected value) basis This includes future premiums (if any), claim benefits, expenses, etc., using unbiased best-estimate assumptions. Actuaries set demographic and expense assumptions (e.g. mortality, lapses, claims frequency/severity, maintenance expenses) and incorporate policy features (options, guarantees) into stochastic or deterministic models to project these cash flows.

Discounting: an adjustment to reflect the time value of money and financial risks in those cash flows. TFRS 17/36 requires discount rates to reflect the characteristics of the cash flows (currency, timing, liquidity) and current market returns, consistent with observable market data. In practice, actuaries derive yield curves either by a "bottom-up" approach (starting from risk-free rates and adding illiquidity premiums) or a "top-down" approach (deriving a yield from reference asset portfolios), ensuring the rates capture the appropriate credit risk and liquidity characteristics.

Risk Adjustment (RA): an explicit risk margin for non-financial risk – the compensation the entity requires for bearing the uncertainty in the cash flows TFRS 17/37 defines the risk adjustment as the amount that makes the insurer indifferent between a certain liability and an uncertain liability with identical expected value. Actuaries typically use techniques like confidence level, Value-at-Risk, or Cost of Capital methods to quantify the RA, reflecting insurance risks (mortality/morbidity volatility, lapse uncertainty, expense risk, etc.). The RA is entity-specific and must have characteristics per TFRS 17's guidance (e.g. higher for low-frequency/high-severity risks, longer durations, etc.). The approach and confidence level equivalent must be disclosed, so actuaries document the methodology and ensure it aligns with TFRS 17's requirements (paragraphs B86–B92 provide application guidance on risk adjustment).

Contractual Service Margin (CSM): the unearned profit of the group of contracts, which is set such that no day-one gain is recognized. TFRS 17 para. 32(b) and 38 require that any positive difference between the premiums (and other inflows) and the fulfilment cash outflows be deferred as CSM (Grant Thornton.2020).

In other words**, the initial CSM = (Present value of inflows – present value of outflows – RA),** if that value is positive (otherwise contracts are onerous, and a loss is recognized immediately). The CSM is a liability representing future profit, which will be recognized as insurance revenue over the coverage period as the insurer provides services. Actuaries ensure that all relevant cash flows (including acquisition costs, which TFRS 17 includes in FCF) are considered so that the CSM correctly captures the residual profit. On initial recognition, if the fulfilment cash flows indicate a loss (negative CSM), TFRS 17 requires recognizing an onerous contract loss immediately (and setting up a loss component of the

liability instead of a CSM) (EFRAG (2017) – Illustrative Example on Variable Fee Approach (www.efrag.org, 2025).

Subsequent Measurement (GMM): After initial setup, actuaries update assumptions and remeasure the fulfilment cash flows at each reporting date with current assumptions (a "current estimate" approach). The CSM is adjusted for certain changes to ensure profit is recognized appropriately over time:

For contracts without direct participation features, IFRS 17/44 specifies that changes in estimates of future cash flows relating to future coverage adjust the CSM (i.e. are absorbed into remaining unearned profit). For example, if longevity assumptions change for a life annuity portfolio, increasing expected payouts, the fulfilment cash flows increase and the CSM is correspondingly reduced (or if insufficient, a loss is recognized). Conversely, favourable updates increase CSM. Changes related to current or past coverage (e.g. differences between actual vs expected claims for expired coverage) are recognized in profit or loss immediately (they do not adjust CSM). Actuaries analyse each assumption change or experience variance to classify it per TFRS 17 (using the guidance of TFRS 17/B96–B97). They must compute the impact on the fulfilment cash flows and determine what portion affects future service. Only the future-service portion adjusts the CSM (ensuring the CSM reflects the remaining profit after updating expectations).

The CSM is also accreted with interest over time. TFRS 17 requires interest on the opening CSM balance, using either locked-in rates or current rates as determined by the accounting policy (for profit or loss vs OCI disaggregation) (IFRS 17 (2022), https://www.aasb.gov.au, 2025). Actuaries supply or validate the discount rates used for this accretion (typically the initial discount rate for contracts without direct participation, per TFRS 17 para. 44(b)). This increases the CSM and generates an equal and opposite insurance finance expense (if recognized in P/L or OCI depending on policy).

The release of CSM to profit: As services are provided, a portion of the CSM is recognized as revenue. TFRS 17/44(e) and B119 require allocation of CSM in each period based on coverage units, reflecting the amount of coverage or service provided in that period relative to the remaining coverage. Determining coverage units often requires actuarial

judgment – for example, using the sum insured or expected benefit payments or another measure that best represents the insurance service provided to the policyholder. Actuaries calculate the number of coverage units for the group and allocate the CSM accordingly, ensuring the pattern of CSM release aligns with the pattern of risk coverage or service over the policy term.

Overall, the GMM demands comprehensive actuarial involvement: setting initial best-estimate assumptions, projecting cash flows under multiple scenarios, selecting and updating discount rates (often in consultation with investment functions), and periodically updating all these estimates. The calculation of the risk adjustment and CSM (including CSM amortization) are actuarial tasks in most insurers. Extensive documentation and controls are needed around models and assumptions to meet TFRS 17's current estimate and disclosure requirements. Actuaries also help explain movements in the liability (reconciliation of opening to closing balances of PV cash flows, RA, and CSM) as required by TFRS 17 disclosures.

3.2.2. Premium Allocation Approach (PAA)

The PAA is a simplified approach permitted for contracts with short coverage periods or those where the simplification would not produce materially different results from the GMM. TFRS 17/53 stipulates that an insurer may use the PAA for a group of contracts only if at inception either (a) the entity expects the simplification to approximate the GMM liability for remaining coverage, or (b) each contract's coverage period is 1 year or less. In practice, most property & casualty (general insurance) contracts qualify for PAA, and many life insurers' very short-term coverages (e.g. certain group risk covers) may also use PAA for the liability for remaining coverage. Under the PAA, the Liability for Remaining Coverage (LRC) is measured in a way analogous to the unearned premium reserve in pre-TFRS 17 accounting. Actuaries have a reduced role in setting up the LRC because it does not require explicit future cash flow projections or CSM at initial recognition. Instead, IFRS 17 para. 55 defines that on initial recognition, the LRC is simply:

Premium received (if any) minus any related insurance acquisition cash flows paid (unless those acquisition costs are expensed immediately by choice), ± any pre-recognition cash flow asset or liability that needs to be derecognized. This effectively means the initial LRC is

often just unearned premium (for prepaid coverage), net of deferrable acquisition costs. If acquisition costs are significant, companies may choose to recognize them as an asset and amortize them, or IFRS 17 para. 59(a) allows an accounting policy choice to expense acquisition cash flows immediately for contracts with <=1 year coverage (simplifying the accounting). Actuaries may be involved in setting up amortization schedules for acquisition cost assets if not expensed, but for PAA with one-year coverage, this is often not needed due to the expensing option.

At the end of each period, the LRC is updated by adding premiums received for future coverage, subtracting the portion of premium recognized as insurance revenue for coverage provided in that period, and adjusting for financing or accrual of interest if applicable. In formula form (IFRS 17 para. 55(b)): **LRC (t end) = LRC (t start) + premiums received – (premium revenue recognized) – (acquisition costs paid, if not expensed) +/– time value of money adjustment.** For most short-term contracts, revenue is recognized roughly on a straight-line or exposure-weighted basis over the coverage period, so the LRC run-off mirrors the unearned premium run-off. Actuaries may assist in determining the pattern of revenue recognition if it's not straight-line (e.g. seasonal risk patterns or uneven coverage units over the period).

Time Value of Money: TFRS 17/56 and 59 (b) deal with discounting under the PAA. If the entity expects a significant financing component (i.e. premium receipt and claim payment dates are far apart), the LRC should be adjusted for the time value of money (discounting the future coverage component). However, this is often avoided for short-term contracts. In fact, TFRS 17 waives the need to discount the liability for incurred claims (LIC) under PAA if those claims are expected to be fully paid within one year of occurrence. In practice, many P&C insurers will not discount their claim reserves for short-tailed business. But for longer-tailed claims (e.g. liability or disability claims), discounting and interest accretion may be required under PAA, and actuaries would then select appropriate discount rates (often current market rates like GMM) for those calculations. PAA also does not require interest accretion on the unearned premium unless the coverage period extends beyond a year; even then, some insurers might deem the effect immaterial. Onerous Contract Testing: A critical actuarial role under PAA is identifying onerous groups of contracts. Because PAA forgoes an explicit CSM,

TFRS 17 requires a check to ensure that the simpler unearned-premium approach isn't hiding a loss. TFRS 17/57 states that if at any time during coverage, facts and circumstances indicate the group may be onerous (i.e. expected future claims + expenses > remaining unearned premium), the insurer must compare the carrying amount of the LRC (basically the unearned premium minus deferred costs) with the fulfilment cash flows for remaining coverage (i.e. an updated best-estimate of future outflows, including RA)

If the future fulfilment cash flows (including RA) exceed the LRC, the excess is recognized immediately as a loss in profit or loss and a corresponding loss component is created in the liability. Actuaries perform this onerous test by estimating ultimate loss ratios or expected combined ratios for the group: if the expected loss ratio is above 100% (after including risk margin), the group is onerous. They then quantify the shortfall. Notably, this test is akin to the "unexpired risk reserve" or premium deficiency test under previous standards, but TFRS 17 mandates it at the group level using current assumptions. Actuaries must update this assessment at each reporting date if no loss was previously recognized or track the loss component if one is established (reversals of the loss component are recognized in income if the outlook improves, per TFRS 17/B128).

Liability for Incurred Claims (LIC): Under PAA, once claims occur, the liability for incurred claims is measured as the present value of future cash flows for those claims plus risk adjustment, just like under the GMM. In other words, the claim reserve for reported and IBNR claims is not simplified – it uses the full IFRS 17 fulfilment cash flow approach (except the optional discounting simplification if paid <1 year). Actuaries are responsible for projecting claim settlement cash flows, selecting appropriate payout patterns and inflation assumptions, and calculating the RA on these claim liabilities (often using similar techniques as under GMM). This is analogous to how claim reserves were calculated under Solvency II or other regimes: best estimate of future payments plus a risk margin. The main difference is that under TFRS 17, changes in discount rates will affect the measurement of LIC (with an option to present the impact in OCI), and the risk adjustment must be explicitly reported. Actuaries working with PAA therefore focus on traditional P&C reserving for the LIC, while the LRC side is largely an accounting exercise of unearned premium run-off, except for the need to monitor onerous contracts. Actuarial Involvement in PAA: Compared to GMM, the PAA

generally involves less intensive actuarial modelling for the unexpired coverage. There is no need to build long-term cash flow projections or calculate a CSM at inception for each group – the premium itself (adjusted for acquisition costs) proxies the liability for coverage. The key actuarial inputs are: (1) performing premium deficiency (onerous) tests using expected loss ratios, which is relatively straightforward for short-duration contracts; and (2) computing incurred claim reserves with risk adjustment, which is essentially the same task actuaries already perform for claim reserving (but now with an explicit confidence margin and discounting where applicable). Thus, the day-one valuation effort under PAA is much lighter for actuaries than under GMM. However, actuaries still must set assumptions for claims development and expenses, and determine the risk adjustment, which in non-life is often calibrated to a confidence level over the runoff of claims (e.g. setting RA such that the total reserve is at a 75th percentile of sufficiency). Actuaries may also assist accounting in determining whether any investment component exists or whether any time value adjustment is needed (for example, some longer-cover PAA contracts might elect to discount the LRC if materially different). In summary, the PAA simplifies the liability for remaining coverage to an unearned premium approach (per TFRS 17/55 measurement rules), but actuaries remain involved in ensuring no onerous losses are hidden (TFRS 17/57-58 tests) and in valuing incurred claims with appropriate discounting and risk margins. The model aligns well with traditional general insurance actuarial workflows, so the actuarial effort under PAA is generally lower and focused on reserving rather than pricing in new cash flows.

3.2.3. Variable Fee Approach (VFA)

The Variable Fee Approach is essentially the GMM with modifications for direct participating contracts, i.e. contracts where policyholders share in a clearly identified pool of underlying assets and the insurer's profit is a variable fee for managing those assets on behalf of policyholders. TFRS 17/45 (together with Appendix B B101–B118) governs the VFA, though the standard doesn't use the term "VFA" explicitly. It classifies a contract as having direct participation features if all three conditions are met (TFRS 17/B101): (i) the policyholder participates in a share of a clearly identified pool of underlying items (assets), (ii) the insurer expects to pay the policyholder an amount equal to a substantial share of the fair value returns on those underlying items, and (iii) the insurer expects a substantial proportion of any change

in the amounts paid to the policyholder to vary with the change in fair value of the underlying items In practice, this captures many unit-linked or with-profit life insurance contracts and some investment contracts with discretionary participation. The VFA is mandatory for contracts meeting these criteria (Grant Thornton, 2020). TFRS 17 requires that these be measured under the variable fee model, which recognizes that the insurer's compensation is the "variable fee" (the entity's share of asset returns less any guaranteed portion). Under the VFA, the initial measurement is the same building-block approach as GMM (present value of cash flows, discounting, risk adjustment, and CSM). The key difference lies in how the CSM is adjusted subsequently for changes in financial variables:

TFRS 17/B110 states that for contracts with direct participation features, the CSM is "adjusted to reflect the variable nature of the fee", i.e. the insurer's share of returns In practical terms, this means that unlike the general model, changes in the fair value of underlying items (assets) will largely offset against the CSM rather than hitting profit or loss immediately. When the underlying assets perform better or worse than expected, the insurer's "fee" (its share of those returns) changes – under VFA, those changes adjust the CSM (future profit) instead of creating immediate volatility.

Concretely, IFRS 17/45(b) and B112 require that changes in the entity's share of the underlying items' fair value are treated as changes in future service and adjust the CSM. For example, if the insurer expects to earn a 20% share of an investment fund's returns as its fee, and the fund assets increase in value, the present value of that future fee increases – TFRS 17 directs this increase into the CSM (deferred profit) rather than recognizing it immediately. Conversely, if assets underperform, the decrease in the expected fee reduces the CSM (but not below zero; losses would be recognized if the CSM is depleted). This mechanism aligns the accounting with the economics of participating contracts: the insurer's profit is "variable" with asset performance and should be recognized over time as services are provided, not in a lump with every market movement.

Changes in non-financial assumptions (mortality, expense, lapses, etc.) for VFA contracts are treated similarly to GMM: those relating to future coverage adjust the CSM (TFRS 17/45(c) parallels 44(c) in concept), and those relating to current or past service go to profit or loss. In TFRS 17/B113, the standard explains that changes in fulfilment cash flows not

arising from underlying asset returns (e.g. changes in mortality or in guaranteed benefits) are analysed just as under GMM for whether they relate to future service and adjust CSM accordingly. Thus, actuaries still remeasure the liability at each period with updated best estimates and determine the split of impacts between CSM-adjusting and P/L, exactly as in GMM, except the portion of changes corresponding to the variable fee.

Changes in the fair value obligation to the policyholder (the portion of the liability that equals the underlying assets) do not adjust CSM because they don't affect the insurer's fee – they are passed entirely to policyholders. TFRS 17/B111 clarifies that if underlying items change and the policyholder benefit changes accordingly (e.g. unit-linked account balance grows with fund asset growth), that part is not future profit for the insurer and is recognized as a liability change in the period (although insurers often choose to present such changes in the insurance finance income/expense line, potentially in OCI if they use that option for finance effects).

The risk adjustment for VFA contracts is handled in the same way as GMM (compensation for non-financial risk, releasing as risk is expired). It does not fundamentally differ under VFA, except that any changes in RA related to future service also adjust the CSM. One nuance: if some non-financial risks are reflected in the discretionary benefits (e.g. the insurer can adjust dividends to policyholders based on mortality experience), actuaries ensure that the assumption changes are categorized correctly (some effects might be considered part of the underlying variable fee vs non-participating components). However, TFRS 17 keeps the treatment consistent: all changes in non-financial risks that affect future service adjust CSM under both GMM and VFA.

Interest accretion on CSM: For VFA, IFRS 17/45 (b) (i) suggests that the CSM is accreted at current discount rates consistent with the obligation on underlying items (since the fee is variable, some interpret that the accretion could use current rates each period). In practice, many VFA implementations still accrete CSM at a locked-in rate for the purpose of P/L vs OCI splitting, but because the entire underlying item effect goes through CSM, the distinction is less impactful. Actuaries must follow the chosen approach for their accounting policy on finance effects (some will have no OCI option for VFA to simplify, recognizing all changes in P/L, since assets and liabilities move together).

CSM release (service units): VFA contracts often provide both insurance coverage and asset-management service (investment-related service). The determination of coverage units for CSM amortization may include both insurance benefit quantity and the investment service component if relevant (TFRS 17 allows an "investment-return service" for certain contracts without participation and an "investment-related service" for those with direct participation. Actuaries may need to define the coverage units in a way that reflects all relevant promised services (e.g. account balance management). However, TFRS 17 (after amendments) treats the investment-related service as part of the insurance service for VFA contracts, so typically the CSM is released over the policy term reflecting insurance cover and asset management together. The method could be proportional to the account balance or sum at risk or a combination, depending on contract design. This is a significant actuarial judgment area under VFA.

Because of these adjustments, actuarial modelling under VFA is complex. Actuaries must incorporate projected underlying asset returns and the insurer's share into the cash flow model. At each reporting date, the fair value of underlying items (e.g. actual fund value or reference portfolio value) needs to be known, and the liability is remeasured accordingly. In practice, actuaries will run an asset-liability model: the liability cash flows (benefit payments, etc.) depend on asset performance (for example, higher fund growth means higher future payouts to policyholders, but also higher fees earned). The projection model must handle these dynamic interactions. For valuation, many insurers use a "nested" calculation: first update the liability by plugging in current asset values (updating the portion of liability that equals the underlying account balances), then adjust CSM for the change in the insurer's share (variable fee) and for assumption changes. The result is that the statement of financial position remains balanced: asset fair value changes are largely offset by liability changes (between the directly passed-through portion and the deferred portion in CSM), so that only the insurer's service margin is recognized over time. Risk Mitigation: One challenge in VFA is that if an insurer hedges financial risks (e.g. guarantees) with derivatives, under the pure VFA model, the derivative's gains/losses might go through P/L while the corresponding liability changes adjust CSM (deferred), creating an accounting mismatch. TFRS 17 offers a risk mitigation option (TFRS 17/B115–B116) allowing the insurer to not adjust CSM for certain financial risk changes if they are hedged.

Actuaries and risk managers must identify if they will use this option (it must be documented in advance for eligible contracts). If applied, those financial changes (e.g. effect of interest rate changes on the insurer's fee or guarantees) are recognized in profit or loss instead, offsetting the derivative gains/losses. While this is an advanced topic, it highlights the need for actuaries to coordinate with asset liability management teams: hedging strategies and accounting strategy must align, and actuaries may perform effectiveness testing to confirm that an "economic offset" exists as required by TFRS 17/B116.

Actuarial Involvement in VFA: The VFA is actuarially intensive, like (and even more than) the GMM. All the general actuarial tasks (assumption setting, cash flow projection, discount curve derivation, risk adjustment calculation, CSM computation) are required, and in addition actuaries must handle market variables and asset dependency. Actuaries (often in conjunction with finance) will update models for actual asset performance at each period. The calculations to adjust the CSM for the variable fee can be complex, especially if there are guarantees or if not, all asset changes are passed to policyholders. Actuaries ensure that market risk scenarios and real-world expected returns are modelled for long-term profit projections (for setting CSM at inception and for interim internal analysis), while also ensuring consistency with market-consistent valuation at each period (for the balance sheet value).

In summary, the General Measurement Model involves the broadest actuarial scope in projecting and valuing all cash flows and margins. The Premium Allocation Approach simplifies many of these steps, leaning on accounting for unearned premium, with actuaries focusing on reserve adequacy and risk adjustment for claims. The Variable Fee Approach adds another layer of complexity to GMM: actuaries must incorporate policyholder fund performance and adjust profits for market changes, effectively doing asset-liability modelling within the valuation. These differences mean, for example, that a life actuary working on long-term traditional contracts (GMM) or participating contracts (VFA) will be deeply involved in assumption management and CSM calculations each quarter, whereas a non-life actuary on short-term contracts (PAA) will spend more effort on refining reserve estimates and checking loss ratios. Each model is governed by specific TFRS 17 provisions – GMM by 32–52 (and related guidance), PAA by 53–59, and VFA by 45 and B101–B118 and actuaries must apply the actuarial techniques (cash flow modelling, present valuing, risk quantification) in a manner

compliant with those paragraphs. The actuarial involvement is thus critical across all models but is most intensive under GMM and VFA, where granular calculations of each component of the fulfilment cash flows and CSM are required, and less intensive under PAA, where simpler approximations suffice and the focus is on traditional reserving and ensuring no onerous losses are unrecognized (Society of Actuaries (2021) – IFRS 17: PAA and Related Disclosure Requirements (www.soa.org, 2025).

4. SAMPLE APPLICATION OF ACTUARIAL VALUATION METHODS

4.1. Initial Measurement under GMM Application

Consider an insurance company issuing a group of 100 identical 4-year life insurance contracts (e.g. term life policies). For simplicity, assume premiums are received immediately at inception and there are no lapses. Key details:

• Premium per contract: ₺1,500 (single premium for 4 years of coverage), payable at inception. Total premiums = ₺150,000 for the group.

• Expected annual cash outflows (claims/benefits and maintenance expenses) = ₺300 per contract each year. For 100 contracts, that is ₺30,000 of outflow each year for years 1–4. (Assume these outflows occur at the end of each year.)

• Discount rate: 10% per annum (for present valuing future cash flows).

• Estimated Risk Adjustment (for non-financial risk) at initial recognition: ₺20,000 (given by the company based on a confidence level analysis).

• The contracts are assumed profitable (we will verify this via the CSM calculation).

Using the GMM building blocks, we calculate the present value of future cash flows and determine the CSM step by step:

1. Project Future Cash Flows: At time 0 (inception), cash inflow = +150,000 (the premiums). Future annual cash outflows = –30,000 each at t=1, 2, 3, 4. There are no further premiums after inception, so future inflows are 0 in this application.

2. Discount the Future Cash Flows: Apply the 10% discount rate to each future outflow. The present value (PV) factors for years 1 to 4 at 10% are: 0.909, 0.826, 0.751, 0.682 (using factor = 1/ (1.10^t)). Multiplying, the PV of each year's outflow is given by the Table 1.

Table 1. Future Cash Flows Outflow

Year 1	PV = –30,000 * 0.909 = –27,270
Year 2	PV = –30,000 * 0.826 = –24,780
Year 3	PV = –30,000 * 0.751 = –22,530
Year 4	PV = –30,000 * 0.682 = –20,460

Meanwhile, the premium was received at inception, so its present value is +150,000 (no discounting needed for time 0). We can summarize the cash flows and their present values in Table 2:

Table 2. Present Values of the Premium

Year	Cash In	Cash Out	Net Cash Flow	Discount	Present Value
0	+150,000	0	+150,000	1.000	+150,000
1	0	–30,000	–30,000	0.909	–27,270
2	0	–30,000	–30,000	0.826	–24,780
3	0	–30,000	–30,000	0.751	–22,530
4	0	–30,000	–30,000	0.682	–20,460
Total PV	150,000	–120,000	Net +30,000	–	+54,960

The present value of net future cash flows (PVFCF) for the group is ৳54,960 (this is the sum of the "Present Value" column). A positive value here indicates the PV of inflows exceeds PV of outflows – i.e. an expected profit of ৳54,960 before risk adjustment.

3. Include Risk Adjustment: We add the risk adjustment (RA) for non-financial risk. The RA is given as ৳20,000 (this margin reduces the initial recognized profit to account for uncertainty in the cash flows). Subtracting the RA from the PVFCF yields the fulfilment cash flows:

Fulfilment Cash Flows (FCF) = PV of net cash flows (54,960) minus RA (20,000) = ৳34,960.

4. Determine the CSM: The CSM is set as the amount of unearned profit to eliminate any day-one gain. In this case, the PV of future inflows exceeded outflows (before RA), so there

is profited to defer. The CSM is essentially the "negative" of the fulfilment cash flows for a profitable contract:

CSM = – ₺34,960.

This negative sign indicates that instead of recognizing a ₺34,960 gain now, we establish a CSM of 34,960 which will be carried on the balance sheet as a liability (unearned profit).

5. Initial Liability and Check: Now we can confirm the initial measurement of the group of contracts. Summing up the components:

PV of future outflows (and other fulfilment cash flows) plus RA plus CSM = 0.

In numbers: PV (outflows) + RA = 85,040 (which is the PV of outflows 120,000 minus 34,960 net inflows = 85,040 net outflows present value) and adding CSM of –34,960 gives 50,080. Meanwhile the PV of inflows (premiums) is 150,000 if considered separately.

Another way to see it: the liability at initial recognition consists of the fulfilment cash flows of -34,960 and the CSM of +34,960, totalling 0. Therefore, the initial recognition liability is zero, meaning no immediate profit or loss is recorded at inception for this profitable group. This aligns with TFRS 17's principle: profit is deferred and recognized over time, and no gain is recorded on day one.

(If the contracts had been onerous – say the premiums were lower or expected claims higher – the above calculation would yield a negative fulfilment cash flow greater in absolute value than the premium, resulting in no CSM and a loss. For example, if the PV of outflows + RA had been ₺160,000 against PV of inflows ₺120,000, the shortfall of 40,000 would be recorded as a loss immediately, and the initial liability would equal ₺40,000. In this example, however, contracts are profitable, so CSM is carrying the 34,960 margins.)

Note: After initial recognition, once the premium is received in cash, the insurer's balance sheet will show an insurance contract liability equal to the premium. In our example, after collecting ₺120,000 from policyholders, the liability becomes ₺120,000, which consists of the fulfilment cash flows (outflows and RA) plus the CSM. This liability will unwind over the coverage period. Each period, the insurer will release a portion of the CSM to revenue

(reflecting services provided), recognize insurance revenue for the expected claims and expenses as they are incurred (offsetting the outflows), and recognize the unwinding of discount and release of risk adjustment as well. The net effect is that profit emerges gradually. For instance, the ৳34,960 CSM in Example 1 would be released over 4 years based on coverage units (say 8,740 per year if straight-line), adding to revenue each year. The risk adjustment of ৳200 would also be released as experience unfolds (reducing the liability for remaining risk). Detailed subsequent measurement is beyond the scope of this initial measurement example, but the key point is that under GMM the initial CSM ensures a smooth profit emergence aligned with insurance service provided.

4.2. PAA for a 1-Year Term Life Contract Application

An insurer issues a group of 1-year level-term life insurance policies (with no cash value) on January 1, 20X1. Assume single premium is collected at issue for the full year's coverage. Key data and steps:

Premium per policy: ৳1,500, received at inception. Suppose 50 such policies are issued, so total premium = ৳75,000. There are no explicit acquisition costs (for simplicity in this example).

Expected claims and expenses over the year: ৳1,200 per policy on average (so for 100 policies, expected outflows = ৳60,000) if experience follows expectations. (This implies the insurer expects a margin, as premium 75,000 > expected costs 60,000.)

Coverage period: 12 months. We assume risk is spread evenly through the year (the chance of death is roughly uniform over the year for this pool, for simplicity). Thus, revenue will be recognized on a straight-line basis over time.

Initial recognition (Day 0): The Liability for Remaining Coverage (LRC) equals the premium received since we assume no acquisition costs to defer. So, LRC = ৳75,000 on January 1. No revenue is recognized at initial recognition; it's all deferred in the LRC. There is no CSM separately recorded (the margin is implicit in the LRC). Also assume an initial onerous test indicates the contract is profitable (we'll verify below), so no loss component.

Onerous contract test at inception: We compare the premium to the fulfilment cash flows for remaining coverage. The expected present value of future claims/expenses is ₺60,000 (if timing of claims is spread, the undiscounted value is 60,000; discounting over at most 12 months would only slightly reduce this, and 1-year is short so discount can be ignored under PAA criteria). We'd also include a risk adjustment, say the actuaries determine an RA of CU 1,500 for uncertainty in claims. Then PVFCF + RA ≈ 60,000 + 1,500 = CU 61,500. The premium (75,000) exceeds 61,500, so there is a positive margin; no loss component is needed. The implicit margin is 75,000 – 61,500 = 13,500, which will be released as profit over the year as services are provided. If instead the premium had been, say, only 55,000, then PV (outflows + RA) 61,500 would exceed premium, and a loss of 6,500 would be recognized immediately. The initial LRC would be set to 55,000 + 6,500 = 61,500, consisting of a loss component of 1,500 and remaining coverage of 55,000.)

Subsequent recognition of revenue: The insurer will recognize insurance revenue over the 12-month coverage as it earns the premium. Assuming even passage of risk, it can recognize one-twelfth of the premium each month (or a quarter each quarter). For illustration, we use quarterly intervals:

March 31, 20X1 (Q1 end): 3 months (25% of coverage) have passed. The insurer recognizes 25% of the premium as insurance revenue. That is ₺18,750 (out of 75,000). The LRC is correspondingly reduced by 18,750. So, the LRC on March 31 is CU 56,250. (If any claims have occurred in Q1, the cash outflow for claims is paid from the LRC or recorded separately in LIC and does not affect revenue directly – the revenue is based on coverage provided, not claims.)

June 30, 20X1 (Q2 end): 6 months have passed (50% of coverage). Another 25% of premium is earned as revenue in Q2: ₺18,750. LRC is now ₺37,500.

Sept 30, 20X1 (Q3 end): 9 months passed (75% coverage). Recognize revenue ₺18,750. LRC now ₺56,250.

Dec 31, 20X1 (Q4 end): 12 months (100% of coverage) completed. Recognize the final ₺18,750 of revenue. LRC is now 0, as all the premium has been earned. At this point, all

coverage is provided. Any claims occurred would have been paid; outstanding claim liabilities (LIC) would be separately measured. Any remaining margin is fully earned.

We can summarize the PAA run-off in a table of the Liability for Remaining Coverage:

Table 3. The Liability for Remaining Coverage

Quarter-end 20X1	LRC Start of Period	Premiums Received in Period	Revenue Recognized (Earned Premium)	LRC End of Period
Initial (Day 0)	-	75,000 (collected)	0	75,000
March 31 (Q1 end)	75,000	0	(18,750)	56,250
June 30 (Q2 end)	56,250	0	(18,750)	37,500
Sept 30 (Q3 end)	37,500	0	(18,750)	18,750
Dec 31 (Q4 end)	18,750	0	(18,750)	0

Each quarter, one-quarter of the premium is recognized as revenue. Over the year, the insurer's profit would emerge from that revenue minus actual claims/expenses incurred. If actual claims equal the expected 60,000, then out of the 75,000-premium earned, 60,000 goes to cover claims/expenses, leaving 15,000 as underwriting profit (which matches the expected margin). The risk adjustment (part of the claims liability) would be released as claims are settled, also affecting the timing of profit.

This example demonstrates the simplicity of PAA: the liability is tracked by premium remaining, and revenue is a function of time (or exposure), not a recalculation of PV of future cash flows each period. No explicit CSM is calculated under PAA (the profit deferred in the premium essentially plays that role). However, actuarial judgment is still required for the onerous contract test and for setting up the liability for incurred claims with a risk adjustment when claims happen. For instance, if by June 30 a large claim occurs, the insurer would reduce the LRC for the coverage component used and establish an LIC equal to the expected remaining claim payments + RA for that claim. The PAA thereby strikes a balance: it leverages the simplicity of unearned premium for the coverage component while still invoking the rigor of fulfilment cash flows for claims and onerous scenarios.

4.3. Participating (VFA) Contract Initial Measurement Application

As an example, consider a single premium participating endowment policy: A policyholder pays ₺10,000 upfront, which the insurer will invest on the policyholder's behalf. The contract guarantees at least the return of the ₺10,000 after 5 years (maturity), plus 80% of any investment profits earned on the premium. The insurer's fee is the remaining 20% of investment gains, as well as implicit fees for insurance coverage (the guarantee and any death benefit) and administration. We will perform an initial measurement assuming expected market conditions. Key assumptions:

Underlying asset return: Suppose the insurer expects the underlying investments to earn ~10% per year on average. Over 5 years, ₺10,000 would grow to ~₺12,762 at 5% (compounded). Thus, the expected maturity payout to the policyholder (which includes 80% of gains) might be around ₺12,760 (for example's sake). This consists of the guaranteed 10,000 plus an expected bonus of 2,760. The insurer's expected share of the gains would be the remaining ~₺552 (20% of the 2,760 total gains). (We'll use simplified numbers for clarity – in practice this would be derived from detailed asset modelling.)

Cash flow projections: The relevant cash flows for the insurer include: the initial premium +10,000 (inflow at time 0), the expected maturity payment –12,760 (outflow at t=5), the insurer's fee inflows. The insurer's fee in this contract comes from investment performance; one way to model it is as an annual fee on fund value. For simplicity, assume the insurer expects to withdraw a fee of ₺200 each year from the fund (this might represent something like a 2% management fee on the growing fund, roughly). That fee is an inflow to the insurer. Also consider any maintenance expenses; we'll assume negligible for simplicity.

Discount rate: Assume a 10% discount rate for present value calculations (close to or a bit above the expected asset return, reflecting perhaps a slight risk adjustment in the rate or market rates). This will be used to discount projected cash flows.

Risk adjustment: The contract has financial risk (investment variability), but non-financial risk might be small here (maybe lapse risk or expense risk, and the guaranteed risk of repaying ₺10,000 even if markets fall). Suppose the insurer sets a risk adjustment of ₺200 for

non-financial risk (covering uncertainty in mortality, lapse, and any guarantee cost beyond the expected).

Now, we calculate the initial fulfilment cash flows like GMM:

Present value of future cash flows:

Apply the 10% discount rate to each future outflow. The present value (PV) factors for years 1 to 5, at 10% are: 0.909, 0.826, 0.751, 0.682, 0,620 (using factor = 1/ (1.10^t)). Multiplying, the PV of each year's outflow is:

Inflow at t=0: +10,000 premium (present value = 10,000).

Annual fee inflows: +10 at t=1,2,3,4,5. Discounting these: PV of 100 at 10% for 1 year is 90.90; for 2 years 82.60; 3 years 75.10; 4 years 68.20; 5 years 62.00. Sum of PV of fees ≈ ৳378.80.

Maturity outflow at t=5: –12,760 expected payment. Discounted 5 years at 5%: 1,150 / (1.05^5) ≈ 12,760 / 1.276 = –৳10,000 (approximately).

(Note: We are discounting the expected total policyholder benefit. The fact that part of it is variable doesn't matter for initial expected cash flows – we use the best estimate.)

There may also be a small death benefit risk for 5 years (which we ignore here) and an implicit cost for the guarantee of returning 10,000 even if markets crash. Let's assume the expected cost of that guarantee is already reflected in the 1,150 figures (or it's not significant under mean expectation).

Summing these present values: PV of inflows = 10,000 + 378.80 = 10.378,80; PV of outflows = 10.000; net PV of future cash flows = 10,378.80 – 10.000 = +378,80. This positive amount indicates an expected profit (present value) of about ৳380 on this contract, before RA. (In other words, the premium is more than enough to cover expected payouts – largely because the payout includes only 80% of investment gains, leaving an expected 20% for the insurer.)

Add Risk Adjustment: Subtract the RA of ₺200 for non-financial risk. Fulfilment cash flows = ₺378.80 – ₺200 = ₺278.80 (net inflow PV after RA). This is the net gain the insurer would recognize if it weren't deferring profit.

CSM at inception: To avoid day-one profit, we establish a CSM equal to the net gain. So CSM = –₺278.80 (a liability for unearned profit). Rounding, say CSM ≈ –₺279. This will ensure the initial insurance contract liability = PV (outflows) + RA + CSM – PV (inflows) = 0 (or equivalently, assets and liabilities net out, with no immediate P&L impact). The initial liability is composed of the fulfilment cash outflows (which here would equal the premium of ₺10,000 minus the CSM) and the CSM of ₺279, totalling the premium received.

Thus, at inception, the insurer's balance sheet reflects a liability roughly equal to the premium received (₺10,000) and no profit. The CSM of ₺279 stores the expected profit, to be released over 5 years as the insurer provides two types of services: insurance coverage (the death benefit & guarantee) and asset management/investment service for the policyholder's funds. The insurer would determine an appropriate allocation base (for example, maybe treat the investment management as the dominant service, and release CSM in proportion to account balance or over time).

CSM and the "Variable Fee" in subsequent periods: Now suppose after 1 year, the underlying assets performed better than expected – yielding 15%. This means the policyholder's account is higher, and the expected future payments to the policyholder increase (because 80% of higher future returns will go to them). But it also means the insurer's expected fee (the 20% share) will increase. Under the VFA, the change in the insurer's share of future returns adjusts the CSM rather than hitting profit immediately. For instance, if the favourable performance increases the present value of the insurer's future fees by ₺100, the CSM would be increased by ₺100 (and not recorded as immediate investment profit). The offsetting increase in the liability for policyholder benefits would be accounted for in the fulfilment cash flows. Then, as the insurer continues to provide service, it will release the (now slightly larger) CSM over the remaining coverage period. This mechanism ensures that the timing of profit recognition under VFA mirrors the provision of service and the passage of time, rather than short-term market fluctuations (www.dawgen.global, 2025). Effectively, the insurer only realizes its share of investment performance as it becomes earned through the contract duration.

If, on the other hand, mark ets crashed and the expected insurer fee dropped (or if guarantees came into the money, reducing the insurer's share), the VFA would reduce the CSM for the loss of expected profit. Extreme cases where the CSM falls to zero would lead to recognizing losses (if the contracts become onerous).

In summary, VFA is characterized by the same initial measurement approach as GMM – calculate PV of cash flows, RA, and a CSM – but with a crucial difference in how the CSM is subsequently managed. The insurer's obligation is to pay the policyholder a substantial portion of asset returns minus a fee. TFRS 17's VFA ensures that changes in that fee (the variable fee) flow through the CSM. This produces a smoother profit profile that reflects the long-term nature of services provided. Financial risks are largely borne by policyholders in such contracts (aside from guarantees), and the accounting mirrors that by not immediately impacting shareholder profit for every asset movement. From an actuarial perspective, modelling VFA contracts requires close integration of asset and liability projections, as well as careful analysis of how guarantees and fees behave under different scenarios. But the result in financial statements is a clearer reflection that the insurer's profit emerges as it earns its fees over time (Grant Thornton, 2020).

5. FINDINGS

In conclusion, it was found that:

GMM offers a complete and granular measurement suitable for most long-term contracts, capturing all financial and non-financial aspects with an explicit profit deferral mechanism (CSM).

PAA offers an operationally simpler approach for short-term contracts, essentially using premium allocation and release to approximate GMM results with far less calculation (at the cost of less granular information, since no explicit CSM or updated PV of future cash flows is shown).

VFA is a targeted approach to handle contracts where policyholder and insurer fortunes are linked to asset returns – it modifies GMM to defer the insurer's share of investment performance into the CSM, thereby aligning accounting with the substance of those contracts.

The table below summarizes key differences:

Table 4. The Key Differences Among Actuarial Techniques

Aspect	GMM (General Model)	PAA (Premium Allocation)	VFA (Variable Fee)
Typical Use Cases	Default for long-term contracts (life insurance, long-tail P&C, etc.). Required if PAA not applicable.	Short-term contracts (<= 1 year) or those behaving like short-term. Common for P&C insurance, short group life, etc. Optional election if criteria met.	Participating contracts with policyholder share in assets (with-profits, unit-linked, variable annuities, etc.). Mandatory if criteria met (all three conditions).
Measurement Approach	Explicit "building blocks": PV future cash flows + RA + CSM. Updated at each reporting date with current assumptions; CSM absorbs certain changes (non-financial assumptions).	Simplified unearned premium approach for remaining coverage. LRC = premium received – acq. costs, amortized over coverage. No explicit CSM (profit is in unearned premium). LIC for claims uses fulfilment cash flows (like GMM).	Same building blocks as GMM at inception. Subsequent: CSM *unlocked* for changes in insurer's share of underlying asset returns. Closer integration of assets and liabilities – effectively **GMM + dynamic CSM** for market changes.
Complexity	High – requires detailed cash flow models, discounting, iterative CSM calc and amortization. Need robust systems and data (actuarial models).	Low – simpler calculations like current unearned premium reserve. Tracking premiums and straightforward amortization. Less sensitive to assumption updates (unless onerous). **However**, need process for loss recognition test and to handle claim reserves with RA.	High – requires everything GMM does, plus tracking of underlying item performance. Market variables and assumptions need continuous updating; complex when guarantees present. Often necessitates stochastic modelling for options/guarantees and sophisticated CSM roll-forward logic.
Key Inputs	*Detailed assumptions:* Mortality, lapse, expenses, claim development, etc. *Discount yield curve* for long durations. *Risk adjustment parameters* (e.g. confidence level). *Grouping info* for CSM (cohorts, coverage units).	*Premium data:* amounts, timing. *Earning pattern:* coverage period and exposure pattern (e.g. straight-line or based on risk). Simplified assumption set since no need for long-term projections (except to test onerousness). *Loss ratio expectations* for onerous test. *Basic RA for claims.*	*All GMM inputs plus:* **Asset data** (market value of underlying pool, expected returns/yields). *Policyholder bonus rules:* what % of returns credited, etc. *Financial market assumptions:* if required for options (volatilities, correlations). Possibly *hedging strategies* if using risk mitigation (to decide certain gains not to adjust CSM). Need to run scenarios to capture how changes affect insurer vs policyholder share.

Profit Recognition	Over life of contract via CSM release – reflects insurance service provided. Changes in estimates: non-financial assumption changes adjust CSM (prospectively), financial changes go to P&L/OCI (unless OCI option used for discount rate changes).	Over coverage period via premium earning. Generally straight-line or according to expected claims. No CSM; profit = premium minus incurred losses and expenses, spread over time. If assumptions change (e.g. higher expected claims mid-way), no deferral mechanism – profit impact happens as loss component or just lower future earnings (PAA doesn't remeasure future cash flows unless onerous).	Over contract duration via CSM release, **including investment management service** component. Changes in *financial variables* (underlying asset returns) adjust CSM (deferred), so profit aligns with long-term outcomes. Non-financial changes (e.g. longevity) also adjust CSM if related to future service. Greater alignment with economic reality of asset-sharing – reduces accounting volatility at the expense of complexity.
When Not Permitted	n/a (always permitted, default model for all contracts).	If coverage > 1 year (unless proving immaterial difference). Not allowed for contracts with significant variability in future cash flows that would cause material GMM vs PAA differences (e.g. some long-tail P&C with seasonality, or contracts with embedded derivatives that make earnings pattern uneven). Also not for contracts with participating features (since those fail PAA criteria typically).	Only applicable if all criteria are met. If an insurance contract has participation-like elements but fails any condition (e.g. the policyholder's share is not "substantial"), then GMM is used instead. Not allowed for reinsurance held or certain investment contracts without insurance.

6. CONCLUSION

TFRS 17 marks a paradigm shift where actuarial science meets financial reporting. The actuarial valuation method lies at the heart of measuring insurance liabilities under GMM, PAA, and VFA. Actuaries are essential in delivering transparent, consistent, and auditable projections of insurance liabilities, while ensuring that risk and profit emergence are faithfully represented. The long-term success of TFRS 17 implementation will depend heavily on the ability of actuaries to integrate technical rigor with business insight.

Actuarial valuation under TFRS 17 requires identifying the correct measurement approach and then diligently applying the formulas and assumptions for that approach. The General Measurement Model provides a comprehensive framework for long-term and complex insurance contracts, ensuring that profits emerge in step with insurance services via the CSM mechanism.

Premium Allocation Approach offers a pragmatic simplification for short-term contracts, using the familiar concept of unearned premium – it trades some precision for operational ease, while still requiring testing for onerous contracts.

The Variable Fee Approach tailors the general model to participating contracts, capturing the essence of "fee-based" profit by adjusting the CSM for changes in the insurer's share of underlying returns.

Each approach has distinct computational and data demands: from the granular scenario modelling of GMM and VFA to the straightforward premium roll-forward of PAA. By working through examples for each method – calculating PVFCF, risk adjustments, and CSM or its equivalent it is seen how TFRS 17 brings increased transparency and consistency to insurance accounting. Actuaries and accountants must collaborate closely under these frameworks, with actuaries providing the estimates and models for cash flows and risks, and accountants ensuring the results are properly reflected in financial statements and disclosures. The result is an accounting model that better reflects the economic reality of insurance contracts, whether it be a simple one-year term policy or a complex multi-decade participating life fund.

Despite its comprehensive approach, this study has certain limitations that should be acknowledged. First, the analysis primarily relies on conceptual and illustrative examples rather than empirical data from Turkish insurance companies implementing TFRS 17. Consequently, while the numerical applications demonstrate the mechanics of actuarial valuation methods, they may not fully capture the institution-specific assumptions or market heterogeneities that could arise in real-world practice. Second, the research focuses mainly on life insurance contracts and does not extend to more complex products such as reinsurance, composite contracts, or investment-linked policies where hybrid valuation models may be required. Additionally, the study assumes deterministic parameters for discount rates and risk adjustments, while in practice, stochastic modelling and scenario testing could provide deeper insights into volatility and uncertainty under TFRS 17.

For future research, several directions are suggested. Empirical studies could examine how Turkish insurers adapt their actuarial systems and data infrastructures to comply with TFRS 17 and assess the impact of the new standard on solvency, profitability, and transparency.

Comparative analyses across different markets could explore how implementation challenges vary depending on regulatory maturity or product structure. Furthermore, future research could integrate machine learning and data analytics techniques into actuarial valuation frameworks to enhance predictive accuracy in risk adjustment and cash flow modelling. Lastly, interdisciplinary studies combining accounting, actuarial science, and regulatory economics could provide a holistic understanding of how TFRS 17 transforms financial reporting and decision-making in the insurance industry.

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