“Accounting-based assessment of bank ROE: Evidence from Armenian banks”

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ACCOUNTING-BASED ASSESSMENT OF BANK ROE: EVIDENCE FROM ARMENIAN BANKS

Abstract

Bank profitability, as measured by return on equity (ROE), may arise from different combinations of operating efficiency, risk costs, and capital intensity, making headline profitability comparisons potentially misleading. Understanding the sources of cross-bank profitability differences is therefore important for performance evaluation and supervisory interpretation.

The purpose of this study is to assess how accounting-based performance components explain cross-bank variation in ROE among Armenian banks using year-end 2023 IFRS data and a Shapley variance decomposition applied to these components. The empirical analysis uses published IFRS financial statements for ten banks representing approximately 75% of total sector assets. ROE is mapped into cost efficiency, leverage, income margins, and provisioning using an accounting identity, and a Shapley variance decomposition is applied to attribute cross-bank variation in pre-tax ROE, excluding tax effects from variance attribution.

The results indicate that cost efficiency accounts for 49.6% of cross-bank pre-tax ROE variation in 2023, followed by leverage at 22.6% and provisioning at 14.8%, while income-related components jointly account for the remaining 13%. Importantly, these variance shares reflect both the role of each component in the accounting transmission from income to profitability and the magnitude of its cross-sectional variation across banks. These results describe the structure of cross-bank profitability differences in the Armenian banking sector in 2023 and support transparent peer comparison and consistent supervisory interpretation of bank profitability. All variance shares are reported for pre-tax ROE to improve comparability by abstracting from institution-specific tax effects.

Keywords banks, profitability, efficiency, leverage, provisioning, accounting, ROE, Armenia

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INTRODUCTION

Bank profitability, as measured by return on equity (ROE), arises from different combinations of operating efficiency, balance-sheet structure, and risk costs. These alternative profitability configurations have different implications for resilience, loss-absorption capacity, and sustainability. A coherent, accounting-consistent attribution framework is necessary to assess how individual components contribute to ROE.

In banking, the classical DuPont structure does not fully reflect the sector-specific features that shape bank earnings performance. Banks create value primarily through intermediation, balance-sheet management, and risk transformation rather than product turnover. As a result, earnings are driven by interest margins, cost efficiency, credit risk dynamics, and capital structure, all operating within regulatory and accounting constraints. The standard DuPont framework does not explicitly capture the joint determination of bank profitability through these mechanisms.

Although financial statements provide detailed indicators such as net interest margin (NIM), cost-to-income ratio (CIR), provisioning

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rates, and leverage, these metrics are typically analyzed in isolation rather than within an integrated, accounting-consistent framework. Profitability is inherently multi-dimensional, with operating efficiency, balance-sheet structure, and risk recognition jointly shaping outcomes. Similar ROE levels may therefore reflect fundamentally different economic positions, with distinct implications for resilience, risk absorption capacity, and sustainability. This creates a practical interpretive challenge for managers, analysts, and supervisors, particularly in cross-sectional assessment of bank performance. The analysis is conducted as a cross-sectional empirical assessment of the Armenian banking sector, focusing on descriptive attribution of profitability within a single reporting period.

1. LITERATURE REVIEW

The academic literature on bank profitability has long sought to adapt general corporate finance tools to the sector's distinctive economic and regulatory structure. Return on equity, widely used as a performance metric, illustrates this challenge clearly.

The classical DuPont decomposition, which separates ROE into margin, efficiency, and leverage components, has been applied in corporate finance since the early twentieth century (Solomons, 1965; Ross et al., 2019). Multi-step variants further isolate tax and interest effects (White et al., 2003; Penman, 2012). However, the sector-agnostic nature of the DuPont framework limits its direct applicability to banking, where profitability does not arise from product turnover but from intermediation, balance-sheet management, and risk absorption (Koch & MacDonald, 2009; Saunders & Cornett, 2018). Regulatory analysis has also emphasized the need to decompose ROE to better interpret the roles of leverage and cyclical risk components in banks (ECB, 2010). These differences have motivated a broad literature seeking banking-specific interpretations of ROE and its underlying profitability drivers.

A substantial body of empirical research identifies cost efficiency as a key determinant of bank performance. Berger (1995) demonstrates the decisive role of managerial efficiency and cost control in explaining performance differences among U.S. banks, providing a foundation for the subsequent efficiency and frontier literature. Subsequent studies confirm that operational efficiency, commonly proxied by the CIR, is a key determinant of shareholder returns across banking systems (Brigham & Houston, 2009; Higgins, 2012; Ross et al., 2019; Bolívar et al., 2023).

Income generation, particularly through the net interest margin, represents another key dimension of bank profitability. Cross-country evidence shows that NIM responds strongly to funding conditions, competition, and monetary policy (Demirgüç-Kunt & Huizinga, 1999). More recent studies document how changes in the term structure and interest rate cycles affect margins and profitability dynamics (Memmel & Heckmann-Draisbach, 2023; Windsor et al., 2023). Policy-oriented research further shows that these effects may be asymmetric and nonlinear, with implications for profitability stability (Samet & Kirimhan, 2025; Fritsch, 2025).

Credit risk and provisioning introduce an additional and often dominant source of earnings volatility. The adoption of forward-looking expected credit loss models under IFRS 9 has strengthened the conceptual and empirical link between macroeconomic conditions, provisioning cycles, and ROE (International Accounting Standards Board (IASB), 2014). Empirical studies show that provisioning behavior plays a major role in explaining profitability fluctuations and cross-sectional differences, particularly during downturns (Albertazzi & Gambacorta, 2009; Athanasoglou et al., 2008). Recent evidence from Europe and emerging markets confirms that provisioning rates remain an important source of cross-bank ROE variation (IMF, 2019, 2024; Jitmaneeroj & Ogwang, 2023).

Leverage and capital structure further shape how income and losses are translated into shareholder returns. Regulatory reforms under Basel II and Basel III have progressively constrained banks' ability to boost ROE through balance-sheet expansion, emphasizing the role of capital buffers and balance-sheet composition (BCBS, 2004, 2011). Empirical research indicates that fi-

nancial leverage plays a central role in shaping banks' profitability and resilience during periods of financial stress (Dietrich & Wanzenried, 2011; Caparusso et al., 2023). Supervisory frameworks such as the Internal Capital Adequacy Assessment Process (ICAAP) and the Supervisory Review and Evaluation Process (SREP) have institutionalized the monitoring of profitability drivers within prudential assessments (ECB, 2018).

Across both academic research and supervisory practice, a common set of indicators emerges as core to the analysis of bank profitability, including net interest margin (NIM), cost efficiency (CIR), provisioning, and leverage (Koch & MacDonald, 2009; Albertazzi & Gambacorta, 2009; BCBS, 2004). Applications in different jurisdictions, including Europe and Austria, show that modified DuPont-style analyses can provide useful insights into the sources of bank profitability when appropriately adapted to the sector (Fiordelisi, 2007; OeNB, 2022). At the same time, alternative approaches such as risk-adjusted performance measures emphasize related dimensions of income, risk, and capital allocation (Young & O'Byrne, 2001).

Comparable single-country descriptive studies have been conducted in other emerging markets. Jitmaneeroj and Ogwang (2023) apply variance partitioning to Ugandan banks and find that time effects account for less variation than bank-specific factors, supporting the relevance of cross-sectional analysis. The Austrian National Bank (OeNB, 2022) applies a modified DuPont framework to Austrian banks and finds that cost efficiency and provisioning cycles are primary drivers of profitability variation. This study complements the literature by providing comparable evidence from an emerging market context (Armenia) and by employing Shapley value decomposition, which offers order-invariant variance attribution suitable for multiplicative accounting identities.

Overall, the literature establishes that bank profitability is shaped by recurring components such as margins, cost efficiency, provisioning, and leverage across different regulatory and market contexts. However, these components are often examined separately rather than within an integrated framework when interpreting cross-bank profitability differences. As a result, understanding how accounting-based performance components jointly relate to observed ROE remains an important empirical question.

Existing research typically analyzes these components using econometric or regression-based approaches, often treating them as separable determinants. In contrast, this study adopts an accounting-consistent perspective that integrates commonly reported banking indicators into a unified structure that exactly reconciles ROE with its financial-statement components. Combined with a Shapley value variance decomposition, the framework provides an order-invariant and internally consistent attribution of cross-bank profitability variation across accounting components. The contribution, therefore, lies in the unified accounting-based representation and its empirical application, rather than in the introduction of a new structural model.

The purpose of this study is to assess how accounting-based performance components explain cross-bank variation in return on equity (ROE) among Armenian banks using year-end 2023 IFRS data and a Shapley variance decomposition applied to these components.

2. METHOD

The analysis is based on an accounting identity and therefore provides an exact mapping between reported ROE and its financial-statement components rather than a statistical estimation framework. The approach is descriptive and focuses on cross-sectional attribution, without attempting to identify causal relationships.

The empirical application uses IFRS financial statement data for ten Armenian banks as of year-end 2023, representing approximately 75% of total sector assets. Banks were excluded if they lacked complete disclosure of all components required for the decomposition (net interest income, fee income, trading income, operating expenses, provisioning charges, and equity). While the sample is not exhaustive, it captures the dominant share of banking activity and provides sufficient cross-sectional variation for descriptive analysis.

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The focus on a single-year cross-section is appropriate for the study's objective, as the Shapley decomposition characterizes contemporaneous variation in ROE components across banks rather than intertemporal dynamics. The 2023 period also provides a relevant setting for component-based peer comparison given the unusually strong profitability observed in Armenian banks.

Financial statements were obtained from the OctoBI analytics platform, which compiles publicly available bank filings. The dataset used in the analysis is publicly available at Zenodo (doi.org/10.5281/zenodo.18144423).

The analysis expresses ROE in terms of banking-specific performance indicators, including NIM, CIR, provisioning, leverage, and tax effects, using reported financial statement data. All components of this relationship are computed directly from published statements. ROE recalculated using Equation (3) is compared with reported ROE to verify exact reconciliation prior to decomposition.

The identity follows standard financial statement definitions and begins with the relationship linking operating income, operating costs, provisioning, and pre-tax profit. ROE is defined on an after-tax basis, consistent with published financial statements. Let t denote the effective tax rate, defined as tax expense divided by pre-tax profit. After-tax profit equals $(1 - t)$ times pre-tax profit, implying that pre-tax profit can be written as $ROE \times E / (1 - A)$. Accordingly, the accounting identity is:

$$Operating\ Income - Costs - Provisioning = \frac{ROE \cdot E}{1-t}, \quad (1)$$

where E denotes average book equity over the reporting period. *Provisioning* is written as $(\gamma \times A)$, where γ is the net provisioning rate (positive for net provision expense, negative for net recoveries), defined as net impairment charge reported in the income statement divided by average interest-earning assets. A denotes average interest-earning assets. *Costs* are expressed as (*CIR* × *Operating Income*), where CIR is the cost-to-income ratio. Operating income (*OI*) aggregates interest, fee, and trading components net of funding costs and is defined as:

$$OI = r_A \cdot A + f \cdot A + x \cdot A - r_D \cdot D, \quad (2)$$

where r_A is the average asset yield; r_D is the average funding cost; D denotes average interest-bearing liabilities; and f and x represent fee and trading yields, respectively (income divided by average interest-earning assets). Substituting the definitions of (*Costs* = *CIR* × *OI)* and (*Provisioning* = $\gamma \times A$) into Equation (1) yields: $(OI \times (1 - CIR) - \gamma \times A = (ROE \times E) / (1 - t))$. Dividing both sides by E and using Equation (2), we obtain:

$$ROE = (1-t) \cdot (1-CIR) \cdot \frac{A}{E} \cdot \left(NIM + f + x - \frac{\gamma}{1-CIR} \right), \quad (3)$$

where $NIM = (r_A \times A - r_D \times D) / A$, consistent with standard banking definitions based on average interest-earning assets. Equation (3) expresses ROE as an accounting relationship linking income margins, cost efficiency, provisioning, financial leverage, and tax effects.

For attribution and presentation purposes, Equation (3) is complemented by its sequential form in Equation (4), which clarifies the transmission from operating income to pre-provision profit, then to after-provision profit, and finally to ROE through leverage and taxes, while maintaining exact reconciliation with reported ROE:

$$ROE = \left[(NIM + f + x) \cdot (1-CIR) - \gamma \right] \cdot \frac{A}{E} \cdot (1-t). \quad (4)$$

For each bank, the effective tax rate is calculated as tax expense divided by pre-tax profit, while CIR is taken directly from published financial statements. The interest-earning asset-to-equity ratio (A / E) is computed consistently with the definitions above, using period-average balance sheet values. Provisioning rates, NIM, fee yields, and trading yields are derived from income statement components relative to average interest-earning assets. This ensures consistency between flow-based income measures and balance sheet denominators and aligns the decomposition with standard banking practice.

While Equations (3) and (4) are stated in after-tax form to ensure exact reconciliation with reported ROE, variance attribution is performed on pre-tax ROE, as effective tax rates may differ across banks due to deferred tax movements, one-off adjustments, and institution-specific tax treatments unrelated to core operating performance. Accordingly, tax effects are retained for reconciliation and presentation but excluded from variance attribution to isolate structural profitability drivers.

To quantify how the remaining accounting components contribute to cross-bank variation in profitability, the study applies a Shapley value variance decomposition (Grömping, 2006). The Shapley rule allocates the cross-sectional variance of pre-tax ROE across the same components embedded in the identity–income margins (NIM, fee yield, trading yield), cost efficiency (CIR), provisioning, and leverage, where pre-tax ROE follows the same multiplicative structure as Equations (3) and (4) but without the (1 – *t*) term. The resulting Shapley shares are descriptive variance allocations within the 2023 cross-section and should not be interpreted as causal effects or structural elasticities.

3. RESULTS

After-tax ROE calculated using Equation (3) exactly matches reported ROE for all banks in the sample, confirming internal consistency of the accounting identity. The "Difference" column in Table A1 (Appendix A) reports the reconciliation residual, defined as "*ROE*(*Calculated*) – *ROE*(*Reported*)", and equals zero for all banks.

Summary statistics for the accounting components used in Equation (3) are presented below, while detailed bank-level decompositions are provided in Appendix A. CIR ranges from 26.5% to 62.4%, with a mean of 42.0%. NIM varies between 5.35% and 8.16%, with a mean of 6.87%. The interest-earning asset-to-equity ratio ranges from 3.93 to 6.40, with a mean of 5.08. Provisioning rates range from –0.10% (net recoveries) to 1.56%. The sample's average after-tax ROE is 23.0%, with a standard deviation of 7.2 percentage points. The highest after-tax ROE in the sample (35.9%) exceeds the lowest (11.5%) by more than threefold. Variation is most pronounced in cost efficiency and, to a lesser extent, provisioning, indicating substantial cross-bank heterogeneity.

Figure 1 presents the sequential attribution for two illustrative banks using the sequential expression in Equation (4).

The left panel presents Unibank (ROE = 11.5%), representing the lower end of the distribution and characterized by an elevated CIR (62.4%) and the highest provisioning rate (1.56%). The right panel presents ACBA Bank (ROE = 23.6%), an above-average performer supported by high NIM (8.16%) and net provision recoveries (–0.10%).

The waterfall charts show the sequential contribution of income margins, cost efficiency, provisioning, and leverage to after-tax ROE, including the final tax adjustment through the (1 – *t*) term in

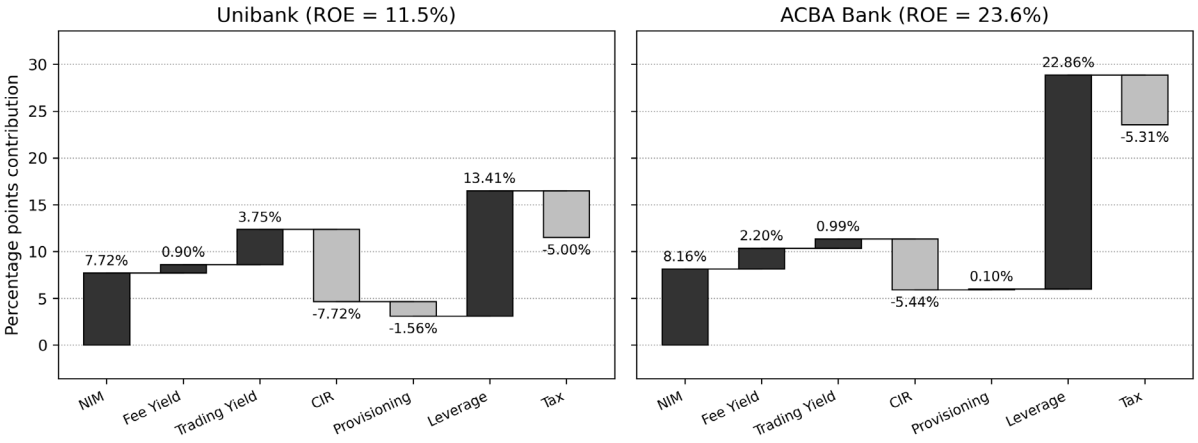

Figure 1. Sequential after-tax ROE attribution waterfall for two illustrative banks (year-end 2023)

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Equation (4). Provisioning enters with a negative sign ($-\gamma$), so net provision expenses reduce ROE, whereas net recoveries increase it.

The Shapley value variance decomposition shows that CIR accounts for 49.6% of cross-bank pre-tax ROE variation, leverage for 22.6%, and provisioning for 14.8%. Together, these three components explain 87% of the observed cross-bank variation in pre-tax ROE. The remaining 13% is captured by income-related components, including NIM (5.5%), fee yield (4.7%), and trading yield (2.8%) (Table 1).

Table 1. Shapley variance decomposition of pre-tax ROE performance components

ROE Components	Shapley Share (%)
Cost-to-Income Ratio (*CIR*)	49.6
Leverage (*A/E*)	22.6
Provisioning Rate	14.8
Net Interest Margin (*NIM*)	5.5
Fee Yield	4.7
Trading Yield	2.8

These shares should be interpreted as descriptive variance allocations within the 2023 cross-section rather than structural elasticities. Although trading yields (average 2.34%) contributed materially to the level of bank profitability in 2023 (Hakobyan & Margaryan, 2025), their low Shapley share (2.8%) indicates that this effect was relatively uniform across banks and therefore did not contribute meaningfully to cross-bank variation in profitability.

To complement the variance-based attribution, Figure 2 presents the cross-bank distribution of revenue composition. The horizontal axis measures net interest margin (NIM), while the vertical axis captures non-interest income (sum of fees and trading yields). Bubble size represents financial leverage (interest-earning asset-to-equity ratio, A/E). The figure illustrates differences in business models, distinguishing between margin-driven and non-interest income-supported structures, and highlights the role of leverage as a scaling mechanism of profitability. The relatively limited variation along the non-interest income dimension is consistent with the variance decomposition results, where income-related components account for a relatively small share of cross-bank ROE variation.

Banks located near the center of the distribution exhibit a relatively balanced mix of interest and non-interest income, indicating diversification across revenue sources rather than reliance on a single income stream. Banks positioned on the right-hand side with comparatively lower non-interest income rely more heavily on traditional intermediation margins, making profitability more sensitive to interest rate conditions and funding costs. Banks located in the upper-left quadrant

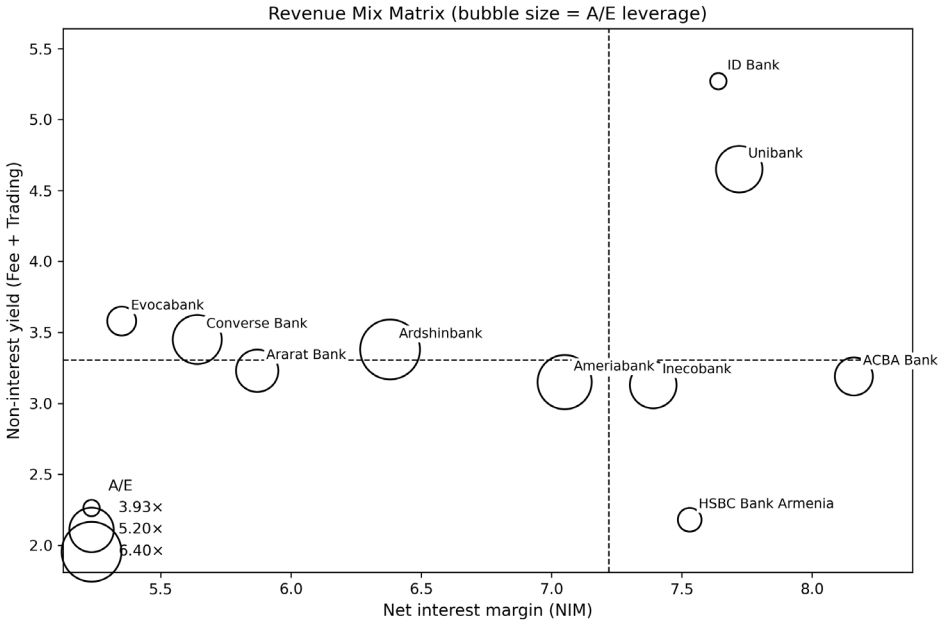

Figure 2. Revenue mix and leverage across banks (year-end 2023)

generate a larger share of income from fees and trading activities relative to margins, reflecting business models oriented toward transactional or market-related activities. Bubble sizes indicate that higher leverage amplifies returns across different revenue structures (e.g., Ardshinbank, Ameriabank), highlighting that revenue mix alone does not determine profitability, as balance-sheet intensity remains a key transmission mechanism. The relatively tight clustering of banks along the vertical axis suggests limited cross-sectional variation in non-interest income compared to NIM, reinforcing the Shapley decomposition result that income-related components contribute only modestly to cross-bank ROE variation.

Figure 3 presents the joint distribution of cost efficiency (1 – *CIR*) and provisioning strength (1 – *γ*), with bubble size reflecting pre-tax ROE, where provisioning strength is the complement of the provisioning rate and reflects the extent to which operating income is preserved after credit cost recognition. Higher values of (1 – *γ*), therefore, indicate lower net provisioning charges relative to assets, which may arise from lower realized credit losses, stronger portfolio quality, or differences in provisioning practices and assumptions.

The figure illustrates how banks combine operating efficiency with credit risk recognition in generating profitability. Greater cross-sectional variation along the cost efficiency dimension relative to provisioning strength is consistent with the variance decomposition results, which identify cost efficiency as the dominant driver of cross-bank variation in pre-tax ROE.

Banks located in the upper-right quadrant combine strong cost efficiency with higher provisioning strength, indicating profitability supported by both operational discipline and relatively contained credit costs. This configuration is consistent with relatively more sustainable earnings profiles, although higher provisioning strength may also reflect temporarily low realized credit risk or less conservative provisioning during the period.

Banks in the lower-right quadrant achieve high efficiency but operate with comparatively weaker provisioning strength. While cost efficiency supports profitability, returns are partially offset by higher provisioning intensity, which may reflect either elevated underlying credit risk or more conservative risk recognition.

Banks in the upper-left quadrant combine weaker cost efficiency with higher provisioning strength, suggesting that lower credit costs partially offset less efficient operating structures. In such cases, profitability may be supported by favorable credit conditions rather than structural efficiency.

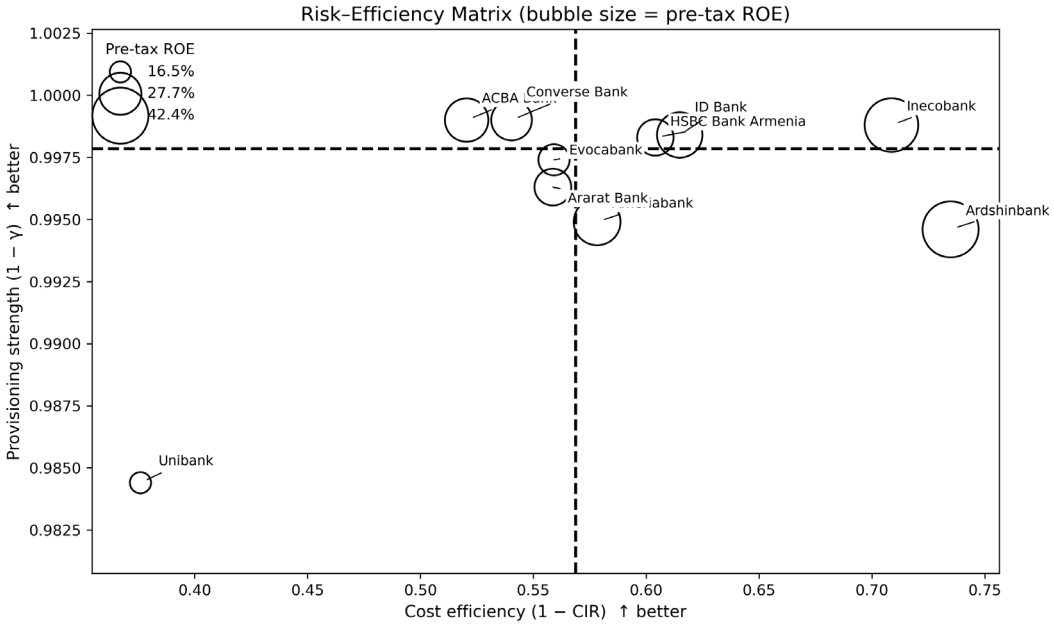

Figure 3. Cost efficiency and provisioning strength (pre-tax ROE representation)

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Banks in the lower-left quadrant (e.g., Unibank) combine weaker cost efficiency with weaker provisioning strength, resulting in lower profitability driven jointly by cost structure and credit cost dynamics.

The distribution of bubble sizes further shows that higher profitability is primarily associated with strong cost efficiency rather than systematically lower provisioning intensity. This reinforces the interpretation that efficiency, rather than credit cost variation, is the dominant driver of cross-bank profitability differences in the 2023 cross-section.

Figure 4 presents the joint distribution of pre-provision return on assets (ROA) and financial leverage (A/E), with bubble size representing pre-tax ROE. Pre-provision ROA isolates operating profitability prior to credit cost recognition. The figure illustrates how return on equity emerges from the interaction between operating performance and balance sheet intensity. Variation across both axes indicates that differences in ROE are not driven by a single factor, but by the combined effect of profitability and leverage.

Banks in the upper-right quadrant combine strong operating profitability with high leverage, generating the highest pre-tax ROE through the joint effect of both components. Banks in the lower-right quadrant (e.g., ID Bank) exhibit strong operating profitability but lower leverage, indicating unused balance sheet capacity that could support higher ROE, subject to risk appetite and regulatory constraints.

Banks in the upper-left quadrant rely more on leverage to support ROE despite weaker operating profitability, implying greater sensitivity of returns to balance sheet scaling rather than core income generation. Banks in the lower-left quadrant combine weaker operating profitability with lower leverage, resulting in structurally lower ROE driven by both limited asset returns and conservative balance sheet intensity.

Overall, Figure 4 shows that cross-bank differences in pre-tax ROE reflect the joint determination of profitability and leverage rather than variation in either component in isolation. In contrast to the risk-efficiency matrix, where cost efficiency dominates, this representation highlights that balance sheet scaling plays a complementary but heterogeneous role across banks. Bubble sizes reinforce this interpretation by showing that similar levels of ROA or leverage can produce different profitability outcomes depending on their combination.

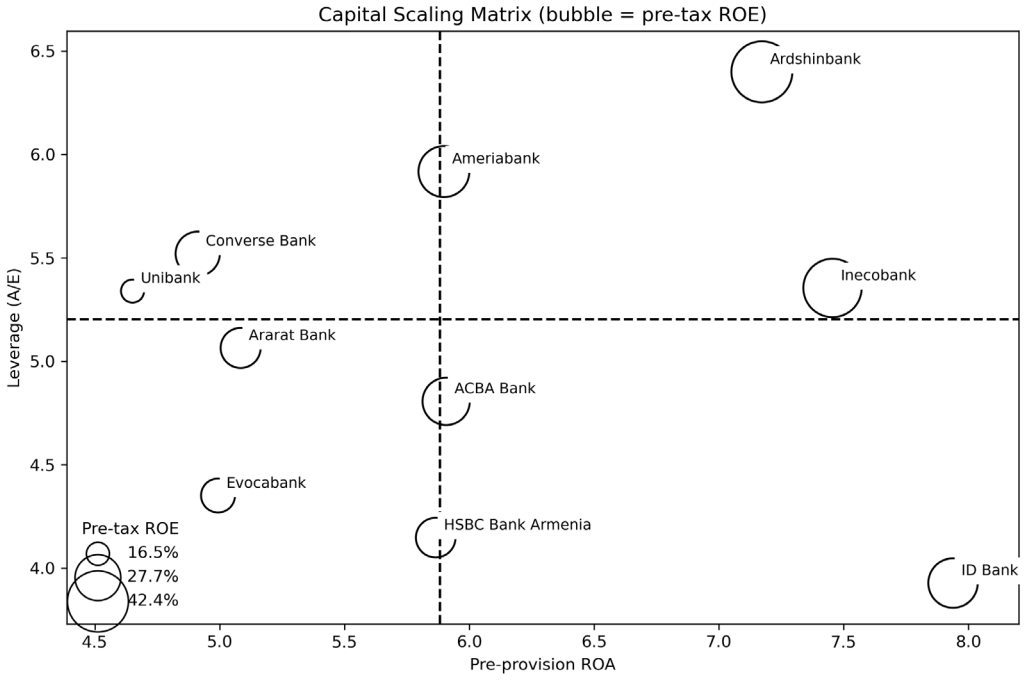

Figure 4. Operating profitability and leverage (pre-tax ROE representation, year-end 2023)

4. DISCUSSION

The results reflect cross-sectional differences in bank profitability in 2023 and should be interpreted as a point-in-time characterization of profitability structure. The relative importance of individual components may partly reflect year-specific conditions. In particular, the 2023 cross-section is conditioned by the elevated profitability observed in Armenian banks during 2022–2023, associated with strong inflows and activity shifts following the Russian–Ukrainian conflict (Hakobyan & Margaryan, 2025).

Although the decomposition allocates variation across distinct accounting-based components, these components are economically interdependent through balance sheet and income statement linkages. For example, leverage influences funding costs and therefore margins, while credit risk strategies affecting provisioning may also shape operating costs through collection intensity, restructuring activity, and portfolio monitoring. The Shapley approach accommodates statistical collinearity in variance attribution but does not imply causal independence among components. The results, therefore, provide a structured, accounting-consistent description of how performance components jointly characterize observed cross-bank profitability differences, rather than evidence of causal effects.

The accounting structure itself provides an additional interpretative perspective. The sequential representation of ROE clarifies the transmission from income generation to after-tax returns: operating income is converted into pre-provision profit through cost efficiency, adjusted for credit costs, scaled by leverage, and finally adjusted for taxation. Within this structure, components such as the cost-to-income ratio (CIR) and leverage act as multiplicative scaling mechanisms rather than purely additive factors. Differences in these components are therefore propagated through multiple stages of the accounting identity, amplifying their impact on final ROE outcomes.

The Shapley value decomposition complements this perspective by allocating cross-sectional variation in pre-tax ROE across the same accounting components. A component's Shapley share reflects both the functional role of a component within the ROE identity and the extent of its cross-bank heterogeneity. In the Armenian sample, cost efficiency emerges as the dominant driver, accounting for 49.6% of cross-bank differences in pre-tax ROE.

This result reflects both economic and structural factors. First, variation in CIR is substantial, ranging from 26.5% to 62.4%, indicating large differences in operating models, cost structures, and scale efficiency across banks. Second, the CIR enters the ROE identity as a direct transformation of operating income into pre-provision profit, making it a central transmission channel in profitability formation. By contrast, income-related components such as NIM exhibit a narrower range (5.35% to 8.16%), consistent with relatively compressed cross-sectional variation by common funding conditions and market-wide pricing dynamics.

In addition, the 2023 environment introduces an important qualification. Elevated foreign exchange and trading activity increased income levels across banks, mechanically improving CIR through denominator effects. However, the low Shapley share of trading yield indicates that this effect was relatively uniform across institutions and therefore did not materially contribute to cross-bank variation in CIR. This suggests that the dominance of CIR in the variance decomposition reflects underlying differences in cost structures rather than temporary income-driven distortions.

Leverage is the second-largest contributor to cross-bank ROE variation. Its role reflects the standard accounting mechanism through which balance-sheet intensity scales operating profitability into returns on equity. While regulatory constraints under Basel III constrain leverage levels, meaningful cross-bank variation remains within prudential bounds, reflecting differences in capital strategy, risk appetite, and asset composition. In this context, leverage should be interpreted not as a direct proxy for risk-taking, but as a regulated scaling parameter within the accounting structure of ROE.

Provisioning contributes a smaller but still economically meaningful share of variation. This reflects the structural integration of credit risk

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recognition into financial performance following the adoption of IFRS 9 (IASB, 2014), which embeds forward-looking expected credit losses directly into earnings. Differences in provisioning rates capture both observed credit risk outcomes and forward-looking loss expectations incorporated in ECL models. As such, provisioning operates simultaneously as a risk recognition mechanism and an earnings transmission channel, linking asset quality dynamics to profitability outcomes.

Income-related components, including NIM, fee yield, and trading yield, account for a comparatively smaller share of cross-bank ROE variation. This contrasts with evidence from other banking systems, where differences in interest margins are often found to play a more prominent role in explaining profitability (Demirgüç-Kunt & Huizinga, 1999). In the Armenian sample, income-related variables exhibit relatively limited cross-sectional dispersion, which reduces their contribution to variance-based attribution. As a result, their explanatory role in cross-bank profitability differences remains modest.

The distinction between level effects and variation effects is particularly important for interpreting the role of trading income. In 2023, trading gains contributed materially to the absolute level of bank profitability; however, the relatively low cross-sectional dispersion of trading yields limited their contribution to variation in ROE across banks. This distinction highlights that factors driving the level of profitability may differ from those explaining cross-bank differences in profitability.

Taken together, the results suggest that cross-bank differences in profitability in the Armenian banking sector are more strongly associated with internal structural characteristics–particularly cost efficiency and balance-sheet intensity–than with revenue generation capacity. This interpretation is consistent with the visual evidence presented in Figures 2-4. The revenue mix matrix shows relatively limited variation in non-interest income; the risk-efficiency matrix highlights the dominant role of cost efficiency; and the capital scaling matrix demonstrates how leverage interacts with operating profitability in generating ROE.

From a measurement perspective, these findings reflect a fundamental property of bank income statements. The cost-to-income ratio represents the primary mechanism through which operating income is transformed into pre-provision profit, so variation in cost structures translates directly into differences in profitability. By contrast, income components operate within relatively narrow ranges and are partially offset by funding costs and competitive pricing dynamics, limiting their contribution to cross-sectional variation in ROE.

The results have direct implications for supervisory analysis and internal bank management. From a supervisory perspective, the findings align with the multi-dimensional assessment of profitability embedded in prudential frameworks (BCBS, 2018; ECB, 2018; FDIC, 2021), where profitability is evaluated jointly with capital adequacy, risk exposure, and sustainability. The proposed decomposition framework provides a transparent mapping between ROE and its underlying accounting drivers, supporting peer benchmarking, stress testing, and forward-looking capital planning.

From a management perspective, the dominant role of cost efficiency suggests that sustainable improvements in ROE are more likely to arise from structural changes in operating models–such as digitalization, process optimization, and scale efficiencies–rather than from short-term margin expansion. This is particularly relevant in environments where income conditions are largely market-driven and exhibit limited cross-sectional variation across banks.

For investors and analysts, the results highlight that headline ROE is not sufficient for performance comparison without decomposition into its underlying drivers. Similar ROE levels may reflect fundamentally different combinations of operating efficiency, leverage, and credit cost recognition, implying materially different risk-return profiles and sustainability characteristics.

Several limitations should be noted. First, the analysis is based on a single-year cross-section and does not capture the dynamics of profitability across the credit and interest rate cycle. Extending the framework to a panel setting

would allow assessment of the persistence and cyclicality of profitability drivers. Second, while the Shapley decomposition provides an order-invariant allocation of variance, it remains a static and linear framework and does not capture nonlinear interactions or tail effects. Third, the analysis focuses on accounting-based profitability and does not explicitly adjust for risk-weighted asset intensity or economic capital usage. Integrating risk-adjusted performance measures represents a natural extension of the framework and would further align it with internal capital adequacy assessment and risk-based performance management practices.

CONCLUSION

The purpose of this study is to assess how accounting-based performance components explain cross-bank variation in return on equity (ROE) among Armenian banks using year-end 2023 IFRS data and a Shapley variance decomposition applied to these components. The results show that operational efficiency, reflected in the cost-to-income ratio (CIR), accounts for the largest share of cross-bank variation in pre-tax ROE. Balance-sheet intensity and provisioning also contribute meaningfully, while income-related components, including net interest margin (NIM) and non-interest income yields, account for a comparatively smaller share of variation.

These findings indicate that differences in cost transformation and balance-sheet structure are more closely associated with cross-bank ROE variation than differences in revenue margins. The results should be interpreted as descriptive within the specific sample and period analyzed. The use of pre-tax ROE for variance attribution ensures that the reported component contributions reflect structural operating differences rather than institution-specific tax effects.

By analyzing profitability through commonly reported banking indicators within a consistent accounting structure, the study improves the interpretability of cross-bank ROE comparisons. In particular, it shows that similar profitability levels may arise from different combinations of efficiency, leverage, and provisioning, with distinct implications for sustainability and risk.

The analysis is limited to a single year and one banking system. Future research may extend the framework to multi-period and cross-country settings and integrate risk-adjusted performance measures (e.g., RAROC or RORWA) to assess the stability and risk sensitivity of accounting-based performance components across different economic conditions, regulatory environments, and phases of the financial cycle.

AUTHOR CONTRIBUTIONS

Conceptualization: Vahagn Melik-Parsadanyan.
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AI-USE DISCLOSURE

The author used AI tools only for language refinement and copy-editing. All conceptual development, research design, analysis, and drafting were conducted entirely by the author.

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APPENDIX A. Bank-Level ROE Component Breakdown and Reconciliation (Year-End 2023)

This appendix reports the bank-level after-tax ROE reconciliation results, and descriptive statistics for the accounting identity. The variance attribution results in Table 1 are computed using pre-tax ROE as described in the Method section.

Table A1. ROE Component Breakdown and Descriptive Statistics for Ten Armenian Banks (Year-End 2023)

Banks	Effective Tax Rate	CIR	A/E	NIM	Fee Yield	Trading Yield	Provision Rate	ROE (Calculated)	ROE (Reported)	Difference
ACBA Bank	18.33%	47.95%	4.806	8.16%	2.20%	0.99%	–0.10%	23.56%	23.56%	0.00
Ameriabank	19.65%	42.17%	5.917	7.05%	0.85%	2.30%	0.51%	25.60%	25.60%	0.00
Ararat Bank	19.87%	44.13%	5.064	5.87%	1.37%	1.86%	0.37%	19.11%	19.11%	0.00
Ardshinbank	15.32%	26.51%	6.399	6.38%	-0.01%	3.39%	0.54%	35.93%	35.93%	0.00
Converse Bank	20.68%	45.96%	5.52	5.64%	1.26%	2.19%	0.10%	21.10%	21.10%	0.00
Evocabank	17.73%	44.08%	4.351	5.35%	0.85%	2.73%	0.26%	16.95%	16.95%	0.00
HSBC Bank Armenia	19.12%	39.59%	4.147	7.53%	1.13%	1.05%	0.17%	19.11%	19.11%	0.00
ID Bank	17.85%	38.51%	3.928	7.64%	1.85%	3.42%	0.16%	25.12%	25.12%	0.00
Inecobank	18.51%	29.13%	5.354	7.39%	1.44%	1.69%	0.12%	32.03%	32.03%	0.00
Unibank	30.27%	62.40%	5.339	7.72%	0.90%	3.75%	1.56%	11.51%	11.51%	0.00
Min	15.32%	26.51%	3.928	5.35%	–0.01%	0.99%	–0.1%	11.51%	11.51%	n/a
Max	30.27%	62.40%	6.399	8.16%	2.20%	3.75%	1.56%	35.93%	35.93%	n/a
Average	19.73%	42.04%	5.082	6.87%	1.18%	2.34%	0.37%	23.00%	23.00%	n/a
Std. dev.	3.98%	10.00%	0.787	0.99%	0.61%	0.98%	0.46%	7.17%	7.17%	n/a

Notes: "Difference" is computed as "ROE (Calculated) − ROE (Reported)" and serves as the accounting reconciliation check for Equation (3)