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ROE (Net Income) versus ROE-CI (Comprehensive Income): A Multidimensional Analysis of a Time-Honoured Performance Metric

Abstract

Business performance is key for all stakeholders. Return on equity (ROE) measures how effectively resources generate profits and indicates both the profitability and managerial efficiency. The traditional ROE, based only on net income, is sensitive to accounting policy (AP) choices and valuation models under IAS/IFRS. Since valuation effects may be recognised either in profit or loss or in other comprehensive income (OCI), ROE can be distorted. This problem has intensified with the introduction of IFRS 9 (2018) and during recent crises, when incentives for earnings management increased. The purpose of this study is to address two research questions: Does the traditional ROE adequately reflect the financial performance efficiency (Q1), and does the use of traditional ROE versus return on equity-comprehensive income (ROE-CI) lead to significant differences in the assessment (Q2)? The methodological triad juxtaposes academic comparative analysis, AI Chat GPT suggestions, and an empirical case study regarding 10 banks listed on the Warsaw Stock Exchange and their financial statements for 2017–2024, comparing ROE, ROE-CI, and the AP ratio to assess the impact of OCI on performance. The academic comparison and AI suggestions are not conclusive; the case study shows that banks increasingly use OCI to recognise valuation effects, creating discrepancies between ROE and ROE-CI. Pioneeringly, it is suggested that the proposed AP ratio (OCI/P) detects distortions and indicates when ROE-CI should be applied to reflect profitability.

Keywords

ROE | return on capital | comprehensive income | net income

JEL Codes

G30, G39, M41

1. Introduction

Since financial performance efficiency reflects the ability of a business to use its assets and financial resources to generate revenue and profits while minimising costs (Kamugisha & Sun, 2025), its assessment is pivotal (Yao & Yang, 2026). Such an assessment is multi-spectral and entails simultaneously liquidity, solvency,

profitability, and operating efficiency, and one of its indicators is return on equity (ROE). Since ROE is a conventional measure of the profitability in relation to equity, it is one of the primary indicators used in financial analysis to assess the effectiveness of the management of resources entrusted by owners. In the academic literature, ROE is considered a fundamental measure of ROE informing about the entity's ability

to generate a profit per unit of capital contributed by its shareholders (Damodaran, 2012; Palepu et al., 2010). In the practice of capital markets, it acts as a tool for assessing the financial health of an entity, the competence of its management and the effectiveness of its strategic decisions (Damodaran, 2012; Moussu & Petit-Romec, 2014; Kayakus et al., 2023).

The traditional way of calculating ROE is based on the ratio of net income to equity, possibly enhanced by the DuPont formula decomposing ROE in three actionable components and reconciling the micro-economic perspective (DuPont formula) with the macro-economic application with the cross-sectional determinants of ROE (Weidman et al., 2019). However, both net income and equity are significantly dependent on the accounting policy (AP) adopted and the various asset and liability balance sheet valuation models (IAS/IFRS) used. The choice of such a valuation model is an important element of AP, which shapes both net income and equity (Barth et al., 2001; Barker et al., 2021). Provided net income only takes into account some of the balance sheet valuation effects, while equity reflects all valuation effects, arguably ROE does not provide complete information about an enterprise's ability to generate a return on capital contributed by shareholders. Again, arguably, this might be offset if the ROE is calculated based on comprehensive income (ROE-CI).

There is a research gap in the literature regarding the appreciation of the selection of the valuation model and balance sheet valuation effects on the interpretation of ROE ratios. This gap leads to research questions to be addressed during our turbulent times:

Q1: Currently, does the traditional ROE adequately reflect the financial performance efficiency? Namely, whether the traditional ROE ratio, which does not take into account the full range of income recognised in equity, adequately reflects the financial efficiency of businesses in a current changing economic environment.

Q2: Currently, does the use of traditional ROE versus ROE-CI lead to significant differences in the assessment of the financial performance efficiency? Namely, whether the use of ROE versus ROE-CI leads to significant differences in the assessment of this efficiency.

The importance of these research questions is further magnified due to the recent standards changes, to the external events (Rubáček & MacGregor Pelikánová, 2025), to the ambivalent Environmental

Social Governance (ESG) impact (Jílková et al., 2025), and to the lack of deeper explorations (Wu et al., 2026) and of generally applicable studies (Liu et al., 2026). Firstly, due to Directive 2013/34, since 2015, it has been harmonised and requires the clarity and comparability of financial statements (MacGregor & MacGregor Pelikánová, 2019). Secondly, changes to IFRS 9 regulations in 2017–2018 have significantly changed the approach to the valuation of financial instruments and provided more opportunities to use other comprehensive income (OCI) to recognise valuation effects, see, for example, financial assets with prepayment features to be measured at an amortised cost or at fair value through OCI. Thirdly, since 2020, businesses have been operating in an economic crisis (COVID pandemic, outbreak of war in Ukraine), which is a period conducive to increased earnings management by businesses (Hawalдар et al., 2022) and the use of valuation models using OCI (Behn & Couaillier, 2025). Fourthly, the Polish financial and banking sector is sufficiently homogenous and relevant, and, at the same time, in this aspect underexplored.

These research questions imply the relevance of the methodological triad: conducting a theoretical-academic comparative analysis of regulations, standards, and related publications in order to extract a new approach, testing it via modern information systems and information technology (IS/IT) tools with automatic features, such as Artificial Intelligence (AI), and verifying it via an empirical practical case study regarding financial statements from one homogenous industry in one jurisdiction. This means exploring fresh primary and published secondary data, entailing both qualitative and quantitative features, and taking advantage of deduction, synthesis, and inference.

After this introduction (1), a solid literature review along with a theoretical and conceptual background is to be presented (2) in order to create a foundation for the selection and description of data, their sources, employed approaches, and methodological processing (3). The results are extracted via the methodological triad (academia-AI suggestions-reality) (4), critically juxtaposed and commented on (5), and lead to conclusions definitely answering both research questions about the relevance of traditional ROE versus ROE-CI at present (6).

2. Literature Review

The ROE is a multi-spectral indicator connecting the past-present-future with a high predictive power (Nissim & Penman, 2001; Penman, 2001) and basically in line with the current EU setting (MacGregor & MacGregor Pelikánová, 2019). The importance of ROE in financial analysis and its use by different stakeholder groups is well established. There is a strong correlation of ROE with total stock returns, confirming the value of ROE as a market indicator (Easton & Harris, 1991; Ahsan, 2013; Firmansyah et al., 2022). ROE is shown to be one of the three key profitability indicators (along with ROA and ROS) (Ramzan, 2025; Simanullang et al., 2021; Weidman et al., 2019), and its role in benchmarking, assessing management efficiency, or the relationship with the cost of equity is emphasised (Palepu et al., 2010; Helfert, 2001; Francis et al., 2004; Li et al., 2021; White et al., 2003; Fairfield & Yohn, 2001).

Due to its universality and multi-spectral features, ROE is suitable for comparing performance efficiency between businesses (Augusto et al., 2009; Fairfield & Yohn, 2001) and for assessing the sustainability of the growth and the effectiveness of profit reinvestment (Lev & Thiagarajan, 1993; Damodaran, 2007) while relying on automatic machine methods (Wu et al., 2026). Businesses with high ROE often exhibit earnings sustainability, which makes the indicator useful in assessing the quality of performance (Dechow & Ge, 2006; Bazimya & Erorita, 2024; Kira, 2014). However, a positive link between sustainability drive as expressed by ESG reporting and rating is so far rather established with ROA (Simanullang et al., 2021; Siwiec & Karkowska, 2024). Further, it is argued that even with respect to the financial and banking sector, the profitability ratio expressed via ROA has a significant positive effect on firm value (Sholahuddin et al., 2020; Simanullang et al., 2021).

Classic ROE is limited due to its sensitivity to AP, particularly in asset valuation and net income presentation (Fama & French, 1995; Barker et al., 2021; Healy & Wahlen, 1999). The value of ROE is influenced by the balance sheet valuation model used (a change in the valuation model will result in a change in the size of ROE, with all other parameters unchanged). A high ROE may be illusory for businesses with aggressive balance sheet policies and indicates the need for contextual analysis (Hirshleifer et al., 2004). Furthermore, it has been proven that earnings management (e.g., by manipulating the valuation of financial instruments or reserves, categories

particularly susceptible to a company's subjective approach to their valuation) has a significant impact on the level of reported net income (Healy & Wahlen, 1999) and industry particularities (Liu et al., 2026). In addition, sustainability concerns and ESG focus arguably suggest rather return on average assets (ROAA) and return on average equity (ROAE) (Jílková et al., 2025). Finally, the use of ROE is highly problematic for strongly pro-innovation modern businesses, which, of course, rely on intangible assets as their core assets (MacGregor Pelikánová et al., 2025; Rubáček & MacGregor Pelikánová, 2025).

In response to these limitations, the literature proposes a modification of ROE by using net profits, aka earnings, before interest and taxes (EBIT = net income + interest expense + tax expense) or even only operating profit (OP= operating revenue—cost of goods sold [COGS]—general and administrative operating expenses—operating expenses—depreciation—amortisation) instead of net income. The use of OP in the calculation of ROE can lead to a more robust and comparable analysis of the operating efficiency of businesses and can eliminate the impact of non-recurring events and events unrelated to operating activities (including balance sheet valuation effects) that could distort the picture of a company's true efficiency (Young, 1999; Stickney et al., 2006; Demir et al., 2013; Du et al., 2015; Soliman, 2008; Ball et al., 2014; Liu & Yadohisa, 2018).

The classic ROE does not use OP and focuses exclusively on the ratio between net income and shareholders' equity. However, by replacing net income with OP in a modified ROE calculation, the effect of core business operations can be isolated by excluding non-operating items and taxes. So this leads to the dilemma about the numerator, that is, whether to consider profits after all expenses (net income) or with interests and tax (EBIT) or the operating revenue reduced by the COGS, operating expenses, and depreciation with amortisation (OP).

This questions the ROE numerator in the context of the current search for the financial performance efficiency (Kamugisha & Sun, 2025; Yao & Yang, 2026), in particular in the sphere of less and more capitalised banks addressing IFRS 9 (Behn & Couaillier, 2025). Can this be assessed with the traditional ROE with net income (Q1), or can better and/or different results be achieved with its modified version, ROE-IC (Q2)? The answer needs proper data and a correct method with consecutive steps and juxtaposing various multi-disciplinary perspectives.

Table 1. Overview of net income versus EBIT versus OP

Net income aka profit after tax	Net profit aka earnings before interest and taxes (EBIT)	OP
= Revenue—Total expenses	= Net income + interest expense + tax expense	= Operating revenue —COGS —general and administrative operating expenses —asset depreciation and amortisation (accounting tools)
	EBIT includes non-operating income and non-operating expenses	Operating income excludes investment income, interests, real estate sales, tax income, accounting adjustments, legal judgements, one-time transactions, and income statement items unrelated to a core business function
Net income measures 'take-home' pay	EBIT measures the profitability as a whole	OP measures the profitability of the business' primary operations

Source: Prepared by the Authors

COGS, cost of goods sold; EBIT, earnings before interest and taxes; OP, operating profit

3. Data and Methods

There is a research gap regarding the measurement, appreciation, and interpretation of financial efficiency, implying research questions:

Q1: Currently, does the traditional ROE adequately reflect the financial performance efficiency?

Q2: Currently, does the use of traditional ROE versus ROE-CI lead to significant differences in the assessment of the financial efficiency?

These research questions require a complex multi-disciplinary analysis within the methodological triad.

Firstly, a critical theoretical-academic comparative analysis with summary coding of publications is to be conducted to see the status quo about ROE with net income and generate propositions about alternatives, such as ROE-CI with comprehensive income.

Secondly, the suitability of traditional ROE and ROE-CI for assessing financial performance efficiency and their differences are to be detected in an automatic machine-based manner (Wu et al., 2026), namely via modern IS/IT tools with automatic features, AI (Ramzan, 2025). ChatGPT is asked by Q1 and Q2 as prompts. An AI testing of academic and empirical findings has become, recently, both popular and recognised, especially about intangibles (Rubáček & MacGregor Pelikánová, 2025). However, it must be emphasised that often it does not contribute

substantive scientific value and might even be misleading, that is, AI can serve as a helpful tool, particularly for processing large datasets, but its propositions are not robust conclusions, but rather suggestions for final processing done in the domain of human expertise.

Thirdly, an empirical, practical case study is conducted based on financial statements from a homogenous industry in one jurisdiction. For this, there were selected companies in the banking sector listed on the Warsaw Stock Exchange. This choice was implied by the significance of financial instruments for the balance sheets of banks operating in one of the EU member states. To make the sample homogenous and indicative, 10 banks were selected, see Tables 2-56. For the longitudinal robustness, the financial statements for 2017–2024 were used, that is, before and after the COVID-19 pandemic (2020) and the outbreak of the war in Ukraine (2022). Regarding the AP (relevancy) indicator, the value 0.6–0.7 is to be considered as mediocre while the value between 0.7 and 0.8 is considered as good (Hutcheson & Sofroniou, 1999), and the case study retains a value of 0.7 (Badulescu et al., 2021).

This case study research procedure included these stages:

- Preliminary verification that times of crisis are associated with a decrease in net profit or loss (a decrease in profit can lead to a decrease in ROE) - the share of profit or loss in the equity of the individual banks was calculated;

Table 2. ROE - share of net income in shareholders' equity (%)

Bank name	2024	2023	2022	2021	2020	2019	2018	2017
Bank Pekao	20.38	21.68	7.54	9.123	4.32	9.26	10.03	10.64
PKO BP	18.38	11.33	5.02	12.74	-7.63	9.49	8.69	7.92
Bank Handlowy	17.83	23.19	19.41	9.71	2.27	6.78	9.05	7.71
Alior Bank	21.81	21.94	11.07	8.14	-4.74	3.74	10.99	7.62
Unicredit	15.65	14.84	10.19	2.58	-4.63	5.65	7.56	11.65
Santander	15.22	14.68	10.57	4.60	4.31	9.05	10.14	10.78
Bank Millennium	9.25	7.48	-18.46	-19.88	0.25	6.27	9.07	8.76
BNP Paribas	15.31	7.87	3.92	1.55	6.09	5.50	3.41	4.26
BOŚ	3.57	3.64	6.52	2.54	-16.04	3.27	2.98	2.47
mBank	12.62	0.17	-5.52	-8.59	0.62	6.25	8.58	7.66
Average	15.00	12.68	5.02	2.24	-1.51	6.52	8.05	7.95
Standard deviation	5.42	8.00	10.40	9.78	6.80	2.19	2.73	2.86

Source: Prepared by the Authors

Table 3. Share of OCI in equity (%)

Bank name	2024	2023	2022	2021	2020	2019	2018	2017
Bank Pekao	0.45	8.66	-7.36	-12.42	3.91	0.67	0.11	0.71
PKO BP	1.81	13.04	-15.31	-19.68	2.87	-0.02	1.11	1.78
Bank Handlowy	-2.04	7.08	-3.19	-10.27	4.40	0.37	1.30	0.95
Alior Bank	0.82	11.35	-7.01	-18.96	2.11	0.37	0.41	1.27
Unicredit	14.83	-0.70	-0.47	2.94	0.16	2.21	-4.88	-0.24
Santander	0.23	7.44	-4.89	-8.74	1.81	0.95	1.31	1.91
Bank Millennium	2.03	12.83	-3.34	-15.80	1.43	-0.04	1.12	1.93
BNP Paribas	0.17	4.53	-4.92	-7.49	1.09	-0.14	-0.01	2.17
BOŚ	0.06	4.94	-1.52	-5.08	1.05	-0.44	-0.11	1.80
mBank	1.54	7.19	-2.46	-13.04	2.45	-0.24	0.72	1.16
Average	1.99	7.64	-5.05	-10.86	2.13	0.37	0.11	1.34
Standard deviation	4.66	4.19	4.23	6.79	1.32	0.78	1.84	0.73

Source: Prepared by the Authors

- Analysis of the importance of OCI in times of crisis—the share of OCI in equity was calculated;
- Calculation of ROE and ROE-CI—a comparison of their magnitudes was an essential element of the research;
- The development of a proposal for an indicator to assess whether the classic ROE is burdened by

distortions resulting from the omission of OCI elements.

These three methodological steps lead to three perspectives to be juxtaposed and, via a snowball backward mechanism, discussed.

Table 4. ROE versus ROE-CI of banks

Bank name	indicator	2024	2023	2022	2021	2020	2019	2018	2017
Bank Pekao	ROE	20.39	21.69	7.55	9.12	4.33	9.26	10.03	10.64
	ROE-CI	20.84	30.35	0.18	-3.30	8.23	9.93	10.15	11.36
PKO BP	ROE	73.29	25.51	-101.49	-19.09	-52.77	8.35	-208.03	24.72
	ROE-CI	68.31	1.23	-119.08	5.33	-38.98	12.28	-226.70	35.51
Bank Handlowy	ROE	17.84	23.19	19.42	9.72	2.27	6.79	9.05	7.72
	ROE-CI	15.80	30.27	16.23	-0.55	6.68	7.16	10.35	8.67
Alior Bank	ROE	21.82	21.95	11.07	8.14	-4.74	3.74	11.00	7.63
	ROE-CI	22.64	33.30	4.06	-10.82	-2.63	4.11	11.41	8.90
Unicredit	ROE	15.65	14.84	10.19	2.53	-4.63	5.65	7.57	11.65
	ROE-CI	30.48	14.14	9.73	5.46	-4.47	7.86	2.69	11.41
Santander	ROE	15.23	14.69	10.57	4.60	4.32	9.06	10.14	10.79
	ROE-CI	15.46	22.12	5.68	-4.14	6.12	10.01	11.46	12.69
Bank Millennium	ROE	9.25	7.48	-18.47	-19.89	0.25	6.27	9.07	8.76
	ROE-CI	11.28	20.31	-21.81	-35.69	1.68	6.23	10.19	10.70
BNP Paribas	ROE	15.32	7.87	3.92	1.55	6.09	5.51	3.41	4.26
	ROE-CI	15.49	12.41	-1.00	-5.94	7.18	5.37	3.41	6.44
BOŚ	ROE	3.57	3.65	6.53	2.54	-16.04	3.27	2.98	2.48
	ROE-CI	3.63	8.59	5.01	-2.54	-14.99	2.83	2.88	4.27
mBank	ROE	12.63	0.18	-5.53	-8.59	0.62	6.25	8.59	7.66
	ROE-CI	14.17	7.36	-7.99	-21.63	3.07	6.02	9.31	8.82

Source: Prepared by the Authors

Table 5. AP indicator of banks (%)

Bank name	2024	2023	2022	2021	2020	2019	2018	2017
Bank Pekao	2.20	40.00	97.60	136.20	90.30	7.20	1.10	6.70
PKO BP	9.80	115.10	304.40	154.50	97.70	0.20	12.70	22.50
Bank Handlowy	11.40	30.50	16.40	105.70	193.70	5.50	14.30	12.40
Alior Bank	3.80	51.70	63.30	232.90	44.60	9.90	3.80	16.70
Unicredit	94.70	4.70	4.60	116.10	3.50	39.20	64.50	2.10
Santander	1.50	50.70	46.30	190.00	41.90	10.50	13.00	17.70
Bank Millennium	21.90	171.60	18.10	79.50	568.70	0.60	12.30	22.00
BNP Paribas	1.10	57.60	125.50	483.00	17.80	2.60	0.20	50.90
BOŚ	1.60	135.40	23.30	199.80	6.60	13.50	3.50	72.60
mBank	12.20	4102.90	44.60	151.80	393.00	3.80	8.40	15.10
Average	16.02	476.02	74.41	184.95	139.78	9.30	13.38	23.87
Standard deviation	28.44	1275.41	89.36	114.47	192.55	11.38	18.72	21.54

Source: Prepared by the Authors

Table 6. Literature comparative table ROE versus ROE-CI

ROE	ROE-CI
= Net Income/Shareholders' Equity	= CI/Book Value Equity
= (Revenue – Total Expenses)/(Net Income – Dividends)	CI = the variation in owners' equity = net income + other income (e.g., unrealised income)
STANDARDISATION (Damodaran, 2012)	CONSISTENCY if financial assets and liabilities are classified under IFRS 9
COMPATIBILITY = ROE is fundamental for Du Pont analysis of profitability, see. $ROE = (\text{Profit margin}) \times (\text{Asset turnover}) \times (\text{Equity multiplier}) = (\text{Net profit/Sales}) \times (\text{Sales/Average Total Assets}) \times (\text{Average Total Assets/Average Equity})$ (Bunea et al., 2019)	SYMMETRY = Effects of balance sheet valuations may be recognised in both net income and OCI (depending on the valuation model adopted by the company) (Yousefinejad et al., 2017).
FITNESS—for modelling (Hawaldar et al., 2022)	INDEPENDENCY = businesses decide for themselves how to address balance sheet valuation effects
POPULARITY = the massive use of ROE facilitates the application and comparison (De Wet & Du Toit, 2007)	INTEGRATION = use of CI provides additional information (Khan et al., 2014)
UNIVERSALITY (Lavery et al., 2025).	FITNESS = ROE-CI can better contribute to managing expectations about future financial results (De Wet & Du Toit, 2007)
TEST OF TIME (Palepu et al., 2010)	INCLUSIVENESS = issues related to share buybacks, intangible assets, non-recurring items, and so forth

Source: Prepared by the Authors

4. Results

The methodological triad juxtaposes academic comparative content analysis, AI Chat GPT suggestions, and an empirical case study.

4.1. Academic comparative analysis

The ROE is recognised as well as its dependence on the balance sheet valuation model (Hirshleifer et al., 2004) and earnings management shaping the reported net income (Healy & Wahlen, 1999). Regarding the formula $ROE = \text{net income}/\text{shareholders' equity}$, it is suggested to replace net income by EBIT or even OP (Ball et al., 2014; Liu & Yadohisa, 2018). The use of the modified ROE is especially suggested for decision-making purposes and for assessing management's operating activities (White et al., 2003)

Since the numerator of the modified ROE includes OP (which excludes the effects of balance sheet valuation), the denominator should include not all equity but only the owners' equity. However, in practice this approach is difficult to implement, because OP and owners' equity are not always indicated in financial statements. Plainly, the balance

sheet valuation models are an important tool for net income management (e.g., Petrović et al., 2023; Arouri et al., 2012; Adwan et al., 2020; Kane, 2016; Barth, 1994; Plantin et al., 2008; Penman, 2007; Palea, 2014). Consequently, net income consists (often in a significant part) of hypothetical (virtual) values estimated by businesses at the time of a balance sheet valuation. Under the current IAS/IFRS regulations, the valuation effect of certain assets (especially financial assets) does not constitute net income, but is a component of OCI, which was introduced into the IAS/IFRS regulations in 2009 as a consequence of a new concept in financial reporting—the concept of comprehensive income as a new reporting category. It is even argued that IFRS 9 allows for substantial heterogeneity in provisioning in the financial and banking sectors (Behn & Couaillier, 2025), addressing the alleged 'too little, too late' methods from the pre-crises era of 2007 (Behn & Couaillier, 2025).

Including comprehensive income in the ROE analysis seems reasonable, especially in the context of the introduction of the concept of comprehensive income in IFRS. An indicator based on comprehensive income, the so-called ROE-CI can better reflect the economic efficiency because it takes into account all unrealised profits or losses (Firmansyah et al., 2022;

Fernández & Arana, 2010; Gazzola & Amelio, 2014; Kusuma et al., 2021; Özcan, 2016; Mechelli & Cimini, 2013). In addition, it can be complementary to ROAA and ROAE in the context of the ESG focus and mixed results (Jílková et al., 2025).

4.2. AI suggestions

Considering the exponentially growing popularity of the AI models that use a transformer architecture to generate human-like content outcomes on the data it was pre-trained on (Generative Pre-trained Transformers, aka GPT), it is relevant to pose Q1 and Q2 as prompts in a conversational manner. To AI GPT v5.

Q1: Currently, does the traditional ROE adequately reflect the financial performance efficiency? AI GPT v5 replied 'the traditional ROE only PARTIALLY reflects a firm's financial performance efficiency today—it remains useful, but it has notable limitations in the modern financial and economic context.' The AI suggested to combine or replace ROE with return on invested capital (ROIC), economic value added (EVA), return on tangible equity (ROTE), Cash ROE because ROE 'is limited by its sensitivity to financial leverage, accounting distortions, and the exclusion of intangible assets that dominate modern value creation. Moreover, it fails to adjust for differing risk profiles across firms.' Interestingly, despite several indirect prompts, ROE-CI was not mentioned.

Q2: Currently, does the use of traditional ROE versus ROE-CI lead to significant differences in the assessment of the financial performance efficiency? AI GPT v5 replied: 'The use of traditional ROE versus ROE-CI can lead to significant differences in assessing a firm's financial performance efficiency'. Hence, once directly prompted, ROE-CI was praised as a tool to provide 'a broader view of performance by capturing volatility and value changes that affect shareholders' equity but are omitted under the traditional approach'. This confirms that AI is to be used with caution and by educated users mastering prompts, and its conclusions should be treated as suggestions to be verified. At the same time, it cannot be denied that recent studies, in particular regarding ROA, are almost conclusive about the relevance and accuracy of the employment of AI in the arena of assessing and improving the financial performance, in particular during crisis eras (Ramzan, 2025). Naturally, this alleged strategic significance and appropriateness of AI heavily

depend upon the type of AI and the involvement of jurisdictions, industries, entities, and reports (Sun, 2025).

4.3 Banking reality—A case study

The empirical case study covered financial statements indicating the share of net income in equity of 10 banks in 2017–2024, see Table 2.

In 2017–2019, all of these banks reported profit, and on average, the share of net income in equity reached 6%–8% of equity, and the standard deviation is less than 3%. Only BOŠ presents volumes significantly smaller than the average. The first year of the COVID-19 pandemic, 2020, led to a dramatic drop. In the following years (2021–2022), the share of net income in equity increased. However, the average did not exceed the 2017–2019 level. The years 2023–2024 are generally characterised by an increased value of the indicator. From 2020 onwards, the standard deviation has significantly increased to around 10. This indicates that banks are highly differentiated in relation to the average of the year. The observed decline in the share of net income in equity since 2020 may indicate a decrease in ROE.

To compare the employment of ROE and ROE-CI, the share of OCI in equity ratios was calculated for each year and each bank (Table 3). The analysis of the ratios can indicate whether, in times of crisis, banks made greater use of the OCI category to present the effects of balance sheet valuation.

In 2021 and 2022, the ratio of the share of OCI in equity took a negative value (the exception is Unicredit in 2021). During the crisis, banks recorded, among other things, a reduction in the value of financial instruments, which they largely reported in OCI (not to burden the financial results additionally with adjustments to the value of financial instruments). The banks that were analysed saw an increase in the share of OCI in equity in 2020, which was on average by around 2% compared to 2017–2019. The following years are characterised by a further increase in the ratio, especially in 2021 (10%), with the highest standard deviation (over 6), which dropped in the following years (to 4). During the economic crisis, banks have increasingly 'used' the OCI category. Due to the decline in the quotation of financial instruments (which represents a significant percentage of banks' assets), banks (as a matter of AP) appeared to opt to

relate the effects of their valuation to OCI (instead of profit or loss), that is, to 'save' income from a severe downgrade. This impacted, perhaps even distorted, the classic ROE. Thus, the ROE versus ROE-CI were juxtaposed, see Table 4.

In 2017–2019, the value of ROE and ROE-CI were not significantly different, while OCI share in equity was low. During 2020–2023, the share of OCI in equity increased, and ROE-CI values generally differ significantly from ROE. In 2020, this applied to half of the observed banks, in 2021 to all of them. Since generally ROE-CI shows lower values than ROE, by choosing to use OCI to present some of the effects of balance sheet valuation, banks influenced the overstatement of the ROE. On more than one occasion, these were situations where ROE showed a positive value, and ROE-CI showed a negative value (e.g., Bank PeKAO, Bank Handlowy, Alior Bank, Santander, BNP Paribas, BOŚ). Between 2022 and 2024, not as many significant differences between ROE and ROE-CI were observed. This was a period in which the situation in the financial markets had improved, and the effects of the balance sheet valuation of financial instruments generally had increased. This translates into ROE and ROE-CI values. For many banks, ROE was lower than ROE-CI.

This supports the finding about the importance of OCI for banks, in particular during the economic crisis. Thus, the effects of balance sheet valuation included in net income should be taken into account when determining and assessing ROE.

This justifies the consideration of a new indicator with a working name: AP indicator, the essence of which is the presentation of the ratio of OCI to net income:

$$AP = (OCI/P) \times 100$$

Where: OCI—other comprehensive income, P—net income

This indicator makes it possible to identify whether the OCIs are a significant element of the AP adopted. Bearing in mind that published financial data includes values for the classic ROE, the use of the AP indicator will make it possible to identify cases where the traditional ROE may be materially distorted and does not reflect the true financial situation or the efficiency of the use of equity. The new measure thus allows for a more complete and transparent view of profitability under modern financial reporting conditions, see the AP ratio calculated for the research sample in Table 5.

The average value of the AP ratio for the entire study group in 2020 increased by 15 times compared to 2019 (with a very high standard deviation of 192 in 2020). In 2020, several banks recorded APs close to 100%. In 2021, the AP ratio of all banks exceeded 100% (the average ratio increased by around 50 points compared to the previous year). In 2022–2023, a high average AP ratio and high standard deviation are still observed. The AP for some banks is higher than 100%, but there are also banks with an AP of 40% or less. In 2024, the AP ratio of banks was at similar to the pre-crisis years (2017–2019). In compliance with prior studies (Badulescu et al., 2021; Hamamura, 2025; Kulikova et al., 2019), an AP ratio value of around 70% and above (Badulescu et al., 2021) is indicative of a distortion of the ROE presented in the financial statements, and the use of ROE-CI is recommended. A low AP value means that the ROE and ROE-CI are not significantly different.

5. Discussion

The discourse about the traditional ROE, its limitations, and possible alternatives is rather underdeveloped (Wu et al., 2026) and industry-specific (Liu et al., 2026). Academia recognises the benefits of ROE linked to its standardisation, compatibility, fitness, universality, and test of time features. However, the positive correlation to the ESG is established rather vis-à-vis ROA (Siwec & Karkowska, 2024). The line supporting ROE-CI is not strongly noticeable, and other pathways are suggested (Jílková et al., 2025). However, this study offers, in a pioneering manner, a closer look which reveals that this drive from net income to careful consideration has a myriad of advantages, especially if certain circumstances and assets are involved. For example, patented inventions leading to innovations are perfect examples of intangible assets which, due to their almost unpredictable timing, volatility, and risky features (MacGregor Pelikánová et al., 2025) are beyond the reach of ROE. The mining of academia, along with this case results reveal that ROE-CI offers significant, and so far overlooked, benefits linked to its consistency, symmetry, independence, and integration features. This offers a brand new, valuable potential to address properly, among others, Research & Development works, which are critically important for the competitiveness and at the same time are not defined in Polish balance sheet law and reduced to IAS 38 (Hołda & Łojek, 2024).

Once asked about ROE (Q1), the AI, specifically GPTv5, admits, similarly to the academia, that the ROE ‘only PARTIALLY reflects a firm’s financial performance efficiency today—it remains useful, but it has notable limitations in the modern financial and economic context’. The AI suggests combining it or replacing it with various tools and indicators, but does not suggest ROE-CI. However, once the AI was prompted directly (Q2), it immediately endorses the previously completely omitted ROE-CI in a laudatory tenor as a tool providing a broader, more accurate, and comprehensive view and leading to different, better results. The AI employment here has not yet reached the maturity as in other jurisdictions and fields (Ramzan, 2025; Sun, 2025), and so far the generated conclusions need to be treated with caution, by educated users, and rather as suggestions

The Polish case study revealed that, in 2020–2023, banks increasingly used OCI to recognise valuation effects, creating discrepancies between ROE and ROE-CI. In some cases, the ROE was positive while ROE-CI was negative. The proposed AP ratio enables a quick detection of such distortions and indicates when ROE-CI should be applied. ROE-CI better reflects profitability and provides a practical tool for assessing the impact of AP. Further, it might be considered in the context of new findings about the positive relationship of financial liquidity measured by current ratio and ROE for aggressive net working capital strategies and negative for conservative strategies (Bolek, 2025).

It can be argued that, failing to take into account all effects of balance sheet valuation, when calculating ROE, can lead to both underestimation and overestimation. This phenomenon assumes particular importance in periods of economic crisis, when entities are more willing to use the possibilities of earnings management (as part of the AP), *inter alia*, through the selection of appropriate valuation models. These findings on the importance of OCI in times of crisis are in compliance with prior studies (Fernández & Arana, 2010; Gazzola & Amelio, 2014; Kusuma et al., 2021). Hence, based on academia and AI (Ramzan, 2025; Sun, 2025), it can be proposed that nowadays the ROE-CI ratio (as opposed to the classic ROE) better reflects a company’s ability to generate a return on the capital contributed by its owners in certain cases (highly leveraged firms, intangible-asset-heavy industries, and businesses undergoing rapid financial restructuring). However, based on the empirical case study, it can be argued that ROE-CI takes into account all the effects of the balance sheet valuation, and not

just part of them, as is the case with classic ROE, and thus ROE-CI is generally and universally to be employed more than the classical ROE.

In sum, there are clear limitations regarding the classic ROE as a measure of ROE, especially in the context of the influence of AP on the formation of the financial result (Fama & French, 1995; Healy & Wahlen, 1999; Barker et al., 2021). Academia raises objections, while the case study negates the Q1, that is, currently, the traditional ROE reflects only partially the financial performance efficiency. Academia and the case study concur with Q2, that is, currently, the use of traditional ROE versus ROE-CI leads to significant differences in the assessment of the financial performance efficiency.

The covered case study regarding Polish banks revives a discourse. The differences between classic ROE and ROE-CI can be noticeable, and the effects of valuation under OCI—instead of net income—can lead to a significant distortion in the assessment of profitability. This fits to prior propositions that ROE-CI better reflects real economic efficiency, as it includes all valuation effects, regardless of where they are recognised in the financial statements (Mechelli & Cimini, 2013; Özcan, 2016). Under conditions of increased market volatility, ROE-CI can be a more reliable tool for assessing profitability and avoiding erroneous conclusions resulting from the application of the classic ROE indicator.

6. Conclusions

The methodological triad, juxtaposing an academic comparative analysis, AI Chat GPT suggestions, and an empirical case study, contributes to filling in the pre-existing knowledge gap. Academia raises objections regarding the use of traditional ROE to adequately reflect the financial performance efficiency, while the case study based on financial statements of Polish banks in 2017–2024 completely rejects the robustness of ROE (Q1). They all three concur that the use of traditional ROE versus ROE-CI leads to significant differences in the assessment (Q2). These results suggest the complementation of the use of the traditional ROE formula by the use of ROE-CI, that is, net income consideration might be insufficient and should be boosted by the consideration of comprehensive income. In the case of businesses that relate a significant part of the effects

of the balance sheet valuation to OCI, it can be argued that the classic ROE may be distorted and inadequate as a measure of the efficiency of capital use. Based on the emerging evidence, an alternative ROE-CI ratio, based on comprehensive income, might be proposed, which arguably provides more complete and reliable information about an entity's ability to generate value for owners. The financial statements of observed Polish banks revealed that, from 2020 to 2023, OCI was used more than before as an instrument for presenting the effects of balance sheet valuation. The use of ROE-CI, as well as the auxiliary indicator AP, makes it possible to identify cases in which the classic ROE does not reflect true efficiency.

The academic analysis refreshed by AI suggestions and the empirical research carried out based on the case study have inherent limitations that inevitably avoid any conclusive generalisation. So far, the discourse regarding ROE versus ROE-CI in academia is underdeveloped, and well-accepted studies and concepts are reduced to identifying key parameters and features, and offer suggestions. However, they are not conclusive, except for the admission that ROE has limitations and its use should be paralleled, without robustly specifying when, how, and with what. They do not imply in which context the ROE-CI should be employed. However, the performed case study is arguably sufficiently conclusive, and its longitudinal character (2017–2024) further reinforces it. Nevertheless, since the research sample covered only the banking sector and only 10 banks listed on the Warsaw Stock Exchange, no generalisation can be offered. Further, the quantitative approach does not allow for identifying companies' motivations regarding accounting policies, which would require qualitative analyses of management reports and disclosures.

Despite these limitations, the addressing of both research questions created a strong potential for theoretical-conceptual and practical implications. Theoretic-conceptual implications consist of the contribution to a deeper understanding of underlying concepts, mechanisms and their inter-relationships and to firmly opening the venue to reconsider the employment of ROE, in particular for businesses with a net income significantly different from comprehensive income, to recognise and assess the advantages and disadvantages of ROE-CI and launch the work on the methodology regarding the use of ROE and ROE-CI in general and for businesses impacted by leverage distortion, intangible

assets, non-recurring events and effects, financial restructuring, and accounting valuation challenges. Practical implications include recommending the extension of a ROE analysis to ROE-CI, especially in sectors where a large proportion of the balance sheet is made up of financial instruments valued according to market models and revaluation gains/losses are carried forward to OCI. The AP ratio, in turn, can be used by analysts, investors, and auditors as a tool to quickly assess the impact of accounting policies on reported ROE and to detect potential distortions due to subjective accounting choices.

The widespread use of the ROE indicator, as well as evolving accounting regulations, points to the need for further in-depth research. Research can be extended to other sectors of the economy, including non-financial companies, where OCI can also make a significant contribution to comprehensive income. Comparative research is also needed on an international basis, taking into account differences in IFRS implementation and accounting practices. The need to analyse the relationship between the AP ratio and the capital market reaction to published financial data, or to develop the analysis model with qualitative elements, such as the analysis of balance sheet valuation disclosures and management commentary, seems important.

In sum, under the conditions of increasing complexity of financial reporting and a volatile macroeconomic environment, the classic ROE may prove to be an insufficient tool to assess performance. The ROE-CI and the proposed AP ratio can be an important addition to the analytical workshop of finance, audit, and regulatory practitioners.

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