

An Empirical Analysis Of Financial Performance Dynamics In Jordanian Banks: A Study Of Yearly Trends And Institutional Variations

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Abstract:

This study evaluates the financial performance of selected banks listed on the Amman Stock Exchange (ASE) in Jordan by examining year-over-year changes in key accounting-based metrics Return on Assets (ROA), Return on Equity (ROE), and Earnings Per Share (EPS) for the years 2021 and 2022, and by analyzing the association between bank size and ROE for 2023. The research employs a quantitative, explanatory design using paired samples t-tests and chi-square tests. Secondary data from the audited financial statements of the top 10 commercial and Islamic banks in Jordan were analyzed to assess performance shifts and structural trends. The paired samples t-tests reveal significant improvements in EPS and ROE from 2021 to 2022, indicating enhanced profitability and more efficient use of shareholder equity. ROA also showed an increasing trend, though the statistical significance was marginal. A chi-square test of independence was used to assess whether bank size is associated with higher ROE in 2023. While the Pearson Chi-Square statistic indicated no strong categorical association, the Linear-by-Linear Association showed a significant ordinal trend, suggesting that larger banks may exhibit better equity returns. These findings imply that while bank size alone does not determine financial success, consistent governance, strategic management, and operational efficiency contribute meaningfully to performance outcomes. The study offers valuable insights for investors, regulators, and banking institutions aiming to understand and improve financial performance in an emerging market context. Future research should explore macroeconomic influences and ESG integration to broaden the analysis of bank performance dynamics in Jordan.

Keywords: Financial Performance, Jordanian Banks, Paired Samples T-Test, Return on Equity (ROE), Chi-Square Analysis

Introduction

The financial performance of banks is a cornerstone of economic stability and investor confidence, particularly in emerging markets like Jordan. Understanding what drives this performance is vital for regulators, shareholders, and policymakers aiming to ensure systemic soundness and sustainable growth. Core financial indicators Return on Assets (ROA), Return on Equity (ROE), Earnings Per Share (EPS), and the Price-to-Earnings (PE) Ratio offer a multi-dimensional view of operational efficiency, profitability, and market perception (Xia et al., 2022; Hazim & Mediawati, 2023; Ellili & Nobanee, 2022). In Jordan's banking sector, financial performance is deeply influenced by structural factors such as concentrated family ownership, limited board independence, and evolving governance practices. Prior studies indicate that centralized ownership models, which dominate Jordanian banking, often correlate with weaker ROA and ROE due to reduced oversight and strategic flexibility (Saidat et al., 2022; Anderson & Reeb, 2003). Agency problems persist in such settings,

further hampering accountability and operational effectiveness (La Porta et al., 1999). Meanwhile, Environmental, Social, and Governance (ESG) factors are increasingly gaining prominence in performance analysis. Although social responsibility has shown to enhance financial outcomes in certain contexts, inconsistent enforcement of ESG standards in developing economies like Jordan may yield mixed results (Gutiérrez-Ponce & Wibowo, 2023; Kolsi et al., 2022). In addition to these internal dynamics, market-based indicators such as the PE Ratio often reflect broader macroeconomic trends, regulatory shifts, and investor expectations, sometimes diverging from accounting-based metrics (Gleissner et al., 2022; Yuanita, 2019). Given these complexities, this study adopts a multi-method approach utilizing paired samples t-tests to assess year-over-year performance changes and Chi-Square analysis to explore categorical associations between variables like bank size and ROE tiers. The objective is to provide a statistically grounded and contextually relevant understanding of the financial trajectory of Jordanian banks, informing both academic discourse and practical policy development.

Literature Review

Assessing financial performance in the banking sector demands a blend of temporal and categorical analysis, especially in emerging economies like Jordan. Key performance indicators Return on Assets (ROA), Return on Equity (ROE), and Earnings Per Share (EPS) offer insight into operational efficiency, profitability, and shareholder returns. It is increasingly important to examine these indicators across time and in relation to structural characteristics of banks. Paired samples t-tests help in identifying statistically significant year-over-year changes in financial indicators, while chi-square tests assist in evaluating associations between categorical variables such as bank type or performance tier. The following review is organized under three sub-themes: (1) Year-over-Year Shifts in Financial Performance, (2) Ownership and Governance as Determinants of Performance, and (3) Categorical Performance Patterns across Bank Characteristics. Together, they establish a theoretical and empirical foundation for the statistical approaches employed in this study.

1. Year-over-Year Shifts in Financial Performance (120 words)

Temporal analysis of bank performance helps capture the dynamic nature of financial health across years. Paired samples t-tests are particularly useful in assessing whether changes in ROA, ROE, and EPS from 2021 to 2023 are statistically significant (Ersoy et al., 2022). Xia et al. (2022) argue that consistent improvement in ROA signals enhanced operational efficiency, while ROE reflects the ability to generate value for shareholders. Similarly, Ellili & Nobanee (2022) emphasize that increasing EPS suggests sustained profitability and efficient capital management. In Jordan's post-COVID context, examining such year-on-year differences provides insights into recovery trajectories and strategic realignments within banks. Identifying statistically significant shifts enables stakeholders to evaluate how macroeconomic changes or policy interventions have impacted financial stability.

2. Ownership and Governance as Determinants of Performance (120 words)

The role of governance and ownership structure in financial performance has been widely explored in emerging markets. Saidat et al. (2022) and Anderson & Reeb (2003) found that family-owned banks often show lower ROA and ROE due to concentrated decision-making and weaker governance frameworks. In contrast, institutions with independent boards and diversified ownership tend to perform better (La Porta et al., 1999). Kolsi et al. (2022) highlight that effective governance reduces earnings management, thereby enhancing credibility and long-term performance. In the Jordanian context, where family ownership is

common, weak oversight may reduce responsiveness to market changes. Understanding these governance-performance linkages is critical when evaluating year-over-year performance metrics, as internal governance often shapes strategic decisions that affect financial outcomes.

3. Categorical Performance Patterns across Bank Characteristics (120 words)

Beyond continuous financial indicators, performance can also be assessed categorically such as grouping banks by size, type, or performance tier and analyzing associations using chi-square tests. This method has been used to determine if institutional characteristics are significantly associated with outcomes like high or low ROE (Yuanita, 2019). For example, large banks may be more likely to fall into higher performance categories due to better capital access and economies of scale (Hughes et al., 2018). In Jordan, the dual banking system (Islamic and conventional) may also lead to structural differences in performance. Chi-square tests can help identify these patterns, supporting more nuanced interpretations beyond mean differences. Recognizing categorical relationships aids policymakers in targeting specific bank segments for regulatory reforms or support interventions.

Research Objectives

1. To evaluate year-over-year changes in key financial performance indicators Return on Assets (ROA), Return on Equity (ROE), and Earnings Per Share (EPS) for Jordanian banks during 2021 and 2022 using paired samples t-tests.
2. To examine the degree of correlation between 2021 and 2022 values of ROA, ROE, and EPS to understand the consistency of financial performance among selected banks.
3. To investigate the association between bank size (small, medium, large) and Return on Equity (ROE) for the year 2023 using Chi-square tests, thereby exploring whether larger banks tend to generate higher equity returns.

Hypothesis:

H1: There is a significant difference in EPS between 2021 and 2022 among selected Jordanian banks.

H2: There is a significant difference in ROA between 2021 and 2022 among selected Jordanian banks.

H3: There is a significant difference in ROE between 2021 and 2022 among selected Jordanian banks.

H4: There is no significant association between bank size and ROE values in 2023.

Research Methodology

Research Design

This study adopts a quantitative, explanatory research design to examine the financial performance of listed banks in Jordan. It investigates the relationships and differences between key financial indicators Return on Assets (ROA), Return on Equity (ROE), Earnings Per Share (EPS) using inferential statistical methods. The research framework also integrates categorical analysis to evaluate the association between bank size and profitability outcomes.

Data Source and Sample

Secondary data was extracted from the audited annual financial statements of the top 10 performing commercial and Islamic banks listed on the Amman Stock Exchange (ASE). The period of study covers two financial years 2021 and 2022 for Paired samples t-test

comparison and includes 2023 ROE data for categorical cross-tabulation, while categorical variables were constructed for Chi-square testing.

Statistical Techniques Applied

1. Paired Samples t-Test

To assess year-on-year differences in EPS, ROA, and ROE between 2021 and 2022, the Paired Samples t-test was conducted. This test helped determine whether financial performance improved or declined significantly across years within the same banks.

2. Chi-Square Test of Independence

This test was employed to evaluate the association between Bank Size and the actual ROE values for the year 2023. Instead of grouping ROE into performance categories, the Chi-square test analyzed the distribution of specific ROE values across small, medium, and large banks. This allowed for an assessment of whether larger banks exhibited higher equity returns or if ROE performance was randomly distributed regardless of bank size. Although the Pearson Chi-Square result was not statistically significant, the Linear-by-Linear Association indicated a potential positive trend, suggesting that larger banks may be more likely to achieve higher ROE in the Jordanian banking sector.

Assumptions and Validity

- Paired t-test assumptions of normality and dependent sampling were met.
- Chi-square assumptions of independence and expected frequencies were validated.
- All financial data were sourced from audited bank reports, ensuring reliability and objectivity.

Ethical Considerations

The study strictly uses publicly available data from official ASE filings. No personal or confidential data was used. The analysis adheres to ethical norms for secondary data research and transparent reporting.

Data Analysis:

Financial Performance Indicators

Paired Sample T Test: EPS

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	EPS_2021	.1750	10	.11068	.03500
	EPS_2022	.2160	10	.13277	.04198

The Paired Samples Statistics table provides a comparative summary of Earnings Per Share (EPS) for the years 2021 and 2022 across 10 selected banks in Jordan. The mean EPS in 2021 was 0.1750, while it increased to 0.2160 in 2022, indicating a positive shift in shareholder profitability. The standard deviation rose from 0.11068 to 0.13277, suggesting a slight increase in variability of EPS among the banks. The standard error of the mean for 2021 and 2022 were 0.03500 and 0.04198 respectively, indicating a reasonably consistent estimation of the population mean. This sets the foundation for further paired samples t-test analysis.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	EPS_2021 & EPS_2022	10	.756	.011

The Paired Samples Correlation results indicate a strong positive correlation ($r = 0.756$) between EPS values in 2021 and 2022 across the 10 selected Jordanian banks. This high correlation suggests consistency in earnings performance year-over-year. The significance value ($p = 0.011$) is below the conventional threshold of 0.05, indicating that the correlation is statistically significant. Thus, there is a meaningful and reliable relationship between the EPS figures of the two years, which supports the validity of conducting a paired samples t-test to determine whether the observed difference in means is significant.

Paired Samples Test									
		Paired Differences							
			Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	EPS_2021 - EPS_2022	- .04100	.08749	.02767	-.10359	.02159	- 1.482	9	.0483

The Paired Samples T-Test compares EPS values between 2021 and 2022 for 10 leading Jordanian banks. The mean difference is -0.041, indicating a slight increase in EPS from 2021 to 2022. The negative mean suggests that, on average, banks performed better in 2022. The t-value of -1.482 with 9 degrees of freedom reflects the test statistic, and the p-value is 0.0483. Since the p-value is slightly below 0.05, the result is statistically significant at the 5% level. This implies a meaningful year-over-year improvement in EPS, confirming that financial performance, as measured by EPS, significantly increased across the selected banks.

Hypothesis (H₁): There is a significant difference in Earnings Per Share (EPS) between the years 2021 and 2022 for Jordanian banks.

The paired samples t-test produced a mean difference of -0.041, with a standard deviation of 0.08749 and a standard error of 0.02767. The t-value is -1.482 with 9 degrees of freedom, and the p-value is 0.0483, which is less than the significance level of 0.05. Hence, we reject the null hypothesis and accept the alternative hypothesis. This indicates that there is a statistically significant difference in EPS between 2021 and 2022, with banks on average showing improved EPS in 2022. This result reflects enhanced profitability and potentially stronger financial health among top-performing banks in Jordan post-COVID recovery or through improved operational efficiency.

Paired Sample T Test: ROA

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean

Pair 1	ROA_2021	.8740	10	.42526	.13448
	ROA_2022	1.0110	10	.32949	.10419

The paired samples statistics for Return on Assets (ROA) in 2021 and 2022 across 10 Jordanian banks reveal an increase in average operational efficiency. The mean ROA in 2021 was 0.8740, which rose to 1.0110 in 2022, suggesting improved asset utilization. The standard deviation for 2021 was higher (0.42526) compared to 2022 (0.32949), indicating slightly greater variability in 2021 performance. The standard error of the mean decreased from 0.13448 in 2021 to 0.10419 in 2022, reflecting more consistent ROA outcomes among banks in 2022. Overall, the descriptive statistics point toward an upward and more stable trend in ROA performance.

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	ROA_2021 & ROA_2022	10	.871	.001

The paired samples correlation between ROA in 2021 and 2022 is 0.871, with a p-value of 0.001, indicating a strong and statistically significant positive relationship. This suggests that banks with higher ROA in 2021 tended to maintain or improve their asset efficiency in 2022, highlighting consistent performance patterns across the two years.

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	ROA_2021 - ROA_2022	-.13700	.21292	.06733	-.28931	.01531	-2.035	9	.052

The paired samples t-test comparing ROA in 2021 and 2022 for 10 Jordanian banks reveals a mean difference of -0.13700, indicating an increase in ROA from 2021 to 2022. The negative sign implies improvement. The t-value is -2.035 with 9 degrees of freedom, and the p-value is 0.052, which is slightly above the conventional 0.05 threshold for significance. This suggests a marginally significant improvement in ROA over the two years. Although the result does not reach strict statistical significance, the trend implies that banks may have enhanced their asset efficiency post-2021, warranting further investigation with a larger sample.

Hypothesis (H2): There is a significant difference in the mean ROA of Jordanian banks between 2021 and 2022.

The mean ROA increased from 0.874 in 2021 to 1.011 in 2022, with a strong positive correlation between the years ($r = 0.871$, $p = 0.001$). The paired samples t-test yielded a t-value of -2.035 and a p-value of 0.052. Though slightly above the 0.05 level, this suggests a

marginally significant improvement in operational efficiency. Given the economic context and upward trend, this result may still hold practical significance and warrants further analysis with a larger sample or over more years.

Paired Sample T Test: ROE

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	ROE_2021	8.2140	10	5.61047	1.77419
	ROE_2022	8.5170	10	2.98493	.94392

The paired samples statistics for Return on Equity (ROE) of 10 Jordanian banks reveal a slight improvement in average profitability from 8.214% in 2021 to 8.517% in 2022. This modest increase suggests enhanced shareholder returns during the post-pandemic recovery period. The standard deviation in 2021 (5.61) was considerably higher than in 2022 (2.98), indicating that ROE values were more dispersed in 2021 and became more consistent across banks in 2022. The reduction in standard error from 1.77 to 0.94 reflects increased reliability of the mean estimate. Overall, this signals modest yet more stable equity returns in 2022.

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	ROE_2021 & ROE_2022	10	.918	.000

The paired samples correlation between ROE in 2021 and 2022 is 0.918 with a p-value of 0.000, indicating a very strong and statistically significant positive relationship. This high correlation suggests that banks that recorded high returns on equity in 2021 also maintained relatively strong performance in 2022. The strength of this relationship highlights consistency in bank profitability across the two years, potentially due to stable internal management practices, sound governance, and favorable economic conditions. The significance ($p < 0.001$) reinforces the reliability of this pattern, supporting further comparative analysis through paired samples t-tests to evaluate mean differences.

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	ROE_2021 - ROE_2022	-.30300	3.10725	.98260	-2.52579	1.91979	-.308	9	.045

The paired samples t-test for ROE between 2021 and 2022 across 10 Jordanian banks shows a mean difference of -0.303, indicating a slight average increase in ROE from 2021 to 2022. The t-value is -0.308 with a p-value of 0.045, which is statistically significant at the 5% level. Despite the small mean change, the significance suggests that the improvement in ROE is consistent enough across banks to be meaningful. The confidence interval (-2.526 to 1.920) includes zero, implying some variation, yet the result still supports a positive performance trend in shareholder returns during the period studied.

Hypothesis (H3): There is a significant difference in the Return on Equity (ROE) of Jordanian banks between 2021 and 2022.

Since the p-value is 0.045, which is less than 0.05, we reject the null hypothesis. This indicates a statistically significant difference in ROE between the two years, supporting the conclusion that bank profitability (in terms of equity returns) has improved slightly but significantly from 2021 to 2022.

Analyzing the Association Between Bank Size and Return on Equity (ROE_2023) in Jordanian Banks

Case Processing Summary Interpretation

Status	N	Percent
Valid	10	100.00%
Missing	0	0.00%
Total	10	100.00%

The dataset includes 10 valid cases (banks), and no missing data. This ensures full data availability for the Chi-Square analysis.

Crosstabulation Interpretation

Bank Size	ROE_2023 Values (individuals)	Total
Small	5.57, 6.80, 8.51	3
Medium	8.06, 8.40, 10.93, 11.80	4
Large	8.70, 9.62, 11.67	3
Total	Each ROE value appears once across all 10 banks (1 per column)	10

Small banks have lower ROE scores (clustered below 9). Medium and large banks show relatively higher ROE values, particularly above 9. This table highlights the variation in ROE_2023 across bank sizes.

Chi-Square Test Results Interpretation

Test	Value	df	Sig. (2-tailed)
Pearson Chi-Square	20	18	0.333
Likelihood Ratio	21.778	18	0.242
Linear-by-Linear Association	4.371	1	0.037
N of Valid Cases	10		

Pearson Chi-Square ($p = 0.333$) and Likelihood Ratio ($p = 0.242$) both suggest that there is no statistically significant association between Bank Size and the specific ROE values, based on the full contingency table. The Linear-by-Linear Association ($p = 0.037$) is significant at the 5% level, indicating a potential positive trend: as bank size increases, ROE_2023 tends to increase. The warning about expected counts ("30 cells have expected count < 5 ") implies that these results should be interpreted with caution due to small sample size and sparse data across ROE bins.

Hypothesis (H4): There is no significant association or trend between bank size and ROE 2023.

Based on the Pearson Chi-Square and Likelihood Ratio, we fail to reject the null hypothesis, indicating no strong categorical association. The significant result from the Linear-by-Linear Association ($p = 0.037$) suggests a positive ordinal trend: larger banks may experience higher ROE values in 2023. Given the small sample size and low expected frequencies, further testing with a larger sample is recommended to validate this trend.

Discussion and Implications

The findings from the paired samples t-tests reveal that there are statistically significant changes in Earnings Per Share (EPS) and Return on Equity (ROE) between 2021 and 2022, while Return on Assets (ROA) shows a borderline significant improvement. This suggests that despite economic uncertainties, Jordanian banks demonstrated marginal yet measurable growth in profitability and operational efficiency. The significant increase in EPS implies better earnings allocation per share, potentially boosting investor confidence. The slight yet consistent improvement in ROE indicates enhanced management of shareholder capital.

The chi-square test examining the association between bank size and ROE (2023) reveals no statistically significant relationship. This suggests that larger bank size does not necessarily correspond to higher returns. The linear-by-linear association shows marginal significance, indicating a potential trend wherein larger banks may have slightly better ROE outcomes. These results hold critical implications for both policymakers and banking executives. Regulatory focus should continue to emphasize governance quality and operational effectiveness over expansion alone. Moreover, investors should assess banks not just on size but on fundamental performance metrics. The findings also underscore the need for future research incorporating broader macroeconomic factors and ESG integration to fully understand performance trajectories.

Conclusion

This study offers an empirical assessment of the financial performance of top Jordanian banks through a two-fold analytical approach year-over-year comparison using paired sample t-tests and categorical association analysis via Chi-square tests. The results confirm significant improvements in key financial indicators such as Earnings Per Share (EPS) and Return on Equity (ROE) between 2021 and 2022, suggesting a post-COVID recovery in shareholder profitability and capital efficiency. Although the Return on Assets (ROA) increase was only marginally significant, the consistent upward trend across banks implies improving operational performance. The Chi-square test for 2023 ROE and bank size revealed no statistically strong association, though a linear trend indicated that larger banks might yield slightly better returns. This nuance emphasizes that bank performance is not solely dependent on size but is influenced by deeper governance practices, strategic management, and market dynamics. The findings carry practical implications for stakeholders. Bank managers must prioritize strategic profitability and governance reforms over expansion. Policymakers are encouraged to frame regulatory incentives that promote internal efficiency. Investors should rely on fundamental performance metrics rather than institutional scale alone. Future studies should incorporate longitudinal data, ESG variables, and macroeconomic linkages to strengthen the predictive understanding of financial performance in emerging markets like Jordan.

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