JORDANIAN BANKING SYSTEM: ANALYSIS OF TECHNICAL EFFICIENCY AND PERFORMANCE

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Abstract

The purpose of this study is to examine the connection between technical efficiency and banks' performance for 13 commercial banks in Jordan over the period 2010-2017. For this purpose, this study will employ the nonparametric model using the linear programming by Data Envelopment Analysis (DEA) to calculate technical efficiency and the panel regression analysis to estimate the relationship between technical efficiency and Banks' performance measured by return on asset (ROA), return on equity (ROE) and Tobin's Q. The empirical findings reveal that pure technical efficiency (PTE) is statistically significant with positive effect on ROA, ROE and Tobin's Q. Further, the relative technical efficiency (RTE) or scale efficiency (SE) has positive significant impact on ROA, ROE, and Tobin's Q. The market share and the ATMs coverage share also has a positive effect on bank's performance. On the other hand, bank's size has no significant effect on ROA and ROE but weak positive effect on Tobin's Q.

Keywords: Technical Efficiency, Banks' Performance, Commercial Banks, Data Envelopment Analysis

JEL Classification: G14, G21, L25

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1. Introduction

Banking efficiency refers to the banks' ability to reform its plans and strategies to obtain maximum returns using the minimum possible expenditures and resources as managerial objectives that are being pursued by the top management. Efficiency makes banks more elastic to domestic and foreign shocks. In the world of increasing competition, banks are therefore fighting for a boost of efficiency, while organizers and decision makers have to achieve the efficiency prior globalization of the market especially that the number of foreign banks significantly increased. In general, efficiency in economics is interpreted as the maximum potential ratio between the output and the input of the product development process, which shows the optimal distribution of available resources that would allow achieving the maximum potential (Cvilikas and Jurkonyte-Dumbliauskiene, 2016). ROA, ROE and Tobin's Q ratios are globally utilized in financial analysis, permit to assess the banks' performance during a period time. So, their significance for management is of comparative nature. Whereas profitability is fundamental for a bank to preserve ongoing activity and for its clients to gain fair earnings.

Although high efficiency may enhance performance, researchers have mixed views on the connection between banks' efficiency and profitability. For this purpose, the study aims at providing an empirical contribution to the concept of the efficiency research of the bank's performance to examine the connection between efficiency and banks' performance for thirteen Jordanian commercial banks over the period (2010-2017).

2. A brief review of literature

The literature on Banks efficiency in the developed countries contains a large number of articles (see Berger et al., 1993; Berger and Humphrey, 1997; Berger and Mester, 1997 for an extensive review of literature on the efficiency of banking sector). The concept of efficiency established in 1951 in the study of Koopmans (1951), which noted that "the product is technically efficient, if the increase in production of a particular product requires a reduce production of another product at least, or adding one more input at least. The literature provides different methods to measure efficiency. Each frontier technique has its specific advantages and disadvantages and yields different efficiency estimates (see Bauer et al., 1998 for advantages and disadvantages

of each frontier technique). Among all the frontier techniques, DEA has emerged over the years as a most potent approach for measuring relative efficiency across banks due to its intrinsic advantages over others. This fact indicates DEA's significance, popularity, and relevance in banking efficiency analyses. Given the advantages of this method in the analysis, it will be used in this study to calculate technical efficiency. The DEA method assuming that the production frontiers either constant returns to scale CRS, or variable returns to scale VRS. It has been applied by Charnes et al. (1978), which has its roots from Farrell (1957). The CRS hypothesis is appropriate in the DEA only when all DMUs are operating by optimal scale (Coelli et al., 2005). This study will focus on output oriented approach to calculate the technical efficiency scours, considers the possible expansion in outputs for a given set of inputs.

Regarding the relationship between efficiency and banks' performance the literature reveals that some studies find a positive connection, others find a negative connection and few studies reject the relationship. Yong et al. (2017) test the impacts of risk, competition, and cost efficiency on bank profitability in a sample of Chinese commercial banks over the period 2003-2013. Results reveal that Chinese commercial banks with higher levels of insolvency risk have higher profitability measured by ROA and ROE. Besides, higher competition leads to lower profitability, and higher levels of cost efficiency have lower ROA in Chinese banks.

Priya and Velnampy (2013) aimed at finding the impact of changes in efficiency on profitability of banks in Sri Lanka over the period 2008-2012. Results confirm a significant relationship between the ratio of sales to total asset, the operating profit margin and ROE. In addition, the ratio of sales to total asset and operating profit margin and loan to total assets are significantly correlated with Net Profit Margin.

The importance of bank efficiency and performance has also been studied by Maredza (2014) who tries to examine the internal determinants of bank profitability the effect of bank efficiency over the period 2005-2011. The study found that high total factor productivity efficiency and capital adequacy produce higher profitability, while high cost inefficiency, diversification activities, large bank size, and high credit risk leads to lower profitability. In other words, there is a positive role of efficiency as a serious reason of profitability among banks. Mawutor and Fred (2015) assessed the efficiency and profitability of banks operating in Ghana over the period 2006-2011. The study

revealed that 61% of the variation in the profitability of the banks are accounted for by the independent variables such as the liquidity level, leverage, productivity, credit risk and size of the banks.

Kumar (2008) examines the relationship between technical efficiency and profitability in the Indian public sector banking industry. Findings show that public sector banks can produce 1.13 times as much output from the same inputs, if they operate efficiently. An analysis of efficiency–profitability matrix based on the efficiency scores and Return on Assets (ROA) reveals that 13 banks that fall in the 'lucky' and 'underdog' quadrants have the technical efficiency score below the industry average. Werner and Moormann (2009) tested the empirical connection between efficiency and profitability in five large countries of the European Union over the period 1998-2005. The findings of the conducted static and dynamic regression analyses confirm that profitable banks operate with higher technical efficiency comparing to other banks. Therefore, banks following this strategic position were able to achieve higher excess returns during the analyzed period.

In addition, Erina and Lace (2013) examine the effect of the external and internal factors of bank performance on the profitability indicators of the Latvian commercial banks over the period 2006-2011. The authors conducted the survey of scientific literature, analyzed profitability indicators of commercial banks and concluded that profitability has had a positive effect on operational efficiency, as measured according to ROA, while according to ROE, negative effect on operational efficiency and credit risk. Hussainey et al. (2017) explore the effect of efficiency on the performance of Islamic banks all over the world using a sample of 151 Islamic Banks. Results confirm a positive connection between risk-based capital adequacy and the existence of Sharia auditing department and the performance of Islamic banks.

Afsharian et al. (2011) examine the effect of efficiency on the performance of publicly traded European banks over the period (2005-2009). The results confirm a positive relationship between technical efficiency and the banks' performance. Aguenaou et al (2017) examine Moroccan banks' financial performance over the period 2004-2014 using the CAMEL framework. Results show that capital adequacy, asset quality, earnings performance, and liquidity have a positive effect on banks' efficiency with capital adequacy having the most significant impact, while management efficiency is negatively related to efficiency.

Sharma (2018) explores the connection between efficiency and market performance. The findings confirmed the existence of a statistically significant relationship between operational efficiency and market performance of Indian banks. Further, operationally efficient banks generate more revenues to banks' investors. Meles et al. (2016) also find that intellectual capital efficiency affects the financial performance of US banks positively. In addition, the results show that human capital efficiency, a subcomponent of IC efficiency, has a larger impact on financial performance. Thus, the development of effective techniques of knowledge management, enhancing banks to accumulate the capital needed to fit to a permanently changing environment.

On the other hand, Kosmidou et al. (2008) evaluated the determinants of profitability of commercial banks in UK. They found that the coefficient of the cost to income ratio that was a proxy for efficiency was negative and significant. That suggested that efficiency in expenses management is a robust determinant of UK bank profits. Kosmidou (2008) and Pasiouras et al. (2006) also confirm this opposite relationship for Malaysia, Greece and Australia.

Palečková (2015) also explores the relationship between profitability and efficiency in the Czech banking sector over the period 2004–2014, but the study rejects the relationship between profitability and efficiency.

3. Source of data and variables selection

To realize the objectives of the study, the study utilizes two sets of variables which have been collected from two distinct sources: First, the annual reports of association of Banks in Jordan; Second, the annual reports of each Bank which obtained from the Amman stock exchange. Thus, this study utilizing the Panel data of 13 Jordanian commercial Banks during the fiscal years of 2010 to 2017. The first set of variables includes input and output variables selected for computing various efficiency scores for individual Jordanian commercial Banks. However, the second set of variables includes the factors that explain the inter-bank differences in performance. This study employed the coding DMUi for each i^{th} Bank as shown in Table 1.

Table 1

The symbol of each Bank

Bank Name	Code
Arab Bank	DMU1
Jordan Ahli Bank	DMU2
Cairo Amman Bank	DMU3
Bank of Jordan	DMU4
Housing Bank	DMU5
Jordan Kuwait Bank	DMU6
Arab Jordan investment Bank	DMU7
Jordan Commercial Bank	DMU8
Investbank	DMU9
ABC Bank	DMU10
Bank of Etihad	DMU11
Société Generale - Jordan	DMU12
Capital Bank	DMU13

Source: Prepared by authors.

3.1. Input and output variables for computing banks efficiency scores

It should be noted that there is no consensus on what constitutes Bank inputs and outputs (Sathye, 2003; Humphrey, 1985). In the literature on banking efficiency, there are mainly two approaches for selecting the inputs and outputs for a bank: first, the production approach as proposed by Benston (1965); and second, the intermediation approach as proposed by Sealey and Lindley (1977).

The output under production approach represents the services provided to the customers and is best measured by the number and type of transactions. Inputs in this approach include physical variables or their associated cost. This approach focuses only on operating cost and completely ignores interest expenses (Humphrey, 1985).

The intermediation approach considers banks as financial intermediaries managing funds between depositors and creditors. Berger and Humphrey (1997) suggested that the intermediation approach is best suited for analysing bank level efficiency, whereas the production approach is well suited for measuring branch level efficiency. Therefore, this paper will adopt the intermediation approach in selecting input and output variables to compute the technical efficiency scores for Jordanian commercial Banks. Table 2 provides the description of the selected output and input variables.

Table 2

Description of output and input variables

Variable		Description
Outputs	net interest income	measured as the difference between interest earned and interest expanded.
	non-interest income	proxied by 'other income' earned from Bank's investments.
Inputs	physical capital	measured as the value of fixed assets.
	labor	measured as the number of employees.
	loanable funds	measured as the sum of deposits and borrowings.

Source: Prepared by authors based on the literature.

3.2. Variables explaining inter-bank performance

The performance analysts are interested to know about the factors assigning the profitability differences among banks. In the present study, we have to examine the connection between efficiency and banks' performance. The dependent variables ROA, ROE and Tobin's Q ratios, are considered to assess the banks' performance during a period of study. This study considers three explanatory variables besides the two technical efficiency scores, which may exert an influence on the performance of a bank. Table 3 provides the description of these factors and their expected effect on the performance of the banks.

Table 3

Description of the variables

Variable		Symbol	Description	Expected Sign
Dependent Variables	Return on Assets	ROA	Financial Performance measure that shows the percentage of how profitable a company's assets are in generating revenue.	--
	Return on Equity	ROE	Financial Performance measure that shows how well a company uses	--

Variable		Symbol	Description	Expected Sign
			investments to generate earnings growth.	
	Tobin's Q	TQ	Market Performance measure that shows firm assets in relation to a firm's market value.	--
Independent Variables	Pure Technical Efficiency	PTE	measure of technical efficiency scores that identifies the efficiency of Bank i by its current inputs and scale.	Positive
	Relative Technical Efficiency	RTE	measure of scale technical efficiency scores that identifies the efficiency of Bank i relative to best practice Banks.	Positive
	Loans Market Share	LOANR	$\frac{Loans\ of\ Bank\ i}{Total\ Loans\ of\ 13\ Banks}$	Positive
	ATMs Coverage	ATM	$\frac{Number\ of\ ATMs\ for}{Total\ number\ of\ ATMs\ f}$	Positive
	Bank's Size	SIZE	Log Total Assets	Positive

Source: Prepared by authors based on the literature.

It is assumed that if the Bank is not efficient relatively (relative to the best practice Banks), it may achieve the pure efficiency by its current inputs and operating size. larger market shares of loans, ATMs coverage and its spread, and Bank's size have positive effect on the performance and profitability of the bank. Expecting that higher market share of deposits and loans, with wide spread of ATMs, will enhance the providing of bank services for customers, which in turn support the banks performance and profitability.

4. Methodological framework

As mentioned above, this study intends to apply the technique of DEA for computing the technical efficiency scores for individual Jordanian commercial Banks by output-oriented approach. After

calculating the technical efficiency scores, this study carried out a regression analysis to estimate the effect of various technical efficiency scores (Pure and relative efficiency) beside the explanatory variables as mentioned above, on the performance of Jordanian commercial Banks measured by ROA, ROE and Tobin's Q. This paper employs ordinary least square (OLS) regression model to analyze the panel data and examine the performance of Jordanian commercial banks. The study determines which of the two models (fixed effect (FE) and random effect (RE)) is best fit by applying the Hausman test for random effects using E-views 9 software. Through literature review, this study constructs the three empirical regression models as below:

$$ROA_{it} = B_0 + B_1 PTE_{it} + B_2 RTE_{it} + B_3 LOANR_{it} + B_4 ATM_{it} + B_5 SIZE_{it} + U_{it} \quad (1)$$

$$ROE_{it} = B_0 + B_1 PTE_{it} + B_2 RTE_{it} + B_3 LOANR_{it} + B_4 ATM_{it} + B_5 SIZE_{it} + U_{it} \quad (2)$$

$$TQ_{it} = B_0 + B_1 PTE_{it} + B_2 RTE_{it} + B_3 LOANR_{it} + B_4 ATM_{it} + B_5 SIZE_{it} + U_{it} \quad (3)$$

Where i denote for each Bank in time t, B0 is the constant, Bj for j=1,2,3,4,5, are the estimated parameters, and U is the error term.

5. Results and discussion

5.1. Technical efficiency scores of Jordanian commercial banks

After applying the DEA technique, the scores of OTE and PTE by applying the two models CRS and VRS. The results show the technical efficiency scores by using the output oriented approach of each Bank in each year from 2010 to 2017.The results reveal the average of OTE ranged between 65% to 76%, where the lowest average of OTE score was in year 2014, and the highest average score was during the years 2012 and 2015. The average of PTE scores ranged between its lowest average 75% during the years 2016 and 2017, and the highest average 86% in year 2012. Results indicate that average of PTE scores were higher than average of OTE scores in general, that because there are differences between TECRS and TEVRS, and the TE scores under the assumption of VRS are higher than the scores of TE assuming CRS. That confirm the existence of inefficient Banks during the years 2010-2017. So that, this study calculates the relative technical efficiency RTE scores, to determine which Banks are technically efficient relative to the best practice Banks.

The average RTE scores ranged between its minimum score 82% in year 2014, and its maximum score 96% in year 2016. The best

practice was for DMU4 and DMU3, which are consider the benchmark of Jordanian commercial banking sector. Moreover, the standard deviation in year 2014 is at maximum 15%, whereas it is at minimum in year 2016. Based on RTE, the efficiency scores of the whole rest Banks were determined relative to DMU4. Accordingly, the rest of the Jordanian commercial Banks were distributed based on its distance from DMU4, their ranking according to the average RTE was as shown in Table 4.

Table 4

Ranking of banks based on RTE scores

Bank	Code	Average RTE	Average Inefficiency	Rank
Bank of Jordan	DMU4	1	0	1
Cairo Amman Bank	DMU3	0.99	0.01	2
Jordan Ahli Bank	DMU2	0.96	0.04	3
Jordan Kuwait Bank	DMU6	0.95	0.05	4
Housing Bank	DMU5	0.93	0.07	5
Bank of Etihad	DMU11	0.93	0.07	6
Arab Jordan investment Bank	DMU7	0.92	0.08	7
Capital Bank	DMU13	0.89	0.11	8
Arab Bank	DMU1	0.85	0.15	9
Jordan Commercial Bank	DMU8	0.85	0.15	10
ABC Bank	DMU10	0.82	0.18	11
Investbank	DMU9	0.77	0.23	12
Société Generale - Jordan	DMU12	0.69	0.31	13
Average		***0.89***	***0.11***	
Max		***1***	***0.31***	
Min		***0.69***	***0***	
St.Dev		***0.09***	***0.09***	

Source: Prepared by authors using E-views 9.

5.1.1. Analysis inter-bank performance

After analyzing the technical efficiency scores, this study carried out a regression analysis to estimate the relationship between TE scores and Banks performance as mentioned before.

Testing stationary problem

To ensure the stability of the variables, this study used the (LLC) test which was used by Levin, Lin and Chu (2002) it takes the following formula:

$$\Delta Y_{it} = a_i + \rho Y_{i,t-1} + \sum_{k=1}^{n} \emptyset_k \Delta Y_{i,t-k} + \delta_i t + \theta_t + \mu_{it} \quad (4)$$

LLC considers an appropriate test in a small sample, this model allows to existence of fixed effects in two directions (Two-way Fixed Effects), the first direction is a_i and it refers to the fixed effects for each country, the second direction is θ_t and it refers to the fixed effects for each year (Baltagi, 2008). Fixed effects for each country is the most important as it allows the existence of a differentiation in the properties of countries. Moreover, LLC test assumed that (Cross-sectional Independent) between countries, under this assumption, the test uses the least squares method to estimate ρ parameter which takes the form of a normal distribution. The null hypothesis (H0) for LLC test indicates for existence of unit root (instability) in the data, if (t-probability<0.05), the data will be stationary (Asteriou and Hall, 2007).

Table 5

Testing unit root problem

Variable	t-statistic	t-Probability	Stationary
ROA	-2.64	0.00	Level*
ROE	-3.68	0.00	Level*
TQ	-9.02	0.00	Level*
PTE	-4.30	0.00	Level*
RTE	-4.69	0.00	Level*
LOANR	-4.22	0.00	Level*
ATM	-7.01	0.00	Level*
SIZE	-4.54	0.00	Level*

***-** *stationary with individual effects*

Source: Prepared by authors using E-views 9.

The results show that all variables are stationary in their level, which means reject H0meaning there is no unit root in study model's variables.

5.1.2. Testing multi-collinearity problem

The study employed Variance Inflation Factors (VIF) to test correlations between the independent variables and the strength of that correlation. According to Robert (2007), as a rule of thumb is that the variance inflation factor (VIF) above 5 or the tolerance value (1/VIF) below 0.2 is an indication that there is a problem of multi-collinearity among the variables. The results are presented in Table 6.

Table 6

Testing multi-collinearity problem

Variable	VIF	Tolerance Value 1/VIF
PTE	1.15	0.87
RTE	1.22	0.82
LOANR	1.08	0.92
ATM	1.04	0.96
SIZE	1.33	0.75
Mean	**1.16**	**0.86**

Source: Prepared by authors using E-views 9.

The above table shows that there is no VIF greater than 5 and the tolerance values were above 0.2; in turn reveals any of the independent variable included in this study is not explained by the other. Hence all variables can be retained in the model of this study.

5.1.3. Testing serial correlation problem

Serial correlation can be tested by the Durbin-Watson (DW) statistic (Baltagi, 2008). More formally, the DW statistic measures the linear association between adjacent residuals from a regression model. The Durbin-Watson is a test of the hypothesis (ρ=0) in the specification:

$$uit = \rho uit - 1 + \varepsilon it \quad (5)$$

If there is no serial correlation, the DW statistic will be around 2. A rule of thumb is that DW statistic values in the range of 1.5 to 2.5 are relatively normal. The results are presented in Table 7.

Table 7

Serial correlation test

Models	DW statistic
ROA	2.16
ROE	2.07
TQ	1.98

Source: Prepared by authors using E-views 9.

The results show that DW statistic in our models are relatively normal and there is no serial correlation.

5.1.4. Regression analysis

This study applies a panel regression analysis to estimate the effect of pure and relative technical efficiency scores on the performance of Jordanian Banks measured by the three models ROA, ROE and Tobin's Q. To determine which model of effects FE or RE is appropriate to study's regression model, Hausman test was conducted. According to Chi-square statistics 25.89, 20.93, and 19.01 respectively, and its probability 0.000, 0.000, and 0.001 respectively, the Hausman test shows that FE is appropriate for the three regression models.

Table 8

Regression analysis by applying FE model

	Model 1	**Model 2**	**Model 3**
Performance Variables	**ROA**	**ROE**	**TQ**
Constant	-0.01* [-4.98] (0.00)	-0.16* [-5.90] (0.00)	-0.01 [-0.51] (0.61)
PTE	0.02* [6.27] (0.00)	0.11* [3.97] (0.00)	0.01 [0.53] (0.59)
RTE	0.01* [6.31] (0.00)	0.07* [0.02] (0.00)	0.02* [2.06] (0.04)
LOANR	0.03* [1.99] (0.04)	0.65* [4.14] (0.00)	0.35* [5.74] (0.00)
ATM	0.02 [0.92] (0.36)	0.32* [2.07] (0.04)	0.21* [3.33] (0.00)
SIZE	0.01 [0.34] (0.73)	0.01 [1.31] (0.19)	0.01** [1.78] (0.07)
R^2	***0.93***	***0.89***	***0.81***
Adjusted R^2	***0.91***	***0.86***	***0.77***
F-statistic	***48.80*** ***(0.00)***	***28.30*** ***(0.00)***	***22.31*** ***(0.00)***
Observations	***104***	***104***	***104***

**, ** indicate for significance level 5%, 10% respectively*
Source: Prepared by authors by using E-views 9.

The results of regression analysis in Table 8 revealed the three models of Banks performance. The first two models (ROA, ROE) interpret Bank's financial performance, and the third model (TQ)

interprets the bank's market performance. Pure technical efficiency PTE is statistically significant with positive effect on ROA and ROE. Meaning that the Bank efficiency calculated by its current inputs and scale enhance its profitability measured by the financial performance without considers the best practice Banks. On other hand, the pure technical efficiency has insignificant effect in Tobin's Q model. Because the bank current scale is not appropriate to achieve Bank's market performance.

The relative technical efficiency RTE or scale efficiency SE has positive significant impact on all Banks performance (ROA, ROE, and TQ). Means, efficient with the capital structure of the commercial banks where any increase in stock price will reflected in total equity because the stock price works as a mirror that reflect market performance for banks. Whereas our study ranked the Jordanian commercial Banks based on the relative efficiency to the best practice Banks, and the relative scale of each Bank influence its performance in the Banking sector. Based on, the Bank should take in consideration the practice of the best Banks to compete in market.

Besides, the market share measured by loans has positive significant impact on Bank's Financial and market performance (ROA, ROE, and TQ). While the loans facilities increase by 1%, the profitability increases as well by 0.03%, 0.65% and 0.35% respectively. Bank's facilities might result in high profit; high market share boosts a bank's market advantages helping the bank to boost profit and achieve economies of scale. Furthermore, the highest impact of market share on Banks performance was in ROE model. Lending might result in high Profitability as loans generate interest revenues that boosts the interest income and ROE. Since we have pure return on equity after paying tax and interest rate.

Results revealed the positive and significant impact of ATMs coverage share on Banks performance measured by ROE and TQ. Whereas its impact on ROA is insignificant. This is an indication that when the ATMs share of each Jordanian commercial bank increases by 1%, bank's return on equity will increase by 0.32%. and Bank's market performance will increase by 0.21%. This is consistent with expectations that the growing number of ATM attracts more clients, increases the stock price and enhances profitability.

On the other hand, bank's size has insignificant impact on ROA and ROE, and it has a weak positive impact (0.01%) on TQ at significance level 10%. Therefore, results indicate the size variable has

no particular impact on financial performance for commercial banks which means that the impact of size on financial performance is similar across commercial banks. Further, the size variable may have effect on Bank's market performance measured by TQ because TQ include capital structure which is related to the size. The components of TQ are total assets and total equity, and more equity means higher portion of total assets and higher size of Bank.

6. Conclusion

Banking efficiency shows the banks' ability to structure its plans, strategies, and decisions to achieve maximum returns using the minimum costs and resources as managerial objectives that are being pursued by the top management. The current study aims at testing the link between technical efficiency and the performance of 13 Jordanian commercial banks for the period 2010-2017. For this purpose, the study used the DEA technique to measure the technical efficiency using CRS and VRS. Besides, the study tested the stationarity, the multi-collinearity, and the serial correlation.

Results reveal that pure technical efficiency PTE has positive effect on ROA and ROE but has insignificant effect in TQ. This might be since the bank current scale is not appropriate to achieve Bank's market performance. Besides, the relative technical efficiency RTE or scale efficiency SE has positive significant impact on ROA, ROE, and TQ. The market share measured by loans has positive significant impact on Bank's Financial and market performance. Furthermore, the highest impact of market share on Banks performance was in ROE model. Referring to ATMs, results show a positive and significant impact on ROE and TQ. Whereas its impact on ROA is insignificant.

On the other hand, bank's size has insignificant impact on ROA and ROE, and it has a weak positive impact on TQ. Therefore, results indicate the size variable has no particular impact on financial performance for commercial banks.

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