COMMERCIAL BANKS' PERFORMANCE IN EMERGING MARKETS: NEW EVIDENCE FROM THE MENAP REGION

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ABSTRACT

Bank performance is an important topic for both professionals and researchers. The purpose of this paper is to study the main determinants of commercial bank performance in emerging markets, specifically the Middle East, North Africa and Pakistan region (MENAP, henceforth). To acquire a deeper understanding of this topic, our research uses the data of 56 stock-listed banks in 7 MENAP countries between 2015 and 2022. This study documents that bank size, operation inefficiency, the GDP growth rate, broad money growth rate, bank accounts' growth rate, cashless payments, and the percentage of the population with access to the internet are the main determinants of commercial bank performance in the MENAP region. This paper aims to contribute to the literature surrounding the topic of commercial bank performance. It sheds light on the MENAP region banking sector, which has not been sufficiently studied. Our research includes data from before and after the COVID-19 recession to provide recent, relevant and holistic insight. Moreover, this study investigates the impact of digitalisation on commercial bank performance via multiple proxies.

Keywords: Commercial Bank, Performance, MENAP, Digitalisation, Emerging Markets.

JEL classification: G21

INTRODUCTION

Banks are detrimental to the development of economic and financial growth. The latter optimally occurs in a context where financial services create capital and ensure financial stability. Therefore, the performance of banks is a critical topic for both professionals and academicians. Consequently, it needs up-to-date research to enrich and complement the current literature (Azzabi & Lahrichi, 2023).

Bank performance can be defined as a bank's capacity to achieve its objectives, generate value for its stakeholders and outperform its competitors (Chenini & Jarboui, 2018). It is commonly measured by the return on equity (ROE, henceforth) or the return on assets (ROA, henceforth). It is affected by multiple factors of different types, such as bank-specific, macroeconomic, industry-related and technology-driven factors.

The topic of bank performance determinants has gained increasing academic interest since the subprime mortgage crisis and the empowerment of FinTech firms and digital financial technologies as of 2015 (Alam et al., 2021).

Investing in financial technology solutions, information and communication technologies (ICT, henceforth) and digitalisation in general has become a key success factor in the banking sector. Our research includes bank-specific, macroeconomic and digital systematic determinants. We rely on the latter to capture the effect of digitalisation and bridge the gap in the literature (Azzabi & Lahrichi, 2023).

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Our paper aims to provide further knowledge on the main determinants of commercial bank performance. To meet this objective, the present paper answers the following questions;

a) What are the main bank-specific factors of commercial bank performance in the MENAP region?
b) What are the main macroeconomic factors of commercial bank performance in the MENAP region?
c) What are the main digital systematic factors of commercial bank performance in the MENAP region?
d) What is their impact on commercial banks' performance?

The remainder of this paper is structured as follows: section 2 presents the review of the literature and the hypotheses development. Section 3 presents the empirical methodology. Section 4 presents the empirical analysis. Section 5 discusses the results of the empirical study. Section 6 concludes.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

This section presents a review of the relevant literature on the factors of commercial bank performance. It is segmented by type of factor, i.e. bank-specific factors, macroeconomic factors and digital systematic factors. Each factor will be associated with a hypothesis to guide our empirical research endeavours.

Bank-Specific Factors

This subsection discusses the bank-specific factors of commercial bank performance.

Bank size

A large-sized bank usually has easier access to the market and a higher capacity to generate economies of scale. This is why numerous authors believe that size is a positive determinant of bank performance (Bonin et al., 2005; Athanasoglou et al., 2006; Jara-Bertin et al., 2014; Menicucci & Paolucci, 2016; Bahyaoui, 2017; Chouikh & Blagui, 2017; Elouali & Oubdi, 2018; Almoneef & Samontaray, 2019; Akoi & Andrea, 2020; Jreisat & Bawazir, 2021).

However, a few authors have found that size had a negative impact on commercial banks' performance (Seiford & Zhu, 1999; Bahyaoui, 2017; Derbali, 2021; Al-Matari, 2023), or even no impact at all (Berger & Mester, 1997; Anarfi et al., 2016).

In light of the contrasting findings, this paper investigates the impact of size on bank performance via the following hypothesis:

H_1: *Bank size has an impact on commercial bank performance, conveyed by the effect on the ROE*.

Loan Growth

A bank's main function in an economy is to finance other economic agents with capital. Many authors' findings point out that positive loan growth predicts higher bank performance (Sufian & Habibullah, 2009; Dang, 2019).

However, excessive lending can result in risky outcomes. A significant body of research claims that the more a bank lends, the higher its credit risk and the lower its credit standards (Fahlenbrach et al., 2016; Kupiec et al., 2017; Naili & Lahrichi, 2022).

In light of the contrasting findings, this paper investigates the impact of loan growth on bank performance via the following hypothesis:

H_2: *Loan growth has an impact on bank performance, conveyed by the effect on the ROE.*

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Non-performing loans

The literature demonstrates that non-performing loans have a negative impact on commercial bank performance (Ghosh, 2015; Naili & Lahrichi, 2022). Since NPLs represent loans that are unlikely to be repaid, a higher NPL ratio suggests a lower interest income and a higher credit risk. NPLs are among the main catalysts of financial crises, such as the subprime crisis of 2008.

However, some authors suggest situations where NPLs can have a positive impact on commercial bank performance on the short-run (Rajan, 1994; García-Marco & Robles-Fernández, 2008). The literature also suggests that NPLs' negative impact can be offset by adequate credit management strategies such as factoring or contracting credit default swaps (Sebayang, 2020).

In light of the contrasted findings, this paper investigates the impact of inefficiency on bank performance via the following hypothesis:

H_3: *Non-performing loans have an impact on commercial bank performance, conveyed by the effect on the ROE.*

Operation inefficiency

The literature overwhelmingly agrees that efficiency is an indicator that enhances bank performance (Pasiouras & Kosmidou, 2007; Bahyaoui, 2017; Otero et al., 2020; Isnurhadi et al., 2021). The more efficient the bank is, the higher its profits and the lower its costs. However, a few authors, such as Chouikh & Blagui (2017) claim that efficiency is statistically insignificant with respect to bank performance.

In light of the findings of the literature, this paper investigates the impact of operation inefficiency on bank performance via the following hypothesis:

H_4: *Operation inefficiency has a negative impact on commercial bank performance, conveyed by the effect on the ROE*.

Macroeconomic Factors

This subsection details the macroeconomic determinants of bank performance.

GDP growth rate

The sampled literature mostly shows that the gross domestic product (GDP, henceforth) growth rate has a positive effect on bank performance (Sufian & Habibullah, 2009; Jara-Bertin et al., 2014; Caporale et al., 2015; Chen & Lu, 2020; Jreisat & Bawazir, 2021). Economic agents exhibit better performance in economic expansion versus those in economic recession. However, some authors, like Pasiouras & Kosmidou (2007) and Chouikh & Blagui (2017) suggest that the GDP growth rate has an adverse effect on bank performance. Alternatively, Derbali (2021) and Isnurhadi et al. (2021) show that GDP growth is statistically insignificant with respect to the latter.

In light of the contrasting findings, this paper investigates the impact of GDP growth on bank performance via the following hypothesis:

H_5: *GDP growth has a positive impact on commercial bank performance, conveyed by the effect on the ROE*.

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Broad Money Growth Rate

Broad money refers to the amount of money circulating within an economy. It is intricately linked to central bank policies to affect the money supply, interest rates and inflation (Modigliani et al., 1970). The relevant literature shows that broad money growth has a positive and significant effect on bank performance and economic growth (Ifionu & Akinpelumi, 2015; Suoyai et al., 2018).

This paper investigates the impact of broad money growth on bank performance via the following hypothesis:

H_6: *Broad money has an impact on commercial bank performance, conveyed by the effect on the ROE*.

Digital Systematic Factors

Banks relied on their clients' physical presence to offer them banking services. However, the COVID-19 regression has accelerated the development of digitalisation in the banking industry. Therefore, an argument could be made that digitalisation helped sustain the economy during the previously mentioned crisis.

With heavily restricted movement worldwide, banks and their clients had to resort to digitalisation, which is now a key success factor for banks. Consequently, banks are endeavouring to keep up with the latest technologies by investing in financial technology solutions.

The findings regarding digitalisation are quite contrasted. Forcadell et al. (2020) claim that digitalisation is not a significant determinant of bank performance on its own. It requires the support of relevant corporate sustainability policies. Wang et al. (2022) and Coryanata et al. (2023) affirm that digitalisation has a negative impact on the financial performance of banks. The former recommend exercising caution when investing in banking companies that use financial technologies. Whereas Potapova et al. (2022) have determined that digital maturity is a competitive advantage for Russian commercial banks. Therefore, it has a positive impact on the former's performance.

Digitalisation and its effects are inherently hard to observe. On that account, we rely on the following proxies to gauge the impact on commercial bank performance:

a) Bank accounts' growth rate[1] (Shihadeh, 2021)
b) Cashless payments[2] (Lu et al., 2022; Mohammed et al., 2022)
c) Credit cards' growth rate (Sinkey & Nash, 1993; Chen & Tseng, 2005)
d) Percentage of the population with access to the internet (Malhotra & Singh, 2009; Tunay et al., 2015)
e) Cellular mobile subscriptions growth rate.

These proxies are related to the three foundational pillars of the digital economy: infrastructure, payments and regulations (Cusolito et al., 2022).

This paper investigates the impact of digitalisation on bank performance via the following hypotheses:

H_7: *Bank accounts' growth rate has an impact on commercial bank performance, conveyed by the effect on the ROE.*

H_8: *Cashless payments have an impact on commercial bank performance, conveyed by the effect on the ROE.*

H_9: *Credit cards' growth rate has an impact on commercial bank performance, conveyed by the effect on the ROE;*

[1] Given the lack of details regarding the number of bank accounts opened specifically through digital means, we took the growth rate of bank accounts as a digital systematic proxy. Moreover, bank accounts are the underlying vehicle through which banks offer digital banking services. ;

[2] Cashless payments include transactions conducted through digital means of payment, such as credit cards.

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H10: *The percentage of the population with access to the internet has an impact on commercial bank performance, conveyed by the effect on the ROE;*

H_{11}: *Cellular mobile subscriptions growth rate has an impact on commercial bank performance, conveyed by the effect on the ROE.*

EMPIRICAL METHODOLOGY

This section discusses the empirical methodology by tackling three sub-sections. It presents this research's data, defines the variables, and provides details pertaining to the latter.

Sample and Data

We have sampled a total of 56 banks from 7 MENAP countries (8 banks per country): Morocco, Egypt, Tunisia, Jordan, Turkey, the United Arab Emirates and Pakistan. The period covers the years 2015 up to 2022. The data has been extracted using the official annual reports of the sampled banks, the World Bank's official open database and the IMF financial access survey.

Variable Definition

This subsection discusses the dependent and independent variables of this empirical study.

Dependent variable

Commercial bank performance will be measured by the return on equity (ROE) to express the (Ghosh, 2015; Naili & Lahrichi, 2022).

Independent variables

This subsection discusses the independent variables and the proxies to measure them.

Bank-specific factors

The retained bank-specific determinants of commercial bank performance are the following;

a) **Bank size:** natural logarithm of the bank's total assets (Alper & Anbar, 2011; Berger & Bouwman, 2013; Islam & Nishiyama, 2016; Jarbou et al., 2018).
b) **Loan growth:** Current year's loan's growth compared to the previous year's (Naili & Lahrichi, 2022)
c) **NPL ratio:** Non-performing loans to total loans ratio (Ghosh, 2015; Naili & Lahrichi, 2022).
d) **Operation inefficiency:** Operation expenses to operation income ratio (Dietrich & Wanzenried, 2014; Saleh & Abu Afifa, 2020; Isnurhadi et al., 2021).

Macroeconomic factors

The retained macroeconomic determinants of commercial bank performance are the following;

a) **GDP growth rate:** Yearly growth rate of GDP (Pasiouras & Kosmidou, 2007; Sufian & Habibullah, 2009; Caporale et al., 2015; Chouikh & Blagui, 2017).
b) **Broad money growth rate:** Yearly growth rate of the broad money supply.

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Digital systematic factors

The retained digital determinants of commercial bank performance are the following;

a) Bank accounts' growth rate (Shihadeh, 2021).
b) Cashless payments (Lu et al., 2022; Mohammed et al., 2022).
c) Credit cards' growth rate (Sinkey & Nash, 1993; Chen & Tseng, 2005),
d) The population percentage with access to the internet (Malhotra & Singh, 2009; Tunay et al., 2015).
e) Cellular mobile subscriptions growth rate.

Descriptive statistics

Table 1 presents the variables, their proxies and data sources. The explanatory variables (bank-specific, macroeconomic and digital systematic) have the same weight in the empirical study.

Table 1
VARIABLES' SUMMARY

Variables	Proxy	Symbol	Source
Dependent variable			
Return on equity	$\frac{\text{Net Income}}{\text{Share Holders'equity}}$	ROE	Authors' calculations; Commercial banks' official financial reports
Bank-specific variables			
Bank size	ln(Total Assets)	SIZE	Authors' calculations; Commercial banks' official financial reports
NPL ratio	$\frac{\text{Non} - \text{performing loans}}{\text{Total loans}}$	NPL	Authors' calculations; Commercial banks' official financial reports
Loan's growth rate	Growth rate of loans between two consecutive years	ROE	Authors' calculations; Commercial banks' official financial reports
Operation inefficiency	$\frac{\text{Operation expenses}}{\text{Operation revenue}}$	INEFF	Authors' calculations; Commercial banks' official financial reports
Macroeconomic variables			
Gross domestic product growth rate	Growth rate of GDP between two consecutive years	GDP	World Bank
Broad money growth rate	Growth rate of broad money supply between two consecutive years	BMG	World Bank
Digital systematic variables			
Bank accounts growth rate	Growth rate of the number of bank accounts between two consecutive years	ACCOUNT	World bank
Cashless payments	Cashless payments in a single year (in billion USD)	CP	Central banks' official reports; Cashless payments organisations' official reports
Credit cards growth rate	Growth rate of circulating credit cards between two consecutive years	CC	IMF Financial Access Survey
Percentage of the population with access to the internet	Yearly percentage of the population with access to the internet	INTERNET	World Bank
Mobile cellular subscriptions growth rate	Growth rate of mobile cellular subscriptions between two consecutive years	MOBILE	World Bank

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Table 2 presents a summary of the descriptive statistics:

Table 2 DESCRIPTIVE STATISTICS				
Variables	**Mean**	**Std. Deviation**	**Min**	**Max**
Return on equity	11.50%	6.64%	-3.56%	28.99%
Bank-specific variables				
Bank size	22.98	1.38	20.43	25.42
Loans' growth rate	12.92%	11.01%	-4.17%	51.74%
NPL ratio	7.47%	2.80%	3.11%	13.34%
Operation inefficiency	49.29%	7.78%	30.03%	61.26%
Macroeconomic variables				
GDP growth rate	3.05%	3.31%	-8.80%	11.40%
Broad money growth rate	12.48%	11.60%	-0.04%	60.34%
Digital systematic variables				
Bank accounts' growth rate	7.97%	5.42%	-6.37%	32.07%
Cashless payments	11.52	12.47	2.00	61.38
Credit cards' growth rate	7.12%	8.20%	-16.85%	35.65%
Percentage of the population with access to the internet	63.91%	24.83%	11.00%	100.00%
Cellular mobile subscriptions growth rate	1.62%	7.10%	-28.84%	24.39%

Table 3 presents the mean of each variable country-wise:

Table 3 COUNTRYWISE MEAN STATISTICS												
Country	***ROE***	***SIZE***	***LOAN***	***NPL***	***INEFF***	***GDP***	***BMG***	***ACCOUNT***	***CP***	***CC***	***INTERNET***	***MOBILE***
Morocco	7.14%	23.70	5.69%	8.55%	54.75%	2.21%	5.65%	5.46%	3.58	7.14%	73.26%	2.37%
Egypt	22.04%	24.10	21.51%	6.63%	55.29%	4.66%	21.29%	13.07%	9.32	9.24%	55.55%	1.15%
Jordan	7.87%	20.66	7.91%	5.76%	36.41%	1.73%	4.41%	4.15%	6.87	6.22%	68.88%	-3.47%
Tunisia	9.61%	21.55	10.22%	11.84%	51.07%	0.83%	8.95%	10.07%	4.93	11.80%	64.25%	1.43%
Turkey	10.20%	24.58	23.46%	4.81%	51.62%	4.95%	30.38%	10.11%	36.27	7.33%	70.50%	2.90%
UAE	8.15%	23.65	6.12%	6.71%	42.31%	2.73%	5.34%	4.78%	10.93	5.16%	96.75%	2.37%
Pakistan	15.50%	22.62	15.54%	7.98%	53.56%	4.23%	11.33%	8.16%	8.74	2.94%	18.21%	4.60%

Table 4 presents the standard deviation of each variable country-wise

Table 4 COUNTRY WISE STANDARD DEVIATION												
Country	***ROE***	***SIZE***	***LOAN***	***NPL***	***INEFF***	***GDP***	***BMG***	***ACCOUNT***	***CP***	***CC***	***INTERNET***	***MOBILE***
Morocco	2.65%	1.06	7.51%	5.90%	8.68%	4.20%	1.59%	2.53%	0.01	80.16%	2.06%	1.73%
Egypt	8.89%	1.43	27.32%	4.86%	11.02%	1.04%	8.07%	8.96%	0.06	352.52%	9.34%	3.49%
Jordan	3.75%	1.79	13.33%	2.86%	10.53%	1.29%	2.71%	3.84%	0.08	429.60%	2.28%	16.18%

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Tunisia	7.41 %	1.00	13.28 %	6.34 %	18.77 %	3.80 %	2.01 %	47.21%	0.03	124.46 %	1.71%	7.55%
Turkey	14.71 %	1.64	18.56 %	4.08 %	9.98 %	3.24 %	16.36 %	12.36%	0.02	1585.43 %	2.39%	3.93%
UAE	13.64 %	1.39	15.42 %	3.73 %	17.08 %	3.85 %	2.10 %	13.55%	0.05	562.38 %	5.62%	4.02%
Pakistan	5.94 %	0.67	18.67 %	5.18 %	12.53 %	2.48 %	2.39 %	6.79%	0.06	229.53 %	1.16%	7.37%

Table 5 presents the mean of each variable year-wise:

Table 5
YEAR WISE MEAN STATISTICS

Year	*ROE*	*SIZE*	*LOAN*	*NPL*	*INEFF*	*GDP*	*BMG*	*ACCOUNT*	*CP*	*CC*	*INTERNET*	*MOBILE*
2015	13.25 %	22.68	12.09 %	8.48 %	46.40 %	4.57%	10.20 %	6.20%	5.28	8.52%	49.00%	3.53%
2016	13.19 %	22.81	13.41 %	8.35 %	45.29 %	3.41%	13.02 %	6.39%	8.12	7.04%	52.29%	-1.33%
2017	11.89 %	22.82	16.68 %	7.62 %	50.01 %	3.71%	9.76%	10.23%	7.80	7.66%	57.49%	2.77%
2018	12.66 %	23.09	12.85 %	8.01 %	52.42 %	3.06%	7.91%	8.07%	9.26	8.93%	60.71%	-0.46%
2019	9.12%	22.85	8.49%	8.47 %	52.40 %	2.56%	11.41 %	9.56%	11.36	3.93%	66.86%	0.13%
2020	7.73%	23.03	7.05%	6.86 %	48.78 %	-1.53%	14.08 %	7.61%	13.25	11.90 %	71.57%	-0.30%
2021	10.33 %	23.21	17.41 %	6.31 %	49.38 %	5.12%	15.40 %	6.41%	17.51	5.27%	75.29%	4.80%
2022	13.85 %	23.33	15.39 %	5.67 %	49.62 %	3.45%	18.05 %	9.29%	19.59	3.69%	78.11%	3.82%

Table 6 presents the standard deviation of each variable year-wise:

Table 6
YEAR WISE STANDARD DEVIATION

Year	*ROE*	*SIZE*	*LOAN*	*NPL*	*INEFF*	*GDP*	*BMG*	*ACCOUNT*	*CP*	*CC*	*INTERNET*	*MOBILE*
2015	7.25 %	1.27	9.63%	3.33 %	8.99%	2.25 %	5.59%	3.21%	3.32	5.06%	23.93%	10.19%
2016	7.39 %	1.37	17.54 %	3.21 %	9.38%	2.20 %	12.83 %	2.11%	9.44	3.44%	23.57%	13.21%
2017	5.19 %	1.29	8.59%	2.55 %	8.84%	2.18 %	7.17%	5.40%	6.88	6.89%	24.43%	3.09%
2018	5.91 %	1.49	9.12%	2.14 %	8.97%	1.97 %	6.41%	5.27%	8.75	4.58%	25.24%	6.38%
2019	7.85 %	1.39	4.37%	2.92 %	7.21%	1.82 %	7.71%	10.79%	11.32	15.36 %	25.73%	5.80%
2020	7.31 %	1.54	8.30%	2.72 %	7.53%	4.23 %	10.38 %	3.16%	13.93	11.17 %	25.11%	6.03%
2021	3.88 %	1.58	14.83 %	2.58 %	7.08%	3.06 %	16.96 %	5.94%	17.63	4.40%	25.47%	2.97%
2022	8.10 %	1.69	11.65 %	2.71 %	3.98%	4.22 %	20.03 %	3.96%	19.15	8.20%	20.22%	3.14%

Figure 1 shows the evolution of the mean ROE throughout the MENAP region between 2015 and 2022:

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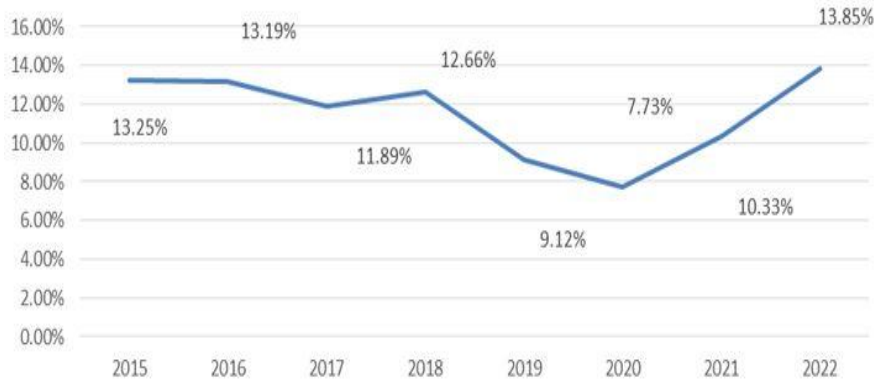

FIGURE 1
EVOLUTION OF COMMERCIAL BANKS' ROE IN THE MENAP REGION (2015-2022)

Figure 2 shows the evolution of the mean yearly ROE for each country between 2015 and 2022:

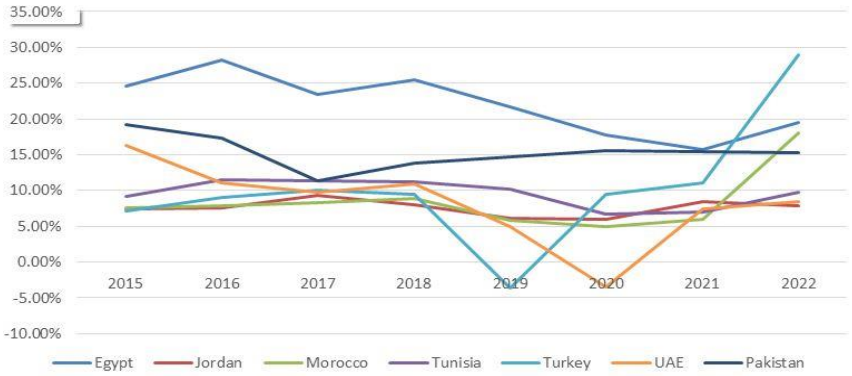

FIGURE 2
EVOLUTION OF MEAN ROE – BREAKDOWN BY COUNTRY (2015-2022)

The MENAP region's average ROE between 2015 and 2022 amounted to 11.50%. Egypt exhibits the highest average ROE amongst the MENAP countries (22.04%), whereas Morocco exhibits the lowest value (7.14%). The MENAP region's mean ROE decreased noticeably between 2019 and 2020. The same pattern can be observed in the loans and GDP growth rates, respectively. Incidentally, this marks the start of the COVID-19 pandemic's spread, the onset of the subsequent economic recession, and the rise in power of FinTech firms and digital solutions in banking and finance. This is supported by an overall increase in cashless payments (5.28 to 19.59 billion USD), bank accounts' growth rate (6.20% to 9.29%), and the percentage of the population with access to the internet (49% to 78.11%) throughout the sampled period. This could explain the subsequent increase in the ROE of the region, especially after the COVID-19 recession (from 7.73% by the end of 2020 to 13.85% by the end of 2022).

EMPIRICAL ANALYSIS

This section presents the empirical analysis in three subsections; the dataset and reliability analysis, the empirical models and the empirical results.

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Dataset and Reliability Analysis

The correlation and collinearity analysis consists of Pearson's pairwise correlation matrix, the statistical tolerance and the variance inflation factor[3] (VIF, henceforth). Cronbach's alpha[4] is used to assess the data reliability.

Table 7 shows Pearson's pairwise correlation matrix:

Table 7
PEARSON'S PAIRWISE CORRELATION MATRIX

	1	2	3	4	5	6	7	8	9	10	11	12
ROE	1.0000											
SIZE	0.2269	1.0000										
LOAN	0.5217	0.3149	1.0000									
NPL	-0.0324	-0.3322	-0.1739	1.0000								
INEFF	0.2064	0.4850	0.2255	0.2684	1.0000							
GDP	0.4392	0.2916	0.4154	-0.2476	0.1412	1.0000						
BMG	0.4713	0.5255	0.7313	-0.2866	0.2771	0.3301	1.0000					
ACCOUNT	0.3430	0.1898	0.1493	-0.0351	0.4261	0.1523	0.3081	1.0000				
CP	0.0809	0.5080	0.4943	-0.4577	0.0971	0.2749	0.8002	0.1985	1.0000			
CC	-0.0163	-0.0612	0.0434	0.1208	-0.0113	-0.1132	-0.0180	0.0386	-0.1355	1.0000		
INTERNET	-0.4438	0.2090	-0.2297	-0.2563	-0.3030	-0.1922	-0.0553	-0.1688	0.2271	0.0233	1.0000	
MOBILE	0.1026	0.2236	0.2080	-0.0666	0.1906	0.2493	0.1604	0.0459	0.1134	0.0029	-0.0594	1.0000

The numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 refers to ROE, SIZE, LOAN, NPL, INEFF, GDP, BMG, ACCOUNT, CP, CC, INTERNET and MOBILE respectively.

Table 8 below shows both the statistical tolerance and the VIF measures associated with each variable:

[3] The statistical tolerance and the VIF both provide a measure of collinearity between the independent variables.
[4] Cronbach's alpha is a statistic used to assess the reliability and internal consistency of a dataset.

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Table 8 STATISTICAL TOLERANCE AND THE VIF		
Variables	**Tolerance**	**VIF**
Bank size	0.356	2.810
Loans' growth rate	0.372	2.685
NPL ratio	0.546	1.831
Operation inefficiency	0.372	2.688
GDP growth rate	0.703	1.423
Broad money growth rate	0.169	5.921
Bank accounts' growth rate	0.703	1.423
Cashless payments	0.242	4.128
Credit cards' growth rate	0.916	1.091
Percentage of the population with access to the internet	0.562	1.780
Cellular mobile subscriptions growth rate	0.892	1.121

Table 9 shows the reliability of our data using Cronbach's alpha:

Table 9 RELIABILITY STATISTICS	
Variables	**Alpha**
Bank size	67.88
Loans' growth rate	67.28
NPL ratio	72.47
Operation inefficiency	70.51
GDP growth rate	68.91
Broad money growth rate	65.12
Bank accounts' growth rate	71.25
Cashless payments	67.44
Credit cards' growth rate	74.50
Percentage of the population with access to the internet	74.64
Cellular mobile subscriptions growth rate	72.12
Cronbach's Alpha	**72.36**

As shown in table 8, all of our variables' VIFs are lower than 10. Therefore, the data is within an acceptable range (Ringim et al., 2012). Moreover, table 9 shows a Cronbach's alpha of 72.36, which indicates good reliability and consistency of the former (Taber, 2018).
The presence of heteroscedasticity is tested using the White and Breusch-Pagan tests[5] under the null hypothesis that the variance of the errors does not depend on the values of the independent variables. For its part, the presence of serial autocorrelation will be tested by using the Wooldridge test[6] under the null hypothesis of no serial autocorrelation. Table 10 below presents the test results:

[5] The commands *imtest, white* and *hettest* on STATA test for heteroscedasticity using White's test and Breusch-Pagan's test, respectively.
[6] The command *xtserial* on STATA tests for serial autocorrelation, which uses Wooldridge's test for serial autocorrelation.

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Table 10 HETEROSCEDASTICITY AND SERIAL AUTOCORRELATION TESTS		
Tests	**P-value**	**Result**
White test	0.4371	No heteroscedasticity
Breusch-Pagan test	0.9791	
Wooldridge test	0.1114	No serial autocorrelation

As shown in table 10, White, Breusch-Pagan and Wooldridge's tests all show a p-value greater than 0.05. Therefore, we fail to reject the aforementioned null hypotheses and conclude the absence of both heteroscedasticity and serial autocorrelation within our dataset.

Econometric Models

In order to emphasise the potential significant effect of digital systematic variables on commercial bank performance, we run two regression models. The first one investigates the impact of bank-specific and macroeconomic variables on commercial bank performance. The second adds the digital systematic variables to the first one.

a) First model:

$$ROE_{it} = \alpha_i + \beta_0 ROE_{i(t-1)} + \sum_{j=1}^{J} \beta_j BANK\ SPECIF_{jit} + \sum_{k=J+1}^{J+K} \beta_k MACRO_{kit} + \mu_i + \varepsilon_{it}$$

b) Second model:

$$ROE_{it} = \alpha_i + \beta_0 ROE_{i(t-1)} + \sum_{j=1}^{J} \beta_j BANK\ SPECIF_{jit} + \sum_{k=J+1}^{J+K} \beta_k MACRO_{kit} + \sum_{l=J+K+1}^{J+K+L} \beta_l DIGITAL\ SYSTM_{lit} + \mu_i + \varepsilon_{it}$$

Where:

ROE_{it} denotes the model's dependent variable: the return on equity;
$ROE_{i(t-1)}$[7] denotes the lagged dependent variable;
J denotes the number of bank-specific variables. There are 4 such variables in this case;
K denotes the number of macroeconomic variables. There are 2 such variables in this case;
L denotes the number of digital systematic variables. There are 6 such variables in this case;
$BANK\ SPECIF_{jit}$ denotes a vector of bank-specific factors;
$MACRO_{kit}$ denotes a vector of macroeconomic factors;
$DIGITAL\ SYSTM_{lit}$ denotes a vector of digital systematic factors;
β denotes a vector's coefficients;
α_i denotes the constant term;
μ_{it} denotes the unobservable effects;
ε_{it} denotes the error term.

In order to further investigate this regression, we focus on two main approaches: the fixed-effects and random-effects.

Fixed-effects Models

$$ROE_{it} = \alpha_i + \beta_0 ROE_{i(t-1)} + \beta_1 SIZE + \beta_2 LOAN + \beta_3 NPL + \beta_4 INEFF + \beta_5 GDP + \beta_6 BMG + \mu_i$$

$$ROE_{it} = \alpha_i + \beta_0 ROE_{i(t-1)} + \beta_1 SIZE + \beta_2 LOAN + \beta_3 NPL + \beta_4 INEFF + \beta_5 GDP + \beta_6 BMG + \beta_7 ACCOUNT + \beta_8 CP + \beta_9 CC + \beta_{10} INTERNET + \beta_{11} MOBILE + \mu_i$$

[7] In fact, bank performance is not an end-of-period reset process but rather a continuous and cumulative one powered in particular by investments that benefit several periods of time.

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Where:

a) i and t are cross-section dimension and time indicators, respectively;
b) α_i denotes the unknown intercept term;
c) μ_i denotes the error term.

Random-effects Models

$$ROE_{it} = \alpha_i + \beta_0 ROE_{i(t-1)} + \beta_1 SIZE + \beta_2 LOAN + \beta_3 NPL + \beta_4 INEFF + \beta_5 GDP + \beta_6 BMG + \mu_i + \varepsilon_i$$

$$ROE_{it} = \alpha_i + \beta_0 ROE_{i(t-1)} + \beta_1 SIZE + \beta_2 LOAN + \beta_3 NPL + \beta_4 INEFF + \beta_5 GDP + \beta_6 BMG + \beta_7 ACCOUNT + \beta_8 CP + \beta_9 CC + \beta_{10} INTERNET + \beta_{11} MOBILE + \mu_i + \varepsilon_i$$

Where:

a) i and t are cross-section dimension and time indicators, respectively;
b) α_i denotes the unknown intercept term;
c) μ_{it} denotes the between-entity error;
d) ε_i denotes the within-entity error.

Empirical results summary

This subsection presents the results of both models.

First model

Table 11 shows the empirical results of the fixed-effects regression:

Table 11
FIRST MODEL, FIXED-EFFECTS RESULTS

Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]
lagROE	0.1188528 (0.0936046)	0.1239632 (0.0955747)	0.1346447 (0.0887845)	0.1361375 (0.0896087)	**0.1803689** (0.0811563)**	**0.1662483** (0.0771923)**	**0.1407606** (0.756539)***
SIZE		0.0067676 (0.0191858)	0.0028138 (0.0178589)	0.0061022 (0.0193538)	0.0136438 (0.0174479)	0.0198794 (0.0167461)	0.0087584 (0.0170975)
LOAN			**0.1951007** (0.0666986)*	**0.1932203** (0.0673961)*	**0.170925** (0.0606292)*	**0.1298301** (0.0599368)**	0.0546706 (0.0688982)
NPL				0.1612635 (0.3471098)	0.3853281 (0.3170688)	0.4654002 (0.302525)	0.4283599 (0.2928953)
INEFF					**-0.4716913** (0.1348929)*	**-0.4643592** (0.1279761)*	**-0.4241457** (0.1252599)*
GDP						**0.426252** (0.1753091)**	**0.4383** (0.1694994)**
BMG							**0.1718766** (0.0853474)**
Constant	**0.1023149** (0.0116929)*	-0.0537425 (0.4425743)	0.0107599 (0.4113748)	-0.0767669 (0.4556941)	-0.0361622 (0.4078321)	-0.1952121 (0.3923047)	0.033904 (0.3957726)
F-stat	1.61	0.85	3.51	2.64	5.09	5.70	5.81
Prob > F	0.2103	0.4324	0.0224	0.0457	0.0009	0.0002	0.0001
R-squared	31.19%	27.21%	44.21%	43.99%	19.99%	26.81%	30.24%

Notes: Table 11 presents the fixed-effects regression results of the relationship between the ROE and the explanatory variables. The coefficients are displayed with their respective standard deviation between brackets. The bold coefficients denote the statistically significant values. Asterisks indicate significance at the following risk errors: 1 percent (*), 5 percent (**) and 10 percent (***) level.

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Table 12 shows the empirical results of the random-effects regression:

Table 12 FIRST MODEL, RANDOM-EFFECTS RESULTS							
Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]
lagROE	0.334974* (0.0887228)	0.2943043* (0.0898698)	0.2851345* (0.080631)	0.3684501* (0.077999)	0.3919683* (0.081081)	0.3688613* (0.0801844)	0.3664006* (0.794721)
SIZE		0.0074783 (0.0070504)	0.0014753 (0.0062779)	0.0017011 (0.0052973)	0.0058177 (0.0065875)	0.0047461 (0.0064609)	0.0015839 (0.006799)
LOAN			0.2415986* (0.0644209)	0.2629795* (0.0636507)	0.2707176* (0.0640138)	0.2306597* (0.066192)	0.1464741 (0.0895397)
NPL				0.3065103 (0.2504324)	0.4834003 (0.301677)	0.5489751*** (0.2968149)	0.5967079** (0.296128)
INEFF					-0.1248007 (0.1189325)	-0.1268061 (0.116786)	-0.1299442 (0.11514)
GDP						0.4103321*** (0.2224323)	0.4322809** (0.2209732)
BMG							0.1257694 (0.0910655)
Constant	0.0792274* (0.0131616)	-0.0882715 (0.1613485)	0.0194316 (0.141895)	-0.0203147 (0.1261553)	-0.0701237 (0.1346728)	-0.0542665 (0.1318292)	0.011159 (0.13895)
Wald chi2	14.25	12.97	31.96	51.30	52.50	58.43	61.42
Prob > chi2	0.0002	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	31.19%	31.91%	48.29%	50.15%	51.22%	54.39%	56.13%

Notes: Table 12 presents the random-effects GLS regression results of the relationship between the ROE and the explanatory variables. The coefficients are displayed with their respective standard deviation between brackets. The bold coefficients denote the statistically significant values. Asterisks indicate significance at the following risk errors: 1 percent (*), 5 percent (**) and 10 percent (***) level.

Second model

Table 13 shows the empirical results of the fixed-effects model:

Table 13 SECOND MODEL, FIXED-EFFECTS RESULTS						
Variables	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**
lagROE	0.1407606*** (0.0756539)	0.1375817*** (0.0747742)	0.1518372*** (0.0826434)	0.1579029*** (0.0838351)	0.1801277** (0.0857119)	0.1810926** (0.086784)
SIZE	0.0087584 (0.0170975)	0.0146218 (0.0173847)	0.0111091 (0.0194083)	0.0097089 (0.0196837)	0.0159213 (0.0203376)	0.0163443 (0.0206201)
LOAN	0.0546706 (0.0688982)	0.0795476 (0.0702682)	0.0844214 (0.0719011	0.0898146 (0.0729595)	0.089408 (0.0726653)	0.0919706 (0.0739408)

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NPL	0.4283599 (0.2928953)	0.5463467*** (0.3009649)	0.5583342*** (0.3053231)	0.5468698*** (0.3082036)	0.365837 (0.3451079)	0.3489292 (0.3529607)
INEFF	-0.4241457* (0.1252599)	-0.4736003* (0.128519)	-0.4986952* (0.1426163)	-0.5115048* (0.1451502)	-0.4774421* (0.1475778)	-0.4748064* (0.1482522)
GDP	0.4383* (0.1694994)	0.4231222** (0.1677923)	0.4115117** (0.1716812)	0.3974535** (0.1744397)	0.3559159*** (0.1774633)	0.366265*** (0.1822959)
BMG	0.1718766*** (0.0853474)	0.1519682*** (0.0854663)	0.1060755 (0.1382394)	0.1000747 (0.139626)	0.0612466 (0.1431168)	0.0641977 (0.1451003)
ACCOUNT		0.1670411 (0.1171753)	0.1528995 (0.1229507)	0.1491626 (0.1240355)	0.1293641 (0.1247323)	0.1292086 (0.1262217)
CP			0.0006311 (0.0014847)	0.0006063 (0.0014966)	0.0014781 (0.0016729)	0.001432 (0.0016962)
CC				-0.0408638 (0.0650922)	-0.03900013 (0.0648492)	-0.0379531 (0.0656999)
INTERNET					-0.0819814 (0.0714259)	-0.0817627 (0.0722813)
MOBILE						-0.251424 (0.0761472)
Constant	0.033904 (0.3957726)	-0.0985109 (0.4018786)	-0.0085349 (0.4578277)	0.034133 (0.4663147)	-0.0642976 (0.4722798)	-0.0745644 (0.4789263)
F-stat	5.81	5.46	4.78	4.28	4.04	3.62
Prob > F	0.0001	0.0001	0.0002	0.0005	0.0006	0.0013
R-squared	30.24%	36.03%	28.93%	27.89%	40.15%	40.40%

Notes: Table 13 presents the fixed-effects regression results of the relationship between the ROE and the explanatory variables. The coefficients are displayed with their respective standard deviation between brackets. The bold coefficients denote the statistically significant values. Asterisks indicate significance at the following risk errors: 1 percent (*), 5 percent (**) and 10 percent (***) level.

Table 14 shows the empirical results of the random-effects model:

Table 14
SECOND MODEL, RANDOM-EFFECTS RESULTS

Variables	[1]	[2]	[3]	[4]	[5]	[6]
lagROE	0.3664006* (0.794721)	0.3476291* (0.0783861)	0.2106218** (0.0846329)	0.2084836** (0.843888)	0.1901576** (0.0819248)	0.1892179** (0.0826897)
SIZE	0.0015839 (0.006799)	0.0044168 (0.0068306)	0.0065552 (0.0063207)	0.0069898 (0.0063125)	0.0126773*** (0.0066803)	0.012893*** (0.0067566)
LOAN	0.1464741 (0.0895397)	0.177544** (0.0892191)	0.1243611 (0.0838469)	0.1330701 (0.0839353)	0.1106753 (0.0817253)	0.1137299 (0.0827255)
NPL	0.4834003 (0.301677)	0.6734646** (0.29261)	0.3246202 (0.2918423)	0.3438618 (0.2914209)	0.3559218 (0.2813244)	0.3517014 (0.2840114)
INEFF	-0.1248007 (0.1189325)	-0.2178546*** (0.1227208)	-0.2200466*** (0.1128793)	-0.2322563** (0.1130381)	-0.314454* (0.116063)	-0.3094039* (0.1176154)
GDP	0.4322809** (0.2209732)	0.406789*** (0.2164755)	0.4697934** (0.200152)	0.4425291** (0.2009642)	0.36041*** (0.1979538)	0.3752555*** (0.2022843)
BMG	0.1257694 (0.0910655)	0.0780363 (0.2164755)	0.3611973* (0.1252692)	0.3709547* (0.125172)	0.325827* (0.1227502)	0.3248164* (0.1238782)
ACCOUNT		0.2461916*** (0.1369653)	0.2586356** (0.1260433)	0.2714387** (0.1261532)	0.2746839** (0.1217666)	0.2719251** (0.1230102)
CP			-0.0031344* (0.001014)	-0.0033077* (0.0010223)	-0.0027924* (0.0010174)	-0.0028011* (0.0010268)

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CC				-0.0818209 (0.0720504)	-0.065531 (0.0699808)	-0.0645956 (0.0706417)
INTERNET					-0.0616167** (0.0296846)	-0.0616043** (0.0299528)
MOBILE						-0.0383773 (0.0826435)
Constant	0.011159 (0.13895)	-0.0312441 (0.1378627)	-0.0338758 (0.1268073)	-0.0337685 (0.12641)	-0.0798367 (0.1240066)	-0.0867181 (0.1260014)
Wald chi2	61.42	79.69	89.35	91.2	102.21	100.6
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	56.13%	62.90%	66.01%	66.96%	69.91%	70.06%

Notes: Table 14 presents the random-effects GLS regression results of the relationship between the ROE and the explanatory variables. The coefficients are displayed with their respective standard deviation between brackets. The bold coefficients denote the statistically significant values. Asterisks indicate significance at the following risk errors: 1 percent (*), 5 percent (**) and 10 percent (***) level.

Retained Model

We use Hausman's test[8] (Hausman, 1978) under the null hypothesis that the random-effects model is most appropriate for this empirical study. Our result shows a p-value of 0.6985. Therefore, we fail to reject the null hypothesis, and conclude that the random-effects regression is the most appropriate empirical approach. We rely on it for results interpretation in the next section.

DISCUSSION OF THE RESULTS

According to the results, the consideration of the digital systematic factors significantly improves the explanatory power of the model.

The improvement of the R-squared for the second model could be explained by an implicit COVID-19 effect. During the subsequent economic recession in 2020, digitalisation gained a significant importance in the financial landscape. This is especially true for banking services due to the rise in power of FinTech firms and digital financial solutions.

The following subsections elaborate on the statistically significant results per variable type: bank-specific, macroeconomic, and digital systematic variables.

The impact of Bank-specific Variables

The lagged dependent ROE has a positive impact on commercial bank performance. It is statistically significant at the 5% risk error level. As mentioned in the previous section, this result means that a change in commercial bank performance during one year affects next year's performance to a degree of 18.92%.

Our research shows that bank size is statistically significant at the 10% risk error level, and has a positive impact on commercial bank performance. This finding is congruent with many authors' research (Bonin et al., 2005; Athanasoglou et al., 2006; Jara-Bertin et al., 2014; Menicucci & Paolucci, 2016; Bahyaoui, 2017; Chouikh & Blagui, 2017; Elouali & Oubdi, 2018; Almoneef & Samontaray, 2019; Akoi & Andrea, 2020; Jreisat & Bawazir, 2021). This would suggest that large-sized commercial banks outperform smaller ones within the MENA region. The former has better access to the market, as well as the ability to

[8] On STATA, we use the *xtreg* command twice with the fixed-effects option, *fe*. Then we use the *estimates store fixed* command to store the results. We do the same thing for the random-effects model by using *xtreg* again with the *re* option, followed by the *estimates store random* command. After storing each iteration, we run the command *hausman fixed random* to test under the null hypothesis that the random-effects model is the most appropriate choice.

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leverage economies of scale. This result is observed in all of the sampled countries, except Jordan.

The literature overwhelmingly suggests that operation inefficiency has a negative impact on commercial bank performance. Our research confirms this assertion (Pasiouras & Kosmidou, 2007; Bahyaoui, 2017; Otero et al., 2020; Isnurhadi et al., 2021). It is statistically significant at the 1% risk error level. Higher operation inefficiency suggests that a bank's operation income is not sufficient to cover its operation expenses. It is evident that more operation inefficiency results in poor performance. This result is observed in all of the sampled countries, except Jordan.

The Impact of Macroeconomic Variables

The GDP growth rate has a positive impact on bank performance (Sufian & Habibullah, 2009; Jara-Bertin et al., 2014; Caporale et al., 2015; Chen & Lu, 2020; Jreisat & Bawazir, 2021). It is statistically significant at the 10% risk error level. GDP is always used as a metric that indicates the status of an economy's business cycle. The obtained result could be explained by the consequences of a positive GDP growth rate: economic agents tend to perform better during periods of economic expansion and growth in comparison to times of economic abysses. This result is observed in Morocco, Jordan, Tunisia and the UAE.

Lastly, the broad money growth rate has a positive impact on commercial bank performance (Ifionu & Akinpelumi, 2015; Suoyai et al., 2018). It is statistically significant at the 1% risk error level. An increase in broad money usually results in higher interest rates. The latter incentivises bank customers to increase their savings. As a result, commercial banks accumulate more funds that they can use for investments. This result is observed in Turkey.

The Impact of Digital Systematic Variables

Cashless payments have a negative impact on commercial bank performance. They are statistically significant at the 5% risk error level. However, its coefficient of -0.0028 is quite low[9]. While a few authors have affirmed that cashless payments are beneficial to commercial bank performance (Mohammed et al., 2022), our research shows the opposite (Lu et al., 2022). This result has three possible explanations: the low financial and digital literacy and inclusion of the population in the MENAP region. This causes resistance to the shift from using only fiat money to adopting digital means of payment. Another explanation could be the lack of sufficient technological infrastructures to support cashless payment channels. This result is observed in Jordan, the UAE and Pakistan.

The bank accounts' growth rate has a positive impact on commercial bank performance (Shihadeh, 2021). It is statistically significant at the 5% risk error level. Bank accounts are the underlying vehicle through which banks offer their services to their customers. When more bank accounts are created, banks can reach and offer their services to a larger customer base. A higher bank accounts' growth rate suggests more financial inclusion and a potentially higher usage rate of banking services. This result is observed in the UAE.

The percentage of the population with access to the internet has a negative impact on commercial bank performance. It is significant at the 5% risk error level with a low coefficient of -0.0616[9]. This is observed in Turkey, Tunisia, Egypt and Pakistan. This could be explained by the digital paradox within the MENAP region (Cusolito et al., 2022) : the region's access to the internet is high compared to what would be expected based on the GDP

[9] The low yet statistically significant coefficients could be explained by the presence of two countries with contrasted levels of development within our sample, i.e. the UAE and Pakistan.

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levels of its countries. However, the usage of the internet to access financial or banking services is relatively lower. Previous research shows that the percentage of the population with access to the internet has a positive impact on commercial bank performance (Malhotra & Singh, 2009; Tunay et al., 2015). However, it is true only when the bank's digital services are frequently used. On the one hand, banks undertake significant investments to set up the proper infrastructure to offer banking services on the internet. On the other hand, browsing and accessing such services is free of charge. Therefore, MENAP commercial banks currently do not benefit from a higher percentage of the population with access to the internet.

CONCLUSION

The topic of determinants of commercial bank performance is of great importance and has gained considerable academic interest. However, there is a noticeable lack of research on emerging markets, such as the MENAP countries. This paper aims to bridge this gap by studying the determinants of the commercial bank performance of 56 banks across 7 MENAP countries between 2015 and 2022.

Using a panel data analysis and a random-effects model, this paper documents that bank size, operation inefficiency, GDP growth rate, broad money growth rate, bank accounts growth rate, cashless payments, and the percentage of the population with access to the internet are the main determinants of commercial bank performance in the MENAP region.

We conclude that commercial bank performance in the MENAP hinges mainly on digital and macroeconomic factors. The impact of the last-mentioned cannot be completely mitigated by banks' strategies and management. However, digital services can be adequately marketed to increase the digital and financial literacy of the clientele. Our findings hint at the fact that improving the MENAP region's financial and digital literacy and inclusion could improve the accessibility and adoption of digital banking services. It is a critical research opportunity that could further complement the obtained results.

Our findings provide new evidence that complements previous researchers' endeavours. Indeed, banking professionals and policymakers will benefit from recent and up-to-date research that could assist their decision-making and strategising processes. In particular, professionals could direct their strategic endeavours towards optimising the main performance determinants. This includes the adequate management of the bank's assets, marketing of its services and devising strategies to increase the return on investment of cashless payment channels and infrastructures.

This research sheds new light on the impact of digitalisation in the banking sector of the MENAP. It is a crucial topic to banks that warrants further research and interest. If the current literature on digitalisation and banking performance is expected to be enriched by this paper's findings, it is important to undertake more research on the impact of digital driven factors on bank performance especially through considering data from more countries and over larger periods of time.

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