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ADAPTING BANK PERFORMANCE TO THE COVID-19 SHOCK: A STUDY OF IRAQI BANKS LISTED ON THE REGULAR STOCK EXCHANGE

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Abstract
The study aims to analyze the impact of the COVID-19 pandemic on the financial performance and banking risks of Iraqi banks listed on the Iraq Stock Exchange during the period 2017-2022. The results showed that non-interest income had a positive effect on ROA and return on equity ROE during the adaptation period, while the cost-to-income ratio and bank size were significant negative factors. Additionally, larger banks were found to be more exposed to risks during the shock period. The findings highlight the importance of diversifying income sources and controlling operating costs to improve financial performance and reduce banking risks in the face of economic crises.

Keyword: bank performance, Risk,COVID19, Shock & adaptation period, Iraqi Stock Exchange.

Introduction

Epidemics are considered one of the crises facing the world that affect its survival and development in various fields. Therefore, governments are striving to limit its spread. Therefore, in order to stop the spread of Coronavirus (COVID-19), governments have implemented various measures such as social distancing, national quarantine, and closure of non-essential businesses. This had a significant impact on many areas, including the economy including financial market (Demirgüç-Kunt et al., 2021a), resulting in a sudden drop in companies' revenues, forcing them to look for additional funds to cover operating expenses. Banks, as vital players in the financial sector, were expected to provide the necessary financing during this crisis. To keep pace with these sudden changes and in response to these unprecedented circumstances, central banks and governments have introduced various policy interventions. Some measures are aimed at relieving immediate financial pressures, while

others have focused on facilitating businesses' access to credit through initiatives such as government-sponsored lines of credit and liability guarantees. In addition, during this period, there was an increase in demand for banking services that was consistent with the crisis situation. Electronic services have witnessed tremendous development, in addition to an increase in demand for non-traditional services that generate returns other than banking interest, such as ATMs, money transfers, and electronic shopping. Although these measures were intended to support the real economy, they also pose potential challenges to the banking sector's future resilience.

Due to the nature of the spread of the epidemic globally and most countries, whether developing or developed, taking the same preventive measures, banks in Iraq, like other countries in the world, were subjected to an economic shock and great pressure in order to maintain the continuity of their operations, given their vital role as a basic pillar in supporting... National economy. In order to provide effective solutions and develop an appropriate vaccine framework that contributes to reducing future risks, it is necessary to understand the strengths and weaknesses of the banking sector's performance during this crisis.

This study aims to explore the impact of the Covid-19 pandemic on the performance of banks and the resulting risks, by analyzing the data of 13 banks, whether traditional or Islamic, listed on the Iraq Stock Exchange. The study covers bank data over a period extending from 2017 to 2022, where each period is studied for an average of two years, with the aim of better understanding the challenges facing the banking sector during this critical period of time.

Literature review and hypotheses development

The COVID-19 pandemic is one of the world's most pressing problems, as lockdown measures bring life to a standstill across societies, with serious impacts. This challenge affects the social and financial sectors around the world, as the economic slowdown caused by the COVID-19 pandemic puts banks' profitability at risk, reduces their income, and results in an increase in debtor defaults. In light of these difficult circumstances, international institutions and banks are forced to reduce their growth expectations (Noor & Al-Dulaimi, 2022). Our paper addresses the rapidly emerging literature on the impacts of COVID-19 on the performance and risks of Iraqi banks. Rising incidence and disease severity have increased fear, anxiety, and uncertainty worldwide, causing a sharp rise in risk aversion and uncertainty (Nguyen et al., 2020). In this paper, we study the behavior of banks during periods of high pandemic risk, contributing to the emerging literature on the effects of the COVID-19 shock on the banking sector (Acharya & Steffen, 2020 ; Li et al., 2020 ; Fakhri & Darmawan, 2021). Recent research suggests a large, positive initial shock to demand for US bank loans in the early weeks of the pandemic (Chakraborty et al., 2020 ;Greenwald et al., 2020). As a result, companies have drawn down their bank credit lines and increased their cash levels due to the significant rise in uncertainty and risk (Acharya & Steffen, 2020).

Many researchers have also studied the impact of the Covid-19 pandemic on banks in different ways. For example, Colak and Oztekin (2021) study the impact of the pandemic on international bank lending, where they find that bank and country characteristics can amplify or weaken the impact of the outbreak on bank credit. Shabir et al. (2023) investigate how

European banks adjusted lending at the beginning of the pandemic depending on their domestic exposure to the COVID-19 outbreak and their capitalization. Duan et al. (2021) explored the impact of the pandemic on banks' systemic risk and found that the pandemic increased systemic risk across countries. E-Nahhas et al. (2021) examined the impact of COVID-19 on banking stability. Berger & Demirgüç-Kunt, (2021) investigated the performance of relationship clients compared to other borrowers during the COVID-19 crisis and found stricter loan contract terms for borrowers. Demircuc-Kunt et al. (2021) find negative effects of the pandemic on bank stock returns. (Beck et al., 2021) show that banks more geographically exposed to the pandemic saw increased loan loss provisions and more nonperforming loans. Despite this, there have been relatively few studies looking at the detailed impact of COVID-19 on banking sector performance and stability from a global perspective. This study fills this gap by analyzing the impact of the COVID-19 outbreak on financial performance across different financial performance indicators (i.e., accounting-based and market-based performance measures), bank stability, and risk measures. This study helps understand the mechanism of the emergency's impact on the banking sector and determines the impact of the pandemic on different banking business models, such as conventional and Islamic banks. The study also investigates various bank-specific factors, such as bank size, liquidity, capital, and non-interest returns represented by the bank's non-traditional businesses such as fees, electronic banking, etc., to better understand the drivers and heterogeneity of banks' risk-taking patterns. The Iraqi banking system consists of 77 banks, including 18 private banks with internal and external support, 7 state banks, 24 commercial banks, and 11 banks based on Islamic banking. These challenging conditions are considered very pivotal, as the Iraqi banking system is under enormous pressure to maintain the sustainability of its operations, given its critical importance as a fundamental pillar in supporting the national economy (Saleem Falih et al., 2021).

Even with regulatory attempts to rescue banks, we assume that bank stability is likely to be negatively affected during the pandemic, given banks' higher risk appetite and lower financial performance. Many previous studies have suggested that "bailout expectations" encourage risk-taking X. Li et al. (2021), and create moral hazard at the bank level (Demir & Danisman, 2021) and at the bank level. Systemic level. According to Wu et al. (2020), rescued banks exhibit excessive levels of risk, as their managers have additional guarantees in the event of their failure.

In a rapidly changing environment, it is difficult to estimate the extent to which these measures will affect bank stability, but it is clear that they entail a sharp contraction in financial performance and increased banking risks (Kanno, 2021; Heyden & Heyden, 2021; Demirgüç-Kunt et al., 2021b). Based on the above considerations, we expect that the chaos resulting from the Corona pandemic will reduce the bank's financial performance and increase risks. This leads to our main study hypothesis, as shown in the alternative images:

H01: The COVID-19 pandemic is characterized by lower financial performance of banks and higher risks.

Data

Data were extracted from the annual banking reports of 20 Islamic and commercial banks listed on the Iraqi regulated stock market. The period studied covers from 2017 to 2022, which was divided into two years for each period, meaning two years before the start of the pandemic, approximately two years during the pandemic period, and two years after it. The annual system was relied upon to analyze the impact of the pandemic on the final budget. The studied sample represents 100% of the total number of banks listed in the regulated market. The research aims to analyze the economic and financial impact of the Covid-19 pandemic on banking performance, by studying the impact of the pandemic on the final budget of banks during the specified period.

This study represents a structured and systematic attempt to understand and analyze the impact of the pandemic on the banking sector in Iraq, and to provide comprehensive insights into how the crisis has affected banks' balance sheets and their overall performance. The results based on evidence-based data are expected to contribute to guiding policies and decision-making to enhance the resilience of the banking system and enhance its stability in the face of future economic challenges.

Methodology

The study examines the impact of the COVID-19 pandemic on banking performance and risks extending from 2017 to 2022. Its methodology includes analysis of various dependent and independent variables to measure this impact, along with other determinants such as non-interest returns(NON_intR) and Size. Control variables, such as cost-to-income (CI) are also taken into account to improve the relationship between the independent and dependent variables.

In this study, we follow the methodology of Elnahass et al. (2021), Çolak & Öztekin (2021) by and Shabir et al. (2023) using an interval time variable to identify periods before and after COVID-19. The COVID-19 period is defined as one year including 2019 we called shock period and one year 2020 it called adaptation period, and a value of zero is given for the other periods.

The dependent variables include bank performance measures such as return on assets (ROA), annualized return per share (SR), and bank risk measured by Z-score. In addition, ROE to Total Assets (ETA) evaluates the efficiency of capital use.

The independent variables include the coronavirus, which is known to affect banking performance and risk, non-interest income, and measures that reflect financial activity such as deposit volume and loan growth.

Control variables include cost-to-income (CI) ratio , Non-performing loans/ Total loans NPL ratio, and deposit, which provide insights into cost effectiveness and capital structure. Through this multi-faceted analysis, the study aims to deepen understanding of how the COVID-19 pandemic is impacting banking performance and risk profiles, and guiding strategic financial decision-making and policy formulation.

Table 1 Variable descriptions

Variable	Definition	Source
COVID19 1	Shock period 2019 use dummy 1 other 0	(Shabir et al., 2023)
COVID19 2	Adaptation period 2020 dummy 1 other 0	
NON-INTERST SHARE	Non-interest income/Total Revenues . include fees related to money transfers, ATMs, and electronic banking activities	(Dzingirai & Dzingirai, 2023)
SIZE	Log(total assets)	(Mkhaiber & Werner, 2021)
LOANGROWTH	Loan growth in the years	(S. W. Wu et al., 2022)
DEPOSIT SHARE	Deposit /Assets	(Baldwin & Alhalboni, 2023)
ROA	Return to Assets	(Kurdi et al., 2019)
ROE	Return to equity	(X. Li et al., 2021)
ETA	Equity to Assets	(Forte & Lovreta, 2023)
Z-SCORE	Bank risk = (ROA + ETA)/SDROA , SDROA = ROA standard deviation	(Abdelsalam et al., 2022)
NPL	Non-performing loans/ Total loans	(Shahriar et al., 2023)
LR	Liquidity Ratio	(Ardekani et al., 2020)
CI	Cost to income	(Kurdi et al., 2019)

Descriptive statistics

Table 2 provided a descriptive analysis of the key variables of banks during the 2019 (COVID1) shock period, which helps in understanding the financial performance and banking risks during that period. The ROA appears at 0.0053 with a median of 0.0055, indicating that banks achieved poor returns on their assets, with limited variation in performance between banks. Similarly, ROE shows a mean of 0.0127, reflecting moderate profitability with high variation across banks. ROE ranges between -0.0063 and 0.0357, which indicates a significant difference in how banks achieve ROE. SR with an average of 4.3112 reflects a wide variation among banks, with some banks appearing to achieve very high returns. Regarding (NON_intro), the average of 0.6514 shows banks' dependence on diverse sources of income, which contributes to the variation in financial performance. The Z_score, with an average of 7.4850, indicates variation in the level of risk among banks, as some banks face much greater financial risks than others. (Loangrowth) with an average of 0.2223 reflects variation in lending strategies, while CI with an average of 0.8271 indicates variation in operational efficiency between banks. The SIZE with a mean of 27.0316 reflects a large variation in asset size, reflecting large differences between the banks included in the study. Overall, the descriptive analysis shows that there was significant variation in financial performance, risks and operational efficiency among banks during the 2019 shock period, reflecting the diversity in management strategies, operational practices and financial risks faced by these banks.

Table 2 Descriptive statistics for 2019 shock period

VARIABLE	Mean	p50	min	max	sd	skewness	kurtosis
ROA	0.0053	0.0055	-0.0034	0.0146	0.0055	0.3827	2.2767
ROE	0.0127	0.0108	-0.0068	0.0357	0.0129	0.3210	1.9481
SR	4.7312	5.0990	1.7321	7.3485	1.6075	-0.1535	2.2583
NON_intro	0.6514	0.6624	0.0960	1.3708	0.3359	0.0961	3.2114
ETA	0.7021	0.7400	0.4378	0.8600	0.1278	-0.9110	2.7016
Z_score	8.5481	7.4875	4.8804	16.2001	3.3371	1.0252	3.0422
Loangrowth	0.2245	-0.0321	-0.3686	1.6654	0.6057	1.3806	3.6849
CI	0.8271	0.8166	0.5384	1.1662	0.1777	0.4179	2.5553
LR	0.6098	0.6719	0.0951	0.9583	0.2439	-0.5453	2.6152
SIZE	27.0316	26.9793	26.0255	28.0101	0.4986	0.1746	3.3024
DepoR	0.3107	0.2545	0.0304	0.7839	0.2251	1.1961	3.4281
NPL	0.4610	0.3117	0.0000	1.9965	0.5548	1.7945	5.5267

Table 3 provided a descriptive analysis of the key variables of banks during the 2020 (COVID2) Adaptation period, which helps in understanding the financial performance and banking risks during that period. The average ROA appears at 0.011 with a median of 0.0026, indicating an improvement in returns compared to the 2019 shock period, where the median was 0.0053. This improvement appears through increased returns and a significant variation between banks as shown by the standard deviation of 0.017, while the high skewness indicates the presence of some banks that achieved significantly higher returns. Similarly, ROE shows a mean of 0.027 with a median of 0.0018, reflecting an improvement in profitability compared to the shock period, where the median was 0.0127. Despite this improvement, variation remains large across banks, with ROE ranging between 0 and 0.1152, indicating significant variation in how banks achieve returns on equity. A standard deviation of 0.0374 reflects variation in performance, and skewness and kurtosis indicate some significantly high values. The average annualized SR of 5.1573 reflects wide variation across banks, an improvement over the shock period where the average was 4.3112. The median of 1,899 reflects wide variation in annual returns, with some banks showing very high returns. The standard deviation of 1.3612 reflects a high variance in the stock's annual returns, while the skewness and kurtosis indicate some significantly high values. Regarding, NON_intro, the average of 0.7376 shows that banks continued to rely on diversified sources of income during the Adaptation period, which is an improvement over the shock period where the average was 0.6514. Skewness and kurtosis reflect that some banks earn high levels of non-interest income, which contributes to variation in financial performance. Z_score with a mean of 8.0197 indicates variation in the level of risk between banks, which is a slight decrease from the shock period when the mean was 7.4850. The standard deviation of 3.504 and high kurtosis reflect that some banks face much greater financial risk than others, indicating variation in risk management strategies. Loangrowth shows an average of 0.1042, reflecting variation in lending strategies among banks, a decline from the shock period when the average was 0.2223. The standard deviation of 0.3364 and kurtosis reflect that some banks are growing faster than others, indicating variation in credit policies. CIR with an average of 0.9452 indicates variation in operational efficiency across banks, which is an increase from

the shock period where the average was 0.8271, indicating a slight deterioration in operational efficiency. SIZE with a mean of 27.0869 reflects a large variation in asset size among banks, which is almost similar to the shock period where the mean was 27.0316. The large standard deviation and kurtosis reflect large differences in the size of the banks studied. NPL ratio with an average of 0.4293 reflects the variation in asset quality among banks, which is a slight decrease from the shock period when the average was 0.461, indicating a slight improvement in loan quality. Overall, the descriptive analysis shows that there was a significant improvement in financial performance, risk and operational efficiency among banks during the 2020 Adaptation period compared to the 2019 shock period, which reflects banks' rapid adaptation to the new situation and adoption of new strategies to deal with the crisis.

Table 3 Descriptive statistics for 2020 adaptation period

variable	Mean	p50	min	max	sd	skewness	kurtosis
ROA	0.0110	0.0026	0.0000	0.0575	0.0170	1.8164	5.3190
ROE	0.0272	0.0048	0.0000	0.1152	0.0374	1.2126	3.2298
SR	5.1573	4.8990	3.4641	7.4162	1.3612	0.3536	1.6585
NON_intro	0.7376	0.8211	0.1223	1.2665	0.3410	-0.5392	2.3582
ETA	0.6961	0.7332	0.4428	0.8844	0.1381	-0.5155	2.2533
Z_score	8.5929	7.3687	4.4927	16.2001	3.5001	0.8391	2.6459
Loangrowth	0.1024	-0.0350	-0.5288	0.8797	0.4454	0.5450	1.9354
CIR	0.7452	0.7361	0.2390	0.9957	0.2216	-0.7641	2.9812
LR	0.6024	0.6413	0.1430	0.9353	0.2363	-0.3562	2.3349
SIZE	27.0869	26.9592	25.9746	27.9817	0.5432	-0.1474	2.8173
DepoR	0.3637	0.3432	0.1149	0.7026	0.1757	0.5287	2.4833
NPL	0.4293	0.2595	0.0000	1.9965	0.5427	2.0269	6.4661

Table 4 provides a descriptive analysis of a set of basic variables used in the study, for years 2017-2022 which contributes to understanding the financial performance and banking risks of the banks included in the sample. ROA is at 0.0075, which indicates that banks achieve a relatively weak return on their assets, with a large variation among banks in this regard. the scale. Similarly, the average ROE stands at 0.021901, reflecting moderate profitability and high variation in performance across banks. The average SR 3,057701 shows a large variation, indicating a non-normal distribution of returns. Regarding NON_intro, the average of 0.701781 indicates that banks rely on diverse sources of income. The return on equity to total assets ETA of 0.696661 shows variation in how banks use capital. Z_score with an average of 8.365266 indicates the variation in the level of risk among banks. Loan growth with an average of 0.218516 reflects variation in lending strategies, while a cost-income ratio CI with an average of 0.816383 indicates variation in operational efficiency. SIZE with a mean of 28.08817 reflects significant variation in asset size among banks. The average Deposit Ratio (DepoR) of 0.508367 reflects variation in deposit size, while NPL ratio of 0.441021 reflects variation in asset quality. In general, the descriptive analysis showed significant variation in financial performance, risk, and operational efficiency among the banks included in the study.

Table 4 Descriptive statistics for 2017-2022

VARIABLE	mean	p50	min	max	sd	skewness	kurtosis
ROA	0.007548	0.005536	-0.03258	0.057471	0.012841	0.645379	6.095839
ROE	0.021901	0.013427	-0.05549	0.152032	0.033163	1.358586	5.863603
SR	5.052701	5.196152	1	7.416198	1.642285	-0.45879	2.418802
NON_intro	0.701781	0.749229	0.034818	1.4793	0.331584	-0.16438	2.695081
ETA	0.696618	0.730612	0.371398	0.999477	0.144317	-0.32722	2.545304
Z_score	8.56268	7.294707	3.426306	16.20012	3.318922	0.777847	2.756539
Loangrowth	0.218669	0	-0.99093	1.883896	0.647373	1.318245	4.28009
CIR	0.816583	0.782976	0.238989	1.28428	0.223217	0.271301	2.905097
LR	0.614779	0.639352	0.095108	0.976465	0.208389	-0.4706	2.977422
SIZE	27.08817	27.02129	25.33448	28.51317	0.569669	-0.14757	3.939223
DepoR	0.367047	0.318745	3.04E-02	0.783871	0.209083	0.673561	2.375686
NPL	0.440123	0.280509	4.50E-07	1.99647	0.533849	1.873267	5.678474
COVID1	0.166667	0	0	1	0.37509	1.788854	4.2
COVID2	0.166667	0	0	1	0.37509	1.788854	4.2

fig 1 shows the performance of banks from 2017 to 2022, showing relative stability in ROA and annualized SR from 2017 to 2018, with high levels of non-interest income. In 2019, a significant rise in interest income share (NON-interest share) and a decline in ROA and SR are observed, indicating negative effects of the onset of the shock (Covid1). In 2020, there is an improvement in ROA and a significant increase in SR during the Adaptation period (Covid2), with non-interest income continuing to rise. The rise in non-interest income in 2019 and 2020 can be explained by several reasons related to the effects of the Covid-19 pandemic and adaptation to it. Banks may have increased fees for electronic banking, transfers and ATMs due to greater reliance on these services as a result of precautionary measures and limiting direct cash transactions. The spread of the pandemic has also led to an increase in the use of digital banking services, which has increased the fees associated with these services. In addition, banks adopted strategies to diversify their non-interest income sources to compensate for challenges in other areas such as loans and investments, which contributed to increased income. The increase in trading and investment activity by clients looking for alternatives to traditional investments during the period of instability contributed to the increase in fees and commissions. In the period from 2021 to 2022, a decline in ROA and SR appears with stability in non-interest income. , reflecting relative stability after a period of adjustment to the continuing effects of COVID-19.

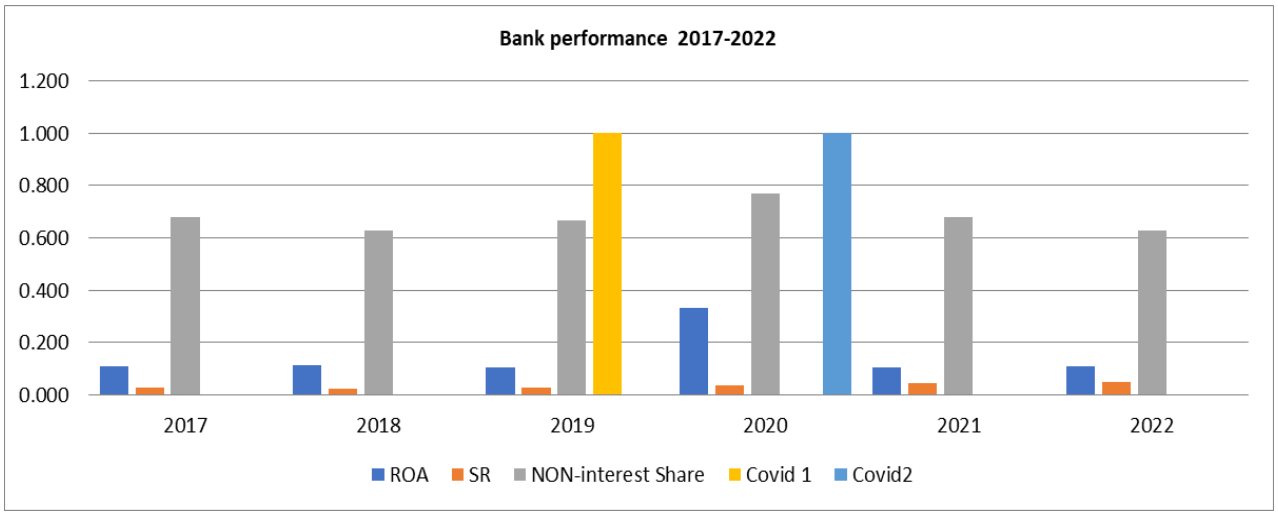

Figure 1 Performance of Iraqi banks for the period 2017-2022

Results and Discussion

- **Empirical finding**

Table 5 shows the correlation coefficients between the different variables in the study, where "COVID1" and "COVID2" represent the effects of COVID-19 in two different periods: the shock period in 2019 and the adaptation 2020.

COVID1 shock period (SHOCK) correlation showed a weak inverse relationship between the impact of the coronavirus in the 2019 shock period and expected deposits in such cases. There are several reasons for this trend: preserving savings, as society tends to withdraw its savings to keep them in cash in anticipation of the repercussions of the crisis, and this behavior is due to the cessation of incomes as a result of the cessation of work sectors, which forces individuals to use their savings to meet their living needs. There is also a lack of confidence in the banking system, as there is still a state of mistrust in the Iraqi banking system due to the many previous crises in which banks were subjected to plunder, theft, and bankruptcy. These repeated experiences have undermined trust between society and the banking system, leading individuals to withdraw their savings from banks during crises. The table also showed an inverse relationship between the impact of the Coronavirus on interest income. This is due to Iraqi banks' reliance on traditional methods of providing financial services, which society accepted before the pandemic. But as the wheel of life stopped due to the preventive measures taken to limit the spread of the virus, income from these sources decreased.

Traditional services include fees related to money transfers, ATMs and electronic banking activities, which have witnessed a decrease as a result of the decline in economic activity and precautionary measures. Also, there is a weak or no relationship between Covid-19 (SHOCK) and loan growth, reflecting banking and economic caution during the crisis. In addition, there is a very weak inverse relationship between the impact of SHOCK and SIZE, indicating a limited impact of the crisis on the size of banking assets. There is a very weak inverse relationship between the impact of SHOCK and ROA, indicating a slight negative impact of the crisis on profitability. Also, there is a weak inverse relationship between

SHOCK and ROE, reflecting the impact of the crisis on investment returns. In addition, there is a weak inverse relationship between the (SHOCK) and the annualized RS, indicating a slight negative impact on stock performance. There is no strong relationship between SHOCK and return on equity to total assets ETA1, suggesting relative stability in this indicator. There is no strong relationship between the impact of SHOCK and Z_score, indicating no significant change in the level of risk. Also, there is no strong relationship between CHOCK and the non-performing loan ratio NPL1, which reflects a relative stability in loan quality. There is no strong relationship between SHOCK and the LR, which indicates stability in the solvency of banks. Finally, there is no strong relationship between the impact of SHOCK and the cost-income ratio CIR1, indicating relative stability in the efficiency of cost management.

Adaptation Period (COVID2) The effects of the second coronavirus on DepoR do not show a strong relationship, indicating that withdrawal and deposit behavior has relatively stabilized after the shock period. Regarding NON_intro, there is a weak positive relationship, which may be the result of the resumption of some traditional banking activities and the high demand for electronic banking services during the Adaptation period. There is a weak inverse relationship between the effect of (ADAPTATION) and loan growth, which may reflect the reluctance of banks and borrowers to deal during this period as a result of economic uncertainty. SIZE is not significantly affected by the effect of (ADAPTATION), which indicates that large and small banks are equally affected. There is a weak positive relationship between impact (ADAPTATION),ROA and ROE, indicating a slight improvement in the financial performance of banks over time as they adapt to the new situation. There is no strong relationship between the second effect of ADAPTATION and SR and ETA1, which means that the effects of the epidemic on these aspects are still unclear. There is also no strong relationship between the second effect of (ADAPTATION) and Z_score, NPL1, and LR , which indicates relative stability in these areas. Finally, there is a weak inverse relationship between the second impact of the ADAPTATION pandemic and the CIR , which may reflect banks' efforts to reduce costs and improve operational efficiency during the Adaptation period. Overall, the effects of COVID-19 and COVID-20 on other variables are generally not strong, with most relationships appearing weak or non-existent

Table 5 Correlation matrix

VARIABLE	COVID1	COVID2	DepoR	NON_in~t	Loangr~h	SIZE	ROA2	ROE2	RS2	ETA1	Z_score	NPL1	LR2	CIR1
COVID1	1													
COVID2	-0.2	1												
DepoR	-0.1213	-0.0071	1											
NON_intro	-0.0683	0.0487	0.0025	1										
Loangrowth	0.004	-0.0809	-0.0381	0.046	1									
SIZE	-0.0447	-0.001	0.2419	-0.1821	-0.0169	1								
ROA2	-0.0371	0.1094	0.2568	-0.1817	0.0767	0.3214	1							
ROE2	-0.0883	0.0745	0.2558	-0.1968	0.1112	0.5572	0.9014	1						
RS2	-0.0881	0.0287	0.3652	-0.0748	-0.0103	0.6165	0.509	0.5727	1					
ETA1	0.017	-0.0015	-0.2774	0.1679	0.0108	-0.9548	-0.2999	-0.5493	-0.5978	1				
Z_score	-0.002	0.0041	0.1551	0.3977	0.0414	-0.5359	-0.2455	-0.3882	-0.2945	0.5275	1			
NPL1	0.0176	-0.0091	-0.207	-0.1299	-0.031	-0.0507	0.0772	-0.0436	-0.0464	0.1608	0.0772	1		
LR2	-0.0109	-0.0267	-0.0139	-0.1838	0.1822	-0.1419	0.1061	0.1618	-0.219	0.0306	0.0381	-0.1837	1	
CIR1	0.0212	-0.1439	-0.2042	0.2487	-0.065	-0.1988	-0.6528	-0.643	-0.3295	0.2881	0.2453	0.2093	-0.3201	1

This table reports Pearson correlation matrix of all independent variables employed in our empirical models.

Table 6 shows the results of the regression analysis of the return on assets (ROA2) variable across several time periods, including the pre-pandemic periods (2017-2018), the shock period (2019), the adjustment period (2020), and the subsequent periods (2021-2022). Before the pandemic (2017-2018), non-interest income (NON_intro) had no significant impact on ROA, while cost-to-income ratio (CIR) had a negative and significant impact, indicating that increasing costs lead to lower returns. The liquidity ratio (LR2) also showed a negative and significant effect in 2017 only. During the shock period (2019), none of the variables showed a significant impact on ROA, indicating increasing uncertainty and the impact of the shock on banks' financial performance. In the adjustment period (2020), non-interest income showed a positive and significant effect on ROA, suggesting that diversification of income sources helped improve returns. The cost-to-income ratio continued to show a negative and significant effect, reflecting the impact of higher costs. In subsequent periods (2021-2022), the cost-income ratio continued to have a negative and significant impact on ROA, especially in 2022. The liquidity ratio also showed a negative and significant impact in 2022, indicating challenges in liquidity management. Overall, across the period from 2017 to 2022, the cost-income ratio had a negative and significant impact on ROA, reflecting the importance of controlling costs to improve the financial performance of banks. The coefficient of determination (R-squared) ranges between 0.293 and 0.792, indicating that the model explains a significant portion of the variation in return on assets across different periods, which reflects the model's ability to explain the relationships between independent variables and banks' financial performance well.

Table 6 Regression Analysis: performance ROA as a dependent variable and independent variables

VARIABLES	(2017) ROA2	(2018) ROA2	**COVID (2019) ROA2**	**COVID (2020) ROA2**	(2021) ROA2	(2022) ROA2	(2017-2022) ROA2
NON_intro	-0.00875	0.0144	-0.00818	0.00236*	0.00259	-0.0210	-0.00822
	(0.0175)	(0.0433)	(0.0144)	(0.0257)	(0.0238)	(0.0178)	(0.0101)
CIR	-0.0519***	-0.0573*	0.00676	-0.0194	-0.0273*	-0.0704***	-0.0376***
	(0.0118)	(0.0280)	(0.0140)	(0.0119)	(0.0129)	(0.0142)	(0.00584)
LR2	-0.0620*	0.0538	0.00175	-0.00259	-0.0480	-0.114**	-0.0185
	(0.0318)	(0.0739)	(0.0213)	(0.0383)	(0.0351)	(0.0398)	(0.0165)
Loangrowth		0.00235	0.0141	0.0406*	-0.00266	0.0265**	0.00300
		(0.0237)	(0.00928)	(0.0202)	(0.00776)	(0.0102)	(0.00475)
Constant	0.218***	0.114*	0.199***	0.189***	0.217***	0.250***	0.196***
	(0.0202)	(0.0569)	(0.0192)	(0.0352)	(0.0264)	(0.0267)	(0.0133)
Observations	20	20	20	20	20	20	120
R-squared	0.727	0.516	0.293	0.605	0.415	0.792	0.397

The dependent variables bank performance, Stock market return (SR) . Independent variable (Non-interest income ratio) We measure it income DIV (DIV) non-interest income/ total income)) for CBs and non- financing income/ total income)) for IBs, which incorporates interest income and five activities within non-interest income. Controlling variables as a Bank size (SIZE) is a Logarithm of total assets. cost to income ratio (CIR) and current assets / current liabilities (LR).. The standard error is presented in brackets. Statistical significance is denoted by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively

Table 7 shows the results of the regression analysis of SR across several time periods, including the pre-pandemic periods (2017-2018), the shock period (2019), the adjustment period (2020), and the subsequent periods (2021-2022). During 2017 and 2018, it appears that NON_intro had an insignificant effect on the annual stock return, while the CI had a negative and significant effect only in 2017. In contrast, SIZE shows a positive and significant effect on the annual return of the stock in both years. In 2019 (the shock period), non-interest income shows a positive and significant effect on the annual stock return, while the cost-to-income ratio has a negative but insignificant effect. The size of the bank did not show a significant effect on the annual return of the stock during this period. During 2020 (adjustment period), non-interest income continues to show a positive and significant impact on annual stock return, indicating the importance of diversified income sources during the adjustment period. The cost to income ratio had a negative and significant effect in this period, which reflects the impact of high operating costs on the annual return of the stock. Bank size shows a positive and significant effect.

In 2021 and 2022, non-interest income remains a positive influence on annual stock return, although the effect is less pronounced in 2021. Bank size continues to show a positive and significant effect in both years, indicating that bank size continues to matter in achieving... Higher returns. Overall, across the period from 2017 to 2022, non-interest income and bank size show positive and significant effects on annual stock return, while cost-income ratio has a negative and significant effect. The coefficient of determination (R-squared) shows that the model explains a significant portion of the variance in the annual stock return across different time periods, which reflects the model's ability to explain the relationships between the independent variables and the annual stock return.

Table 7 OLS regression analysis: SR as a dependent variable and independent variables

VARIABLES	(2017) SR	(2018) SR	**COVID (2019) SR**	**COVID (2020) SR**	(2021) SR	(2022) SR	(2017-2022) SR
NON_intro	0.177	-0.896	1.667*	2.290**	0.187*	0.724*	0.507*
	(1.273)	(1.117)	(1.336)	(0.795)	(1.709)	(0.977)	(0.456)
CIR	-2.084*	-0.300	-2.458	-2.084*	-0.0390	-0.608	-1.096***
	(0.990)	(0.897)	(1.772)	(0.983)	(1.279)	(1.112)	(0.398)
SIZE	1.868**	1.667**	1.188	1.333**	2.612**	1.541**	1.654***
	(0.718)	(0.719)	(0.911)	(0.491)	(0.962)	(0.559)	(0.262)
Loangrowth		1.120	-0.318	-0.589	-0.733	-0.384	-0.148
		(0.684)	(0.911)	(0.651)	(0.519)	(0.459)	(0.210)
Constant	44.55*	39.48*	26.64*	31.32**	65.36**	36.14**	39.27***
	(19.84)	(19.73)	(24.87)	(13.38)	(26.45)	(15.62)	(7.211)
Observations	20	20	20	20	20	20	120
R-squared	0.620	0.554	0.392	0.698	0.546	0.692	0.441

The dependent variables bank performance, Stock market return (SR) . Independent variable (Non-interest income ratio) We measure it non-interest income/ total income for CBs and non- financing income/ total income)) for IBs, which incorporates interest income and five activities within non-interest income. Controlling variables as a Bank size (SIZE) is a Logarithm of total assets. cost to income ratio (CIR) and (Loan growth).. The standard error is presented in brackets. Statistical significance is denoted by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively

Table 8 shows the results of regression analysis of the Z-score variable over several time periods, which helps in understanding the impact of independent variables such as non-interest income (NON_intro), SIZE, and CI on banking risk. In the pre-pandemic periods (2017-2018), non-interest income did not have a significant effect on the Z-score, indicating that these incomes did not play a significant role in reducing risk, while bank size showed a negative and significant effect in 2017, indicating However, larger banks were more exposed to risks. In the shock period (2019), non-interest income showed a positive but insignificant effect on the Z-score, while bank size showed a negative and significant effect, indicating that larger banks were facing greater risks during this period. In the adjustment period (2020), non-interest income showed a positive and significant effect on the Z-score, indicating that increasing this income helped reduce bank risk, while bank size continued to show a negative and significant effect. In subsequent periods (2021-2022), non-interest income showed a positive and significant effect on the Z-score in 2022, indicating its important role in reducing risks, while bank size continued to show a negative and significant effect, indicating the persistence of associated risks. The size of the bank. Overall, across the period from 2017 to 2020, non-interest income shows a positive and significant effect on the Z-score, reflecting its importance in reducing bank risk, while bank size shows a negative and significant effect, indicating that increasing bank size increases risk. The coefficient of determination (R-squared) ranges between 0.183 and 0.632 across different periods, indicating that the model explains a significant portion of the variance in the Z-score, and reflects the ability of the model to explain the relationships between independent variables and bank risk well.

Table 8 OLS regression analysis: Z_Score as a dependent variable and independent variables

			CCVID	**COVID**			
	2017	2018	**2019**	**2020**	2021	2022	(2017-2020)
VARIABLES	Z_score	Z_score	Z_score	Z_score	Z_core	Z_score	Z_score
NON_intro	0.362	0.886	1.037	0.629**	1.326*	2.760*	16.89**
	-1.148	-1.356	-1.279	-1.26	-1.706	-1.271	-9.158
SIZE	-61.5	-43.57	-79.51	-103.4**	-102.5**	-134.0***	-1,223***
	-43.96	-50.55	-51.37	-44	-48.1	-38.89	-321.4
CIR	1.424	-0.421	0.77	1.305	0.733	-2.587	15.36
	-1.608	-2.129	-2.249	-1.133	-1.655	-1.904	-11.77
Constant	212.6*	152.7*	271.7**	351.0**	347.8**	451.7***	4,135***
	-144.6	-166.2	-169.3	-145.2	-158.7	-128.4	-1,059
Observations	20	20	20	20	20	20	120
R-squared	0.325	0.183	0.293	0.433	0.453	0.632	0.264

The dependent variables bank Risk, Z-Score = (ROA + ETA)/SDROA . Independent variable (Non-interest income ratio) We measure non-interest income/ total income)) for CBs and non- financing income/ total income)) for IBs, which incorporates interest income and five activities within non-interest income. Controlling variables as a Bank size (SIZE) is a Logarithm of total assets. cost to income ratio (CIR). The standard error is presented in brackets. Statistical significance is denoted by ***, **, and *, indicating significance at the 1%, 5%, and 10% levels, respectively

Conclusion

It is clear from a comprehensive analysis of the financial statements of Iraqi banks listed on the Iraqi Stock Exchange during the period from 2017 to 2022 that the Covid-19 pandemic had a tangible impact on financial performance and banking risks. In the pre-pandemic periods, non-interest income had no significant impact on return on assets (ROA) and return on equity (SR), while cost-to-income ratio and bank size were negative and significant influencers. During the 2019 shock period, data showed that major Iraqi banks were more exposed to risk, while none of the other variables had a clear significant impact, reflecting uncertainty.

In the adjustment period in 2020, the role of non-interest income emerged as a positive and important factor in improving return on assets and earnings per share, which reflects the ability of Iraqi banks to diversify their sources of income to adapt to new challenges. However, the cost-to-income ratio continued to have a negative impact on financial performance. During this period, there was a positive and significant effect of non-interest income on reducing banking risks, which indicates the importance of diversifying sources of income in enhancing the stability of Iraqi banks. In contrast, bank size continued to show a negative and significant effect on risk, indicating that larger banks face greater challenges in risk management.

In subsequent periods (2021-2022), the cost-to-income ratio continued to have a negative and significant impact on return on assets and earnings per share, especially in 2022, and the liquidity ratio also showed a negative and significant impact. In general, improving the financial performance of Iraqi banks in the post-pandemic period requires focusing on diversifying sources of income, effectively controlling operational costs, and managing liquidity effectively. These results reflect the importance of adopting flexible and integrated strategies to adapt to unexpected economic crises, which contributes to developing more effective policies and procedures to confront future challenges and reduce banking risks.

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