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COVID-19 EXTERNAL VULNERABILITY SHOCK AND FINANCIAL PERFORMANCE OF US DEPOSIT MONEY BANKS: AN EMPIRICAL EVALUATION

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Abstract: The outbreak of Coronavirus (Covid-19) pandemic was found to have changed the narrative of business operations globally with its resultant repercussion on the financial performance of businesses. Therefore, using data from 30 US Deposit Money Banks (DMBs) between 2007 and 2022, this study investigates the effect of the Covid-19 external vulnerability shock on the financial performance of DMBs in the US. The results, which are based on a strong OLS technique, show that the pandemic significantly had a negative effect on the US equity performance. Global financial markets were significantly impacted by the COVID-19 pandemic, particularly DMBs, which were at risk of major liquidity crises, reduced investment portfolios, and general financial disruptions. On the other hand, the Return on Equity (ROE) of DMBs in the US is positively and significantly impacted by bank size and deposits. In view of the findings, it is suggested that DMBs adopt strong shock-reducing measures, particularly those that reduce their vulnerability to externally generated shocks and uncertainty. Similarly, measures to enhance the size of DMBs, as well as deposits are important, given the potential economies of scale of large size on the financial performance of banks.

Keywords: Covid-19, financial performance, deposit money banks, external vulnerability shock.

1.   INTRODUCTION

Technology is developing quickly and competition is getting more sophisticated in today's complicated business environment, therefore, managers of banks must effectively manage risk if they hope to turn a profit (Patil & Vittaldas, 2024). The global economic crisis has changed corporate executives' perspectives on risk reduction by providing them with insightful information (Ahmad *et al*. 2022). According to the liquidity preference hypothesis of John Maynard Keynes, businesses usually keep more liquid assets on hand during uncertain or crisis situations to safeguard their capacity to fulfill short-term commitments and effectively manage risks (Bibow). Conversely, in a situation where the goal of risk management policies is to maximize profits instead of preserving high liquidity, the trade-off theory offers a theoretical foundation to back up this method of making strategic decisions. According to the trade-off theory, firms may decide to implement more aggressive risk management strategies in order to maximize profitability, even at the expense of some liquidity loss (Vo & Ngo, 2023). While excessive liquidity can limit the amount of cash available for long-term projects (Chen, 2011), we must also keep in mind that taking too many risks can negatively impact business performance (Onsongo *et al*., 2020). Because of this, managing profitability and liquidity in accordance with the market conditions in which their company works is one of the key issues and challenges facing managers (Akbar *et al*., 2021). Therefore, in order to preserve stability, performance, and the ability to meet obligations, managing liquidity risk is an ongoing process that must be monitored and modified in response to shifts in the cash flows generated by the bank's assets.

The coronavirus pandemic in late 2019 compelled nations to implement strict security measures, such as social quarantines, social distancing, and stay-at-home orders. Ahmad *et al*. (2022) and Tarighi *et al*. (2023) claim that these acts had severe effects on all sectors of the economy, but they specifically disrupted bank operations. The impact of the COVID-19 pandemic was described by Tan *et al*. (2022), Zhao *et al*. (2023), and other studies as follows: a decline in the stock market; sharp declines in domestic consumption; the transfer of fragile demand to other sectors and economies through trade and production linkages; notable declines in company earnings; and a lack of liquidity.

The COVID-19 issue presents distinct challenges that set it apart from previous financial crises in terms of severity. This makes improvement much

more challenging as it exposed management of affected banks to a multitude of risks, including lack of liquidity (Tarkom 2022). The impact of the COVID-19 pandemic on oil prices (Paramati *et al.* 2023; Terraza *et al.* 2024), interest rates (Lee *et al.* 2023; Garcia *et al.* 2023), energy (Shaikh 2022), exchange rates (Jawad & Naz, 2023), unemployment rates (Davidescu *et al.* 2021), and other facets of society life has been the subject of numerous studies to date. Tarkom (2022) notes that although COVID-19 is a crucial factor in developing financial performance strategies, there is rarely empirical proof in diverse markets to support this claim. In actuality, research worldwide has mostly focused on the role of COVID-19 at the macro level, despite the fact that banks have financial difficulties, particularly in the area of financial performance and how it should be handled to optimize shareholders' wealth (Ahmad *et al.* 2022). This disparity is present in developing nations, but particularly apparent in the research literature from the advanced economies, like the US, UK, France, etc., where there are substantial differences from other markets in all aspect. Inspite of this, the relationship between the COVID-19 external vulnerability shock and financial performance is still not well understood. This is particularly true in the US's advanced market where banks are especially vulnerable due to the sophistication in technology. This study is among the first to ascertain whether the COVID-19 external vulnerability shock has significantly impacted the US bank's financial performance and as well the US managers' perceptions of financial performance. This investigation is motivated by this knowledge gap.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Covid-19 and Bank Financial Performance

It has been demonstrated that the COVID-19 epidemic has had a significant impact on every area of the economy, including the financial sector. In particular, there is evidence that the pandemic led to increased risks that banks face, with implications on their financial performance. Thus, the pandemic was seen to have both direct and more indirect effects on banks' financial performance. According to a KPMG research from 2023, COVID-19 has caused a low interest rate web in the banking industry. The banking sectors of more developed economies have seen a decline in core banking profitability as a result, suggesting that banks have shifted from conventional interest-bearing operations to more commission-based revenue sources. This has implications

for the financial performance of banks. Furthermore, according to the PwC analysis from 2023, the pandemic's additional indirect repercussions on financial performance included a decline in productivity and a rise in interest rate risks in the industry.

Onsongo, *et al.* (2020) and Ademola and Ismaila (2022) examined the effect of the pandemic on banks by computing a financial performance index for the banks in Bangladesh. The study found that Covid-19 only exacerbated the fragility of banks that were already performing poorly before the pandemic. The study specifically demonstrated how the pandemic caused banks'non-performing loan ratio to rise sharply and how they found it difficult to protect themselves against interest rate and liquidity risks, both of which had a detrimental effect on the banks' overall financial performance. Additionally, Almustafa *et al.* (2023) discovered that the pandemic had a detrimental indirect effect on bank performance via the interest rate and lending system. The effect of COVID-19 on the financial performance of banks in the region was investigated by Angosto (2024) using data from 5474 banks across 23 OECD nations. According to their findings, COVID-19 had a direct negative impact on banks' profitability, particularly during the start of the pandemic (Alade, Adeusi, & Alade, 2020; Adeusi, *et al.*, 2020). The study however found that larger banks were more able to weather the pandemic storm than smaller banks from the likes of payments and tech businesses. Arising from the above, our first hypothesis is stated in the null form as follow:

Ho$_1$: Covid-19 has no significant impact on financial performance of US Commercial bank

2.1.1. Bank Size (BSZ)

Bank size refers to the sum of all assets owned by an institution which include cash, loans, securities, banks premises and other assets (Ademola & Ismaila, 2022). The size of banks has been of interest to significant players in the banking sector. Regulatory authorities, who are worried about the viability of the financial sector, identify certain banks as Systematically Important Banks (SIBs), popularly known as "too big to fail" institutions. The size of the bank is one factor used to identify SIBs. Researchers utilized the size of banks as either explanatory or control variables, and the banking public used bank size to determine which bank is safe for their funds. Bank size is a criterion

used by investors and other industry observers to determine their investment outlets.

Schildbach (2017) classified the various bank size measures according to who used them.Market capitalization, revenues, and net income are examples of market/cash flow-based metrics that investors and shareholders employ. Indicators based on accounting include total assets, equity held by shareholders, total loans, and total deposits; indicators based on regulation include risk-weighted assets and CET1/Tier1capital. Any of these elements used in combination can yield very different outcomes. However, all measures used to quantify bank size have advantages and disadvantages. For example, one widely used measure, total assets, has issues with asset valuation and fails to take into consideration variations in the different business strategies of the banks (Schildbach,2017). Other indicators, such as market capitalization, number of branches, number of workers, equity, total loans, total deposits, and revenues (gross earnings), each has advantages and disadvantages.The objective of the particular study or the availability of data may influence the use of a particular measure (Deng *et al.*, 2020). Although bank size has been studied extensively by practitioners, regulators, researchers, and other industry observers, the measurements mostly rely on the type of research being done.

2.1.2. Bank Deposit (BDP)

Money deposited in banks for safekeeping is known as a bank deposit.It is a method of securely storing money that may be accessed whenever it is convenient. These deposits are made to financial institution deposit accounts, including money market, savings, and check accounts. According to the terms and circumstances governing the account agreement, the account holder has the right to withdraw money that has been deposited. The deposit is a debt that the bank owes the depositor. Instead of referring to the real money that has been deposited, bank deposits refer to this obligation. Banks use consumer deposits to expand their operations and generate operating profits.

When money is deposited into a bank account and the legal title to the money is given up, the money becomes a bank asset. In other words, the bank is liable for the account. The account user can frequently take money out of these accounts via bank cards, checks, or over-the-counter withdrawal slips. Bank deposits being an indicator for financial performance evaluation is adopted as a control variable in this study.

2.1.3. Return on Equity (ROE)

Return on equity (ROE) measures the efficiency with which the firm generates profit using shareholders' funds. ROE shows how well management utilizes shareholders' funds to maximise wealth (Ademola & Ismaila, 2022). This metric is used to assess how profitable the business is in relation to the equity held by shareholders. The ratio of a company's net income to its shareholders' wealth is known as return on equity (ROE). Since the company's profit and investor return are correlated, ROE is a particularly useful metric to look at. According to Garcia *et al.* (2023), ROE is a valuable indicator of financial success or failure since it shows whether or not the company is increasing profits without introducing more equity capital into the business. An indication that management is providing shareholders with greater value for their money, as measured by shareholders' equity, is a consistently rising ROE. ROE is computed by dividing the year's profit after taxes by the equity's book value (ordinary shares) at the start of the year. Equity is made up of the share premium, reserves, and the regular ordinary share capital that is issued. Therefore, making better use of the bank's assets can improve ROE and boost financial performance.

2.2. Theoretical Framework

2.2.1. Trade-Off Theory

Myers (1984) Trade-off theory, which establishes a connection between financial difficulties and a firm's risk, eventually expanded the finance distress theory. The theory talks about how much financial turmoil and agency fees cost a company. The idea is that there is a trade-off between bankruptcy and the interest tax shield when the debt-to-equity ratio rises. A business that finances its activities through debt is said to gain from tax advantages (Andiyappillai, 2020; Muller *et al.*, 2012). On the other hand, the company will not be able to pay off its debt obligations when they are due, increasing the risk of distress that comes with such collapses (Zurigat, 2009; Canarella *et al.*, 2014) in instances where the levels of debt reach are beyond the management of the firm. The management of risks was looked into in Croatia by Karanovi *et al.* (2018). The study made clear, among other things, that the majority of Croatian managers lacked the financial literacy necessary to handle the consequences of liquidity risk and related risks like those arising from Coronavirus more effectively, which

resulted in a high proportion of illiquid enterprises in the nation. Therefore, having a thorough understanding of finance, particularly in regards to financial risk, can be seen as a powerful tool for preventing illiquidity and avoiding the risks that come with it.

The theory offered a framework for analyzing the firms' costs related to interest rate, credit, and liquidity risks, which helped to clarify how the variable affected or did not affect the financial distress of listed firms. This study's theoretical framework enabled a full understanding of how risks arising from Covid-19 can ultimately have a detrimental impact on listed companies; as a result, it is important to make adequate and thoughtful tradeoffs at all levels. This theory is adopted in this study since it is the most suitable theory that addresses the risk banks face due to defaults in repayment of debts obligations, resulting from external shocks such as Covid-19 pandemic, thus, the need for managers of banks to be financially skilled in managing the effects of unanticipated risks arising from business operations.

3.   METHODOLOGY

This study used an ex post facto research methodology to examine the effects of the COVID-19 external vulnerability shock on the financial performance of US deposit money institutions. Financial performance is proxied by return on assets (ROA). A secondary data technique was employed to collect the data for the years 2007–2022. The data came from the financial statements of the chosen institutions, which were taken from the US Bloomberg Database. The period is informed by availability of data, important institutional and regulatory reforms in the banking landscape in the US and the twin effects of global economic and financial recession, as well as the Covid-19. Specifically, 30 (thirty) largest commercial banks in the US as at June 30, 2022 were utilised for the study on the basis of purposive sampling technique. The thirty banks categorised by FDIC (2022) and Federal Reserve (2022) reports as banks with the largest total assets, market share capitalization value and huge revenue generation were purposively selected for the study. The panel robust econometric technique was adopted for the analysis as it yields more reliable and efficient parameter estimates. However, prior to utilizing the robust panel estimation approach, the preliminary characteristic observations of the variables were conducted using descriptive statistics and correlation matrix. In the functional form, the

models depicting the nexus between external vulnerability shock of Covid-19 and ROE of US DMBs is captured as:

$$ROE = f(\text{Covid-19}, X) \qquad (1)$$

ROE is return on equity, Covid-19 is the externally induced shock, caused by the novel Coronavirus. The shock was induced by financial disruptions caused by diminished credit, liquidity, and equity funding (Ozekhome, 2023), with the year of the peak of the pandemic (i.e. 2020) being captured by a dummy variable that demonstrates the effect of the pandemic shock on equity performance, represented as 1 and 0 otherwise; X denotes a vector of other bank performance determining variables that include:, bank size (BSZ) and bank deposits (BDP).

In empirical form, model 1 is captured as:

$$ROE = \alpha_0 + \alpha_1 Covid - 19 + \alpha_2 BSZ + \alpha_3 BDP + \varepsilon \qquad (2)$$

Where; all variables are as previously defined; α_0 = Constant term, $\alpha_1 - \alpha_3$ are parameters to be estimated; and e= error term for period t.

4.   RESULTS AND DISCUSSION

4.1. Descriptive Statistics

The descriptive statistics of data for the banks used in the study are presented in Table 1.

Table 1: Descriptive Statistics

Variable	Mean	Max.	Min.	Std. Dev.	Skew.	Kurt.	J-B
ROE	6.50	20.22	-50.23	10.24	-2.86	15.2	7505.2 (0.00)
Covid-19	0.10	1.00	0.00	0.31	2.20	4.12	588.68 (0.00)
BDP	68.27	103.20	30.26	11.25	-1.25	3.50	79.48 (0.00)
BSZ	98.20	163.4	35.02	28.32	2.14	4.32	87.22 (0.00)

Source: Authors' Computation (2025)

Table 1 reveals the average Return on Equity (ROE) for the banks as a result of the Covid-19 shock as 6.50 percent, with a standard deviation of 10.24 that is higher than the observed mean value. Thus, noticeable instability in equity performance of US banks following the pandemic spread. This indicates that through its shock vulnerability, the financial system deteriorated. The wide divergence between the maximum and minimum values of 20.22 and -50.23,

respectively further indicates that performance of US Deposit Money Banks contracted on account of the Covid19- induced shock period. The mean value of the Covid-19 shock is 0.10, with a standard deviation of 0.31, implying a considerable measure of instability in the Covid-19 impact during the period, particularly in the peak episodes. The corresponding average values of BDP and size during the period are 68.27 and 98.20 respectively. The Jarque-Bera (J-B) test is significant at the 1 percent level for the variable, implying a non-normally distributed datasets.

4.1.1. Correlation Analysis

The correlation matrix used to observed the degree of association among the variables is presented in Table 2.

Table 2: Correlation Matrix

	ROE	*Covid-19*	*BDP*	*SZ*
ROE	1			
Covid-119	-0.167 (0.003)	1		
BDP	-0.253 (0.02)	0.177 (0.04)	1	
BSZ	-0.084 (0.041)	-0.058 (0.588)	-0.185 (0.174)	1

Note: Sig. probabilities in parentheses.
Source: Authors' Computation (2025)

The correlation matrix clearly indicates that Covid-19 externally induced shock is negatively correlated with ROE and all other variables. Thus, the pandemic had a detrimental impact on the financial system of the US as resources, flow of liquidity and credit shrinked, in addition to the considerable decline in investment and the uncertainty syndrome it generated. The combination of these negative effects, without doubt weakened the financial performance of US Deposit Money Banks. Given that none of the correlation coefficient exceeded 0.8, the problem of multicollinearity is avoided in the model.

4.1.2. Cross-section Dependence Test

Because the datasets used in this investigation are heterogeneous, the panel structure of the datasets may present underlying estimating issues, such as the

potential presence of undetected correlations within the panel's cross-sections (Baltagi *et al.*, 2012). These cross-sectional dependences decrease the efficiency and reliability of regression parameter estimates and raise the standard errors of the estimates (Wooldridge, 2010). The Breusch-Pagan and Pesaran (2004) tests are therefore adopted to investigate the likely occurrence of cross-sectional correlation in the datasets. While the latter test is particularly useful for assessing cross-sectional dependency for a panel data set where the cross-sectional units are greater than the time period, the former test can be used to evaluate cross-sectional dependence in any type of panel data. Because of the panel structure of the data utilized in this investigation, where the cross-sectional dimension is larger than the time dimension (i.e., $N > T$), both tests for cross-sectional dependency can be applied. For both cross-sectional dependence tests, the absence of cross-sectional dependence is the null hypothesis. Table 3 presents the outcomes of the CD tests.

Table 3: Cross-sectional dependence Test Results

Test	Statistic	Prob.
ROE Equation		
Breusch-Pagan LM	1058.4	0.00
Pesaran scaled LM	32.27	0.00
Bias-corrected scaled LM	30.16	0.00
Pesaran CD	22,28	0.00

Source: Authors' Computation (2025)

Table 3 indicates that all test statistics are significant at the 1 percent level ($p < 0.01$). As a result, the null hypothesis that there is no cross-sectional dependency is rejected, suggesting that the datasets indeed exhibit cross-sectional dependence.

4.1.3. Heteroskedasticity Test

Given the outcome of the cross-sectional dependence tests, the presence of heteroskedasticity is likely. Thus, the estimated standard errors in the models may be over-inflated, making the estimates unreliable. To empirically confirm this, a test of heteroskedasticity is performed for the ROE mode, and the result is presented in Table 4. For this test, the absence of heteroskedasticity in the datasets is the null hypothesis.

Table 4: Test for Heteroskedasticity

Indicator	ROE
chi2(1)	17.07
Prob > chi2	0.00

Source: Authors' Computation (2025)

From the test result (using the Chi square), it is seen that the residuals in both equations pass the Chi square test at the 1 percent level. The null hypothesis is therefore rejected, implying that there is heteroskedasticity in the model. In view of this, an estimation procedure that corrects for heteroskedasticity needs to be applied in this study. To address the presence of heteroskedasticity in the datasets, an OLS estimation that reports robust standard errors is adopted in the analysis. In this case, the OLS estimates report the heteroskedasticity-robust standard. Two sets of estimations were performed for ROE on account of the datasets used for the analysis. The first set entails measuring financial risk in terms of loan to deposit ratio of the banks while the second uses deposit to asset ratio.

4.2. Main Results

Table 5 shows the outcome of the Covid-19 equity model. The findings are presented in two panels: the robust standard error estimates are displayed in the first panel, and the estimates utilizing an OLS-based fixed effects technique are displayed in the second panel. Focus is on the robust panel estimates since they are more dependable and effective, even though the results are roughly identical in terms of signals and significance. In the results, the adjusted R-squared is 0.527, indicating that 52.7 percent of the net changes in ROE of US Deposit Money Banks are explained by Covid-19 shock and the other two control variables (size and bank deposits). Thus, a reasonable predictive capacity for the Covid-19 shock-ROE model exist. The F-value of 16.2 significant is indicating that the financial performance of US banks, in terms of equity returns is sufficiently explained by the three regressors.

The effect of COVID-19 on ROE is statistically significant and adverse. Invariably, the shock associated with Covid-19 had a significant detrimental impact on banks' equity funding in the US, given its disruptive economic and financial activities, with abrupt decline in liquidity, credit and investment

Table 5: Results for Covid-19 ROA Model

Variable	Panel Robust Fixed Effect	
C	-0.082* (0.045)	-0.023* (0.012)
Covid-19	-1.121*** (0.272)	0.706*** (0.194)
BDP	0.314** (0.141)	0.044* (0.025)
BSZ	0.722** (0.283)	0.518** (0.246)
Adj. R-sq.	52.7	48.2
F-stat.		
Obs	17.32	16.25

Note *, ** and ** indicate $p < 0.10$, $p < 0.05$ and $p < 0.01$, respectively.
Standard errors (SE) are in parentheses.
Source: Authors' Computation (2025)

inflows (Ozekhome, 2023), resulting in a fundamental change or impact on macroeconomic and financial outcomes. This finding is constituent with the evidence of Ademola and Ismaila (2022), PwC (2023) and KPMG (2023). A 1 percent rise in the vulnerability-induced shock and financial disruptions by the pandemic is associated with a 1.12 percent decline in equity performance of US Deposit Money Banks. Bank deposits and size are both significant at the 5 percent level, suggesting that improved bank deposit and economies of scale associated with large size tend to enhance financial performance of deposit money banks in the US. Thus, the twin positive effects of large bank deposits and size enables growth expansion, economies of scale in cost, better managerial capacity and positive growth prospect that combine to enhance equity performance of US Deposit Money Banks. A unit percent rise in the level of bank deposits and bank size are associated with a 0.31 and 0.72 percent rise in equity performance of US Deposit Money Banks, respectively.

4.3. Hypotheses Testing and Discussion of Findings

As a further confirmation of the empirical results, the testing of the hypothesis is conducted as follows:

Hypothesis One: *Covid-19 has no significant impact on the financial performance (measured by ROE) of US deposit money banks.*

According to the empirical findings in Table 5, the Covid-19 shock t-ratio is significant at the 1 percent level ($p < 0.01$). Given the significance of the coefficient, the null hypothesis is rejected, suggesting that the Covid-19 shock significantly impaired the US deposit money banks' financial performance.

5. CONCLUSION AND RECOMMENDATION

The study's investigates the impact of the Covid-19 shock on the financial performance of US Deposit Money Banks based on a sample of 30 (thirty) largest Deposit Money Banks as at June 30, 2022 over the period 2007-2022, categorised by FDIC (2022) and Federal Reserve (2022). Utilizing robust panel data analysis procedure that corrects for heteroskedasticity, the findings show that Covid-19 external shock had a significant deteriorating impact on the financial performance of US Deposit Money Banks. The results also indicated that bank deposits and size are positively and significantly connected to equity performances of US banks. In view of the foregoing findings, US Deposit Money Banks need to adopt strong financial resilient measures that will reduce their susceptibility to externally-induced shocks. This can be achieved through financial insulation means that include optimal risk diversification, securitisation and shifts towards commission-based income that will effectively mitigate the effect of externally-generated shock, such as the Covid-19 on its equity financial performance now and/or in the future.

5.1. Suggestions for Further Study

Further studies may need to include broad macroeconomic variables that influence the relationship examined. Variables such as inflation, output and investment are important in the proper modeling of the relationship since they constitute important intermediating variables that will help in the formulation of broad-based policy perspectives.

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