



## IMPACT OF COVID-19 ON THE FINANCIAL STABILITY OF COMMERCIAL BANKS IN KENYA

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### Abstract:

Countries worldwide were gripped by the COVID-19 pandemic for the greater part of 2020 and 2021. COVID-19 spread to virtually all nations around the globe, causing a contraction of the global economy, and Kenya was no exception. Governments worldwide deployed social distancing, lockdowns, and curfews, which resulted in employee lay-off, business closure, and suppressed demand for commodities and services, eventually trickling down to commercial banks. The Kenyan banking sector experienced deterioration in asset quality which has been worsening since 2014 when it stood at 5.6 percent, reaching an all-time high of 14.5 percent in 2020 whereas Return on Assets which has also been declining since 2014, stood at 4.46 percent dropped to a record low of 2.07 percent in 2020 during the pandemic. This study, therefore, sought to determine how the financial stability of Kenyan commercial banks has been impacted by the COVID-19 shock. The study sought to specifically establish how both Z-score and capital adequacy of Kenyan commercial banks were impacted by the COVID-19 pandemic. Financial intermediation theory, Capital buffer theory, and Financial Instability Hypothesis anchored the study. The research design embraced was non-experimental, while the financial stability proxy was Z-score. The study's target population was 19 commercial banks in Kenya between the years 2015 and 2022, which had complete data on all the study variables. Annual bank-level data was obtained from Kenya's Central Bank's annual supervision reports from 2015-2022. Event study methodology was used while collecting data whereby, the event window was 2020-2021, the period before the event (COVID-19) was 2015-2019, and the period after the event was 2022. The study espoused a panel vector autoregression model in data analysis where the impulse response functions were generated. The researcher discovered that

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the COVID-19 pandemic adversely impacted Z-score and capital adequacy. Based on the research findings, the Government of Kenya ought to institute non-disruptive pandemic control measures such as proper hygiene and wearing of masks as opposed to quarantines and lockdowns, which are detrimental to commercial banks' operations and other businesses, ultimately leading to a decline in income for commercial banks. Moreover, since capital acts as a shock absorber for banks, Kenyan commercial banks should strive to achieve and maintain the minimum capital adequacy ratios set by the Central Bank of Kenya. This will ensure that commercial banks in Kenya cushion themselves against economic shocks generated by pandemics such as COVID-19.

**JEL:** E44, E58, G01, G21, G28, G32

**Keywords:** COVID-19, commercial banks, financial stability, panel vector autoregression

## 1. Introduction

The occurrences of pandemics are not new phenomena rather, they have occurred throughout human history at different periods (Ferguson *et al.*, 2020). Wuhan Province, China, is mostly attributed to the initial occurrence of COVID-19 in December 2019 (World Health Organization (WHO), 2020). From Wuhan, COVID-19 fanned out to the rest of the world at an alarming rate. The pandemic caused widespread destruction due to its communicable and very infectious nature (Zaremba *et al.*, 2020). Governments scrambled to contain the highly infectious disease globally by instituting safe distance measures and partial lockdowns (Fong *et al.*, 2020). These restrictions created a massive economic turndown in most global economies.

The severity of COVID-19 was expected to be much worse than the 2008–2009 Financial Crisis (IMF, 2020) as highlighted by a 3.5 percent global contraction (International Monetary Fund (IMF, 2021)). This prompted the World Bank deployment of a total of \$157 billion from April 2020 to 2021 to address the growing social, health, and economic implications triggered by the pandemic (World Bank, 2021). Global deaths stood at 6,650,433 due to COVID-19 (Worldometre, 2022). Africa experienced a contraction of 3.4 percent in real GDP in 2020 (United Nations Conference on Trade and Development (UNCTAD), 2021). Africa experienced 258,146 casualties from the pandemic (Worldometre, 2022). Sub-Saharan Africa experienced its first recession in 25 years as a result of the pandemic leading to a worsening public debt vulnerability, plunging up to 40 million people into extreme poverty, and ultimately undoing years of advancement in eradicating poverty. The Kenyan economy declined by 0.3 percent in Real Gross Domestic Product (GDP) (Kenya National Bureau of Statistics (KNBS), 2021). An increase in food prices coincided with an increase in inflation from 5.3 to 4.4 percent in 2019 and 2020 respectively and the manufacturing sector declined by 0.1 percent in 2020 (KNBS, 2021). Confirmed deaths in Kenya as of November 2022 were 5,680 (MOH, 2022).

The critical difference between COVID-19 and earlier crises, as highlighted by Laeven *et al.* (2020) and Brunnermeier and Krishnamurthy (2020), is the magnitude of the shock to particular industries. The COVID-19 pandemic affected all people irrespective of their nationality, race, color, religion, and gender (Cuesta & Pico, 2020). According to Azarova and Mier (2020), COVID-19 triggered a global exogenous shock. COVID-19 generated a demand and supply shock with the capacity to evolve into a depression (IFC, 2021). The ability of financial institutions to continue providing intermediation services has become a point of contention since the onset of COVID-19 (Beck, 2020; Cecchetti and Schoenholtz, 2020). The pandemic led to the financial sector's escalating loan default rates, difficult and complex loan recoveries, decreased loanable funds, and suppression of new investment demands (Baker *et al.*, 2020). The decline in loan growth has been attributed to COVID-19, especially to the small banks that make low profits and have high non-performing assets (Colak & Oztekin, 2021). Bank borrowers, both people and businesses, are at a high risk of default due to the various macroeconomic disturbances posed by COVID-19 (Vidovic & Tamminaina, 2020). COVID-19 shock generated revenue disruptions particularly in developing and emerging nations where banks are mostly dependent on loans for their business portfolio (Barua, 2021).

The Monetary Policy Committee (MPC) lowered the Cash Reserve Ratio (CRR) and Central Bank Ratio (CBR) from 5.25 percent to 4.25 percent and 8.25 percent to 7.25 percent, respectively (MPC, 2020). Consequently, the Central Bank of Kenya (CBK) advocated policy interventions such as loan restructuring and extension. Despite these policy interventions made to curb the pandemic from turning into a serious economic and financial crisis, Kenyan commercial banks' asset quality which has been on an increasing trend since 2014 deteriorated to an all-time high of 14.5 percent whereas ROA has also been declining since 2014 dropped to a record low of 2.07 percent during the pandemic (CBK, 2020). Furthermore, commercial banks in Kenya contribute 7.7 percent to the gross domestic product of the economy and employs over 1.5 million people (Bloom *et al.*, 2018) making it a crucial sector in the Kenyan economy. To the best of the researcher's knowledge, no inquest into the impact of COVID-19 on the financial stability of commercial banks in Kenya has been made. This, therefore, necessitates the inquiry into the impact of COVID-19 on the financial performance of commercial banks in Kenya using panel vector autoregression. Specifically, the study sought to establish the impact of COVID-19 on the Z-score and capital adequacy of Kenyan commercial banks.

## 2. Literature Review

The inquiry into the impact of COVID-19 on the financial stability of commercial banks in Kenya was anchored on the financial intermediation theory, capital buffer theory, and Financial Instability Hypothesis (FIH). Financial intermediation theory was proposed by Diamond (1984) and stipulates that banks act as intermediaries by linking savers and borrowers. The proxy for financial stability, Z-score, was deduced from this theory. Calem & Rob (1996) introduced the capital buffer theory. Increased capital levels act as buffers against negative shocks, reducing the possibility of bank failure, which is the

main concept proposed by the theory. Hyman Minsky (1992) proposed the Financial Instability Hypothesis (FIH). The theory emphasizes that capitalist economies frequently exhibit cycles marked by periods of inflation followed by severe deflationary periods.

Several efforts have been made to assess the impact of COVID-19 on the financial stability of commercial banks among them; Elnahass *et al.* (2021) using panel data from 1090 banks explored the COVID-19 outbreak and Global banking stability between 2019 (pre-Covid-19) and 2020 (during COVID-19). Z-score was the proxy for financial stability for global banking. Ordinary Least Squares (OLS) regression outcome revealed that the pandemic significantly harmed the financial stability of global banks. Global banks were explored using the OLS estimator in the study. This current study examined the financial stability of commercial banks in Kenya using P-VAR.

Sunarsih *et al.* (2022) assessed the stability and risk of Islamic banks (Indonesia) amidst COVID-19 from 2017 to 2020. Stability was based on the Z-score. Regression results indicated that the pandemic had no impact on the stability of Indonesian banks. Indonesian banks were analyzed using the Generalized Method of Moments (GMM). P-VAR was adopted in this current study to investigate the impact of COVID-19 on the stability of commercial banks in Kenya.

Ochenge (2022) examined how both bank profitability and stability are affected by revenue diversification amidst the COVID-19 pandemic in Kenya from 2010 to 2020. ROA and ROE were employed as profitability measures, whereas the stability measures used were Z-score, Standard deviation of ROA, and ROE. The results revealed an inverse association between non-interest income and risk but positive in profitability. The researcher focused on 30 banks in Kenya and used standard deviations of ROA and ROE as stability measures, which are more profitability measures. The current study used P-VAR methodology.

### 3. Material and Methods

Non-experimental research design was adopted for this study. Data from the 19 Kenyan commercial banks was sourced from CBK's Bank Annual Supervision Reports from 2015-2022. Based on the financial intermediation theory, Boyd and Runkle's (1993) financial stability is measured as shown in equation 1.

$$z=(k-q)/\sigma \tag{1}$$

Where,

$q$  = mean of distribution,

$\sigma$  = standard deviation, and

$z$  = probability of failure.

The Z-score was measured similarly by Qazi *et al.* (2021) and Sunarsih *et al.* (2022).

$$Z - \text{score} = \frac{ROA_{it} + ETA_{it}}{\sigma ROA_i} \quad (2)$$

Where,

$i$  is the bank,

$t$  is the time (year),

$ROA_{it}$  proportion of profit/loss before tax profit to the total asset,

$ETA_{it}$  is the ratio of total equity to the total asset, and

$\sigma ROA_i$  is the bank's  $i$  standard deviation of ROA calculated from 2015 to 2022.

Therefore, the estimated model was linear, as shown by equation (3), which assessed the impact of the pandemic on the Z-score.

$$ZS=f(ROE,CAP,AQ,Covid\_dummy) \quad (3)$$

Where,

ZS is financial stability represented by Z-score,

ROE is the proportion of profit/loss before tax to total shareholders' funds,

CAP is capital adequacy,

AQ is asset quality, and

Covid\_dummy is COVID-19.

To analyze the impact of the pandemic on capital adequacy, equation (4) was employed;

$$CAP=f(ROE,ROA,AQ,Covid\_dummy) \quad (4)$$

Where,

CAP is capital adequacy,

ROA profit/loss before tax divided by total assets,

ROE is the proportion of profit/loss before tax to total shareholders' funds,

AQ is asset quality, and

Covid\_dummy is COVID-19.

Since neither Fixed/random effects models nor OLS can yield consistent and efficient parameters (Ochenge, 2022). Therefore, to analyze equations 3 and 4, Panel Vector Autoregression (P-VAR) methodology was applied which stems from the works of Love and Zicchino (2006).

Therefore, panel vector autoregression was applied in this study. The P-VAR model was specified as equation 5.

$$Y_{it} = Y_{it-1}A_1 + Y_{it-2}A_2 + \dots + Y_{it-p}A_p + X_{it}B + e_{it} \quad (5)$$

Where,

$i = 1, \dots, N$  indicates the bank and  $t = \text{time (2015-2022)}$ ,

$Y_{it}$  = endogenous variables captured by  $1 \times k$  vector,

$X_{it}$  = exogenous covariates of  $1 \times m$  vector, and

$e_{it}$  =errors (idiosyncratic), parameters to be measured are  $A_1, A_2, \dots A_p$ .  
 $Y_{it}$  is a vector of ROE, ROA, Asset Quality (AQ),  
 ZS is Z-score, capital adequacy (CAP), and  
 Covid\_dummy (Covid-19)

### 3.1 Data Collection, Processing, and Analysis

An event study technique was employed in data collection. World Bank (2022) defines an event study as a mathematical tool technique for determining the outcome of an event based on an outcome of interest whereby data is collected before and after the event or in combination with the time around the event. Annual bank-level panel data was collected from 19 Kenyan banks from 2015-2022. The period before the event (COVID-19) was 2015-2019, 2020 and 2021 was the period around the event, and 2022 was the period after the event. The data was sourced from the CBK bank annual supervision reports. Stata version 18 was used to run the panel vector autoregression model.

**Table 1:** Variables Measurement and Definition

Variable	Description	Measurement
Z-score	Refers to banks` probability of insolvency.	A Ratio $Z\text{-score} = \frac{ROA_{it} + ETA_{it}}{\sigma ROA_t}$
ROA	Represents the percentage of profit/loss before tax divided by total assets.	A Ratio $\frac{\text{Profit/loss before tax}}{\text{Total assets}} \times 100$
ROE	Percentage of profit/loss before tax divided by total shareholders` funds.	A ratio $\frac{\text{Profit/loss before tax}}{\text{Total Shareholder`s Funds}} \times 100$
Capital Adequacy	Percentage of the ratio of core capital to total deposits	A Ratio $\frac{\text{Core Capital}}{\text{Total Deposits}} \times 100$
Asset Quality	Percent of the Gross non-performing loans divided by total loans.	A Ratio $\frac{\text{Gross non - performing loans}}{\text{Total loans}} \times 100$
COVID-19	This is a dummy variable that took the value of 1 in 2020 and 2021 and or zero otherwise.	Cardinal

**Source:** Author.

Table 1 shows the variables' definition and their measurement.

## 4. Results and Discussion

**Table 2:** Descriptive Statistics for the Period without COVID-19

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Zscore	114	25.6742	12.1388	2.91385	54.2768
ROE	114	18.8256	11.0244	1.2283	47.1922
CAP	114	22.1246	7.4219	9.2000	50.9000
AQ	114	11.5155	7.3024	1.4054	43.9679
ROA	114	3.1584	1.7740	0.3554	7.4021
Covid-dummy	114	0	0	0	0

**Source:** Author's computations.

### 4.1 Descriptive Statistics

**Table 3:** Descriptive Statistics for the Period with COVID-19

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Zscore	38	24.3525	12.7545	2.8447	51.5049
ROE	38	13.8222	9.2603	0.4970	38.5733
CAP	38	21.0447	7.6993	8.20000	38.6000
AQ	38	14.4211	6.6133	1.8971	33.6979
ROA	38	2.2989	1.4676	0.1103	5.1478
Covid_dummy	38	1	0	1	1

**Source:** Author's computations.

Mean, maximum, minimum, and standard deviation encompasses the descriptive statistics. The outcome of the study variables (Z-score, capital adequacy (CAP), return on assets (ROA), return on equity (ROE), asset quality (AQ), and COVID-19 (covid\_dummy)) are presented in Tables 2 (period without COVID-19) and Table 3 (period during COVID-19).

Financial stability based on the Z-score had a mean of 25.6742% in the absence of COVID-19, a maximum of 54.2768%, a minimum of 2.9138%, and a standard deviation of 12.1388, as shown in Table 2. Z-score during the COVID-19 pandemic dropped to a mean of 24.3525%, a maximum of 51.5049%, a minimum of 2.8447%, and a standard deviation of 12.7545 as shown in Table 3.

In the absence of the pandemic, the mean ROE was 18.8256%, the maximum was 47.1922%, the minimum was 1.2238%, and the standard deviation was 11.0244 according to Table 2. On the contrary, during the pandemic, the mean ROE declined to 13.8222%, a maximum of 38.5733%, a minimum of 0.4970%, and a standard deviation of 9.2603 as shown in Table 3.

Capital adequacy in absentia of COVID-19 had a mean of 22.1246%, a minimum of 9.2%, a maximum of 50.9%, and a standard deviation of 7.4219 as shown in Table 2. During the pandemic, capital adequacy's mean declined to 21.0447%, the maximum value was 38.6%, the minimum value was 8.2%, and the standard deviation was 7.6993 according to Table 3.

Asset quality mean value before the pandemic was 11.5155%, the minimum value was 1.4054%, the maximum value was 43.9679%, and the standard deviation was 7.3023, according to Table 2. Table 3 shows that, during the COVID-19 pandemic, the asset quality worsened to a mean of 14.4211%, the minimum value was 1.8971%, the maximum value was 33.6979%, and the standard deviation was 6.6133.

Table 2 shows the mean of ROA in the absence of the pandemic was 3.1584%, the maximum value was 7.4021%, the minimum value was 1.4054%, and the standard deviation was 1.7740. On the contrary, ROA during the pandemic declined to a mean value of 2.2989%, the maximum value was 5.1478%, the minimum value was 1.4676%, and the standard deviation was 0.1103 as shown in Table 3.

## 4.2 Panel Vector Autoregression Analysis

Similar to Abirgo and Love (2016), the study variables were converted into logarithms before data analysis commenced.

### 4.2.1 Lag Length Selection

**Table 4: Optimal Lag Length Selection**

Lag	CD	J	J pvalue	MBIC	MAIC	MQIC
1	0.9997959	24.56516	0.5988168	-84.59723	-29.43484	-50.87282
2	0.99983	19.50743	0.3612219	-53.26749	-16.49257	-30.78456
3	0.9998661	7.36337	0.5993433	-29.02409	-10.63663	-17.78262

Source: Author's computations.

Before analyzing the P-VAR model, the model's optimum lag length is established. Lag length selection is based on the three model selection criteria by Andrews and Lu (2001). One order lag (one lag) P-VAR was selected as evidenced by Table 4 where MBIC, MAIC, and MQIC reach their minimum values.

### 4.2.2 Model Stability

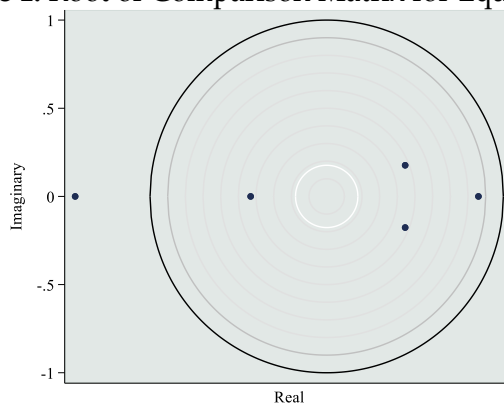
**Table 5: Eigenvalue Stability Condition for Equation 3**

Eigenvalue		Modulus
Real	Imaginary	
-1.423776	0	1.423776
0.8588663	0	0.8588663
0.4441758	0.1765474	0.477976
0.4441758	0.1765474	0.477976
-0.4305323	0	0.4305323

Source: Author's computation.



**Figure 1:** Root of Comparison Matrix for Equation 3



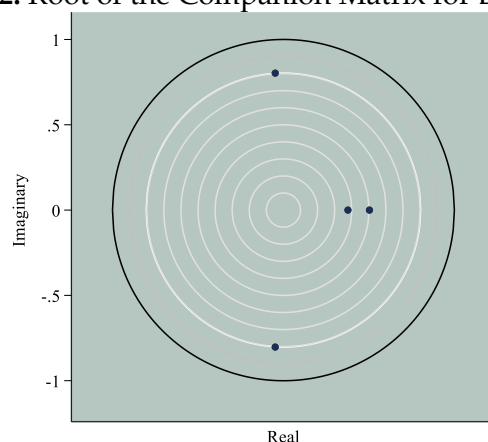
Source: Author's computation

**Table 6:** Eigenvalue Stability Condition for Equation 3

Eigenvalue		Modulus
Real	Imaginary	
-0.0480356	-0.8027936	0.8042295
-0.0480356	0.8027936	0.8042295
0.5032514	0	0.5032514
0.3774144	0	0.3774144

Source: Author's computation

**Figure 2:** Root of the Companion Matrix for Equation 3



Source: Author's computation

**Table 7:** Eigenvalue Stability Condition for Equation 4

Eigenvalue		Modulus
Real	Imaginary	
0.1931895	0.7021236	0.7282168
0.1931895	-0.7021236	0.7282168
0.3216948	0	0.3216948

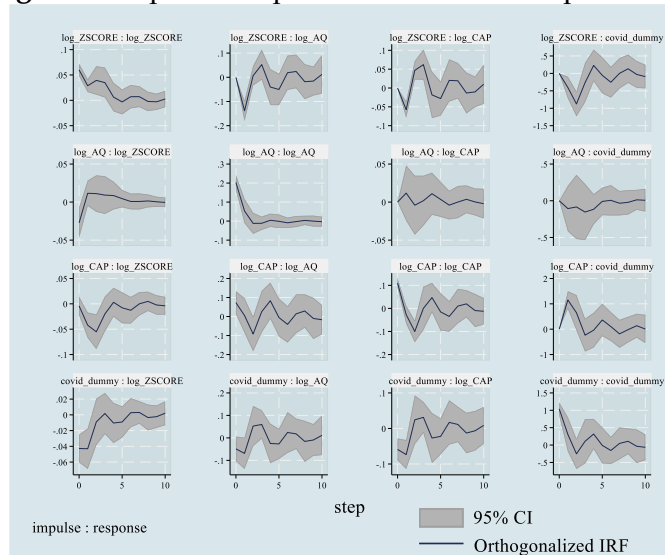
Source: Author's computation.

The stability condition of the P-VAR requires the moduli of the eigenvalues of the dynamic matrix to lie inside the unit circle. Table 5 shows that equation 3 does not satisfy the stability condition as one value lies outside the unit circle, which is further

emphasized in Figure 1. The ROE variable was thus dropped, as shown in Table 6 and Figure 2, where all variables lie within the unit circle, and the stability condition is satisfied. Table 7 shows that the stability condition for equation 4 is satisfied as all the eigenvalues lie within the unit circle. Further, Figure 3 supports this claim of stability.

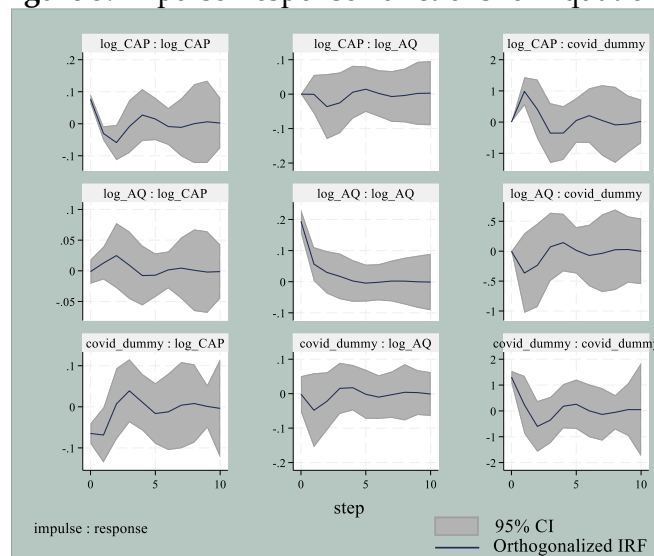
### 4.3 Impulse Responses

**Figure 4: Impulse Response Functions for Equation 3.5**



Source: Author's computation

**Figure 5: Impulse Response Functions for Equation 4**



Source: Author's computation.

After the appropriate lags were established and the stability condition was satisfied, the researcher generated the Impulse Response Functions (IRFs). The P-VAR results are rarely interpreted by themselves rather, most researchers are often interested in the IRFs. The IRFs generate the impact of one variable in the system to innovations in another variable while holding all other shocks at zero. Consequently, the standard errors

of the IRFs and the confidence intervals are generated using Monte Carlo simulations (Garita, 2011). IRFs were generated by Monte Carlo simulations with 200 repetitions over the next 10 years. By orthogonalizing, the more exogenous variables appear first in the P-VAR equation. The first variable represents the impulse variable, while the second variable is the response variable.

Figure 4 outlines the results of the impulse response functions for equation 3. The impulse responses show that one standard deviation shock of COVID-19 on Z-score negatively impacted the financial stability of Kenyan commercial banks, which wore out after 10 years. This is shown in Figure 4 in column 1, row 4. This outcome is akin to the findings of Elnahass *et al.* (2021), who used OLS regression analysis to analyze global banks; Sukisno *et al.* (2022), who utilized the least squares random effects model to study Indonesian banks, and Siti *et al.* (2022). However, Sunarsih *et al.* (2022), using GMM regression, discovered that the pandemic had no impact on the financial stability of Islamic Indonesian banks. Capital adequacy (equation 4) was similarly negatively affected by COVID-19, as shown in Figure 5, row 1, column 3. This implies that one standard deviation shock of COVID-19 negatively affects the capital adequacy of commercial banks in Kenya. The impact wears out after 10 years. Similar results were obtained by Dung *et al.* (2022), who utilized the fixed effect model to study United States and non-United States banks.

## 5. Recommendation

The study's outcome revealed that the pandemic negatively impacted commercial banks in Kenya. The financial stability proxy Z-score is based on ROA, a profitability measure. Therefore, the GOK ought to institute non-disruptive pandemic control measures such as proper hygiene and wearing of masks (in the case of COVID-19) as opposed to quarantines and lockdowns, which affect the commercial banks' operations and also other businesses, ultimately leading to a decline in income for banks. The capital adequacy of Kenyan commercial banks was similarly negatively impacted by the pandemic. Since capital acts as a shock absorber for banks, Kenyan commercial banks should strive to achieve and maintain the minimum capital adequacy ratios set by the CBK. This will ensure that the commercial banks in Kenya cushion themselves against economic shocks generated by pandemics such as COVID-19. Future studies can focus on other financial actors in the Kenyan economy such as SACCOs and microfinance banks. Lastly, a different financial stability proxy can be adopted: the fragility index coupled with time series data.

## 6. Conclusion

The study concluded that, in periods of pandemics, the financial stability of Kenyan commercial banks is bound to be compromised and hindered. In the case of COVID-19, this was in part due to the shock that emanated from the pandemic, which occasioned the government to institute partial lockdowns and travel restrictions. Z-score, the

financial stability proxy, was negatively impacted by COVID-19, as depicted by the IRFs. Likewise, the IRFs depicted a scenario whereby the pandemic negatively impacted the capital adequacy of Kenyan commercial banks.

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### **Conflict of Interest Statement**

The authors declare no conflicts of interest.

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