THE IMPACT OF EXCHANGE RATE FLUCTUATIONS ON CAPITAL ADEQUACY IN LIGHT OF THE CORONA PANDEMIC: AN ANALYTICAL STUDY ON A SAMPLE OF IRAQI COMMERCIAL BANKS FOR THE PERIOD (2011-2021)

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Article history:		Abstract:
Received:	6th September 2022	The study aims to find out the effect of the exchange rate on the capital adequacy index with the introduction of the impact of the pandemic as a modified intermediate variable, due to the exposure of all sectors and their activities to major problems as a result of the exchange rate change at the end of 2020 and the exposure of the world and Iraq in particular to the Corona pandemic at the beginning of 2020, forcing and others from Countries to stop life as a global precaution. The variable represented by the exchange rate (market rate) and the Corona pandemic (as a modified intermediate variable) and the approved variable represented by the capital adequacy index, and certain software such as EViews 12 and Excel were used for the time period 2011-2021 and for four banks listed on the Iraq Stock Exchange. . After a series of calculations at the level of financial, statistical and standard analysis, the researcher concluded that the pandemic significantly affected the dependent variable and strengthened the results of the impact of exchange rate fluctuations on the banking capital adequacy index. Taking into account in formulating the policies of the financing and investment banks in order not to expose these banks to exchange rate risks and the risks associated with them as a result, and to ensure that they maintain their competitive and market position, in addition to that interest in studying the problems of the times and epidemics that appear from time to time and matters related to the environment because they are problems that may be a result Human intervention in it and its consequences are great on all activities, including banking.
Accepted:	6th October 2022	
Published:	7th November 2022	

INTRODUCTION

The exchange rate is one of the most important determinants of the economic stability of a country, which constitutes a vital role in the level of trade exchange in any country, and it is extremely important for every economy in the world. For this reason, the country needs to reevaluate the exchange rate of its currency against the exchange rate of other countries' currencies periodically in order to measure strength own purchasing at the exchange rate of its currency. On the other hand, the study and analysis of the financial safety indicators of the commercial banking sector is also important because this sector is the most economic sector that is affected and affected by the exchange rate and its fluctuations, due to the primary role that this sector plays in the economy and the movement of money and business within the country.

The banking system is the driver that stimulates economic efficiency through the multiple banking operations and services it provides to mobilize savings in investment channels to achieve economic growth in the country. In addition, exchange rate volatility negatively affects the performance of banks by affecting the behavior and performance of depositors and borrowers through Uncertainty about the level of volatility of a currency's exchange rate.

From this standpoint, the Corona pandemic has disrupted economic activity and daily life all over the world, including Iraq, so he took a number of resolute measures to limit the spread of the pandemic and intensified its efforts to ensure the proper functioning of the health and social care system and protect the most vulnerable and affected groups, however, due to the outbreak of the pandemic The

state of uncertainty and weakness caused by the closures that affected most institutions, including commercial, banking and business establishments throughout the country, and the imposition of travel restrictions to contain the pandemic that caused economic effects, which resulted in a significant decrease in production, investment and profits, increased. In addition, the pandemic caused a drop in oil prices, which led to the instability of the economic situation inside the country, which depends almost entirely on oil imports to finance its operating budget. This led to an economic turmoil that affected the stability of the exchange rate, and as a result the activity of the banking sector was affected, which in turn affected the results of banks' business and their financial position.

Therefore, the question here is, to what extent do exchange rate fluctuations affect the capital adequacy index of the Iraqi banking sector in light of the Corona pandemic? With the theoretical framework that shows the exchange rate, the factors affecting it, and the profitability indicators used in banks, the third chapter is devoted to the practical aspect that deals with the interpretation of the type of relationship between the exchange rate and banking profitability indicators. The fourth and final chapter presents the most important conclusions and recommendations for the study reached by the researcher.

The first topic
Study Methodology
First: the research problem

The exchange rate is one of the most important pillars of economic growth and stability for countries because of its vital impact on service, investment and financial activities and trade exchanges at the local and international levels. Measuring the economic and competitiveness of the country, and from this standpoint crises occur from time to time at the local and global levels and have different effects in all sectors, specifically the economic sector by affecting the monetary system as fluctuations and instability in the exchange rate. Financial and banking institutions and money markets are also affected, which leads to Financial stumbling and declining levels of profits, and consequently large losses, and this is what happened in the last global and most important event, which is the Corona pandemic, As this pandemic affected the economic sector as a whole, the monetary system in the country

was affected, which led to instability and fluctuation in the exchange rate due to the state of uncertainty at the level of the local and global economy. In the occurrence of a glitch and reluctance and failure in its work. For the research problem lies in the following question:

What is the impact of fluctuations in the exchange rate on the capital adequacy index in Iraqi commercial banks in light of the Corona pandemic?

Second: the importance of research

The importance lies in studying the currency exchange rate variable because it is one of the economic variables adopted in drawing up the fiscal and monetary policy, especially when the sample is private banks whose foreign transactions are governed by remittances. For this reason, these indicators are considered one of the financial analysis tools that are used in predicting the mechanism of movement and development of banks in the future, as well as showing the impact of the Corona pandemic on research variables.

Third: The purpose of the research

This research aims to measure and analyze the impact of exchange rate fluctuations (market rate) on the capital adequacy index in Iraqi commercial banks in light of the Corona pandemic for the period (2011-2021).

Fourth: Research hypotheses
The first hypothesis:

1- The effect of the exchange rate (market rate) on the capital adequacy index.

The second hypothesis:

1- The effect of the exchange rate (market rate) on the capital adequacy index in light of the Corona pandemic.

Fifth: temporal and spatial boundaries

1- The spatial boundaries of the research: the Iraqi Stock Exchange, the Iraqi commercial banking sector.

2- The temporal limits of the research: the financial statements data of the Iraqi commercial banks for the period (2011-2021) were included.

Sixth: Research community and sample

The research community includes the Iraqi joint stock banks listed in the Iraq Stock Exchange, as four banks were selected, namely (Al-Mansour Investment Bank, Khaleeji Commercial Bank, Bank of Baghdad, National Bank of Iraq) for the period of the year (2011-2021) as shown in the table below:

Table (1) Iraqi local commercial banks study sample (amount in million Iraqi dinars)

the bank	bank code	Listing date	The current capital
Al-Mansour Investment Bank	BMNS	2008/07/01	250,000,000,000
Commercial Alkhalij Bank	BGUC	2004/07/25	300,000,000,000
Baghdad Bank	BBOB	2004/06/15	250,000,000,000

Bank of Iraq alahli	BNOI	2004/07/08	250,000,000,000

Source: Prepared by the researcher after reviewing the information from the Iraq Stock Exchange, the commercial banking sector.

Seventh: Financial and statistical tools and methods

The use of the data on the exchange rate and the capital adequacy index in banks as financial tools for the purposes of analysis, which are represented in the equations for testing hypotheses with the symbols that correspond to the statistical methods in this study to show whether there is a correlation or not between the variables, and then using multiple linear regression to reach the model equations after Data was collected and extracted The necessary, organized, and classified within a program, and models were used to test the research hypotheses based on the study of Ruihao, Ke, 2012)), the study (Shumway.T, 2001), the study (Campbell, et al, 2008), and the study (Falah, et al, 2018), (Hillegeist&Keating, 2004). It is as follows :

1- For the purpose of testing the first hypothesis, Model No. (1) is used:

$$CAR_{t.i} = \beta + \beta_1\, MP_{t.i} + \beta_2\, CO19_{t.i} + \beta_3\, CO19*MP_{t.i} + \varepsilon_{t.i}$$

2- For the purpose of testing the third hypothesis, Model No. (2) is used:

$$CAR_{t.i} = \beta + \beta_1\, WP_{t.i} + \beta_2\, CO19_{t.i} + \beta_3\, CO19*WP_{t.i} + \varepsilon_{t.i}$$

Table (2) Scientific symbols for independent and dependent variables

variable	User code
Capital Adequacy Ratio = Total Regulatory Capital / Risk Weighted Assets.	$CAR_{t.i}$
exchange rate (market rate)	$MP_{t.i}$
Dummy variable (binary): Takes (1) in the event of a COVID-19 pandemic, the opposite takes (0)	$CO-19_{t.i}$
Error value (residuals)	$\varepsilon_{t.i}$

The table was prepared by the researcher after reviewing the scientific sources.

The second topic: the theoretical side of the research
First, the exchange rate
1- The concept of exchange rate

The exchange rate reflects the purchasing power of one country's currency against the purchasing power of another country's currency (Agarwal, 2010:315) and it can also measure the value of one currency in units of another currency. This is why as local and global market conditions change exchange rates can change drastically and a decline in the value of a currency is often referred to as inflation. For example, when the value of the pound sterling decreases against the US dollar, it means that the US dollar is stronger compared to the pound sterling, which gives a greater value and appreciation for the dollar (Madura, 2008:85). So is the price of a country's currency in relation to other currencies. In other words, it is the price at which one currency can be converted into another (Nelson, 2015:1).

2-The importance of the exchange rate

The study of the exchange rate has attracted the attention of many academics and researchers, due to the diversity and openness in the financial and business sector at the level of global markets, which results in the multiplicity and difference in currency values due to the disparity of levels between countries of the world (Williamson, 2009: 2-3), for that the exchange rate It has an important role in the money market through its compatibility with whether the monetary policy is strict because high interest rates will stabilize the economy and reduce inflation rates, which leads to an increase in the value of the currency, and also the exchange rate has a role in financial and investment policy if this policy is lenient and leads to devaluation of the currency, And there is a relationship between the exchange rate and inflation by way that a country with a low inflation rate increases the value of its currency by increasing the purchasing power of citizens due to the general decrease in the price level within the country, in contrast when the inflation rate rises as a result of an increase in the money supply, the value of the local currency decreases, which leads to a decrease Purchasing power due to the general rise in the price level, moreover, the exchange rate is closely related to interest rates through central banks' control of interest rates. It leads to an increase in the value of the exchange rate. (Bihari,2013:1-2)

Second: the Corona pandemic

1- What is the Corona pandemic?

In late December 2019, an outbreak of a disease of unknown cause called pneumonia occurred in Wuhan, Hubei Province, China. The outbreak has spread dramatically, infecting 9,720 people in China, with 213 deaths and 106 people infected in 19 other countries. A few days after the outbreak of this disease, the causative agent of this mysterious pneumonia was identified as a virus by several independent laboratories, which is why this virus was named after the Corona virus, as well as the Corona virus disease (COVID-19) from Before the World Health Organization (He, et al, 2020:1). The virus that causes COVID-19 undoubtedly affects people of all ages. (WHO, 2020:2), Perhaps it is useful to touch on some methods that help in the treatment of COVID-19, in the beginning it is recommended at the present time to take the special vaccine for COVID-19 as a precautionary measure to prevent the disease, but if it happened and was infected with COVID-19 the person prefers to follow those methods that help On healing, which is to ensure proper isolation to prevent transmission of infection to other people. Especially mild illness should be dealt with at home by consulting a specialist doctor about some of the symptoms of the disease, and it is necessary to maintain hydration and nutrition and control fever and cough. Excessive use of antibiotics and antivirals should also be avoided, except after consulting a specialist doctor. As for patients who suffer from a lack of oxygen, oxygen must be provided through nasal tubes or a face mask. And artificial respiration may be needed, depending on the patient's condition (4: Singhal, 2020).

2- The impact of the Corona pandemic on the exchange rate

This pandemic has caused significant fluctuations in global financial markets, after the regulatory authorities found that global stock market reports show clear different patterns before and after the outbreak of the pandemic, as well as that the policy responses of countries that present more uncertainty in global financial markets helped create This fluctuation (Benzid&Chebbi,2020:2). In addition to what has been mentioned, the volume of exchange rate volatility is of great importance in the stability of foreign trade and the external environment of any country. Therefore, the high volatility of the exchange rate increases the risks of financial markets and also increases the uncertainty about foreign investment and leads to a decrease in social welfare, and the turmoil of internal and external conditions or times of local and global crises have a significant impact on the stability of the exchange rate. With the spread of the Corona pandemic worldwide, many countries have adopted a number of measures such as controlling the movement of transport and imposing restrictions on the movement of the population, which made the global economic and trade environment more flabby and discouraging, and as a result international trade was affected by these measures. According to statistics from the World Trade Organization (WTO), the volume of merchandise trade in the first quarter of 2020 decreased by 3%. Preliminary estimates of global trade in the second quarter of 2020 also indicate that the pandemic has affected a large part of the world's population due to the embargo measures, as global merchandise trade decreased more on an annual basis by 18.5%. This is due to the sharp decline in the volume of world trade, and it is clear that international capital flows will inevitably be affected, which will significantly increase exchange rate volatility. Also, with the decrease in global capital flows, financial institutions assume an upward trend in the risks resulting from the unbalanced demand for international financial assets, which causes a change in the direction of investors towards reducing their holdings of currencies and thus affecting the stability of the exchange rate. (Feng, et al, 2021:3).

3- The impact of the Corona pandemic on the capital adequacy of banks

To avoid a bank's capital falling below the requirements of the legal reserve maintained with the Central Bank, banks may wish to have an additional capital reserve on hand, especially if their capital adequacy ratio is unstable and increases or decreases. Capital is the most important tool used in banking supervision (Anastasia, et al, 2022)). For this, the capital adequacy ratio in banks is expressed as a comparison between capital and risk-weighted assets. That is, the higher the capital adequacy value (CAR), the better the ability of banks to deal with the risk of potential loss, and the higher the value of the interest rate on depreciation. The pandemic has an impact at the global level. It has affected the financial and banking performance and various indicators of financial performance and stability in different countries. This pandemic has also increased systemic risks in many countries, as banking performance has declined during a pandemic, banking services resilience in managing pandemic shock has deteriorated, and the banking mediation function has also been postponed due to weak credit with credit growth dropping from 7.89% to 0.12% and return on assets has decreased. (ROA) from 2.45% to 1.74%, net interest margin (NIM) decreased from 4.79% to 4.29%, operating expenses to operating income ratio (BOPO) increased from 80.66% to 86.15%, and loans to deposits ratio (LDR) decreased from 93.76% to 83.16%, non-performing loans increased from 2.66% to 3.14%, these events due to the pandemic affected the value of capital adequacy (CAR), which led to a decrease in this percentage in most banks and as a

result, the ability of banks to deal with risks decreased and they were exposed to Losses and increased risks of allocating the bank's capital to its assets (Purbayati, et al, 2022:2-6).

4-Capital Adequacy Indicator
The capital adequacy ratio (CAI) is one of the financial measures that works to achieve the financial health of the bank by absorbing a reasonable amount of loss. Banks face different types of risks while carrying out financial intermediation business because it is a highly indebted sector in the economy, so risks and uncertainties are an integral part of banking business and that risk management is the core of any banking service and therefore there is a need for a sufficient capital adequacy ratio to cover these risks. In addition, capital regulation is of great importance to reduce bank failures, enhance the stability and safety of the banking system, prevent systemic risks and reduce losses in order to provide protection to shareholders, depositors and borrowers, especially gaining their trust (Fatima, 2014:771). In a related context, the risks that banks are exposed to are classified into various risks, including credit risk, market risk, interest rate risk and exchange rate risk. These risks are also taken into consideration when calculating the interest rate on debt. Therefore, the regulatory authorities used the capital adequacy ratio as an important indicator of the safety and stability of banks and depository institutions because they view capital as a guard or protection against financial risks (Bateni, 2014: 108). So all banks should start publicly disclosing their leverage ratio (Charpentier, 2014:25). The capital adequacy ratio can also be expressed by the following equation (Skully, et al, 2009:7):

$$capital\ adequacy\ ratio\ \frac{Regulatory\ Capital\ Total\ Capital}{Risk\ Weighted\ Assets} * 100 \ldots \ldots (1)$$

The third topic
First: descriptive analysis of the research variables
1- Market exchange rate analysis
The data issued was approved by the Central Bank of Iraq (Monetary Stability Department - Statistics - Central Banking - Central Bank Library) published on the website of the Central Bank of Iraq on the Internet.
Here we will analyze the exchange rate of the Iraqi dinar against the US dollar during the study period that extends (2011-2021).

Table (3) market exchange rate
Data Rage: 01/31/2011 To: 12/31/2021

Date	market price
12/31/2011	1195.66
12/31/2012	1232.66
12/31/2013	1128.92
12/31/2014	1213.66
12/31/2015	1247.41
12/31/2016	1275.25
12/31/2017	1258
12/31/2018	1217.25
12/31/2019	1196.25
12/31/2020	1233.91
12/31/2021	1474.16
the highest rate	1474.16
minimum	1128.92
Arithmetic mean	1243.012

Source: Central Bank of Iraq - Department of Statistics and Research.

According to Table (3), the market exchange rate for the period (2011-2021) is clarified, as it turns out that the general average for the study period is (1243.012) dinars, The lowest value of the exchange rate was in 2013, when the exchange rate amounted to (1,128.92) dinars, and the highest value of the exchange rate was in 2021, when the exchange rate amounted to (1474.16) dinars, and the fluctuation rate is between the lowest and highest value of the exchange rate at a rate of (1.23%).

2- Analysis of the capital adequacy index for the Iraqi domestic commercial banking sector
The following is the special analysis of the capital adequacy index according to the financial statements issued by the Iraqi local commercial banks (the study sample for the period 2011-2021)

1- Capital Adequacy Index

				Table (4) Capital Adequacy Ratio (CAR) % Analysis
Al-Mansour Investment	Alkhalij Commercial	Baghdad Bank	alahli Bank of	years

Bank	Bank		Iraq	
102.089	60.22	37	196	2011
244	51.496	55	133	2012
223.44	78.034	59	104.15	2013
210.88	73.809	58	111.5	2014
190.84	75	64	116.9	2015
226.43	89	88.7	103.22	2016
206.25	125	103	106.65	2017
204.89	131	127	82.87	2018
209.13	148	64	58.19	2019
210	15	28.58	30.91	2020
111	33	34	25	2021
244	148	127	196	the highest rate
102.089	15	28.58	25	minimum
194.45	79.9599	65.2982	97.1264	Arithmetic mean

The table was prepared by the researcher using the Excel program after accreditation, review and analysis of the annual financial reports of the Iraqi local commercial banks, the study sample published in the Iraq Stock Exchange.

Table (4) shows that the highest value of the capital adequacy ratio was in Al-Mansour Bank for Investment at (244 percent), and the lowest value of this ratio during the years of the study period in Gulf Bank was (15%), after that the arithmetic mean of the study sample banks It turns out that Al-Mansour Bank for Investment recorded the highest mean of the arithmetic mean by (194.45) and this indicates that Al-Mansour Bank is the most capital-reserving bank compared to other banks. Its amount is (15%), however, this rise provides security for depositors or bank owners, but at the same time it represents a weakness, because the bank does not use a large part of its money, whether in the form of loans or investments that may generate profits in the future. The part of the capital incurs the opportunity cost of the bank as a result of using the capital within narrow limits.

Second: descriptive tests for research

Test the correlation coefficient between the research variables

The correlation coefficient measures the degree of linear correlation between two variables, and the correlation coefficients for the study variables were as in the table below:

Table No. (5) Correlation matrix for study variables

Correlation	CAR	MP
CAR	1.000	
Probability	-----	
MP	-0.240	1.000
Probability	0.116	-----

Source: Prepared by the researcher based on the outputs of the Eview12 program.

Table No. (5) indicates that the values of the correlation coefficient between the independent variables are less than ($0.80 \pm$), which indicates that there is no linear correlation problem between the study variables.

Third: Testing and analyzing research hypotheses
Model installation results (1)

We determine the most suitable model, as we will conduct two tests and in two stages, the first stage (the first test) to determine the homogeneity of individual units between the lump-sum effects method (OLS) (homogeneous individual units) and the fixed effects method (LSDV) (heterogeneous individual units) in order to know the most suitable model. Fitting, which is known as a Chow or restricted F test. The results of this test were as follows:

Table (7) for the restricted Chow or F test.

(H_0) Null hypothesis	F test	Prop	Test result
model direction OLS	30.213	0.000	The hypothesis is accepted The most appropriate) cumulative effects method) H0

Source: Prepared by the researcher based on the outputs of the Eview12 program.

According to the above table, the Prop value of the F-test is (0.000), which indicates that the null hypothesis H0 is rejected, which means that the fixed effects method is superior, that is, individual heterogeneous units are accepted and the fixed effects method has become the most suitable.

If the null hypothesis is rejected, the second stage (the second test) is applied for the preference between the fixed effects model and the random effects model, using the Hassmann test, to verify the significant correlation between the components of the disorder and the explanatory variables of the model. If there is a significant correlation, the tablet method will be used. With fixed effects, but if this correlation is not significant, the tablet method with random effects should be used, as in the table below:

Table (7) Hausmann test

(H0) Null hypothesis	.Chi-Sq test	Prop	Test result
The random effects method is the best	0.000	1.000	H0 Hypothesis Accepted The most appropriate random-effect) (tablet method

Source: Prepared by the researcher based on the outputs of the Eview12 program.

It can be seen from Table (7) that the Prop value of the Hausmann model test is (1,000), which indicates that the null hypothesis H0 is accepted, which means that the random-effects tablet method is more suitable than the fixed-effects tablet method.

Testing the first and second major hypotheses
1- The first hypothesis: the effect of the exchange rate (market rate) on the capital adequacy index.
2- The second hypothesis: the effect of the exchange rate (market rate) on the capital adequacy index in light of the Corona pandemic.

Table (9) Testing the second sub-hypothesis of the first and second main hypotheses

Variable	Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	fixed limit	40.581	39.458	1.028	0.331
MP	market price	0.068	0.034	1.997	0.077
Co-19	COVID-19	117.617	36.168	3.252	0.010
Co-19*MP	COVID-19 *Market Price	-0.143	0.032	-4.435	0.002
R-squared	0.868	Adjusted R-squared		0.839	
F-statistic	29. 969	Prob(F-statistic)		0.000	

Source: Prepared by the researcher based on the outputs of the Eview12 program.

Table (8) shows through the results of the statistical analysis the significance of the model, where the value of (Prob) (F-statistic) was less than (0.05) and it was (0.000), which indicates that the model is valid for the test and its results are reliable, as for the value of (R-squared) was (0.868), which means that the explanatory power of the independent variables with the dependent variable is 87%), and the value of (Adjusted R-squared) was (0.839), which means that the independent variables affect the dependent variable by 84%.

Interpretation of the result of the first hypothesis
The results of the statistical analysis show that the value of (Prob) for the independent variable, the exchange rate measured by the market price index, is higher than (0.05) where it reached (0.077), which indicates that there is no significant effect of the market price on the financial safety indicators as measured by the capital adequacy ratio.

Interpretation of the result of the second hypothesis
The results of the statistical analysis show that the value of (Prob) for the period of Covid-19 is less than (0.05), reaching (0.002), which indicates that there is a significant effect of the exchange rate measured at the market price on the financial safety indicators as measured by the capital adequacy ratio in light of the Corona pandemic.

Fourth Topic: Conclusions And Recommendations
First: The Conclusions
The state of fluctuation in exchange rates according to the market rate is large and in proportion to the conditions of the country and the state of supply and demand, as well as the state policy in the recent period that adopted the high exchange rate compared to the Iraqi currency in order to cover the budget deficit. It turns out that there is a clear discrepancy for each of the selected sample banks during the study period in terms of the capital adequacy index and this is due to the large retention by the administrations of these banks greater than the percentage imposed by the Central Bank, which makes these differences large and this clearly appears in Al-Mansour Bank Compared to other banks. As it is clear from the results that there is no significant effect of the exchange rate according to the market price index

on the financial safety indicators measured by capital adequacy, except in light of the Corona pandemic, it turned out to the contrary, and there was a moral effect, especially in light of the period in which Iraq was exposed to the pandemic (beginning of 2020) that corresponds with The state of change in exchange rates (end of 2020) for the same year, which was reflected on the reality of the capital of the study sample banks.

Second: Recommendations

The need to take into consideration the study of the state of fluctuation in exchange rates (the market) in the Iraqi financial reality and its positive and negative results in all areas and activities, especially its banking activity. It is also preferable to work out how to deal with the large retention of capital adequacy ratios by banks, which prevents them from being employed in various investment activities that contribute in one way or another to moving and developing the Iraqi financial situation. Also, the need to show great interest in the precautionary measure through the allocation of debts or loan losses after extensive study in the procedures for granting loans to ensure the correct granting of these funds without falling into financial problems that the bank is exposed to as a result.

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