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RESEARCH ARTICLE

The Impact of Inflation on Bank Profitability: Empirical Evidence from Iraq

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ABSTRACT

This study aims primarily to analyze the relationship between inflation and the financial performance of a sample of Iraqi banks. Besides the inflation, considered as the key macroeconomic variable, four other independent variables, namely the growth rate, liquidity risk, leverage, and size are added to explain bank profitability. Our sample consists of 14 Iraqi banks over the period from 2012 to 2022. Using panel data techniques, we provide evidence that the financial performance of Iraqi banks is negatively affected by inflation. We also find that bank profitability is positively affected by the GDP growth, the bank size, and leverage. However, the effect of the liquidity risk according to the measure used for bank profitability (return on assets or return on equity).

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INTRODUCTION

Aware of the importance of banks in boosting economic development, several previous studies have investigated the factors influencing their profitability. They provide evidence that bank profitability depends on bank-specific and macroeconomic factors. Dietrich and Wanzenried (2011) examines the explanatory factors of bank profitability during the crisis by applying a generalized method of moments (GMM) technique to a panel of commercial banks in Switzerland. They find that profitability is principally explained by bank-specific factors (operational efficiency, the growth of total loans, funding costs, the business model) and a macroeconomic variable (effective tax rate). Capraru and Ihnatov (2014) identify the main determinants of bank profitability in five CEE countries (Romania, Hungary, Poland, Czech Republic and Bulgaria). They provide evidence that bank profitability depends on management efficiency, capital adequacy, credit risk and inflation. Dietrich and Wanzenried (2014) find that the bank profitability is affected by bank-specific characteristics, macroeconomic variables and industry-specific factors. Albulescu (2015) assesses the influence of financial soundness indicators on the banks' profitability in six Central and South American countries (Chile, Colombia, El Salvador, Honduras, Mexico and Paraguay) over the period 2005-2013. He concludes that bank profitability may be explained by five factors, namely, non-performing loans, capitalization, liquidity, interest rate margins and non-interest expenses. Petria et al. (2015) explore the explaining factors of bank profitability in EU27 over the period 2004-2011. Their findings reveal

that credit and liquidity risk, management efficiency, the diversification of business, the market concentration/competition and the economic growth are the main determinants of bank profitability.

Recently, some studies, including Boyd and Champ (2006), have proven the existence of a negative relationship between high inflation and bank profitability. One possible explanation for this inverse relationship is that a rise in inflation leads to a decline in demand for loans due to a rise in interest rates. Also, an increase in the inflation rate may lead to bank employees requesting an increase in their wages to maintain their purchasing power, and the increase in wages for the bank will inevitably lead to a decrease in profitability. In contrast, some other studies (for example Tan and Floros, 2012; Kanval et al., 2024) have documented a positive relationship between bank profitability and inflation.

These mixed results regarding the effect of inflation on bank profitability requires further investigation of this relationship in different frameworks. Thus, the present paper aims to investigate the impact of inflation on the profitability of Iraqi banks. The analysis of this topic seems very interesting given the importance of the banking sector in boosting economic development in Iraq.

MATERIALS AND METHODS

We use a sample consisting of a balanced panel data of 10 Iraqi banks over the period 2012-2022. The panel techniques are applied to identify the main factors affecting bank profitability.

The main objective of this paper is to assess the effect of inflation on bank profitability. However, we added some other variables suggested by theories and previous studies as determinants of bank profitability.

Building on previous studies, two measures of bank profitability are used namely the return on assets (ROA) and the return on equity (ROE). ROA and ROE are defined, respectively, as net income reported to total assets and to equity.

In this study, we use these both measures of bank profitability although it seems more appropriate to focus on the ROA since banks with a lower leverage ratio (higher equity) usually report a higher ROA but a lower ROE. However, the ROE disregards the higher risk that is associated with a high leverage and the effect of regulation on leverage (Dietrich and Wanzenried, 2011).

Building on the results of previous studies, we assume that the profitability of Iraqi banks can be explained by both macroeconomic factors such as inflation and economic growth and bank-specific characteristics such as size, liquidity and leverage. Inflation is defined as the annual change of the consumer price index. Economic growth is measured by the annual increase of the Gross Domestic Product (GDP). The bank size is measured by the natural logarithm of total assets. A positive relationship is expected between size and profitability because large banks are more able to diversify their activities and as a consequence increase their revenue. Liquidity (LIQ): The liquidity ratio equals to loans divided by customers' deposits. A positive relationship between liquidity and profitability is expected because banks that are able to convert the increasing value of deposits into loans benefit from the interest rate spread to increase their income. Leverage equals total assets divided by equity.

We perform regressions of bank profitability on this set of variables, namely inflation and the four other factors using panel techniques. Panel data analysis is increasingly the preferred form of analysis among researchers given it allows one to identify some effects that cannot be detected using another kind of analysis (i.e., individual time series). A panel data is a cross-sectional units observed over time. In many cases, relatively small number sectional units are observed over a number of periods. We term such as pooled cross section data or pooled time series.

The dependent and explanatory variables for panel data models are typically denoted using two

subscripts usually indicating both individual and time. Some variants of the model ("fixed effects" models) can be viewed as special cases of the classical linear regression model, while others ("random effects" models) are special cases of the generalized regression model.

In this study, we assume that bank profitability considered as the dependent variable satisfies a linear model with an intercept that is specific to individual i. Thus, estimate the following linear model:

$Prof_{it} = \alpha_i + \beta_1 inf_{it} + \beta_2 GDP_{it} + \beta_3 liquidity_{it} + \beta_4 leverage_{it} + \beta_5 size_{it} + \varepsilon_{it}$, i =1,..., 14 , t=1,...,11

Where bank profitability is measured either by ROA or by ROE.

The individual effect, α_i, which is taken to be constant over time t and specific to the individual cross-sectional unit i. As it stands, this model is a classical regression model. If we take the α_i to be the same across all units, then ordinary least square provides consistent and efficient estimates of α and β. There are two basic frameworks used to generalize this model. The fixed effects models approach takes α_i to be a group specific constant term in the regression model. The random effects approach specifies that α_i is a group specific disturbance.

RESULTS

Before starting the identification of the factors affecting the financial performance of Iraqi banks, we will first focus on the descriptive analysis of the variables using means, standard deviations, and minimum and maximum values, in order to give a clear picture of these variables. Table 1 presents the results of these statistics for each variable separately:

Table 1: Descriptive statistics

	ROE	ROA	INFLATION	GDP	LIQUIDITY	LEVERAGE	SIZE
Mean	4.439	2.125	2.192	2.509	2.478	55.906	10.059
Median	1.830	0.935	1.390	2.800	1.755	51.340	9.135
Max	99.250	42.060	6.09	14.80	42.96	427.930	12.190
Min	-4.850	-2.610	-0.20	-15.70	0.020	0.000	8.430
Std. Dev.	10.144	5.197	2.283	8.061	4.469	38.123	1.465
Skewness	6.361	5.702	0.780	-0.605	7.451	6.277	0.279
Kurtosis	54.390	39.261	1.987	3.193	62.054	60.810	1.169
Jarque-Bera	17984.58	9271.329	22.200	9.631	23802.50	22456.06	9.631
Probability	0.000	0.000	0.000	0.008	0.000	0.000	0.008
Observations	154	154	154	154	154	154	154

Through the results of the descriptive statistics in Table 1 for return on assets, it is found that the p-value of the Jarque-Bera test for all variables is less than 5%, which indicates that they do not follow a normal distribution, but the normality condition can be ignored according the Central Limit Theorem since the number of observations is greater than 30.

The highest value is 42.060%, while the lowest value is -2.610%, and the mean is estimated at 2.125%, with a standard deviation of 5.197%. This indicates that Iraqi banks achieved, in general,

positive results during the period ranging from 2012 to t 2022, but there is a noticeable discrepancy between their financial performance. The value of the Skewness coefficient is positive, which indicates that the distribution curve is skewed to the left, while the value of kurtosis is 39.261, which is higher than 3, and this indicates that the curve of the variable return on assets is not leptokurtic.

As for return on equity; It is found that the highest value is 99.250%, while the lowest value is -4.850%, and the arithmetic mean is estimated at 4.439%, with a standard deviation of 10.144%. The value of the Skewness coefficient is positive. This indicates that the distribution curve is skewed to the left, while the value of kurtosis is 54.39, which is higher than 3, and this indicates that the curve of the variable return on equity is not leptokurtic.

The highest value of inflation in the Republic of Iraq is 6.09%, which is in the year 2012, while the lowest value is -0.20%, which is in the year 2019, and that the arithmetic average of the inflation rate in the Republic of Iraq is 2.192% during the period from 2012 to 2022, with a standard deviation of 2.283%. The value of the skewness coefficient is positive, which indicates that the distribution curve is skewed to the left, while the value of kurtosis is 1.987, which is less than 3, and this indicates that the curve of the inflation rate variable is leptokurtic.

The mean of GDP growth is equal to 2.50, and the lowest value is -15.70 in 2020 and the highest value is 14.80 in 2016, with a standard deviation equal to 8.06, while the value of the Skewness coefficient is negative. This indicates that the distribution curve is skewed to the right, while the kurtosis value is 3.19, which is higher than 3 suggesting that the curve of the GDP growth variable is not leptokurtic.

The highest value of the liquidity ratio is 6.640%, while the lowest value is 0.020%, and the mean is estimated at 1.872, with a standard deviation of 0.884, and the value of the Skewness coefficient is positive. This indicates that the distribution curve is skewed to the left, while the value of kurtosis is 8.058, which is higher than 3, and this indicates that the curve of the liquidity variable is not flat.

As for the financial leverage ratio, it is found that the highest value is 427.93%, while the lowest value is 0.000%, and the arithmetic mean is estimated at 55.906%, with a standard deviation of 38.123%. The value of the Skewness coefficient is negative which indicates that the distribution is skewed to the left, while the value of kurtosis is 60.81 indicating that the curve of the financial leverage variable is not leptokurtic.

The highest value of the bank size is 12.190, while the lowest value is 8.430, and the arithmetic mean is estimated at 10.059, with a standard deviation of 1.465. The value of the Skewness coefficient is positive indicating that the distribution curve is skewed from on the left side, while the value of kurtosis is 1.169, suggesting that the curve of the size variable is flat.

The Augmented Dickey–Fuller (ADF) test is used to verify the stationarity of the time series. The results reported in Table 2 suggest the rejection of the null hypothesis of the existence of a unit root at the level for all series. Thus, all series are stationary at level and can be incorporated in the model without need for first difference.

Table 2: Stationarity test

Variables		**Stationarity at level**		
		None	Trend & Intercept	Intercept
ROA	Statistic	102.732	72.6823	77.9985
	p-value	0.0000	0.0000	0.0000
ROE	Statistic	111.598	82.2196	90.0441
	p-value	0.0000	0.0000	0.0000

Inflation	Statistic	261.392	237.305	319.265
	p-value	0.0000	0.0000	0.0000
GDP growth	Statistic	168.821	72.4314	99.4284
	p-value	0.0000	0.0000	0.0000
Liquidity	Statistic	25.5298	56.8509	25.2877
	p-value	0.5989	0.0000	0.0060
Leverage	Statistic	35.0202	45.3161	53.4056
	p-value	0.1693	0.0205	0.0026
Bank size	Statistic	116.992	40.2322	62.4911
	p-value	0.0000	0.0630	0.0002

The problem of multicollinearity occurs when one of the independent variables is a composite of other variables or when the independent variables are closely related. Under this situation, the variables begin to cancel each other out, leading to a decrease in the predictive power of the model. Therefore, when conducting a multivariate regression analysis, we should check the absence of multicollinearity between the independent variables. Thus, two common tests will be used to detect multicollinearity in this study, which are correlation matrix analysis, and the Variance Inflation Factor (VIF).

The correlation matrix analysis for all independent variables states that when a correlation coefficient of ±0.50 and above indicates the presence of multilinearity between the independent variables (Hair Jr. et. al., 2014). The results reported in Table 3 indicates the absence of the multicollinearity problem.

Table 3: Correlation matrix

Probability	**INFLATION**	**GDP**	**LIQUIDITY**	**LEVERAGE**	**SIZE**
INFLATION	1.000000				

GDP	0.221741	1.000000			
	0.0057	-----			
LIQUIDITY	-0.056995	0.043823	1.000000		
	0.4826	0.5894	-----		
LEVERAGE	0.008244	0.047290	-0.163964	1.000000	
	0.9192	0.5603	0.0422	-----	
SIZE	0.037092	0.011727	0.140789	-0.103348	1.000000
	0.6479	0.8852	0.0816	0.2021	-----

In addition, the results of the Variance Inflation Factor (VIF) reported in table 4 confirm the absence of multicollinearity among independent variables.

Table 4. Variance Inflation Factor (VIF)

	ROA				**ROE**	
	Coefficient	**Uncentered**	**Centered**	**Coefficient**	**Uncentered**	**Centered**
Variable	Variance	VIF	VIF	Variance	VIF	VIF
INFLATION	0.013548	1.065938	1.058974	0.066295	1.065938	1.058974
GDP	0.002096	1.161931	1.058699	0.010259	1.161931	1.058699
LIQUIDITY	0.006784	1.378557	1.052857	0.033195	1.378557	1.052857
LEVERAGE	9.19E-05	3.284705	1.037969	0.000450	3.284705	1.037969
SIZE	0.152492	1.029316	1.029310	0.746184	1.029316	1.029310

To choose the appropriate model to determine the impact of inflation and other variables on bank profitability measured by ROA and ROE, we begin by testing the significance of individual effects, i.e. testing the hypothesis that the constant terms are all equal. In the case of absence of individual effects, the pooled model will be considered as the more appropriate. In contrast, the presence of individual effects requires that we check if these effects are fixed or random using the Haussman test.

To check the presence of individual effects, we formulate the following hypothesis is:

H0: The Pooled model is appropriate.

H1: The fixed effects model is appropriate.

The results of the homogeneity test of effects reported in Table 5 show that the p-value for both Fisher and Chi-square tests is greater than the 5% level of significance, and therefore the H0 hypothesis is accepted, meaning that the Pooled effect model is the appropriate one.

Table 5: Results of the homogeneity test

		ROA				**ROE**	
Effects Test	Statistic	d.f.		Prob.	Statistic	d.f.	Prob.
Cross-section F	0.861019	(13,121)		0.5954	0.846124	(13,121)	0.6110
Cross-section Chi-square	12.386400	13		0.4962	12.181184	13	0.5128

The results obtained using the Pooled model for both ROA and ROE are presented in table below:

Table 6. Regression results of the determinants of bank profitability

	ROA				**ROE**			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
C	0.7984	0.2896	2.7572	0.0066	-2.1057	0.5224	-4.0309	0.0001
INFLATION	-0.0487	0.0213	-2.2841	0.0239	-0.0131	0.0839	-0.1557	0.8765

GDP	0.0485	0.0227	2.1366	0.0344	0.0516	0.0334	1.5440	0.1250
LIQUIDITY	-0.0265	0.0147	-1.8017	0.0738	0.0469	0.0396	1.18470	0.2382
LEVERAGE	0.0104	0.0031	3.3335	0.0011	0.0860	0.0078	10.9608	0.0000
SIZE	0.3816	0.1886	2.0231	0.0451	0.2869	0.3486	0.8230	0.4120
R-squared		0.1311			0.4867			
Adjusted R-squared		0.0987			0.4676			
F-statistic		4.0443			25.413			
Prob(F-statistic)		0.0019			0.0000			

For the ROA variable, we notice from Table 6 that the probability value of the Fisher test is 0.0019, which is less than 5%, which means that the model as a whole is statistically significant. The value of the R-squared is 13.11%, which means that the independent variables in the model explain the change in return on assets for the sample of Iraqi banks by 13.11%. The relative weakness of the coefficient of determination indicates that there are other independent variables that were not included in the research as a result of the lack of data, such as those related to governance. Therefore, we recommend that future studies need to expand the list of independent variables to improve the model's ability to explain the return on assets.

For ROE, the p-value of the Fisher test is 0.0000, which is less than 5%, which means that the model is statistically significant. The value of the R-squared is 48.67%, which means that the independent variables in the model explain the change in return on equity for the sample of Iraqi banks by 48.67%, meaning that this model can explain approximately half of the change that occurs in the return on bank capital.

DISCUSSION

The results obtained indicate that inflation negatively affects bank profitability, and this effect is statistically significant at the 5% level. A change in the inflation rate of 1% results in a decrease in the return on assets of Iraqi banks by 4.87%. and the return on equity by 1.31%. This result aligns with previous findings in Boyd and Champ (2006) and contradicts that of Tan and Floros (2012).

GDP growth at constant prices in Iraq positively affects the profitability of Iraqi banks. The increase in the growth rate of GDP at constant prices in Iraq by 1% contributes to the improvement of the return on assets in Iraqi banks by 4.85% and the return on equity by 5.16%.

The effect of liquidity on the financial performance of Iraqi banks is statistically significant in the two models, but it is positive when using return on equity and negative when using return on assets. An increase in the liquidity ratio by 1% contributes to an improvement in the return on equity in Iraqi banks by 4.69% and a decrease in the return on assets by 2.65%. The negative relationship between bank profitability measured by ROE corroborates with previous findings in Bougatef (2017) for Tunisian banks, while the negative association between ROA and liquidity stands in line with results in Petria et al. (2015) for European banks.

Our findings also reveal that the leverage positively affects bank profitability. An increase in the level of financial leverage by 1% contributes to an improvement in the return on assets in Iraqi banks by 1.04% and the return on equity by 8.6%.

Finally, we notice that bank profitability turns out to vary according to the size. The larger the bank, the better its profitability. This can be explained by the diversification of the activities of large banks and thus the variety of their sources of income. This result is coherent with previous findings in Petria et al. (2015) and Bougatef (2017).

CONCLUSION

This study aimed primarily to analyze the relationship between inflation and the profitability of a sample of Iraqi banks. The model included four other independent variables that are considered, according to theories and previous studies, to be factors affecting banks' profitability. We added the growth rate, liquidity ratio, financial leverage, and bank size to the inflation rates to explain changes in bank profitability ratios. In this study, we relied on annual data for 14 Iraqi banks during the period extending from 2012 to 2022 years. Our findings reveal that inflation in Iraq has a negative and significant impact on the profitability of Iraqi banks. Indeed, the increase in the inflation rate in Iraq by 1% leads to a decrease in the return on assets in Iraqi banks by 4.87% and 1.31% return on equity. As for the rest of the independent variables (GDP growth rate, financial leverage, and bank size) they contribute to improving the return on assets of Iraqi banks. However, a mixed result is found regarding the effect of liquidity on bank profitability.

Our evidence on the existence of an inverse relationship between inflation and bank profitability recommend to Iraqi bank managers and political and economic decision-makers that they should control the inflation rate due to its negative impact on bank profitability through some mechanisms and policies, such as relying on the inflation targeting system, which has proven its effectiveness in some countries such as Brazil.

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