

The Impact of Inflation on Bank Financial Performance: Case of Tunisia

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Abstract

Inflation is when the price of the most goods and services continue rising upward. This situation may cause the standard of living cost falls because, we have to spend a lot of money to get the same amount of goods and services that we bought previous time. On the other hand bank financial performance is important and is measured by several indictors. In this study we use a methodology of panel data in the sample of 11 banks in Tunisia over the period of (2000—2018). We found that inflation has positive impact on ROA (return on assets) and negative impact on ROE (return on equity).

Keywords: Inflation, bank financial performance, panel data, ROA, ROE

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Introduction

The banking sector plays an important role in the economic system . A stable and profitable banking sector is able to withstand negative shocks and the maintain stability of the financial system by providing finance for economic needs . (Karadzic; Dalovic 2021). Also inflation defines percentage change in a specific price index . Theoritically inflactionary conditions affects the value of financial assets and other financial instruments in a bank portfolio and ultimately the return accuring on such assets over time .(Abaido; Anyigba) 2020) In this article we attempt to study the impact of inflation rate on financial performance of banks in Tunisia . We employ a methodology of 3 sections . The first section concern the literature review; in the second section we analysed the empirical study .We conclude with the conclusion .

Literature Review

In economics; inflation is a sustained increase in the general price level of goods and services in an economy over a period of time resulting in a loss of value of currency.

When the price level rises; each unit of currency buys fewer goods and services. Consequently; inflation reflects a reduction in the purchasing power per unit of money aloss of real value in the medium of exchange and unit of account within the economy. (Karman; al (2017)).

Batsinda and Shukla (2019) studied the effect of inflation on bank performance. They found that inflation has a significant role in enhancing commercial bank's profitability.

Tutf and Omarkhil (2018) found that inflation has significant effect on bank financial performance in Pakistan.

Inflation affect the purchasing power and bank exchange rate regime; opportunity cost of holding currency in the future; worsen loans policy; disrupt business plans and the equity holding performance of banks. While the other side of the argument states that inflation leads to an increase in bank performance as long as the banks can be able to anticipate future.

Inflation and adjust interest rate to generate higher revenue than cost which leads to higher profit and perform as a result of adjusting interest rate . (Umar; Amadu (2016)).

Chioma; al(2014) found that inflation has positive effect but non significant in bank performance.

Ramadan, Kilani and Kaddumi [2011] in their study on Jordanian banks during (2001-2010) found that the only macroeconomic factor that is related to profitability is the inflation rate. Also, Athanasoglou, Brissimis and Delis [2008] found that inflation is having positive significant relationship with profitability. Petria et al., [2015] in their study of profitability determinants in 27 European Unions' banking sectors over the period 2004-2011 found that banks' financial performance is positively affected by inflation rate. The authors indicate that an increase in inflation rate might determine the increase of the loans interest rates, and thus, the bank's profitability. Moreover, Naceur and Omran [2011], Ayaydin and Karakaya [2014] argued that high inflation rate is always linked with high interest rate and thus high income which leads to higher profitability levels in banks.

Inflation affect bank performance as it transfer money from savers and investors to debtors. Therefore the opportunity cost of holding currency in the future may discourage savings that will in turn affect the performance of the bank .

The amount of savings that would be able at the disposal of the banks will decrease as savers will preper to



invest in non monetary capital projects to avoid losses expected from the declining purchasing power of money.

Jadah et al (2020) studied a sample of 18 banks in Iraq for 13 years (2005..2017). They found that inflation affect negatively the financial performance of bank.

Also Borges and Tavares (2020) found strong influence of inflation on financial performance of banks in Portugal . Lemin and al (2020) studied a sample of banks in Ethiopia . They found a positive impact of inflation on bank financial performance .

Uralov (2020) studied a sample of banks in the central European countries during (1996-2017). He found positive impact of inflation on bank financial performance. Nyabokora and al (2020) found a negative impact of inflation on bank financial performance in Tanzania.

Almansoor; al (2021) used data from 5 jordanian listed banks in Amman stock exchange over the period of (2009...2019). They found a strong and negative relationship between inflation and bank's performance.

3-Empirical study

The relationship between inflation and bank profitability has been the object of several researches.

Under this section; we will identify the sample at the beginning and then we specify the variables and the models. After we carry out the necessary econometric tests:

Finally we show the estimation results of the model and their interpretations.

3-1 Sample

We will use 11 banks (BIAT ; STB ; BNA ; BH ; ATB ; AMEN Bank ; BH ; BTEI ; BT ; Attijari bank ; UBCI) that belong to professional association of banks in Tunisia and quoted in Tunisian sotck exchange over the period (2000...2018)

Financial data are collected through the annual report of banks existed in the website of the professional association of banks in Tunisia over the period (2000...2018)

3-2 Estimation method

We will utilize panel static because it controls:

- -The time and individual variation in the observable behavior across sectional times series aggregated.
- -The observed or unobserved individual heterogeneity

3-3 Specification of variables

We will estimate the following models:

- (1) ROA i,t = b0+ b1 Sizei;t +b2 CAPi;t +b3 TLAi;t +b4 CEAi,t +b5 CFCi;t +b6 Tdeposit i ;t+b7 CEAi,t +b8 CFCi,t +b9 ALA i,t +b10 CD i,t +b11 TPIBt +b12 TINFt +Ei,t
- (2) **ROEi,t** = b0+ b1 **Size** i,t +b2 **CAPi,t** +b3 **TLAi,t** +b4 **CEAi,t** +b5 CFCi,t +b6 Tdepositi,t +b7CEAi,t +b8 CFCi,t +b9 **ALAi,t** +b10 **CDi,t** +b11 **TPIBi,t** +b12 TINFi,t +Ei,t

Where : i = Bank

T= Time

b0= constant

b 1; b2; b3;.....b12= parameters to be estimated

We test the following hypothesis:

H1: Inflation has a positive effect on financial performance of bank

H2: Inflation has a negative effect on financial performance of bank

ROA = return on assets = net income/ total assets

ROA shows how to generate income from the assets of the bank (Chin (2011))

It measures the profit earned per dollar of assets and reflects how well management uses the bank's investment resources has generate profit (Naceur (2003))

ROA is considered as the best proxy of profit (Flamini; al (2009); Samad (2005))

ROE = return on equity = Net income /total equity

ROE reflects the ability of bank to use its own funds to generate profits (Yilmaz (2013))

This ratio shows the profit earned per 1 dinar of investment. This is an indicator of how well banks uses investor's money or generate profit (Chowikh; Blagui (2017))

Size = size of the bank = Natural logarithm of total assets

Size can show the economies of scale . The large banks benefits from economies of scale which reduces the cost of production and information gathering (Boyd; Runkhle (1993))

ALA= liquid assets / total assets

ALA depicts the bank's ability to absorb the liquidity shocks. In theory the higher liquidity ratio indicates that



the bank is better position to meet its stochastic with drawals (Chagwiza (2014)).

CEA= operating expenses / total assets

Operating expenses including personal expenses and other expenses . CEA shows the weight of operating expenses compared to total assets

CFC = Financial expenses / total credits

Financial expenses include interest expenses due to loan made in the money market and the capital market by banks.

CFC shows the financial expenses in relation to total credits

Tdeposits = Total deposits / total assets

Deposits include demand deposit and term deposits. T deposits shows the share of deposits compared to total assets. The more the deposit a bank collect; the more the loan opportunities; it will be able to generate further profits (Mencucci; Paolucci (2016))

CD= total credits / total deposits

It is the ratio that describes how allocation of funds in term of deposits; comparing to a number of funds which is obtained from savings (Widyastuti; al (2017))

When the ratio is higher; it show more risky conditions because the funds from deposits have been collected in more of credits. Conversely the lower ratio indicate effective banks in lending decision.

TPIB = Growth rate of gross domestic product

It shows the growth in the economic activity in the country.

TINF = rate of inflation. It is known as a specific or sustained increase in the actual price of the commodities in the economy over a certain period. Inflation has a lot to do with the banks as it fluctuate of the bank to balance the economy. (Al mansour and al (2021)).

3-4	Desc	riptiv	e sta	tistics

	Observations	Mean	Standard deviation	Minimum	Maximum
ROA	209	0.0117	0.0100	0	0.975
ROE	209	0.1047	0.06077	0	0.2976
Size	209	15.013	1.017	11.93	18.29
CAP	209	0.1162	0.096	0	0.6739
TLA	209	0.7569	0.131	0.107	0.9817
CEA	209	0.02841	0.0063	0.000237	0.056
CFC	209	0.03677	0.0207	0.0184	0.3051
T deposit	209	0.7421	0.1599	0.0205	0.956
ALA	209	0.03494	0.037	0.0033	0.44
CD	209	1.5292	2.83	0.1852	35.76
TPIB	209	0.03310	0.0147	0.0012	0.0811
TINF	209	0.05529	0.05356	0.03	0.0781

^{209= 11*19}

ROA (mean = 0.0117) . In the average; net return represent 1.17% of total assets . Standard deviation is low (1%) . There is no great difference between banks in ROA . Also **ROE** (Mean = 0.1047) . In the average; net profit represent 10.47% of total assets . Standard deviation is high (6%) . There is no great difference between banks in ROE . Besides; On the other hand; **Size** (mean = 15.013) . In the average; size of bank equal to 15 . Standard deviation is high . There is a big difference between banks in size .

CAP (mean = 0.1162) . In the average; capital of bank equal to 11.62% of total assets . Standard deviation is high . There is a big difference between banks in Capital . Also TLA (mean = 75.69%) . In the average total credit represents 75.69% of total assets . There is a big difference between banks in TLA . The banks is differently in TLA .

CEA (mean =0.02841) . The operating expenses represent an average 2.841% of total assets. There is a low standard deviation . There isn't big differences between banks in term of CEA. On the other hand; CFC (mean =0.03677) . In average financial expenses represent 3.677% of total credits .

T deposit (mean =0.7421). In average total deposits represent 74.21% of total assets. The standard deviation is high. There is a big difference between banks in term of deposits.

ALA (mean =0.034). In average asset liquid represent 3.4% of total assets. There is not high standard deviation. There isn't big difference between banks in term of ALA. Besides CD(mean= 1.52). In average total credit represent 1.52 of total deposits. There is a high standard deviation. There is a big difference between banks in

¹¹⁼ Number of banks

¹⁹⁼ Number of years (2000....2018)



term of CD.

TPIB (mean=0.033). In average economic growth equal to 3.33% in the period of study (2000...2018). There is a low standard deviation. There is no big difference between years in economic growth except the years after revolution of 2011 who the economic growth has dropped.

TINF (mean =5.52%). In average the rate of inflation equal to 5.52% in the period of study (2000...2018). There is a low standard deviation. There is a big difference between years in inflation except the years after revolution of 2011 who the inflation has increased.

3-5 Multicolinearity test

Table1: correlation between variables

	ROA	ROE	Size	CAP	TLA	CEA	CFC
ROA	1.000						
ROE	0.3930	1.000					
Size	0.0158	0.3964	1.000				
CAP	0.2435	-0.2316	-0.4941	1.000			
TLA	0.0933	0.0639	0.1256	0.09781	1.000		
CEA	0.0524	-0.0157	0.1215	-0.0841	-0.0628	1.000	
CFC	-0.0056	0.0089	0.1200	-0.0915	-0.2040	0.2885	1.000

Table 2: Suit of correlation between variables

	ROA	ROE	Size	CAP	TLA	CEA	CFC	Tdeposit
Tdeposit	-0.0463	0.3751	0.534	-0.7636	0.0528	-0.0738	0.0303	1.000
ALA	-0.0920	-0.1441	-0.0794	-0.0619	-0.0700	-0.374	-0.036	-0.0849
CD	0.2313	-0.1557	-0.3739	0.7434	0.0517	-0.1049	-0.063	-0.59
TPIB	0.0685	-0.1856	-0.3656	0.0522	-0.1881	-0.0532	0.021	-0.1314
TINF	0.0427	0.0486	0.1247	-0.0160	0.1440	0.0418	-0.0038	0.0753

Table 3: Suit of correlation between variables

	ALA	CD	TPIB	TINF
ALA	1.000			
CD	-0.0598	1.000		
TPIB	0.1226	0.0628	1.000	
TINF	-0.0834	-0.0186	-0.2389	1.000

Multicolinearity occurs when there is a high correlation between the independent variables in the regression analysis which impacts the overall interpretation of the results it reduces the power of coefficients and weakens the statistical measure to test the p value is identify the significant independent variables.

All coefficients between variables are inferior to 80%. There is no problem of multicolinearity Test of VIF

Variables	VIF	1/VIF
CAP	3.87	0.25
Tdeposit	2.97	0.33
CD	2.27	0.44
Size	1.74	0.57
TPIB	1.26	0.79
CEA	1.18	0.84
CFC	1.15	0.86
TLA	1.15	0.86
TINF	1.08	0.91
ALA	1.07	0.93

VIF quantifies the extent of correlation between one predictor and other predictors in a model. High value signifies that is difficult to assess accurately the contribution of predictors to a model .

3-6Hausman test

The Hausman test is developed to give existence in deciding on electing between the field effects and random effect approach.



The hypotheses of the hausman test are: H0: Random effect are consistent and efficient

H1: Random effect are inconsistent

When the pvalue is greater to 0.05 the random effect is chosen

In Model 1: Pv = 0.0534Model 2: Pv = 0.068

3-7 Estimation of result of models and interpretations

A – Estimation of result of model 1 and their interpretations

ROA	Coeff	Std.error	Z	Z < P	95% CI
Size	0.0015	0.00085	0.072	0.072	-0.00013 0.0032
CAP	0.049	0.013	0.000	0.000	0.022 0.075
TLA	0.0023	0.0053	0.663	0.663	-0.0081 0.0128
CEA	-0.1998	0.112	0.077	0.077	-0.021 0.42
CFC	-0.0079	0.033	0.814	0.8140	-0.074 0.058
Tdeposit	0.0213	0.0070	0.003	0.003	0.0074 0.035
ALA	-0.0063	0.0181	0.726	0.726	-0.042 0.029
CD	0.00050	0.00034	0.149	0.149	-0.00018 0.0011
TPIB	0.1090	0.049	0.029	0.029	0.011 0.206
TINF	0.0064	0.01270	0.611	0.611	-0.0184 0.031
Cons	-0.040	0.0142	0.002	0.002	-0.072 -0.0165

-There is a positive relationship between ROA and size (if size increase by 1%: ROA will be increase by 0.0015%). The increase of size has a positive effect on return on assets. This result is similar to result found by (Menicucci ; Paolucci (2016) : Serwaddad (2018)) but contrary to result found by (Pasiouras ; Kosmidou (2007) ; Athansoglou ; al(2008))

Large banks might benefit from economies of scope economies (Menicucci; Paolucci (2016)). Also there is a positive relationship between ROA and CAP (if CAP increase by 1%; ROA will be increase by 0.049%) The increase of capital has a positive effect on return on assets of bank. This result is similar to result found by (Trujillo; Ponce (2013); Dhouibi (2017)).

A high volume of equity will reduce the cost of capital; causing a positive effect on profitability. Therefore well capitalized banks achieve greater profitability (Menicucci; Paolucci (2016)).

There is a positive relationship between ROA and TLA (if TLA increase by 1%; ROA will increase by 0.0023%). The increase of total credits by total assets has a positive effect on return on assets of bank. This result is similar to result found by (Meniccuci; Paolucci (2016)).

There is a positive relationship between CEA and ROA (if CEA increase by 1%: ROA will decrease by 0.1998%). The increase of operating expenses has a negative effect on bank return on assets. This result is similar to result found by (Athansoglou; al (2008); Kosmidou; al (2005)).

The negative effect of cost means that there is a lack of competence in expense management since banks pass part of increased costs to customers and the remaining parts to profits; possibly due to the fact that competition does not allow them to over charges (Athansoglou; al (2008)). Besides there is a negative relationship between CFC and ROA (if CFC increase by 1%; ROA will be decrease by 0.0079%). The increase of financial expenses by credits has a negative effect on return on assets.

There is a positive relationship between $\ T$ deposit and ROA (if T deposit increase by 1%; ROA will increase by 0.0213%). The increase of deposit has a positive effect on return on assets of banks. This result is similar to result found by

There is a negative relationship between ALA and ROA (if ALA increase by 1%; ROA will increase by .0063%) . The increase of asset liquid has a negative effect on return of assets .

Also there is a positive relationship between CD and ROA (if CD increase by 1%; ROA will increase by 0.0050%). The increase of credits by deposits has a positive effect on return on assets. This result is similar to result found by (Hassan; Bashir (2003); Bawacha(2018))but contrary to result found by (Pruwoko; Sudyatno(2013)).

There is a positive relationship between TPIB and ROA (if TPIB increase by 1%; ROA will increase by 0.1090%). The increase of economic growth has a positive effect on return on assets of bank. This result is similar to result found by (Dietrich; Wanzenried (2011); Jawad, Lahsen (2018)) but contrary to result found by (Blagui; Chouikh (2017)).

There is a positive relationship between TINF and ROA (if TINF increase by 1%; ROA will increase by 0.0064%). The increase of rate of inflation has a positive effect on bank return of assets. This result is similar to result found by (Pasiouras; Kosmidou (2007)), Lemin and al (2020); Karadazic and Dalovic (2021)) but contrary to result found by (Chitha (2018); Almansour and al (2021) Nyabakora and al (2020); Ebrahimi and



al (2021)).

Estimation of results and interpretations of model 2

Table: Estimation of results of model 2

ROE	Coeff	Std .error	Z	Z <p< th=""><th>95% CI</th></p<>	95% CI
Size	0.01668	0.0049	3.37***	0.001	0.0069 0.026
Сар	0.07381	0.077	0.95	0.341	-0.078 0.22
TLA	-0.0068	0.031	-0.22	0.827	-0.067 0 .054
CEA	-0.062	0.65	-0.10	0.923	-1.34 0.21
CFC	-0.068	0.19	-0.35	0.728	-0.45 0.30
T deposit	0.1295	0.0409	3.16***	0.002	0.049 0.20
ALA	-0.1297	0.1054	-1.23	0.2180	-0.33 0.076
CD	0.0013	0.002	0.66	0.511	-0.0026 0.0032
TPIB	-0.19	0.2891	-0.67	0.505	-0.75 0.37
TINF	-0.027	0.0736	-0.38	0.7060	-0.17 0.11
Const	-0.23	0.082	-2.79	0.005	-0.39 0.066

(***) significant at 1%

-There is a positive relationship between size and ROE (if size increase by 1% ROE will increase by 1.66%). The increase of size has a positive effect on return on equity of bank. This relationship is statistically significant at 1%. This result is similar to result found by (Topak ; Talu (2017) ; Abobaker (2018) ; Bogale (2019). This result is contrary to found by Gadagbi(2017)

Finance literature suggests that large banks are said to exhibit lower returns because of the enhanced economies of scale which they may pass on their customers in the form of lower lending rates .

There is a positive relationship between CAP and ROE (if CAP increase by 1%; ROE will increase by 7.38%). The increase of capital has a positive effect on bank return on equity. This result is similar to result found by (Ahansolgou; al (2008); Abobaker (2018)). There is contrary to result found by Gadegbi (2017).

Banks with a high capital ratio are consistent to be insured against bankruptcy to have access to cheap funds to be more flexible in pursing business opportunities and have to ability to absorb any unexpected losses.

There is a negative relationship between ROE and TLA (if TLA increase by 1%; ROE decrease by 0.0068%). The increase of TLA has a negative effect on return on equity of bank. This result is similar to result found by Yuksul; al (2018)). Therefore high level of loans means a possible deterioration of the bank asset quality with a negative effect on bank profitability (Alper; Anbar (2011)

There is a negative relationship between ROE and CEA (if CEA increase by 1% ROE decrease by 0.062%). The increase of operating costs has a negative impact on bank return on equity.

There is a negative relationship b etween ROE and CFC (if CFC increase by 1%; Roe decrease by 0.068%). The increase of financial expenses has a negative impact on bank return on equity.

There is a positive relationship between ROE and T deposit (if T deposit increase by 1%; ROE will increase by 0.1295%). The increase of deposits have a positive impact on bank return on equity.

There is a negative relationship between ROE and ALA (if ALA increase by 1%; ROE will decrease by 0.1297%). The increase of asset liquid has a negative impact on bank return on equity.

There is a positive relationship between ROE and CD (if CD increase by 1%; ROE will increase by 0.0013%). The increase of credits by deposits have a positive impact on bank return on equity .

There is a negative relationship between TPIB and ROE (if TPIB increase by 1%; ROE will decrease by 0.19%). The increase of TPIB have a negative impact on bank return on equity.

There is a negative relationship between TINF and ROE (if TPIB increase by 1%; ROE will decrease by 0.027%). The increase of TINF have a negative impact on bank return on equity

This result is similar to found by (Ebrahimi and al (2021), Saeed (2014); Sufian; Chong (2008); Ayadin and Karakaya (2014))

Conclusion

Inflation is a global phenomenon in persistency times. There is hardly any country in the capitalist would today which is not affected by the specter of inflation. There are many factors are responsible for inflation (increase supply of money; increase in government expenditure; increase in business activities; shortage of factors of production ...)

In a stable economic system banking activities hold remarkable role by enhancing financial resources for industrial activities which in term generate employment opportunities and over development of the country.

The financial performance of banks guides to analyses the outcomes of a firm's policies; performance efficiency and effectiveness in monetary terms (Pinto; al (2017)).

In this article we used a methodology of panel for the sample of 11 banks in Tunisia over the period (2000----



2018) . We found that inflation has a positive impact on ROA (return on assets) but negative impact on ROE (return on equity).

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