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Analysis Of The Macroeconomic Factors Determining The Asset Profitability of The Turkish Banking System in The Period of 2010-2020

Özgür Özkan[a]

[a] Dr, Sworn CPA, ozgur_978@hotmail.com

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Abstract

Purpose: The aim of the study is to analyze domestic and international macro-economic factors affecting the profitability rates of the Turkish banking sector, in the period 2010-2020 as capital movements are quite volatile.

Methodology: Thus, it will be investigated whether global factors or domestic economic conditions are more effective on bank vulnerability. ARDL and Error Correction Models were used to analyze the short and long term relationships between variables.

Findings: ARDL bounds test findings show that there is a cointegration relationship between bank profitability and selected macro-economic variables in the long run. In this respect, we can say that there is a causal link between all variables considered in the number one functional relationship and ROA

Originality/Value: This study contributed to the Turkish literature by examining the macroeconomic determinants of bank profitability with ARDL method.

Introduction

Developments after 2008 global financial crisis has shown the central banks of the developed countries that faced the crisis that traditional monetary policies were insufficient in recovering economies and achieving price stability. According to this situation, major central banks such as the Fed, BOE (Bank of England), BOJ (Bank of Japan) and ECM (European Central Bank) applied "unconventional" monetary policies to achieve these goals[1] (Dağlaroğlu et al., 2013).

On the other hand, expansionary monetary policies implemented by central banks of developed countries increased global liquidity. Because of the increasing global liquidity, central banks of emerging market economies also had to lower their own interest rates. Emerging market economies faced two major problems with the effect of increasing global liquidity and capital movements (Demirel et al, 2016; Aydın, 2014).

Firstly, the foreign capital going to emerging market economies (EME) has weakened the competitiveness of these countries by lowering the value of the exchange rate and exposed them to the current account deficit problem. Secondly, the increasing capital movements caused banks and firms' balance sheets to become fragile, leaving them unstable. This is the part that concerns this study. This is because the increasing capital movements and the decrease in interest rates have increased the risk undertaking behaviors in the banking sector. Increasing risks inevitably cause the banking sector to become more fragile (Demirel et al, 2016; Dağlaroğlu et al, 2013).

The underlying reasons for this situation are the global liquidity abundance and excessive credit expansion seen in emerging market economies due to falling interest rates[2]. Based on the study of Elekdağ and Wu (2011), the increase in capital flows

[1] Unconventional monetary policy can be defined as a policy framework based on setting the interest rate close to zero (near-zero bond), as well as aiming to manage expectations (forward guidance) and expanding the balance sheets of CBs through asset purchases in this process (Dağlaroğlu et al., 2013).

[2] According to Gourinchas et al. (2001), excessive credit expansion is expressed as an excessive deviation from the normal credit volume of the country under consideration. In market economies developing in parallel with the decrease in global interest rates, the decrease in interest rates

causes an increase in domestic credit in emerging market economies. According to the authors, there is a strong relationship between global financial market conditions and domestic credit growth. For example, the increase in global liquidity also affects the increase in domestic loans. De Bock and Damyanets (2012) caused excessive capital movements towards developing countries due to their excessive external financing needs. Increasing foreign capital led to loan growth and economic growth

Excessive credit expansion causes a dilemma for monetary policy, as this excessive credit expansion seen in GPEs not only provides economic growth but also paves the way for the formation of asset bubbles. This dilemma can be expressed as staying between financial instability and economic growth (Del Arccia et al., 2012). According to Mendoza and Terrones (2008), the credit expansion is seen together with economic growth. Within the framework of the balance sheet approach, it has been observed that credit expansion caused an increase in house prices and share values, and firm-bank leverage ratios increased. The relationship between credit boom and capital flows is much more pronounced in developing countries than in developed countries. In addition, the relationship between industrial production growth and domestic savings increase and credit expansion in developing countries is not as strong as the increase in capital flows. According to the study, consumption, investment and output were well above their own trends during the credit boom. The values of these variables were below their own trends during the contraction periods. He found a linear relationship between credit expansion and financial crises in his study findings.

It is not clear in the literature whether the effects of unconventional monetary policies on the banking sector are on profitability or on risk. However, the new monetary policy (unconventional monetary policy) framework has an impact on the banking sector benefits and costs. This situation may occur as sudden changes in bank stocks and / or change in bond risk (Lambert and Ueda, 2014).

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decreases the cost of borrowing and causes lenders to turn to more risky assets to earn more. In such periods when risk appetite increases, risk-taking behavior increases.

This study aimed to analyze the relationship between domestic and foreign macroeconomic variables, which are thought to affect the profitability of the Turkish banking sector, and profitability ratios.

In the second part following the introduction of the study, the literature review is included. The third chapter is devoted to models and findings. In the conclusion part, the estimated findings are evaluated from an economic perspective.

Related Literature

In the literature, the factors that are thought to have an effect on the profitability of the banking sector in the banking sector are classified as microeconomic, macroeconomic and bank specific factors. In the study of Chaudhry et al. (1995), a total of 15 ratios in the banking sector balance sheet have been considered as housing loans / total assets, consumer loans / total assets, commercial and industrial loans / total assets, other loans / total assets, US treasury bills / total assets, total fixed capital / total assets, total deposits / total assets.

According to Demirgüç-Kunt and Harry Huizinga (2001), which are also among pioneering studies, bank-specific factors, macroeconomic conditions, regulations for deposit insurance, explicit and implicit tax regulations and the structure of the financial system are among the main factors affecting the bank profitability.

When the studies analyzing the effects of macroeconomic variables on the banking sector are analyzed, it is seen that the following findings are reached.

Dietrich and Wanzenried (2011) analyzed the factors that determine the profitability of the Swiss banking sector in 2008. Dynamic panel method was used in the study (panel-GMM). In the study, macroeconomic and microeconomic factors specific to the bank, which are thought to have an impact on the banking sector profitability, are considered as independent variables. Effective tax rate, GDP growth rate, loan interest rate are considered as macro economic factors. In the study, it is found that tax rate has a negative effect, while growth and interest rates have a positive effect on the profitability of the bank.

Alberttazzi and Gambacorta (2009) conducted an analysis of macroeconomic factors affecting bank profitability in countries in the European

Union. As macroeconomic factors determining bank profitability in the study using Panel GMM; GDP growth rate, consumer inflation, money market interest rate, long-term treasury bill interest, stock market index / GDP ratio, and volatility of stock market index were considered. At the end of the study, it was seen that while GDP growth and stock market index / GDP had a positive effect on bank profitability, the inflation rate had a positive but statistically insignificant effect.

Panel GMM was used in Athanasoglou et al. (2008) study. The study analyzed the relationship between business cycles and Greek banking sector profitability for the period 1985-2001. As a result of the study, it is concluded that business cycles have a positive and asymmetrical effect on the banking sector. The study also stated that domestic and international inflation rates have an effect on bank profitability.

Sufian and Chong (2008) analyzed the factors determining bank profitability in the economy of Philippines. The study using the linear regression method deals with the period of 1990-2005. The study finds that the inflation rate has a negative effect on the profitability of the bank, while the economic growth, monetary expansion and stock market index have a positive effect.

If we look at studies conducted in Turkey, Yıldırım (2008) as factors affecting the profitability of banks, off-balance sheet transactions, the consumer price index, budget balance / industrial production ratio, equity / total assets stated can be considered the ratio of the industrial production index. According to Bumin (2009), Sarıtaş and Saray (2012), the global crisis and changes in global markets are among the factors affecting the profitability of the Turkish banking sector.

Model, Data Set, Method, and Findings

In this study, which aims to analyze the domestic and foreign factors that determine the banking sector profitability rate (ROA), the functional relationship between dependent and independent variables is as follows:

$$ROA_{it} = \beta + \alpha \sum_{i=1}^{t} X_{t-i} + \varepsilon_{it}$$

Where, β is constant, ROA, bank return on assets ratio; ε, error term; X is represented as the matrix of factors affecting bank profitability (ROA). The functional representation of the variables in the X matrix is as follows;

ROA = f (CPI, RER, GOLDEN, BİSTFİN, NPLs, FONCST,VIX)

Where; CPI, represents Consumer Inflation Index; RER, real exchange rate; GOLDEN, Gold Prices; BISTFIN, BIST Financial Index; NPLs, non-performing loans; FONCST, MB funding cost; and VIX the volatility index.

The study covers the 2010-2020 period and the monthly data set of the variables was used. Series of variables included in the study were compiled from CBRT, Thomson Data Streem and Banks Association data banks.

There are two basic variables representing bank profitability. These are Net Asset Return (ROA) and Net Equity Return (ROE). ROA shows the profitability of company assets. ROE reflects management performance as equity profitability. According to the literature, ROA reflects the risk situation of the banking sector better. According Bashir and Hassan (2003), Sufian and Chong (2008), Athanasoglou et al. (2008), Dietrich and Wanzenried (2011), ROE can show deviations in leverage ratios, that is, the regulations and it is the variable that best reflects the ROA banking profitability. Since the ROA is calculated on banking sector assets, considering the relationship between macroeconomic variables and bank assets, we can think that the changes in macroeconomic variables will reflect the effects on bank profitability more accurately.

Since this study aims to analyze the relationship between macroeconomic variables and bank profitability and depending on the literature, ROA is used as a proxy variable for bank profitability.

Before testing the long and short term relationships between variables in the above functional relationship, the stationarity test of the variables should be done. Because one of my assumptions of cointegration analysis is related to stationarity, the stationarity of variables should be tested. Root tests (ADF) (Dickey and Fuller, 1979) were used in this study. The results of the unit root tests are shown in Table 1.

According to the findings of Table 1, it is seen that all the variables discussed in the functional relationship above are not stationary in level, but when their first difference is taken, they are stationary. This result enables us to make co-integration analysis between series that are stationary at the same level.

Table 1 Unit Root Tests ADF

SERIES	LEVEL	FIRST ROW DIFFERENCES
ROA	-2.3348	-2.8529**
CPI	-2.0266	-5.1409***
REER	-0.7814	-8.2783***
GOLDEN	-1.5722	-8.7269***
NPLs	-2.6468*	-6.1027***
BİSTFİN	-3.0003**	-9.0314***
VIX	-4.5151***	-10.1484***
FONCOST	-2.1543	-3.8473**

Note: Where there is asterisk (***), the null hypothesis was rejected and the alternative hypothesis predicting that the series are stationary was accepted according to the 1% significance level. The number of lags used for the ADF test is considered the value automatically selected by the Eviews 8.0 econometric package program.

In this study, ARDL method was used for cointegration testing. The reasons stated in the study of Shrestha and Chowdhury (2005) are the factors that cause us to prefer the ARDL method. According to the study of Shrestha and Chowdhury (2005), the ARDL method, unlike the cointegration analysis of Johansen and Juselius (1990), allows for cointegration analysis, although variables are stationary at different levels. The stationarity test findings shown in Table 1 indicate that it would be more appropriate to use the ARDL model in this study.

The ARDL model is a two-stage model. In the first step, the unconstrained error correction model (UECM) needs to be estimated. Here, whether there is a cointegration relationship between variables is determined as a result of the comparison of the calculated F Test value with the table values mentioned in the study of Pesaran et al. (2001). If the F test value is greater than the table values, we can talk about the cointegration relationship between the selected variables.

Table 2. Limit Test Findings

F-Limit Test		Zero Hypothesis: No relationship at all levels		
Test Statistics	Value	Prob.	I(0)	I(1)
			Large Sample: n = 1000	
F-Statistics	7.666847	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68
			Certain Number of Sampling: n = 80	
Actual sample size	121			
		10%	2.355	3.5
		5%	2.787	4.015
		1%	3.725	5.163

Note: Zero (H0) hypothesis is that there is no long-term relationship. Since the F test value is greater than the critical values shown in the table, the alternative hypothesis (H1) was accepted. Where, k shows the number of variables in the model. The lag length was calculated as 4 according to Akaike, Schwarz, Hannan-Quinn criteria.

The results of the F test presented in Table 2 indicate that there is a cointegration-long-term relationship between the variables in the model. Therefore, this finding provides us to pass the second stage of the ARDL model. Thus, we will be able to reach parameter values by analyzing the short-term relationships between variables using the ARDL model.

Error correction model was used to determine the short-term relationship between variables. The error correction model findings of the study are presented in Table 3 below.

Table 3 Error Correction Model Findings

ARDL Error Correction Regression Model

The dependent variable: D(ROA)

Selected Model: ARDL(5, 5, 5, 5, 5, 5)

Sample: 2010M01 2020M06

Number of Observations: 121

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	-1.251654	0.187384	-6.679628	0.0000
D(ROA(-1))	0.349015	0.104110	3.352381	0.0012
D(REER(-1))*	7.096643	3.765364	1.884716	0.0629
D(GOLDEN(-3))**	0.001996	0.000831	2.402329	0.0185
D(CPI)	0.324513	0.119785	2.709130	0.0082
D(BISTTFINANCIAL(-1))	-0.000744	0.000567	-1.312076	0.1930
D(BISTTFINANCIAL(-2))	-0.000710	0.000568	-1.248907	0.2151
D(VIX(-1))	-0.003439	0.007228	-0.475804	0.6354
ect(-1)*	-0.820636	0.117586	-6.979042	0.0000

R-squared	0.547477	Prob(F-statistic)	0.000001
Adjusted R-squared	0.396636	Durbin-Watson stat	2.139862

Note: Asterisk ***, **, * indicate the significance level of 1%, 5% and 10%, respectively.

A delay value (ect) of the error correction term in the model is used to connect the short-term behavior of the variables with cointegration to the long-term behavior.

The error correction model was used to analyze whether the short-term deviations that may arise between variables with long-term relationships are temporary or whether the long-term balance found is stable equilibrium. The error correction model also shows the existence and direction of the short-term relationship between variables.

When the Table 3 findings were examined, it was found that a lagged value of the error correction parameter (ect) was negative and statistically significant. This finding can be explained by the fact that short-term deviations that may arise in the relationship between variables have a strong tendency to tend towards balance in

the long term. More precisely, the long-term causality between the variables included in function 1 and the ROA is predicted to be valid even if there are short-term deviations.

Considering the short-term findings, the finding that a lagged value of ROA has a positive and statistically significant effect on ROA stands out.

The second variable that has a statistically significant effect on bank profitability is the real exchange rate. As it is known, the decrease in the real exchange rate has a (-) direction as it means a depreciation of TL. In the error correction finding, the real exchange rate estimation coefficient value was found to be + 7. At this point, since the multiplication of negative and positive signs will be negative, we can say that changes in the real exchange rate have a negative and statistically significant effect on the ROA with a lag.

It is estimated that the consumer inflation CPI has a positive and statistically positive effect on ROA.

It was estimated that the lag effect of global gold prices (GOLDEN) 3 had a positive and statistically significant effect on ROA, whereas the BIST financial index (BISTTFINANCIAL) and VIX, which indicates the global risk appetite, had a negative but statistically insignificant effect.

Finally, Granger Causality Test was conducted between Borsa Istanbul Index (BIST100) and ROA and the test findings are reported in Table 4. According to the Granger Test findings obtained, the direction of the causality relationship between BIST100 index and ROA was estimated to be from ROA to BIST100. Accordingly, changes in bank profitability affect the BIST100 index. The opposite situation was found to be statistically insignificant.

Table 4 Granger Causality Test

Zero Hypothesis:	NoO:	F-Statistics	Prob.
DBISTT100 is not DROA's Granger cause	118	0.90287	0.5074
DROA is not DBISTT100's Granger cause*		1.95119	0.0690

Note: Asterix (*) indicates 10% significance level.

Finally, the presence and absence of structural break related to the period discussed in this study was analyzed using the CUSUM test and no structural break was found. Test results are reported in Annex 1.

Conclusions

The findings of the study analyzing the existence or absence of short and long term relationships between macroeconomic variables that are thought to have an impact on the profitability of the Turkish banking sector and the bank profitability ratio (ROA) have led us to reach different results for the short and long term.

ARDL bounds test findings show that there is a cointegration relationship between bank profitability and selected macro-economic variables in the long run. In this respect, we can say that there is a causal link between all variables considered in the number one functional relationship and ROA. In this respect, there is a causality link between non-performing loans (NPLs) and MB funding cost (FONCOST), which cannot be seen in the error correction model, and ROA, but their short-term effects on banking profitability are not clear. This situation may have emerged as a reason for the stability of the Turkish banking sector's balance sheet.

When the short-term effects arising due to the error correction model are considered, it has been observed that the obtained findings are compatible with the literature. Therefore, the estimation finding that changes in real exchange rates may affect bank profitability negatively reveals the importance of exchange rate risk for the banking sector.

On the other hand, the increase in inflation rate has a positive effect on bank profitability without delay. In this finding, we think that as the inflation rate

increases, it emerges due to banks demanding higher real interest rates. However, this finding is surely not open to interpretation that as the inflation rate increases, the profitability of the bank increases. Because it should not be neglected that high inflation may cause production losses and this may negatively affect the profitability of the bank as the delay periods prolong.

It is an important finding that the effect of bank profitability (ROA) own lag on ROA is positive and significant. This estimation finding can be interpreted as the increase in bank profitability in the Turkish banking sector has a supportive effect on the next period profitability, and the banking system can transform their profits into investments that will increase productivity.

We can explain that VIX, which determines the BIST financial index and global appetite, has a negative but insignificant effect on ROA in the short term, again by the high stability of the Turkish banking system.

The most striking finding here was the determination of a positive and significant relationship between global gold prices (GOLDEN) and the profitability of the Turkish banking system. This result can be interpreted as the Turkish banking system has a surplus on the gold side in its on-balance sheet asset liability composition. Of course, there are indirect effects that may arise from this finding. If the prices of gold rise with anticipation of an increase in production, this may also have a positive effect on bank profitability. Again, if the increase in gold prices reduces the pressure on the country's currency, the decrease in exchange rate risk for banks may reduce the deterioration in assets, so it may affect profitability positively.

This study also tested the causality relationship between BIST100 index and bank profitability and the causality analysis findings showed that the direction of causality is from bank profitability to BIST100 index. This situation shows that increasing profitability in the Turkish banking system can positively increase the Istanbul stock exchange.

Finally, it can be stated that the Turkish banking sector in particular has a sound balance sheet structure despite the adverse global conditions based on the findings of

this study. In this context, we can say that the Turkish banking sector is resistant to negative developments originating from domestic and abroad with its solid balance sheet structure. However, we think that it is necessary to be careful against the risks that deteriorate the asset quality, such as the increase in exchange rates and non-performing receivables, which may deteriorate asset quality in the long term. These findings can be evaluated as the contribution of the study to the literature.

Of course, it is also necessary to carry out a study that can re-evaluate the banking system profitability with on-balance sheet variables. We plan to reconsider this issue in another study

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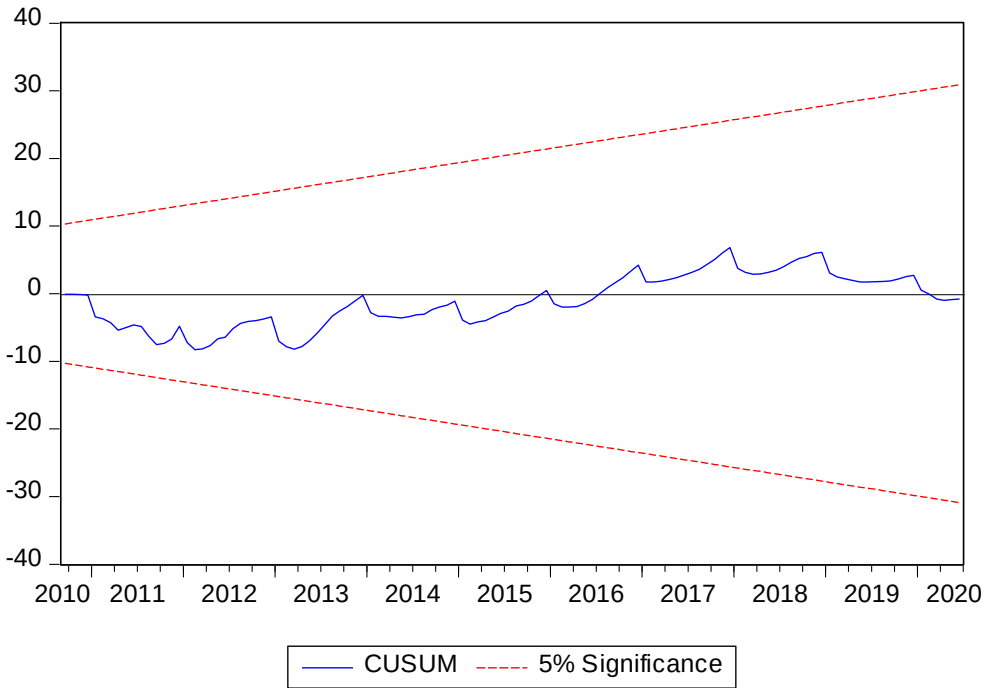
ANNEX 1- Structural Fracture Tests

Supplementary Chart 1 CUSUM Test



The CUSUM test, that is used to analyze the structural break, reflects the stability of the coefficients. Accordingly, the long-term prediction of consecutive errors and the same sign indicates structural change. If there is a structural change, the regression model coefficients will be affected after the structural change, that is, the coefficients will be distorted. Therefore, if it is decided that the coefficients are stable as a result of the structural test, it can be said that there is no structural change.

As seen in Graphic 1, the fact that the coefficients do not deviate from the range of 5% and their values are marked with time changes enable us to reach the finding that there is no structural break.