Determinants of Deposit Bank Profitability: Evidence from Turkey

Onder Ozgur
Ankara Yıldırım Beyazıt University, Turkey

Muhammed Sehid Gorus[1]
Ankara Yıldırım Beyazıt University, Turkey

Abstract

This study aims to investigate the impact of bank-specific and macroeconomic factors on deposit bank profitability in Turkey. To present the significance of these variables OLS methodology is performed to construct multiple regression analysis. Monthly data is employed for the period over 2006:1 to 2016:2. Empirical results suggested that, equity over total assets, non-performing loans to total cash loans, net interest revenues to average total assets, and central bank policy interest rate have a significant impact over return on assets while non-interest income over total assets, market share of deposit banks in banking sector, operational expenses to average total assets, and exchange rate are not statistically significant. Also, effect of recent global financial crisis on bank performance is significantly negative. Indeed, result of this study provide supportive evidence that financial crisis adversely affected banking industry performance in Turkey.

1. Introduction

Economic circle consists of the units that have financing needs and that have financing surpluses. Presence of the financial intermediaries facilitates economic activity through matching these units and eliminating the obstacles in the financing relations. There exists a vast literature to shed light on the theoretical framework of the financial intermediary concept. Diamond (1984) pointed out that, financial intermediaries exist as a "delegated monitor" decrease monitoring costs and free-rider problem arising in public markets. Similarly, Hubbard (1994) also stressed that principal-agent problems are mitigated with existing financial intermediaries.

Banks are the prominent ones among all other financial intermediaries. Some borrowers are said as bank dependent instead of being dependent to another financial intermediary. Peek and Rosengren (1995) revealed that, banks are the institutions that are operating for providing external sources for small and medium sized firms. Furthermore, Casu et al. (2006) presented that the major function of banks is collecting deposits from surplus units and lend to deficit units that need financing. By ensuring larger-sized and longer-term financing needs of borrowers with collecting small-sized and short-term deposits banks perform size, maturity and risk transformation.

---

[1] Correspondence to Muhammed Sehid Gorus, Email: msgorus@ybu.edu.tr

Studying about the banking industry is popular in all economies and Turkey as well. Especially, banking crisis that bursts out in November 2000 and February 2001, confront as the most outstanding threshold in Turkish Banking sector. Following these two crisis, to mitigate the destructive impacts of those crisis into banking sector, "Banking Sector Restructuring Program" was adopted to strengthen the banking system by improving the screening and monitoring activities.

These restructuring activities functioned well and the banking system has been built on a strong foundation. Thus, providing that the mentioned restructuring program, banking sector was not deeply affected with recent global financial crisis that evokes its destructive effects all over the world (Artar Kibritçi and Sarıdoğan Atılgan, 2012).

In the performed model employed in this study, determinants of profitability analyzed in the period which comprises both pre and post-global financial crisis. The model is constructed by employing the sample data covering the period between 2006:1 and 2016:2. According to Banking Regulation and Supervision Agency (BRSA) data, at the beginning of the analyzed period Turkish banking sector consists of the 51 banks with 6,612 branches. 34 of them is deposit banks that operates with 6,287 branches. Also, at the end of the analyzed period, there are 50 banks with 12,194 branches and 32 of them is deposit banks. These deposit banks have 11,074 domestic branches. Data provides an evidence that the deposit banks dominates the banking sector with number of banks and branches.

Furthermore, banks are the business organizations that perform the mentioned functions and their main aim is to maximize profit such as other business organizations. Functions that are not compensated with other financial intermediaries increase the importance of the banks. Indeed, all the factors that destroy the effectiveness of banking sector leads an economy into a financial crisis due to systemic risk potential of banking sector. Thus, importance of the profitability and the sustainability of the profitability arises for banks to provide strong financial environment in an economy.

There are vast studies in the literature investigates the determinants of deposit bank profitability by performing panel data econometrics methods with using disaggregated data. This study includes the empirical working that employs aggregated data with time series methodology.

The plan of the paper is as follows: The next section summarizes the existing literature on the determinants of profitability in banks. Section 3 describes the variables that are employed to explain the variation in profitability of deposit banks. In section 4, performed model is explained, and sources of the employed data in the econometric model is displayed. Section 5 presents the empirical results while the results are discussed in section 6. The last section, part 7, concludes the study.

2. Literature Review

Determinants of bank profitability examined vastly through last four decades in the literature. Bank specific factors, external determinants and intra-industry variables are used mainly to reveal the variation in banking profitability in these studies. However, some of the existing studies examine the determinants of profitability in single country time series and panel data analysis while there are also more than one country panel data analysis take many countries into account to compare the contributory factors on bank profitability. In this study, literature is reviewed by time series and panel data studies incorporating for developed economies, emerging economies, and Turkish economy.

2.1. Studies for Developed Countries

Single country analyses consist substantial part of the literature that includes examinations for U.S. and other developed countries and emerging economies as well. Chaudhry et al. (1995) examined the period between 1977 and 1985 by dividing the interval into two subsamples as 1997 to 1980 and 1981 to 1985 for U.S. They found that, the coefficient for loan losses to total assets is significantly negative for both sub-periods as a result of deteriorating effect of loan loss provisions over liquidity. Also, ratio of net worth to total assets found to have statistically positive effect over bank profitability in both periods. Besides, Miller and Noulas (1997) examined the effect of loan composition over large bank profitability and found that real estate loans have significantly negative effect on large bank profitability whereas construction and land development loans have a strong positive effect for the sample of 243 banks covering the period between 1984 and 1990 in U.S.

Furthermore, Hoffmann (2011) examined 11,777 U.S banks from 1995 through 2007 by employing GMM methodology by combining bank specific and macroeconomic variables. Their empirical results pointed out a negative relationship between capital ratio and profitability representing that over-cautiously operating banks miss profit opportunities in the market. Recently, Chronopoulos et al. (2015) investigated nearly all U.S. banks except small ones between 1984 and 2010 by dividing the period into sub-intervals. They pointed out that, size and asset growth positive and significant effect over all sub-periods however, equity over total assets and loans to total assets have significantly negative impact on return on assets (ROA) as a proxy of profitability in four of five sub-periods. They also revealed that GDP growth and HHI that is the representative of concentration ratio in banking industry displays both positive and negative link with ROA in different sub-periods.

There are also many studies examining other developed countries in this manner. Kosmidou et al. (2005) analyzed domestically owned 32 commercial banks between 1995 and 2002 and found that equity over total assets, ratio of liquid assets, inflation, stock market capitalization and concentration in banking industry are statistically significant over ROA and the impact is positive. However, there exists a negative relationship between size, costs, loan loss reserves to gross loans and profitability of banks. Besides, Dietrich and Wanzenried (2011) employed GMM estimator technique to represent the determinants of profitability of banks in Switzerland by using 372 commercial banks data between 1999 and 2009. They revealed that, coefficients of equity over total assets, funding costs, cost-income ratio, growth of deposits and interest income share is negative and statistically significant. Also, it has been found that, real GDP growth, term structure of interest rates and HHI linked positively with ROA. Recently, by performing GMM methodology, Trujillo-Ponce (2013) investigated the determinants of profitability of Spanish banks and presented that loans over total assets, equity over total assets, deposits over total liabilities, GDP and inflation is significant over ROA positively whereas link between profitability and non-performing loans to gross loans, cost to income ratio and interest rate is significantly negative.

Panel data studies also comprise substantial part of the bank profitability literature. These studies reveal various differences among countries. In the study that examines the sample of 60 banks from 12 developed countries Short (1979) stressed that there is a positive link between size and profitability as a result of bigger firms raising capital with lower cost. Also, he pointed out that, institutional and regulatory frameworks have smaller impact over market power and profit levels as well. Besides, Abbreu and Mendes (2001) found a supportive evidence for the significance of capital structure on profitability level in European countries including Portugal, Spain, France and Germany in pre monetary union period. Goddard et al. (2004) investigated the determinants of bank profitability in 665 banks in six European countries over the period between 1992 and 1998 by performing GMM method. They found that there is a positive

relationship between capital adequacy and profitability whereas no statistical link between profitability and bank size. Furthermore, Staikouras and Wood (2004) expanded the region and analyzed European Union banking industries as a whole in the period 1994-1998. They indicated that total assets, equity to total assets and interest rate have significantly positive relationship with profitability and there exists significantly negative link between loans to assets, overheads to assets, ratio of loan loss provisions to total loans and growth rate of GDP and profitability variable. In their recent analysis Borio et al. (2015) examined 109 large international banks in 14 major advanced economies for the period 1995-2012 and indicated a positive relationship between short-term interest rates and bank profitability. They also implied that the impact is stronger when the level of interest rates is lower.

2.2. Studies for Emerging Countries

It has been a long debate to examine the profitability determinants of banks in emerging economies as well. Some of the studies that is based on single emerging country and more than one country analyses that comprises both emerging and developed economies reviewed in this part.

Naceur (2003) in the study that analyzed the impact of bank specific factors and macroeconomic variables over bank profitability on which estimation based balanced panel data regression in Tunisia between 1980 and 2000, revealed that equity to total assets, logarithm of total assets and overheads to total assets variables are statistically and positively significant over ROA whereas there is no link between macroeconomic factors and profitability. In a narrower analysis, Aburime (2008) examined the macroeconomic factors that influence the bank profitability by employing panel data method with the sample of 154 banks over the period of 1980-2006 in Nigeria. He found that real interest rate, inflation rate and exchange rate regime have significant and positive influence over profitability. In their study aiming to examine bank-specific, macroeconomic and industry-specific factors over bank profitability in Greece with the sample data covering 1985 to 2001, Athanasoglou et al. (2008) employed GMM methodology. They pointed out that, capital, labor productivity, inflation and cyclical output have significantly positive impact over profitability whereas operating expenses negatively linked with it. Also, they stated that effect of size and concentration is insignificant on the volume of bank profits. Likewise, Kosmidou (2008) analyzed the determinants of profitability of Greece banks over 1990 and 2002 performing GMM methodology and found that size, capital structure and growth of GDP have significantly positive effect on profitability while inflation affects negatively.

García-Herrero et al. (2009) aimed to examine the factors under the low profitability of Chinese banks with 87 Chinese banks data covering 1997-2004. They revealed that equity over assets, deposit over assets, interest rate and inflation affect profitability positively. Conversely, higher market share and inefficiency have negative impact over profit level. Also, Tan and Floros (2012) examined the profitability of banks in China over the period 2003-2009 by performing GMM method, they revealed that labor productivity, cost efficiency, stock market development and inflation significantly positive influence over ROA while credit risk is negatively related. Recently, Ally (2014) performed fixed effects regression model to investigate the profitability determinants of banks in Tanzania data obtained from 23 banks between 2009 and 2013. Results of the study stressed that bank size, capital level and asset quality improves bank profitability however macroeconomic factors do not have significant effect over profit level.

2.3. Studies for Developed and Emerging Countries

In their comprehensive analysis analyzing the effects of bank-specific factors, industry-specific factors, macroeconomic indicators, taxation and financial structure including both

developed and developing 80 countries for the period of 1988-1995, Demirgüç-Kunt and Huizinga (1999) found that banks with higher capitalization, low level of non-interest earning assets, less dependent to deposits as a fund have higher level of profit than others. Their findings also supported that, domestically owned banks are less profitable than foreign banks in developing countries however findings contradict with developed countries. Also, they revealed that inflation and interest rates have positive impact over bank profitability especially in developing economies. Similarly, Lee and Hsieh (2013) examined regional analysis in their study that comprises 42 Asian countries. They performed GMM methodology for the sample of 2,276 banks data covering the period between 1994 and 2008. Their empirical results represented that the effect of capital strength on profitability is higher in low-income countries.

Besides, Mirzaei et al. (2013) employed fixed/random effect models in order to analyze the profitability of 1929 banks in 40 emerging and advanced economies for the period of 1999-2008. Results of their empirical investigation supported that the banks operating under higher capital ratio and environment of higher interest rate spreads, have more profits. Also, they revealed that concentration ratio has negative impact over bank profitability in emerging markets. In his study just comprises 9 emerging economies including Turkey. Yılmaz (2013) performed fixed-effect panel data regression over 2005 to 2010. They pointed out that, ROA is positively affected with strong capital structure, efficient cost and risk management and bigger size in emerging economies. Recent and more comprehensive analysis is conducted by Dietrich and Wanzenried (2014) covering 118 low, middle and high-income countries over the period of 1998-2012 with employing GMM method. Empirical results of their study suggested that ratio of capital as a proxy for capital strength has just significantly positive impact over ROA in high income countries whereas share of interest income and GDP growth have respectively negative and positive link with ROA. In addition, cost to income ratio, loan loss provisions, deposit growth and inflation have similar impact over profitability in low, middle and high-income countries.

2.4. Studies for Turkey

Investigating the determinants of bank profitability also have been attracted great attention in Turkey over the years and there exists vastly literature. Some of these empirical studies reviewed as following.

Türker Kaya (2002) employed two-step approach to examine the indicators of profitability in Tukey for the period between 1997 and 2000. Empirical findings of the conducted study suggested that equity over total assets, liquid assets over total assets and loans over total assets have significantly positive whereas loan loss over total assets, personnel expenditures and total deposits over total assets significantly negative influence over ROA. Also, results revealed that there is a positive link between inflation, government budget deficit and ROA. Atasoy (2007) investigated the determinants of commercial banks in Turkey for the period of 1990-2005 and found that concentration ratio in an industry and growth rate has negative relationship with probability of banks. Furthermore, Ata (2009) analyzed profitability of deposit banks operating in Turkey over the period between 2002 and 2007 by employing GMM methodology. Empirical findings supported that size, ratio of loans to deposits and bank assets over GDP have significantly positive impact over profitability while capital adequacy ratio, cost ratio and loan losses over total loans affecting profitability negatively. In their studies that employs panel data regression analysis over the periods 1990-2000 and 2002-2008, Gülhan and Uzunlar (2011) pointed out that capital adequacy, operational expenses, liquidity, size, non-performing loans ratio, inflation and market share have significant impact over ROA in the former period whereas size and inflation are significantly effective over ROA in the latter.

İşcan and Oransay (2011) aimed to find the determinants of profitability of banks in Turkey in the post crisis period between 2002:2 and 2011:2. They performed cointegration

analysis and empirical results supported that, profit level of banks benefited from rising total loans and total deposits. Also, manufacturing productivity index as a proxy for economic activity level linked positively with profitability of banks. In addition, Akbaş (2012) employed fixed and random effect models over the period of 2005-2010, and found that loan loss provisions over total loans, total costs over total income and HHI for deposits and inflation have significantly negative impact over ROA. Besides, İskenderoğlu et al. (2012) investigated the relationship between profitability of banks and size, growth and capital structure by performing GMM estimator analysis for 2004-2009 period. Empirical results suggested that growth in assets and size affect ROA significantly and positively. Demirhan (2013) also employed GMM estimator technique in order to get the factors affecting profitability of deposit banks in Turkey over the period 2003 to 2012. In the study, covered interval divided into two sub-periods as December 2003 to September 2008 and December 2008 to June 2012 which former represents pre-crisis period and latter indicates post-crisis period. Empirical results of the study suggested that just non-interest income over total assets has significantly positive impact over ROA in both periods. Nevertheless, interest income collected from loans over total loans and consumer price index significantly effective in the pre-crisis period whereas equity to total assets have significant influence on profitability in post crisis period. Lastly and more currently, Özcan and Çiftçi (2015) investigated he relationship between concentration and profitability in banking industry with the sample data comprising 24 deposit banks operating in Turkey between 2006-2013. Panel data regression results indicate that there is a positive relationship between market share and profitability in which represents the significant link between competitiveness and profitability.

3.   Determinants of Bank Profitability

In order to examine the determinants of bank profitability bank-specific, industry-specific and macroeconomic indicators are employed in the literature. This study performed OLS methodology to point out the significance of the bank-specific variables and macroeconomic indicators. Bank specific variables are also called as internal determinants which consist of banks performing data and macroeconomic indicators known as external factors which are not indicators of bank management and reflects existing economic conditions in an environment that banks operate (Asimakopoulos et al., 2005). Dependent variable that represents the profitability and independent variables that comprise both internal and external factors are explained as follows:

3.1. Dependent Variable

Profitability of banks is proxied by different variables and most commonly used profitability measures are return on assets, return on equity and net interest margin in the literature. As an indicator of the profits earned per Turkish Lira of assets, return on assets (ROA) represents the ability of bank management in order to get profit in their operations with total asset holdings (Dietrich and Wanzenried, 2014).

3.2. Independent Variables

In the literature independent variables are presented as the composition of internal and external factors. Internal factors indicate the bank-specific variables while external factors both includes industry-specific variables and macroeconomic indicators. In this study, bank specific variables and macroeconomic indicators are employed in order to examine the determinants of bank profitability.

Six variables that represent bank-characteristics is used in the study. These six variables included in this analysis explained as below:

Equity Over Total Assets (ETA) is the variable that is used as the proxy that represents the capital strength in this analysis. It is commonly expected that higher ETA leads both need for external funding and cost of funding to decline and profitability of bank to mounts up (Kosmidou et al., 2005). Non-Performing Loans Over Total Cash Loans (LQ) is employed as a measure of the loan quality and represents credit risk in bank portfolio allocation. In theory it is expected that an increase in credit risk results with declining bank profitability (Dietrich and Wanzenried, 2014). Two other bank-specific variables employed in this analysis are the non-interest income to total assets (NII) that is the ability of revenue diversification of banks and interest revenues over average total assets (NIM) which measures the strength of main pillar of banks revenue sources. Banks are the institutions mainly engage collecting deposits and providing loans to economic units, so their main income source is an interest revenue. However, highly competitive business environment and declining interest margins between external funds and loans increasing the importance of non-interest revenues (Demirhan, 2013).

Moreover, it is obvious that in any firm effective cost management plays a crucial role for profitability. As a proxy for effective cost management operational expenses to average total assets ratio (OETA) is used in this study. Asimakopoulos et al. (2005) stated that, expected sign of the OETA variable is expected to be negative due to rising efficiency with an improvement in cost management. Lastly, market share of deposit banks in banking sector in terms of real total assets (MS) is captured in the model as a proxy for the size variable. In the studies that panel data econometric models performed in the literature, total real asset variable is used as a representative of size variable in order to reveal the existence of economies of scale. Since time series model is constructed in this model, presence of the MS just represents the impact of total deposit banking size over aggregated profitability.

Furthermore, output level, inflation rate, exchange rate and GDP growth rate are the most commonly used macroeconomic indicators in the literature. There are insufficient number of studies capturing central bank policy interest rate as a determinant of profitability in deposit banks. Thus, in addition to mentioned bank-specific variables, central bank policy interest rate (INT) and exchange rate (ER) captured as macroeconomic indicators in this study.

4.   Data and Methods

Multiple regression models are commonly used tools in economics to point out more than one factor that contemporaneously influence dependent variable. Allowing an explicit control over many elements that are able to affect dependent variable is crucial to analyze economic theories while using non-empirical data sets. Besides, multiple regression analysis is used to extract the factors that explain more of the variation in dependent variable (Wooldridge, 2013:68).

The general multiple regression model that explains the response of the dependent variable to change in independent variables can be shown as below in Eq. 1:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_{ki} + \varepsilon_i \qquad i = 1, 2, ..., n \qquad (1)$$

where, Y_i represents the dependent or explained variable that we want to explain, β_0, β_1, β_2, …, β_k are unknown constant parameters, X_1, X_2, …, X_k are independent or explanatory variables that are used to explain dependent variable, and ε_1, ε_2, …, ε_k are the random error terms which are the deviation of true value of dependent variable and expected value of dependent variable. Besides, in multiple regression models, β_0 is also known as intercept term. Indeed, it is the average value of dependent variable when independent variables are all equal to zero. Coefficients β_1, β_2 are called partial slope coefficients. They measure the change in dependent variable for a one-unit change in any specific independent variable when all other independent variables are taken constant (Mendenhall et al. 2012:666).

Furthermore, ordinary least squares method is commonly used to estimate the constant term and partial slope coefficients in multiple regression model by minimizing the sum of squares of residuals (RSS). Residuals are gathered as follows:

$$e_i = Y_i - \hat{\beta}_0 - \sum_{k=1}^{K} \hat{\beta}_k X_{ki} \tag{2}$$

$$RSS = \sum_{i=1}^{n} e_i^2 = \sum_{i=1}^{n}(Y_i - \hat{\beta}_0 - \hat{\beta}_2 X_{2i} - \cdots - \hat{\beta}_k X_{ki})^2 \tag{3}$$

The residual sum of squares is minimized by taking derivative with respect to parameters and setting them equal to zero in the following two normal equations.

$$\frac{\partial(\sum_{i=1}^{n} e_i^2)}{\partial \hat{\beta}_0} = -2 \sum_{i=1}^{n} e_i = 0 \tag{4}$$

$$\frac{\partial(\sum_{i=1}^{n} e_i^2)}{\partial \hat{\beta}_k} = -2 \sum_{i=1}^{n} e_i X_{ki} = 0 , \qquad \text{for } k = 1, ..., k. \tag{5}$$

(Baltagi, 2008: 73)

In our study, following multiple regression model is constructed to reveal the effects of bank-specific and macroeconomic factors on profitability of deposit banks.

$$ROA_t = \beta_0 + \beta_1 ETA_t + \beta_2 LQ_t + \beta_3 NII_t + \beta_4 NIM_t + \beta_5 OETA_t + \beta_6 MS_t + \beta_7 INT + \beta_8 ER + \beta_9 TREND_t + \beta_{10} DUMMY_t + \varepsilon_t \tag{6}$$

Description of the data is summarized in Table 1 as follows:

Table 1: Descriptions and sources of data

Abbreviations	Description	Source	Unit
ROA	Return on Assets	BRSA	Real Terms Monthly Data
ETA	Equity/Total Assets	BRSA	Real Terms Monthly Data
LQ	Non-Performing Loans/Total Cash Loans	BRSA	Real Terms Monthly Data
NII	Non-Interest Income/Total Assets	BRSA	Real Terms Monthly Data
NIM	Net Interest Revenues/Average Total Assets	BRSA	Real Terms Monthly Data
OETA	Operational Expenses/Average Total Assets	BRSA	Real Terms Monthly Data
MS	Market Share	BRSA	Real Terms Monthly Data
ER	Exchange Rate	CBRT	Real Terms Monthly Data
INT	Central Bank Policy Interest Rate	IMF	Monthly Data

Main data source is the Banking Regulation and Supervision Agency (BRSA) Turkish Banking Sector Interactive Monthly Bulletin. However, Central Bank of Republic of Turkey (CBRT) Electronic Data Delivery System is also used to get the monthly consumer price index (CPI, 2003=100) data to adjust the nominal values into real terms, and real exchange rate. In addition, Central Bank Policy Interest Rate data is obtained from International Monetary Fund's International Financial Statistics (IFS) system.

In this study, (9) independent variables are employed to explain the variation in profitability of deposit banks in Turkey. Aggregated data set that covers all deposit banks which

are in business within an analyzed period are used in the study. Data set comprises the monthly data covering the period between 2006:1 and 2016:2. All series are converted to seasonally adjusted monthly data by the Census X-13-additive method.

Table 2 gives the summary of some statistics which includes mean, median, maximum value, minimum value, standard deviation, skewness, and kurtosis of dependent and independent variables.

Table 2: Descriptive statistics of the variables

Descriptive Statistics	ROA	ETA	LQ	NII	NIM	OETA	MS	INT	ER
Mean	11.44	0.75	3.51	0.20	0.35	0.21	0.21	0.75	110.17
Median	11.33	0.62	3.14	0.19	0.34	0.21	0.20	0.62	110.07
Maximum	12.81	1.54	5.52	0.61	0.54	0.33	0.39	1.54	127.39
Minimum	9.93	0.12	2.69	0.08	0.22	0.16	0.03	0.12	92.25
Std. Deviation	0.74	0.43	0.80	0.06	0.06	0.03	0.07	0.43	8.33
Skewness	0.18	0.49	1.05	3.26	0.47	0.53	0.15	0.49	0.11
Kurtosis	1.97	1.81	2.97	22.90	2.77	2.95	2.95	1.81	2.28

5.   Econometric Results

Handling an econometric analysis with time series data generates the so called spurious regression (Granger and Newbold, 1974). They indicated that, spurious regression exists when series that are used in regression analysis is not stationary and indicators of this problem is high R^2 and significant t-statistics. Enders (2008:195) pointed out that, despite the fact that high R^2 and significant t-statistics, regression results are not meaningful and least-square estimates are not consistent in the case of spurious regression. To test the presence of the unit roots of the employed series Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are performed in this analysis. Results of the unit root tests are displayed in Table 3.

Table 3: Unit root test results

	ADF Test		PP Test	
Variables	Constant	Constant & Trend	Constant	Constant & Trend
ROA	-2.537	-7.464*	-5.290*	-7.770*
MS	-0.578	-2.330	-0.602	-1.963
ΔMS	-4.220***	-4.233***	-11.879*	-11.849*
OETA	-1.231	-4.370*	-2.474	-7.627*
ΔOETA	-12.553*	-12.499*	-38.767*	-38.565*
NIM	-3.179**	-4.718*	-2.626***	-4.745*
NII	-2.557	-11.200*	-8.970*	-11.348*
LQ	-2.274	-2.590	-2.007	-2.049
ΔLQ	-3.500*	-3.496**	-4.751*	-4.785*
INT	-0.932	-0.808	-1.179	-1.337
ΔINT	-8.715*	-8.697*	-9.053*	-9.029*
ETA	-3.055**	-3.082	-2.875***	-2.966
ΔETA	-9.371*	-9.338*	-9.386*	-9.288*
ER	-2.593	-3.513*	-2.232	-3.009
ΔER	-8.723	-8.685	-8.522*	-8.477*

Note: Δ denotes difference operator. * denotes 1%, ** denotes 5% and *** denotes 10% significance level.

Test results presented that, series for the variables ROA, NII, and NIM are stationary (I(0)) whereas series of the variables ETA, LQ, OETA, MS, INT and ER have unit root (I(1)). Hence, first difference is taken for the variables that have unit root and are made stationary to construct a multiple regression model with OLS method.

Afterwards, OLS method performed to analyze the effects of employed independent variables on dependent variable. Regression results are presented in Table 4 as follows:

Table 4: Coefficients of the variables and descriptive statistics of the model

Variables	Coefficients	t-Statistic
C	0.011 [0.804]	0.248
ΔETA	0.086 [0.000]*	4.575
ΔLQ	-0.180 [0.000]*	-3.704
NII	0.122 [0.318]	1.002
NIM	0.587 [0.000]*	6.166
ΔOETA	0.377 [0.100]	1.658
ΔMS	0.004 [0.906]	0.118
ΔINT	-0.098 [0.044]**	-2.036
ΔER	0.000 [0.965]	0.043
DUMMY	-0.040 [0.003]*	-2.951
TREND	-0.000 [0.001]*	-3.224

Descriptive Statistics	
R^2	0.780
Adjusted R^2	0.760
F-Statistic	39.002 [0.000]
Autocorrelation (LM Test)	3.031 [0.219]
Heteroscedasticity (White Test)	72.578 [0.216]
Normality (Jarque-Bera Test)	60.878 [0.000]

Note: ** and * denote statistical significance at the 5% and 1% respectively. Figures in the square brackets are p-values.

According to econometric results, effects of ETA and NIM on ROA are found positive and significant at 1%. On the other hand, coefficients of LQ and INT are predicted as negative and significant at 1% and at 5% respectively. On the contrary, NII, MS, ER and OETA variables found statistically insignificant which points out that there is not an explanatory power of these variables over the variability in profitability in deposit banks operating in Turkey.

Dummy and Trend variables are also included in regression analysis. Dummy variable is added to examine the effect of recent global financial crisis to the Turkish banking profitability. Dummy variable takes the value of 0 except the period between 2008:3 and 2008:12 in which the value is 1. Coefficient of the dummy variable seems negative and significant that indicates the significant negative effect of the recent global economic crisis on profitability of deposit banks in Turkey. There is also a trend variable in the model whose coefficient is negative and significant.

However, turning to the descriptive statistics of the model, it seems that model passed all the diagnostic tests. R^2 that represents the explanatory power of the independent variables all together over dependent variable is pretty high and joint probability F-statistics is also significant. Indeed, model is seemed as well specified. Also, there is no heteroscedasticity and autocorrelation problems in the model. Although normality test does not indicate error terms are normally distributed, OLS estimators are still BLUE (Best Linear Unbiased Estimators) (Baltagi, 2008:98).

6. Discussion

According to estimation results in which ROA is dependent variable, ETA that is the proxy for the capital adequacy, has a positive and significant impact over return on assets. Coefficient indicates that banks that have stronger capital level are more profitable than that have lower capital adequacy. Empirical results of the studies of Demirgüç-Kunt and Huizinga (1999), Staikouras and Wood (2004), Gülhan and Uzunlar (2009) are compatible with our

findings. According to Athanasoglou et al. (2008), positive and significant impact of capital soundness over profitability revealed that bank managers conducting risk-averse policies to achieve profitability by screening and monitoring activities over credit risk. Besides some studies revealed incompatible findings with this study that there is a negative link between equity level and profitability i.e. Ata (2009), Hoffmann (2011) and Chronopoulos et al. (2015).

Another important variable over profitability analysis is the LQ measure, as stated it is the ratio of non-performing loans to total cash loans. Coefficient of LQ in regression presented a negative and significant relationship between profitability and weakness of loan quality and provided a supportive evidence for the expectations. Indeed, these results are consistent with the empirical findings of Akbaş (2012), Chaudhry et al. (1995), Dietrich and Wanzenried (2014), and Trujillo-Ponce (2013).

Although it is used representative of profitability as dependent variable in many studies, ratio of net interest income to average total assets (NIM), is also proxy for the bank efficiency by measuring the effectiveness of interest earnings that is the main revenue item for deposit banks. Positive and significant regression result again compatible with the priori expectations in terms of NIM. Regression coefficient represents that one-unit increase in the ratio of net interest income to average total assets leads 0.56-unit rise in ROA. Positive and significant impact of interest revenue over total assets coincides with the findings of (Demirhan, 2013).

Turning to the other explanatory variable that represents the effect of macroeconomic variables on profitability variable is central bank policy interest rate (INT). Empirical results displayed the negative and significant impact of the changes of monetary stance over bank profitability. Indeed, an expansionary monetary policy results a decline in interest rates cause bank profitability to increase in Turkey. Empirical results obtained in this study coincide with the findings of Naceur (2003) and dissociated with the results of Demirgüç-Kunt and Huizinga (1999).

7.   Conclusion

Banks are the commercial businesses that aims to maximize their profits while they are performing significant functions to assure economic system to work properly. Their major role is to eliminate the mismatching problems arise between borrowers and lenders. They act just a buffer that guarantee the interests of the both sides in lending-borrowing relationship as an intermediary. Thus, profitability is one of the key factors to ensure the sustainable stability in financial sector. Also, significant impact of bank-specific and macroeconomic variables on bank profitability differs substantially over the economies that operates different economic and financial environments.

In this study, multivariate regression analysis is performed to investigate the impact of bank-specific and macroeconomic variables over deposit bank profitability in Turkey between 2005 and 2016. Empirical results of this study suggested that in explaining bank profitability equity over total assets that represents the capital adequacy, non-performing loans over total cash loans as a proxy of loan quality and ratio of net interest revenues over average total assets shows the strength of main revenue source are significantly instructive. Also, effect of recent global financial crisis on bank performance is significantly negative. Indeed, result of this study provide supportive evidence that financial crisis adversely affected the performance of banking industry in Turkey.

However, insignificant coefficient of operational expenses to average total assets over profitability represents the ineffectiveness of cost management on bank performance. Macroeconomic indicator, central bank policy interest rate, is negatively linked with bank profitability executed adverse effect of monetary tightening in bank performance.

Furthermore, ratio of non-interest income over total assets as a proxy for the impact of product diversification, operational expenses to average total assets and market share representative of size are not significantly linked with the volume of bank profits. Insignificant size variable reveals the presence of economies of scale in banking industry as a whole by using aggregated data.

References

Abreu M, Mendes V. 2001. Commercial bank interest margins and profitability: Evidence for some EU countries. *In Pan-European Conference Jointly Organized by the IEFS-UK & University of Macedonia Economic & Social Sciences, Thessaloniki, Greece, May*, 17-20.

Aburime TU. 2008. Determinants of bank profitability: Macroeconomic evidence from Nigeria. *Available at SSRN 1231064*, 1-34.

Akbaş HE. 2012. Determinants of bank profitability: An investigation on Turkish banking sector. *Öneri Dergisi* 10:37, 103-110.

Ally Z. 2014. Determinants of banks' profitability in a developing economy: Empirical evidence from Tanzania. *European Journal of Business and Management* 6:31, 363-375.

Artar Kibritçi O, Sarıdoğan Atılgan A. 2012. Küresel finansal krizin Türkiye'de bankacılık sektörü mali yapısına etkileri. *Marmara Sosyal Araştırmalar Dergisi* 2, 1-17.

Asimakopoulos I, Athanasoglou P, Georgiou E. 2005. The effects of M&A announcement on Greek bank stock returns. *Economic Bulletin of Bank of Greece* 24:1, 27-44.

Ata HA. 2009. Kriz sonrası Türkiye'de mevduat bankaları kârlılığına etki eden faktörler. *İşletme Fakültesi Dergisi* 10:2, 137-151.

Atasoy H. 2007. Türk bankacılık sektöründe gelir-gider analizi ve karlılık performansının belirleyicileri. *Speciality Thesis, Central Bank of Turkey.*

Athanasoglou PP, Brissimis SN, Delis MD. 2008. Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of international financial Markets, Institutions and Money* 18:2, 121-136.

Baltagi BH, 2008. *Econometrics.* 4th ed. Springer.

Banking Regulation and Supervision Agency (BRSA). 2016. *Turkish Banking Sector Interactive Monthly Bulletin.* Retrieved May, 20, 2016, from http://ebulten.bddk.org.tr/ABMVC/en/Gosterim/Gelismis.

Borio CE, Gambacorta L, Hofmann B. 2015. The influence of monetary policy on bank profitability. *BIS Working Paper No:514,* 1-34.

Casu B, Girardone C, Molyneux P. 2006. *Introduction to banking.* Vol. 10. Pearson Education.

Central Bank of the Republic of Turkey (CBRT). 2016. *Electronic Data Delivery System,* Retrieved May, 20, 2016 from http://evds.tcmb.gov.tr/index_en.html.

Chaudhry M, Chatrath A, Kamath R. 1995. Determinants of bank profitability. *American Journal of Business* 10:1, 41-46.

Chronopoulos DK, Liu H, McMillan FJ, Wilson JO. 2015. The dynamics of US bank profitability. *The European Journal of Finance* 21:5, 426-443.

Demirgüç-Kunt A, Huizinga H. 1999. Determinants of commercial bank interest margins and profitability: Some international evidence. *The World Bank Economic Review* 13:2, 379-408.

Demirhan D. 2013. Effects of the recent financial crisis on the determinants of bank profitability: Case of Turkish banking industry. *Journal of Yaşar University* 8:31, 5203-5228.

Diamond DW. 1984. Financial intermediation and delegated monitoring. *The Review of Economic Studies*, 51:3, 393-414.

Dietrich A, Wanzenried G. 2011. Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money* 21:3, 307-327.

Dietrich A, Wanzenried G. 2014. The determinants of commercial banking profitability in low-, middle-, and high-income countries. *The Quarterly Review of Economics and Finance* 54:3, 337-354.

Enders W. 2008. *Applied Econometric Time Series*. John Wiley & Sons.

García-Herrero A, Gavilá, S, Santabárbara D. 2009. What explains the low profitability of Chinese banks?. *Journal of Banking & Finance* 33:11, 2080-2092.

Goddard J, Molyneux P, Wilson JO. 2004. The profitability of European banks: a cross-sectional and dynamic panel analysis. *The Manchester School* 72:3, 363-381.

Granger CW, Newbold P. 1974. Spurious Regressions in Econometrics. *Journal of Econometrics* 2:2, 111-120.

Gülhan Ü, Uzunlar E. 2011. Bankacılık sektöründe kârlılığı etkileyen faktörler: Türk bankacılık sektörüne yönelik bir uygulama. *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 15:1, 341-368.

Hoffmann PS. 2011. Determinants of the profitability of the US banking industry. *International Journal of Business and Social Science* 2:22, 255-269.

Hubbard RG. 1994. Is There a Credit Channel for Monetary Policy?. *National Bureau of Economic Research* No: w4977, 1-45.

International Monetary Fund (IMF). 2016. *International Financial Statistics (IFS) System.* Retrieved May, 20, 2016 from http://data.imf.org/regular.aspx?key=60998111

İşcan E, Oransay G. 2011. Banka karlılıklarının banka-özellikli, sektör özellikli ve makroekonomik belirleyicileri: Türk bankacılık sektöründe 2002-2010 dönemi. *EconAnadolu 2011: Anadolu International Conference in Economics II, Eskişehir/Turkey.*

İskenderoğlu Ö, Karadeniz E, Atioğlu E. 2012. Türk bankacılık sektöründe büyüme, büyüklük ve sermaye yapısı kararlarının karlılığa etkisinin analizi. *Eskişehir Osmangazi Üniversitesi İktisadi ve İdari Bilimler Dergisi* 7:1, 291-311.

Kosmidou K, Tanna S, Pasiouras F. 2005. Determinants of profitability of domestic UK commercial banks: Panel evidence from the period 1995-2002. In *Money Macro and Finance (MMF) Research Group Conference,* 45, 1-27.

Kosmidou K. 2008. The determinants of banks' profits in Greece during the period of EU financial integration. *Managerial Finance* 34:3, 146-159.

Küçükbıçakçı R. 2004. Banka yeniden yapılandırma programları ve ekonomik sonuçları. *Specialty Thesis, Central Bank of Turkish Republic.*

Lee CC, Hsieh MF. 2013. The impact of bank capital on profitability and risk in Asian banking. *Journal of international money and finance* 32, 251-281.

Mendenhall W, Beaver R, Beaver B. 2012. *Introduction to Probability and Statistics.* Cengage Learning.

Miller SM, Noulas AG. 1997. Portfolio mix and large-bank profitability in the USA. *Applied Economics* 29:4, 505-512.

Mirzaei A, Moore T, Liu G. 2013. Does market structure matter on banks' profitability and stability? Emerging vs. advanced economies. *Journal of Banking & Finance* 37:8, 2920-2937.

Molyneux P, Thornton J. 1992. Determinants of European bank profitability: A note. *Journal of Banking and Finance* 16, 1173-1178.

Naceur SB. 2003. The determinants of the Tunisian banking industry profitability: Panel evidence. *Universite Libre de Tunis working papers,* 1-17.

Özcan A, Çiftçi C. 2015. Türkiye'de mevduat bankacılığında yoğunlaşma ve kârlılık ilişkisi (2006-2013 Dönemi). *Niğde Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi* 8:3, 1-12.

Peek J, Rosengren E. 1995. The capital crunch: neither a borrower nor a lender be. *Journal of Money, Credit and Banking* 27:3, 625-638.

Short BK. 1979. The relation between commercial bank profit rates and banking concentration in Canada, Western Europe, and Japan. *Journal of Banking & Finance* 3:3, 209-219.

Staikouras CK, Wood GE. 2004. The determinants of European bank profitability. *International Business & Economics Research Journal 3*:6, 57-68.

Tan Y, Floros C. 2012. Bank profitability and inflation: the case of China *Journal of Economic Studies* 39:6, 675-696.

Trujillo-Ponce A. 2013. What determines the profitability of banks? Evidence from Spain. *Accounting & Finance* 53:2, 561-586.

Türker Kaya Y. 2002. Türk bankacılık sektöründe karlılığın belirleyicileri: 1997-2000. *BDDK, Mali Sektör Politikaları Dairesi Çalışma Raporları*, 1.

Wooldridge J. 2013. *Introductory Econometrics: A modern approach.* Nelson Education.

Yılmaz AA. 2013. Profitability of banking system: Evidence from emerging markets. *WEI International Academic Conference Proceedings. January 14-16, 2013, Antalya-Turkey.*