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Testing the Factors that Determine the Profitability of Banks with a Dynamic Approach: Evidence from Turkey

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Abstract: The present study aims to identify the internal and external factors that affect the profitability of banks operating in Turkey. For this purpose, the study used data from 23 public, private, and foreign banks, covering the period from 2007 to 2020. Two dependent variables were used as the profitability indicators of banks, namely, the Return on Equity (ROE) and the Return on Assets (ROA). In order to increase the reliability of the models developed during the study, Dynamic Generalized Method of Moments (GMM) and Fixed Effect Model (FEM) were applied. Results of the analysis indicate a positive and statistically significant relation between inflation rate and GDP growth rate, and ROA and ROE. According to the results of GMM, there was a positive relation between ROA and ROE, and 1-year and 2-year lagged ROA and ROE. This situation may be explained by the fact that profits acquired in the Turkish banking sector are steady. ROA and ROE were observed to have a positive relation with inflation rate and economic growth rate. In other words, the increase in inflation rate and GDP growth rate positively affect profitability of public, private, and foreign banks.

Keywords: Bank Profitability, Turkish Banking, Dynamic Approach.

JEL Classification: G21, L25.

1. Introduction

Financial sector has an important role in a country's economic development. A strong and healthy banking sector is considered to be a prerequisite for a sustainable economic growth. In terms of evaluating sector's success on national and international levels, it is important to measure performances of the banks, which contribute in the process of maintaining economical activities especially through their loan channels (Demireli, 2010). Banking sector plays a key role in financial sector with its mediator position in channelizing resources to investments. Financial liberalization trend in 1980s influenced financial and corporate structures of the Turkish banking sector, which have reached an important level today. This condition has brought the banking sector to a central position in the economic development of the country. Positive changes in the country`s increased the loan and deposit volume of the banks, which caused the growth of assets of the banking sector. In addition, profitability of the Turkish banking sector has significantly increased. Investigation and evaluation of the increase in the profitability of banking sector will contribute to a better understanding of possible increase in the profitability performance of the sector in the future.

The present study aims to determine the internal and external factors that determine the profitability of the banks operating in Turkey. In this scope, the study utilized data of 23 public, private, and foreign banks over the period from 2007 to 2020. Two dependent variables have been used as profitability indicators of banks. These are Return on Equity (ROE) and Return on Assets (ROA). Dynamic Generalized Method of Moments (GMM) was used in the study to increase the reliability of developed models.

The study consists of six sections. The second section following the introduction describes Turkish banking sector. The third section summarizes the studies conducted on the factors that determine profitability of banks, and the forth section presents dependent and independent variables and describes the methodology and the model of the study as well. Fifth section includes findings, while the last part gives general evaluation of the research.

2. Literature review

This section summarizes academic studies previously conducted on internal and external factors that determine the profitability of the banks. Some of these studies were conducted on banking sector of a single country (Sufian and Chong, 2008; Javaid, Anwar, Zaman and Gafoor 2011; Ponce, 2011; Alp, Ban, Demirgüneş

and. Kılıç, 2012) while others focused on banking sectors of more than one country (Abreu and Mendes, 2001; Pasiouras and Kyriaki (2007); Flamini, McDonald and Schumacher, 2009: Vučinić, 2020; Abbas and Younas; 2021).

An important majority of these studies have divided the determinant factors of profitability into two groups, as internal and external factors. In the studies on internal factors, dependent variables of return on assets (ROA) and return on equity (ROE) was used as bank profitability indicators in general, and analyses were conducted in order to examine relations of these factors with bank-specific internal factors. Internal factors (capital adequacy, employees, investments, etc.) are controllable factors. External factors (inflation, GDP, competition, etc.), on the other hand, are uncontrollable factors.

One of the first empirical studies concerning internal factors that determine bank profitability was conducted by Lambert and Hoselitz (1963). Later, Hester and Zoellner (1966) argued that balance structure of banks is an important factor in determining profitability. Heggested (1977) identified a negative relation between savings deposits and profitability of the banks. Mullineaux (1978) derived a positive relation between profitability and size of the banks. Berger, Hanweck and David (1987) found a positive relation between capitals and profitability of the banks as a result of their empirical study. Bourke (1989), on the other hand, used capital adequacy, bank size and increase in the rate of return as internal factors. Results of his study suggested a positive relation between capital adequacy and profitability, and he argued that profitability of the banks would increase as their capitals increase. A positive relation was identified between inflation and interest rate as external factors, and bank profitability. Molyneux and Thorton (1992) identified positive relations between personnel expenses, inflation and long-term interest rate of the banks, and their profitability. Steinherr and Huveneers (1994), on the other hand, argued that the increase in operating expenses affected profitability negatively.

In the study of Demirguc-Kunt and Huizinga (1999) involving the period between 1988 and 1995, factors that determine profitability of banks in 80 countries, including both developed and developing, were analyzed. They identified a higher performance for foreign banks compared to domestic ones. They also found positive and statistically significant results between the capital ratio and financial performance.

Abreu and Mendes (2001) examined factors that determine profitability of commercial banks operating in Portugal, Germany, Spain, and France. The results of their study, which involved the period between 1986 and 1999, suggested that loan ratio and leverage ratio had a positive relation with ROA.

Alrashdan (2002) analyzed internal factors that determine profitability of banks, and identified positive and statistically significant results between return on assets (ROA) and liquid assets (liquid assets/total assets). On the other hand, he found a negative relation between ROA, and financial leverage and interest expenses.

Naceur (2003) studied 10 commercial banks operating in the Tunisian banking sector and the results of the study, which covered the period between 1980 and 2000, suggested that increase in operating expenses, loans within their assets, and capital adequacies of the banks affected profitability in a positive way, but increase in the size of the banks (their assets) affected profitability in a negative way. Nevertheless, Naceur argued that macroeconomic factors did not affect bank profitability.

In their studies, Hasan and Bashir (2003) argued that short-term foreign resources and non-interest income affected banks' profitability. They also identified a negative relation between the loan ratio and profitability, and a positive relation between profitability and the capital ratio. Similarly, Staikouras and Wood (2003) found a negative relation between the loan ratio and profitability. The results of Haron and Azmi's (2004) study, which was conducted in order to identify profitability of Islamic banks operating in various countries, suggested that liquidity, deposits, assets and capital structures of the banks affected their profitability, while banks' sizes did not affect their profitability.

In the study analyzing factors that determine profitability of the banks operating in Arab States of the Gulf, Alkassim (2005) found that an increase of assets in conventional banks decreased their profitability, while the increase of assets in Islamic banks increased their profitability.

Amor-Tapia, Tascón Fernandez and Fanjul Suarez (2006) analyzed the internal factors that determine the profitability of the banks operating in OECD countries. Results of this study suggested that an increase in the financial leverage ratio helped in increasing profitability. Athanasoglou, Delis and Staikouras (2006) conducted an empirical study in order to identify profitability of the Greek banks. Results of this study suggested that capital adequacy was a very important ratio in explaining bank profitability. In addition, they argued that increased loan risks affected the profitability of the banks in a negative way. On the other hand, they identified a positive relation between inflation and bank profitability.

Vong and Chan (2006) conducted an empirical study in order to identify the internal and external factors that determine the profitability of the banks operating in Macao region of the People's Republic of China. Results of their study involv-

ing the period between 1993 and 2007 suggested that the increase in the capitals of the banks would reduce their risks, thus would affect their profitability in a positive way.

Pasiouras and Kyriaki (2007) conducted a study on the influence of the internal and external factors on the profitability of domestic and foreign commercial banks in 15 European Union countries between 1995 and 2001, and concluded that the financial structure of the banks had an important influence on their profitability. Additionally, they identified a positive relation between inflation rate and bank profitability.

Sufian and Chong (2008) conducted an empirical study in order to identify the internal and external factors that determine profitability of the banks operating in Philippines. Results of the study, which involved the period between 1990 and 2005, suggested that bank-specific internal factors affected profitability of the banks. They also found a negative relation between bank sizes, loan risks and operating expenses, and their profitability, while identifying a positive relation between their non-interest incomes and capital adequacies, and their profitability.

Flamini et al. (2009) used data of 389 banks operating in 41 countries in Africa in order to identify determinants of profitability of the banks. As a result of their study, they identified a negative and statistically significant relation between banks` total assets, operating expenses and leverage ratios, and their profitability. On the other hand, they argued that profitability would increase as loan risk increases.

Ramlall (2009) studied the internal factors that determine profitability of the banks operating in Taiwan between 2002 and 2007. Results of his study suggested that the increase in non-performing loans (non-performing loans/total loans) and non-interest incomes of banks affected profitability of banks negatively, while the increase in their capital adequacies affected their profitability positively.

Berger, Hasan and Zhou (2010) analysed factors that determine profitability of Chinese banks in the period between 1996 and 2006. In their study, they divided banks into two groups of large-scale and middle-scale banks. They identified that capital increase in middle-scale banks affected their profitability positively, while capital increase in large-scale banks affected their profitability negatively.

Ponce (2011) studied the factors that determine profitability of the banks operating in Spain between 1999 and 2009. According to the results of the analysis, the increase in capital adequacy and deposits of the banks increased profitability of the banks, while the increase in total assets decreased their profitability.

Javaid et al. (2011) investigated the internal factors that determine profitability of the banks and used the data of the largest 10 banks operating in Pakistan between 2004 and 2008. They analysed whether loans, equity, assets and deposit structure had an influence on profitability of the banks. A strong relation between these variables and profitability was observed. They also identified a negative relation between assets and profitability of the banks. This situation was associated with negative scale economy. They also identified positive but statistically insignificant results between loans and profitability. Another important finding of their study suggested positive and quite significant results between profitability, and deposits and capital adequacy.

Alp et al. (2012) analysed the internal factors of profitability of the banks operating in Turkey in the post-crisis period. They suggested that banks continued their operations in a healthy and profitable way in the post-crisis period. Moreover, a positive relation between assets and capital adequacy of the banks, and a negative relation between their liquidity and operating expenses were identified.

Thota (2013) analysed the internal and external factors that determine profitability of 108 commercial banks operating in India. The study used the data of the period between 1999 and 2011. The result of the unstable panel data analysis suggested that the internal and macroeconomic factors were affecting profitability (ROA and ROE) of Indian banks. In addition, a positive relation was obtained between loan risk, and ROA and ROE for foreign and private banks. Moreover, a positive relation was identified between operating expenses and ROE for foreign and private banks, while a negative relation was identified for public banks.

Chavarín (2014) tested the factors that determine profitability of the banks operating in Mexico with the help of GMM. The study made use of the data of 45 banks belonging to the period between 2007 and 2013. According to the results of GMM, there was a positive relation between ROA and ROE, and 1-year lagged ROA and ROE. In addition, there was a positive relation between equity level, and ROA and ROE.

Petria, Capraru and Ihnatov (2015) studied the internal and external factors that determine profitability of the banks belonging to and operating in 27 countries within the European Union. Results of the study, which made use of the data in the period between 2004 and 2011, suggested that loans and liquidity risk, management efficiency, job diversification, competitive intensity and economic growth had a positive relation with ROA and ROE. Similarly, Bhattarai (2018) on the case of Nepal, Brahmaiah and Ranajee (2018) on the case of India; Ghurtskaia,

(2018) on the case of Georgia; and Hasanov, Bayramli and Al-Musehel (2018) on the case of Azerbaijan investigated the factors that determine bank profitability.

Karadžić and Đalović (2021) examined which factors and with what intensity affect the profitability of large banks in Europe. The study used fairly balanced panel models with annual data on 47 large banks from 14 European countries during the 2013-2018 period. As a result of the research, GDP growth rate, inflation rate and market concentration have a positive effect on profitability, while the membership of the European Union has a negative impact on profit, meaning that banks with headquarters outside the EU are more profitable.

Khan (2022) investigates the determinants of profitability of banks operating in Gulf Cooperation Council (Gulf Cooperation Council) countries. As a result of the research, bank size and GDP growth have a significant and positive association with ROA. In addition, while bank size and asset management have significant and positive impact, capital adequacy, financial risk, operating efficiency, and asset quality have a negative and significant impact on ROE.

3. Methodology and Data Set

The present study aims to identify the internal and external factors that affect the profitability of banks operating in Turkey. This section of the study presents information on data set and sampling and also introduces dependent and independent variables.

3.1. Data Set and Sampling

The study used data from 23 public, private, and foreign banks, covering the period from 2007 to 2020 (table 1). Although there are 49 banks operating in the Turkish banking sector, some of the banks have not been included in the analysis due to their different structure.

Table 1: Banks Used in the Analysis

Bank Type	Number of the Banks
Public Banks	3
Private Banks	10
Foreign Banks	10
Total Number of Banks	23

3.2. Variables

Two dependent variables have been used in this study. These are return on assets (ROA) and return on equity (ROE). ROA is obtained by dividing net profit to total assets, while ROE is obtained by dividing net income of the banks to shareholder's equity. ROA and ROE are ratios indicating profitability and management capability of the banks. Similarly, the studies conducted by Hassan and Bashir (2003), Molyneux and Thornton (1992), Kosmidou (2008), Abbasoğlu, Aysan and Güneş (2007), Javaid et al. (2011), Abreu and Mendes (2001), Alp et al. (2012), Naceur and Goaied (2008) have used ROA and ROE as profitability indicators.

Independent variables used in the study are internal and external factors specific to individual banks. The independent variables are bank-specific factors, industry-specific factors and macroeconomic factors. These variables are presented in Table 2.

Table 2: Variables Used in Analyses

Variables	Definitions	Codes
Dependent Variables		
Return on Assets	Net Income of the Period/Total Assets	ROA
Return on Equities	Net Income of the Period/Total Equity	ROE
Bank-Specific Factors (Independent Variables)		
Bank Size	Logarithm of Total Assets	SIZE
Capital Structure	Total Equity /Total Assets	EQU/ASS
Loan Risk 1	Loans/Deposits	LOAN/DEP
Loan Risk 2	Loans/Total Assets	LOAN/ASS
Liquid Structure	Liquid Assets /Total Assets	LIQ/ASS
Expense Management	Operational Expenses /Total Assets	OPE/ASS
Industry-Specific Factors (Independent Variables)		
Competitive Intensity	First Five Banks Assets / Total Assets	INTENSITY
Ownership Structure	Public / Private / Foreign	
Macroeconomic Factors (Independent Variables)		
Inflation Rate	12-Month Consumer Price Inflation	INFLATION
Growth Rate	Annual Growth Rate	GROWTH

3.3. Methodology

Data used in the study are considered as stable panel data due to their coverage of 23 banks across 10 years. Within the scope of the study, the data were analyzed through Stata 13.0 software. Hausman Test was utilized in order to decide whether to use fixed effect approach or random effect approach for the analysis. Typically, fixed effect and random effect models do not give much different results. Since the probability value determined through Hausman Test was smaller than 0.05, the fixed effect model was considered to be able to give more accurate results for the study. The fixed effect method used in the panel data analysis is presented below.

$$y_{it} = \alpha + \beta' X_{it} + u_{it}$$

$$u_{it} = \mu_i + v_{it}.$$

The fixed and random effect methods used in the panel data analysis give unstable and biased results. Particularly, the dependent variable is affected by its value of the previous period, and as a result the requirement for the error value and independent variables to be independent from each other is removed. Therefore, a requirement to use a dynamic model arises (Arellano and Bond, 1991).

In the scope of the present study, dynamic panel GMM was utilized to increase reliability of the results, taking into account the regression models dynamic internality. Dynamic GMM model used in panel data analysis is presented below.

$$R_{it} = \beta\, Y_{i,\,t-1} + \beta_2 X_{it} + \beta_3 + u_{it}$$

Models developed using dynamic GMM are presented below. 1-year and 2-year lagged values of the dependent variables (ROA and ROE) of these models were also added.

$ROA_{it} = \beta_0 + \beta_1\, ROA_{it-1} + \beta_2\, ROA_{it-2} + \beta_3\, SIZE_{it} + \beta_4\, EQU/ASS_{it} + \beta_5\, LOAN/DEP_{it} + \beta_6\, LOAN/ASS_{it} + \beta_7\, LIQ/ASS_{it} + \beta_8\, OPE/ASS_{it} + \beta_{10}\, INTENSITY_{it} + \beta_{11}\, INFLATION_{it} + \beta_{12}\, GROWTH_{it} + e_{it}$

$ROE_{it} = \beta_0 + \beta_1\, ROE_{it-1} + \beta_2\, ROE_{it-2} + \beta_3\, SIZE_{it} + \beta_4\, EQU/ASS_{it} + \beta_5\, LOAN/DEP_{it} + \beta_6\, LOAN/ASS_{it} + \beta_7\, LIQ/ASS_{it} + \beta_8\, OPE/ASS_{it} + \beta_{10}\, INTENSITY_{it} + \beta_{11}\, INFLATION_{it} + \beta_{12}\, GROWTH_{it} + e_{it}$

Figure 1: Research Model
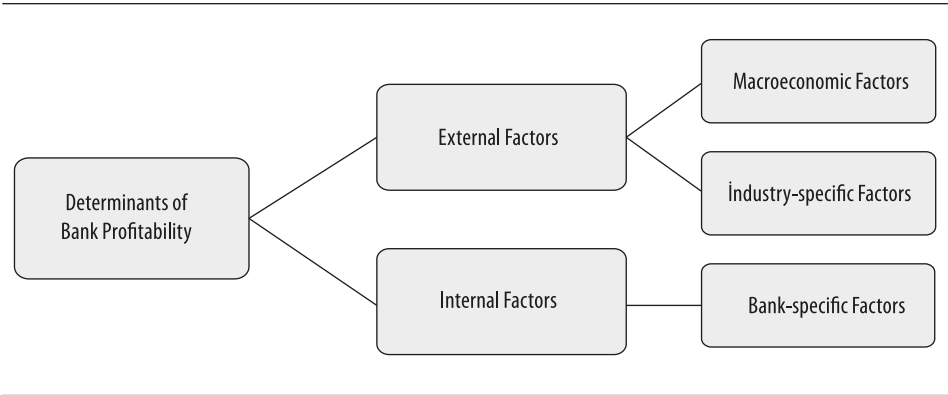
Source: Authors

4. Findings

Table 3 shows the results of descriptive statistics concerning dependent and independent variables used in empirical analyses. As seen in Table 3, the average ROA of all banks subjected to analysis is 1.5%, while their ROE is 11.38%. In addition, ROA of public banks is calculated as 2.1%, and their ROE as 21.3%. However, ROA of private banks is found as 1.19%, and their ROE as 8.94%. Public banks are observed to have higher profitability compared to other kinds of banks. Flamini et al. (2009) have identified average ROA and ROE of 389 banks from 41 countries in Africa as 2.3% and 12.5%, respectively, for the period between 1998 and 2006. According to the report of the European Banking Federation, as of the 2009 year-end, average ROA and ROE of banks from 16 countries operating in Europe were 0.5% and 10.5%, respectively.

Table 3: Descriptive Statistics

	ROA	ROE	EQU/ASS	LOAN/ASS	LOAN/DEP	LIQ/ASS	OPE/ASS	SIZE
All Banks								
Mean	1.507	11.38	13.29	53.38	90.40	34.59	5.43	10.05
Min	-12.60	-178.6	5.70	3.60	9.40	8.60	2.40	8.48
Max	8.20	34.40	49.20	84.70	332.20	91.30	16.20	11.32
Std. Deviation	1.63	15.99	5.99	15.92	33.43	15.41	2.31	0.75
Observation	322	322	322	322	322	322	322	322
Public Banks								
Mean	2.107	21.30	10.15	46.92	65.59	31.67	3.03	10.88
Minimum	1.20	12.30	7.10	20.60	25.90	14.90	2.40	10.43
Maximum	2.90	33.90	13.20	65.10	106.40	54.20	4.20	11.32
Std. Deviation	0.55	6.98	1.48	14.44	23.92	10.85	0.41	0.24
Observation	42	42	42	42	42	42	42	42
Private Banks								
Mean	1.191	8.94	12.43	55.89	88.57	33.08	5.20	10.12
Minimum	-12.60	-178.6	6.70	17.30	35.30	9.80	2.50	8.67
Maximum	3.40	33.60	21.90	84.70	138.20	77.40	16.20	11.32
Std. Deviation	1.80	21.88	2.85	13.71	20.90	14.86	2.07	0.80
Observation	140	140	140	140	140	140	140	140
Foreign Banks								
Mean	1.644	10.85	15.10	52.81	99.68	36.97	6.38	9.73
Minimum	-.60	-7.00	5.70	3.60	9.40	8.60	2.50	8.48
Maximum	8.20	34.40	49.20	76.20	332.20	91.30	14.60	10.82
Std. Deviation	1.61	8.03	8.21	17.87	41.37	16.87	2.31	0.59
Observation	140	140	140	140	140	140	140	140

Source: Authors` calculations

As seen in Table 3, the ratio of equities to assets of the banks is observed to be 13.29% for all banks. This ratio is found to be at its highest for foreign banks and at its lowest for public banks. Ramrall (2009) identified the ratio of equities to assets of the banks operating in Taiwan between 2002 and 2007 as 9.3%. Sufian and Chong (2008) calculated the average capital ratio of the banks operating in Philippines between 1990 and 2005 as 18.9%. Berger et al. (2010) identified the average capital ratio of the banks operating in China between 1996 and 2005 as 9.4%. Ponce (2011) determined the capital ratio of the banks of Spain as 6.9%. Banks operating in Turkey have a higher equity to total assets ratio compared to the majority of the banks operating in other countries. This fact may be ex-

plained by the efforts to strengthen the capital structures of Turkish banks after the Banking Sector Re-structuring Program.

All banks are observed to have the ratio of loans to assets amounting to 53.38%. This ratio is 49.93% for public banks, 52.81% for foreign banks, and 55.89% for private banks. And foreign banks are observed to rank first in the loan-deposits ratio with the rate of 99.68%. One might say that the foreign banks have a higher level of ability to transform deposits into loans compared to public and private banks. Finally, public banks are observed to rank first in terms of size.

Table 4: Results of Correlation Analysis

	ROA	ROE	EQU/ASS	LOAN/ASS	LOAN/DEP	LIQ/ASS	OPE/ASS	SIZE
ROA	1.00							
ROE	0.845	1.00						
EQU/ASS	0.415	0.312	1.00					
LOAN/ASS	0.215	0.184	-0.326	1.00				
LOAN/DEP	-0.119	-0.070	0.111	0.483	1.00			
LIQ/ASS	0.085	0.014	0.301	-0.549	-0.442	1.00		
OPE/ASS	-0.223	-0.416	0.413	-0.032	0.03	0.076	1.00	
SIZE	0.140	0.276	-0.401	0.178	-0.057	-0.245	-0.421	1.00

Source: Authors` calculations

Results of correlation analysis are shown in Table 4. When the results of correlation analysis are examined, *ROA* and *ROE* are observed to have positive relations with bank total assets (*SIZE*), loan-total assets ratio (*LOAN/ASS*), and equity-total asset ratio (*EQU/ASS*). On the other hand, *ROA* and *ROE* are observed to be decreasing whenever operating expenses within the assets are increasing. Additionally, it appears from the correlation table that there is no important relationship among independent variables. This, in turn, increases the reliability of the model.

Table 5: FEM Results with Variables Related to Bank Features (ROA)

	Model 1 (ROA)	Model 2 (ROA)	Model 3 (ROA)	Model 4 (ROA)
Variables	All Banks	Public Banks	Private Banks	Foreign Banks
Intercept	0.092[a]	0.086[a]	0.093[a]	0.125[a]
	(7.52)	(2.420)	(3.730)	(8.954)
EQU/ASS	0.787[a]	-0.029	0.173[a]	0.952[a]
	(10.324)	(-0.157)	(2.915)	(10.393)
LOAN/ASS	0.241[c]	1.785[a]	0.348[b]	0.229[c]
	(2.414)	(2.780)	(2.298)	(1.801)
LOAN/DEP	-0.163	-0.155	0.069	-0.080
	(-1.489)	(-1.445)	(0.581)	(-0.827)
LIQ/ASS	-0.009	.090	(-0.026)	0.118
	(-0.092)	(0.637)	-0.936	(1.018)
OP/ASS	-0.344[a]	-0.439[c]	-0.670[a]	-.0115[c]
	(-4.747)	(-1.808)	(-8.886)	(-1.529)
SIZE	0.268[a]	-0.564[b]	-0.013	0.279[a]
	(3.790)	(-2.462)	-0.170	(3.881)
Sample	322	42	140	140
Period	2007-2020	2007-2020	2007-2020	2007-2020
Adjusted R²	0.388	0.410	0.437	0.525
Hausman Test		0.000		

a, b and c denote significance at the 1, 5, and 10 percent level, respectively.

Source: Authors` calculations

Table 5 presents regression results indicating the relation between internal factors of the banks and *ROA*. When model 1 is examined for all banks *EQU/ASS*, *LOAN/ASS*, *OPE/ASS* and *SIZE* independent variables are observed to affect *ROA*. ROA is observed to have a positive relation with total assets (*SIZE*), equity-total assets ratio (*EQU/ASS*) and loan-total assets ratio (*LOAN/ASS*), while it is observed to have a negative and statistically significant relation with the operating expenses-total assets ratio (*OPE/ASS*). In other words, return on assets increases as bank's assets, and equity and loan ratios within assets increase, while operating expenses decrease.

When model 2 is analysed, no significant relation could be observed between *EQU/ASS* and *ROA* for public banks, while a positive relation is observed between *EQU/ASS* and *ROA* in model 3 and 4 for private and foreign banks. For all banks, a positive relation between *LOAN/ASS* ratio and *ROA* is observed, while a negative relation between *OPE/ASS* ratio and *ROA* is found. Additionally, *ROA* is observed to have an insignificant relation with *LOAN/DEP* and *LIQ/ASS* ratios.

A positive relation was identified between bank size and *ROA* for foreign banks, while the same relation was a negative one for public banks. However, no significant relation was observed between bank size and *ROA* for private banks.

Table 6: FEM Results with Variables Related to Economic Conditions (ROA)

Variables	Model 5 (ROA) All Banks	Model 6 (ROA) Public Banks	Model 7 (ROA) Private Banks	Model 8 (ROA) Foreign Banks
Intercept	0.075[a] (8.10)	0.091[a] (3.65)	0.088[a] (3.12)	0.110[a] (9.21)
EQU/ASS	0.698[a] (9.120)	-0.035 (-0.289)	0.295[a] (3.545)	0.899[a] (11.656)
LOAN/ASS	0.105[b] (1.236)	1.695[a] (2.452)	-0.401[b] (-2.369)	0.217[c] (1.754)
LOAN/DEP	-0.011 (-1.105)	-0.233 (-0.589)	0.112 (0.458)	-0.395 (-1.185)
LIQ/ASS	-0.012 (-0.132)	0.085 (0.478)	(-0.274) -1.085	0.098 (0.976)
OPE/ASS	-0.654[a] (-4.855)	-0.395[c] (-1.754)	-0.754[a] (-9.363)	-0.095[c] (-1.623)
SIZE	0.435[a] (4.696)	-0.652[b] (-2.585)	-0.011 -0.125	0.324[a] (3.988)
INTENSITY	0.052 (0.858)	0.252* (1.852)	0.195[c] (1.568)	0.012 (0.204)
INFLATION	0.152[c] (1.778)	0.074[a] (4.454)	0.014[b] (0.352)	0.038 (0.501)
GROWTH	0.014[b] (2.205)	0.089[b] (2.656)	0.078[a] (2.252)	0.052[b] (2.988)
Sample	322	42	140	140
Period	2007-2020	2007-2020	2007-2020	2007-2020
Adjusted R²	0.407	0.546	0.454	0.577
Hausman Test	**0**,000			

a, b and c denote significance at the 1, 5, and 10 percent level, respectively.

Source: Authors` calculations

In Table 6, macroeconomic and industry-specific factors that affect bank profitability were added to the models. When models are analysed, competitive intensity, inflation rate and GDP growth rate are observed to be effective on banks' return on assets (ROA). For all banks, private and foreign banks, ROA is observed to have an insignificant relation with competitive intensity (INTENSITY); while for private and public banks, ROA is observed to have a positive and statistically significant relation with INTENSITY. In other words, public banks that have high asset intensity have higher profitability as well. When the relation between

inflation and ROA is examined, one may say that private and public banks reach higher levels of profitability in the periods with high inflation rates. But inflation rate does not affect the profitability of foreign banks. When the relation between GDP growth rate and ROA is examined, a positive and significant relation is observed for all banks. In other words, the increase of economic growth rate affects profitability of the banks in a positive way.

Table 7: FEM Results with Variables Related to Bank Features (ROE)

Variables	Model 9 (ROE) All Banks	Model 10 (ROE) Public Banks	Model 11 (ROE) Private Banks	Model 12 (ROE) Foreign Banks
Intercept	0.079[a] (5.45)	0.115[a] (8.35)	0.85[a] (6.96)	0.68[a] (5.65)
EQU/ASS	0.689[a] (9.632)	-0.025 (-0.255)	0.312[c] (1.988)	0.366[b] (2.545)
LOAN/ASS	0.312[b] (2.025)	0.654[a] (4.524)	0.401[b] (2.352)	0.203[c] (1.652)
LOAN/DEP	-0.154 (-1.024)	-0.014 (-0.974)	0.034 (0.505)	-0.287 (-1.352)
LIQ/ASS	-0.022 (-0.102)	0.085 (0.432)	(-0.465)[a] -2.585	0.042 (0.740)
OPE/ASS	-0.699[a] (-5.878)	-0.545[b] (-3.324)	-0.785[a] (-8.752)	-0.225[c] (-1.925)
SIZE	0.301[b] (2.225)	-0.542[a] (-4.366)	-0.155 (-0.925)	0.595a (6.252)
Sample	322	42	140	140
Period	2007-2020	2007-2020	2007-2020	2007-2020
Adjusted R²	0.245	0.684	0.430	0.108

a, b and c denote significance at the 1, 5, and 10 percent level, respectively.

Source: Authors` calculations

Table 7 presents regression results indicating the relation between internal factors of the banks and ROE. Results presented in Table 7 are observed to be similar to those obtained from the previous models. This could be explained by the high correlation rate (0.845) between ROA and ROE. Model 9 shows that EQU/ASS, OPE/ASS and SIZE independent variables affect ROE. ROE is observed to have a positive relation with total assets (SIZE), equity-total assets ratio (EQU/ASS), while it is observed to have a negative and statistically significant relation with the operating expenses to total assets ratio (OPE/ASS). Similar results with the ones of Model 10, 11 and 12 were obtained for public, private and foreign banks as well.

Table 8: FEM Results with Variables Related to Economic Conditions (ROE)

Variables	Model 13 (ROE) All Banks	Model 14 (ROE) Public Banks	Model 15 (ROE) Private Banks	Model 16 (ROE) Foreign Banks
Intercept	0.087[a] (5.45)	0.145[a] (9.65)	0.096[a] (7.85)	0.068[a] (6.85)
EQU/ASS	0.695[a] (9.565)	-0.102 (-0.266)	0.314[c] (1.814)	0.321[b] (2.254)
LOAN/ASS	0.397[b] (2.422)	0.525[a] (4.250)	0.222[c] (1.969)	0.213[c] (1.522)
LOAN/DEP	-0.155 (-0.963)	-0.0654 (-0.878)	0.032 (0.101)	-0.050 (-0.699)
LIQ/ASS	-0.021 (-0.144)	0.065 (0.345)	(-0.151) -1.025	0.052 (0.858)
OPE/ASS	-0.565[a] (-4.989)	-0.525[a] (-4.105)	-0.560[a] (-6.352)	-0.252[c] (-1.854)
SIZE	0.358[a] (3.855)	-0.435[a] (-3.545)	-0.121 (-0.903)	0.454[a] (3.988)
INTENSITY	0.185 (1.025)	0.232[b] (1.945)	0.369[b] (2.985)	0.156 (1.021)
INFLATION	0.295[c] (2.105)	0.426[a] (4.854)	0.275[c] (1.543)	0.022 (0.365)
GROWTH	0.302[b] (2.485)	0.389[a] (3.421)	0.498[a] (3.324)	0.205[b] (1.812)
Sample	322	42	140	140
Period	2007-2020	2007-2020	2007-2020	2007-2020
Adjusted R^2	0.252	0.791	0.459	0.295

a, b and c denote significance at the 1, 5, and 10 percent level, respectively.

Source: Authors` calculations

In Table 8, macroeconomic and industry-specific factors that affect bank profitability were added to the models. When models are analysed, competitive intensity, inflation rate and GDP growth rate are observed to be influential on banks' return on equity (ROE). When the relation between GDP growth rate and inflation rate, and ROE is examined, a positive and significant relation is observed for all banks. ROE is observed to have a positive relation with competitive intensity (INTENSITY) for private banks.

Table 9: Results of Regression Analysis with Arellano-Bond Dynamic Model (ROA)

Variables	Model 17 (ROA) All Banks	Model 18 (ROA) All Banks	Model 19 (ROA) Public Banks	Model 20 (ROA) Private Banks	Model 21 (ROA) Foreign Banks
Intercept	0.057[a] (4.34)	0.045[a] (4.21)	0.052[a] (5.07)	0.061[a] (6.75)	0.042[a] (4.36)
ROAt-1	0.654[a] (8.225)	0.602[a] (7.903)	0.656[a] (7.854)	0.558[a] (5.240)	0.488[a] (4.324)
ROAt-2	0.487[a] (4.524)	0.451[a] (5.542)	0.652[a] (6.547)	0.398[a] (4.021)	0.401[a] (3.920)
EQU/ASS	0.058[c] (2.102)	0.052[c] (2.595)	-0.002 (-0.266)	0.014 (0.525)	0.021[c] (2.235)
LOAN/ASS	0.023[b] (3.52)	0.033[b] (3.28)	0.002 (0.450)	0.002 (0.987)	0.001 (0.432)
LOAN/DEP	-0.024 (-0.560)	-0.120 (-0.951)	-0.062 (-0.668)	0.012 (0.401)	-0.054 (-0.699)
LIQ/ASS	-0.009 (-0.092)	-0.021 (-0.144)	0.065 (0.345)	(-0.151) -1.025	0.052 (0.858)
OPE/ASS	-0.054[b] (-3.254)	-0.087[a] (-3.352)	-0.065[b] (-2.365)	-0.095[a] (-3.311)	-0.044[c] (-1.854)
SIZE	0.105[b] (2.254)	0.052[b] (2.365)	-0.021 (-0.854)	-0.021 (-0.854)	0.004[c] (1.854)
INTENSITY	0.098[b] (2.254)	-	-	-	-
INFLATION	0.085[a] (4.254)	-	-	-	-
GROWTH	0.098[a] (4.134)	-	-	-	-
Sample	322	322	42	140	140
Period	2007-2020	2007-2020	2007-2020	2007-2020	2007-2020
Wald Chi²	36521.24 0.000	38542.20 0.000	31220.96 0.000	27854.15 0.000	39654.65 0.000
Sargan (p-value)	0.8523	0.8921	0.8020	0.7572	0.9120
AR (1)	1.820 0.4520	1.9521 0.4987	1.452 0.3250	1.3520 0.2047	1.9852 0.5125
AR (2)	1.5684 0.3652	1.5210 0.2952	1.2041 0.4951	1.9852 0.4854	1.1202 0.7820

Source: Authors` calculations

Table 9 shows the relation between banks' internal and external factors, and ROA through GMM dynamic modelling. The 1- and 2-year lagged values of return on assets (ROA) were also added to this model. A positive and statistically significant relation is observed between banks' current return on assets, and their 1-year and 2-year lagged return on assets. In other words, 1-year and 2-year lagged returns on assets of the banks affect their current return on assets positively. When mac-

roeconomic variables are examined, ROA is observed to have a positive relation with competitive intensity, GDP, and inflation rate. Similar results to the ones of fixed effect model were acquired with the other variables.

Wald statistics and Sargan statistics show that the model is conforming to panel data. In addition, AR(1) and AR(2) values indicate that instrument variables are conforming and that the model does not have autocorrelation.

Table 10: Results of Regression Analysis with Arellano-Bond Dynamic Model (ROE)

	Model 22 (ROE)	Model 23 (ROE)	Model 24 (ROE)	Model 25 (ROE)	Model 26 (ROE)
Variables	All Banks	All Banks	Public Banks	Private Banks	Foreign Banks
Intercept	0.066[a] (5.01)	0.063[a] (4.33)	0.049[a] (4.95)	0.077[a] (4.29)	0.054[a] (4.66)
ROE_{t-1}	0.242[a] (4.652)	0.195[a] (5.903)	0.146[a] (1.874)	0.148[a] (2.145)	0.212[a] (3.542)
ROE_{t-2}	0.198[a] (2.521)	0.151[a] (2.122)	0.102[a] (1.184)	0.098[a] (1.958)	0.101[a] (2.132)
EQU/ASS	0.067[c] (2.299)	0.065[c] (1.232)	-0.005 (-0.378)	0.009 (0.542)	0.047[c] (2.656)
LOAN/ASS	0.059[b] (4.01)	0.049[b] (3.74)	0.010 (0.651)	0.021 (0.685)	0.015 (0.544)
LOAN/DEP	-0.069 (-0.669)	-0.085 (-0.741)	-0.065 (-0.858)	0.008 (0.334)	-0.021 (-0.254)
LIQ/ASS	-0.011 (-0.198)	-0.036 (-0.265)	0.078 (0.498)	(-0.099) -0.443	0.032 (0.227)
OPE/ASS	-0.042[b] (-3.002)	-0.055[a] (-2.102)	-0.022[b] (-1.988)	-0.089[a] (-4.215)	-0.063[c] (-2.962)
SIZE	0.091[b] (3.036)	0.062[b] (2.637)	-0.005 (-0.774)	-0.005 (-0.652)	0.021[c] (1.995)
INTENSITY	0.075[b] (3.244)	-	-	-	-
INFLATION	0.096[a] (3.837)	-	-	-	-
GROWTH	0.102[a] (4.232)	-	-	-	-
Sample	322	322	42	140	140
Period	2007-2020	2007-2020	2007-2020	2007-2020	2007-2020
Wald Chi^2	33211.12 0.000	34985.36 0.000	29454.11 0.000	25654.55 0.000	35465.77 0.000
Sargan (p-value)	0.5654	0.6235	0.4520	0.9833	0.9901
AR (1)	1.322 0.3325	1.211 0.2254	1.655 0.3141	1.478 0.1983	1.874 0.4521
AR (2)	1.105 0.2389	1.366 0.3454	1.875 0.4328	1.366 0.3392	1.5474 0.4995

Source: Authors` calculations

Table 10 shows the relation between banks' internal and external factors, and ROE through GMM dynamic modelling. The 1- and 2-year lagged values of return on equity (ROE) were also added to this model. A positive and statistically significant relation is observed between banks' current return on equity, and their 1-year and 2-year lagged return on assets. When macroeconomic variables are examined, ROE is observed to have a positive relation with competitive intensity, GDP, and inflation rate. Wald statistics and Sargan statistics show that the model is conforming to panel data. In addition, AR(1) and AR(2) values indicate that instrument variables are conforming and that the model doesn't have autocorrelation.

5. Conclusion and general assessment

Banking sector affects the country's economy and all sectors either directly or indirectly. A strong and healthy banking system is considered a prerequisite for sustainable economic growth. In other words, the banking sector is extremely important in terms of bringing in idle funds to the economy, contributing to economic growth, foreign resource transfer and tax revenues. In the banking sector where competition is intense, managing a bank`s resources effectively and efficiently has revealed the need to evaluate its performance and compare it with the competition. Measuring the financial performance of banks has a key role in terms of economy. In today's world where uncertainty and global competition are so intense, measuring bank performance with non-dynamic methods may not yield correct results.

Today, performances of banks are evaluated according to varied financial ratios and the results may differ. A bank that displays a high performance according to one rate can perform poorly compared to another rate. Therefore, due to the continued increase in risk, uncertainty and competition in the banking sector, feasible or fuzzy techniques are used and performance measurements can yield more reliable and sensitive results. Also, as in the data of this study, in the performance measurement of a bank, the financial ratios should be backtracked at least five years. Dynamic methods provide more accurate and easy monitoring of the changing financial rates over the years.

The present study aims to identify the internal and external factors that affect the profitability of banks operating in Turkey. For this purpose, the study used data from 23 public, private, and foreign banks, covering the period from 2007 to 2020. The GMM was applied in order to increase the reliability of the models developed during the study.

Results of the study suggest that the increase in the equity to total assets rate positively affects both return on equity (ROE) and return on assets (ROA) of the banks. Considering from the perspective of the banks operating in Turkey, the increase of equity rate within total assets, e.g. the strength of capital adequacy decreased the banks' foreign capital costs and this caused an increase in the profitability of banks. These findings show similarity with Javaid et al. (2011); Chavarín`s (2014) studies.

Another important finding of the study is the fact that ROA and ROE increase as asset sizes of the banks increase. This may be explained by the fact that large banks are more effective than small banks since they make use of the scale economy. In addition, ROA and ROE were observed to have a negative and statistically significant relation with the operating expenses within the assets of the bank. These findings show similarity with the studies by Alrashdan (2002); Naceur (2003); Flamini et al. (2009); Thota (2013).

When findings related to macroeconomic conditions were analyzed, ROA and ROE were observed to have a positive relation with inflation rate and economic growth rate. In other words, the increase in inflation rate and GDP growth rate positively affect profitability of public, private and foreign banks. Additionally, a positive relation was observed between competitive intensity, and ROA and ROE for public and private banks. Profitability indicators of public and private banks with less competition were observed to be higher. As a result, one may say that macroeconomic and industry-specific factors are effective on the profitability of the banks. These findings show similarity with the studies of Bhattarai (2018) and Hasanov et al. (2018) studies.

According to the results of GMM, there was a positive relation between ROA and ROE, and 1-year and 2-year lagged ROA and ROE. This situation may be explained by the fact that profits acquired in the Turkish banking sector are steady. These findings show similarity with Chavarín`s (2014) study.

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