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SCALE FACTOR IN THE PERFORMANCE OF DEPOSIT BANKS - THE TURKISH CASE

Mevduat Bankalarının Performansında Ölçek Faktörü - Türkiye Örneği

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Keywords:
Deposit Banks, Bank Performance, Cluster Analysis.

JEL Codes:
G21, L25, C38.

Abstract

The objective of this research was to clarify how the scale factor and bank performance relate to one another. It was observed that the benefit of scale emerged in various economic areas. In terms of efficient resource usage and cost advantage, the banking industry must determine if scale creates an advantage or not. Because banks' financial services are strongly linked to the expansion of the economy. In this framework, banks were divided into three clusters as large-, medium-, and small-scaled banks and analyzed as two different panels, consisting of 7 large- and medium-scaled banks and 13 small-scaled banks, to explicate the factors influencing the performance of deposit banks between 2012:Q4-2020:Q3. As a result, the study's findings showed that internal and macroeconomic variables, which were significant components regarding the scale structure of the banks' performance, had a high explanatory power in the analysis of commercial banks and were crucial to the profitability of the banks. Even when deposit banks were categorized as Large-, Medium-, and Small-Scaled Banks, the chosen explanatory variables were significant and strong estimators.

Anahtar Kelimeler:
Mevduat Bankaları, Banka Performansı, Kümeleme Analizi.

JEL Kodları:
G21, L25, C38.

Öz

Bu çalışmanın amacı ölçek faktörünün banka performansı ile ilişkisini sorgulamaktır. Ekonomideki bazı sektörlerde ölçek avantajının ön plana çıktığı görülmektedir. Literatürde banka performans analizi yapılırken örneklemin homojen olmasını sağlayan ölçeklendirmenin yapıldığı ve her bir grup için ayrı analizin sağlandığı az sayıda çalışmanın olması, bu çalışmanın farkını oluşturmaktadır. Bankacılık sektöründe ölçeğin avantaj yaratıp yaratmadığı konusu; kaynakların etkin kullanımı ve maliyet avantajı açısından önemlidir. Bu çerçevede Türk Bankacılık Sektöründe faaliyet gösteren mevduat bankalarının 2012Q4-2020Q3 dönemi performansına ölçek büyüklüğünün etkisinin incelenebilmesi için bankalar öncelikle ölçeklerine göre gruplandırılmıştır. Büyük, orta ve küçük ölçekli bankalar olarak 3 kümeye ayrılarak; büyük ve orta ölçekli 7 adet ve küçük ölçekli banka için ise 13 adet şeklinde iki farklı panel analiz yapılmıştır. Sonuç olarak ulaşılan bulgular, ticari bankaların analizinde ölçek yapısına göre içsel değişkenlerin ve makro ekonomik değişkenlerin banka performansını açıklayıcı gücü yüksek ve anlamlı bileşenleri olduğu, bankaların kârlılık performanslarında önem arz ettiğini göstermektedir. Seçilen açıklayıcı değişkenlerin, ticari bankaların Büyük, Orta ve Küçük Ölçekli Bankalar olarak daha homojen gruplar olarak ele alındığında da anlamlı ve güçlü tahmin ediciler oldukları görülmektedir.

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1. Introduction

The health of the banking industry has a significant influence on the economy of a nation. Banks serve as crucial financial mediators for economies (Menicucci and Paolucci, 2016). Nonetheless, banking failures may result in systemic crises. Profitable banking sectors enable economies to better withstand shocks. Thus, it is crucial to comprehend what factors affect bank profitability. Banks dominate Turkey's financial markets, conducting the majority of transactions and activity. The banking industry is thus the most significant tool for funding economic expansion in Turkey.

The effect of the 2008 global crisis on the Turkish financial industry was minimal, thanks to stricter restrictions implemented following the 2001 crisis, and there was no significant deterioration in the banking system's financial structure. Variations in bank scales might give banks with benefits or drawbacks. Several academic studies have explored the influence of bank scale, as defined by total assets, on bank performance (Spathis et al., 2002; Dietrich and Wanzenried, 2011; Aladwan, 2015; Nguyen, 2020). These studies' conclusions demonstrate that the size of a bank has a considerable impact on profitability measures.

In this context, the aim of the study is to examine the effect of scale size on the performance of deposit banks operating in the Turkish Banking Sector in the period 2012Q4-2020Q3. In this context, banks were first grouped according to their scales. Divided into 3 clusters as large, medium and small scale banks; Two different panel analyzes were made for 7 large and medium-sized banks and 13 for small-scale banks. This study's contribution to the literature stems from questioning the existence of an additional impact of the scale factor on the influence of internal and external variables on financial performance, and providing recommendations to market players and regulatory authorities based on the obtained results.

2. Literature Review

Demirgüç-Kunt and Huizinga (1999) utilized banking data from 80 countries between 1988-1995 to study the factors of profitability, with NII (Net İnterest İncome) and ROA (Return on Assets) as dependent variables. While the capital adequacy ratio (CAR) is connected to profitability, provisions have the opposite impact. Furthermore, a positive association was shown between the variables of RIR (Real interest Rate), inflation rate, and profitability, particularly in emerging nations.

Spathis et al. (2002) classified Greek banks into big and small asset sizes and analyzed their efficiency performance using ROA, ROE (Return on Equity), NIM (Net İnterest Margin), liquidity, leverage, and CAR. Efficiency of large-scaled banks was found to outperformed small-scaled banks.

Between 1995 and 2001, Pasiouras and Kosmidou (2007) examined the profitability drivers of 584 domestic and international deposit banks in 15 EU nations. According to the findings, bank-specific characteristics, financial market structure, and macroeconomic variables had substantial influences on ROA.

Sufian and Habibullah (2009) explored the drivers of profitability of 37 Bangladeshi deposit banks between 1997-2004 employing the unbalanced panel data model. As dependent variables, the NIM, ROE, and ROA were employed. According to the findings, the loan-asset

ratio, credit risk, capital ratio, and cost ratio all have a substantial and positive effect on bank profitability. Asset size had an adverse effect on ROE but a good effect on ROA and NIM. Only inflation was found to have a substantial and negative association.

According to Alp et al. (2010), the internal drivers of performance in Turkish banks operating between 2002 and 2009; credit risk and operational expenditures have a adverse influence.

Dietrich and Wanzenried (2011) analyzed the profitability of 372 Swiss deposit banks over the period 1999 2009 employing the GMM (Generalized Method of Moments) technique. They used NIM, ROE, and ROA as dependent variables. They also used macroeconomic independent variables, including GDP (Gross Domestic Product) growth rate, maturity structure of interest rates, and effective tax rate. The study detected that the capital ratio did not affect bank profitability between 1999 and 2006 but had an adverse influence on ROA during 2007-2009. The cost-to-income ratio, funding costs, loan growth, and interest income were found to explain bank profitability. Dummy variables were created to analyze scale size effects for small, medium, and large banks, and the results asserted that large-scaled banks had an adverse influence on profitability.

Ahmad et al. (2012) carried out research to reveal the factors that determine the profitability of local banks in Pakistan, covering the period of 2001-2010. They used ROA as an indicator of profitability and employed cost-income ratio, liquid assets/short-term funding, equity/assets, and provision for loan losses/total gross loans as independent variables. The findings asserted that an adverse correlation existed between all the independent variables and ROA.

Lee (2013) aimed to identify the factors that determine the profitability of Korean banks under different banking regulation regimes using the OLS (Ordinary Least Squares) regression method. The study employed ROA as an indicator of banks' profitability. The findings indicated that ROA of Korean banks had a positive correlation with asset size and equity-asset ratio, but a negative relationship with fixed assets ratio and NPL ratio. Nevertheless, following the Asian financial crisis, where there was a tightening of banking regulations with structural reforms, the positive correlation between ROA and asset size weakened, whereas the positive correlation between ROA and capital ratio increased.

Menicucci and Paolucci (2015) examined the profitability of the European banking sector using panel data analysis for the 35 largest banks in Europe between 2009-2013. They used NIM, ROA, and ROE and found that bank scale size and capital ratio had a significant positive effect on bank profitability.

Similarly, Pervan et al. (2015) explicated the factors that affect bank profitability using the dynamic panel model for the period of 2002-2010, using ROA as the dependent variable. Bank-specific independent variables included bank size, market share, solvency, credit risk, and operating expenses. They found that except for market share, all variables had a significant effect on ROA. Bank scale, solvency, and economic growth had positive impacts on ROA, while operating expenses, inflation, and credit risk had negative effects on ROA.

Aladwan (2015) explicated the influence of bank scale on the profitability of deposit banks in Jordan over the period 2007-2012. They divided Jordanian commercial banks into 3 groups based on their asset size and used ROE as a profitability indicator. The findings showed a significant difference in ROE among banks in different scale groups.

Using the GMM approach, Saona (2016) assessed the profitability determinants of 7 Latin American deposit banks over the years 1995-2012, using the NIM as the dependent variable. The findings indicated an inverse association between income diversification and profitability. Additionally, it was seen that a positive association existed between profitability and market concentration.

Bucevska and Misheva (2017) conducted a study on the determinants of bank profitability using ROE and ROA. The study considered the ratio of bank assets to the total banking sector, NII to average yielding assets, cost efficiency, asset size, loan provisions to gross loans, shareholders' equity to total assets, inflation rate, and GDP growth rate as independent variables. The GMM was applied to 127 commercial banks between 2005-2009. The findings showed that only bank scale was unimportant, and the remaining variables affected bank profitability.

Alharbi (2017) investigated the factors affecting the profitability of Islamic banks worldwide between 1992 and 2008. The fixed effects regression model was applied using panel data, and it was found that capital adequacy ratio, operating income, bank scale size, GDP per capita, and petroleum prices had a positive influence on the profitability, whereas the insurance system and growth had negative effects.

Paleni et al. (2017) explicated the impact of minimum CAR, loan/deposit ratio, and NPL to total loans ratio on ROA for rural banks in Indonesia between 2011-2015. The results indicated that when all these variables were used simultaneously, they had positive effects on ROA.

Similarly, Dizgil (2017) investigated the effect of internal factors on the profitability of deposit banks in Turkey. The study employed panel data analysis using the data of the ten largest banks. The results indicated a significant association between ROA and operating expenses ratio, CAR, and the ratio of financial assets to total assets. A significant association was also detected between ROE and operating expenses, CAR, and the ratio of liquid assets to total assets.

Serwadda (2018) examined how the performance of deposit banks in Hungary was inflenced by bank-specific factors in the period between 2000 and 2015. It was found that bank scale had a positive influence on bank performance.

Almaqtari et al. (2018) investigated the factors influencing the profitability of 69 deposit banks in India over the period 2008-2017. The study employed two indicators, ROA and ROE, to measure the profitability of Indian banks. The study asserted that inflation, exchange rate, interest rate, and monetization had a significant effect on ROA, while all macroeconomic determinants except monetization had a significant impact on ROE.

Similarly, Batten and Vo (2019) examined the determinants of profitability for Vietnamese banks between 2006-2014. Bank scale size, capital asset ratio, the ratio of provisions to loans, and cost-income ratio were used as independent variables. ROA, ROE, and NIM were dependent variables used to represent profitability. The study claimed that inflation and growth had a strong effect on profitability.

Madugu et al. (2020) analyzed the influence of banks' CAR and credit risk on the profitability of 11 foreign and local banks in Ghana between 2006-2016. The study found that NPL/total assets had a stronger positive effect on the profitability of domestic banks than foreign banks. Nevertheless, the CAR did not have a significant influence on the profitability of domestic banks, while it had an adverse influence on the foreign ones.

Also, Nguyen (2020) investigated the influence of CAR on the profitability of banks in Vietnam, using ROA and ROE. The study conducted panel data regression analysis for 22 Vietnamese banks between 2010-2018 and found that NIM was positively associated with non-interest income and CAR, and negatively associated with NPL and public ownership. Besides, the study calculated the median, made a distinction between small and large banks, and examined the influence of CAR on profitability. It was found that the influence of CAR on ROA was positive for small banks, whereas no significant association was detected for large banks.

Tran and Phan (2020) conducted a study to investigate the association between bank scale size, credit risk, and profitability of deposit banks in Vietnam between 2009-2018 using the GMM method. However, the study found that the relationship between these variables was less significant.

Kaya et al. (2021) aimed to explore the determinants of banks' profitability in Turkey by categorizing deposit banks into large- and small-scaled institutions. Panel data analysis was applied for 24 deposit banks between March 2009-September 2020, using the FEM (Fixed Effects Model). ROA and ROE were used as measures of banks' profitability. The study found that the determinants of profitability differed for large-scaled and small-scaled banks. Bank-specific determinants, such as equity/assets, deposit/assets, and liquidity ratio, were found to have a significant effect on the profitability of large-scaled banks but were not related to the profitability of small-scaled banks. The asset quality ratios had an adverse influence on the profitability of large-scaled banks.

3. Dataset, Model, and Empirical Findings

This part of the study involved creating a model that takes into account both bank-specific and macroeconomic variables, as well as commonly used ones in the literature as an indicator of bank profitability, to examine the factors affecting bank profitability while considering scale. The model has been used in the study over the period 2012:Q4 - 2020:Q3. The banks whose data could be accessed without interruption were subjected to cluster analysis and divided into three groups: large, medium, and small-scaled banks. Large-scale banks are in cluster 1, medium-sized banks are in cluster 3, and small-scale banks are in cluster 2. The analysis was conducted as two separate panels, one for the seven large and medium-scaled banks and another for the 13 small-scaled banks. The study's contribution to the literature lies in its analysis of banks of different scales and the classifications resulting from the cluster analysis are presented in Table 1.

Table 1. Clusters Obtained from the K-mean Cluster Analysis

Row	Bank	Cluster	Distance
1	Türkiye Cumhuriyeti Ziraat Bankası A.Ş.	1	0.000
2	Türkiye Vakıflar Bankası TAO	3	167006.365
3	Türkiye Halk Bankası AŞ	3	162536.778
4	Türkiye İş Bankası AŞ	3	65432.755
5	Türkiye Garanti Bankası AŞ	3	81726.919
6	Yapı ve Kredi Bankası AŞ	3	142203.776
7	Akbank TAŞ	3	163373.211
8	QNB Finansbank AŞ	2	262188.045
9	Denizbank AŞ	2	216727.427
10	Türk Ekonomi Bankası AŞ	2	101661.797
11	ING Bank AŞ	2	14442.090
12	HSBC Bank AŞ	2	33863.449
13	Odea Bank AŞ	2	44411.255
14	Şekerbank TAŞ	2	43822.964
15	Alternatifbank AŞ	2	54731.416
16	Fibabanka AŞ	2	58617.058
17	Anadolubank AŞ	2	63688.064
18	Arap Türk Bankası AŞ	2	94976.550
19	Turkish Bank AŞ	2	100220.970
20	Citibank AŞ	2	75305.131

There are two primary methods used in the analysis: fixed effects method (FEM) and random effects method (REM) models. In studies utilizing panel data analysis, one way to account for differences between units or differences between units over time is to assume that current changes cause changes in some or all of the coefficients in the regression model. The FEM consists of n different terms, one for each unit, which can be represented by indicator variables. The REM can be seen as identical to the FEM when each individual is defined with a separate cross-section number. However, the REM considers constant terms to be randomly selected from a pool, treating them as part of the error term. The variables used in the study are presented in Table 2.

Table 2. Variables Used in the Study

Dependent Variables	**Database**
ROA Net Profits/ Total Assets	TBB
ROE Net Profits/ Total Equity	TBB
Independent Variables	
Endogeneous Variables	
Non-Interest Incomes/ Non-Interest Expenses (NII)	TBB
Capital Adequacy Ratio (CAR)	TBB
Net Interest Margin (NIM)	TBB
Non-Performing Loans Ratio (NPL)	TBB
Loan/Total Assets (L/TA)	TBB
Securities/ Total Assets (SEC/TA)	TBB
Deposits/ Total Assets (D/TA)	TBB
Liquidity Ratio (LR)	TBB
Foreign Loans/Total Assets (Liabilities) (FL)	TBB
Exogeneous Variables	
Industry Production Index (IPI)	TÜİK
Inflation (Consumer Price Index) (INF)	TÜİK
Foreign Exchange Rate (FER)	TCMB
Benchmark Interest Rate (BIR)	TCMB
GDP Growth Rate (GDP)	TÜİK

Table 3. **Descriptive Statistics of the Variables**

Variables	Mean	Standard Dev.	Minimum	Maximum
ROA	1.206	0.916	-2.294	6.2005
ROE	10.606	7.408	-32.033	43.428
SEC/TA	0.129	0.061	0.006	0.401
FL	0.103	0.0702	0	0.641
CAR	16.695	3.132	12.042	36.418
LR	51.586	32.039	7.575	290.544
D/TA	62.484	9.369	14.777	85.395
NPL	4.010	2.135	0	11.609
NII	78.781	74.659	-65.794	596.975
L/TA	63.458	11.870	16.3501	106.036
NIM	0.024	0.012	0.0004	0.079
IPI	103.824	11.673	80.388	126.996
FER	3.678	1.608	1.778	7.202
BIR	10.634	4.015	6.770	22.368
INF	11.968	4.300	6.673	23.743
GDP	4.444	4.222	-10.448	10.521

Table 3 presents summary statistics for the whole panel of large, medium, and small-scaled banks. On the other hand, Table 4 displays the correlation among the variables.

Table 4. Correlation Matrix

	ROA	ROE	SEC/TA	FL/TA	CAR	LR	D/TA	NPL	NII	L/TA	NIM	IPI	GDP	FER	INF	BIR
ROA	1	0.922	-0.0964	-0.095	0.1602	-0.017	0.0069	-0.034	0.1052	0.0326	0.1937	0.0226	-0.042	-0.002	0.0921	0.0281
ROE	0.9224	1	-0.0624	-0.061	0.1265	-0.023	-0.0058	-0.085	0.0923	-0.004	0.1076	0.0076	-0.026	0.0379	0.1235	0.0330
SEC/TA	-0.096	-0.06	1	-0.097	0.1322	-0.110	-0.147	-0.053	0.025	-0.031	-0.0323	-0.115	-0.140	0.0450	-0.0911	-0.064
FL/TA	-0.095	-0.06	-0.097	1	0.0305	0.113	-0.469	-0.118	0.0094	-0.086	0.0295	0.0171	-0.034	0.0877	0.0535	0.0294
CAR	0.160	0.126	0.1322	0.030	1	0.032	-0.1108	0.071	0.0029	-0.124	0.1463	-0.063	-0.112	0.2058	0.1529	0.1601
LR	-0.017	-0.02	-0.1109	0.1133	0.0320	1	0.0282	0.094	0.274	-0.082	-0.027	0.003	0.0106	0.0173	0.0864	0.0925
D/TA	0.0069	-0.005	-0.1475	-0.469	-0.110	0.028	1	0.036	-0.013	0.0073	-0.0229	0.0545	0.0842	-0.078	0.0002	-0.014
NPL	-0.034	-0.08	-0.0535	-0.118	0.0711	0.094	0.0368	1	0.0061	-0.127	0.0763	-0.090	-0.129	0.0832	0.0911	0.0706
NII	0.1052	0.092	-0.0251	-0.009	0.0029	0.027	0.0136	0.006	1	0.0422	-0.171	-0.011	0.0666	-0.096	-0.069	-0.134
L/TA	0.0326	-0.004	-0.0311	-0.086	-0.1245	-0.08	0.0073	-0.127	0.0422	1	0.0186	-0.049	-0.029	-0.152	-0.099	-0.111
NIM	0.1937	0.107	-0.0323	0.0295	0.1463	-0.027	-0.0229	0.076	-0.171	0.0186	1	0.351	-0.007	0.0220	-0.014	0.0049
IPI	0.0226	0.007	-0.1151	0.0171	-0.0634	0.003	0.0545	-0.090	-0.0115	-0.049	0.3516	1	0.7632	-0.161	0.0745	0.1662
GDP	-0.042	-0.02	-0.1407	-0.034	-0.1125	0.010	0.0842	-0.129	0.0666	-0.029	-0.007	0.763	1	-0.262	-0.036	0.1495
FER	-0.002	0.037	0.0450	0.0877	0.2058	0.017	0.0788	0.083	-0.096	-0.152	0.0220	-0161	-0.262	1	0.6209	0.5319
INF	0.0921	0.123	-0.0916	0.0535	0.1529	0.086	0.0002	0.091	-0.069	-0.099	-0.0143	0.0745	-0.036	0.6209	1	0.7093
BIR	.0281	.033	-.0647	.0294	.1601	.0925	-.0145	.0706	-0.1343	-0.1115	0.0049	0.1662	0.1495	0.5319	0.7093	1

When the results shown by the correlation matrix table are evaluated, it is noteworthy that the highest correlation is between the ROA and ROE variables. Accordingly, the 0.92 correlation calculated among these variables was accepted as normal since the variables had similar dynamics and both of these variables were dependent variables.

The highest correlation among independent variables was observed between Industrial Production Index (IPI) and GDP Growth Rate. It can be stated that a 0.76 correlation between these variables is an expected situation due to the strong relationship between the variables. Apart from this, a high correlation of 0.70 was calculated between the Benchmark Interest Rate (BIR) and Inflation. A high-level positive relationship between the variables in question is an expected situation due to the structure of the variables.

Correlation analysis helps to determine whether the variables are suitable for econometric analysis. Therefore, the correlation matrix provides an understanding of the multicollinearity problem between the variables. In order to have a multicollinearity problem, a correlation of 0.80 and above should be determined between the independent variables (Gujarati, 2004). Therefore, since there was no variable with this ratio among the independent variables, it was determined that the variables were suitable for panel data analysis.

In econometric analysis, first of all, it should be determined whether the series is stationary or not. It is a prerequisite for the series to be stationary to examine the econometrically significant relationships among the variables (Tatoğlu, 2018). The unit root test of the variables consisting of panel data was examined by using the test statistics of Levin, Lin & Chu (LLC), Im, Pesaran, and Shin (IPS), and Harris-Tzavalis (H-T). In this context, the outcomes of the tests performed to determine whether the variables are stationary or not are shown in Table 5.

It is necessary for the variables to be stationary for econometric analysis. Therefore, unit root tests were conducted using the test statistics of LLC, IPS, and H-T to determine the stationarity of variables consisting of panel data are presented in Table 5.

Table 5. Unit Root Test Results

	H-T		**LLC**		**IPS**	
Variables	**Intercept**	**Intercept - Trend**	**Intercept**	**Intercept - Trend**	**Intercept**	**Intercept – Trend**
ROA	0.739	0.962	0.000***	0.000***	0.000***	0.003**
ΔROA	0.000***	0.000***	-	-	-	-
ROE	0.707	0.981	0.000***	0.002**	0.004**	0.062*
ΔROE	0.000***	0.000***	-	-	-	-
NII	0.000***	0.000***	0.549	0.057	0.681	0.358
ΔNII	-	-	0.000***	0.000***	0.000***	0.000***
CAR	0.000***	0.000***	0.960	0.003**	0.809	0.029
NIM	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
NPL	0.845	0.260	0.888	0.001**	0.983	0.556
ΔNPL	0.000***	0.000***	-	-	0.000***	0.000***
L/TA	0.000***	0.000***	0.000***	0.000***	0.000***	0.018**
SEC/TA	0.000***	0.015**	0.054	0.956	0.077*	1.000
ΔSEC/TA	-	-	0.000***	0.000***	0.000***	0.000***
D/TA	0.000***	0.097*	0.025**	0.000***	0.121	0.233
ΔD/TA	-	-	-	-	0.000***	0.000***
FL/TA	0.057**	0.742	0.103	0.000***	0.281	0.654
ΔFL/TA	0.000***	0.000***	-	-	0.000***	0.000***
LR	0.000***	0.000***	0.443	0.019	0.693	0.000***

Table 5. Continue

Variables	Intercept	Intercept - Trend	Intercept	Intercept - Trend	Intercept	Intercept – Trend
IPI	0.000***	0.000***	0.000***	0.356	0.002**	0.000***
ΔIPI	-	-	0.000***	0.960	-	-
INF	0.125	0.999	0.000***	0.004**	0.000***	0.001**
ΔINF	0.000***	0.000***	-	-	-	-
FER	1.000	0.972	1.000	0.013**	1.000	0.999
ΔFER	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
BIR	0.009**	0.566	0.000***	0.000***	0.005*	0.002**
GDP	0.000***	0.000***	0.000***	0.002**	0.000***	0.000***

Note: *,**,*** indicate significance at the 10%, 5%, and 1% levels, respectively. The lag lengths are set as 1. The relevant test statistics are obtained from the Stata 15 package software.

The null hypothesis (H_0) for the unit root tests used is "H_0: Series contains the unit root". Thus, if the probability value is lower than 0.05, the H_0 is rejected and the H_1 is accepted, hence, the series is stationary. Table 5 presents the results of the IPS, H-T, and LLC test statistics. Regarding the probability values of the fixed and fixed-trend test statistics, it was determined that all the variables became stationary, with some becoming stationary at the level and some at the I(1) level.

Following this determination, panel data models were estimated, but before conducting panel data analysis, a unit effect test was performed to determine whether a unit effect was present or not. Table 6 displays the results of the F-Test, wherein the H_0 that the unit effect is equal to zero was rejected, indicating the presence of a unit effect. Consequently, the dataset was deemed suitable for panel data regression.

Table 6. Unit Effect Test

	F-Test	P-Value
Large- and Medium-Scaled Banks *Unit Effect Test (Dependent Variable ROA)*	8.49	0.000***
Large- and Medium-Scaled Banks *Unit Effect Test (Dependent Variable ROE)*	12.70	0.000***
Small-Scaled Banks *Unit Effect Test (Dependent Variable ROA)*	24.28	0.000***
Small-Scaled Banks *Unit Effect Test (Dependent Variable ROE)*	17.08	0.000***

Note: *,**,*** indicate significance at the 10%, 5%, and 1% levels, respectively. The relevant test statistics are obtained from the Stata 15 package software.

The validity of the classical (pooled) model in panel data analysis can be evaluated by testing for the existence of unit and/or time effects using different statistical tests such as F-test, likelihood ratio test (LR), Breusch-Pagan Lagrange Multiplier (B-P LM), Adjusted Lagrange Multiplier (ALM), Score test, and Wooldridge's test. For this study, the B-P LM test was conducted to determine if the model can be pooled or not. If the results of this test indicate that

the model cannot be pooled, the Hausman Test is used to determine whether FEM or REM should be used. The outcomes of the B-P LM test can be found in Table 7.

Table 7 presents that the p-value of the Breusch and Pagan LM tests is 0. After concluding that the model cannot be predicted using the Pooled OLS model, the Hausman test is conducted to decide whether to use FEM or REM in the analysis. In the literature, the following hypotheses are used in the Hausman test to decide whether the models should be estimated as the FEM or REM:

H_0: The REM is effective.
H_1: The FEM is effective.

Table 7. Breusch-Pagan LM Test

	Chibar^2	**P-Value**
Breusch & Pagan LM Test for the REM	466.30	0.000***

Note: *,**,*** indicate significance at the 10%, 5%, and 1% levels, respectively. The relevant test statistics are obtained from the Stata 15 package software.

Table 8 shows the Hausman test statistics results for Large and Medium Banks and Small Banks. When Hausman (p-value) was evaluated for two different models of Large and Medium-Scaled Banks, the H_0 is rejected because it is lower than 0.05 significance level. Therefore, it is decided to use the FEM for both models. As for the results of Hausman Test statistics for Small-Scaled Banks, it is decided to use the FEM since the probability value is lower than 0.05. The Hausman Test statistic results for Small-Scaled Banks, it was decided to use the REM since the probability value exceeds 0.05.

Table 8. Hausman Test

Dependent Value	**Hausman Test (X^2)**	**P-Value**
Large- and Medium-Scaled Banks *Dependent Variable ROA*	51.82	0.000
Large- and Medium- Scaled Banks *Dependent Variable ROE*	36.42	0.000
Small-Scaled Banks *Dependent Variable ROA*	42.15	0.000
Small-Scaled Banks *Dependent Variable ROE*	17.55	0.228

Note: The relevant test statistics are obtained from the Stata 15 package software.

After deciding which model could be used with the Hausman test, the results of the appropriate models are shown. Tables 9 and 10 show the test results of two different models for Large and Medium Banks. Table 9 presents the FEM results of the model with the ROA. Moreover, the equations of the two different models estimated are as follows;

$$ROA_{it} = \beta_0 + \beta_1 SEC/TA_{it} + \beta_2 FL_{it} + \beta_3 CAR_{it} + \beta_4 LR_{it} + \beta_5 D/TA_{it} + \beta_6 NPL_{it} + \beta_7 NII/NI_{it} + \beta_8 L/TA_{it} + \beta_9 NIM_{it} + \beta_{10} IPI_{it} + \beta_{11} FER_{it} + \beta_{12} BIR_{it} + \beta_{13} INF_{it} + \beta_{14} GDP_{it} + \varepsilon_{it} \quad (1)$$

$$ROE_{it} = \beta_0 + \beta_1 SEC/TA_{it} + \beta_2 FL_{it} + \beta_3 CAR_{it} + \beta_4 LR_{it} + \beta_5 D/TA_{it} + \beta_6 NPL_{it} + \beta_7 NII/NI_{it} + \beta_8 L/TA_{it} + \beta_9 NIM_{it} + \beta_{10} IPI_{it} + \beta_{11} FER_{it} + \beta_{12} BIR_{it} + \beta_{13} INF_{it} + \beta_{14} GDP_{it} + \varepsilon_{it} \quad (2)$$

The established model for Large and Medium-Scaled Banks shows a significant probability value at the 1% level, indicating a 99% confidence interval (Table 9). The R^2 value is determined to be 0.63, which is considered high. Furthermore, all of the exogenous variables have a significant association with the ROA. The results show that an increase in the IPI by one unit reduces the ROA by 0.008 units, while an increase in the exchange rate by one unit decreases the ROA by 0.169 units. On the other hand, an increase in the BIR by one unit increases the ROA by 0.05 units, and an increase in inflation by one unit reduces the ROA by 0.03 units. Lastly, a rise in the growth rate by one unit is found to increase the ROA by 0.02 units. Therefore, it can be concluded that all exogenous variables, except for growth rate and BIR, have a significant and inverse association with ROA. Meanwhile, the BIR and growth rate are detected to have a positive association with the dependent variable.

Upon evaluating the results of the internal variables, it is observed that the liquidity ratio, NPL ratio, loan/asset variables are not in a statistically significant association with the dependent variable. It is observed that one-unit rise in the securities/total assets variable reduces the ROA by 3.04. One-unit increase in foreign loans increases ROA by 3.29. A one-unit increase in the CAR increases ROA by 0.09 units. A one unit rise in total deposits increases ROA by 0.007 units. It is observed that a one-unit increase in non-interest incomes increased ROA by 0.002 units. A one-unit increase in the NIM increases the dependent variable, ROA, by 7.37 units. It has been observed that the variables other than securities/total assets, which are internal variables, have positive associations with the dependent variable.

Table 9. FEM for Large- and Medium-Scaled Banks (Model 1)

Variables ***(Dependent Variable ROA)***	**Coefficient**	**Std. Error**	**P-Value**
Securities/Total Assets	-3.044	0.790	0.000***
Foreign Loans	3.293	1.058	0.002**
Capital Adequacy Ratio	0.095	0.015	0.000***
Liquidity Ratio	-0.001	0.0021	0.601
Total Deposits	0.007	0.0028	0.008**
Non-Performing Loans Ratio	0.022	0.030	0.470
Non-Interest Incomes/ Net Interest	0.002	0.0004	0.000***
Loans/Total Assets	0.003	0.008	0.711
Net Interest Margin	7.375	2.128	0.001**
Industry Production Index	-0.008	0.0032	0.011**
Foreign Exchange Rate	-0.169	0.036	0.000***
Benchmark Interest Rate	0.054	0.012	0.000***
Inflation Rate	-0.031	0.010	0.002**
Growth Rate	0.026	0.006	0.000***
Constant Term	0.549	0.894	0.540
R^2: 0.63			
F (statistic): 25.38			
F(probability): 0.000***			
Number of Observation: 640			

Note: *,**,*** indicate significance at the 10%, 5%, and 1% levels, respectively. The relevant test statistics are obtained from the Stata 15 package software.

In the model developed for Large and Medium-Scaled Banks, the significance level of the probability value was found to be 1% for the model where ROE was the dependent variable, indicating a high level of confidence (Table 10). The model's R^2 value is determined to be 0.56.

In the second model developed for Large and Medium-Scaled Banks, the dependent variable was ROE. It was found that all of the exogenous variables, except for the IPI, were significantly related to the dependent variable. Specifically, an increase in exchange rate reduces ROE by 1.12 units, while an increase in the BIR raises ROE by 0.46 units. Inflation was found to decrease ROE by 0.3 units for every unit increase, while growth rate was observed to increase ROE by 0.14 units for every unit increase.

When the statistical results of the internal variables are evaluated in the model, the liquidity ratio and loan/asset variables are not significant. All of the variables except these variables are observed to be statistically significant with the dependent variable. Among the significant variables, it is observed that all of the variables except the securities/total assets variable has a positive coefficient, while the securities variable has a negative coefficient. A one-unit increase in the Securities/Total Assets variable reduces ROE by 18.12 units. It is observed that a one-unit increase in foreign loans increased ROE by 34.99 units. A one-unit increase in the CAR increases ROE by 0.54 units. It is observed that a one-unit increase in total deposits increases ROE by 0.05 units. When the NPL ratio is evaluated according to the 10% significance level, it can be considered to be statistically significant. Accordingly, a one-unit rise in the NPL ratio increases the ROE by 0.46 units. One unit increase in non-interest income increases ROE by 0.02 units. A one-unit increase in the NIM increases the dependent variable, ROE, by 41.28 units.

Table 10. FEM for Large- and Medium- Scaled Banks (Model 2)

Variables ***(Dependent Variable ROE)***	**Coefficient**	**Std. Error**	**P-Value**
Securities/Total Assets	-18.12	6.825	0.009**
Foreign Loans	34.99	9.141	0.000***
Capital Adequacy Ratio	0.546	0.132	0.000***
Liquidity Ratio	0.004	0.018	0.810
Total Deposits	0.057	0.023	0.014**
Non-Performing Loans Ratio	0.461	0.266	0.085*
Non-Interest Incomes/ Net Interest	0.021	0.003	0.000***
Loans/Total Assets	-0.047	0.076	0.531
Net Interest Margin	41.28	18.387	0.026**
Industry Production Index	-0.021	0.028	0.452
Foreign Exchange Rate	-1.123	0.313	0.000***
Benchmark Interest Rate	0.463	0.106	0.000***
Inflation Rate	-0.304	0.088	0.001**
Growth Rate	0.144	0.056	0.011**
Constant Term	7.904	7.27	0.308
R^2: 0.56			
F (statistic): 19.04			
F(probability): 0.000***			
Number of Observation: 640			

Note: *,**,*** indicate significance at the 10%, 5%, and 1% levels, respectively. The relevant test statistics are obtained from the Stata 15 package software.

In the small-scaled banks' model, the model's probability value, in which ROA is the dependent variable, is significant at the 1% level, indicating a 99% confidence interval (Table 11). The R^2 value is calculated as 0.29, representing the model's explanatory power.

In the first model established for small-scaled banks, all variables except for the loan/asset variable are statistically significant. A one-unit rise in the securities variable reduces the ROA by 3.38 units, and foreign loans reduce ROA by 4.71 units. The CAR's increase by one unit increases the ROA by 0.03 units. Conversely, a one-unit rise in the liquidity ratio, total deposits, and the NPL ratio reduces ROA by 0.002, 0.03, and 0.14 units, respectively. A one-unit increase in non-interest income increases ROA by 0.001 units, while a one-unit increase in the NIM increases the dependent variable by 17.11 units.

Upon analyzing the results of the exogenous variables, it was discovered that all variables except BIR are statistically significant. Furthermore, it was found that exogenous variables other than the IPI had positive coefficients. Specifically, a one-unit rise in the IPI causes a reduction of 0.02 units in ROA. Conversely, a one-unit rise in the exchange rate leads to a rise of 0.2 units in ROA. Moreover, a one-unit rise in inflation leads to a rise of 0.04 units in ROA, while a one-unit rise in growth rate results in an rise of 0.02 units in ROA.

Table 11. FEM for Small-Scaled Banks *(Model 1)*

Variables ***(Dependent Variable ROA)***	**Coefficient**	**Std. Error**	**P-Value**
Securities/Total Assets	-3.384	1.001	0.001**
Foreign Loans	-4.710	1.008	0.000***
Capital Adequacy Ratio	0.039	0.013	0.005**
Liquidity Ratio	-0.002	0.001	0.088*
Total Deposits	-0.037	0.009	0.000***
Non-Performing Loans Ratio	-0.141	0.023	0.000***
Non-Interest Incomes/ Net Interest	0.001	0.0005	0.004**
Loans/Total Assets	0.005	0.005	0.311
Net Interest Margin	17.110	2.900	0.000***
Industry Production Index	-0.020	0.005	0.000***
Foreign Exchange Rate	0.207	0.055	0.000***
Benchmark Interest Rate	-0.020	0.023	0.373
Inflation Rate	0.043	0.020	0.033**
Growth Rate	0.028	0.011	0.018**
Constant Term	4.401	1.040	0.000***
R^2: 0.29			
F (statistic): 11.90			
F(probability): 0.000***			
Number of Observation: 640			

Note: *,**,*** indicate significance at the 10%, 5%, and 1% levels, respectively. The relevant test statistics are obtained from the Stata 15 package software.

In the model established for Small-Scaled Banks, it was observed that the probability value of the model, with ROE as the dependent variable, was significant at the 1% level, which corresponds to a 99% confidence interval (Table 12). The R^2 value is calculated as 0.27.

The second model for small-scaled banks has ROE as the dependent variable. The CAR, liquidity ratio, and loan/asset variable are not statistically significant. A rise in securities reduces ROE by 33.79 units, whereas an increase in foreign loans reduces ROE by 61.8 units. The increase

in total deposit assets decreases ROE by 0.5 units. A one-unit rise in the NPL ratio decreases ROE by 1.4 units. One unit increase in non-interest income increases ROE by 0.009 units, and a one-unit increase in the NIM increases ROE by 126.3 units.

As for the exogenous variables in the ROE model for small-scaled banks, the BIR and growth rate are not statistically significant. A one-unit increase in the IPI decreases ROE by 0.1 units, while a rise in the exchange rate increases ROE by 1.3 units. A one-unit increase in inflation increases ROE by 0.3 units.

Table 12. REM for Small-Scaled Banks (Model 2)

Variables ***(Dependent Variable ROE)***	**Coefficient**	**Std. Error**	**P-Value**
Securities/Total Assets	-33.791	8.920	0.000***
Foreign Loans	-61.803	9.536	0.000***
Capital Adequacy Ratio	0.0712	0.123	0.565
Liquidity Ratio	-0.017	0.013	0.180
Total Deposits	-0.531	0.086	0.000***
Non-Performing Loans Ratio	-1.456	0.205	0.000***
Non-Interest Incomes/ Net Interest	0.009	0.004	0.050**
Loans/Total Assets	-0.015	0.043	0.719
Net Interest Margin	126.34	26.28	0.000***
Industry Production Index	-0.112	0.052	0.031**
Foreign Exchange Rate	1.385	0.501	0.006**
Benchmark Interest Rate	0.006	0.210	0.976
Inflation Rate	0.355	0.183	0.053**
Growth Rate	0.171	0.010	0.117
Constant Term	58.064	9.329	0.000***
R^2: 0.27			
F (statistic): 10.71			
F(probability): 0.000***			
Number of Observation: 640			

Note: *,**,*** indicate significance at the 10%, 5%, and 1% levels, respectively. The relevant test statistics are obtained from the Stata 15 package software.

4. Conclusion

The banking sector plays a crucial role in promoting economic growth and stability by acting as a financial intermediary. Therefore, the stability of the banking sector, which relies on bank profitability and capital adequacy, is vital for overall economic stability and growth. This study aims to examine the factors influencing bank performance in the Turkish banking market, with a focus on profitability indicators (ROA and ROE) and considering bank size.

Panel data analysis was conducted using data from 2012:Q4 to 2020:Q3. The selected variables were based on previous research, and both internal and external factors were examined. The study differentiated between large and medium-scaled banks and small-scaled banks to capture potential variations in the relationships. Indeed, it is observed that there are few studies in the literature that analyze the determinants of profitability from this perspective (Spathis et al., 2002; Aladwan, 2015; Nguyen, 2020; Kaya et al., 2021). However, Dietrich and Wanzenried (2011) considered the scale factor as a dummy variable in their study.

The analysis focused on large, medium, and small-scale banks, investigating the relationships between various external and internal variables and the financial performance

indicators of ROA and ROE. For large and medium-scale banks, it was observed that all selected external variables had a statistically significant association with ROA and ROE, except for the IPI in the latter case. The variables of exchange rate, and inflation exhibited negative coefficients, indicating a negative impact on ROA and ROE. Conversely, the policy rate and growth rate showed positive coefficients, suggesting a positive relationship with the financial performance indicators. Regarding internal variables, the liquidity ratio and loan/asset ratio did not show a statistically significant relationship with ROA and ROE. In addition, the variable of securities/total assets exhibited a negative relationship with the financial performance indicators, while the remaining variables showed a positive association.

Two models were developed to analyze the financial performance of small-scale banks, with ROA and ROE as the dependent variables. In the first model, all internal variables, except for the credit/asset ratio, showed statistical significance. Securities, foreign loans, liquidity ratio, total deposit assets, and NPL ratio had a negative relationship with ROA, while CAR, non-interest income, and NIM had a positive relationship. Among the external variables, all except the policy rate were statistically significant, with positive coefficients observed for variables other than the industrial production index. In the second model for ROE, the internal variables of CAR, liquidity ratio, and credit/asset ratio were not statistically significant. Securities, foreign loans, total deposit assets, and NPL ratio had a negative coefficient, while non-interest income and NIM had a positive coefficient. Among the external variables, the policy rate and growth rate were not statistically significant, and the IPI had a negative coefficient, while the exchange rate and inflation had a positive coefficient. Overall, the findings indicate significant relationships between various internal and external factors and the financial performance of small-scale banks, highlighting the importance of these factors in determining ROA and ROE.

In conclusion, the findings suggest that external variables, such as economic indicators and interest rates, have a significant influence on the financial performance of banks, while internal variables, except for securities/total assets, play a relatively smaller role.

The findings obtained in the study that are consistent with the literature are as follows: The findings regarding securities are consistent with the studies conducted by Sufian and Habibullah (2009), Pervan et al. (2015), Almaqtari et al. (2018), and Batten and Vo (2019). The findings regarding securities are in line with the studies conducted by Sufian and Habibullah (2009), Pervan et al. (2015), Almaqtari et al. (2018), and Batten and Vo (2019). The findings related to the capital adequacy ratio are in line with the studies of Paleni et al. (2017), Dizgil (2017), and Nguyen (2020). The findings concerning non-performing loans, particularly for small-scale banks, are in line with the studies conducted by Lee (2013), Paleni et al. (2017), and Madugu et al. (2020). The finding related to non-interest income is supported by Nguyen's (2020) study. The findings regarding net interest margin (NIM) are consistent with the studies of Batten and Vo (2019) and Nguyen (2020). The findings related to exchange rates are in line with the study conducted by Almaqtari et al. (2018). The findings regarding inflation are in line with the studies of Demirgüç-Kunt and Huizinga (1999), Sufian and Habibullah (2009), Pervan et al. (2015), and Almaqtari et al. (2018). The findings related to growth are in line with the studies conducted by Pervan et al. (2015), Bucevska and Misheva (2017), Alharbi (2017), Batten and Vo (2019), and Kaya et al. (2021).

According to the study's findings, regulatory and supervisory authorities should consider differentiating their approach to the existing financial indicators set for banks, taking into account

the scale factor, particularly SYR. This differentiation would contribute to performance management. Additionally, it is important for bank managers to consider the study's findings in their strategic financial performance planning, taking into account their own scales.

In conclusion, this study provides valuable insights into the factors influencing bank performance in the Turkish banking sector. Both internal and external variables were found to have a significant impact on bank profitability, with some variables showing positive associations and others demonstrating negative associations. These findings contribute to the existing literature.

Declaration of Research and Publication Ethics
This study which does not require ethics committee approval and/or legal/specific permission complies with the research and publication ethics.

Researcher's Contribution Rate Statement
The authors declare that they have contributed equally to the article.

Declaration of Researcher's Conflict of Interest
There are no potential conflicts of interest in this study.

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