Analysis of Profitability Levels of Deposit Banks in Turkey

Türkiye'deki Mevduat Bankalarının Kârlılık Düzeylerinin Analizi

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ABSTRACT

This study aims to analyze the profitability levels of deposit banks in Turkey by using the panel data analysis method. Profitability is an important indicator reflecting the financial health of banks and is of great importance in terms of determining the sustainability and competitive advantages of banks in the sector. In this study, the factors affecting the profitability levels of deposit banks in Turkey are investigated. These factors include variables such as size, asset quality, capital adequacy, and liquidity status of banks. In the study, annual data for the period 2010–2020 were used through panel data analysis method, and CIPS (Cross Sectionally Augmented IPS) unit root test and Dumitrescu–Hurlin causality analysis were performed. According to the findings, there is a reciprocal causality relationship between bank earnings and return on average assets in deposit banks. In addition, it was determined that there is a unidirectional causality relationship between liquidity ratio and return on average assets. However, there is no causality relationship between capital adequacy and return on average assets. It was found that banks with increasing size generally have higher profitability levels, whereas banks with low asset quality face difficulties in terms of profitability. These findings provide guidance on potential measures that banks can take to increase their profitability levels. The study aims to contribute to a better understanding of the performance of banks in the sector and to determine their future strategies.

Keywords: Deposit banks, panel data analysis, profitability level.

ÖZ

Bu çalışma, Türkiye'deki mevduat bankalarının kârlılık düzeylerini panel veri analizi yöntemi kullanarak analiz etmeyi amaçlamaktadır. Kârlılık, bankaların mali sağlığını yansıtan önemli bir gösterge olup, bankaların sektördeki sürdürülebilirliklerinin ve rekabet üstünlüklerinin belirlenmesi açısından büyük önem taşımaktadır. Bu çalışmada, Türkiye'deki mevduat bankalarının kârlılık düzeylerini etkileyen faktörler araştırılmaktadır. Bu faktörler bankaların büyüklüğü, aktif kalitesi, sermaye yeterliliği ve likidite durumu gibi değişkenleri içermektedir. Çalışmada panel veri analizi yöntemi ile 2010–2020 dönemine ait yıllık veriler kullanılmış ve CIPS birim kök testi ve Dumitrescu–Hurlin nedensellik analizi yapılmıştır. Elde edilen bulgulara göre, mevduat bankalarında banka kazançları ile ortalama aktif getirisi arasında karşılıklı bir nedensellik ilişkisi bulunmaktadır. Ayrıca likidite oranından ortalama aktif getirisine doğru tek yönlü bir nedensellik ilişkisi olduğu tespit edilmiştir. Ancak, sermaye yeterliliği ile ortalama aktif getirisi arasında nedensellik ilişkisi yoktur. Büyüklüğü artan bankaların genel olarak daha yüksek kârlılık seviyelerine sahip olduğu, aktif kalitesi düşük olan bankaların ise kârlılık açısından zorluklarla karşılaştıkları tespit edilmiştir. Bu bulgular, bankaların kârlılık düzeylerini artırmak için alabilecekleri olası önlemler konusunda yol gösterici niteliktedir. Çalışma, sektördeki bankaların performanslarının daha iyi anlaşılmasına ve gelecek stratejilerinin belirlenmesine katkı sağlamayı amaçlamaktadır.

Anahtar Kelimeler: Mevduat bankaları, kârlılık düzeyi, panel veri analizi

Introduction

The banking sector plays a vital role in the financial systems of developing countries where financial markets are inadequate. In such countries, the banking sector is predominantly responsible for bridging the gap between savers and borrowers and providing financial intermediation services by converting deposits into productive investments (Sufian and Habibullah, 2009). In this framework, it can be

stated that banks are intermediary institutions that have a high degree of importance in the national economy, as well as bringing together those who supply funds and those who demand funds in financial markets.

Basically, the primary task of banks is to provide an intermediary service between savers and those in need of funds. In addition, another task of banks is to make a profit from their transactions by reducing their costs in order to continue their activities. Profit, in general terms, refers to the positive difference between the income and expenses of an institution or organization in a certain period. Like every institution or organization, banks try to increase their profits. Profitability is an important indicator that reflects the financial health of banks and is of great importance in terms of determining the sustainability and competitive advantages of banks in the sector.

In the Turkish economy, the banking sector is one of the leading sectors with 35 deposit banks and 16 development and investment banks serving with more than 9000 branches and 185,000 employees. In this sense, it is possible to say that the deposit banks group plays a dominant role in the Turkish banking sector.

In the Turkish banking sector, January 1980 and May 2001 are defined as two important breaking points (TBB, 2022). Until the 1980s, the Turkish banking sector had been organized at the regional level, heavily protected by the state with very strict regulations, closed to the outside world, and non-competitive (Işık & Hassan, 2002). With the January 24, 1980, stabilization measures and financial liberalization movements, a series of reforms such as the removal of restrictions on market entry, interest and foreign exchange transactions, reduction of reserve and liquidity requirements, and financial taxes were implemented in order to increase efficiency and competitiveness in the banking sector. As a result of these reforms, banks started to operate in a more competitive environment, increased their investments in technological infrastructure, and employed more professional staff.

In this study, the concept of banking, deposit banks, and the Turkish banking sector is introduced, the related literature is reviewed, and a panel data analysis is conducted on the factors affecting the profitability of deposit banks, which constitute an important pillar of the banking sector in Turkey.

The study aims to examine the factors affecting the profitability levels of deposit banks in Turkey using panel data analysis method. These factors include variables such as the size, asset quality, capital adequacy, and liquidity status of banks. The study aims to contribute to a better understanding of the performance of banks in the sector and to determine their future strategies.

For this purpose, the CIPS unit root test and Dumitrescu–Hurlin causality analysis were conducted using annual data for the period 2010–2020. In the study, it was found that there is a reciprocal causality relationship between earnings and the return on average assets of deposit banks. There is a unidirectional causality relationship from the liquidity ratio to return on average assets, whereas there is no causality relationship between capital adequacy and the return on average assets. It was also found that banks with increasing size generally have higher profitability levels, whereas banks with low asset quality face difficulties in terms of profitability. The findings may provide guidance on potential measures that banks can take to increase their profitability levels.

Banking System and Deposit Banking

The origins of many of the current banking services can be traced back to civilizations characterized by the vibrant development of trade and culture. Lydian, Phoenician, Greek, Chinese, and Roman civilizations can be given as examples among these civilizations. The first examples of banking activities are found in the temple of Ur belonging to the Babylonian Empire in 2000 BC. In this temple, people called monks were able to lend money thanks to their wealth. In the Babylonian Empire as well as in the Mesopotamian civilization, relics in the form of grain and other commodities were accepted in the palaces and temples of the king, which were considered the safest place. These practices were also reflected in the famous Code of Hammurabi (Aktaran Kuryłowicz, 2004, p. 2; Morawski, 2002, p. 17). Given its historical background, the concept of a bank refers to a financial institution that bridges the gap between savers and borrowers through certain types of activities such as accepting deposits, lending money, and creating money by dealing with debts and credits (Nikolaevna, 2017, p. 31).

In addition to being a financial institution with both deposit-taking and lending powers, banks can also perform other financial services. In this context, the concept of a *bank* can refer to many different types of financial institutions such as savings and loan associations and other deposit-taking institutions (Turner, 2022). Indeed, banking is only one of the types of financial intermediation. Depositors, historically the most important capital provider of banks, require banks to provide three basic services: investment, custody, and transaction execution. While the relative importance of these functions varies across depositors, the attractiveness of bank deposits is that they provide a favorable mix of safety, liquidity, and return on savings (Langevoort, 1987, p. 676).

Deposit banks are financial institutions that conduct their transactions in money and aim to make a profit while performing these transactions. In addition, it is an intrinsic characteristic of banking that banks accept deposits of money from individuals so that they can keep it in their custody for security purposes. In addition, a bank can create loans by making advances to individuals or firms in need from the funds they receive in the form of deposits. Thus, by mobilizing the savings in the economy, banks facilitate the redistribution of existing savings by providing loans with interest to other individuals or institutions that need these savings for production, investment, or personal use of the excess money of individuals or institutions (Nikolaevna, 2017, p. 31).

In this framework, the main function of deposit banks, which operate on an interest-bearing basis, is to collect time and demand deposits, extend loans to individuals and institutions, and perform other banking services (Yurttadur & Demirbaş, 2017, p. 91).

Deposit banks are financial institutions that aim to obtain the maximum possible profit by investing the deposit resources they collect from depositors in productive economic sectors and play an important role in the economic system. Their main tasks are deposit acceptance, credit and payment services, account and risk management, and financial security. The continuation of their operations depends on providing a high level of assurance to their customers and their funding capabilities.

The concept of profit refers to the income accruing to the owners of a commercial enterprise or a productive undertaking through the activities of that enterprise or undertaking (Knight, 1942, p. 126).

Maximizing profits is the primary objective of all commercial enterprises. Therefore, it is very important to predict future profitability by measuring current and past profitability (Hofstrand, 2009, p. 1).

Conceptually, profit refers to the positive difference between an organisation's revenues and expenses over a given period. Financially, profit is an important indicator and is also used as a guideline for investment and management decisions of institutions and organizations. At the same time, profit levels also form expectations about the future performance of an organization and may affect its continuity or termination of operations.

Banks, one of the most prominent structures of financial intermediation organizations, are basically commercial enterprises. From this point of view, the most fundamental objective of banks, like any other commercial enterprise, in terms of sustaining their existence, is to maximize the benefit from their current and future transactions. This benefit is mainly expressed with the term "profit."

As of 2022, there are 35 deposit banks operating in the Turkish banking sector. Of these banks, 3 are publicly owned deposit banks, 8 are privately owned deposit banks, 3 are banks transferred to the Savings Deposit Insurance Fund, 16 are foreign-owned banks established in Turkey, and 5 are foreign-owned banks that have opened branches in Turkey.

It is important to examine the financing behavior and profits of financial intermediaries, particularly banks, over business cycles to derive policy implications. Today, the banking sector has a leading role in the development of all sectors with the credit facilities it provides. Therefore, the performance of the banking system is closely monitored by all economic units. Moreover, ensuring the stable functioning of the banking system is very important as it is in everyone's favor. In this context, it can be said that the performance of the banking sector is closely affected by internal and external economic conditions.

The graph shows the return on assets of deposit banks operating in the Turkish banking sector between 2010 and 2020.

According to Figure 1, it is understood that the return on assets of publicly-owned deposit banks followed a fluctuating course from 2010 to 2017, and after 2017, the return on assets tended to decrease. The profitability of privately-owned deposit banks, on the other hand, started to decline as of 2010, fell to a minimum in 2015, and then started to recover slightly in other

years. It is observed that the profitability levels of banks transferred to the Savings Deposit Insurance Fund reached the highest levels in 2011, 2012, 2013, and 2019, while they tended to decrease in 2010, 2015, 2017, and 2020. The return on assets of foreign capital deposit banks established in Turkey entered a downward trend between 2010 and 2013, reached its lowest level in 2013, followed an increasing trend from 2013 to 2018, and then declined again. The return on assets of foreign-capitalized deposit banks that opened branches in Turkey followed an increasing trend in 2014, 2018, and 2019 and entered a downward trend in 2020.

Literature Review

A closer look at the literature on the variables affecting bank profitability reveals that some studies consider the data of a single country, while others analyze the data of several countries together.

Arif and Anees (2012) used the multiple regression analysis method to evaluate the impact of liquidity risk on bank profitability in their analysis with the data of 22 Pakistani banks between 2004 and 2009. As a result of the findings, it was determined that the factors that increase liquidity risk have a significant negative impact on bank profitability.

Ayadi and Boujelbene (2012) tried to determine the variables affecting bank profitability with a panel data analysis conducted using the data of 12 Tunisian banks between 1995 and 2005. The findings indicate that bank capitalization and bank size have a positive and statistically significant effect on bank profitability. Financial structure, the bank assets to gross domestic product ratio, and stock market capitalization variables are found to have a negative and statistically significant effect on bank profitability. It is concluded that the macroeconomic indicators used in the study do not have any effect on bank profitability.

Chronopoulos et al. (2015) examined the main determinants of profitability of banks operating in the United States between 1984 and 2010, the extent to which short-term profits are sustainable, and to what extent this sustainability is affected by both changes in regulation and the financial crisis covering the years 2007–2010. As a result of the findings, it was determined that the competitive process reduces abnormal profitability levels over time. In addition to this, it is concluded that the legislative changes enacted in the 1990s affected both the level and the sustainability of bank profitability.
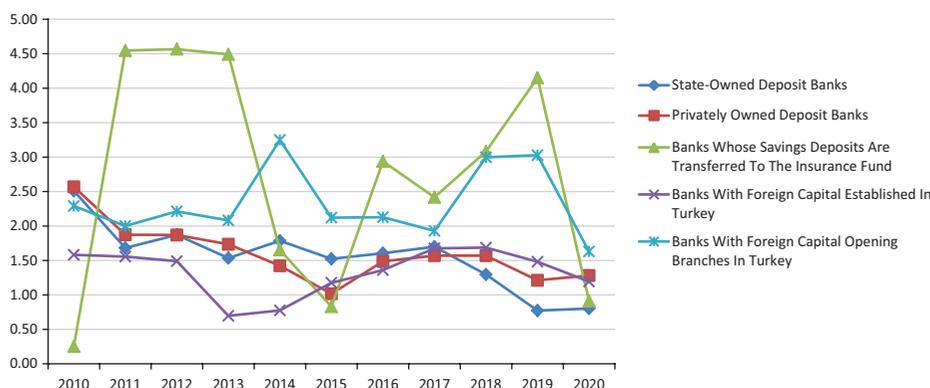

Figure 1.
Return on assets of deposit banks operating in the Turkish banking sector.

Kripa and Ajasllari (2016) conducted an analysis using data on return on average assets, growth rate, liabilities, liquidity ratio, fixed assets, capital volume, and company size for the period 2008–2013 for seven insurance companies. The findings indicate that the growth rate, liabilities, liquidity ratio, and fixed assets variables are the main factors affecting profitability. In addition, the growth rate, company size, and capital volume variables are positively related to the profitability variable, while the liabilities, liquidity ratio, and fixed assets variables are negatively related.

Saona (2016) conducted a profitability analysis with the data of seven commercial banks operating in Latin America for the period covering 1995–2012. According to the findings, there is an inverted U-shaped relationship between capital and return on assets, a positive relationship between asset diversification (such as securities and foreign exchange trading) and market concentration and profitability, and a negative relationship between income diversification (such as interest and fees) and profitability. Moreover, it is concluded that improvements in the legal and regulatory system have a negative impact on banks' profitability.

Bikker and Vervliet (2017) analyzed the effects of low interest rates on profitability with the data of commercial and savings banks operating in the United States for the period covering 2001–2015. In this framework, they used both static and dynamic modeling approaches and various forecasting methods. As a result of the findings, it is concluded that low interest rates negatively affect the performance of banks and reduce the net interest margin.

Nuhiu et al. (2017) analyzed the banking system in Kosovo with the help of panel data analysis by using the CAMEL approach with the data for the period 2010 to 2015 and constructed three different models. Through the constructed models, it is concluded that the profitability of Kosovo banks is mostly driven by bank-specific variables. They also concluded that macroeconomic factors have a positive impact on profitability but do not have a significant impact on financial performance.

Ersoy and Aydın (2018) conducted a panel data analysis with the data for the period 2007 to 2013 and found no significant relationship between board of directors size, bank size, lending level, and profitability among the variables included in the study. They also found a statistically significant but negative relationship between the number of independent directors and the proportion of foreign directors, as well as a statistically significant and positive relationship between bank capital and profitability.

Batten and Vo (2019) examined the factors affecting the profitability of various banks operating in Vietnam for the period covering the years 2006–2014 using panel data analysis method. As a result of the findings, it was determined that bank size, capital adequacy, bank risks, bank expenses, and bank efficiency variables, among the variables included in the analysis, have a strong effect on the profitability variable. In addition to the endogenous variables of the banks, the macroeconomic variables used in the analysis were also found to have a significant effect on bank profitability. However, in the analysis, it was concluded that the direction of causality is not the same among the variables affecting profitability.

Sarıkale and Kayahan (2019) conducted a correlation analysis between the ratios in their study using the percentage analysis method with data for the period 2002–2016. As a result of the analysis, a very strong relationship was found between the ratios used in the study, both in the analysis and graphically.

Akgüneş (2021) concluded that inflation and liquidity risk variables, which are among the variables used in the study, cause an increase in all profitability measures, while GDP causes a decrease in net interest margin but an increase in return on assets and return on equity with the panel regression equation he constructed with the data for the period 2008–2019. In addition, market capitalization and credit risk variables have no effect on bank profitability.

Çelik and Kaya (2021) concluded that the independent variables, such as bank age, loan/deposit ratio, financial asset ratio, in the model they constructed for domestic deposit banks have a statistically significant effect on return on assets with the panel data analysis they conducted using data for the period 2009–2017. They also found that the independent variables, such as growth in deposits, deposit/loan ratio, capital adequacy ratio, etc., in the model they constructed for foreign deposit banks have a statistically significant effect on return on assets. In addition, in the models established for both domestic and foreign deposit banks, it is found that there is a non-linear relationship between the deposit/loan ratio and return on assets.

In his study analyzing the banking systems of Balkan countries, Öncü (2021) determined that both bank-specific and non-bank variables can be effective in profitability by using the panel data analysis method. In the analysis conducted using the panel data analysis method with data for the period 2008–2017, it was found that the variables of non-performing loans, cost–income ratio, and inflation rate in the study have a negative effect on the dependent variables of return on assets and return on equity, while the GDP variable has a positive effect on the dependent variables.

According to the findings obtained with the help of panel data analysis using the data for the period 2008 to 2018, Özer et al. (2021) determined a positive relationship between return on average assets (ROAs), capital adequacy ratio, and unemployment rate, and a negative relationship between TDO (Non-Performing Loans (Gross)/Total Loans and Receivables), CR_MV (Toplam Krediler ve Alacaklar/Toplam Mevduat), and liquidity ratio. They also found a negative relationship between ROE (Return on Assets (Net Profit for the Period/Total Assets), TDO, CR_MV, and liquidity ratio, and a positive relationship between unemployment and CPI (Consumer Price Index) ratio.

In their analysis using data for the period 2014–2019, Şekeroğlu and Acar (2021) determined that the liquidity ratio in the study does not have a statistically significant effect on return on assets and return on equity with the help of structural equation modeling. They concluded that the financial leverage ratio has a negative effect on return on assets and a positive effect on return on equity.

Taysı and Özgür (2021) found that there is a deviation from the basic assumptions among the variables in the model they constructed for the panel data analysis with the data for the period 2009 to 2019. Therefore, the model was reconstructed with the help of robust estimators, and as a result of the findings, it was concluded that the dependent variable in the model was negatively affected by the financial assets (net)/total assets variable and positively affected by the non-performing receivables/total loans variable at the 5% and 1% significance levels.

Canatan and İpek (2022) based their analysis on the ARDL (Autoregressive Distributed Lag), Engle-Granger, and Johansen

cointegration approaches using data for the period 2011–2021. As a result of the findings, there is a strong relationship between mobile banking activities and bank net profits both in the short and long run.

Sihotang et al. (2022) used quantitative research and purposive sampling methods in their analysis, using the data for the period 2016–2020. As a result of the analysis, it was determined that the endogenous variables in the study have a statistically significant effect on return on assets. Additionally, among the exogenous variables used in the study, total money supply has a statistically significant effect on return on assets, but inflation does not have a statistically significant effect on return on assets.

In their multiple regression analysis using the data for the period 2012–2020, Ulusoy and Demirel (2022) concluded that the size of transactions made through internet banking has a significant effect on profitability. In addition, the digital transformation of banks has also been found to contribute significantly to bank profitability.

Methods

In this study, the profitability levelss of 27 deposit banks operating in the Turkish banking system for the period 2010–2020 are analyzed using panel data analysis. In this context, firstly, it is examined whether the variables in the model are stationary or not. For this purpose, horizontal cross-section dependence test and homogeneity tests were applied to the available data in order to determine the appropriate panel unit root test. In this framework, according to the CD (Cross-Sectional Dependence) test, which is a horizontal cross-section dependence test, it is concluded that there is horizontal cross-section dependence among the variables. According to the results of the Pesaran–Yamagata homogeneity test, heterogeneity was found in the model.

Since there is both horizontal cross-section dependence and heterogeneity in the model, the panel data analysis is continued with the "CIPS Panel Unit Root Test," one of the second generation panel unit root tests. According to the CIPS test results, both dependent and independent variables are stationary [I(0)] at the level. Subsequently, the analysis was continued with Dumitrescu–Hurlin causality analysis.

Data Set of the Study

In this study, the data of 27 deposit banks operating in Turkey in the period 2010–2020 are analyzed with the help of panel data analysis, taking into account the studies in the literature. In the model established within this framework, ROA for return on average assets is analyzed as the *dependent variable*, CAP for capital adequacy, LIQ for liquidity ratio, and ADD for bank earnings are analyzed as independent variables.

Table 1.
Variables in the Study

	Variables	Variable Codes
Dependent variable	Average return on assets	ROA
Independent variables	Capital adequacy	CAP
	Liquidity ratio	LIQ
	Bank earnings	ADD

Note: ADD = Bank earnings; CAP = Capital adequacy; LIQ = Liquidity ratio; ROA = Average return on assets.

To explain the concepts expressed in Table 1, *Return on average assets* is an indicator that shows how much profit banks can achieve in proportion to their assets. This indicator can be found by dividing banks' net profit for the period by their total assets. Capital adequacy is defined as the ability of banks to maintain sufficient equity capital against losses that may arise due to various risks they face.

The concept of *liquidity* is an indicator that expresses how much of the funds of the fund holders can be returned to the fund holders as a result of the withdrawal of the funds subject to the transaction by banks by using bank loans as a basis. The *liquidity ratio* is a ratio that shows how much of the existing assets of banks are transferred to liquid assets. In other words, the liquidity ratio expresses how much of a bank's assets can be easily converted into cash in a possible situation while trying to fulfilll its obligations. In other words, this ratio shows the extent to which a bank's current assets are sufficient to pay its debts.

Another concept closely related to the liquidity ratio is capital adequacy. *Capital adequacy* is the ability of a bank to have sufficient liquid assets to finance its financial liabilities against possible risks. From this point of view, a bank's capital adequacy ratio at a certain level (in Turkey, according to Article 45 of the Banking Law, this ratio is determined as at least 8%) indicates that the bank has sufficient capital against any risk. Because if this ratio is at a very low level, it means that the bank does not have sufficient capital, and if it is at a very high level, it means that the bank does not use its existing capital at an optimum level.

The concept of *bank earnings* is an indicator that expresses the share of total income of banks in total expenses during their operating periods. This indicator is calculated as the ratio of total revenues to total expenditures.

The deposit banks to which the data used in the study belong are listed in Table 2.

Research Method and Definition of Variables

The *panel data analysis method*, which refers to the aggregation of horizontal cross-sectional observations at a certain point in time, is a very useful method since it allows both time and cross-sectional data to be evaluated together. More broadly defined, panel data are data consisting of N number of units and T number of observations corresponding to each of these units (Tatoğlu, 2020, p. 1). Another feature of panel data is that it allows both

Table 2.
Banks in the Study

T.C. Ziraat Bank A.Ş.	Türkiye İş Bank A.Ş.	ICBC Turkey Bank A.Ş.
Türkiye Halk Bank A.Ş.	Yapı ve Kredi Bank A.Ş.	ING Bank A.Ş.
Türkiye Vakıflar Bank T.A.O.	Alternatifbank A.Ş.	QNB Finansbank A.Ş.
Akbank T.A.Ş.	Arap Türk Bank A.Ş.	Turkland Bank A.Ş.
Anadolubank A.Ş.	Burgan Bank A.Ş.	Türkiye Garanti Bank A.Ş.
Fibabanka A.Ş.	Citibank A.Ş.	Bank Mellat
Şekerbank T.A.Ş.	Denizbank A.Ş.	Habib Bank Limited
Turkish Bank A.Ş.	Deutsche Bank A.Ş.	JPMorgan Chase Bank N.A.
Türk Ekonomi Bank A.Ş.	HSBC Bank A.Ş.	Société Générale (SA)

Table 3.
Descriptive Statistics of Variables

Variables	Number of Observations	Mean	Standard Deviation	Minimum Value	Maximum Value
ROA	297	1.565	2.281	−11.905	15.008
CAP	297	16.669	15.911	2.881	92.809
LIQ	297	34.686	21.748	8.367	99.811
ADD	297	163.910	96.444	82.702	988.215

Note: ADD = Bank earnings; CAP = Capital adequacy; LIQ = Liquidity ratio; ROA = Average return on assets.

qualitative and quantitative factors to be constructed together in a model at the same time. Finally, with the help of panel data analysis, the heterogeneity of units or time-dependent heterogeneity can be calculated by defining it in the structure of the established model. Thus, serious specification errors are prevented and the reliability of the obtained estimation results is ensured (Tüzüntürk, 2007: pp. 1-2).

In this study, the dependent variable, return on average assets, was attempted to be explained with the help of three independent variables. In this context, annual data of 27 deposit banks covering the period 2010–2020 are used. Since both horizontal and vertical cross-sectional data are available in the data set used, "panel data analysis" is preferred as the method. In this framework, the descriptive statistics of the dependent and independent variables in the analysis are presented in Table 3.

When the descriptive statistics of the variables in the model established in Table 3 are analyzed, it is seen that there are 297 observation values belonging to the variables of ROA, capital adequacy ratio (CAR), liquidity ratio (LIQ), and bank earnings (ADD). In addition, the mean, standard deviation, minimum value (which is the lowest value in the data), and maximum value (which is the highest value in the data) of these variables are given respectively.

Results and Discussion

When working with time series in econometric models, the concepts of unit root or stationarity are frequently encountered in many analyses. When a time series contains a unit root, i.e., is non-stationary, it means that the mean, variance, and covariance of the series do not approach a constant value over time. If a series is non-stationary, i.e., contains a unit root, econometric models may be spurious (Boğa, 2019, p. 366). Therefore, a model should be tested for the presence of a unit root. In this framework, in order to decide on the correct unit root test, the horizontal cross-section dependence test should be applied first.

This concept, also known as horizontal cross-sectional dependence or inter-unit correlation, basically refers to the situation where the other units are affected by a change in any of the units that make up the panel data model (Koçbulut ve Altıntaş, 2016, p. 152). In case of horizontal cross-section dependence, first generation panel unit root tests, which do not take into account the correlation between units, cannot be used. Therefore, if there is horizontal cross-section dependence in a panel data model, it is recommended to use second generation panel unit root tests. In this study, the "CD test" proposed by Pesaran (2004) was used to measure the horizontal cross-section dependence. In this test, Pesaran uses the residuals obtained from the estimation of the ADF regression and calculates the correlation of each unit with all other units except itself (Tatoğlu, 2020, p. 105). Hypotheses for the horizontal cross-section dependence test will be formulated as follows:

Table 4.
CD Test

Variables	Breusch–Pagan LM	Pesaran scaled LM	Pesaran CD	Probability
ROA	664.3895	11.828	4.456	.000
CAP	836.31	18.317	8.287	.000
LIQ	1057.464	26.663	17.414	.000
ADD	1427.14	40.616	26.881	.000

Note: ADD = Bank earnings; CAP = Capital adequacy; LIQ = Liquidity ratio; LM = Lagrange Multiplier; CD = Cross-Sectional Dependence; ROA = Average return on assets.

H_0: There is no horizontal cross-section dependence.

H_1: There is horizontal cross-section dependence.

When the probability values are analyzed according to the results in Table 4, it is seen that the probability values are below .05 for all variables at a 95% CI. Therefore, the basic hypothesis "there is no horizontal cross-sectional dependence" will be rejected; in other words, it will be accepted that there is horizontal cross-sectional dependence between the variables.

After horizontal cross-sectional dependence is determined, the homogeneity factor, which means that each unit constituting the panel data has the same quality, should also be taken into consideration. In cases where homogeneity is not ensured, the tests applied give erroneous results. In this study, "Pesaran-Yamagata Homogeneity Test" was applied to determine the homogeneity of the model. In 2008, Pesaran and Yamagata developed a test that allows the homogeneity concept to be tested for panel data models where the unit dimension and time dimension are of different sizes (Öztürk, 2018, p. 5). In this test, which is called "Delta Test," there are two test statistics characterized as Δ (Delta) and Δadi (adjusted Delta) (Koçbulut & Altıntaş, 2016, p. 159). The main advantage of this test is that it can give quite consistent results even in panel data models where both time and unit size are large. The hypotheses for this test will be formed as follows:

H_0: Slope coefficients are homogeneous.

H_1: Slope coefficients are not homogenous.

Table 5.
Pesaran–Yamagata Homogeneity Test

	Delta Value	*p*
Δ	2.124	.03
$Δ_{adj}$	2.977	.003

Table 6.
CIPS Panel Unit Root Test

	Fixed				Fixed and Trended			
Unit Root Test	ROA	LIQ	ADD	CAP	ROA	LIQ	ADD	CAP
CIPS	−2.53	−2.94	−2.28	−2.19	−2.69	−3.32	−2.72	−3.31

Note: Critical table values for CIPS are −2.69 at 5% for $N=27$ and $T=11$ with constant and trend. The constants are 2.36 at 1% and −2.17 at 5%, respectively.
ADD = Bank earnings; CAP = Capital adequacy; LIQ = Liquidity ratio; ROA = Average return on assets.

Table 5 shows the results of the homogeneity test. According to these results, since the probability values are less than .05, there is heterogeneity in the model.

Since the Pesaran–Yamagata homogeneity test revealed that the model is heterogeneous and the CD test revealed that there is horizontal cross-section dependence among the variables, the analysis will continue with the "CIPS Panel Unit Root Test," one of the second-generation unit root tests. In this test proposed by Pesaran (2006), simulation results under the assumption of a single common factor specification for the cross-correlation structure and a known autocorrelation order of the residuals indicate that the CIPS test performs very well (Cerasa, 2008).

H_0: Units contain a unit root.

H_1: Units are stationary.

Table 6 shows that CIPS statistical values are greater than the critical value at the 95% CI. This implies that the dependent and independent variables are stationary at level [I(0)].

The final stage of the empirical analysis is causality tests for the variables. For this purpose, the causality test developed by Dumitrescu and Hurlin (2012) and based on Wald statistics will be used. The important advantage of this test is that it takes into account the dependence and heterogeneity across countries. It can also be realized when the time dimension (T) is higher or lower than the section size (N). In this method, the analysis is performed

Table 7.
Dumitrescu–Hurlin Causality Analysis

Dependent Variable: ROA	Z^{HNC} Statistics	p
LIQ	2.95	.03
ADD	1.88	.05
CAP	0.0611	.95
Dependent Variable: CAP	Z^{HNC} **statistics**	**p**
ROA	−0.202	.83
LIQ	2.87	.02
ADD	3.20	.00
Dependent Variable: LIQ	Z^{HNC} **statistics**	**p**
ROA	−0.42	.68
CAP	−0.44	.55
ADD	3.51	.00
Dependent Variable: ADD	Z^{HNC} **statistics**	**p**
ROA	3.234	.00
CAP	1.70	.08
LIQ	3.80	.00

Note: ADD = Bank earnings; CAP = Capital adequacy; LIQ = Liquidity ratio; ROA = Average return on assets.

with two stationary series, and if the series used in the analysis are not stationary, they should be stabilized by removing their inconsistencies.

According to Table 7, while there is a reciprocal causality relationship between bank earnings and the return on average assets. There is a unidirectional causality relationship from the liquidity ratio to return on average assets. There is no causality relationship between capital adequacy and the return on average assets.

Conclusion and Recommendations

The banking sector plays a leading role in the development of real sectors with the deposits it collects and the loans it extends. Therefore, it is in the interest of every economic unit in the economy that the banking system maintains its stability and performs well. It can be said that banks are one of the most prominent structures of financial intermediation organizations operating as commercial enterprises. Banks, like all other businesses, aim to make a profit in order to maximize the benefit from current and future transactions and to ensure a sustainable existence.

This study analyzes the profitability levels of deposit banks operating in the Turkish banking system for the period 2010–2020 using the panel data analysis method. In the analysis, tests were conducted to determine whether the variables were stationary or not, and the analysis was carried out on stationary variables. The results of the analysis show that there is a reciprocal causality relationship between bank earnings and the return on average assets. There is a unidirectional causality relationship from the liquidity ratio to return on average assets, whereas there is no causality relationship between capital adequacy and the return on average assets.

In addition to the factors affecting banking performance, such as liquidity ratio and capital adequacy, it is suggested to expand the scope of the study and analyze the data of other bank types in order to guide future studies on this subject. Moreover, by examining the effects of macroeconomic variables on profitability levels, it may be possible to better understand the relationships between internal and external factors of financial institutions.

References

Akgüneş, A. O. (2021). Finansal Risklerin Banka Kârlılığı üzerine etkisi: BIST Banka Endeksi üzerine bir uygulama. *Muhasebe Bilim Dünyası Dergisi*, *23*(3), 556–576. **[CrossRef]**

Aktaş, C. (2009). Türkiye'nin ihracat, ithalat ve ekonomik büyüme arasındaki Nedensellik analizi. *Kocaeli Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *18*, 35–47.

Arif, A., & Nauman Anees, A. N. (2012). Liquidity risk and performance of banking system. *Journal of Financial Regulation and Compliance*, *20*(2), 182–195. **[CrossRef]**

Ayadi, N., & Boujelbene, Y. (2012). The determinants of the profitability of the Tunisian deposit banks. *IBIMA Business Review Journal*, 1–21. **[CrossRef]**

Bansal, S. (2020). Meaning, concept and significance of banks. *International Journal of Recent Advances in Multidisciplinary Topics*, *1*(2), 11–15.

Batten, J., & Vo, X. V. (2019). Determinants of bank profitability—Evidence from Vietnam. *Emerging Markets Finance and Trade*, *55*(6), 1417–1428. **[CrossRef]**

Bikker, J. A., & Vervliet, T. M. (2017). Bank profitability and risk-taking under low interest rates. *International Journal of Finance and Economics*, *23*(1), 3–18. **[CrossRef]**

Boğa, S. (2019). Ekonomik karmaşıklık seviyesinin ekonomik büyüme üzerine etkisi: Geçiş ülkeleri için bir panel zaman serisi analizi. *Akademik Hassasiyetler*, *6*(12), 357–386.

Canatan, B., & İpek, E. (2022). Mobil bankacılık İşlemlerinin Banka net Kârlarına etkileri. *Bankacılar Dergisi*, *120*, 6–17.

Çelik, S., & Kaya, F. (2021). Banka kârlılığına etki eden mikro değişkenler: Türk bankacılık sektöründeki yerli ve yabancı bankalar üzerine bir araştırma. *İşletme Araştırmaları Dergisi*, *13*(1), 719–738.

Cerasa, A. (2008). CIPS test for Unit Root in Panel Data: Further Monte Carlo results. *Economics Bulletin*, *3*(16), 1–13.

Chronopoulos, D. K., Liu, H., McMillan, F. J., & Wilson, J. O. S. (2015). The dynamics of US bank profitability. *European Journal of Finance*, *21*(5), 426–443. **[CrossRef]**

Ersoy, E., & Aydın, Y. (2018). Yönetim kurulu yapısı ve banka kârlılığı arasındaki ilişki: Dinamik panel veri analizi. *Nevşehir Hacı Bektaş Veli Üniversitesi SBE Dergisi*, *8*(2), 248–264. **[CrossRef]**

Grossman, R. S. (2010). *Unsettled account: The evolution of banking in the industrialized world since 1800*. 1. Baskı. Princeton University Press.

Hofstrand, D. (2009). Understanding profitability. *AG Decision Maker*, *3*(24), 1–5.

Işık, I., & Hassan, M. K. (2002). Cost and profit efficiency of the Turkish banking industry: An empirical investigation. *Financial Review*, *37*(2), 257–279. **[CrossRef]**

Kayahan, C., & Sarikale, H. (2019). Türk bankacılık sektörünün aktif Yapısındaki değişim ve Gelişimler. *Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi*, *21*(1), 209–222. **[CrossRef]**

Knight, F. H. (1942). Profit and entrepreneurial functions. *Journal of Economic History*, *2*(Suppl.1), 126–132. **[CrossRef]**

Koçbulut, Ö., & Altıntaş, H. (2016). İkiz açıklar ve Feldstein-Horioka Hipotezi: OECD Ülkeleri üzerine yatay Kesit bağımlılığı altında yapısal Kırılmalı Panel Eşbütünleşme analizi. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *0*(48), 145–174.

Kripa, D., & Ajasllari, D. (2016). Factors affecting the profitability of insurance companies in Albania. *European Journal of Multidisciplinary Studies*, *1*(1), 352–360. **[CrossRef]**

Kurylowicz, L. (2004). Short history of banking and prospects for its development in Poland at the beginning of the 21st century. *SSRN Electronic Journal*, 1–16. **[CrossRef]**

Langevoort, D. C. (1987). Statutory obsolescence and the judicial process the revisionist role of the courts in federal banking regulation. *Michigan Law Review*, *85*(4), 672–733. **[CrossRef]**

Nuhiu, A., Hoti, A., & Bektashi, M. (2017). Determinants of commercial banks profitability through analysis of financial performance indicators: Evidence from Kosovo. *Business: Theory and Practice*, *18*, 160–170. **[CrossRef]**

Öncü, E. (2021). Balkan ülkelerinde banka kârlılığını etkileyen faktörler. *Anadolu ve Balkan Araştırmaları Dergisi*, *4*(8), 479–492. **[CrossRef]**

Özer, Y., Babuşçu, Ş., & Hazar, A. (2021). Bankaların Kârlılığını Etkileyen İçsel ve Dışsal Faktörlerin Analizi-Türkiye örneği (2008–2018). *Uşak Üniversitesi Sosyal Bilimler Dergisi*, *14*(2), 29–44.

Öztürk, E. (2018). Elektrik Tüketimi Ile ekonomik büyüme arasındaki Nedensellik İlişkisi: Üst orta gelir grubu ülkeler Panel veri analizi. *Uluslararası İşletme, Ekonomi ve Yönetim Perspektifleri Dergisi*, *3*(2), 1–10.

Saona, P. (2016). Intra- and extra-bank determinants of Latin American banks' profitability. *International Review of Economics and Finance*, *45*, 197–214. **[CrossRef]**

Şekeroğlu, G., & Acar Boyacioğlu, M. (2021). Likidite ve Finansal Kaldıracın Banka Kârlılığı Üzerindeki Etkisinin Yapısal Eşitlik Modeli ile İncelenmesi. *İzmir İktisat Dergisi*, *36*(4), 857–865. **[CrossRef]**

Sihotang, M. K., Hasanah, U., & Hayati, I. (2022). Model of sharia bank profitability determination factors by measuring internal and external variables. *Indonesian Interdisciplinary Journal of Sharia Economics*, *5*(1), 235–251. **[CrossRef]**

Sufian, F., & Habibullah, M. S. (2009). Determinants of bank profitability in a developing economy: Empirical evidence from Bangladesh. *Journal of Business Economics and Management*, *10*(3), 207–217. **[CrossRef]**

Tatoğlu Yerdelen, F. (2020a). *Panel Veri Ekonometrisi*. 5. Baskı. Beta Basım Yayım Dağıtım.

Tatoğlu Yerdelen, F. (2020b). *Panel zaman Serileri analizi*. 3. Baskı. Beta Basım Yayım Dağıtım.

Taysı, K., & Özgür, E. (2021). Yabancı sermayeli mevduat bankalarının aktif kalitesine etki eden faktörlerin belirlenmesi için panel veri analizi uygulaması. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *61*, 175–198.

Turner, T. (2022). *Banking*. Annuity.org. https://www.annuity.org/personal-finance/banking/

Tüzüntürk, S. (2007). Panel veri Modellerinin Tahmininde parametre Heterojenliğinin önemi geleneksel Phillips Eğrisi üzerine bir uygulama. *İktisadi ve İdari Bilimler Dergisi*, *21*(2), 1–14.

Ulusoy, A., & Demirel, S. (2022). Türk bankacılık sisteminde dijitalleşme-kârlılık etkileşimi. *Hacettepe Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *40*(1), 184–200.

Nikolaevna, V. T. (2017). Effectiveness of banking: Evaluation and measuring. *Social-Economic Phenomena and Processes*, *12*(2), 30–35. **[CrossRef]**

Yurttadur, M., & Demirbaş, H. (2017). Türkiye'de bulunan Katılım Bankaları ve özel sermayeli mevduat bankalarının finansal performanslarının karşılaştırılması. *İGÜ Sosyal Bilimler Dergisi*, *4*(2), 89–117.

Genişletilmiş Özet

Ekonomik döngü, finansman ihtiyacı olan ve finansman fazlası olan birimlerden oluşmaktadır. Finansal aracıların varlığı, bu birimlerin eşleştirilmesi ve finansman ilişkilerindeki engellerin ortadan kaldırılması yoluyla ekonomik aktiviteyi kolaylaştırmaktadır. Finansal kuruluşlar, tasarruf sahiplerinin biriktirdiklerinin fazlasını toplayarak, bu fonları reel sektörde ihtiyacı olanlara dağıtmaktadır. Böylelikle tasarruf sahiplerinin yatırımlarından kazanç elde etmelerini sağlamakta ve verimli yatırımlarla reel sektörün büyük ölçekli üretim yapmasına olanak sağlamaktadır. Bir ekonomide bu iki sektör arasındaki ilişki ne kadar iyiyse refah seviyesi o kadar yüksek olacaktır. Tasarrufların yatırımlara kanalize edilmesi yoluyla büyüyen sermaye stoku, bilgi ve işlem maliyetlerini azaltır. Bu nedenle özellikle gelişmekte olan ülkelerde tasarruf açığı reel sektörün finansmanında ciddi sorunlara yol açmaktadır. Bu, nihayetinde, toplumun refah düzeyinin anahtarı olan büyüme potansiyelinin başarısız olmasına yol açar.

Bankacılık sektörü, finansal piyasaların yetersiz kaldığı gelişmekte olan ülkelerin finansal sistemlerinde hayati bir rol oynamaktadır. Bu tür ülkelerde tasarruf sahipleri ile borç alanlar arasındaki uçurumu kapatmak ve mevduatları verimli yatırımlara dönüştürerek finansal aracılık hizmetleri sağlamak, ağırlıklı olarak bankacılık sektörü tarafından üstlenilmektedir.Bu çerçevede bankaların, finansal piyasalar içerisinde fon arz edenlerle fon talep edenlerin bir araya gelmelerini sağlamanın yanı sıra ülke ekonomisi içinde önem derecesi oldukça yüksek olan aracı kurumlardan olduğu söylenebilir.

Mevduat bankaları, işlemlerini parayla yapan ve bu işlemleri yaparken kâr amacı güden finansal kuruluşlardır. Ek olarak, bankaların güvenlik amacıyla gözetimlerinde tutabilmeleri için bireylerden para mevduatı kabul etmeleri bankacılığın kendine özgü bir niteliğidir. Bununla birlikte bir banka mevduat şeklinde aldıkları fonlardan ihtiyaç sahibi kişi ya da firmalara avans vererek kredi yaratabilmektedir. Böylelikle bankalar ekonomide yer alan tasarrufları harekete geçirerek bu tasarrufların kişi ya da kurumların fazla paralarının üretim, yatırım veya kişisel kullanım için ihtiyaç duyan diğer kişi ya da kurumlara faizle kredi vererek mevcut tasarrufların yeniden dağıtılmasını kolaylaştırmaktadır.

Bu çerçevede faiz esasına göre çalışmakta olan mevduat bankalarının esas fonksiyonu, vadeli ve vadesiz mevduat toplayarak, kişi ve kurumlara kredi kullandırmak ve diğer bankacılık hizmetlerini yerine getirmektir.Mevduat bankaları, mudilerden topladıkları mevduat kaynaklarını verimli ekonomik sektörlere yatırarak mümkün olan maksimum karı elde etmeyi hedefleyen ve ekonomik sistemde önemli bir rol oynayan finans kuruluşlardır. Temel görevleri; Mevduat kabulü, kredi ve ödeme hizmetleri, hesap ve risk yönetimi ile finansal güvenliktir. Faaliyetlerinin devamı, müşterilerine yüksek düzeyde güvence sağlamasına ve fonlama kabiliyetlerine bağlıdır.

Banka kârlılığının önemi, ekonominin mikro ve makro düzeylerinde değerlendirilebilir. Mikro düzeyde kâr, rekabetçi bir bankacılık kurumunun temel ön koşulu ve en ucuz fon kaynağıdır. Bir banka yönetiminin temel amacı, herhangi bir iş yapmanın temel gereği olarak kar elde etmektir. Makro düzeyde, kârlı bir bankacılık sektörü olumsuz şoklara daha iyi dayanabilir ve finansal sistemin istikrarına katkıda bulunabilir. Banka kârlılığının hem mikro hem de makro düzeydeki önemi, araştırmacıları, akademisyenleri, banka yönetimlerini ve banka düzenleyici otoritelerini banka kârlılığını belirleyen faktörlere önemli ölçüde ilgi duymaya yöneltmiştir

Türkiye ekonomisinde, bankacılık sektörü, 9.000'den fazla şubesi ve 185.000 çalışanı ile hizmet veren 35 mevduat bankası ve 16 kalkınma ve yatırım bankası ile önde gelen sektörlerden biridir. Bu anlamda mevduat bankaları grubunun, Türk bankacılık sektöründe baskın rol oynadığını söylemek mümkündür.

Türk bankacılık sektöründe Ocak 1980 ve Mayıs 2001 tarihleri, iki önemli kırılma noktası olarak tanımlanmaktadır. 1980'li yıllara kadar Türk bankacılık sektörü, bölgesel düzeyde örgütlenmiş, devletçe çok sıkı düzenlemeler ile aşırı biçimde korunan, dışa kapalı ve rekabetçi olmayan bir sektör görüntüsündeydi. 24 Ocak 1980 istikrar tedbirleri ile birlikte uygulamaya geçilen finansal serbestleşme hareketleri ile birlikte bankacılık sektöründe etkinliği ve rekabet gücünü artırmak amacıyla piyasaya giriş, faiz ve döviz işlemleri üzerindeki kısıtlamaların kaldırılması, rezerv ve likidite gereksinimlerinin ve mali vergilerin azaltılması gibi bir dizi reform hayata geçirilmiştir. Bu reformlar sonucunda bankalar daha rekabetçi bir ortamda faaliyet göstermeye başlamış, teknolojik altyapı yatırımlarını artırmış ve daha profesyonel çalışanlar istihdam etmiştir.

Çalışmada, sırasıyla bankacılık kavramıyla birlikte mevduat bankaları ve Türk bankacılık sektörü tanıtılmış, ilgili literatür taraması yapılmış ve Türkiye'de bankacılık sektörünün önemli bir ayağını oluşturan mevduat bankalarının kârlılığını etkileyen faktörler üzerinden panel veri analizi gerçekleştirilmiştir. Bu amaç doğrultusunda, 2010-2020 dönemine ait yıllık veriler kullanılarak CIPS birim kök testi ve Dumitrescu-Hurlin nedensellik analizi yapılmıştır. Çalışmada mevduat bankalarının kazançları ile ortalama aktif kârlılığı arasında karşılıklı bir nedensellik ilişkisi olduğu, likidite oranından ortalama aktif kârlılığa doğru tek yönlü bir nedensellik ilişkisi olduğu, buna karşılık sermaye yeterliliği ile ortalama aktif kârlılığı arasında ise herhangi bir nedensellik ilişkisi bulunmadığı tespit edilmiştir. Ayrıca büyüklüğü artan bankaların genellikle daha yüksek kârlılık seviyelerine sahip olduğu, buna karşılık düşük aktif kalitesine sahip bankaların kârlılık açısından zorluklarla karşılaştığı saptanmıştır. Elde edilen bulgular, bankaların kârlılık düzeylerini artırmak için alabilecekleri potansiyel önlemler konusunda yönlendirici olabilir.

Bu konuda yapılacak gelecekteki çalışmalara yön göstermek için likidite oranı ve sermaye yeterliliği gibi bankacılık performansını etkileyen faktörlerin yanı sıra, çalışmanın kapsamının genişletilerek diğer banka türlerinin verilerinin de analiz edilmesi önerilmektedir. Ayrıca, makroekonomik değişkenlerin kârlılık düzeyleri üzerindeki etkilerinin incelenerek, finansal kuruluşların iç ve dış faktörleri arasındaki ilişkileri daha iyi anlamak da mümkün olabilir.