

The Identification Of Factors Affecting The Capital Structure of Commercial Banks In The Turkish Banking Sector

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SUMMARY: Banks are financial intermediaries that rely on capital to generate liquidity and credit. The objective of banks, like other financial institutions, is to have a capital structure that minimizes the cost of capital and maximizes the market value of the institution. The determinants of the capital structure of banks have a significant impact on the decisions to be undertaken. Banks are expected to hold more than the minimum capital requirements. The reason for this is to prevent banks from facing various risks that may affect their operations, such as bankruptcy. This study aims to determine the factors affecting the capital structure of commercial banks operating in the Turkish banking sector. In the study, banking sector data for the period 2016-2021 were analyzed. In the study, correlation analysis was employed to examine the relationship between capital adequacy ratio (CAR) and micro-macro indicators and regression analysis was utilized to examine the relationships at multiple levels. Capital adequacy ratio is considered as the dependent variable representing the financial stability of commercial banks. Our independent variables; return on assets, liquidity risk, size, non-performing loans, which are considered to affect capital structure and accepted in the literature, are accepted as micro factors, while economic growth, inflation, exchange rate and interest rate are accepted as macro factors. With this study, the relationship between macro and micro economic parameters affecting the capital adequacy ratio has been identified.

KEY WORDS: Capital Structure, Turkish Banking Sector, Regression Analysis, Commercial Banks

GEL CODE: C23, G21, G32

I. INTRODUCTION

Like in other countries, in order to overcome the economic problems in Turkey, there is a need for stable and sustainable growth, and price stability provided by an environment without inflation. In addition, it is extremely important to increase domestic savings and use them economically in order to create an economic environment where international competition can be made possible. Therefore, it is necessary to have a real and innovative economic policy that increases domestic savings, supports private entrepreneurship based on international competition, provides incentives for production, and takes into account the rules of the free market and macro balances. A strong economy can only be achieved with a growing and healthy functioning financial sector. Banks, which have a very important role in the financial system, need to carry out their activities efficiently and healthily in collecting savings and returning them to the economy based on the principle of productivity and confidence. Banking inherently requires taking calculated risks. Preventing the possible damages of risks is only possible by managing them properly. In this context, it is extremely important for banks to take into account the rates and regulations set by banking regulators when making financing decisions. However, experiencing financial crises, whether global or not, is always possible. Liquidity problems that may arise in the banking sector and insufficient capital can have negative consequences, and even bankruptcies can occur. In case of such risks faced by banks, strong capital structures will reduce the severity of possible damages like a buffer. Capital structure is indisputably one of the most important topics of modern finance theory. Therefore, the stronger the capital structure of banks, the better they will be able to eliminate risks, prevent them from affecting the system in a short time, and make a great contribution to the healthy and stable functioning of the financial system.

Our rapidly globalizing world has faced many financial crises in recent years. Therefore, the capital adequacy of banks in both developed and developing countries has become much more important. It is important to determine whether banks' current capital situation can meet credit, market, and other risk requirements based on the principle that the capital structure of banks should be determined according to their risk profiles. The capital adequacy ratio of banks during their operational process is an important indicator in measuring risk levels. However, it is necessary for banks to maintain their capital adequacy ratio levels in accordance with standards in order to protect themselves from shocks they may face and to protect their customers who benefit from the services they offer. In summary, the capital adequacy ratio serves as a safety buffer against risks. In Turkey, the banking sector has continued its operations with capital adequacy levels higher than the legally determined

minimum of 8% and the targeted 12% levels thanks to the macro-prudential measures taken by the Banking Regulation and Supervision Agency (BRSA) after the 2008 crisis. The increasing performance of the banking sector in risk management, balanced distribution of risks, adequate equity and solid financial structures have prevented the banking sector from becoming a cause of a potential crisis.

In a banking system with a capital structure that minimizes the cost of capital, the determinants of the capital structure are of great importance. Due to the different risks that can affect banks' banking activities and increase their likelihood of bankruptcy, banks are expected to have more capital than the minimum capital requirements set by regulators. Only in this way can the banking sector maintain its effectiveness and efficiency in the event of negative situations in the economy, and be able to cope with unexpected losses and fulfill its responsibilities smoothly. In this study, the capital adequacy ratio of banks was taken as the dependent variable as a financial stability indicator, and the relationship between banks' internal factors and macroeconomic factors was investigated. Regression analysis was preferred to examine their relationships at multiple levels. As is known, deposit banks in a country play an important role as financial catalysts in that country's growing economy. In existing studies on the importance of the banking sector, not enough attention has been paid to the capital structure, emphasizing the importance of legally determined capital levels, and in addition to the variables specific to banks in the literature, the relationships between CAR and macro variables at multiple levels were examined in this study.

II. LITERATURE REVIEW

The stability of the financial system has a serious importance in economies. Banks are the most important actors in the stability of the financial system. Many studies on the banking sector have focused on the determination of the effects and relationship levels of CAR, profitability, risk and bank performance. Related studies in the literature are presented below.

The concept of stability in the banking sector has been defined in different ways. In order for this study to provide a conceptual unity with the literature review, the definitions of financial stability of deposit banks by different researchers are also included.

Darıcı (2001) stated that there are two reasons for the lack of consensus in the definition of financial stability, the first reason is that the concept of stability, which means the absence of volatility, includes the fact that volatility is a problem for financial markets and the other reason is that there are continuous new developments in theory and practice on financial stability, unlike the concepts of macroeconomic stability and monetary stability.

Amidu (2007) study investigates the dynamics involved in determining the capital structure of banks in Ghana using a panel regression model. The results of this study show that profitability, corporate tax, growth, asset structure, and bank size all influence the financing or capital structure decisions of banks. The most significant finding of this study is that more than 87% of the assets of banks are financed by debts, and short-term debts account for more than three-quarters of bank capital, highlighting the importance of short-term debts in the financing of Ghanaian banks over long-term debts.

Asarkaya and Özcan (2007) analyzed the determinants of capital structure in the Turkish banking sector. In the study, a panel dataset covering the period from 2002 to 2006 was created to identify the variables that explain why banks hold more capital than required by regulations, and the generalized method of moments (GMM) was used for estimation. According to the findings, delayed capital, portfolio risk, economic growth, the sector's average capital, and capital returns are positively related to the amount of held capital, while asset size and deposit share are negatively related.

Gropp and Heider (2009) attempted to explain the capital structure of large publicly traded banks, including commercial banks and bank holding companies from 16 different countries (the US and 15 EU members), based on the idea that "bank managers usually want to hold less bank capital than required by regulators due to the high costs of holding capital. In this case, the amount of bank capital is determined by bank capital requirements." They found that incorrectly priced deposit insurance and capital regulation were of secondary importance in determining the capital structure of large US and European banks, and that in banks with capital ratios close to the legal minimum, there was a shift in liability structure from deposits to non-deposit liabilities, consistent with a reduction in the role of deposit insurance. The study did not find a significant effect of deposit insurance coverage on the capital structure of banks.

Jucá M.N. and others (2012) aim to determine whether standard capital structure determinants have the same predictive power for American banks with business portfolios as for banks that maintain their own capital above the minimum regulatory requirement. The study evaluates the role of executive compensation programs for determining banks' capital structures. The final sample consists of 30 banks referred to the pre-crisis period (2003-2006) and (2007-2010). The main objective of the study is to better understand the factors that determine the capital structure of financial institutions and to increase interest in this sector by those who work in and develop this segment.

Okuyan (2013) examined quarterly data obtained from financial statements of 23 banks between 2002 and 2012 and investigated the factors affecting the capital adequacy ratios of Turkish banks. As a result, it was concluded that there is a negative relationship between the capital adequacy ratio and risk, size, deposit ratio and loan ratio, and a positive relationship between economic growth and asset yield.

Allen D. E. and others (2013) This study aims to examine the factors that determine the capital structures of Thai banks. The data covers a ten-year period from 1999 to 2008. The differentiation point of this study is that most studies on capital structure focus mainly on internal bank variables. However, this study includes market-based risk variables in addition to internal variables. A series of market-based default and exposure value variables were taken into account. Thai banks were compared with Japanese and Malaysian banks, and it was found that the importance of market-based variables was greater than book leverage for market leverage.

Taşkın (2015) stated that it is generally difficult to define financial stability in the literature and that stability is mostly defined as the absence of financial instability or fragility.

AL-Mutairi and Naser (2015) This study aims to determine the determinants of capital structure in a sample commercial bank traded on the Gulf Cooperation Council (GCC) stock exchanges by collecting data from 47 GCC commercial banks for the period between 2001 and 2010. As a result, it was found that profitability and liquidity affect banks' capital structure decisions. This study revealed that the majority of commercial banks' assets in the GCC are financed with debt representing more than 80% of their capital.

Zahid et al. (2015) This study investigated how regulatory bodies responded to changes in capital requirements during the global crisis and examined the behavior of capital adequacy in Pakistan's banking sector between 2004 and 2009.

Swai et al. (2016) In this study, the determinants of capital structure of commercial banks operating in Tanzania were examined using panel financial data from 14 banks on a quarterly basis from 1998 to 2010. A structural equation modeling with multiple indicators and multiple causes was applied considering structural breaks. In order of importance in the capital structure decisions of commercial banks in Tanzania, bank size, profitability, tax shield of non-depreciation expenses, growth, and volatility were identified as the main determinants.

Tin and Diaz (2017) conducted an analysis using multiple linear panel regression models such as leverage-focused Ordinary Least Squares (OLS), Fixed Effects (FE), and Random Effects (RE) for 31 commercial banks in Vietnam from 2009 to 2014. This research examines five bank-specific factors (size, profitability, growth rate, taxation, and business risk) and three financial market and economic variables (stock market, economy, and inflation) that influence the capital structure through the debt ratio. Both OLS and FE models obtained the same result that the size of a Vietnamese bank has a positive impact on leverage. Additionally, both models found adverse effects of the stock market and economic conditions. Large commercial banks in Vietnam are also found to have a positive contribution to leverage, while medium and small-scale banks tend to carry relatively high amounts of debt. This article cites empirical literature on non-financial firms to explain the capital structure of large, publicly traded banks in Vietnam.

Özer and Özer (2018) investigated what affects the capital adequacy of the banking sector and whether there is a difference in terms of different types of banking. Through the analysis conducted for this purpose, it was found that size and financial stability have a positive effect on capital adequacy in all types of banking, and a negative effect was observed for non-performing loans/total loans. Liquidity, profitability, and asset structure were found to be positive and significant in deposit and private banks.

Sibindi (2018) This study investigates the determinants of bank capital structure and tests the relationship between bank leverage and bank-level determinants of capital structure using panel data techniques using a sample of 16 South African banks for the period 2006-2015.

Gulaliyev et al. (2019) investigated what factors affect the Financial Stability Conditions Index (FSCI) and defined the financial stability indicator as a product of the term spread, which includes not only commonly accepted variables but also volatility in stock prices. Gadanez and Jayaram (...) argued that, unlike price stability, it is not easy to define or measure financial stability, considering the interdependence and complex interactions of different elements of the financial system.

Gupta and Kashiramka (2020) argue that "Financial stability refers to the smooth functioning of the key elements that make up the financial system, and at the individual level, financial stability reflects the ability of a financial institution to accelerate economic processes, control risks and absorb shocks."

In this research, Harun T.W.R et al. (2020) comprehensively reviewed selected studies on the determinants of capital structure from a banking perspective and divided the selected works into two parts: theoretical and empirical. The theoretical studies on capital structure are categorized into two parts: the general concept of capital structure from a banking perspective, an overview of existing capital structure theories, and a critical review of existing theories on bank capital structure.

Raja et al. (2020) aimed to discuss capital structure from a banking perspective and identify the determinants that could be ultimate factors in determining the capital structure of banks. The theoretical studies related to capital structure were grouped into three main categories: the concept of general capital structure in banking, a general overview of existing capital structure theories, and a critical examination of existing theories related to a bank's capital structure. As a result, it was observed that most of the theories discussed regarding capital structure were not applicable to the banking sector, and it was suggested that the theories should be modified or approached from different perspectives since banks are required to maintain the minimum capital adequacy ratio as prescribed by regulators and rating agencies. Additionally, it was stated that banks have a tendency or possibility to replace debt with equity to increase their return on capital and satisfy investors.

Güngör and Dilmaç (2020) examined the relationship between the financial performance and capital structures of commercial banks during the 2008 crisis period. The aim of the study was to determine the effects of bank capital structures on their financial performance during crisis periods by analyzing quarterly data from 2002:4 to 2015:1 using panel data analysis. As a result, it was stated that in order for banks in Turkey to improve their performance, working with lower equity and more long-term foreign sources of funding, deposits, and non-deposit sources would be more beneficial.

Citak and Goker (2020) stated that the capital adequacy ratio is an important indicator for profitability and risk in banks, and if the CAR is high, the risk faced will decrease but the negative effect will be giving up profitability. They also expressed that banks should determine a CAR in accordance with their own dynamics. Moni Das and Rout (2020) stated in their study that the primary function of banks is to collect deposits and lend them back to the system as loans. They have highlighted that the linear relationship between lending and deposits can cause a downward fluctuation or risk in banks, which can lead to a collapse of capital and pose a serious threat to the bank.

Uçarkaya et al. (2021) aimed to determine the determinants of the capital structure of private and foreign deposit banks in the Turkish banking sector after the global financial crisis. They analyzed the quarterly data from March 2009 to September 2020 using panel data method for model estimation. It was found that the capital adequacy ratio had a negative relationship with the loan ratio, alternative cost of capital, liquidity, and growth, while it had a positive and significant relationship with the equity-to-assets ratio, size, inflation, and the sector's average SYR. However, no significant relationship was found between the capital adequacy ratio and the deposit ratio and the ratio of overdue loans to credits.

CBRT (2022) defines financial stability as the resilience of the economy against unexpected events that may disrupt the balance of the financial system.

Akkaynak (2022) conducted a study to investigate the determinants of capital structure in the banking sector in Turkey using a dataset covering the years 2002 and 2020 and panel data analysis method, and to identify the capital structure theories associated with the sector. As a result, it was found that CAR is positively related to variables such as size, ROA, and interest rate risk, and negatively related to variables such as liquidity, growth opportunities, and ROE. Additionally, it was determined that the capital structure of the Turkish banking sector is generally consistent with financing hierarchy theories.

Dung et al. (2020) examined the determinants of bank capital structure using a wide sample of banks around the world. It was found that, except for growth opportunities, banks determine their capital structures similarly to non-financial firms. Moreover, they provided evidence that country-level factors such as legal systems, bank-specific factors, and economic conditions influence banks' capital decisions through their effects on bankruptcy costs, agency costs, information asymmetry, and liquidity creation. The study also found that macro factors have indirect effects on bank capital decisions.

III. DATA SET AND VARIABLES

The population of this study consists of 24 public and private deposit banks operating in the Turkish banking sector. Regarding the analysis of the data; correlation analysis was implemented to examine the relationships between CAR and micro-macro indicators and regression analysis was employed to examine the relationships at multiple levels. Data on banks were obtained from the data internet system of the Banks Association of Turkey (<https://www.tbb.org.tr/tr/bankacilik/banka-ve-sektor-bilgileri/istatistiki-raporlar>). Macro variable GDP data were obtained from TUIK statistical data portal website (data.tuik.gov.tr) and data on Interest Rates, Exchange Rate and Inflation were obtained from CBRT EVDS data website (<https://evds2.tcmb.gov.tr/>). In the study, p-values less than 0.05 are considered significant. Analyses were conducted with SPSS 25.0 package program. The dependent and independent variables employed in the study are presented in Table 1. In the study, the data of the banks covering the period 2013-2021 were analyzed.

Table 1: Variables Subject to Analysis

Micro Variables	Independent	Description	Notation
Return on Assets		Net Profit/Total Assets	ROA
Liquidity Risk		Liquid Assets/Total Assets	LRisk
Magnitude LOG		Natural Logarithm of Total Assets	Magnitude LOG
Non-performing Loans		Non-performing Loans (gross)/Total Loans and Receivables	TK
Loans		Total Loans and Receivables/Total Assets	K
Macro Variables	Independent		
GDP (Economic Growth)		Expenditure-Chained Volume Index	GDP
Inflation			E
Exchange Rate			DK
FO			FO
Dependent Variable			
Capital Adequacy Ratio		Equity/(CRET+PRET+ORET)x100	CAR

IV. DATA ANALYSIS METHODS

Abbreviations used in the data analysis are as follows: p: Significance level (if p value is less than 0.05, it means there is a significant relationship. If $p > 0.05$, there is no significant relationship. An asterisk (*) on the p value in the table indicates significant difference). r: Pearson correlation coefficient takes values between $-1 < r < 1$. A negative sign on r indicates a negative relationship. If $r = 0.40$ or less, it is weak, if $r = 0.20$ or less, it is very weak, if r is between 0.40 and 0.60, it is moderately strong, if r is between 0.60 and 0.80, it is strong, and if r is greater than 0.80, it is very strong. Regression analyses investigate the relationship between one dependent and multiple independent variables. The assumptions are high R², model significance, and coefficient significance. If these assumptions are met, the model can be interpreted. If there is an independent variable that violates these assumptions, it is removed from the model and the model is reanalyzed. Therefore, the best model was obtained using the forward method in the models employed in the study. Insignificant variables are not included in the model.

V. FINDINGS

In Tables 2 and 3, CAR levels are correlated with micro and macro indicators, and in Tables 4 and 5, they are subjected to regression analysis.

Table 2: Examination of the relationships between CAR and Microeconomic parameters

		CAR
ROA	r	0,36*
	p	0,01
Lrisk	r	-0,22*
	p	0,02
Magnitude LOG	r	-0,31*
	p	0,01
TK	r	-0,08
	p	0,23
K	r	-0,22*
	p	0,01

*Significant relationship at 0.05 level

There is a positive and significant relationship between CAR levels and ROA. In the study, it can be stated that the level of CAR in banks increases in periods when ROA level is high. (r= 0,36, p=0,01).

There is a negative and significant relationship between CAR levels and Lrisk. In the study, it can be stated that the level of CAR in banks decreases in periods when the level of Lrisk is high. (r= -0,22, p=0,01).

There is a negative and significant relationship between CAR levels and Magnitude LOG. In the study, it can be stated that the level of CAR in banks decreases in periods when the magnitude of LOG is high. ($r = -0,31, p = 0,01$).

It was determined that there was no significant correlation between EMR levels and TK ($p > 0,05$). It is observed that there is a negative and significant relationship between CAR levels and K. In the study, it can be stated that the level of CAR in banks decreases in periods when the level of CAR is high ($r = -0,22, p = 0,01$).

Table 3: Examination of the relationship between CAR and Macroeconomic parameters

		CAR
GDP	r	0,37*
	p	0,01
E	r	0,32*
	p	0,01
DK	r	-0,39*
	p	0,01
FO	r	0,29*
	p	0,01

* Significant relationship at 0.05 level

There is a positive and significant relationship between CAR levels and GDP. In the study, it can be stated that the level of CAR in banks increases in periods when the GDP level is high ($r = 0,37, p = 0,01$).

There is a positive and significant relationship between CAR levels and E. In the study, it can be stated that the level of CAR in banks increases when the level of E is high. ($r = 0,32, p = 0,01$).

There is a negative and significant relationship between CAR levels and DK. In the study, it can be stated that in periods when the level of DK is high, the level of CAR in banks decreases.. ($r = -0,39, p = 0,01$).

There is a positive and significant relationship between CAR levels and FO. In the study, it can be stated that in periods when the level of FO is high, the level of CAR in banks increases. ($r = 0,32, p = 0,01$).

Table 4: Examining the Relationship between CAR and Microeconomic Parameters

Dependent Variable	Independent Variables				Model testing	
	K	Lrisk	ROA	Magnitude LOG	F _{Model}	R ²
	(β)	(β)	(β)	(β)		
CAR	-0,09	0,29	0,31	-0,28	46,23	0,54
	p=0,01	p=0,01	p=0,01	p=0,01	(p=0.01)	

DW= 1,94

It is observed that the level of CAR is correlated with microeconomic parameters. It is found that the level of CAR has a multiple relationship with K, Lrisk, ROA, Size LOG measures. It was excluded from the model since it was not related to the TQ level. The model is significant ($F = 43.23, p = 0.01$) and the explanatory ability is as high as 54% ($R^2 = 0.54$).

$$CAR = -0,09 * K + 0,29 * Lrisk + 0,31 * ROA - 0,28 * \text{Magnitude LOG}$$

ROA is found to be the most important micro parameter affecting CAR levels. It can be stated that the effect of size and risk levels are lower than ROA and at similar levels. The effect of the K variable was found to be at the lowest levels.

In the study, it can be stated that the level of CAR is lower in the years when the level of K and size is high, while the level of CAR is higher in the years when the level of risk and ROA is high.

Table 5: Examination of the Relationship between CAR and Macroeconomic Parameters

Dependent Variable	Independent Variables		Model testing	
	DK	GDP	F _{Model}	R ²
	(β)	(β)		
CAR	-0,39	0,05	11,25	0,15
	p=0,01	p=0,04	(p=0.01)	

DW= 1,85

It was observed that the level of CAR was correlated with macroeconomic parameters. It was found that the level of CAR was found to have a multiple relationship with the VA and GDP measures. E and FO levels were excluded from the model as they were not correlated. The model was found to be significant (F=11.25 p=0.01) and its explanatory ability was found to be low at 15% (R²=0,15).

It is found that the most important micro parameter affecting CAR levels is the DC and has a negative effect. It can be stated that the effect of GDP levels is very low and positive.

$$CAR = -0,39 * DK + 0,05 * GDP$$

In the years when the most important macro parameter affecting the level of the CAR, the DC, increases, the level of the CAR decreases. In the years when GDP levels increase, it can be stated that the level of CAR increases.

In the study, it can be stated that the level of CAR is lower in years when the level of P and size is high, while the level of CAR is higher in years when the level of risk and ROA is high.

Regression analysis was conducted for a third model with all parameters, but the result was obtained as the model in Table 4. This is due to the fact that microeconomic parameters have a very high level of influence on the CAR. The level of explanation in the micro model is 54% and 15% in the macro model.

Although it is seen that the level of CAR levels is related with the micro parameters K, Lrisk, ROA, Size LOG and macro parameters DC and GWP, the parameters K, Lrisk, ROA, Magnitude LOG display the highest level of effect. In these micro parameters, the effect power of Lrisk, ROA, Magnitude LOG parameters is considerably higher than all other parameters.

VI. CONCLUSION

Due to its importance in the financial system, the trust in the banking sector stands out. While banks perform intermediary functions, they face many risks such as liquidity and credit risk. If risks are managed correctly, it is possible to stay in the system with minimum losses. Therefore, banks consider their existing capital as a security plug. However, considering the density in the sector, banks can sometimes be the cause of crises that may arise in the economy and can be the sector that is most affected by these crises. Regulators have determined the minimum capital adequacy ratios of banks due to these key roles. The minimum capital requirement brought by the Basel agreements is accepted as the main determinant of the capital structure. With the latest Basel III criteria, it has been emphasized that increases in the existing capital amounts should be made, taking into account the risks assumed by banks. For the Turkish banking sector in compliance with Basel criteria, this ratio has been determined by the BRSA as at least 8% and as the targeted ratio of 12%. However, based on the studies in the literature, it can be said that the Turkish banking sector operates well above the determined ratio as a benchmark. Having a strong capital base in the Turkish banking sector will be a stability element for the financial system, and it will contribute to the country's economy and create a trust factor. A banking sector with a strong capital structure will be able to continue its activities in a stable manner even in times of crisis, and thus, it will not contribute to the deepening of the crisis or its negative effects, but instead, it will act as a safety valve in all measures to be taken to overcome the crisis. Based on its importance, in our study, the relationship and level of influence of the factors that we think affect the capital structure of the banking sector, our dependent variable CAP representing the capital structure, were analyzed. For this purpose, data related to our micro and macro variables were reached annually for the period of 2013-2021. Correlation analysis was applied to look at the relationship between CAP and macro and micro indicators. At the same time, relationships at multiple levels were investigated, and regression analysis was used for this purpose. It was found that the relationship between CAP and ROA is positive and significant. Our finding is consistent with Zahid's 2015 study, suggesting that banks rely on their accumulated profits to increase their capital. In addition, this finding is in line with the result they found in Kleff and Weber's 2008 study that the capital level is positively related to profit. A negative significant relationship was found between CAP and Lrisk, Magnitude LOG, and K. In terms of size, this result may indicate that larger banks are more willing to increase capital than

smaller banks because they have easier access to securities markets and can easily issue bonds in larger amounts. No significant relationship was found between CAP and TK.

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