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The Impact of Bank-Specific and Macroeconomic Factors on the Capital Structure of Banks

Semira HASSEN-ALI *(https://orcid.org/0000-0002-3224-6633), Ethiopian Civil Service University, Ethiopia; smrhassen3@gmail.com*

Hüseyin DAĞLI *(https://orcid.org/0000-0002-2416-9340), Karadeniz Technical University, Türkiye; dagli@ktu.edu.tr*

Sara FAEDFAR *(https://orcid.org/0000-0002-5237-7948), İstanbul Aydın University, Türkiye; sarafaedfar@aydin.edu.tr*

Ayten TURAN-KURTARAN *(https://orcid.org/0000-0001-6116-6467), Karadeniz Technical University, Türkiye; ayturan@ktu.edu.tr*

Bankaya Özgü ve Makroekonomik Faktörlerin Bankaların Sermaye Yapısı Üzerine Etkisi

Abstract

This study aims to investigate the bank-specific and macroeconomic factors that affect the capital structure of banks. The study used panel data from 42 banks operating in Turkey from year 2003 to 2017. In the analysis, total, long-term and short-term debt ratios are used as a proxy for capital structure. The findings show that bank size, growth opportunity, interest rate and exchange rate positively affect the three leverages, while profitability has a negative effect. Most of this study findings are related to the expectations of pecking order theory.

Keywords : Bank, Capital Structure, Leverage, Panel Data Analysis.

JEL Classification Codes : C23, G21, G32.

Öz

Bu çalışma, bankaların sermaye yapısını etkileyen bankaya özgü ve makroekonomik faktörleri incelemeyi amaçlamaktadır. Çalışmada, Türkiye'de 2003-2017 yılları arasında faaliyet gösteren 42 bankanın panel verileri kullanılmıştır. Analizde, toplam borç, uzun vadeli ve kısa vadeli borç oranları sermaye yapısının göstergesi olarak kullanılmıştır. Araştırma bulguları, banka büyüklüğü, büyüme fırsatı, faiz oranı ve döviz kurunun kaldıraç oranlarını olumlu yönde etkilediğini, kârlılığın ise olumsuz yönde etkilediğini göstermektedir. Bu çalışmanın bulgularının çoğunluğu finansman hiyerarşisi teorisinin beklentileriyle uyumludur.

Anahtar Sözcükler : Banka, Sermaye Yapısı, Kaldıraç, Panel Veri Analizi.

1. Introduction

Capital structure combines debt and equity to fund real investments. It shows the financing strategy of firms and their financing tactics (Myers, 2000: 2). There have been a lot of capital structure theories and models established following Modigliani and Miller (1958: 261-297), and efforts have been exerted to determine factors that affect the capital structure. However, many empirical studies concentrated on industrialised countries and non-financial firms. Additionally, studies on the capital structure of financial institutions, especially banks, are minimal. The unique nature of banks, such as the degree of leverage in banking, the type of deposit contract and the regulatory requirements imposed on financial institutions, make studies on banks' capital structure under-explored than non-financial firms.

Even though regulatory requirements are indicated as a significant factor in banks' capital structure, recent studies proved that banks' optimal capital structure is realised by reacting to the influences of bondholders and shareholders in the same way as non-financial institutions. Flannery and Rangan (2008: 2) analysed the capital build-up in the U.S. They concluded that the regulatory requirements will not always be necessary for the capital determination of banks. Instead, investors and market disciplinary pressures significantly impact banks' capital ratios. Moreover, recently many researchers tended to conclude the similarities of factors affecting financial and non-financial companies' capital structures. Gropp and Heider (2010: 9) attempted to investigate the determinant bank capital structure in 16 different countries. They showed that regulatory requirement is not the foremost important factor of banks' equity, and it may only be the second-order important to determine the capital structure of banks. They also uncovered similarities among the factors affecting the banks' and non-financial corporates' capital structures. In other words, the same drivers ultimately determine banks' and corporations' capital structures.

In the case of Turkey, there are very few empirical studies about the capital structure of banks. In these studies, the determinants of banks' leverage were investigated by selecting firm-specific and macroeconomic factors like GDP and inflation rate by making total debt ratio and equity ratio as measures of leverage. Even though these studies attempt to examine the firm-specific and macroeconomic factors, they did not study the impact of macroeconomic factors on the three debt ratios of banks. Additionally, in the previous works conducted in Turkey, the effect of net interest margin and macroeconomic factors like the unemployment rate, interest rate, and the exchange rate has not been observed. Therefore, in addition to following the existing literature, this study tries to fill the gaps in the previous studies. Furthermore, the entire time is separated into two sub-periods to determine whether the 2008 global financial crisis influenced the capital structure of banks or not. The first sub-period spans 2003-2008, while the second spans 2009-2017.

2. Theoretical Framework and Hypothesis Development

In this part, hypotheses are developed based on the literature and theories about the nature of the relationship between capital structure and different types of determinants.

Profitability: The effect of profit on firms' leverage is a controversial issue by previous capital structure theories. According to the trade-off theory, a high profitability level increases firms' borrowing capacity if corporate taxes are considered. Generally, profitable firms are required to pay more taxes than non-profitable firms. To deduct the tax payment amount, they prefer issuing more debt to benefit from a tax shield on the interest payment. This strategy makes firms have more debt than equity. Furthermore, agency costs theory recommends that profitable firms increase the amount of debt in their capital structure to control the manager's actions. All of these suggestions indicate the existence of a positive correlation between debt and profitability (Güngöraydınoğlu & Öztekin, 2011: 1471). Instead, the pecking order theory suggests that firms have an order of preference to finance their operation and prioritise using retained earnings first over debt. Highly profitable firms are considered as they have more retained earnings and are less dependent on borrowed funds, which demonstrate a negative association between profitability and debt (Rajan & Zingales, 1995: 1422; Chakraborty, 2013: 117; Drobetz & Fix, 2003: 24).

Hypothesis 1. Leverage is negatively affected by profitability.

Asset tangibility According to the literature, the asset structure of firms positively affects their capital structure. If the more significant percentage of firms' assets is tangible, it increases the capacity of getting debt with a collateral agreement. According to the trade-off assumption, asset tangibility and leverage have a positive relationship. The reason is that in the case of bankruptcy, the loss on tangible assets is lower than the loss on other assets. Other empirical works support this prediction. Drobetz and Fix's (2003: 32) findings revealed that asset tangibility positively impacts leverage. Furthermore, (Hanousek & Shamshur, 2011: 1364; Gropp & Heider, 2010: 45; Titman & Wessels, 1988: 17) indicated a significant correlation between tangibility and total debt. On the contrary, the pecking order assumptions suggest that more tangible-intensive firms tend to depend on domestic capital and estimate a negative association between asset tangibility and leverage. The negative association between tangibility and short-term debt is also proved by (Bas et al., 2009: 14; Degryse et al., 2012: 440).

Hypothesis 2. Leverage is positively affected by the tangibility of assets.

Firm size: One of the most significant factors of capital structure is firm size. According to trade-off assumptions, firm size is positively correlated to leverage. Large firms are generally more diversified with stable cash flows than small firms. As a result, the probability of bankruptcy will be less, and they will be able to borrow more than small firms. Chakraborty (2013: 17) and Tekin (2019: 156) proved the positive correlation between company size and capital structure. The contradictory justification comes from a problem of

asymmetry of information. By pecking order assumptions, large firms must provide additional public information and offer market securities, including sensitive information like equities. Thus, firms preferring equity financing over debt leads to a negative correlation between leverage and firm size.

Hypothesis 3. Leverage is positively affected by the size of the bank.

Net interest margin: Banks' net interest margin is the difference between what lenders eventually receive and what the borrowers have to pay for their debt (Busch & Memmel, 2016: 1). Net interest margin indicates profitability. In other words, the greater the net interest margin, the more the profit created by the bank, which means stability and the effectiveness of the bank (Hailu, 2015: 5). Even though the theories on capital structure did not demonstrate the impact of net interest margin on the capital structure, almost all studies conducted on the net interest margin indicated that it is the primary measure of banks' profitability. Khalil (2017: 33) and Hailu (2015: 8) found a negative association between net interest margin with leverage.

Hypothesis 4. Net interest margin has a negative effect on leverage.

Growth opportunity: Capital assets that enhance the company's worth are known as growth opportunities. These assets do not produce taxable income and cannot be collateralised (Titman & Wessels, 1988: 4). According to the trade-off assumptions, corporations with higher growth opportunities choose to maintain debt financing since they may need additional resources in the future. Hence, they reduce their debt level in their capital structure. Thus, the anticipated growth opportunities in the future should have a negative impact on the debt. Some of the empirical researchers who suggest a negative association between growth and leverage are Chakraborty (2013: 117), Gaud et al. (2005: 1) and Goyal et al. (2002: 57). Instead, the pecking order predicts the leverage and growth opportunity to have a positive relationship. Firms with higher growth opportunities need external funds in the form of debt because of insufficient internal funding sources. This effect is proved in Drobetz & Fix (2003) and Frank & Goyal (2009).

Hypothesis 5. Leverage is positively affected by growth opportunities.

Liquidity: The liquidity of an asset indicates the degree to of an asset can be easily traded in the market. The liquidity ratio demonstrates that the firm can meet its financial commitments in the short term. Sibilkov (2009: 1173) proved a significantly positive association of asset liquidity with leverage. Similarly, Shleifer and Vishny (1992: 21) described those illiquid assets poorly affect debt financing, and liquid assets serve as a better increase in the firm's debt capacity. Williamson (1988: 567) states that firms with more liquid assets undertake higher liabilities because of lower financing costs of such assets. These findings are compatible with trade-off assumptions.

Šarlija and Harc (2012: 34) suggest that short-term debt correlates more to liquidity than long-term debt. But generally, firms that have more liquid assets undertake less

leverage. Similarly, Akdal (2011: 12) presented a significantly negative impact of liquidity on leverage. Anderson (2002: 13) examined whether asset liquidity affects the long-term and short-term liabilities of the sample of the U.K. and Belgian firms. He found that firms that relied on more long-term debts tend to hold more liquid assets. However, when the test is made on Belgian companies, he found a positive correlation between short-term liabilities and liquid assets. The pecking order hypothesis suggests a negative association between leverage and liquidity.

Hypothesis 6. Leverage is negatively affected by liquidity.

The real GDP growth rate: Köksal and Orman (2015: 18) stated that in a highly growing environment, firms have a shortage of tangible assets regarding the availability of investment opportunities which leads to losing their value at the time of distress. They also indicated that GDP negatively affects total and long-term debts but not short-term ones. The trade-off theory assumes that a higher growth environment negatively affects the leverage ratio. The theory suggests that firms in a growth environment are likely to face financial distress and a debt overhang problem since the new investment opportunities in a growing economy make the cost of debt higher than equity (Myer, 1977: 147). Similarly, Muthama et al. (2013: 56) indicated that the GDP growth rate negatively correlates with the total and short-term liabilities, while the correlation with long-term liabilities is positive. Instead, pecking order assumptions suggest a positive correlation between GDP growth and leverage. Firms in high-growth environments prefer external financing through debt over equity. This positive relationship is found by Magwai (2014: 71).

Hypothesis 7. Leverage is negatively affected by the real GDP growth rate.

Inflation rate: The relation between leverage and inflation is interpreted differently in different capital structure theories. The assumptions of the trade-off theory suggest a positive effect of the inflation rate on leverage. Taggart (1985) indicated that in the U.S., the characteristics of the tax law make the real value of interest tax discounts to be low during the high expected inflation rate. Hortlund (2005: 23) proved that a high inflation rate increases the debt ratio, especially for banks. The positive effect of the inflation rate on leverage is also concluded by Frank and Goyal (2009), Mokhova and Zinecker (2014), and Noguera (2001). These studies revealed that high inflation creates a high demand for corporate bonds. However, the expectation of pecking order regarding the association between inflation rate and leverage is not explicit. Dammon (1988) indicated that a higher inflation rate increases the demand for stocks than bonds. Thus, the leverage of the firms tends to decrease. Booth et al. (2001: 98) noted that firms' total and long-term liabilities decrease with the inflation rate increase.

Hypothesis 8. Leverage is negatively affected by inflation.

Interest rate: The interest rate is the borrowed resource charge for a given period. Frank and Goyal (2009: 47) suggested that the tax benefit of debt makes firms hold more

debt by the trade-off. Therefore, considering the bankruptcy risk, the high cost of debt is a key reason for firms to adjust their capital structure, leading to the positive association of interest rate and leverage. While Bokpin (2009: 129) proved a positive effect of interest rate on leverage, Mokhova and Zinecker (2014: 534) came to an opposite conclusion. Dell'Ariccia et al. (2014: 24) noted that when banks are poorly capitalised, and the leverage of banks cannot easily be adjusted in response to change in the risk-free rate, the relation between leverage and real interest rate need no longer be negative. However, if the capital structure of banks is not fixed and can be easily adjusted, a decrease in real interest rates increases the leverage. Unexpected interest rate changes significantly affect the firm's leverage value. For instance, an unexpected increase in interest rates reduces the market value of long-term loans while not affecting short-term debts or the book value of long-term debts (Gordon & Shoven, 1982: 477).

Hypothesis 9. Leverage is negatively affected by interest rates.

Unemployment rate: Mogwai (2014: 26) stated that in countries with a high unemployment rate, it is possible to expect firms to be labour incentives and make them hold a lower level of leverage. Generally, employees need to be safe in the working environment, get incentives and feel confident in the firm they are working in. Customers and shareholders are reluctant to work in highly leveraged likely to fail firms. Thus, highly leveraged firms spend more to pay employees' wages, and it could be difficult to hire workers at a low-cost relative to the labour market (Maksimovic & Titman, 1991: 176).

Despite the limited research on the linkage between unemployment and capital structure, some empirical data shows the structure of unemployment-leverage correlation. At the same time, Mokhova and Zinecker (2014: 535) and Akyol and Verwijmeren (2013: 480) state that the unemployment rate has a positive effect on capital structure, and Kalaleh et al. (2015: 432) proved a negative correlation.

Hypothesis 10. Leverage is negatively affected by the unemployment rate.

Exchange rate: The exchange rate is the currency value of one country regarding another country's currency. Francis and Hunter (2012: 5) demonstrated that volatility in the exchange rate has an economic effect on firms' debt costs and may lead to an increase in interest conflict between debtholders and shareholders. To investigate whether the banks' leverage is procyclical or not, Pedrono and Aurelien (2017) found that the leverage of commercial banks is less procyclical than the leverage of investment banks and this difference is captured by currency diversification (Baglioni et al., 2013: 10; Kalemli-Ozcan et al., 2012: 3). The empirical literature that tried to examine the relationship between exchange rate and capital structure found mixed results. Zare et al. (2013) indicated no significant relationship between the leverage of listed companies on The Tehran Stock Exchange and exchange rate changes. On the other hand, Mohsin (2016) found a significant positive effect of the exchange rate on leverage. Whereas M. Zein and Ångström (2016: 33) found a negative association.

Hypothesis 11. Leverage is negatively affected by the exchange rate.

3. Model Development

In this study linear panel regression model is used. Because of having three dependent variables, three models are developed (Weisberg, 2005: 20-21).

$$LEV1_{it} = ß_0 + ß_1PROFT_{it} + ß_2TANG_{it} + ß_3SIZE_{it} + ß_4NIM_{it} + ß_5GROW_{it} + ß_6LIQU_{it} + ß_7LNGDP_{it} + ß_8INF_{it} + ß_9INT_{it} + ß_{10}LNUNEMP_{it} + ß_{11}EXCH_{it} + e_{it} \quad (1)$$

$$LEV2_{it} = ß_0 + ß_1PROFT_{it} + ß_2TANG_{it} + ß_3SIZE_{it} + ß_4NIM_{it} + ß_5GROW_{it} + ß_6LIQU_{it} + ß_7LNGDP_{it} + ß_8INF_{it} + ß_9INT_{it} + ß_{10}LNUNEMP_{it} + ß_{11}EXCH_{it} + e_{it} \quad (2)$$

$$LEV3_{it} = ß_0 + ß_1PROFT_{it} + ß_2TANG_{it} + ß_3SIZE_{it} + ß_4NIM_{it} + ß_5GROW_{it} + ß_6LIQU_{it} + ß_7LNGDP_{it} + ß_8INF_{it} + ß_9INT_{it} + ß_{10}LNUNEMP_{it} + ß_{11}EXCH_{it} + e_{it} \quad (3)$$

In the model, the $ß_0$ indicates the coefficient of regression, $ß_1$, $ß_{,2}$ and $ß_3$ indicate the coefficient of explanatory variables, e_i shows the error, i implies the bank in the same cross-section and the period is characterised by t.

3.1. Data and Methodology

The study covers 42 sample banks with yearly data from 2003 to 2017. The data of all bank-specific factors used in this study are collected from statistical reports of The Banks Association of Turkey (BAT). The macroeconomic data, namely, the inflation rate, real GDP growth rate, interest rate, unemployment rate, and exchange rate, are collected from the statistical reports of the World Bank.

For the objective of our study, capital structure is used as the dependent variable. Several studies used a firm's debt or leverage ratio to measure the capital structure. It is recommended that besides using total liability, dividing it into short-term and long-term liability is appropriate to measure the financial leverage, which helps to show whether the firm is at default risk or not and it gives complete information on past financing choices (Hanousek & Shamshur, 2011: 1363; Michaelas et al., 1999: 113; Rajan & Zingales, 1995: 9; Titman & Wessels, 1988: 7).

In addition, pecking order and trade-off have different approaches for different liabilities. Firms with high total and long-term liabilities prefer the pecking order theory's predictions, whereas firms with lower long-term and total liabilities prefer the trade-off theory's predictions (Pontoh 2017: 138). As a result, in this research, three measures of leverage are total used liabilities (LEV1), long-term liabilities (LEV2), and short-term liabilities (LEV3). The independent variables include bank-specific and macroeconomic factors: Tables 1 and 2 below present the variables' definitions and descriptive statistics results.

Table: 1
The Description of Variables

Variables	**Model Name**	**Description**
Dependent Variables		
Total Liabilities Ratio	$LEV1_{it}$	Total Debt over Total Assets
Long Term Liabilities Ratio	$LEV2_{it}$	Long Term Debt over Total Assets
Short Term Liabilities Ratio	$LEV3_{it}$	Short Term Debt over Total Assets
Independent Variables		
Profitability	$PROFT_{it}$	Operating Income/Total Asset
Asset Tangibility	$TANG_{it}$	Fixed Assets/Total Assets
Bank Size	$SIZE_{it}$	The Natural Logarithm of Total Asset
Net Interest Margin	NIM_{it}	(Interest Income-Interest Expense)/Total Assets
Liquidity	$LIQU_{it}$	Current Assets/Current Liabilities
Growth Opportunity	$GROW_{it}$	The Annual Growth Rate in Total Asset
The Real GDP Growth Rate	GDP_{it}	The Natural Logarithm of the Percentage Change in Yearly GDP Growth Rate
Inflation Rate	INF_{it}	The Percentage Change in the Annual Consumer Price Index (CPI)
Interest Rate	INT_{it}	Real Interest Rate
Exchange Rate	$EXCH_{it}$	Exchange Rate (Turkish Lira to American Dollar)
Unemployment Rate	UNEMPit	The Natural Logarithm of the Percentage Change in the Total Labour Force.

Table: 2
Results of Descriptive Statistics

	Mean	Maximum	Minimum	Std. Dev.	Observations
LEV 1	0,714	0,969	0,009	0,255	629
LEV 2	0,305	0,917	0,001	0,217	629
LEV 3	0,455	1,000	0,002	0,243	629
PROFT	0,023	0,895	-0,632	0,071	629
TANG	0,563	0,999	0,002	0,255	629
SIZE	3,182	5,060	0,401	1,072	629
NIM	0,049	0,361	-0,232	0,046	629
GROW	0,211	10,872	-0,878	0,693	629
LIQU	7,173	463,7	0,018	32,6	629
LNGDP	0,054	0,105	-0,048	0,037	629
INF	0,094	0,216	0,063	0,035	629
INT	0,044	0,209	-0,030	0,060	629
LNUNEMP	2,352	2,646	2,219	0,110	629
EXCH	1,885	3,670	1,299	0,687	629

Moreover, The Hausman test with the null hypothesis of the random effect model is used to choose between fixed and random effect models, and the results indicate that the fixed effect model is the right choice. Additionally, the Chow test is performed to ensure whether the model is a common or a fixed effect model, with a null hypothesis of a common effect. The Chow test results of three regression models for the entire period are found in Table 3.

Table: 3
The Results of the Chow Test

Model	**Dependent Variable**	**Effects Test**	**Statistics**	**Prob.**
Model 1	LEV1	Cross-Section F	23.44	0.000
		Cross-section Chi-Square	604.37	0.000
Model 2	LEV2	Cross-Section F	20.28	0.000
		Cross-Section Chi-Square	551.09	0.000
Model 3	LEV3	Cross-Section F	16.67	0.000
		Cross-Section Chi-Square	483.84	0.000

Based on Table 3 above, the fixed effect model is suggested by the p-value of Cross-section Chi-Square being less than 0.05 for all three full period models.

3.2. Panel Unit Roots

Although testing for variable stationarity is a common practice in time series analysis, testing for unit roots in a panel data set has recently become common as a result of shifting the application of panel data from large cross-sections (N) and short time series (T) to large cross sections (N) and long-time series (T) (Barreira & Rodrigues, 2005: 2). As a result, since the data in this study represents a panel data set, panel unit root tests are performed. There are different types of tests used for unit roots. In this study Phillips-Perron (PP) Fisher Chi-Square test was used. The H_0 of the test is a variable that possesses a unit root. The test result is given in Table 4 below.

Table: 4
The Result of Panel Unit Root Test

	Constant	Constant and Trend	The first difference between the variables	
			Trend	Constant and trend
PROFT	313,60***[1]	355,19***	793,03***	659,15***
TANG	95,26	84,55	256,82***	208,80***
SIZE	293,89***	97,27	292,93***	391,01***
NIM	322,15***	353,90***	684,34***	611,63***
GROW	295,90***	403,84***	893,09***	711,67***
LIQU	229,79***	229,19***	618,48***	541,46***
LNGDP	190,32***	105,08*	799,58***	641,23***
INF	1137,95***	870,23***	1041,13***	872,14***
INT	491,34***	194,65***	426,57***	823,70***
LNUNEMP	127,98***	56,94	245,28***	130,27***
EXCH	0,0002	0,003	37,43	299,73***

According to the results, all the remaining variables are stationary except for asset tangibility and exchange rate. Since two variables, i.e., asset tangibility and exchange rate have a unit root at level, both variables are first differenced. The first difference of asset tangibility is stationary with the trend and constant and trend. Instead, the first difference in the exchange rate is stationary with constant and trend. Therefore, in the regression analysis, the first difference between tangibility and exchange rate is represented by DTANG and DEXCH.

3.3. Structural Break Test

As indicated in the first part of this study, besides investigating the determinants impacting the capital structure, additional analysis is made to determine whether the factors affect the leverage differently before and after the global economic crisis. Therefore, it is important to indicate the structural point to split the entire sample period and determine the two sub-periods. The Dickey-Fuller breakpoint selection test determines the break period for each macroeconomic variable, including real GDP growth rates, inflation rates, interest rates, unemployment rates, and exchange rates. The results of the tests show that, excluding exchange rates, 2009 is a breakpoint for the other four macroeconomic factors. The macroeconomic variables have changed significantly since 2009. Table 5 shows the result

[1] *In this study, the ***, ** and * indicate the significance level at p<1%, p<5%, and p<10%, respectively.*

of each variable. Also, to get the structural break, the Chow breakpoint (Chow 1960: 602) test is applied. The results are given in Table 6 below.

Table: 5
The Variance Inflation Factor for the Full Period (2003-2017)

Variable	VIF	I/VIF
INT	3.20	0.31205
INF	2.51	0.394825
LNUNEMP	1.78	0.560873
LNGDP	1.69	0.599922
EXCH	1.47	0.67852
SIZE	1.39	0.720272
TANG	1.24	0.80591
NIM	1.22	0.818678
PROFT	1.11	0.899649
GROW	1.10	0.911832
LIQU	1.09	0.919534
Mean	1.62	

Table: 6
The Result of the Structural Break Test

F-statistic	9,976***
Log-likelihood ratio	28,534***
Wald Statistic	39,906***

Based on Table 6 above, the F statistic results indicate that the null hypothesis of no breaks at specified breakpoints (2009) is rejected, and 2009 is considered a structural point. Therefore, the full-time span is divided into two sub-periods according to the results of a structural break test. In which, from the years 2003-2008 are considered the first sub-period and the years 2009-2017 are the second sub-period.

3.4. Autocorrelation and Heteroscedasticity

To test whether there is a relationship among the values of the same variable at different periods, the autocorrelation test is performed using Wooldridge's (2002: 176) test with H_0 of no serial correlation. The results revealed that there is autocorrelation in all models. Additionally, to detect whether the variance of all observations in a data set is equal or not, the heteroscedasticity test is made by modified Wald tests. The test result indicates the presence of heteroscedasticity. Therefore, the Driscoll-Kraay standard error is computed for the correct estimated regression, which provides robustness to heteroscedasticity and serial correlation (Hoechle, 2007: 29).

4. Results and Discussions

Table 7 demonstrates the correlation among the entire period's dependent and explanatory variables. Except for the five variables (asset tangibility, bank size, growth opportunity, real GDP growth rate, and exchange rate), LEV1 is negatively associated with all the remaining variables with a range between -0,01 and -0,38. The positive correlation of LEV1 with asset tangibility, bank size, and growth opportunity is statistically significant. The second leverage, LEV2, is negatively correlated with most variables. The only three

positively associated with LEV2 are real GDP growth rate, asset tangibility and bank size. Although LEV 2 is associated negatively with most independent factors, only the correlation of profitability, net interest margin, and liquidity are statistically significant.

On the other hand, LEV3 positively correlates with many variables. But statistically significant correlation is found only with bank size and growth opportunity with a degree of significance of 1% and 5%, respectively. These results imply that when the bank size and growth opportunity increase, the short-term debts also significantly increase. On the contrary, asset tangibility, net interest margin, and liquidity negatively correlate to LEV3.

Table: 7
Correlation Coefficients between Variables

	LEV1	LEV2	LEV3	PROFT	TANG	SIZE	NIM	GROW	LIQU	LNGDP	INF	INT	LNUNEMP	DEXCH
LEV 1	1													
LEV 2	0,206***	1												
LEV 3	0,541***	-0,262***	1											
PROFT	-0,059	-0,118**	0,029	1										
DTANG	0,265***	0,505***	-0,119**	-0,078*	1									
SIZE	0,632***	0,273	0,411***	0,036	0,407***	1								
NIM	-0,358***	-0,090*	-0,222***	0,226***	-0,148***	-0,298***	1							
GROW	0,115**	-0,005	0,107**	-0,047	-0,080*	-0,036	-0,158***	1						
LIQU	-0,382***	-0,083*	-0,330***	-0,111**	-0,147***	-0,220***	0,069	-0,075	1					
LNGDP	0,023	0,005	0,025	-0,074	-0,025	-0,027	-0,089*	0,079*	-0,006	1				
INF	-0,021	-0,012	0,047	0,128***	-0,063	-0,100**	0,109**	0,060	0,012	0,011	1			
INT	-0,062	-0,021	0,056	0,092*	-0,066	-0,162***	0,103**	0,152***	-0,004	-0,108**	0,712***	1		
LNUNEMP	-0,009	-0,044	0,068	0,035	-0,012	0,002	0,022	0,001	-0,011	-0,625***	0,016	0,211***	1	
DEXCH	0,081	-0,016	0,033	-0,016	-0,036	0,105**	-0,040	-0,161***	0,079*	-0,079*	-0,065	-0,404***	0,042	1

4.1. Determinative Factors of Bank Capital Structure During the Entire Period

The fixed effects regression analysis result for the entire period is presented in Table 8 below, in which the results' robustness has been ensured through the Driscoll-Kraay (DK) model. The result indicates that profitability significantly and negatively affects the total and long-term liabilities ratios, while the effect on short-term liabilities is statistically insignificant. These results align with pecking order theory assumptions and indicate that highly profitable Turkish banks have lower debt rates than less profitable banks.

Asset tangibility significantly and positively affects long-term debt, whereas total and short-term debts are negatively affected. As a result, banks with higher tangible assets seem to undertake more long-term liabilities than short-term liabilities. In other words, banks that make increased investments in tangible assets have high levels of long-term debt and short-term debts are used for current requirements. Based on these findings, it is possible to deduce that banks in Turkey follow the maturity matching approach in their asset management. The negative association of LEV1 and asset tangibility is compatible with those predicted by the pecking order theory.

The impact of bank size seems to be significantly positive among all discussed debt ratios. Results imply that other things remain constant; large banks use more debt than small banks. Additionally, the degree of significance on all leverages indicates that in the Turkish banking sector, in line with trade-off assumptions, bank size has the most significant impact on leverage. The results of Table 8 show that; the effect of the net interest margin is

significant only on LEV2. This implies that whenever the long-term debts of banks increase, the net interest margin will also increase.

The impact of growth opportunity is positive on the three leverages. However, the effect is statistically insignificant on LEV 2. This indicates that banks with a high growth opportunity tend to hold more leverage. The main reason is that the opportunity of getting more investments makes internal funds unlikely to be sufficient, which leads banks to demand more funds, which is in line with pecking order assumptions. Liquidity significantly and negatively affects the total and short-term debt, but its effect on long-term debt is insignificant. The reason might be that when the indebtedness of banks increases, the number of current assets on hand may decrease and make liquidity turn down. These results are in line with pecking order assumptions.

Table: 8
The Regression Results of the Full Period (2003-2017)

Variable	LEV 1	LEV 2	LEV 3
C	-0,019 (0,123)	0,493 (0,291)	-0,775*** (0,151)
PROFT	-0,556*** (0,049)	-0,513*** (0,111)	-0,100 (0,075)
DTANG	-0,056 (0,051)	0,300*** (0,053)	-0,259** (0,105)
SIZE	0,238*** (0,034)	0,083* (0,043)	0,168*** (0,016)
NIM	-0,014 (0,123)	0,510*** (0,103)	-0,095 (0,147)
GROW	0,020*** (0,006)	0,007 (0,010)	0,016** (0,006)
LIQU	-0,002*** (0,000)	0,000 (0,000)	-0,001*** (0,000)
LNGDP	0,334** (0,112)	-0,096 (0,242)	0,792*** (0,141)
INF	0,134 (0,303)	-1,756* (0,742)	1,333** (0,514)
INT	0,524** (0,173)	0,047 (0,308)	0,888*** (0,130)
LNUNEMP	-0,027 (0,030)	-0,135** (0,045)	0,217** (0,066)
DEXCH	0,052*** (0,012)	0,026 (0,033)	0,020 (0,038)
Adjusted R^2	0,815	0,634	0,671
Wooldridge	50,96***	45,34***	87,26***
Hetrosce Wald	15614,92***	3269,80***	2714,83***
Total panel	587	587	587
No.of groups	42	42	42

Regarding the regression results of macroeconomic factors, the real GDP growth rate has a significantly positive impact on LEV1 and LEV3 but not on LEV2. This finding indicates that a bank with high economic growth demands more debt than equity. The reason is that during high economic growth, the demand for external financing increase to make new investments which is similar to pecking order assumptions.

Contrarily, inflation rates' impact is statistically significant on LEV2 and LEV3. As can be observed from the result of Table 8, the coefficient of the inflation rate is high relative to the coefficients of other variables. Based on this finding, it is worth mentioning that the

inflation rate in the banking industry is considered a significant and determinative factor for the leverage rate. This result is compatible with the trade-off expectations. The statistically negative correlation between inflation and long-term liabilities might be because, during high inflation, one of the measures taken by the banks is increasing the interest rate, which increases the cost of debts of banks. Thus, banks prefer to reduce the leverage amount in the capital structure.

The interest rate positively affects the three leverages, but its effect on LEV2 is statistically insignificant. This finding implies that the leverage of banks in Turkey is sensitive to the change in interest rate. Similarly, the exchange rate affects all three leverages positively. However, the impact is significant only on total debt. The periodic exchange-rate fluctuation impacts the total liabilities rate of banks. The unemployment rate negatively affects LEV1 and LEV2. But the effect on LEV1 is statistically insignificant. Instead, the impact on LEV3 is significantly positive. This means that the increase in the unemployment rate decreases the long-term liabilities and banks' short-term liabilities.

4.2. Determinants of Banks' Capital Structure in the Two Sub-periods

Table 9 shows the regression results for both sub-periods except when all the variables are similar.

Except for the LEV2 of the second sub-period, profitability has a negative impact on all leverages in both sub-periods. But the effect is only statistically significant on the LEV2 of the first sub-period. These results indicate that before and after the financial crisis, highly profitable banks use less debt than less profitable banks, which is consistent with pecking order assumptions. Asset tangibility similarly affects the three leverages of the two sub-periods. In both periods, asset tangibility negatively affects LEV1 and LEV3 at a 1% significance level and positively impacts LEV2. Thus, banks with higher tangible assets undertake lower total and short-term debts and a higher long-term debt burden. The pecking order assumptions explain many findings in this study regarding the effect of asset tangibility on leverage.

From Table 9, the regression results of both sub-periods show that the association between bank size and leverages is significantly positive. Based on this point, it is worthwhile to deduct those large banks in Turkey use more debt in adjusting their capital structure than equity. In line with trade-off assumptions, this might happen due to significant companies' supposed diversification and steady cash flow that allows them easy access to external funds.

In the two sub-periods, the effect of net interest margin on long-term debt is significant and positive but is insignificant on short-term and total debts. Also, the impact of growth opportunity is insignificant on the three leverages of the first sub-period. While in the second sub-period, it has a statistically positive effect on LEV 1 and LEV2. The impact of liquidity on LEV1 and LEV3 of the first sub-period is negative and is statistically

significant only on LEV3. Moreover, liquidity does not affect LEV2 in both periods, which implies that, in the first sub-period, banks that hold more short-term debts have less liquidity.

Table: 9
The Regression Results for Two Sub-Periods

	First sub-period (2003 - 2008)			Second sub-period (2009 - 2017)		
Variable	**LEV1**	**LEV2**	**LEV3**	**LEV1**	**LEV2**	**LEV3**
C	0,010 (0,126)	-0,662*** (0,103)	0,753** (0,212)	0,055 (0,055)	0,420 (0,222)	-0,558** (0,151)
PROFT	-0,129 (0,107)	-0,346*** (0,072)	-0,047 (0,132)	-0,004 (0,425)	0,170 (0,282)	-0,049 (0,252)
TANG	-0,191*** (0,070)	0,095 (0,120)	-0,308*** (0,059)	-0,175*** (0,035)	0,226** (0,075)	-0,389*** (0,035)
SIZE	0,270*** (0,030)	0,133*** (0,035)	0,116** (0,042)	0,177*** (0,028)	0,077 (0,052)	0,104*** (0,021)
NIM	-0,324 (0,194)	0,480*** (0,248)	-0,159 (0,234)	0,142 (0,115)	0,272*** (0,079)	-0,153 (0,109)
GROW	0,012 (0,009)	-0,004 (0,010)	0,010 (0,016)	0,072*** (0,009)	0,049* (0,022)	0,020 (0,026)
LIQU	-0,001 (0,000)	0,000 (0,001)	-0,002*** (0,001)	-0,001*** (0,000)	0,000 (0,000)	0,000** (0,000)
LNGDP	-0,028*** (0,005)	-0,008* (0,004)	-0,018** (0,007)	-0,405*** (0,118)	-1,860*** (0,312)	1,426*** (0,242)
INF	-0,493*** (0,126)	-0,293*** (0,099)	-0,375** (0,146)	-1,273*** (0,317)	-3,846*** (0,382)	2,064*** (0,545)
INT	0,503*** (0,115)	0,579*** (0,090)	0,299** (0,122)	-0,326* (0,165)	-0,758** (0,289)	0,434 (0,541)
LNUNEMP	-0,346*** (0,038)	0,027 (0,077)	-0,500*** (0,066)	0,082*** (0,015)	0,027 (0,048)	0,167** (0,054)
EXCH	0,624*** (0,051)	0,305*** (0,085)	0,549*** (0,094)	0,058*** (0,013)	-0,014 (0,031)	0,019 (0,034)
Adjusted R^2	0,847	0,637	0,631	0,879	0,713	0,764
Wooldridge	26,567***	12,620***	22,220***	29,301***	42,941***	62,973***
Hetrosce Wald	67600,32***	5993,81***	29265,75***	30442,40***	7381,32***	8451,23***
Total panel	252	252	252	335	335	335
No. of groups	42	42	42	42	42	42

In the two sub-periods, the effect of the real GDP growth rate and inflation rate on the three leverages is similar. Except for LEV3 of the second sub-period, the two variables affect all leverages negatively. Additionally, the inflation rate seems to impact the three leverages strongly. For instance, in the second sub-period, a unit increase in inflation rate caused a significant decline of LEV1 and LEV2 by 1,27 and 3,84, respectively, While LEV3 significantly increased by 2,06. In all regression results of the first sub-period period, the impact of interest rate and exchange rate on three leverages is very positive, indicating that an increased exchange rate and interest rate increased the banks' indebtedness before the financial crisis. While after the crisis period, banks' total and long-term debts significantly decreased with the increase in interest rate. Also, in the first sub-period, the unemployment rate negatively and substantially affects LEV1 and LEV3, while in the second sub-period, the variable positively affects these two leverages.

Based on the findings of the analysis made to investigate the effect of the selected determinants on the debt level of banks, the result of some variables is like the developed hypotheses or expected results. In this study, the null hypotheses that predict a negative effect of profitability, liquidity, and the real GDP growth rate on the leverage are accepted. In contrast, the hypotheses that predict a negative impact on net interest margin and interest

rate are rejected. On the other hand, the hypotheses that estimate a positive effect of bank size, growth opportunity, unemployment rate, and exchange rate on leverage are accepted. In contrast, the hypotheses that assume the positive impact of the inflation rate and asset tangibility on debt level are rejected.

Most of the study's findings are consistent with the prediction of the pecking order theory. Even though the results of this study support the pecking order theory, the theory does not precisely explain the relationship between some variables and capital structure. According to Köksal and Orman (2015: 30), the major limitation of the pecking order theory over the trade-off theory is that it does not produce a prediction about the association of corporate debt tax shields, inflation, and non-debt tax shields with leverage. The findings of this study also indicate that neither pecking order nor trade-off theory can exactly match the relationship between leverage and some macroeconomic factors.

5. Conclusion

This study aims to determine the bank-specific and macroeconomic factors that affect the capital structure of banks in Turkey from 2003 to 2017. Apart from this, to analyse whether the 2008 global financial crisis affected the capital structure of banks or not, the full-time span is broken into two sub-periods. The first sub-division runs from 2003 to 2008, and the second runs from 2009 to 2017.

The findings show that the effect of bank size, growth opportunity, interest rate, and exchange rate on the three leverages is positive, while the impact of profitability is negative. Tangibility, net interest margin, and liquidity negatively affect the total and short-term debts; however, it does not affect long-term debts. On the contrary, inflation and real GDP growth positively impact the total and short-term liabilities. The effect of the unemployment rate on long-term liabilities is significantly negative, whereas, on short-term liabilities, the effect is positive.

When breaking the entire period into two sub-periods, the results show that except for the short-term debts of the second sub-period, the effect of real GDP growth rate, profitability and the inflation rate is significant on all leverages of the two sub-periods. Instead, bank size has a positive impact on all leverages. The effect of interest rate is significantly positive on the three leverages of the first sub-period. At the same time, in the second-sub period, it greatly affects the total and long-term debts. The association between the unemployment rate and total and short-term debts are extremely negative only in the first sub-period. The findings of this study indicate that the association between leverages and the majority of the explanatory variables are consistent with pecking order expectations. However, since this theory does not generate a prediction for the association between debt level and some of the explanatory variables used in this study, it does not precisely match all of the observed relationships between leverages and some of the selected variables. The findings of this study have significant implications, especially for bank managers who

should consider both macro and microeconomic factors when making decisions related to financing.

Even though this study tried to determine the factors that affect banks' capital structure of banks, it fails to show the impact of the factors on market-based leverage, which is assumed to be forward-looking. The other limitation of the study is that it does not provide whether the ownership structure of banks affects the capital structure, and factors related to risk and taxes such as non-debt tax shields, corporate debt tax shields, and asset quality are not observed. Therefore, it would be important to include such factors in future studies.

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