



NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF BANKING AND FINANCE
BANKING AND ACCOUNTING PROGRAM

**DETERMINANTS OF CAPITAL STRUCTURE:
EVIDENCE FROM NON-FINANCIAL FIRMS IN TURKEY**

ZNAR AHMED

MASTER'S THESIS

NICOSIA
2019

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NICOSIA
2019

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DEDICATED TO

My Parents

ABSTRACT

DETERMINANTS OF CAPITAL STRUCTURE: EVIDENCE FROM NON-FINANCIAL FIRMS IN TURKEY

The subject of corporations' funding decisions is one of the most important and most discussed issues of research in corporate finance. Funding decisions are the way that the capital of a firm is structured through equity or debt or a combination of both debt and equity. Companies tend to fund their activities and assets with external sources by issuing debt and equity. This combination could be with various levels of debt and equity in the structure which is known as the leverage ratio. Capital structure with a high level of debt is known to be highly levered and vice versa. There are numerous factors on corporation level and country level that can determine the capital structure and they are explained by several theories such as trade-off theory, pecking order theory and agency theory.

This study is an empirical investigation which aims to identify the factors determining the capital structure of non-financial firms listed on Borsa Istanbul in Turkey during the period 2002 - 2017. We consider several firm-level factors and investigate their impacts on the capital structure of our sample firm. Using an explanatory research design, this research attempts to achieve its objective. Two different techniques of multiple linear regressions, pooled Least Square and Fixed-effect model, are performed to analyse the sample data. Additionally, related and necessary diagnostic checks are performed to investigate the reliability of the results.

The results indicate that there are several factors that can well determine the variations in the capital structure of non-financial firms listed on BIST in Turkey. We found evidence that tangibility, profitability, size, and liquidity are the most important factors which can determine the financing policy of those firms, in addition to the one period lagged value of leverage ratios. Conversely, we failed to find support for the relationships of capital structure with each of growth and risk.

Keywords: Capital structure, growth, tangibility, profitability, size, liquidity, risk, developing country.

ÖZ

SERMAYE YAPISININ BELİRLENMESİ: TÜRKİYE'DE FİNANSAL OLMAYAN FİRMALARDAN OLGUN

Şirketlerin fonlama kararları konusu, kurumsal finans alanında araştırmaların en önemli ve en çok tartışılan konularından biridir. Finansman kararları, bir firmanın sermayesinin, sermaye veya borç veya hem borç hem de özsermaye kombinasyonu ile yapılandırılmasıdır. Şirketler, borçlarını ve öz kaynaklarını vererek faaliyetlerini ve varlıklarını dış kaynaklarla fonlama eğilimindedir. Bu kombinasyon, kaldıraç oranı olarak bilinen yapıdaki çeşitli borç ve özsermaye seviyelerinde olabilir. Borç seviyesinin yüksek olduğu sermaye yapısının oldukça yüksek olduğu ve bunun tersi olduğu bilinmektedir. Şirket düzeyinde ve ülke düzeyinde, sermaye yapısını belirleyebilecek çok sayıda faktör vardır ve bunlar, takas teorisi, gagalama düzeni teorisi ve ajans teorisi gibi birkaç teori ile açıklanmaktadır.

Bu çalışma, 2002 - 2017 döneminde Borsa İstanbul'da listelenen finansal olmayan firmaların sermaye yapısını belirleyen faktörleri belirlemeye yönelik ampirik bir araştırmadır. Şirket düzeyinde bazı faktörleri göz önünde bulundurarak sermaye üzerindeki etkilerini incelemekteyiz. Örnek firmamızın yapısı. Açıklayıcı bir araştırma tasarımı kullanarak, bu araştırma amacına ulaşmaya çalışır. Örneklem verilerini analiz etmek için iki farklı çoklu regresyon tekniği, havuzlanmış en küçük kareler ve sabit efektli model uygulanmaktadır. Ek olarak, sonuçların güvenilirliğini araştırmak için ilgili ve gerekli teşhis kontrolleri yapılır.

Sonuçlar, Türkiye'de BIST'te listelenen finansal olmayan firmaların sermaye yapısındaki farklılıkları iyi bir şekilde belirleyebilecek çeşitli faktörlerin olduğunu göstermektedir. Kaldıraç oranlarının düşük olan bir döneme ek olarak, somutluk, kârlılık, büyüklük ve likiditenin bu firmaların finansman politikasını belirleyebilecek en önemli faktörler olduğuna dair kanıtlar bulduk. Tersine, sermaye yapısının her bir büyüme ve risk ile olan ilişkilerine destek bulamadık.

Anahtar Kelimeler: Sermaye yapısı, büyüme, somutluk, karlılık, büyüklük, likidite, risk, gelişmekte olan ülke.

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ABBREVIATIONS

BIST	Borsa Istanbul in Turkey
MM	Modigliani and Miller
TOT	Trade-off theory
POT	Pecking order theory
MTT	Market timing theory
GDP	Gross domestic product
LS	Least square
FE	Fixed effect
RE	Random effect
GTA	Change in total assets
CE	Capital expenditure
TA	Total assets
RD	Research and development
S	Sales
ROA	Return of assets
ROE	Return of equity
TDR	Total debt ratio
LDR	Long debt ratio
CS	Capital structure
GRO	Growth opportunities
TAN	Tangibility
PRO	Profitability
SIZ	Firm size
LIQ	Liquidity
RSK	Volatility (FIRM RISK)
LLC	Levin, Lin, and Chu
ADF	Augmented Dickey–fuller
PP	Phillips–perron
SD	Standard deviation
Obs.	Observations

CHAPTER 1

INTRODUCTION

After developing the contemporary philosophical theory of Modigliani and Miller (MM) in 1958 concerning the relationship between the cost of capital and the theory of investment and financing of the company, the financial thought entered in a debate and a scientific dispute that still survives among the financial theorists. This theoretical shift of financial thought has turned into several paradigms. One trend strongly supports those ideas whereas another one rejects those ideas and builds the relationship between the variables that affect the value of the company. A third stream discusses the issue from the point of view of the strategic objective of the business company, which is to maximize the market value of the company and the type of factors and determinants that affect it.

The decision to fund the activities of the company is one of the most important and most discussed subjects of research. Since the emergence of the famous study of MM almost seven decades ago claiming that capital structure has no effect on the company's value, theories about the capital structure and the factors influencing the decision to finance the company began to emerge. Such theories are trade-off theory (TOT), pecking order theory (POT) and market timing theory (MTT). TOT relies on factors such as bankruptcy costs, agency costs, tax shields, and other theories (Myers, 1977). The POT relies on the heterogeneity of information between the company and investors (Myers and Majluf, 1984). However, MTT depends on the timing at which the company needs financing, and the conditions prevailing at that time (Baker and Wurgler, 2002). These theories have been examined in numerous studies to explicate the funding decision, and their outcomes were dissimilar. This, therefore, resulted in little consensus and

much disagreement on how a company chooses its capital structure. There are still many differences between theory and practice which need further understanding.

This situation created a kind of multiple interpretations of the funding decision. The many factors that affect the company and its managers make it difficult to identify one factor that is responsible for interpreting the funding decision. What makes interpretation more difficult is the role of heterogeneity in information between managers and investors in influencing the financing decision. This gap in financial literature is seen as the underlying truth behind the divergence in the funding decision.

Turkey is a developing country with a rapidly growing financial market. Borsa Istanbul is the only exchange market in the country and represents the overall financial market for it. Market Capitalization of Turkey was 28.3 % of its Nominal GDP in the last month of 2017, whereas this rate was 23.5 % in 2016. Market capitalization to nominal GDP reached an all-time low of 14.8% in December 1998 and a record high of 57.0% in December 1999 (CEIC, 2019). The number of companies listed on the Turkey stock market has doubled in the last two decades. Over 400 companies are listed in 2018 while this number was under 250 firms in 1997 (The global economy, 2019). That number illustrates the development of the Turkish stock market and the size of the economy over that period. The higher the number of listed companies in a country, the more equity and debt financing is used for their operations.

Koksal and Orman (2015) found that many of the factors influencing the capital structure of developed countries were not statistically significant in explaining the financing decision of the less advanced countries. The data of a sample of companies listed on the Borsa Istanbul were analysed, taking into account the specificity of the non-financial sectors. The data were collected from DataStream data source of Thomson Reuters. Using the panel regression method during the period of 2002-20017, the study attempts to identify the most important determinants affecting the capital structure of non-financial companies on Borsa Istanbul as Turkey is one of the developing countries.

1.1. Research problem:

The specialized scientific references in financial studies indicate that the capital structure, determination and amount of capital in a company, is influenced by a variety of factors whose degree of influence varies from one company to another, from time to time, from sector to sector, and from country to country. This group of factors has different effects on the size and composition of the capital structure; these companies operate in spite of their varying degree of influence.

Based on the above statement, we can formulate the main problem as “What factors affect the capital structure of non-financial firms listed on Borsa Istanbul in Turkey?” Then, this problem is divided by the following partial questions:

Can the factors influencing the composition of the capital structure to be considered to largely reflect the nature of the whole non-financial sectors in Turkey?

Is there a similarity or difference in the parameters of the financing policy for non-financial institutions in Turkey, compared with those in the economic environments of developing countries?

Do the grounded theories of the capital structure capable, through the characteristics imposed by them, to interpret the policy or financing behavior in the case of Turkish non-financial institutions?

1.2. Research hypotheses:

Assume that the determining factors in the composition of the financial structure do not reflect the nature of the whole non-financial sectors in Turkey.

There are similarities in the specific factors of the financial policy for non-financial institutions in Turkey, compared with those in the economic environments of developing countries.

This hypothesis is based on predicting the relationship between the measures of the dependent variable and the independent variables. This hypothesis can be divided into the following sub-hypotheses:

Hypothesis 1: A statistically significant correlation between capital structure and firm's growth rate is expected.

Hypothesis 2: A statistically significant correlation between capital structure and tangibility is expected.

Hypothesis 3: It is expected that there is a statistically significant relationship between capital structure and profitability.

Hypothesis 4: A statistically significant correlation between capital structure and firm size is expected

Hypothesis 5: A statistically significant relationship between capital structure and the level of risk is expected.

Hypothesis 6: A statistically significant relationship between capital structure and liquidity ratio is expected.

1.3. Research objectives:

This study mainly aims to identify the factors affecting the capital structure of non-financial firms listed on Borsa Istanbul in Turkey during the period 2002 - 2017. In order to determine the extent to which the results of the studies identified many factors that affect the capital structure of companies operating in developed countries.

In light of the research problem and the nature of the specific questions raised, the objectives of this study can be more defined in details as follows:

1. Determine the impact of specific factors on the composition of the capital structure of the institution and its financial position.
2. Know and distinguish between all theories that are interpreted, supported and lead to an optimal financial structure.
3. Try to find out the extent to which the theoretical side of the study matches the practical reality in the field.

1.4. Significance of study:

Many studies conducted to test theories of the capital structure were based on information from developed countries. The importance of this study is that it is trying to narrow the gap between theory and practice in a developing country such as Turkey by analysing the funding decision for non-financial firms listed on Borsa Istanbul based on information from the reality of these companies. The results of this study are a modest scientific addition to a series of studies conducted in developed countries. It also sheds light on one of the most important topics for researchers. It is commonly thought that the decision to finance the company is one of the most important decisions that the management of the company can make continuously and concurrently to achieve success and expansion for the firm. According to Oztekin (2015), the capital structure is one of the most important financing topics.

1.5. Limitations of the study

Consistent with any other studies, this research may have some limitations. The limitation of this research is the degree of generalisability. Since we concentrate on a single developing country, Turkey, we might not be able to simply generalise our results to another developing country because different countries can have dissimilar aspects concerning the cultural, regulatory, financial, economic, political, etc. conditions. Based on this limitation, we can recommend future studies to expand the sample studies by including more developing countries in order to robust the findings. In addition, we excluded financial firms listed on the Borsa Istanbul because of their different regulations and policies. One could also consider the capital structure of firms in that sector in order to be able to compare the results between financial and non-financial firms. Basically, financial firms and their competitors tend to have a high rate of debt since they normally borrow from savers and lend to investors.

The remainder of the study is ordered as follows: in Chapter 2, a theoretical background will be discussed about the subjects along with reviewing the most related and contemporary empirical studies on the factors determining capital structure; Chapter 3 develops the methodology through describing the data and the variables along with introducing the empirical model; Chapter 4 presents the results of several regression models such as pooled LS, FE and RE. It also performs some other analysis techniques for the purpose of robustness. Then, a discussion of the policy implication is made, and the discussions and recommendations follow in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

The subject of the capital structure is one of the most central topics that have received the attention of scientific researchers in the field of financial management. As the decision making centre, a company is based on a number of distinct financial decisions which have a diversity of financing sources that require a differentiation between them. It is the accountability of the finance manager to choose the appropriate sources of financing taking into consideration the required rate of return and the associated risk in forming an optimal financial structure which explains the financing behaviour. In order to be adopted, the company takes many considerations and factors that determine the funding policy. Nevertheless, there is no agreement on a specific theory which seeks to raise questions in this regard, especially upon the optimal capital structure.

It is the responsibility of the financial manager to choose the optimal combination of the institution that allows for higher profitability and less risk. This combination is called capital structure or financial structure. Additionally, the extent of the use of available funding sources to them is the financial manager's responsibility. This is to ensure the formation of wealth and increase the rate of growth and thus increase the value of the company in general.

In this chapter, we will discuss the notion of capital structure and the theories that explicate and support the existence of an optimal capital structure and how to indicate it and identify the main factors that determine the funding policy. Moreover, the second section of the chapter presents and discuss the

most contemporary and relevant previous empirical studies that dealt with the subject of determinants of the capital structure.

2.1. The concept of capital structure

In this section, we are going to theoretically discourse the concept of capital structure and its components, which are the main sources discussed by firms. Moreover, we are going to discuss how to choose an optimal financial structure in a firm. There are a number of definitions for capital structure, including the following:

The Random House Webster's Dictionary (2001) of the English characterizes the word "structure" as a method of construction of development or association or course of action of parts, components or constituents, a pyramidal construction; anything made out of parts masterminded together here and there and association; the arrangement of relations between the constituent gatherings of society; to give a structure association or the board to, build an orderly system for. Basically, the word structure is a term utilized in the art of designing. In the event of the development of a structure, there are some standard extents in which different components are incorporated together.

The idea of capital is seen differently. Capital structure is characterized in two different ways. As per a few creators capital structure alludes to the connection between the long haul obligations and value. At the end of the day, it contemplates just the long-haul wellsprings of capital. It incorporates momentary capital from its domain. Actuality, the controller of capital issues fixed a rule for the capital structure of organizations basing on the connection between long-run obligation and value. Then again some trust that capital structure alludes to the relationship among all wellsprings of capital. They would prefer not to recognize long run and transient sources. It is believed that capital structure is synonymous with all-out capital this term alludes to the make up the credit side of cases among exchange loan bosses, bank lenders, bondholders and so forth (Arnold, 2007).

Capital structure is the composition of the issuance of which a company acquired funds to finance its investments. It includes all elements comprising liabilities and equity from the balance sheet, which includes short-term debt (current liabilities), long-term debt (long-term liabilities) and equity (Brealey et al., 2012).

Additionally, the concept of capital structure is associated to how the total assets of a firm, the left side of the balance sheet, are financed by a mixture of loans or equity or solely one of the two main sources (Ross et al., 2008).

Capital structure is further defined as involving all methods of financing, whether property money, borrowed funds, short-term or long-term funds, pointing to the left side of the balance sheet (Damodaran, 1996). The concept of capital structure and other similar concepts can be distinguished.

A combination of debt and equity creates a conflict of interest between the owners of a company and the management team. The procedure of preference between sources of internal and external finance varies between different perspectives of management and shareholders. The management mostly prefers external financing because it is less expensive and enjoys tax advantages that increase profits. However, from the point of view of the shareholders, access to finance through the issuance of ordinary shares gives the company high flexibility and avoid the restrictions imposed by the creditors. There could be opposition from regular shareholders to the belief that an increase in the number of shareholders would weaken their earnings. Here, the difficult task of a financial manager is to balance return, risk, cost, sustainability and wealth maximization.

Therefore, the policy of capital structure includes a balance between risk and return. The use of more loans as a source of financing increases the risk to shareholders and is often accompanied by a high expectation of a return on equity and a high degree of risk, which reduces the value of the shares.

Capital structure is different from the financial structure so that it is part of the structure of the institution's money and is the permanent financing which usually consists of long-term loans and equity, including preferred shares if

any. However, financing structure means the identification of the appropriate mix of property debt that is determining the structure of funding policy for the firm, debt plus equity.

The various forms of capital structures have been linked to the degree of financial leverage, with the purpose of special advantages for insurance companies if they are made in return for assets higher than the cost of borrowing. In order to attain this, the company needs to develop its financial and investment policies in line with its position and nature. This, therefore, can maximize the shareholders' wealth and increase the value of the company in the financial market. Additionally, the identification of a range of risks to which the greater the dependence of the company on the sources of self-funding, the less these risks and increase the risks if they rely on external sources (creditors).

To achieve this, the company needs to develop its financial and investment policies in line with its position and nature in a way that it can maximize the shareholders' wealth, increase the value of the company in the financial market and identify a range of risks to which it is exposed. The more the company relies on self-financing sources, the lower these risks whereas the greater the risks if they rely on external sources of financing (Abdulfatah, 2014).

2.2. The funding sources of capital structure

Financing sources are the funding flow that a company obtains for the purpose of investment from various sources in different forms such as long-term and short-term. This combination of funding sources is called capital structure. The capital structure consists of borrowing or equity or a combination of both. The percentage of this combination could vary between from firm to firm or firm time to time for the same company according to the financial policy that firm follow. Figure 2.1 presents capital structure elements in details.

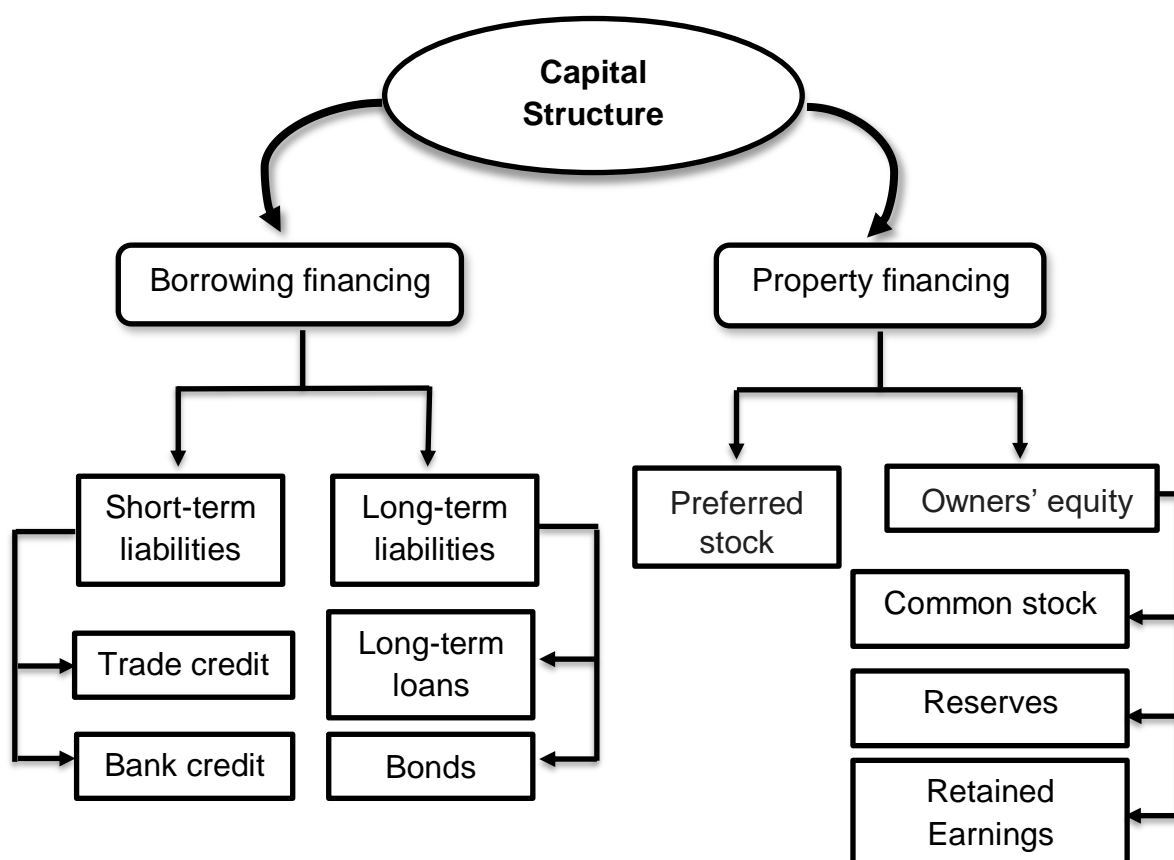


FIGURE 2.1

Available funding sources for a firm

(Source: Nuaimi and Khrsha 2007)

2.2.1. Borrowing financing

This part of capital is debt and creates a liability for the firm to pay off at the end of the arranged period. Liabilities can be either in the form of short-term or long-term debts.

Short-term borrowing represents funds received by a company from third parties and is obligated to repay them within a period not exceeding one

calendar year. Short-term debts are used to finance temporary financial requirements in current assets. This term of funding is therefore divided into two main types, trade credit, and bank credit. First, trade credit is defined as a short-term credit given by the supplier to the buyer when the latter buys goods for resale. This definition is excluded from commercial credit, medium-term or long-term credit granted by fixed asset vendors; and consumer credit such as installment sales. Second, bank credit means short-term debts obtained by the company from banks. This type comes in the second row after commercial credit in terms of the degree of dependence on the institution as a source of short-term financing. Moreover, this kind of debt is less expensive than commercial credit.

On the other hand, long-term borrowing represents funds received by a firm from third parties and is obligated to repay them within a period exceeding one calendar year. Long-term debts are used to finance long-run financial investments in fixed assets. Modern institutions seek to provide financial resources from multiple sources in different forms according to the prevailing conditions in the financial markets and the direction of their administrations. The purpose here is either to bear risks or avoid them. Long-term borrowing is one of the main sources of financing for institutions. They are mainly long-term debts and bonds.

A company obtains long-term debts from financial institutions and insurance companies such as banks. These debts are obtained through direct negotiation for the transfer of funds from the lender to the borrower in accordance with the terms specified in their contract. Interest is paid periodically, and the loan is amortized in equal installments on certain dates or once at the agreed maturity date. The most important characteristics of debt are the interest rate, due date, mortgages, and the use of the debt.

Bonds are long-term borrowing issued by the borrowing firm that gives its holder the right to receive the face value of the bond on the maturity date and gives it the right to an annual interest rate which represents the percentage of the face value. In other words, it gives the bondholder an opportunity to make

capital gains and may also be exposed to capital losses. Its market value is determined by the degree of risk to which the bondholder is exposed.

2.2.2. Property financing

The second element of corporations' capital is shareholders' equity. Equity shows the portion of a business which is owned by its shareholders. Equity funds are the primary source of financing for new enterprises and it is also considered as one of the basic funding for existing institutions. We will address the most important components of this source which are represented by preferred shares, common shares, and retained earnings.

Preferred share is a title deed and it is considered as an important source of long-term funding for the company. It is also characterized by combining equity and borrowing properties. In addition, it is a form of capital invested in the company and an excellent position towards stocks. The book value of this share is calculated by dividing the total capital generated by preferred shares by the number of preferred shares.

In addition to preferred shares, owners' equity creates a significant portion of the capital of a firm which is financed through shareholders' properties. This element consists of common stocks, reserves, and retained earnings. Common stocks are shares that do not have any priorities or special precedents, whether in the declaration of dividends or in circumstances of bankruptcy and liquidation. These shares are the foundation of the company's goal of valuing them in the stock markets. It also represents the capital provided by the owners when the foundation is established.

Reserves are another element of owner's equity. These funds are collected by the company and deducted from recognised and undistributed profits within a particular year or cumulated from the undistributed profits of several fiscal years. Reserves of any kind are net undisclosed profits recorded in a special account which is the reserve account. Therefore, they are considered

to be the rights of the owners of the firm. There are three main types of reserves which are legal reserves, optional reserves, and systemic reserves.

Moreover, retained earnings are another important portion of owners' equity for institutions. Profits represent an important internal source used to finance the institution's long-term financial requirements. It also represents the portion of the profits retained within the enterprise for the purpose of reinvestment. Retained earnings are used in the case of institutions with financial problems when a firm wishes to reduce their debts or institutions facing volatile economic conditions. The most important advantages of retaining profits are their associated costs are low compared to other sources of financing and they positively affect the book value of shares.

2.3. Theories to explain capital structure

Regarding the determinants of leverage at firm-specific, there are several key theoretical approaches that are particularly important: the trade-off theory, the pecking order theory, the agency theory and the MM irrelevance theory. These propose several expectations concerning firm-level and country-level factors influencing the leverage of firms.

Based on the trade-off theory, capital structure policy can be determined through a process of trade-off between the costs and benefits of debt (Kraus and Litzenberger, 1973). According to Myers (1977) and Jensen (1986), typical opinions for this theory are based on tax benefits, bankruptcy costs, and agency costs with regard to replacement of asset and overinvestment. Each company has a target debt ratio for value maximizing purpose and attempts to achieve. Consequently, even though a rise in leverage can ease the agency costs of equity, it might deteriorate the conflict between shareholders and bondholders (Drobetz et al, 2013).

One vital motivation of the theory is to clarify the way that firms normally are financed partially with debt and partially with equity. It expresses that there is

a bit of benefit to financing with debt. This benefit comes from the tax reductions of debt. Additionally, there is a cost of financing with debt. Those costs are in the form of financial distress which includes bankruptcy cost of debt and non-liquidation costs. The minor advantage of further increments in debt decays as debt increments, while the minimum cost increments, thus a company that is optimizing its general value will concentrate on this exchange off when selecting how much equity and debt to use for financing.

The pecking order theory maintains that the costs of adverse selection regarding the issuance of securities with high risk would result in a preferred position over financing sources through producing a segment between the costs of external and internal financing and through the rise of the difficulty in securities' issuance (Myers, 1984; Myers and Majluf, 1984). In order to reduce the costs related to adverse selection, companies tend to firstly use available internal funds, debt in the second place, and lastly rely on equity issuance (Gungoraydinoglu and Öztekin, 2011). According to pecking order theory, there is no target capital structure. Based on the assumptions of the pecking order theory, there exists the information asymmetry because users of financial and accounting information from outside the firm possess less information than firm insiders (Chakroborty, 2010). This theory gives a hierarchical order to the firm's financing sources based on the degree they are influenced by asymmetric information. Consequently, companies prefer to utilize internally generated funds in the first place. In the case if external funds are needed, debt is preferred to be issued over equity (Drobetz et al, 2013).

In the context of the pecking order theory, internal financing flows directly from the firm and minimizes asymmetric information. Contrary external financing such as debt and equity financing where the firm is required to incur fees to issue external financing, internal financing is the least expensive and most convenient source of financing.

Alternatively, when a firm finances an asset through external financing, a greater return is required because investors and creditors own less information about the firm than managers of the firm. In terms of external

financing, managers give priority to debt over equity in financing the assets because the cost of debt is lower than the cost of equity.

The debt issuance sends a signal of the existence of an undervalued stock and confidence that the managers believe the investment is profitable. Conversely, the equity issuance signals an overvalued stock and that the management is seeking raise financing by diluting shares in the company.

According to the pecking order theory, it is useful to consider the seniority of claims to assets. Debt holders prefer a lower return than stockholders because they are entitled a higher claim to assets in the circumstance of bankruptcy. Thus, when considering sources of financing, the least expensive source is through retained earnings, then through debt, and finally through equity.

From the perspective of the agency theory, there exist both agency benefits and agency costs of the level of debt in capital structure. According to the arguments of the theory, the agency costs of debt come from the conflicts between shareholders and creditors. It is thought that shareholders of a financially distressed company can possibly take advantage of investing the standing debt in more risky projects. The theory claims that financing through debt can brings about agency benefits because this does not decrease the portions of shareholders as the equity issuance does (Jensen and Meckling, 1976). Myers (1977) approves that there exists an agency cost of debt; however, he stresses the under-investment issue which leverages brings about. Therefore, firms might be discouraged to invest in a project that could possibly increase firm value. Alternatively, a new perspective is provided by Jensen (1986) stating that leverage decreases the inefficient investment through absorbing the additional cash flow. This brand new standpoint is known as “free cash flow hypothesis”. It assumes that when a company owns huge spare free cash flows, the managers can use the cash in unprofitable investments for some purposes such as higher compensation, promotion and prestige. Here, debt can be used to tight the free cash flow in firms since a regular payment of interest is needed to be made to debt holders. According

to agency theory, the optimal leverage is the point where the total marginal cost of the debt exactly compensates the total marginal benefit of debt.

Additionally, the MM irrelevance theory of capital structure has vital contribution to the literature, and it is still working after several decades from its appearance. The Modigliani and Miller way to deal with capital hypothesis, concocted during the 1950s, advocates the capital structure irrelevancy hypothesis. This proposes the valuation of a firm is irrelevant to the capital structure of an organization. Regardless of whether a firm is profoundly utilized or has a lower obligation segment makes little difference to its reasonable worth. Rather, the market estimation of a firm is exclusively subject to the working benefits of the organization.

The Modigliani–Miller hypothesis is a persuasive component of monetary hypothesis; it shapes the reason for present day thinking on capital structure. The fundamental hypothesis expresses that in a market without taxes, bankruptcy costs, agency costs, and information asymmetry, and in a perfect market, the estimation of a firm is unaffected by how that firm is financed (Modigliani and Miller, 1958). Since the estimation of the firm depends neither on its profit strategy nor its choice to raise capital by issuing stock or selling obligation, the MM hypothesis is regularly called the capital structure superfluity guideline.

The key Modigliani-Miller hypothesis was created in a world without taxes. Nevertheless, if we move to a reality where there are charges, when the interest on debt is tax-deductible, and overlooking different contacts, the estimation of the organization increments in extent to the measure of obligation utilized (Modigliani and Miller, 1963). What's more, the wellspring of extra esteem is because of the measure of expenses spared by issuing obligation rather than value.

The capital structure of an organization is the manner in which an organization funds its benefits. An organization can fund its activities by either value or various mixes of obligation and value. The capital structure of an organization can have a lion's share of the obligation part or a dominant part of value, or an even blend of both obligation and value. Each

methodology has its very own arrangement of focal points and hindrances. There are different capital structure hypotheses that endeavour to set up a connection between the money related influence of an organization (the extent of obligation in the organization's capital structure) with its reasonable worth. One such methodology is the Modigliani and Miller Approach.

2.4. Optimal capital structure

An ideal capital structure is the impartially best blend of tax, preferred stock, and common stock that expands an organization's worth in the market while limiting its expense of capital. Theoretically, debt financing offers the most minimal expense of capital because of its tax deductibility. Nonetheless, a lot of debt expands the monetary hazard to investors and the arrival on value that they require. Therefore, organizations need to locate the ideal time when the minimal advantage of debt approaches the minor expense. As indicated by market analysts Modigliani and Miller, without tax, bankruptcy costs, agency costs, and information asymmetry. In a perfect market, the estimation of a firm is unaffected by its capital structure.

The optimal capital structure is evaluated by computing the blend of obligation and value that limits the weighted average cost of capital (WACC) while expanding its value in the market. The lower the expense of capital, the more prominent the present estimation of the association's future money streams, limited by the WACC. Consequently, the main objective of any corporate account office ought to be to locate the ideal capital structure that will result in the most reduced WACC and the greatest estimation of the organization.

This MM theory expresses that in efficient markets the capital structure that an organization employs doesn't make a difference on the grounds that the market estimation of a firm is controlled by its winning force and the risk of its fundamental resources. As per Modigliani and Miller, firm value is independent of the strategy for financing utilized and an organization's speculations. The MM hypothesis made two propositions: first proposition

says that the capital structure is insignificant to the value of a firm. The value of two indistinguishable firms would continue as before and value would not be influenced by the decision of fund embraced to finance the assets. The value of a firm is reliant on the anticipated future earnings. This occurs when there are no taxes. Second proposition says that the financial leverage supports the value of a firm and lessens WACC. This occurs when information related to tax is accessible (Modigliani and Miller, 1958).

Moreover, the pecking order theory focuses on the cost of asymmetric information. This approach assumes that firms order their financing plan according to the path of least resistance. Internal financing is the first preferred method, followed by debt and external equity financing as a last resort (Myers and Majluf, 1984).

The cost of equity is thought to be more expensive than cost of debt to compensate for the extra risk berried. The desired return required to reward investors in debt is smaller compare to the desired return required to reward investors in equity. This is might be because the payment of interest has priority over cash distributions to shareholders, and the priority is given to the debt holders in the circumstances of bankruptcy. Moreover, another reason to make debt cheaper than equity is because firms receive tax reduction on interest paid to debt holders, whereas cash distribution in the form of dividend is a taxable item.

However, a limit exists to the debt quantity that a firm can borrow to financing its assets since an excessive debt quantity can surge payments of interest, earnings volatility and bankruptcy risk. This surge in the financial volatility to shareholders can provide a sign that they will desire a larger quantity of return to reward them, which rises the WACC and lowers the business value in the market. The optimal structure of capital includes enough dependency on equity to minimize the risk of not being able to delete off the debt taking into consideration the inconsistency of the cash flow of the business.

2.5. The determinants of capital structure

This section illustrates a brief discussion of illuminating characteristics as a proxy for the factors that determine the combination of debt and equity in a firm. Those characteristics are represented growth opportunities, tangibility, firm size, liquidity, volatility and profitability of the firm. We discuss these indicators and determinants below followed by the findings of the prior studies which are organized according to the determining factors of their research:

2.5.1. Growth opportunities

It is contended that firms who control its equity will in general contribute not well to dispossess wealth from the company's bondholders. The associated cost with this agency connection is probably going to be greater for companies in developing sectors, which possess greater adaptability in their future investment decisions. Projected future development should accordingly be adversely identified with the levels of long-term debt. Nevertheless, Myers (1977) noticed that this agency issue is relieved if the company problems short-term debt instead of long-term. This proposes short-term debt proportions may really be directly associated with the rates of growth if growing companies alter to long-term financing from short-term financing. Gillet and de La Bruslerie (2010) and Green (1984) contended that the agency costs will be decreased when companies sell transformable debt. This recommends transformable debt proportions might be directly associated with the opportunities of growth.

Likewise, it ought to be noticed that growth opportunities are capital resources that increase the value of a firm yet could not be collateralized and cannot create current income which are taxable. Consequently, the contentions set forth in the past subsections likewise recommend a negative connection among growth opportunities and debt. The growth indicators consist of the growth rate in total assets estimated by the change in total assets (GTA) and capital expenditure over total assets (CE/TA). Companies normally participate in innovative work through research and development

expenses to produce more investment. Thus, research and development over sales (RD/S) additionally play an indicator role in the characteristics of growth.

The association between capital structure and firm's growth has been observed in the present literature (see, for instance, Kara and Erdur, 2015; Cevheroglu-Acar, 2018). Nonetheless, there exist different theories to explain the direction of this relationship. Furthermore, using different measures of capital structure can affect the extent of this association. For instance, a negative relationship is expected between leverage and growth based on agency theory. The theory argues that companies with great opportunities of growth have a tendency to maintain financial elasticity for the purpose of being able to increase borrowing in consequent years (La Rocca et al., 2009; Myers, 1977).

In addition, there are a number of other justifications for the relationship between capital structure and the opportunities for growth in the literature. First, when there are great opportunities for a firm to grow, the agency costs of free cash flow tend to be lower (Jensen, 1986). Second, Harris and Raviv (1991) state that firms whose growth opportunities are high are unlikely to finance their projects mainly through debt because the financial distress is relatively high in those circumstances, and the value of intangible assets would dramatically drop in the situation of bankruptcy. Finally, the asset substitution issue is especially increasingly pertinent for companies with higher growth opportunities compared to other firms with lower opportunities of growth. Consequently, this encourages lenders to impose greater financing cost. This implies that companies with high growth opportunities borrow smaller debts.

Nonetheless, the pecking order theory grounds that leverage and growth opportunities can be positively correlated. The favoured method for diminishing asymmetric information cost is through financing assets (Myers, 1984). Especially, firms would firstly incline toward utilizing retained earnings, debt with low risk comes second, and then debt with high risk, and new equity is issued as the last resource. It pursues, at that point, that when an

organization is given great opportunities of speculation however needs cash flow from interior. The primary choice is debt for financing developments in that firm. Therefore, high level of debt would be the outcome in such organizations. At last, as organizations with larger opportunities of growth produce more asymmetric information, they observe that high leverage is a type of signalling their investments' quality.

Moreover, the trade-off theory can also explain the relationship between leverage and growth. From this approach, those firms may face large financial distress costs that have potential growth opportunities because growth opportunities can present the issues of moral hazard which push the organization to be more on the side of risk takers (Baskin, 1989). This, in turn, leads the relationship between leverage and growth opportunities to be an inverse one. The hypothesis of pecking order infers that the firm development may cause exhaustion of the internal cash flows, and therefore the absence of financing encourages the organizations into discovering external financing sources (Michaelas et al., 1999). To conclude, the impact of growth opportunities on the financing policy (capital structure) is also contradicting.

2.5.2. Tangibility

The theories behind capital structure mostly claim that the kind of assets possessed by a company somehow influences its decision of capital structure. It is stated by Titman and Wessels (1988) that the ratios of inventory plus gross plant plus equipment to total assets and intangible assets to total assets are also included in the assets. A negative association there exists between leverage and intangibility whereas the relationship between leverage and tangibility is positive. The positive association can be explained by the trade-off theory and agency theory. Higher warranty value is basically provided by tangible assets compare to intangible assets. This implies that tangible assets might support greater level of leverage. Therefore, these kinds of assets can decrease the financial distress costs. A

positive relationship between leverage and tangibility is found by many previous works (for example, Akgul and Sigali, 2018; Acaravci, 2014; Bevan and Danbolt, 2002; Chen, 2004; Koralun-Bereznicka, 2018; Wahab et al., 2012). However, the negative relationship can be explained by the pecking order theory of capital structure. There also exists empirical evidence to support this (see, for instance, Baltacı and Ayaydın, 2014, Serghiescu and Vaidean, 2014; Mugosa, 2015)

The two theories of trade-off and agency suggest, on the other hand, a positive relationship between leverage and capital structure. Warranty for debt can be seen as one advantages of using tangible assets. Firms are encouraging to attain finance form external easily if it owns a high portion of tangible assets. This would, in turn, lead to increase the level of leverage in the firm (Sbeti and Moosa, 2012). In addition, asset's tangibility is closely related to the costs of financial funds and agency cost of debt (Booth et al., 2001). La Rocca et al. (2009) add to the argument by stating that agency cost of debt will rise if companies do not consider warranty for their debts. Moreover, if a company cannot provide warranty, it will be burdened with higher interest rate or it will be mandated to depend on equity issuance instead of issuing debt (Akgul and Sigali, 2018).

In the situation of bankruptcy, intangible assets are less valuable relative to tangible assets. Thus, lower risk premiums are demanded by bondholders. Tangible assets might also moderate concerns about expropriation of insiders' resources. In addition, Moro et al. (2018) confirm that the practice of warranty plays a more significant role in countries with fairly weak creditor protection. It is generally acknowledged that developing countries are in the group of this weak creditor protection. To sum up, it is predicted that leverage is positively associated with asset tangibility.

The pecking order theory suggests a negative association between leverage and tangibility of assets. This explanation is behind the fact that firms that use high amount of tangible assets are likely to depend more on internal cash flows raised from the use of these types of assets, i.e. firms that can internally generate relatively extraordinary cash flows have a tendency to

avoid financing through debt. Therefore, firms that depend more on tangible assets are inclined to employ less debt than the firms with lower rate of tangible assets. Such firms prefer to use internally generated funds instead of debt (Harc, 2015; Gao and Zhu, 2015). On the other hand, trade-off theory expects a positive relationship between leverage and tangibility. Here, tangible assets are considered as warranty of debt since they can provide financial safety to the lenders alongside bankruptcy cases. Therefore, firms can effortlessly attain higher amount of debt.

2.5.3. Profitability

The association between profitability and capital structure is controversial on both theoretical and empirical grounds (Akgul and Sigali, 2018; Cevheroglu-Acar, 2018; Kara and Erdur, 2015; Sbeti and Moosa, 2012). A firm might choose debt between the two options of debt and equity in order to obtain tax shield advantage (Modigliani and Miller, 1963). Additionally, profitability is positively related to the issues of free cash flow existence. In such cases, Jensen (1986) argues that the debt can work as a controlling tool to make sure that managers do not follow their personal objectives.

The theories which explain the relationship between capital structure and profitability are diverse and no consistent theoretical expectations are found in the previous empirical studies. The pecking order theory predicts a negative impact of profitability of capital structure since the theory states that internal financing is preferred to external sources by firms in general. Thus, there should be lower leverage for firms with high profitability ratios because they depend on that profit for financing their projects. In other words, those firms do not need external financing (Gill and Mathur, 2011). Empirically, most studies found a negative relationship between profitability and leverage (see, for example, Ab Wahab and Ramli, 2013; Akgul and Sigali, 2018; Baltacı and Ayaydın, 2014; Guner, 2016; Tomak, 2013; Yolanda and Soekarno, 2012; Wahab et al., 2012). Nonetheless, the trade-off theory suggests a positive relationship between profitability and leverage. The

theory claims that companies with high leverage would have greater chance to shield income from taxes which in turn increases profit. The theory of free cash flow suggests that a positive connection between profitability and leverage since firms with high profitability tend to borrow larger debt trying to persuade managers to avoid spending on unproductive projects and pay out the cash instead (Bauer, 2004). Consequently, some empirical studies, for example Fattouh et al. (2002), Salawu and Agboola (2008), found a positive impact of profitability upon leverage.

Based on the pecking order hypothesis, firms with high profitability have potential to use internal debt in financing their projects instead of debt and equity. As a result, a negative impact of profitability on leverage is expected withholding the level of investment constant. Nevertheless, in order to signal a better quality to the market, firms may hold a higher leverage ratio when there is information asymmetry on the firm's quality. Moreover, profitable companies may be afraid of possible weakening of ownership and they, therefore, prefer not to issue equity.

On the other hand, the trade-off theory expects a positive relationship between profitability and leverage. Fama and French (2002) argue that the probability of bankruptcy declines with the increase of profitability. Additionally, a firm with high profitability has greater willingness to increase its debt aiming to take advantage of the tax shield (Frank and Goyal, 2009). On the other side, creditors may prefer to lend to a firm with high present cash flow compared to the low profitable firms (Wiwattanakantang, 1999). To sum up, the costs of bankruptcy and agency imply high profitability is accompanying a higher leverage in a company, and thus, it is expected that profitability has significant and negative impact on leverage.

Myers and Majluf (1984) confirm that companies prefer to use first retained earnings in raising capital and borrowing in the second place and issuing equity as a last option because of the information asymmetry which is the result of pecking order theory brings about the negative association between leverage and profitability. Nevertheless, firms with high profitability are keen to expand their size of debt in order to benefit from the tax shield, according

to the trade-off theory. Therefore, cost of financial distress declines with the increase of profitability in a firm (Frank and Goyal, 2009). This leads to a positive connection between leverage and profitability. The ratios of return on assets and return on equity are widely used in the literature to measure firm profitability.

2.5.4. Firm size

It is widely thought by scholars that capital structure might be connected to the size of the firm. However, this relationship between firm size and leverage is found to be contradictory. According to the trade-off theory, the effect of firm size is predicted to be positive on leverage in a company. This expectation is based on the argument that larger firms are less risky and less subject to bankruptcy because they are potentially more diversified. Equity financing is only preferred by firms when there is no debt to borrow. A positive association between leverage and size is supported by control considerations. Therefore, large companies must be highly leveraged. Empirically, several studies found that firm size is positively related to leverage (see, for example, Akgul and Sigali, 2018; Baltacı and Ayaydın, 2014; Gaud et al., 2005; Serghiescu and Vaidean, 2014; SheikhSalawu and Agboola, 2008; Mugosa, 2015; AhmedSheikh and Wang, 2011; Tomak, 2013). Nonetheless, Ab Wahab and Ramli (2013), Guner (2016) and Yolanda and Soekarno (2012) find out an opposing negative association between size and leverage. Ramli et al. (2019) and Vo (2017) report that the effect of size is insignificant of capitals structure. Kara and Erdur (2015) highlighted that firm size does not influence leverage in the automotive and food and beverage industries in Turkey. The natural logarithm of total assets at market value and book value are commonly used by scholar in the literature to measure firm size (Koralun-Bereznicka, 2018).

Additionally, firm size has been identified in the empirical literature as one of the key determinant factors of leverage from several different standpoints (Akgul and Sigali, 2018; Akpinar, 2016; Cevheroglu-Acar, 2018). From the

viewpoint of financial distress, several scholars claim that the larger the firm size, the larger diversification they have. As a result, they face smaller probability to collapse. Therefore, firm size can compensate the potential of bankruptcy (Cultrera and Bredart, 2016; Wu et al., 2010).

On the other hand, small firms are normally recognised for having greater costs of bankruptcy in relative terms (Zorn et al., 2017). However, trade-off theory suggests that larger companies tend to use greater amount of debt compare to small firms (Titman and Wessels, 1988). In addition, La Rocca et al. (2009) highlights that because larger firms possess enhanced standing in the market, they can possibly obtain more debt at cheaper costs. Similarly, larger firms are likely to be more transparent, so they take advantages of lower debt costs available for them (Andrade et al., 2014).

From the trade-off viewpoint, larger companies possess a smaller likelihood of default because of greater diversification. Moreover, larger companies assume higher debt ratio as a result of the lower costs of monitoring the company and the condensed moral hazard and contrary collection (Acedo-Ramirez and Ruiz-Cabestre, 2014). Therefore, a positive relationship between firm size and capital structure is expected. Moreover, the larger firms present smaller asymmetric information between outsiders and insiders due to the high level of transparency (Yoon et al., 2011), they, therefore, are more likely to be far from issuing undervalued new equity into the market. Booth et al. (2001) point out that firm size is related with the agency cost of equity and debt and with survival. As a result, the large size of firms supports them in accessing equity market much easier because of small stable costs. Moreover, those firms prefer equity issuance to debt in raising their capital. From this standpoint, firm size can negatively be related to leverage.

2.5.5. Liquidity

The ratios of liquidity are commonly stated to possess mixed influence on the ratios of leverage. From one side, the relationship between liquidity and capital structure could be a positive one. This argument is based on the fact

that high liquidity ratios can encourage firms to use a high rate of debt because high liquidity supports the firms to pay their short-term liabilities at their dues (Ozkan, 2001). As suggested by trade-off theory, it is better for the companies that have higher liquidity ratios to use a larger amount of debt compare to firms with lower liquidity position due to their ability in meeting their obligations right on time. Furthermore, it is argued that leverage is likely to prevent the issues related to agency particularly for companies with great liquidity position but small rate of growth opportunities (Jensen, 1986). From this perspective, liquidity position of firms can positively influence capital structure.

On the other side, it is expected that liquidity position might negatively influence the ratios of debt. When firms own a large amount of debt, their liabilities will increase and this will then lead to decrease the current assets available for the firm (Lipson and Mortal, 2009). In addition, external creditors are ready to reduce the limit of debt financing accessible to companies if those firms own a large agency costs of liquidity, according to the agency theory (Deesomsak et al., 2004). Similarly, the association between liquidity and capital structure is negative based on the logics behind the pecking order theory since this theory assumes that firms follow a financing hierarchy in raising their capital (Sbeti and Moosa, 2012). In other words, companies with larger liquidity need to utilise their remaining internal sources of financing instead of borrowing debt.

To sum up, the impact of liquidity position on the capital structure of a firm is contradicting. On the one hand, as the liquidity of a firm becomes larger; the company tends to push its leverage to a higher level in order to meet its short-term obligation. This implies that there is a positive association between liquidity and debt ratio. On the other hand, when companies retain liquid assets, they use these assets in fulfilling their capital needs such as funding investment projects. Therefore, there exists a negative association between liquidity position and capital structure decision.

Empirically, the impact of liquidity position on the capital structure decisions are mostly found to be negative and support the pecking-order theory

(AhmedSheikh and Wang, 2011; Akgul and Sigali, 2018; Deesomsak et al., 2004; Guner, 2016; Mazur, 2007; Serghiescu and Vaidean, 2014). Some other studies, probably the minority, find support for the trade-off theory when investigating the relationship between liquidity and leverage (Ramli et al., 2019; Vo, 2017). Following the previous studies, we are going to measure liquidity for firms of our research sample based on the ratio of current assets over current liabilities.

2.5.6. Volatility (Firm Risk)

Firm risk (also known as volatility) is a measure for the likelihood of financial distress, in addition to the interest rates determined in the market and the amount of debt available for the firm to borrow in terms of the earnings volatility for that company (Titman and Wessels, 1988). Therefore, it is found by a number of studies that optimal leverage level of a firm is negatively associated to the riskiness of that firm (see, for example, AhmedSheikh and Wang, 2011; Baltacı and Ayaydın, 2014; Booth et al., 2001). However, the relationship between the two variables could be positive due to the fact that equity's systematic risk tends to decline if the variance in the company's value of assets rises.

High level of risk with regard to earnings might be considered as a signal sign that the company faces financial distress. With the increase of volatility, the company is less likely to be able to accomplish its promised claims as they come due. As a result, a negative relationship is hypothesised by the financial theories between leverage ratio and earnings instability. This argument is supported by a number of empirical studies (AhmedSheikh and Wang, 2011; Booth et al., 2001; Fama and French, 2002). Based on the previous studies, we use the standard deviation of ROA in this study to measure firm's volatility (Booth et al., 2001; Huang and Song, 2006).

Different proxies are offered in the previous literature to measure firm volatility for example, Mugosa (2015) and Wald (1999) uses standard deviation in operating cash flow over total assets after taking the first

difference, Booth et al. (2001) employ the coefficient of variation in return on sales, Chang et al. (2009) use standard deviation of ROE and ROA, Titman and Wessels (1988) use the coefficient of variation in the operating income's percentage change.

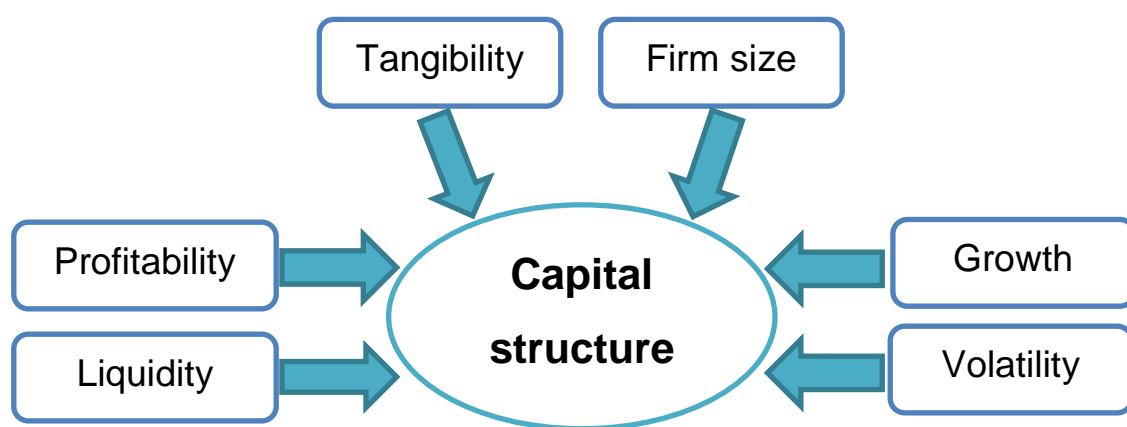


FIGURE 2.2

Conceptual Framework

Figure (2.2) illustrates the proposed conceptual framework of our study to line with the purposes of the study, identifying the factors which can determine the capital structure of Turkish non-financial firms listed on Borsa Istanbul during 2002-2017.

2.6. Empirical review

There are numerous empirical studies that investigated the factors affecting capital structure decisions in both developed and developing countries. In order to be comparable, we selected several recently conducted studies in Turkey and a number of other developing economies (see table 2.1). Although, these studies investigate the same issue, they diverge regarding the aspects such as, sample size, time period, and their employed factors in the determination of capital structure. Here, we classify the empirical literature into two categories based on the country concentrated on. Group one discusses the studies carried out in Turkey whereas group two discourses the studies conducted in other developing countries.

Cevheroglu-Acar (2018) conducted a study aiming to determine the factors that affect the capital structure decisions in turkey. His sample size contains non-financial firms operating in Turkey and listed on Borsa Istanbul. The final sample size is 111 firms their data available between 2009 and 2016. Using fixed-effect and random-effect models on balanced panel data, the results confirm that the capital structure is influenced by several micro-factors which are profitability, liquidity, size, non-debt tax shield, tangibility.

Akpinar (2016) investigates the determinant factors of capital structure also in Turkey. However, this study only considers manufacturing firms listed on Borsa Istanbul during 2010-2014. What makes this study unique is using various levels of leverage to measure capital structure such as total debt ratio, long-term debt and short-term debt. In addition to the variables of profitability, size and non-debt tax shield, this study found that firm growth, maturity, dividend yield and tangibility can also play a significant role in the determination of capital structure decisions for manufacturing firms in Turkey. Similarly, Acaravci (2014) emphasize that, using fixed-effect model of panel regression, leverage of manufacturing firms listed in Turkey from 1993 to 2010 can be affected by profitability, size, growth and tangibility whereas non-debt tax shield seems to be insignificant. Moreover, Akgul and Sigali (2018) found evidence to support the trade-off theory of capital structure since their results confirm positive impacts of tangibility and size on long-term

debt in Turkish transportation firms over the period 2002-2013. Nonetheless, evidence to support the pecking order theory is found by Guner (2016) in a number of publicly traded firms in Turkey between 2008 and 2014, through confirming that profitability, liquidity, size, and growth can significantly and negatively influence capital structure decisions. In summary, the results from empirical studies are contradicting according to factors such as the methods applied, the sample analyzed and the duration considered.

In order to better capture the impact of some additional factors on the determinants of capital structure in Turkey, we discuss the results of a research carried out by Kara and Erdur (2015). This study attempts to differentiate among the capital structure determinants of various sectors of Borsa Istanbul during 2006-2014. Using fixed and random effect models for panel analysis, the study finds dissimilar results across the different studied sectors. Profitability, liquidity and assets structure influences capital structure in the automotive sector and food & drink sector whereas liquidity, asset structure, size and non-debt tax shield influences capital structure in the sectors of textile and leather. The study found support for both trade-off theory and financial hierarchy theory. To sum up, although all the concentrated sectors in this study are from Turkey, the results are different from sector to another one.

Some other studies concentrate on financial sectors in turkey in order to identify the factors influencing the capital structure decisions of the firms in this sector including banks, insurance, real estates, mutual funds and other financial service firms. Baltacı and Ayaydın (2014) is an example which examines the determinants of capital structure of banking sector in Turkey from 2002 and 2012. Since this study investigates the impact of some macroeconomic factors and those factors might have potential endogeneity characteristics, generalized methods of moments are used to analyse the panel sample. The study found that leverage is significantly and positively related to average industry leverage, size, and GDP growth. They found also that leverage is significantly and negatively related to tangibility, profitability, inflation and risks. Koksall and Orman (2014) also found that macroeconomic

factors such as inflation, capital flows and GDP can play significant roles in determining the level of firms' leverage in a country like Turkey during 1996-2009.

Additionally, other studies examine the same issue, determinants of capital structure decisions, in other developing economies. Their results are sometimes consistent with the results of studies from Turkey and sometimes could be contradicting. Serghiescu and Vaidean (2014) investigate determinants of capital structure in the case of Romanian firms in the construction sector which are listed on the Bucharest Stock Exchange during 2009-2011. They found that profitability, tangibility and liquidity are negatively affecting the total debt ratio, and however, size and asset turnover have positive relationships with leverage. Vo (2017) observed that the direction of relationship between capital structure and other potential determinants, which are profitability, liquidity, asset growth, tangibility and size, tends to be mixed for short- and long-term debt for public firms listed on the Ho Chi Minh City stock exchange in Vietnam. In the case of Chinese listed non-financial firms during 1991-1997, Huang and Song (2006) found that firm leverage increases with firm size, tangibility, institutional stockholding, and risks while it decreases with profitability and non-debt tax shields. Moreover, Shah and Khan (2017) find that profitability, tangibility, and growth are significantly influence debt ratio in Pakistan whereas the impacts of size, risks, and depreciation on debt found to be insignificant. Slightly different results are found by Ahmed Sheikh and Wang (2011) in Pakistan during 2003-2007, confirming a positive effect of size on capital structure. Ramli et al. (2019) state that factors like liquidity, growth, asset structure, non-debt tax shield and interest rate can influence level of leverage in Malaysia and Indonesia.

In addition, the determinants of capital structure can alter based on the financial systems in the country and firm size. Acedo Ramirez and Ruiz-Cabestre (2014) claim that the factors influencing capital structure decisions might differ from country to another because of having different financial systems in each particular country (bank-oriented and market-oriented), in addition to the firm-specific variables. These contradictory results are found,

however, their study considers capital structure determinants in five developed countries namely the UK, France, Spain, Germany and Italy during 1998-2008. The findings of this study indicate that there are substantial differences in the capital structure of the five selected European countries. Moreover, Koralun-Bereznicka (2018) finds support for the pecking-order theory in the case of financing choices in small companies, whereas the trade-off theory can explain the capital structure decisions of medium and large-sized firms during 2000-2013 in a number of European countries.

TABLE 2.1

Summary of certain previous studies on the determination of capital structure

Author, Year	Sample	Period	Method	Factors studied	Major findings
Kara and Erdur, 2015	Sectors of automotive, food & drink, textile and leather from Borsa Istanbul (BIST)	2006 - 2014	panel analysis	Profitability, liquidity, asset structure, size, non-debt tax shield, growth and risks	The authors found that the determinant factors are different from a sector to another. Profitability, liquidity and assets structure influences capital structure in the sectors of food & drink and automotive whereas liquidity, asset structure, size and non-debt tax shield influences capital structure in the sectors of textile and leather.
Cevheroglu-Acar, 2018	Non-financial firms in Turkey	2009 - 2016	panel analysis	Profitability, liquidity, size, leverage, non-debt tax shield, tangibility, growth and risks.	The author found that the profitability, liquidity, size, non-debt tax shield, tangibility are important determinants of the capital structure. However, the strongest one is size. On the other hand, growth and volatility are not significantly related to leverage.

Baltacı and Ayaydın, 2014	Turkish Banking Sector	2002–2012	panel analysis	Profitability, leverage, size, GDP growth, tangibility, inflation and risks.	This study found that leverage is significantly and positively related to average industry leverage, size, and GDP growth. They found also that leverage is significantly and negatively related to tangibility, profitability, inflation and risks.
Koksal and Orman, 2014	Turkish manufacturing Firms	1996–2009	Panel analysis	Profitability, size, tangibility, risk, growth, non-debt tax shields, taxes, inflation, capital flows and GDP	The results confirm that the pecking order theory cannot explain the capital structures of Turkish non-financial firms as much as the trade-off theory does, regardless of firm size, industry affiliation, and stock market listing.
Akpınar, 2016	Turkish manufacturing firms traded on Borsa Istanbul	2010 - 2014	panel analysis	Profitability, size, non-debt tax shield, growth, maturity, dividend yield and tangibility.	This study uses various levels of leverage to measure capital structure like long-term, short-term and total debt ratio. The study found evidence for the relationship of the explanatory variables including Profitability, size, growth, maturity, dividend yield, tangibility, and non-debt tax shield with the measure of capital structure.

Acaravci, 2014	Manufacturing sector traded on the Istanbul Stock Exchange	1993-2010	panel analysis	Profitability, size, growth, tangibility and non-debt tax shield.	In this study, the author found that there are significant relationships of profitability, size, growth, tangibility with leverage variables. However, non-debt tax shield does not seem to have a significant effect on leverage.
Akgul and Sigali, 2018	The transportation industry in Turkey	2002-2013	panel analysis	Profitability, liquidity, size, tangibility, growth, non-debt tax shield, corporate governance and risks.	In this study, the authors found that tangibility and size are significantly and positively related to long-term financing decisions. Their results support the trade-off theory.
Guner, 2016	A number of publicly traded Turkish firms	2008 - 2014	panel analysis	Profitability, liquidity, size, growth and non-debt tax shields.	The results indicate that there is a negative relationship between the degree of leverage and profitability, liquidity, size, and growth. On the other hand, non-debt tax shields variable has a positive effect on the degree of leverage.

Vo, 2017	Public firms listed on the Ho Chi Minh City stock exchange.	2006 - 2015	panel analysis	Profitability, liquidity, asset growth, Tangibility and size.	The study observed a negative relationship between short-term and long-term leverage. Moreover, the direction of relationship between capital structure and other potential determinants tends to be mixed for short- and long-term debt.
Serghiescu and Vaidean, 2014	Romanian construction firms listed on the Bucharest Stock Exchange	2009-2011	panel analysis	Profitability, liquidity, size, debt ratio, Tangibility and asset turnover.	The authors found that profitability, tangibility and liquidity are negatively affecting the total debt ratio. On the other hand, the firm size and its asset turnover have a positive relationship to leverage.
AhmedSheikh and Wang, 2011	The Karachi Stock Exchange of Pakistan	2003-2007	panel analysis	Profitability, liquidity, size, non-debt tax shields, tangibility, growth and risks.	The results suggest that profitability, liquidity, volatility, and tangibility are correlated negatively to the debt ratio, while firm size is positively related to leverage. Non-debt tax shields and growth do not appear to be significantly correlated to the debt ratio.

Huang and Song, 2006	A number of Chinese listed companies	1994-2000	panel analysis	Profitability, tangibility, tax, size, non-debt tax shields, growth and risks.	The results of this study confirm that firm leverage increases with firm size, tangibility, institutional stockholding, and risks. On another hand, leverage decreases with profitability and non-debt tax shields.
Salawu and Agboola, 2008	A number of non-financial firms in Nigeria	1990-2004	panel analysis	Profitability, size, tangibility, growth and non-debt tax shields.	The findings of this study suggest that the determinants of capital structure are profitability, firm size and tangibility which are positively associated to total debt and long-term debt, however, growth is negatively associated with total debt ratio.
Shah and Khan, 2017	KSE listed non-financial firms, Pakistan	1994-2002	panel analysis	Profitability, tangibility, size, growth, depreciation, non-debt tax shields and risks.	There is an important influence of profitability, tangibility, and growth upon debt ratio. However, the impacts of size, risks, and depreciation on debt found to be insignificant.

Koralun-Bereznicka, 2018	Eleven European Union countries	2000–2013	panel analysis	Liquidity, tax, tangibility, growth, ROE, variability, depreciation and size.	The results support the pecking-order theory in the case of financing choices in small companies, whereas the trade-off theory can explain the capital structure decisions of medium and large-sized companies.
Ramli et al. 2019	7819 firm-year observations from Malaysia and Indonesia	1990-2010	panel analysis	Tangibility, firm size, liquidity, risk, non-debt tax shield, stock and bond market development, interest rate, inflation rate and growth.	The study confirms that asset structure, liquidity, growth opportunities, non-debt tax shield and interest rate are considered as the characteristics that were indirectly driven by debt amount on financial performance of the firm.

Acedo Ramirez and Ruiz-Cabestre, 2014	A sample of companies from UK, France, Spain, Germany and Italy	1998–2008	panel analysis	Tax rate, financial distress cost, investment, asymmetric information and size.	The findings of this study indicate that there are substantial differences in the capital structure of the five selected European countries. These differences are influenced by the kind of financial systems of the countries (bank-oriented and market-oriented) and influence the capital structure indirectly through the firm-specific variables.
Mugosa, 2015	Western European companies	2003 - 2010	panel analysis	Profitability, tangibility, size, growth, average stock return, product uniqueness, cash flow volatility and tax.	The results of this study suggest that there is a statistically significant and negative relationship between target leverage ratio and tangibility, profitability, product uniqueness and total return whereas statistically significant and positive relationship is found between target leverage ratio and size.

2.7. Summary of the chapter

This chapter provided several points such as a theoretical background on capital structure, factors expected to influence the decisions related to it, and theories that can explain the level of debt in a company's capital. It also presents and discuss several relevant past empirical papers which sought to determine the factors affecting capital structure decisions in Turkey and some other developing counties.

CHAPTER 3

METHODOLOGY

The aim of this chapter is to build the research methodology and its contents, thus, is divided into three sections. The sample and data collection method are described in section 3.1. In section 3.2, the variables of the study are identified in order to develop the study hypotheses. Lastly, the method to analyse the data and to investigate the research hypotheses is described and explained in section 3.3.

3.1. Data and sample

Using the Public Disclosure Platform of Borsa Istanbul (2018), we draw our study sample according to a number of criteria. Total number of firms listed on Borsa Istanbul was just over 400 firms in 2017 including all the various sectors (see table 3.1). Based on the purpose of this study, we excluded the firms from the financial sector since they are subject to different rules and regulations with regard to capital structure compare to non-financial firms (Salawu and Agboola, 2008; Shah and Khan, 2017). Non-financial firms listed on Borsa Istanbul consist of the major part of the only stock market in Turkey. In order to produce a balanced panel data, we also excluded non-financial firms with missing data between 2002 and 2017. After these exclusions, there are 71 non-financial firms in each calendar year which makes a total of 1136 firm-year observations available for this current study. Annual data for the sample firms and all the incorporated variables are collected from Thomson Reuters DataStream (2018) database.

TABLE 3.1

Number of firms listed in the sectors on BIST

Sectors	No. of firms	rate
Agriculture, forestry and fishing	4	0.97%
Mining	5	1.21%
Manufacturing industry	178	43.10%
Electricity gas and water	10	2.42%
Construction and public works	12	2.91%
Wholesale and retail trade, hotels and restaurants	32	7.75%
Transportation, telecommunication and storage	11	2.66%
Education, health, sports and other social services	7	1.69%
Technology	17	4.12%
Professional, scientific and technical activities	2	0.48%
Administrative and support service activities	4	0.97%
Financial sectors	131	31.72%
Total	413	100.00%

Source: Public Disclosure Platform (PDP, 2019)

The sample country of this study is Turkey and has been chosen based on the aim of the study which is to investigate the factors determining capital structure decisions in a developed country. Turkey is one of the most major developing countries with US\$ 10,546 GDP per capita and market capitalisation of US\$ 227.512 billion in 2017. Turkey GDP per capita has increased dramatically from US\$ 3,120 in 2001 to over \$10 today. Moreover, its market capitalisation has significantly increased over the last 15 years, \$ 36.44 billion in 2002 (WorldBank, 2019). Table 3.2 shows the number of listed companies on BIST from 2002 to 2017 and it reveals that the number has increased by 150 firms, from 288 firms in 2002 to 413 firms in 2017, over that period. The strategic location of the country among the Europe, Asia and Middle East makes the country more important economically and financially.

Borsa Istanbul is formed officially in the early 2000s as a combination of Istanbul Stock Exchange, the Istanbul Gold Exchange and the Turkish Derivatives Exchange. Prior to the formation of Borsa Istanbul, the listed firms in Turkey were operating under a remarkably divergent regulatory setting compared to developed countries. This stock market is the sole exchange body in the entire country and, therefore, it represents the total financial market in Turkey which 49% of its shares are owned by the government of Turkey. Manufacturing sector occupies 43% of the stock market and financial sector comes in the second place with covering 32% of the market (see table 3.1). It can be seen that firms in the non-financial sectors outnumber the firms in the financial sectors (also see Figure 3.1).

TABLE 3.2

Change in the number of listed firms on BIST

Year	Number of firms	% change
2002	288	
2003	285	-1.05%
2004	297	4.04%
2005	306	2.94%
2006	322	4.97%
2007	327	1.53%
2008	326	-0.31%
2009	325	-0.31%
2010	350	7.14%
2011	375	6.67%
2012	422	11.14%
2013	438	3.65%
2014	437	-0.23%
2015	428	-2.10%
2016	414	-3.38%
2017	413	-0.24%

Source: Public Disclosure Platform (PDP, 2019)

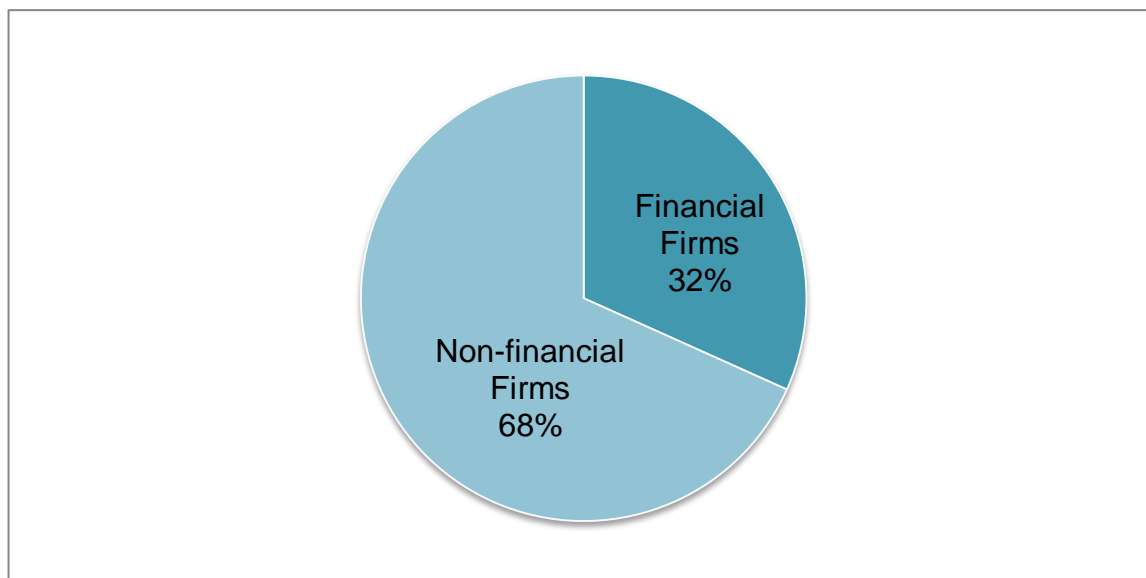


FIGURE 3.1

Size of financial and non-financial sectors in BIST

(Source: Public Disclosure Platform (PDP), 2019)

3.2. Variable construction model specification

The variables used in this study are identified in this section of the chapter. The equations used to calculate each ration is also illustrated. Additionally, the basic models of the study are also constructed in order to show the different proxies of each variable.

3.2.1. Capital structure

This study aims to identify the factors which can determine capital structure decisions for the non-financial listed firms in Turkey. Leverage measures are the dependent variables which are going to be regressed separately on the expected factors. Different ratios of leverage are used as the measures of capital structure in the literature. Following the previous studies, this study uses total debt ratio and long-term debt ratio (Akgul and Sigali, 2018; Akpınar, 2016; Vo, 2017). Total debt ratio, denoted as TDR, is calculated by

dividing total debt in a firm over the total assets capitalised in that firm (see, equation 3.1). This proxy indicates the rate of total assets in a firm financed by debt. In other words, it measures what proportion of the total assets is financed by external financing sources. Long-term debt ratio, denoted as LDR, is another ratio of leverage used in this study to measure capital structure. This ratio is calculated through long-term debt over total utilised assets of a firm (see, equation 3.2). This proxy indicates the rate of total assets in a firm financed by long-term debt. In other words, it measures what portion of firm's total assets is financed through long-term debts, debts which are due in at least five years of period. To sum up, TDR and LDR are the two measures of leverage which are used in this study. These two ratios separately measure capital structure in two different models. Equation 3.3 shows that leverage is the function of both total debt ratio and long-term debt ratio.

$$\text{Total Debt Ratio (TDR)} = \frac{\text{Total debt}}{\text{Total assets}} \quad (3.1)$$

$$\text{Long – term Debt Ratio (LDR)} = \frac{\text{Long-term debt}}{\text{Total assets}} \quad (3.2)$$

$$CS_{it} = f(TDR_{it}, LDR_{it}) \quad (3.3)$$

Where,

CS is the capital structure of firm *i* at time *t*,

TDR is total debt ratio for firm *i* at time *t*,

LDR is long-term debt to total assets ratio for firm *i* at time *t*,

3.2.2. Growth opportunities

Future opportunities in a firm to grow are expected to have a significant impact on capital structure. Based on previous literature, we measure growth opportunities using percentage change in sales (Cevheroglu-Acar, 2018; Kara and Erdur, 2015; Koksall and Orman, 2015). Therefore, this study computes firms' growth rate using annual percentage change in total sales for the sample firms (see equation 3.4). Growth (denoted as GRO) is an Independent variable in this study. The impact of growth on capital structure decisions could be either negative or positive, according to the different theoretical perspectives.

$$Growth (GRO) = \frac{\ln T. sales (t) - \ln T. sales (t-1)}{\ln T. sales (t-1)} \quad (3.4)$$

3.2.3. Tangibility

Second explanatory variable of our study is tangibility. Related theories explain the logics of the impact of tangibility in a firm on the decisions of capital structure. For example, intangible assets are thought to be less valuable relative to tangible assets in the situation of bankruptcy. In such cases, lower risk premiums are demanded by bondholders. Tangible assets might also moderate concerns about expropriation of insiders' resources. Tangibility is a ratio of net fixed assets over total assets (equation 3.5), and this ratio is used by the majority of past papers in the field (see, for example, Huang and Song, 2006; Koksall and Orman, 2015; Vo, 2017). This ratio considers as a warranty for the borrower and the lender because it accounts for those assets that have a long-term and large value.

$$Tangibility (TAN) = \frac{Fixed\ asset}{Total\ asset} \quad (3.5)$$

3.2.4. Profitability

Profitability is another independent variable which is expected to have an impact on capital structure decisions in a firm. Put it differently, profitability is theoretically expected to determine the ratios of leverage and this is empirically observed by a number of studies previously. Those studies employ several proxies to measure profitability ratio such as return on assets (ROA), return on equity (ROE) and return on sales (ROS). The current study uses the first two ratios of ROA and ROE to measure profitability of our research sample firms. ROA is computed (see equation 3.6) through net income in a particular year over the total assets for that period (Mugosa, 2015; Serghiescu and Vaidean, 2014). ROE is calculated (see equation 3.7) by dividing net income over total equity for the same fiscal year (Akgul and Sigali, 2018; Koralun-Bereznicka, 2018). In summary, we measure profitability of non-financial firms listed on BIST according to the two different ratios of ROA and ROE (i.e. profitability is the function on ROA and ROE, see equation 3.8).

$$\text{Return on Assets (ROA)} = \frac{\text{Net income}}{\text{Total assets}} \quad (3.6)$$

$$\text{Return on Equity (ROE)} = \frac{\text{Net income}}{\text{Total equity}} \quad (3.7)$$

$$PRO_{it} = f(ROA_{it}, ROE_{it}) \quad (3.8)$$

Where,

PRO is profitability of firm *i* at time *t*,

ROA is the return on assets for firm *i* in period *t*,

ROE is the return on equity for firm *i* in period *t*,

3.2.5. Firm size

An extra explanatory variable we consider determining capital structure is firm size. It is widely thought by scholars that capital structure might be connected to the size of the firm. However, this relationship between firm size and leverage is found to be contradictory based on the explanation of different related theories. Size has been identified in the empirical literature as one of the key determinant factors of leverage from several different standpoints (Akgul and Sigali, 2018; Akpinar, 2016; Cevheroglu-Acar, 2018). The current study follows Baltacı and Ayaydin (2014) and Kiraci and Aydin (2018) to use natural logarithm of total assets in measuring firm size for our sample firms (see equation 3.9).

$$\text{Firm size (SIZ)} = \ln(\text{Total Assets}) \quad (3.9)$$

3.2.6. Liquidity

Liquidity is another expected explanatory variable in the determination of capital structure decisions. The ratios of liquidity are commonly stated to possess mixed influence on the ratios of leverage. From one side, the relationship between liquidity and capital structure could be a positive one since high liquidity ratios can encourage firms to use a high rate of debt because high liquidity supports firms to pay their short-term liabilities when they due. Nevertheless, liquidity is expected to have a negative influence on the ratios of debt when a firm owns a large amount of debt, its liabilities will increase and this will in turn lead to decrease the current assets available for the firm. We measure firm's liquidity (denoted as LIQ) using the natural logarithm of the ratio of current assets over current liabilities (see equation 3.10), and this is based on prior studies (AhmedSheikh and Wang, 2011; Koralun-Bereznicka, 2018; Ramli et al., 2019).

$$\text{Liquidity (LIQ)} = \ln\left(\frac{\text{Current Asset}}{\text{Current Liquidity}}\right) \quad (3.10)$$

3.2.7. Volatility

Volatility (firm risk) is the last explanatory variable that this study employs to determine capital structure for the sample of non-financial firms listed on BIST during 2002-2017. Firm risk (denoted as RSK) is a measure for the likelihood of financial distress, in addition to the interest rates determined in the market and the amount of debt available for the firm to borrow in terms of the earnings volatility for that company. Different proxies are offered in the previous literature to measure firm volatility. Consistent with Chang et al. (2009), this study uses standard deviation of return on assets to measure firm volatility. Equation 3.11 illustrates the calculation method of firm risk.

$$sd(ROA_{it}) = \sqrt{\frac{\sum_{t=1}^{15} (ROA_{it} - \overline{ROA_{it}})^2}{n - 1}} \quad (3.11)$$

3.3. Research model

The aim of this section is to build our research model in order to be able to investigate the determinants of capital structure for non-financial firms listed on BIST during 2002-2017. Based on the capital structure theories and previous empirical studies, we proposed a number of factors that might influence the capital structure decisions of our study sample firms. The following model (3.12) shows the basic relationship that we logically propose and seek to observe:

$$CS = f(GRO, TAN, PRO, SIZ, LIQ, VOL) \quad (3.12)$$

The above equation shows a proposed model of this study in a way that capital structure decisions of our sample firms could be understand and

explained by several microeconomic factors including growth, tangibility, profitability ratios, size, liquidity and volatility. Based on that proposed mathematical relationship, the econometric model of this study can be drawn in the following model (3.13) to account for the extent of impact from each individual variable on capital structure and to control for the possible error term.

$$CS_{it} = \beta CS_{i(t-1)} + \gamma X_{i(t)} + \varepsilon_t \quad (3.13)$$

Where CS_{it} is capital structure for firm i at time t , represents the dependent variable in this study and measured by the two ratios of total debt ratio and long-term debt ratio; we consider the lagged value of debt ratios into their own models in order to capture the impact of last period capital structure on the decisions of current period's capital structure. Moreover, this may help to control for the endogeneity issue which is thought to be common in corporate finance models (Vo, 2015). X is a vector of control variables in our study model; and ε_t is the random error term.

This study uses panel multiple regression analysis after restricting for firm features in order to investigate the level of influence from the proposed explanatory variable on capital structure decisions. The common methods used in the literature to analyse panel data are pooled LS, Random-Effect (RE) model and Fixed-Effect (FE) model (Acaravci, 2014; Akpinar, 2016; Kiraci and Aydin, 2018; Shah and Khan, 2017). The current study applies those methods to examine the factors determining capital structure in Turkey. In the case when the residuals are independent to the vector of dependent variables, pooled LS estimators are consistent and unbiased. Nevertheless, firm-individual effects are relatively common in non-experimental studies, and therefore, Random-Effect and model and Fixed-Effect models are used in such cases since they can control for particular firm level's error components

(Le and Phan, 2017). In order to identify the appropriate model between FE and RE, the Hausman specification test is used (Hausman, 1978).

The extended model of this study is shown in the following research model:

$$CS_{it} = \beta_0 + \beta_1 CS_{i(t-1)} + \beta_2 GRO_{it} + \beta_3 TAN_{it} + \beta_4 PRO_{it} + \beta_5 SIZ_{it} + \beta_6 LIQ_{it} + \beta_7 VOL_{it} + \varepsilon_t \quad (3.14)$$

Where CS is capital structure policies for non-financial firms listed on BIST, measured by the ratios of leverage (total debt ratio and long-term debt ratio); GRO is growth rate for firm *i* at time *t* measured by change in natural logarithm of total sales; TAN is tangibility ratio for firm *i* at time *t*; PRO is the profitability for firm *i* at time *t* measured by both ratios of ROA and ROE; SIZ is the natural logarithm of total assets for firm *i* at time *t*; LIQ is natural logarithm of liquidity ratio for firm *i* at time *t*; VOL is volatility (firm risk) for firm *i* at time *t*; β_0 is the constant in the regression model; β_1 to β_7 are the parameters of the explanatory variables; and ε is stochastic error term.

Table 3.3 shows more details with regard to the definition of the variables, their calculation methods, and the expected signs of each explanatory variable in the study models.

TABLE 3.3

Variable definition and their expected signs

Variable	Proxy	Symbol	Variable Type	Hypothetical Relationship	
Leverage	Total Debt / Total Asset	TDR	Dependents		
	Long term Debt / Total Asset	LDR			
Growth	[Sales (t) - Sales (t-1)] / Sales (t-1)	GRO	Independent	Trade-off theory	-
				Pecking order	+
Tangibility	Fixed Assets / Total Asset	TAN	Independent	Trade-off theory	+
				Pecking order	-
Profitability	Net Income / Total Asset	ROA	Independent	Trade-off theory	+
	Net Income / Total Equity	ROE		Pecking order	-
Size	ln (Total Asset)	SIZE	Independent	Trade-off theory	+
				Pecking order	-
Liquidity	Current Asset/Current Liability	LIQ	Independent	Trade-off theory	+
				Pecking order	-
Firm risk	Standard deviation of ROA	RSK	Independent		-

3.4. Panel unit root test

For those variables which have a time series characteristic, it is essential to test for unit root. In other words, a unit root test is used to clarify whether a time series variable contains a unit root and is non-stationary. In order to be able to use a variable in a regression model, that variable needs to be stationary either at level or differenced. Each variable is firstly tested at level for a unit root. Almost all the unit root tests state their null hypotheses in a way that a unit root exists in the series and their alternative hypothesis is stationary or trend stationary. Generally, the method to implicitly test for unit root suggests that the variable for test (Y_t) can be stated as:

$$Y_t = D_t + z_t + \varepsilon_t \quad (3.15)$$

Where D_t is the deterministic element; z_t is the stochastic element; and ε_t represents the stationary error term.

The purpose of the test is to identify if the stochastic element possesses a unit root or it is alternatively stationary. There are several unit root tests available to test non-stationarity in panel data. The most common used approaches in the literature are the Levin, Lin and Chu (LLC) (2002) and Fisher-specific tests of Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) (Choi, 2001), (Dickey and Fuller, 1981) and (Maddala and Wu, 1999) which their null hypotheses are similarly set for having unit roots in the panel. This study uses all these three types of unit root test (see table 5) to finalise the decisions and for the purpose of robustness check. Latest literature recommends that the tests for panel unit root owns greater control compare to unit root tests for specific time series.

Although the different types of unit root test work to somehow similar on a particular series, they are not precisely identical. Here, we describe the three techniques of unit root employed in this study with dividing them to common and individual unit root tests. In doing so, we should firstly classify the tests

according to the presence of restrictions on the process of autoregressive through series or cross-sections. The following AR(1) process (3.16) is designed for panel:

$$y_{it} = \rho_i y_{it-1} + X_{it} \delta_i + \varepsilon_{it} \quad (3.16)$$

Where X_{it} characterised for the models' exogenous variables, counting for any specific trends or fixed effects; ρ_i represents the coefficients of autoregressive; ε_{it} is the error term which supposed to be mutually independent; and $i = 1, 2, \dots, N$ series or cross-section units which are perceived during periods $t = 1, 2, \dots, T_i$. The panel series is thought to be stationary or trend stationary if the unit root of ρ_i is less than 1 whereas it contains a unit root if ρ_i is equal to 1.

Two previously accepted assumptions exist about the ρ_i for the purposes of testing. The first one assumes the mutuality of persistence parameters through cross-sections ($\rho_i = \rho$ for all i). The LLC test for panel unit root uses this assumption. The second one assumes that the persistence parameters differ freely through cross-sections. The ADF and PP tests of panel unit root are of this method. These three tests all employ a null hypothesis of non-stationary (Barbieri, 2009).

LLC method tests for the following simple specification of ADF:

$$\Delta y_{it} = \alpha y_{it-1} + \sum_{j=1}^{P_i} \beta_{ij} \Delta y_{it-j} + X'_{it} \delta + \varepsilon_{it} \quad (3.17)$$

Where it is assumed that $\alpha = \rho - 1$, but lag order is allowed for the difference terms, ρ_i , to differ through cross-sections. The hypotheses of this test can be

stated as $H_0: \alpha = 0$ and $H_1: \alpha < 0$. Null hypothesis states there is a unit root whereas the alternative claims stationarity.

The fisher based ADF and PP tests for panel data both allow for separate unit root procedures which can differ through cross-sections. The p-values of separate unit root tests will be combined to provide the panel-characteristic outcome.

The suggested Fisher-type test for unit root is stated as:

$$-2 \sum_{i=1}^N \log(\pi_i) \rightarrow \chi^2_{2N} \quad (3.18)$$

Additionally, Choi (2001) suggests a Z test as:

$$Z = \frac{1}{\sqrt{N}} \sum_{i=1}^N \Phi^{-1}(\pi_i) \rightarrow N(0,1) \quad (3.19)$$

The hypotheses of these tests can be stated as $H_0: \alpha_i = 0$ for all i and $H_1: \alpha_i = 0$ for $i = 1, 2, \dots, N-1$ or $H_1: \alpha_i < 0$ for $i = N+1, N+2, \dots, N$. Null hypothesis states there is a unit root whereas the alternative claims stationarity.

The results of the three used panel unit root tests are illustrated in table 3.4. The t-statistics of LLC and Fisher Chi-square of both ADF and PP tests confirms that we can reject the null hypothesis of unit root test of all the three tests and for all the variables used in this study. In other words, the employed variables are $I(0)$, meaning they are stationary at their level. This is confirmed based on the small probability values of all the tests, P-value < 0.01 . Since all the variables are identically stationary at level, this study can therefore conduct pooled LS, FE and RE models (Acaravci, 2014; Bas et. al., 2009) to investigate the factors determining capital structure for non-financial firms listed on BIST.

TABLE 3.4

The results of panel unit root tests

Variables	LLC	ADF	PP
	t-statistics	Fisher Chi-square	Fisher Chi-square
TDR	-6.60 ^c	250.24 ^c	231.59 ^c
LDR	-10.05 ^c	308.73 ^c	254.51 ^c
GRO	-19.82 ^c	562.78 ^c	717.09 ^c
TAN	-3.6 ^c	217.23 ^c	241.79 ^c
ROA	-18.78 ^c	525.25 ^c	640.52 ^c
ROE	-25.60 ^c	590.61 ^c	716.89 ^c
SIZ	-8.95 ^c	236.60 ^c	311.07 ^c
LIQ	-7.08 ^c	248.80 ^c	238.33 ^c
RSK	-36.50 ^c	520.62 ^c	554.81 ^c

(a, ^b and ^c) denotes the level of significance of 10%; 5% and 1% respectively.

3.5. Summary of the chapter

This chapter described the sample of the study and the data collection method. It also identified the variables of the study in accordance to their measurements. The model of the study is also set to analyse the data for non-financial firms listed on BIST. Accordingly, we run pooled LS with FE and RE models to investigate the factors determining the capital structure of the sample firms in Turkey. Finally, different types of unit root tests are performed against each panel variable and we found that all the variables are stationary at their level.

CHAPTER 4

DATA ANALYSIS

The aim of this chapter is to empirically analyse our sample data according to the objectives of the study. In order to achieve the objectives, the data is presented in a way to understand its nature and several tests are performed to investigate the potential relationships amongst the variables. First of all, the descriptive statistics are illustrated to understand the patterns in the variables of non-financial firms listed on Borsa Istanbul in Turkey which can provide a preliminary insight into the characteristics of the sample firms in regard with growth, profitability, size and risk. In section 2, correlation coefficient is performed to test the bivariate correlations between each pair of the variables in our study. This also helps to test for multicollinearity problem. Finally, section 3 presents the regression analyses and their results are interpreted accordingly.

4.1. Descriptive statistics

Descriptive statistics help us to understand the nature of the non-financial firms listed on Borsa Istanbul through the pattern of their financial data that are used in this study such as level of leverage, level of growth, tangibility, their level of profitability, their total assets and the liquidity and tangibility scopes they hold on their balance sheets. The results of descriptive statistics such as mean and range can provide initial insights regarding these characteristics of the sample firms. The figures illustrate the average values of the sample firms.

Table 4.1 shows the descriptive statistics of mean, median, standard deviation (denoted as SD.), maximum and minimum values, and the number of observations for each variable on an individual basis. The total available firm-year observations (Obs.) is 1136 and this number is less for the variables of growth rate and firm risk because their calculation formulas compares the current year to the previous year and therefore one degree of freedom is lost per firm which makes a total of 71 firm-year observations. This would leave a total of 1065 observations available for the purpose of analysis.

The mean value of total debt ratio shows that the non-financial firms listed on BIST in Turkey are on average held a very low level of leverage with on about 20% of their total capital. In other words, the majority (80% on average) of their capitals are financed through equity rather than debt. However, there are firms in our sample with high level of debt in the capital structure, according to the maximum value of 79.7%. Conversely, there are a number of firms with zero level of debt and all their capital is raised from the shareholders. We can also notice that the debt borrowed by the Turkish non-financial firms for raising capital are mostly in the type of short-term debt because the mean of long-term debt to total debt for the sample firms are very small, 8%. There are few numbers of firms with their long-term debt ratio over 50%. In summary, non-financial firms listed in Turkey tend to be poorly leveraged.

The mean and median of the natural logarithm of growth rate in total sales show that on average non-financial listed firms grew rapidly over 2002-2017. The exponential of the natural logarithm of growth rate is slightly over 100% showing that total sales of the sample firms have on average doubled over the study period. Nevertheless, there are firms with very large negative growth in some points of time, according to the minimum value of growth.

Tangibility shows the rate of tangible assets held by a firm over the total assets. Tangible assets are known to be less risky assets compared to intangibles with regard to losing their values. The mean and median of tangibility show that on average only above 50% of the total assets of the

sample firms constitute from tangible assets and the remaining are intangible types of assets. Although some firms possess a small ratio of tangibility, there are some firms in our sample with approximately 100% ratio of tangible assets to total assets.

TABLE 4.1

Descriptive statistics of the study variables

Variable	Mean	Median	SD.	Max.	Min.	Obs.
TDR	0.1969	0.1623	0.1736	0.7971	0.0000	1136
LDR	0.0823	0.0326	0.1081	0.5779	0.0000	1136
GRO	0.0076	0.0091	0.0664	0.3269	-1.9844	1065
TAN	0.5371	0.5527	0.2211	0.9996	0.0018	1136
ROE	0.1553	0.1538	0.3203	2.8264	-2.9063	1136
ROA	0.0894	0.0816	0.3203	0.6043	-0.3284	1136
SIZ	12.8466	12.6639	1.3819	17.2261	8.8142	1136
LIQ	0.5916	0.5419	0.6447	3.7844	-1.9205	1136
RSK	0.0453	0.0315	0.0527	0.8837	0.0000	1065

Profitability of the sample firms is measured using the ratios of ROA and ROE. Mean of ROE is 15.53% with a wide range between 2.83% and -2.91% for the highest and lowest ROE respectively. The sample firm has an average return on equity of 15.5%. The mean of return on assets is 0.089 with a narrower range of distribution compared to the range in ROE.

The wide range in size and the large standard deviation show that size varies considerably among the firms of our sample. There are firm with a very large size and there also small firms based on their total assets on their report of condition. The mean of the natural logarithm of total assets is 12.85.

Mean of the natural logarithm of liquidity ratio show that the sample firms tend to keep a high ratio of liquidity. This would help in paying of their short-term liabilities when they due. The exponential value shows that 59% is the average of liquidity for our study sample firms. Nonetheless, there are firms with very low and very high ratio of liquidity.

Regarding the firm risk measured by the standard deviation of ROA, the mean show that the non-financial firms listed on Borsa Istanbul possess an average risk of 4.5% with a maximum of 88% in some firms. This may indicate that the levels of risk associated with our sample firms are small.

4.2. Correlation coefficients

The correlations coefficients are measured based on Pearson test. This is a bivariate correlation which measures the degree of association between two variables. Although correlation coefficient can provide the level of relationship, it cannot identify the direction of the impact from a variable to another. In other words, the variables are seen identically without categorising them into dependent and independent ones. The test is standardised based on covariance of two variables which investigates the value of an unknown signed (ρ) to be $-1 \leq \rho \leq +1$. Negative one denoted a perfect negative correlation between the two variables while +1 represents a perfect positive correlation. This test is commonly used to examine the

multicollinearity issue in time series and panel-oriented data and the normal range is when the correlation is smaller than the root of 0.80 between a couple of explanatory variables (Box, et al., 2015; Gujarati, 2009). If the correlation coefficients are higher than $|0.80|$ between two predictor variables, there exists the problem of multicollinearity and those two variables cannot be included in the same model unless the issue is solved.

TABLE 4.2

Bivariate Pearson correlation matrices

	TDR	LDR	GRO	TAN	ROE	ROA	SIZ	LIQ	RSK
TDR	1								
LDR	0.738	1							
GRO	0.030	0.025	1						
TAN	-0.706	-0.541	-0.073	1					
ROE	-0.129	-0.096	0.064	0.093	1				
ROA	-0.327	-0.241	0.055	0.369	0.643	1			
SIZ	0.078	0.128	-0.012	-0.105	0.146	0.057	1		
LIQ	-0.550	-0.312	0.077	0.659	0.172	0.452	-0.077	1	
RSK	0.087	0.054	-0.010	-0.071	-0.048	-0.033	-0.123	-0.074	1

Table 4.2 shows the results of Pearson correlation matrices. The association between long-term debt and total debt ratio is 73.8%. Growth, size and risk are positively associated with the two ratios of leverage in our sample firms and those relationships seem to be weak, according to the correlation matrices. Growth ratio is connected with TDR and LDR at 3% and 2.5% respectively. Level of firm risk is associated with TDR and LDR at 8.7% and 5.4% respectively. However, each of tangibility, ROE, ROA, and liquidity variables are negatively associated with the two used ratios of leverage. Tangibility is associated with TDR and LDR at -70.6% and -54.1% respectively. The natural logarithm of liquidity ratio is associated with TDR and LDR at -55% and -31.2% respectively.

The results of correlation coefficients show that the relationship between the pairs of the explanatory variables are moderate and therefore seem to be unproblematic regarding the multicollinearity issue because they are less than 80% with the highest correlation of 65.9 between liquidity and tangibility. Growth is negatively correlated with tangibility, size and risk at -7.3%, -1.2% and -1% respectively. Nevertheless, it has positive connections with profitability ratios, and liquidity with 6.4% and 5.5% with ROE and ROA respectively and 7.7% with liquidity. Tangibility is positively correlated with the measures of profitability and liquidity. However, its connections with size and risk are negative.

The ratios of ROE and ROA to measure profitability have a positive and strong correlation with each other around 64.3% but it is still considered as in the accepted range with regard to the multicollinearity issue. ROE and ROA are positively correlated with firm size with 14.6% and 5.7% respectively. Their correlations with liquidity are also positive and stronger than the ones with size. Conversely, risk is negatively associated with both ROE and ROA, -0.048 and -0.033 respectively.

Risk is negatively associated with both firm size and liquidity ratio. Their correlations are presumed to be weak which are only -12.3% and -7.4% respectively. Similarly, size is also negatively and weakly correlated with liquidity with approximately -8%.

In summary, there exist moderate correlations between each pairs of variables of our study, and therefore the explanatory variables can be combined simultaneously in one regression model for the purpose of data analysis.

4.3. Regression analysis

In order to analyse the direction and the level of the relationship amongst the variables of this study, several different methods of regression analysis are performed based on the past literature. The regression analysis methods are performed after controlling for firm-specific features. The common models used to analyse panel data of corporations in the literature are pooled Least Square (LS) method, and the regression techniques of Fixed Effect (FE) and Random Effect (RE) (see, for instance, Cevheroglu-Acar, 2018; Delcours, 2007; Kara and Erdur, 2015; Le and Phan, 2017; Mwangi et al., 2014). This study utilises these models of data analysis to robustness check.

4.3.1. Pooled LS regression

The technique of pooled LS is firstly used to examine the relationships between each of the proposed factors and the capital structure of the non-financial firms listed in Turkey during 2002-2017. Because this study uses two different measures of the dependent variable, there are two different models performed to regress the measures of capital structure separately on the explanatory variables. Table 4.3 shows the results of the pooled regression models. Total debt ratio is dependent variable in model 1 and long-term debt ratio is dependent variable in model 2 which are the two employed measures on capital structure.

TABLE 4.3
Results of pooled LS regression

Variable	Model 1 (TDR)		Model 2 (LDR)	
	Coefficient	t-Statistic	Coefficient	t-Statistic
CS(-1)	0.596 (0.019)	30.46 ^c	0.706 (0.018)	40.17 ^c
GRO	-0.003 (0.024)	-0.13	-0.005 (0.011)	-0.50
TAN	-0.269 (0.018)	-14.56 ^c	-0.097 (0.009)	-10.62 ^c
ROA	-0.097 (0.033)	-2.88 ^c	0.001 (0.019)	0.07
ROE	-0.028 (0.009)	-2.99 ^c	-0.02 (0.011)	-1.88 ^a
SIZ	0.006 (0.002)	2.40 ^c	0.004 (0.001)	4.86 ^c
LIQ	0.007 (0.004)	1.44	0.014 (0.002)	5.77 ^c
RSK	-0.037 (0.039)	-0.93	0.0005 (0.02)	0.02
CONSTANT	0.159 (0.034)	4.64 ^c	0.016 (0.012)	1.32
Adjusted R-squared	0.747		0.762	
F-statistic	391.92		426.19	
Prob(F-statistic)	0.000		0.000	
Durbin-Watson stat	1.749		1.902	
Heteroskedasticity	0.99		0.93	
LR test (p-value)				
No. of Obs.	1065		1065	

(^a, ^b and ^c) denotes the level of significance of 10%; 5% and 1% respectively. the values in the parentheses are standard error.

Model 1 shows the results of panel least square when total debt ratio is dependent on a number of explanatory variables aiming to identify the factors determining capital structure in our sample firms in Turkey. The results of the model show the existence of the overall goodness of fit for the model through the F-statistics value (391.9) and its small probability. The probability of F-statistics (p-value < 0.05) can confirm the goodness of fit of the model and reject the null hypothesis of the impact of all coefficients are equal and equal to zero. In other words, the alternative hypothesis is favoured claiming at least the impact of one of the explanatory variables is statistically significant and does not equal to zero. Below are the null and alternative hypotheses for F test:

$$H_0: \beta_1 = \beta_2 = \dots \beta_k = 0$$

$$H_1: \beta_1 \neq \beta_2 \neq \dots \beta_k \neq 0$$

Additionally, t-statistics and its probability value are used to investigate the significant level of each explanatory variable individually. If t-calculated is greater than t-table, the null hypothesis stating that the coefficient of that variable equals to zero is rejected in favour of the alternative. Similarly, if the p-value of t-statistics is smaller than the accepted confidence interval of 0.05, the null hypothesis is rejected. The null hypothesis of t test is separately tested for each variable and can be stated as follow:

$$H_0: \beta_n = 0$$

$$H_1: \beta_n \neq 0$$

The results of model 1 in table 4.3 show that there are some employed variables which can significantly impact the capital structure measured by total debt ratio. The lagged value of the dependent variable itself, denoted as TDR(-1), positively influences the current value of leverage and this effect is statistically significant at the 1% level. Precisely, every percentage increase in the previous value of TDR can increase the current value of TDR by approximately 0.60%, holding the impact of all other variables constant.

This relationship is logically expected since the current values of balance sheet in a firm are built on the values from the previous fiscal year.

The impact of growth, tangibility, profitability and risk seem to be negative on TDR of the non-financial firms listed on Borsa Istanbul, albeit not all of them are statistically significant. Growth and risk have small negative impacts but they seem to be statistically insignificant because the p-values (0.89 and 0.35) are greater than the accepted level of 0.05 and therefore we cannot reject the null hypotheses that their coefficients equal to zero. Tangibility has a negative impact on TDR with every percentage increase in tangibility would lead to a decline in TDR by about 0.27% and this result is statistically significant at the 0.01 level. Likewise, both measures of profitability negatively influence TDR with 1% increase in each of ROA and ROE separately would decrease TDR by around 0.10 and 0.3 respectively, and these effects are statistically significant at the 0.01 level.

However, the impacts from the variables of firm size and liquidity tend to be positive on the total debt ratio of the sample firms listed on BIST. Although the impact of firm size is relatively small, it seems to be statistically significant at the level of 0.05 because its t-calculated is greater than t-table and the p-value of t-stat is less than 0.05 and therefore the null hypothesis can be rejected. Precisely, every 1% increase in firm size leads to an increase in leverage measured by TDR by 0.006% with a small standard error of only 0.002. The impact of liquidity is small and positive but it seems to be statistically insignificant since the p-value of t-stat (0.149) exceeds the accepted level of confidence interval 5%.

The adjusted R-squared shows the level of variance in the dependent variable explained by the significant explanatory variables in the model. In the case of model 1 in table 4:3, the adjusted R-squared is 0.746 which indicates that the explanatory variables can together explain the variances in total debt ratio by about 75%.

Regarding model 2, the results are for pooled least square when long-term debt ratio is dependent on a number of explanatory variables aiming to identify the factors determining capital structure in our sample firms in Turkey. The results of the model show the existence of the overall goodness of fit for the model through the F-statistics value (426.2). Moreover, the probability of F-statistics ($p\text{-value} < 0.05$) can confirm the goodness of fit of the model and reject the null hypothesis that the impact of all coefficients is equal and equal to zero. In other words, the alternative hypothesis is favoured claiming at least the impact of one of the explanatory variables is statistically significant and does not equal to zero.

The results of model 2 in table 4.3 show that there are some employed variables which can significantly impact the capital structure measured by long-term debt ratio. The lagged value of the dependent variable itself, denoted as LDR(-1), positively impacts the current value of leverage and this effect is statistically significant at the 1% level. Precisely, every percentage increase in the previous value of LDR can increase the current value of LDR by approximately 0.71%, holding the impact of all other variables constant. Logically, this relationship is expected since the current values of balance sheet in a firm are built on the values from the previous fiscal year.

The impact of growth, tangibility and profitability seem to be negative on LDR of the non-financial firms listed on Borsa Istanbul, but not all of them are statistically significant. Growth and ROE have small negative impacts but they seem to be statistically insignificant at the 5% level because the p-values (0.61 and 0.06) exceeds the accepted level and thus we cannot reject the null hypotheses that their coefficients equal to zero. Tangibility has a negative impact on LDR in a way that 1% increase in tangibility would lead to a decline in LDR by about 0.10% and this result is statistically significant at the 1% level.

However, the impacts from the variables of ROA, size, liquidity and risk tend to be positive on the LDR of the sample firms listed on BIST. The coefficients of both ROA and risk are statistically insignificant since their respective t-calculated (0.07 and 0.02) are smaller than the t table, and therefore, we

cannot reject the null hypotheses. Although the impacts of size and liquidity are relatively small, they seem to be statistically significant at the level of 0.01 because the t-calculated are greater than the t-table and the p-value of t-statistics are less than 0.01 and therefore the null hypotheses can be rejected. Precisely, 1% increase in size and liquidity separately lead to an increase in leverage measured by LDR by 0.004% and 0.014% with small standard errors.

The adjusted R-squared in model 2 is 0.762 which indicates that the explanatory variables can together explain the variances in long-term debt ratio by about 76%.

4.3.2. Serial correlation test

In order to check for autocorrelation (serial correlation), the tests of residual cross section dependence test are used which are common tests autocorrelation in panel data. The tests used in this study are Breusch-Pagan LM test (Breusch and Pagan, 1980) and Pesaran CD test (Pesaran, 2004). If a serial correlation exists, it might lead to underestimating the standard error and might cause the explanatory coefficients to look significant whereas they are not. The null hypotheses of these tests stated as there is no serial correlation in the weighted residuals. If the probability value of the tests are greater than 0.05, then we cannot reject the null hypothesis and conclude that the model is clean from serial correlation.

Table 4.4 show the results of both tests for the two pooled panel regression models separately. The results show that our research models 1 and 2 do not suffer from the problem of autocorrelations based on the two different tests of panel serial correlation of Breusch- Pagan LM and Pesaran CD. The probability values of both tests for both models are greater than 5%, the null hypotheses cannot be rejected and this indicates the fact that there are no serial correlation issues in the two panel LS models.

TABLE 4.4
Cross-Section Dependence Test

		Breusch-Pagan LM	Pesaran CD
Model 1	Statistic	2503	1.208
	d.f.	2485	
	Prob.	0.397	0.227
Model 2	Statistic	2550	0.648
	d.f.	2485	
	Prob.	0.179	0.517

The estimators of panel LS regression are considered as consistent and unbiased when the residuals of the model and the vectors of the explanatory variables are independent from each other. Nevertheless, the effect of firm-specific characteristics is usually perceived in non-experimental investigations. From this point of view, the models of FE and RE would perform better to the pooled LS with regard to their particular outcome of error section at firm level. Moreover, the Hausman test (Hausman, 1978) is conducted to identify the appropriate model between FE and RE.

4.3.3. FE and RE regression models

The results of Hausman test on random effect models are shown in table 4.5 for the two models separately. According to the probability of Chi-squared, we can reject the null hypothesis of the test which states that the random effect model is appropriate for model 1 when TDR is dependent. In other words, the results of the tests confirm that fixed effect model is appropriate for. Similarly, a fixed effect model is favoured in model 2 when LDR is the dependent variable. Therefore, the results of a fixed effect model would be presented and interpreted in this part.

TABLE 4.5
The Hausman test

Cross-section random	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Model 1	458.629189	8	0.0000
Model 2	409.200130	8	0.0000

Table 4.6 presents the results of fixed effect regression for the two models of the study. In model 1, the dependent variable is TDR while it is LDR in model 2. As it can be observed, the results of fixed effect model are very similar with regard to the significance of the variables. However, there are some changes regarding the level of their impacts and the overall explanations of the variances in the dependent variables.

The results of model 1 when TDR is dependent show the existence of the overall goodness of fit for the model through the F-statistics value 392. Furthermore, this can be confirmed through the probability of F-statistics (p-value < 0.05). Therefore, the null hypothesis is rejected claiming that the impacts of all coefficients are equal and equal to zero. In other words, the alternative hypothesis is favoured stating at least the impact of one of the explanatory variables is statistically significant and does not equal to zero. The adjusted R-squared in model 1 is 0.746 which indicates that the explanatory variables can together explain the variances in total debt ratio by approximately 75%.

TABLE 4.6

Fixed effect regression model

Variable	Model 1 (FE)		Model 2 (FE)	
	Coefficient	t-Statistic	Coefficient	t-Statistic
CS(-1)	0.419 (0.022)	18.97 ^c	0.339 (0.026)	12.73 ^c
GRO	-0.023 (0.031)	-0.75	-0.056 (0.029)	-1.95 ^a
TAN	-0.442 (0.018)	-19.39 ^c	-0.345 (0.02)	-17.22 ^c
ROA	-0.114 (0.038)	-3.02 ^c	-0.123 (0.035)	-3.55 ^c
ROE	-0.022 (0.01)	-2.29 ^c	0.001 (0.009)	0.116
SIZ	0.009 (0.004)	2.49 ^c	0.011 (0.003)	3.1 ^c
LIQ	0.016 (0.006)	2.84 ^c	0.071 (0.005)	13.2 ^c
RSK	-0.029 (0.041)	-0.70	0.026 (0.038)	0.67
CONSTANT	0.237 (0.053)	4.43 ^c	0.07 (0.049)	1.43
Adjusted R-squared	0.859		0.701	
F-statistic	84.55		32.96	
Prob(F-statistic)	0.000		0.000	
Durbin-Watson stat	1.79		1.86	
No. of Obs.	1065		1065	

(a, b and c) denotes the level of significance of 10%; 5% and 1% respectively. the values in the parentheses are standard error.

Similar to the results of pooled LS in model 1, the impacts of growth and risk are likely to be statistically insignificant since their p-value of t-test are greater than the followed significant level of 5%. This means that those variables cannot explain the dispersions in TDR. However, the impact of liquidity became significant in the FE model.

The lagged value of the TDR positively influences the current value of leverage and this effect is statistically significant at the 1% level. Precisely, every 1% increase in the previous value of TDR can increase its current value by approximately 0.42%, holding the impact of all other variables constant. Similarly, the impacts of size and liquidity are positive on TDR. Nevertheless, the variables tangibility and profitability influence TDR significantly and negatively. Precisely, firm size has a positive impact on TDR in a way that 1% increase in size would result in an increase in TDR by about 0.009% and this result is statistically significant at the 5% level. Moreover, assuming the impact of all other explanatory variables constant, 1% increase in liquidity brings about 0.017% increase in TDR at the 1% level of significance. The impact from tangibility is negative but greater, 1% increase in tangibility leads to a decline in TDR by 0.27%. The ratios profitability have negative impact with every percentage increase in ROA can result in a decrease in TDR by 0.11 at the 1% level and every 1% increase in ROE leads also to a decline in TDR but by 0.022% at the 5% level.

The results of model 2 when LDR is dependent also show the existence of the overall goodness of fit for the model through the F-statistics value 32.96. Likewise, this can be confirmed through the probability of F-statistics (p-value < 0.05). Therefore, the null hypothesis is rejected which claims that the impacts of all coefficients are equal and equal to zero. Additionally, the adjusted R-squared in model 2 is 0.70 which indicates that the explanatory variables can together explain the variances in long-term debt ratio by approximately 70%.

Similar to the results of pooled LS in model 2, the impacts of growth, ROE and risk seem to be statistically insignificant since their p-value of t-test are greater than the followed significant level of 5%. This means that those

variables cannot explain the variations in LDR. However, the impact of ROA became significant in the FE model.

The lagged value of the LDR positively influences the current value of leverage and this effect is statistically significant at the 1% level. Precisely, every 1% increase in the previous value of LDR can increase its current value by around 0.34%, holding the impact of all other variables constant. Similarly, the impacts of size and liquidity are positive on LDR. Nevertheless, the variables tangibility and ROA influence LDR significantly and negatively. Precisely, firm size has a positive impact on LDR in a way that 1% increase in size would result in an increase in LDR by about 0.011% and this result is statistically significant at the 5% level. Moreover, assuming the impact of all other explanatory variables constant, 1% increase in liquidity brings about 0.07% increase in LDR at the 1% level of significance. The impact from tangibility on LDR is negative but greater compare to the influence of other variables, 1% increase in tangibility leads to a decline in LDR by 0.35%. ROA has a negative impact with every percentage increase in ROA can result in a decrease in LDR by 0.12.3% at the 1% level.

TABLE 4.7
Redundant fixed effect tests

		Cross-section F	Cross-section Chi-square
Model 1	Statistic	7.48	453.61
	d.f.	(70,986)	70
	Prob.	0.0000	0.0000
Model 2	Statistic	6.32	394.79
	d.f.	(70,986)	70
	Prob.	0.0000	0.0000

The results of Pesaran CD test for serial correlations suggest for no autocorrelation in both models 1 and 2 of FE. The obtained p-values from the tests, 0.15 and 0.74 for model 1 and 2 respectively, are greater than 0.05 and therefore we cannot reject the null hypothesis of no serial correlation.

In order to further investigate the appropriateness of the fixed effect models, we perform the redundant fixed effect model. The null hypothesis of this test is that the fixed effect model is unnecessary and redundant. The results in table 4.7 show that we can reject the null hypotheses in both model 1 and 2 of FE models because the probability values of F-stat and Chi-squared are less than 0.01. Therefore, we can conclude that the results of FE models are not redundant and appropriate in the context of our research sample.

4.4. Summary of the chapter

This chapter is designed for data analysis purposes. Descriptive statistics is performed for the variables individually to understand their nature and pattern. Moreover, correlation coefficient is performed to show the bivariate relationships between the pair of the variables and accordingly we noticed that there exist no problems of multicollinearity in our research panel data. Then, pooled least square and fixed effect model are run in order to determine factors that influence the capital structure of non-financial firms listed on BIST. We found that variables of tangibility, profitability, size and liquidity are among the factors which can determine the financing policy of those firms. There are some tests such as Hausman test, serial correlation and redundant FE test performed to identify the appropriate model to analyse the data and for diagnostic check purposes.

CHAPTER 5

DISCUSSION AND CONCLUSION

This chapter presents the discussion of the results of empirical investigations on the determinants of capital structure for non-financial firms listed on Borsa Istanbul. It also presents a summary of the previous chapters of the study. Moreover, possible policy implications and recommendations for future studies are showed.

5.1. Summary of the chapters

Chapter 1 is the introduction section which provides the general background on the topic, it identifies the research problem, and it presents the purposes this study and shows how the study plans to achieve them through hypotheses setting and empirical investigation of data analysis.

The research problem is formulated based on the argument that the specialized scientific references in financial studies indicate that the capital structure, determination and amount of capital in a company, is influenced by a variety of factors whose degree of influence varies from one company to another, from time to time, from sector to sector, and from country to country. This group of factors has different effects on the size and composition of the capital structure; these companies operate in spite of their varying degree of influence. Therefore, we raise the main question of what factors affect the capital structure of non-financial firms listed on Borsa Istanbul in Turkey? We also consider whether the theories of the capital structure through the characteristics imposed by it capable of interpreting the policy or financing behaviour in Turkish non-financial institutions?

The aim of this study is to identify the factors affecting the capital structure of non-financial firms listed on Borsa Istanbul in Turkey during the period 2002 - 2017. According to the employed theories and the previous studies, we set the study hypotheses as there are some specific factors, namely growth, tangibility, profitability, size, liquidity and risk, which can determine capital structure in the context of Turkey. The hypotheses are based on predicting the relationship between the measures of the dependent variable and the independent variables. The significance of this study is that it attempts to narrow the gap between theory and practice in a developing country such as Turkey by analysing the capital structure choices for non-financial firms listed on Borsa Istanbul based on information from the reality of these companies.

Chapter 2 presents the theoretical and empirical background behind capital structure and its determinants. Capital structure as a financing policy and the factors that can determine this policy in the firms are controversial topics in the field of corporate finance. Theoretically, there are a number of theories that can explain the capital structure and its variations at firm-level. The most considerable theories in the literature are the trade-off theory, pecking order theory and the agency theory. This study uses the three theories to support the theoretical discussions and employ a number of firm-specific variables in order to identify the determinants of capital structure of our sample firms in Turkey.

Based on the trade-off theory, capital structure policy can be determined through a process of trade-off between the costs and benefits of debt. Typical opinions for this theory are based on tax benefits, bankruptcy costs, and agency costs with regard to replacement of asset and overinvestment. Each company has a target debt ratio for value maximizing purpose and attempts to achieve. Consequently, even though a rise in leverage can ease the agency costs of equity, it might deteriorate the conflict between shareholders and bondholders.

The pecking order theory maintains that the costs of adverse selection regarding the issuance of securities with high risk would result in a preferred position over financing sources through producing a segment between the

costs of external and internal financing and through the rise of the difficulty in securities' issuance. In order to reduce the costs related to adverse selection, companies tend to firstly use available internal funds, debt in the second place, and lastly rely on equity issuance. According to pecking order theory, there is no target capital structure.

From the perspective of agency theory, there exist both agency benefits and agency costs of the level of debt in capital structure. According to the arguments of the theory, the agency costs of debt come from the conflicts between shareholders and creditors. It is thought that shareholders of a financially distressed company can possibly take advantage of investing the standing debt in more risky projects. The theory claims that financing through debt can bring about agency benefits because this does not decrease the portions of shareholders as the equity issuance does.

Regarding the empirical literature, this study selected several recently conducted studies in Turkey and a number of other developing economies. Although, those studies investigate the same issue, they diverge with regard to the aspects such as, sample size, time period, and their employed factors in the determination of capital structure. The empirical literature review is classified into two categories based on the country concentrated on, Turkey and other developing countries.

This study employs an explanatory research design to determine the factors effecting capital structure of non-financial firms listed in Turkey. Correlation coefficient and two different techniques of multiple linear regressions are performed to analyse the sample data. Additionally, related and necessary diagnostic checks are performed to investigate the reliability of the results.

5.2. Discussion of results

The empirical results reveal that there are a number of factors that can well determine the variations in capital structure of non-financial firms listed on BIST in Turkey. We found evidence that tangibility, profitability, size, and liquidity are the most important factors which can determine the financing

policy of those firms, in addition to the one period lagged value of leverage ratios. Conversely, we failed to find support for the relationships of capital structure with each of growth and risk. Table 5.1 gives a summary of the findings and the theories that can explain those results.

TABLE 5.1
Summary for the findings

Variable	Symbol	Relationship and explanation	
Lagged leverage	TDR (-1)	+	
	LDR (-1)		
Growth	GRO	Statistically insignificant	
Tangibility	TAN	-	Pecking order
Profitability	ROA	-	Pecking order
	ROE		
Firm size	SIZE	+	Trade-off theory
Liquidity	LIQ	+	Trade-off theory
Firm risk	RSK	Statistically insignificant	

The results show that tangibility and profitability can explain the variations in the capital structure of the sample firms and their impacts are negative. These negative relationships can logically be explicated with the negotiations of pecking order theory.

Regarding to the negative impact of tangibility, this explanation is behind the fact that firms that use a high amount of tangible assets are likely to depend more on internal cash flows raised from the use of these types of assets, i.e. firms that can internally generate relatively extraordinary cash flows have a tendency to avoid financing through debt. Therefore, we found that Turkish firms that depend more on tangible assets are inclined to employ less debt

than those Turkish firms which have lower rate of tangible assets. On the empirical background, this result is consistent with the results of Baltacı and Ayaydın (2014), Drobetz and Fix (2003), Frank and Goyal (2009), Harc (2015); Serghiescu and Vaidean (2014); Mugosa (2015) but contrary to what is found by Akgul and Sigali (2018); Acaravci (2014); Koralun-Bereznicka (2018); Wahab et al. (2012) because they found that tangibility can positively explain capital structure. Our results indicate that Turkish firms are likely to prefer to use internally generated cash flow instead of external sources such as debt because their mean of tangibility rate is high and above 50% over the study period.

Moreover, the pecking order theory predicts a negative impact of profitability of capital structure since the theory states that internal financing is preferred to external sources by firms in general. Thus, there should be lower leverage for firms with high profitability ratios because they depend on that profit for financing their projects. According to the results, we found that non-financial firms listed in Turkey have relatively high arithmetic mean of profitability ratios over the study period whereas their mean of leverage ratio is relatively low. Our results regarding this negative relationship are in line with the findings of Ab Wahab and Ramli (2013); Akgul and Sigali (2018); Baltacı and Ayaydın (2014); Guner (2016); Tomak (2013); Yolanda and Soekarno (2012); Wahab et al. (2012) whereas not in line with the findings of Fattouh et al. (2002), Salawu and Agboola (2008).

5.3. Contribution and implications

Many studies conducted to test theories of capital structure were based on information from developed countries. The importance of this study comes from two aspects.

First, it can be considered as an empirical investigation which is trying to narrow down the gap between theory and practice in a developing country such as Turkey by analysing the funding decision for non-financial firms listed on Borsa Istanbul based on information from the reality of these companies.

Thus, the results of this study are a modest scientific addition to a series of studies conducted in developing countries.

Second, it sheds light on one of the most important topics for research that can assist managers of corporation with regard to their concentration on the factors determining capital structure in the case of Turkey. The decision to finance the company is one of the most important decisions that management of the company can take continuously and concurrently with the company to achieve success and expansion.

5.4. Limitations and Recommendations

Like any other studies, this research may have some limitations. Therefore, we can recommend the future studies to conduct regarding the limitations of this study. The results of our research are limited regarding the characteristics of generalisability on the country level and sector level as follow:

First, one limitation of this research is on the country level. Since we concentrate on a single developing country, Turkey, we might not be able to simply generalise our results to another developing countries because different countries can have dissimilar aspects concerning the cultural, regulatory, financial, economic, political, etc. conditions. Based on this limitation, we can recommend future studies to expand the sample studies by including more developing counties for the purposes of comparison.

Second, another limitation of this research is on the firm-sector level. We excluded financial firms listed on the Borsa Istanbul because of their different regulations and policies. One could also consider the capital structure of firms in that sector in order to be able to compare the results between financial and non-financial firms. Financial firms and their competitors tend basically to have high rate of debt since they normally borrow from savers and lend it to investors. Future study may also investigate the determinants of capital structure for the different sectors of non-financial firms separately to better understand the funding policy across different sectors.

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ETHICS COMMITTEE APPROVAL

01.04.2019

Dear Znar Ahmed

Your project “**Determinants of capital structure: Evidence of non-financial firms from Turkey**” has been evaluated. Since only secondary data will be used the project it does not need to go through the ethics committee. You can start your research on the condition that you will use only secondary data.

Assoc. Prof. Dr. Direnç Kanol

Rapporteur of the Scientific Research Ethics Committee

A handwritten signature in black ink, reading 'Direnç Kanol'.

Note: If you need to provide an official letter to an institution with the signature of the Head of NEU Scientific Research Ethics Committee, please apply to the secretariat of the ethics committee by showing this document.