Determinants of Capital Structure: Evidence from Istanbul Stock Exchange

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ABSTRACT

This thesis aims to explain determinants of capital structure evidence from istanbul stock exchange from three companies (Turkcell ,Vodafone and Deutesche Telekom).The two main theories used are for trade-off theory and pecking order theory. The essential of the pecking order is the manager's of capital structure decision are influenced by the market perception of manager's superior information. The trade-off theory provides support for manager's trade-off between benefits and costs of debt .the conventional model is also used in the analysis in the order to increase the robustness of the results . We find that dynamic partial-adjustment model of the trade-off theory seems to explain better the choice of capital structure in the analyzed period than pecking order theory .

Keywords: capital structure, pecking order theory, trade-off theory.

ÖZ

Bu tezin amacı işletmelerin sermaye yapısı belirleyicilerini İstanbul Borsasında işlem gören üç şirketi (Turkcell, Vodafone ve Deutesche Telekom) baz alarak açıklamaktır. Bu çalışmada trade-off ve pecking order teorisi kullanılmıştır. Pecking order teorisinin temel özelliği yöneticilerin sermaye yapısı kararı market algısından etkilenmektedir. Bunun yanında sonuçların sağlamlığını artırmak için geleneksel teori de göz önünde bulundurulmuştur. Trade off teorisinin dinamik kısmi ayarlama modeli sermaye yapısı tercihini pecking order teorisinden daha iyi açıklamaktadır.

Anahtar kelimeler : sermaye yapısı, sipariş teorisi gagalama, trade-off teorisi.

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Chapter 1

INTRODUCTION

1.1 Background

Nowadays, the role of corporations in economies is undeniable. They are the heart of financial activities and help to increase the speed of economic development. Financing has been known as a critical issue in the framework of corporations. Therefore, development of corporations directly results in the expansion of productions in an economy, the supply of tax revenues for the governments and accordingly the reduction of poverty (Prasad et al., 2001).

As mentioned, it is vital to perceive the process in which firms try to provide capital sources in order to build their capital structure. A series of policies are considered in order to decide on capital structure. These polices could be taken into account both in macro level and micro level. The former could be capital markets, interest rates of countries and regulations while the latter could be corporate governance and future development plans in a firm (Green, Murinde and Suppakitjarak, 2002). Technically, most of available literature about capital structure is established in developed industries which their economies have many related structures (Booth et al., 2001).

It should be added that countries are concerned with different tax, bankruptcy, banking system and capital market regulations, so they have different institutional arrangements. In addition, they are divergent not only socially but also culturally.

Theoretically, a large proportion of literature is concentrated on developing a universal and comprehensive model to explain how firms are acting financially. In addition, many studies have been tried to recognize an optimal capital structure.The outcomes of these studies are different capital structure theories such as trade-off theory, also known as TOT, introduced by Modigliani and Miller (1963), pecking order theory, also known as POT, introduced by Myers and Majluf (1984) and agency cost theory, also known as ACT, introduced by Jensen and Meckling (1976).

Empirically, there are many studies conducted on capital structure theories in order to investigate whether there is an explanation for capital structure selection; and, whether it is possible to identify the determinants of capital structure.

1.2 Aim and Contribution of the Study

The aim of this study is to investigate the determinants that significantly affect firms' capital structures in telecommunication industry especially cell phone operators. As it is obvious, a firm is successful when it has a well-structured and well-organized access to capital sources in financial markets. In addition, the ultimate goal of corporation is maximizing shareholders' value. This fact is not reachable unless the management utilizes the corporation capital sources optimally. It is worth noting that it is a hard decision to choose an optimal mixture of debt and equity. In this context, the determinants of capital structure affecting cell phone operators are going to be identified and analyzed.

1.3 Thesis Structure

The first chapter of this study introduces the subject of study and tries to represent its importance. Then, it is followed by a chapter regarding the related literature which is chapter two and it reviews the literature. The third chapter talks about the data and

research methodology which are going to be used. The fourth chapter employs the methodology of chapter three and presents the empirical results. The last chapter, chapter five, makes some conclusions based on what results taken in the previous chapters.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

Modigliani and Miller (1958) study prepared a way for investigating the capital structure and its impact on the corporation's capital costs. So capital structure theory is named MM hereafter.MM theory is fundamentally based on a set of assumptions, which are unrealistic, and states that the cost of capital and the value of a firm are not dependent on the type of financing. Since this theory suggests the independency of financing choice, it is also called the debt irrelevancy theorem.MM study outcomes were not match with its time accepted views on corporate financing. Therefore, after its publication it activated a flood of articles on the subject. One of the first criticisms of the work was stated by Durand (1959).He initially questioned the assumptions which are basics of the MM propositions and expressed that MM conclusions are not feasible in the real world and are "faulty at best" (Durand, 1959).Durand's criticisms intensified the triggered a major continuous progress by critics, as most claimed that the MM assumptions would be very strong to be implemented to real world circumstances that financial firms and investors were involved in.

To a distinctly greater extent, the assumption supposing perfect markets is a strong assumption. If one accepts this assumption, he or she is ignoring tax impacts, bankruptcy costs, and agency costs. In addition, the assumption states that all information is reflected in the market with no time intervening and there is not any

asymmetry in terms of having access to market information or in other words all market participants have equal access to information.

Although there are lots of criticisms of MM theory, their work is still known as a fundamental assumption from which corporate finance theories are developed. The reason is that their study suggested a model which was employed from 1985 and resulted in the development of a new period in corporate finance. Moreover, their model has become a tool to analyze the outcomes of different capital structure options.

MM theory suggests that the value of a firm is an increasing function of its debt ratio because more debt increases the benefits of tax shield. New capital structure theories are based on this reference from MM theory. Specifically, new theories are developed by altering previous assumptions of theoretical models. In addition, some of them employed new factors to explicate corporation's capital structure. The process of development of MM theory resulted in three significant new capital structure theories: trade-off theories, pecking order and agency theory.

2.2 Trade-Off Theory (TOT)

Being mentioned above, the MM theory proposes that market performs in perfect conditions. The first thing which deforms this perfect manner is tax. Because of the deductibility of interest in the presence of tax, debt is preferred in order to increase the value of the corporation. Therefore, natural consequence of MM model is trade-off theory. We know that interest expenses are deductible for tax. Hence, the larger the interest expense is, the lower taxable profits will be accordingly. So it can be inferred that firms can maximize the level of debt on their capital structure and take

the benefit of the interest tax shield. On the other hand, as debt amount becomes larger, there is a higher probability of financial distress. Firms with high levels of debt on their balance sheet are more potential to fall short in their debt repayments so they have a higher probability of default. In sum, costs and benefits of debt are in an exchange that occurs as a compromise or in other words in a trade-off.

Myers study (1984) suggests that every corporation which employs TOT (Trade-Off Theory) has planned for a target level of debt. Accordingly, that corporation performs in a manner to makes that target viable. Target leverage is the outcome of balancing the costs and benefits of leverage. However, structure of target leverage may not be clarified (Frank & Goyal, 2009). Additionally, it is mentioned that target debt can express into two ways. Firstly, it might be representing a single period balance of costs and benefits of debt. This kind of target debt is called static TOT. Secondly, it might cover the adjustments of trade-off between costs and benefits over time. Therefore, the second type is called dynamic TOT.

In conclusion, it should be notified that all firms which are going to use debt are exposed to a simultaneous decreasing rate of benefit and increasing rate of cost. Therefore, if a CFO is willing to maximize the firms' value has to increase the level of debt to an extent which the marginal benefits compensate for the marginal costs (Myers 1984).

2.3 Pecking Order Theory (POT)

From 1984, pecking order theory (POT) has been seen in many studies originated by Myers. POT refers to an organization of preferences at different ranks in an administrative framework or in other words the hierarchy of preferences. Technically, it ranks the different preferences of a firm in providing financing sources. In this framework, internal financing is preferred to external financing. Similarly, debt is preferred to equity.

In Myers' study (1984), the hierarchies of preferences are categorized into two definitions. First part is defined the preference of internal financing to external financing and the second part refers to the preference of debt to equity. According to another study by Frank and Goyal (2009), due to Myers definitions, there would two main questions here to be answered according to the first part of definition:

- Does it mean that a corporation should utilize all internal funds before considering debt or equity (external financing)? (Flexible Interpretation)
- Does it mean that in a ceteris paribus situation all firms mainly employ internal financing before any external financing? (Strict Interpretation)

They also add that these two questions are accurate and flexible in order to test the first part of POT definition by Myers. If one uses the strict interpretation of the theory, it would be more feasible to test it. However, the flexible interpretation would not be feasible depending on the changes in other things.

As mentioned in the previous section, TOT employs a target level of debt. On the other hand, the pecking theory does not perform as well. In POT framework, firms

would issue and retire debt or equity according to their funding requirements. Empirical studies (Frank & Goyal, 2003; Shyam-Sunder & Myers, 1999) have revealed this fact by analyzing the relationship between firms financing short falls in a period and changes in capital structure of firms in the same period and the upcoming periods.

It is worth noting that according to POT, firms consider a financing hierarchy while they are evaluating information costs (Myers and Majluf, 1984). Generally, firms are exposed to two kinds of costs when they are willing to provide required funds form the external funds: information asymmetry costs and transaction costs. This is where POT suggests that these additional costs lead the CFOs to prefer internal capital sources to expensive external sources.

In addition, taking the transaction and information asymmetry costs into account, firms most likely prefer internal financing to external capital sources. Similarly, when they have to select among external sources of funding, they will choose debt instead of equity (Donaldoson, 1961). To sum up, POT declares that there is not any optimal capital structure, and it is a function of the firms' requirements to provide funding sources from external markets when internal funds are not enough for investment opportunities.

It should be mentioned that the pecking order theory role is not the determination of an optimal capital structure. It only enables us to perceive patterns according to financing hierarchy preferences.

Finally, Donaldson (1961) has stated a pecking order to show how firms act to provide long-term capital sources:

- Internal financing is prior to external financing when firms are served with positive NPV projects.
- Firms preferably sell off part of their investments when they do not have enough cash flows from internal activities.

- When a firm faces a situation in which external financing is inevitable, the pecking order of available securities would be as follow: Very secured debt, risky debt, convertible bonds or securities, preferred stock and finally common stock.

2.4 Agency Cost Theory (ACT)

In corporations, the owners are separated from the management team. This separation can result in a conflict of interest between these two parties in which the management team does not act in the interest of the owners. In finance literature, this problem is known as agency problem. Agency problem incurs some costs to corporations which are called agency costs.

Jensen study (1986) introduces an agency problem case which is a classic example in the related literature. He mentions that as the managers of a firm have complete access to free cash flows, they may involve in some activities such as over-investing or luxury-spending. Therefore, the costs of these activities are drawn directly from the investors' pocket without their satisfaction.

Accordingly, corporations are more interested in increasing leverage level to control managers' activities. Leverage structure obligates managers to transfer the excess cash flows to interest payment accounts or invest in profitable projects in order to

meet debt obligations. Hence, ACT introduces a theory which suggests that leverage is preferred to internal funds even if sufficient internal funds are available. It leads to a mechanism in which managers are disciplined (Dewatripont and Tirole, 1994; Lewis and Sappington, 1995).

Agency theory has more implications. For instance, the potential conflict between the bondholders and shareholders in a corporation is another implication of ACT (Jensen and Meckling, 1976). In this case, bondholders or debt-holders are prior in terms of claims over shareholders. On the other hand, shareholders can affect the flows of benefits to debt-holders by either investing in riskier opportunities or employing underinvestment approaches. Myers (1977) indicates that underinvestment is seen in the firms which are in growth phase. He adds that underinvestment performs better for them in order to find valuable investment opportunities. Therefore, it is suggested that these firms establish their capital structure by equity financing. However, Grossman (1988) declares that underinvestment can be controlled by employing short-term debt financing. This kind of financing can alleviate the agency problem and satisfy both parties' interests.

2.5 Determinants of Capital Structure

So far, capital structure theories are discussed which are used to determine an optimal capital structure. In this part, the determinants of capital structure are introduced and analyzed. These factors should be taken into account by firms to make a conclusion about their capital structure.

According to mentioned theories of capital structure, many studies have recognized some micro-level or firm-level characteristics that play important roles in

determination of the capital structure of firms. To make a list of these important factors, one can mention age of the firm, the firm size, asset structure, profitability, growth opportunities, firm risk level, taxation and ownership structure.

2.5.1 Tangibility of Assets

In terms of tangibility, assets can be divided into tangible assets and intangible assets. Every physical asset (building, machinery, computers and etc.) is a tangible asset. When a firm is looking for debt, creditors evaluate tangible assets as the most secure type of asset to be used as collateral.

On the other hand, intangible assets are those which do not have any physical appearance such as goodwill. They are very difficult to be priced because their trade involves a high degree of asymmetric information.

While capital structure decision makers are considering debt, tangible assets play an important role. The more tangible assets translate into the less leverage risk because debtors are more relaxed by having an access to liquid collaterals.

In the literature, tangible assets are measured by the ratio of fixed assets over total assets (Jensen and Meckling, 1976). It is argued that there should be a positive relationship between this ratio and leverage level. Based on the trade-off theory, lower expected costs and lower agency costs result in a lower risk perception for creditors toward corporations.

An empirical study by Gaud, Hoesli and Bender (2005) shows that there is a positive relationship between debt ratio and tangible assets considering a firm which employs tangible assets as collaterals.

In addition, a similar study (Frank and Goyal, 2007) indicates that firms which have higher proportions of tangible assets have shown empirically higher levels of leverage. Mjos' study (2007) bolsters this finding by investigating Norwegian companies. He finds that tangibility of assets is positively related with leverage and this relationship is statistically significant.

2.5.2 Firm Growth Opportunities

When a firm faces growth opportunities, it will definitely demand more for internal funds and most probably decides to borrow (Hall et al., 2004). It is also confirmed by Marsh (1982) study that firms with higher growth opportunities tend to have higher leverage ratios. Similarly, SMEs with high growth rates have a greater demand for external financing and accordingly they possess higher leverage (Heshmati, 2001). It is also seen that firms experience different forms of financing over their life. As they grow more, they shift financing sources. Expectedly, they evolve form internally-financed to externally-financed firms (Aryeetey, 1998).

However, empirical studies are not leading to a definite result. Some studies show a direct relationship between growth in sales and debt ratio (Kester, 1986; Titman and Wessels,1988). On the other hand, other researchers indicate that there is an indirect relationship between a firm's growth rate and the amount of its debt (Kim and Sorensen, 1986; Al-Sakran, 2001).

It is worth noting that the dividend policy of a firm can affectively play a role in determination of capital sources. So, a firm with a lower dividend payout rate would appear more oriented to internal funds in order to plan for growth opportunities. Since firms with lower dividend payment has higher retained earnings, they would demand less debt financing. On the other hand, firms with higher rate of dividend

payment demand unsurprisingly more debt financing to provide capital sources for their growth opportunities.

2.5.3 Risk level of Firm

According to the related literature, risk profile of a firm is believed to be an important determinant of firms' capital structure (Kale et al., 1991). Generally, firms avoid employing a 100% debt structure because of possible bankruptcy costs. Therefore, firms decide on their capital structure as a function of their risk profile (Castanias, 1983). Since volatile earnings could possibly lead to operating risks, firms prefer to reduce their debt level in order to mitigate their exposure to bankruptcy costs. As a study by Johnson (1997) shows, earning volatility bring firms to a position in which debt service obligations are met hardly. In a similar study, it is indicated that as business risk increases in firms, their ability to control and mitigate the risks decreases; therefore those firms are not able to use more leverage (Kim and Sorensen, 1986). In addition, an empirical research (Esperanca et al., 2003) reveals that firms' risk level is related to debt level both in long-run and short-run.

2.5.4 Taxation Benefit

Initially, the importance of tax benefit was appeared in the study of M&M (Modigliani an Miller, 1958). It is believed that tax is one of the most affecting factors on management decision making process for capital structure.

Logically, as tax rate helps firms to protect their income, it is expected that firms with a higher level of tax employ higher debt level. However, the tax shield is suitable where a firm is making profit, otherwise there would not be any advantage in increasing debt level. Theoretically, profitable firms should try to protect their profits against taxes as much as they can; but, practically, it is seen that this group of firms does not demand for external financing and particularly debt financing. Since they

have sufficient internal sources of capital, they finance their investments with retained earnings (Donaldson, 1961).

In addition, another study (Deangelo and Masulis, 1980) indicates that tax benefits are viable from different approaches including depreciation or capital allowances, R&D expenditures and etc. Therefore, these alternatives could likely provide the same feedback fiscally as debt does.

2.5.5 Profitability

There are many studies which are suggesting the potential relationship between profitability and debt level. Moreover, pecking order theory also confirms that profitability is expected to have a negative impact on debt ratio; that is, a firm with a higher profits has more retained earnings, so it would not most probably demand for external financing.

On the other hand, according to trade-off theory, if a firm has more profits, they would take more proportions of debt in capital structure. TOT declares that a profitable firm can use its capacity to protect its income against taxes. This is not feasible unless the firm employ a higher leverage. This fact could confirm that there would be expected to be a direct relationship between profitability and debt level (Myers, 1993).

In this chapter, we discussed some of the capital structure theories and then we introduced some potential determinants of capital structure which are commonly studied in the related literature.

Chapter 3

Data and Methodology

3.1 Type and Source of Data

In order to collect the related data for this study, we used Thomson Reuters' Data Stream. Balance sheet and income statements are gathered accordingly. The collected data covers the period starting from 1993 to 2012 and it is present quarterly. It should be noted that the availability of data is different for three companies. Specifically, Turkcell data covers the period starting from 2000 to 2012, while Vodafone and Telekom data are available in the period of 1993 up to 2012.

3.2 Methodology

Econometrically, the first step is to specify a model which our study will be based on it. Then, the stationary status of data will be checked. Next step will be the determination of coefficients of independent variables by employing regression analysis.

3.2.1 Model Specification

According to the literature, we have supposed that debt ratio of a company has a functional relationship with some company-specific independent variables which is shown below:

Debt Ratio = f (Tax Benefit, Growth Opportunities, Risk, Profitability, Tangibility)

Therefore, this functional relationship should be represented in an equation form in order to be investigated properly. According to the specific firm, we have defined an individual model as below:

- Telekom, Germany

$$\text{Debt Ratio}_i = \beta_0 + \beta_1 \text{Growth}_i + \beta_2 \text{Profitability}_i + \beta_3 \text{Risk}_i + \beta_4 \text{Tangiblity}_i + \beta_5 \text{ Tax Benefit}_i + \epsilon_i$$

- Turkcell, Turkey

$$\text{Debt Ratio}_i = \beta_0 + \beta_1 \text{Tax Benefit}_i + \beta_2 \text{Tangiblity}_i + \beta_3 \text{Profitability}_i + \beta_4 \text{Growth}_i + \beta_5 \text{ Risk}_i + \epsilon_i$$

- Vodafone, UK

$$\text{Debt Ratio}_i = \beta_0 + \beta_1 \text{Profitability}_i + \beta_2 \text{Tangiblity}_i + \beta_3 \text{Tax Benefit}_i + \beta_4 \text{Growth}_i + \beta_5 \text{ Risk}_i + \epsilon_i$$

Where, Debt Ratio_i is the dependent variable representing firm i. In addition, independent variables are specified in table 3.1:

Table 3.1: Specification of Independent Variables

Independent Variable	Variable Description
Tax Benefit	$\text{Tax Benefit} = \frac{\text{Depreciation}}{\text{Total Assets}}$
Growth	$\text{Growth} = \frac{\text{Total Asset (t)} - \text{Total Asset (t}-1)}{\text{Total Asset (t}-1)}$
Risk	$\text{Risk} = \frac{\text{EBIT (t)} - \text{EBIT (t}-1)}{\text{EBIT (t}-1)}$
Profitability	$\text{Profitability} = \frac{\text{EBIT}}{\text{Total Assets}}$
Tangibility	$\text{Tangibility} = \frac{\text{Fixed Assets}}{\text{TotalAssets}}$

3.2.2 Unit Root Tests for Time Series Data

In the framework of econometrics, time series data must be checked by unit root test, otherwise the regression will be spurious. So, the first stage should be unit root test. In this context, two types of unit root tests are employed:

- Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979)
- Phillips-Perron (PP) test (Phillips and Perron, 1988)

These tests reveal the stationary status of our variables. Variables are either stationary or non-stationary. If a variable is stationary in the level form, it is called I(0). Similarly, if a variable is stationary in the first difference order, it is called I(1). So, I(n) means that the variables is not stationary at its level form and it will be stationary if the nth. difference is taken of the variable.

The last but not the least point to mention is that the process of unit root test may involve a data generating trap. Therefore, researchers should carefully be aware of this phenomenon. Hence, as Doldado and et al. (1990) suggests, one should start from the most general form while conducting a unit root test (trend and intercept form).

3.2.3 Correlation Analysis

Multicollinearity is one the problems that reduces the level of model validity. This problem occurs when there are correlations between explanatory variables in a multiple regression model (Wooldridge, 2009). These relationships could be either negative or positive. It is worth noting that explanatory variables should have a high degree of correlation, otherwise we should omit one of them.

3.2.4 VAR models

In order to analyze the variables, the vector autoregression (VAR) models are applied. VAR models are popular because of their flexibility for time series data. They are one of the best options for analyzing a multivariate time series and they help to investigate the dynamic behavior of time series data in economics and finance. Their flexibility is mainly because of their conditional analysis based on the different behaviors of variables in different paths during the time.

This model is usually used to forecast the random disturbances of variables in interrelated time series. Every independent variable is treated is a function of the lagged values of all other variables which are being tested. In the following equation (3), the functional form of a VAR model is shown:

$$Y_t = c + \pi_1 Y_{t-1} + \pi_2 Y_{t-2} + \cdots + \pi_p Y_{t-p} + \varepsilon_t, t = 1, \dots, T \qquad (3)$$

Where,π_p are $K \times K$ matrices of coefficients, u_t is an $K \times 1$ unobservable zero mean white noise vector process with covariance matrix $\sum$.

Chapter 4

Empirical Results and Discussions

In this section of study, empirical results for each company are represented separately. Each section starts with descriptive statistics of the data and continues with the unit roots of time series. Then, the next part includes correlation analyses which are followed by VAR model estimates.

4.1 Descriptive Statistics

4.1.1 Turkcell

The following table (4.1) shows the descriptive statistics for Turkcell in the period of 1993 up to 2012. According to the table 4.1, the number of observations for Turkcell is 45. In addition, the highest level of debt ratio is 0.5225 or 52.25%, while the lowest level is 0.0900 or 9%. Turkcell has used on average 19.57% during this period.

Table 4.1: Descriptive Statistics of Turkcell

	N	Minimum	Maximum	Mean	Std. Deviation
Debt Ratio	45	0.090011	0.522501	0.195794	0.120284
Tangibility	45	0.476172	0.789689	0.614244	0.100922
Profitability	45	0.027192	0.235891	0.171840	0.048048
Risk	45	-0.579348	5.787446	0.582353	1.312357
Tax Benefit	45	0.065731	0.144831	0.103450	0.030710
Growth	45	-1.000000	5.787446	0.386867	1.167713

Similarly, the mean, maximum and minimum values of independent variables are shown in the table.

4.1.2 Telekom

Telekom descriptive statistics are depicted in the table 4.2. As it is shown, the number of observations is 73. The debt ratio of Telekom is on average 0.4597 or 45.97%. The highest debt ratio is 0.7036 or 70.36% and the lowest debt ratio is 0.3499 or about 35%.

Table 4.2: Descriptive Statistics of Telekom

	N	Minimum	Maximum	Mean	Std. Deviation
Debt Ratio	73	0.349922	0.703616	0.459703	0.096753
Tangibility	73	0.812628	0.896336	0.858718	0.017315
Profitability	73	-0.168105	0.107227	0.048216	0.052599
Risk	73	-10.89705	0.730892	-0.707965	2.147088
Tax Benefit	73	0.085525	0.116133	0.099379	0.008941
Growth	73	-0.234149	0.330569	0.025270	0.123262

Similarly, the descriptive statistics of other variables are listed in the table 4.2.

4.1.3 Vodafone

Telekom descriptive statistics are depicted in the table 4.3. As it is shown, the number of observations is 65. The debt ratio of Telekom is on average 0.1552 or 15.52%. The highest debt ratio is 0.4404 or 44.04% and the lowest debt ratio is 0.0058 or about 5.8%.

Table 4.3: Descriptive Statistics of Vodafone

	N	Minimum	Maximum	Mean	Std. Deviation
Debt Ratio	65	0.005826	0.440429	0.155268	0.105926
Tangibility	65	0.658768	0.986291	0.862346	0.088081
Profitability	65	-0.131361	0.375563	0.096758	0.159035
Risk	65	-4.994819	3.486107	-0.161408	1.418716
Tax Benefit	65	0.009357	0.134998	0.071978	0.027016
Growth	65	-3.543311	3.486107	0.055198	1.198049

Similarly, the descriptive statistics of other variables are listed in the table 4.3.

4.2 Unit root Tests of Time Series

4.2.1 Turkcell

As indicated in the previous chapter, time series data should be checked to see whether they are stationary or non-stationary.

In order to determine whether variables are stationary or not, t-statistics of unit root tests are evaluated. The results of ADF and PP tests report a t-statistics which is representative of rejection or acceptance of the null hypothesis. If t-values are less than the critical values, the null hypothesis is accepted means the variable has a unit root and vice versa. In case of non-stationary variables, the first difference tests might have enough evidence to reject the null.

The Table 4.4 shows the outcomes of ADF and PP tests. As it can be inferred from the table 4.4, Growth and Risk variables are stationary at their level form. In other words, they are I (0) variables. In addition, Debt Ratio, Tax Benefit, Profitability and Tangibility are not stationary at their level form; however, they are I (1) or stationary at their first difference.

4.2.2 Telekom

Table 4.5 depicts the results of unit root tests for Telekom data. It is shown in the table that Growth and Risk, similar to Turkcell data, are stationary at their level order. Therefore, these variables are called I (0). In addition, the other variables including Debt Ratio, Tax Benefit, Profitability and Tangibility are not stationary at their level order but they are stationary at their first difference. So, these variables are I (1).

4.2.3 Vodafone

The outcomes of unit root tests for Vodafone data are shown in the table 4.6. Similar to the previous ones, Vodafone data have two different statuses regarding to their orders. In this case, Growth and Risk are again stationary variables or I (0) variables, while Debt Ratio, Tax Benefit, Profitability and Tangibility are stationary at their first differences,I(1).

Table 4.4: Unit Root Tests for Turkcell

Statistics (Level)	Total Debt	Lag	Tax Benefit	Lag	Growth	Lag	Risk	Lag	Profitability	Lag	Tangibility	Lag
τ_T (ADF)	-2.01	(5)	-3.09	(1)	-3.94**	(1)	-4.24*	(2)	-3.16	(1)	-3.08	(5)
τ_μ (ADF)	-2.83***	(5)	-1.83	(1)	-3.72*	(1)	-4.27*	(2)	-3.45	(1)	-0.62	(5)
τ (ADF)	-2.22**	(5)	-0.87	(1)	-3.63*	(1)	-3.77*	(2)	-2.51	(1)	-0.46	(5)
τ_T (PP)	-1.49	(3)	-2.87	(5)	-2.24	(5)	-2.47	(3)	-2.43	(4)	-2.06	(3)
τ_μ (PP)	-2.24	(3)	-1.15	(5)	-2.27	(5)	-2.48	(3)	-1.81	(4)	-0.67	(3)
τ (PP)	-2.36**	(3)	-0.33	(5)	-2.31**	(5)	-2.31**	(3)	-1.89***	(4)	-0.81	(3)

Statistics (First Difference)	Total Debt	Lag	Tax Benefit	Lag	Growth	Lag	Risk	Lag	Profitability	Lag	Tangibility	Lag
τ_T (ADF)	-2.93	(4)	-3.79**	(0)	-3.27***	(4)	-3.47***	(4)	-3.43***	(1)	-3.22	(3)
τ_μ (ADF)	-2.13	(4)	-3.83*	(0)	-3.30**	(4)	-3.30**	(4)	-3.04**	(1)	-2.95**	(3)
τ (ADF)	-1.97**	(4)	-3.85*	(0)	-3.32*	(4)	-2.82*	(4)	-3.03*	(1)	-2.90*	(3)
τ_T (PP)	-3.41***	(1)	-3.75**	(2)	-4.17**	(2)	-4.37*	(2)	-3.47**	(3)	-4.43*	(1)
τ_μ (PP)	-3.27**	(1)	-3.78*	(2)	-4.19*	(2)	-4.39*	(2)	-3.33*	(3)	-3.44*	(1)
τ (PP)	-3.25*	(1)	-3.82*	(2)	-4.21*	(2)	-4.21*	(2)	-3.26*	(3)	-3.22*	(1)

τT represents the most general model with a drift and trend; $\tau\mu$ is the model with a drift and without trend; τ is the most restricted model without a drift and trend. Numbers in brackets are lag lengths used in ADF test (as determined by AIC set to maximum 3) to remove serial correlation in the residuals. When using PP test, numbers in brackets represent Newey-West Bandwith (as determined by Bartlett-Kernel). Both in ADF and PP tests, unit root tests were performed from the most general to the least specific model by eliminating trend and intercept across the models (See Enders, 1995: 254-255). *, ** and *** denote rejection of the null hypothesis at the 1%, 5% and 10% levels respectively. Tests for unit roots have been carried out in E-VIEWS 7.

Table 4.5: Unit Root Tests for Telekom

Statistics (Level)	Total Debt	Lag	Tax Benefit	Lag	Growth	Lag	Risk	Lag	Profitability	Lag	Tangibility	Lag
τ_T (ADF)	-3.78**	(1)	-3.72**	(5)	-3.96**	(1)	-4.14*	(1)	-3.99**	(1)	-3.75**	(5)
τ_μ (ADF)	-3.54	(1)	-2.89***	(5)	-3.75*	(1)	-4.17*	(1)	-3.65	(1)	-3.72*	(5)
τ (ADF)	-1.02	(1)	0.02	(5)	-3.71*	(1)	-3.87*	(1)	-2.81	(1)	-0.16	(5)
τ_T (PP)	-2.11	(6)	-2.66	(4)	-2.42	(5)	-2.57	(4)	-2.45	(5)	-3.68**	(4)
τ_μ (PP)	-1.90	(6)	-2.75***	(4)	-2.32	(5)	-2.58	(4)	-2.21	(5)	-3.77	(4)
τ (PP)	-0.61	(6)	-0.52	(4)	-2.35**	(5)	-2.41**	(4)	-1.86***	(5)	-0.61	(4)

Statistics (First Difference)	Total Debt	Lag	Tax Benefit	Lag	Growth	Lag	Risk	Lag	Profitability	Lag	Tangibility	Lag
τ_T (ADF)	-2.42	(0)	-3.81**	(2)	-3.37***	(4)	-3.37***	(4)	-3.33***	(0)	-3.32	(4)
τ_μ (ADF)	-2.44	(0)	-3.83*	(2)	-3.40**	(4)	-3.40**	(4)	-3.14**	(0)	-2.90**	(4)
τ (ADF)	-2.42**	(0)	-3.59*	(2)	-3.42*	(4)	-2.72*	(4)	-3.08*	(0)	-2.94*	(4)
τ_T (PP)	-2.53	(2)	-3.81**	(2)	-4.27**	(2)	-4.27*	(2)	-3.57**	(3)	-4.23*	(2)
τ_μ (PP)	-2.55	(2)	-3.83*	(2)	-4.29*	(2)	-4.29*	(2)	-3.43*	(3)	-3.94*	(2)
τ (PP)	-2.54**	(2)	-3.85*	(3)	-4.31*	(2)	-4.31*	(2)	-3.36*	(3)	-3.92*	(2)

τT represents the most general model with a drift and trend; $\tau\mu$ is the model with a drift and without trend; τ is the most restricted model without a drift and trend. Numbers in brackets are lag lengths used in ADF test (as determined by AIC set to maximum 3) to remove serial correlation in the residuals. When using PP test, numbers in brackets represent Newey-West Bandwith (as determined by Bartlett-Kernel). Both in ADF and PP tests, unit root tests were performed from the most general to the least specific model by eliminating trend and intercept across the models (See Enders, 1995: 254-255). *, ** and *** denote rejection of the null hypothesis at the 1%, 5% and 10% levels respectively. Tests for unit roots have been carried out in E-VIEWS 7.

Table 4.6: Unit Root Tests for Vodafone

Statistics (Level)	Debt Ratio	Lag	Tax Benefit	Lag	Growth	Lag	Risk	Lag	Profitability	Lag	Tangibility	Lag
τ_T (ADF)	-2.15	(8)	-3.64**	(1)	-4.14*	(5)	-4.14*	(5)	-1.96	(1)	-1.48	(5)
τ_μ (ADF)	-1.83	(8)	-3.55*	(1)	-4.18*	(5)	-4.18*	(5)	-2.16	(1)	-2.18	(5)
τ (ADF)	-0.05	(8)	-1.25	(1)	-4.13*	(5)	-4.13*	(5)	-2.22**	(1)	0.22	(5)
τ_T (PP)	-3.04	(3)	-2.30	(5)	-3.04	(4)	-3.04	(4)	-1.11	(5)	-1.58	(4)
τ_μ (PP)	-2.75***	(3)	-2.24	(5)	-3.05**	(4)	-3.05**	(4)	-1.95	(5)	-2.60***	(4)
τ (PP)	-1.10	(3)	-0.96	(5)	-3.03*	(4)	-3.03*	(4)	-2.29**	(5)	0.07	(4)
Statistics (First Difference)	Total Debt	Lag	Tax Benefit	Lag	Growth	Lag	Risk	Lag	Profitability	Lag	Tangibility	Lag
τ_T (ADF)	-7.19*	(0)	-2.77	(4)	-3.47**	(0)	-2.67	(8)	-3.48**	(0)	-2.99	(4)
τ_μ (ADF)	-7.23*	(0)	-2.78***	(4)	-3.47**	(0)	-2.69***	(8)	-3.48**	(0)	-3.03**	(4)
τ (ADF)	-7.24*	(0)	-2.83*	(4)	-3.49*	(0)	-2.72*	(8)	-3.48*	(0)	-3.05*	(4)
τ_T (PP)	-7.25*	(3)	-4.08*	(2)	-3.72**	(2)	-3.92**	(2)	-3.76**	(2)	-4.16*	(0)
τ_μ (PP)	-7.29	(3)	-4.07*	(2)	-3.73*	(2)	-3.94*	(2)	-3.76*	(2)	-4.24*	(0)
τ (PP)	-2.54**	(3)	-4.11*	(3)	-3.74*	(2)	-3.96*	(2)	-3.76*	(2)	-4.28*	(0)

τT represents the most general model with a drift and trend; $\tau\mu$ is the model with a drift and without trend; τ is the most restricted model without a drift and trend. Numbers in brackets are lag lengths used in ADF test (as determined by AIC set to maximum 3) to remove serial correlation in the residuals. When using PP test, numbers in brackets represent Newey-West Bandwith (as determined by Bartlett-Kernel). Both in ADF and PP tests, unit root tests were performed from the most general to the least specific model by eliminating trend and intercept across the models (See Enders, 1995: 254-255). *, ** and *** denote rejection of the null hypothesis at the 1%, 5% and 10% levels respectively. Tests for unit roots have been carried out in E-VIEWS 7.

4.3 Correlation Analysis

4.3.1 Turkcell

In order to check the degree of multicollinearity between variables, our variables are checked by correlation analysis. The outcomes for Turkcell (Table 4.7) show that the highest correlation exists between D (Tangibility) and D (Tax Benefit) (0.550). It can be interpreted that higher proportion of fixed assets is associated with higher depreciation costs and as a result, higher tax benefit. In addition, D (Tax_Benefit) has the lowest correlation level with D (Profitability) (-0.031). Tax benefit is a product of depreciation deductibility and profitability is the ratio of earnings to total assets. Hence, they have nothing to do with each other.

4.3.2 Telekom

Similarly, the same analysis is done for Telekom in the Table (4.8). The outcomes for Turkcell show that the highest correlation exists between Growth and D (Tax Benefit) (-0.615). In addition, D (Tax_Benefit) has the lowest correlation level with D(Debt Ratio) (0.009). It is logical that tax benefit has the lowest correlation with debt ratio. Since tax benefit in this context is concerned about the depreciation, so the changes in tax benefit does not have anything in common with debt ratio.

4.3.3 Vodafone

Like the other two firms, correlation analysis is done for Vodafone data. The results in the Table 4.9 show that the highest correlation is between Growth and Risk (0.619) which can be translated as the trade-off between risk and higher return opportunities; while the lowest one exists between D (Tax_Benefit) and D(Profitability) (-0.031).

Similar to the Turkcell data, tax benefit and debt ratio changes do not have any explanation for their correlation because they are irrelevant.

4.4 VAR Model Estimations

In this section, the estimations of VAR models are represented for each company. As mentioned above, VAR models are one of the best options to analyze the relationship between variables in time-series data. The results are appeared in the following section. It should be noted here that the results in the table only represent the significant ones.

Table 4.7: Correlation Analysis of Turkcell

	D(DEBT RATIO)	D(TANGIBLITY)	D(PROFITABILITY)	D(TAX_SHIELD)	RISK	GROWTH
D(DEBT RATIO)	1					
D(TANGIBLITY)	0.313	1				
D(PROFITABILITY)	-0.129	-0.222	1			
D(TAX_BENEFIT)	-0.097	0.550	-0.031	1		
RISK	-0.350	-0.132	-0.301	-0.131	1	
GROWTH	0.053	-0.409	0.142	-0.115	0.317	1

Table 4.8: Correlation Analysis of Telekom

	D(DEBT RATIO)	D(TANGIBLITY)	D(PROFITABILITY)	D(TAX_BENEFIT)	RISK	GROWTH
D(DEBT RATIO)	1					
D(TANGIBLITY)	0.133	1				
D(PROFITABILITY)	-0.142	-0.249	1			
D(TAX_BENEFIT)	0.009	0.430	-0.063	1		
RISK	-0.251	-0.129	0.361	-0.181	1	
GROWTH	0.067	-0.309	0.042	-0.615	0.539	1

Table 4.9: Correlation Analysis of Vodafone

	D(DEBT RATIO)	D(TANGIBLITY)	D(PROFITABILITY)	D(TAX_BENEFIT)	RISK	GROWTH
D(DEBT RATIO)	1					
D(TANGIBLITY)	0.152	1				
D(PROFITABILITY)	-0.236	-0.126	1			
D(TAX_BENEFIT)	0.084	0.374	-0.031	1		
RISK	-0.282	-0.097	0.301	-0.211	1	
GROWTH	0.100	-0.333	0.096	-0.446	0.619	1

4.4.1 The VAR estimates for Turkcell

VAR models are flexible models which are properly employed for time series data. Table 4.10 shows the outcome of VAR estimation for Turkcell data. As it can be inferred from the results, the behavior of debt ratio is dependent on the behavior of the

Table 4.10: VAR estimates for Turkcell*

	D(DEBT_RATIO)
D(DEBT_RATIO(-1))	0.792662
	(0.44160)
	[1.79499]
D(TANGIBLITY(-4))	0.497769
	(0.19298)
	[2.57934]
D(TAX_BENEFIT(-4))	-1.962324
	(0.78619)
	[-2.49598]
D(PROFITABILITY(-4))	0.383297
	(0.19235)
	[1.99271]
GROWTH(-4)	0.056481
	(0.01800)
	[3.13745]
RISK(-1)	-0.102785
	(0.03475)
	[-2.95779]
C	-0.001286
	(0.00216)
	[-0.59523]
R-squared	0.978145
Adj. R-squared	0.945362
Sum sq. resids	0.000770
S.E. equation	0.006939
F-statistic	29.83738
Log likelihood	164.9078
Akaike AIC	-6.824772
Schwarz SC	-5.779911
Mean dependent	-0.008350
S.D. dependent	0.029686

*denotes that only the statistically significant coefficients are shown in the table.

last period debt ratio. This relationship is shown by the first lag of debt ratio which is statistically significant in the 10 % confidence interval. In addition, this relationship is positive which means that as a firm becomes older, its debt capacity increases. The next

variable to be discussed is D (Tangibility) which is significant at its fourth lag. This model shows that tangibility is associated with debt ratio positively. In other words, as tangibility of assets increases, the potential of debt financing increases since the creditors tend to lend more when there are more tangible assets to be titled as collaterals. The next determinant of capital structure which shows significant relationship is tax benefit. This variable shows a negative relationship with debt ratio. This implies that as tax benefit increases, the debt ratio decreases. One can interpret as tax savings caused by depreciation increases, the advantage of interest tax savings by debt financing becomes less important, so debt ratio decreases. Profitability is the next significant determinant which is significant at its fourth lag. The positive relationship implies that firms prefer to use more debt financing to leverage their investments to earn more profits. Therefore, higher profits are associated with higher debt ratios. In this case, if Turkcell shows 1% increase in its profitability, its debt ratio should have been raised by 38.32 percent on average (keeping everything else constant). Growth and Risk also show significant relationships. The former, Growth, represents a positive coefficient which means that higher growth opportunities are necessarily associated with higher debt ratios. A growing firm needs external financing to invest. The latter, Risk, shows a negative coefficient which is obviously the predicted impact of volatility of the earnings on the creditors. Higher risk lessens the willingness of debtors to lend.

4.4.2 The VAR estimates for Telekom

Table 4.11 depicts the estimates of VAR model for Telekom. Similar to the results of Turkcell, debt ratio has positive relationship with its first lag. This can be translated to the increase in level of debt ratio as a firm becomes older.

Table 4.11: VAR model estimates for Telekom*

	D(DEBT_RATIO)
D(DEBT_RATIO(-1))	0.962053 (0.15125) [6.36089]
D(TAX_BENEFIT(-4))	-1.449281 (0.63426) [-2.28498]
D(TANGIBLITY(-5))	0.291320 (0.14333) [2.03250]
D(PROFITABILITY(-4))	-1.054155 (0.33895) [-3.11010]
GROWTH(-1)	0.071926 (0.05822) [1.23541]
RISK(-5)	-0.016777 (0.00770) [-2.17830]
C	-0.001322 (0.00099) [-1.33165]
R-squared	0.900912
Adj. R-squared	0.820570
Sum sq. resids	0.001016
S.E. equation	0.005240
F-statistic	11.21352
Log likelihood	281.2989
Akaike AIC	-7.361733
Schwarz SC	-6.349899
Mean dependent	-0.003888
S.D. dependent	0.012371

*denotes that only the statistically significant coefficients are shown in the table.

The first independent variable which is shown in the table is tax benefit which shows a negative relationship in its fourth lag. The negative relationship has a similar interpretation with the Turkcell one. Increasing tax benefits of depreciation reduces the present values of tax savings by interests. The next determinant of capital structure in the table is tangibility. Similarly, there is a positive relationship here with the same interpretation. Profitability also shows the same behavior in this case. So, whenever Telekom has shown higher profits, a higher debt ratio is associated. Growth and Risk are also show a positive and negative behavior respectively.

4.4.3 The VAR estimates for Vodafone

It is shown in the Table 4.12 that how debt ratio of Vodafone is related with its capital structure determinants. The first note is the relationship of debt ratio with its previous lags which in this case is the fourth lag. So, the same interpretation exists here. All other independent variables show the same signs but they have different amounts.

Table 4.12: VAR model estimates for Vodafone*

	D(DEBT_RATIO)
D(DEBT_RATIO(-1))	0.882000
	(0.18571)
	[4.74940]
DPROFITABILITY(-5)	4.089842
	(2.06558)
	[1.98001]
DTANGIBLITY(-4)	2.448384
	(1.37319)
	[1.78299]
DTAX_BENEFIT(-5)	-6.956082
	(2.98533)
	[-2.33008]
GROWTH(-5)	0.036806
	(0.02120)
	[1.73598]
RISK(-1)	-0.077173
	(0.03962)
	[-1.94783]
C	0.059897
	(0.02937)
	[2.03956]
R-squared	0.811207
Adj. R-squared	0.608930
Sum sq. resids	0.111547
S.E. equation	0.063117
F-statistic	4.010363
Log likelihood	101.2727
Akaike AIC	-2.382125
Schwarz SC	-1.290538
Mean dependent	0.169307
S.D. dependent	0.100930

*denotes that only the statistically significant coefficients are shown in the table.

Chapter 5

CONCLUSION

5.1 Conclusion

This thesis investigates the determinants of capital structure of telecommunication firms especially cell phone operators. Accordingly, five characteristics of firms in the sample are selected to be analyzed: tangibility of assets, profitability, growth, risk and tax benefit. The sample is consisted of three large operators in Europe including Turkcell, Telekom and Vodafone and the period of study is from 1990 up to 2012. The main findings of our study are summarized below:

- As the firms become older, their debt ratio increases accordingly. In other words, debt ratio is correlated with its lagged values.
- Firms with higher proportions of tangible assets tend to employ higher debt ratios in their financing decisions.
- Firms which benefit from depreciation tax savings tend to use less debt financing because the present value of interest tax savings are low.
- Firms show that higher profits are associated with higher debt ratio. In other words, a firm which is going to increase its profitability should use debt as leverage for investments.

- Firms which are facing growth opportunities tend to have higher debt ratios.

Although our results represent significant coefficients for the selected determinants, there might be other variables which are not included in our model.

5.3 Policy Implications

The main findings of this study suggest some implications for financial managers of telecommunication industries. For instance, holding more tangible assets can increase their creditworthiness in the banker's point of view. Similarly, insuring a safer stream of income would decrease the risks associated with debt financing. So, financial decision makers should optimize their income.

It is also worth noting that policy makers should be well aware of maturity of assets. As our findings show, there are many risks and pressures associated with debt financing decisions. Therefore, managing the duration of assets and matching maturities should be one of the important tasks of financial managers.

All mentioned in this study shows the sensitivity of debt financing as a reliable source of financing. It is suggested to the financial managers to implicate some financing strategies to optimize their capital structure. A sample policy implication could be categorizing debt financing decisions based on their maturity. For instance, the determinants which affect the capital structure of a firm in short run are different from those which affect in long run. Therefore, another policy implication could be categorization of debt ratios.

5.4 Shortcomings of Study and Direction of Further Research

Any research is limited by some kind of confronters in the methodology and data. The availability of data is a problem for researchers in this field. As this study has investigated three large operators, it cannot be titled as the whole industry analysis; however, it is a representative of telecommunication industry. Another shortcoming of the study could be the definition of proxies for independent variables. One can claim that there are other proxies to be used but as we are going to be consistent with the previous literature, we should stick to the previous studies.

One of the possibilities of further research is the generalization of the investigation for the industry. This study only focuses on three large European operators. The further research can consider a larger sample which can be representative of the industry.

Another possibility for researchers is the study of country-specific factors. This study only considers the firm-specific characteristics and can be complemented by country specific-factors.

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