

Capital Structure And Financial Crisis: Evidence From Turkey

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Abstract

The Financial crisis (FC) displayed a crucial impact on the financial markets, incredibly decreasing security issuance by companies. A standout amongst the outcome of the interruption of the capital furthermore lending markets created by financial crisis might have been enhancing the level of debt in firm capital structures. Therefore, this paper uses Dynamic Panel Data (GMM) Estimator in order to investigate the impact financial crisis on capital structure over a sample of 15 cement firms that are recorded on Istanbul Stock Exchange from 2005 to 2017. Financial debt is utilized as evaluation of dependent variables (DV) while, Size, Growth, Tangibility and Profitability are used in assessment of independent variables (IV). The results indicate that there is connection between firm's capital structure and financial crisis. Furthermore; the results express that firm size, tan, growth are positive associated with leverage while profitability, NDTS, CR, Crisis and leverage are negatively related.

Keywords: Capital Structure, Leverage, Liquidity, Financial Crisis, and Cement Companies.

JEL Codes: G30, G01, G32, L61

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1. Introduction

Choosing the suitable capital structure may be the critical choice of the financial management. As a result, it is almost recognized the corporate value. Furthermore, the structure of capital states that all the kind of securities and also the amounts of proportion that create capitalization. This is the mixture of various sources of long-term sources for example, such that equity, share, preference share, debentures, long -term credits also retained earnings. To start with talk regarding the capital structure, Modigliani and Mill (1958) expressed that the capital structure of organizations does not impact on the corporation's value. Besides, according to Modigliani and Miller's contention will be in light of a few presumptions for example, there will be a perfect capital market, there are no retained earnings and corporate taxes, the investors' gesture rationally, the dividend payout ratio may be hundred percent and the business comprises of the same level of firm risk (Paramasivan and Subramanian, 2009).

The term crisis in finance is named as an interruption to financial markets in which unfavorable choice furthermore, moral risk issues get extensively unpleasant, thus, financial markets can incapable to proficiently channel fund with the persons that gain the best fruitful fund chances (Mishkin, 2001:2). A financial crisis thus brings about disappointment or failure of financial markets to work efficiently, which prompts a sharp contraction in economic action. Researchers are attempting to understand the effect of the crisis in finance on the capital structure of company.

Did the financial crisis effect on Capital Structure in Turkey Cement companies or not? In order to find the answer for this question, this study researches the impact of the crisis in finance on the capital structure of Cement companies in Turkey for the period of 2005-2015. The research is arranged into five categories. The first one as introduction, the second section as literature reviews while methodology is discussed in the third one. Finally; section four focuses on the results and section five highlights the study conclusion.

2. Literature Review

2.1 Theories of Capital Structure

Capital structure is defined by Brigham and Ehrhardt (2013) as the firm's mixture of debt and equity hence a considerable studies have been carried out highlighting diverse parts of the capital structure theories for companies. anyhow this quest began with Modigliani and Miller (1958) at they provided for their theory of irrelevency: capital structure is unimportant of the firm's worth done impeccable market with symmetric information when there would no agency costs, bankruptcy costs and taxes. Modigliani and Miller (1963) included corporate taxes in their model furthermore found that the firm worth build or grow at the leverage raise because the tax-deductibility of debt.

Miller (1977) himself included personel taxes also pointed that the income from debt, which will be by interest, may be, is taxed concerning personal income, same time the income from stocks is taxed during a lower rate and the tax of capital gains might deferred until the stock may be sold thus he closed that the deductibility of interest favors the utilization of debt financing, yet supporting a better successful tax treatment of revenue from stock favors the utilization of equity financing.

In the static trade-off theory, a company's optimal capital structure is arrived at when a trade off costs and benefit to borrowing, at the margin eventually by cost of financial distress as stated by Myers (1984).

He demonstrates an additional theory (1984) organizations prefer toward with pecking order, i.e. organizations like internal finance (retained earnings) by reinvesting its profit furthermore selling its marketable securities.

Jensen and Meckling (1976) state that the agency theory might be a demonstration to transform the capital structure and it portrays the separation between principal and agent

In signaling theory, MM accepted that investors have the same information something like a business's prospects likewise managers. This may be called symmetric information. However, managers frequently have better information over outside investors. This may be titled asymmetric information. Asymmetric information has crucial influence on the optimal capital structure (Brigham and Houston, 2003).

2.2 Capital Structure Determinants

Size, growth, tangibility, profitability, non-debt tax shield and liquidity are the major factors that determine capital structure. Size of the firm impacts the capital structure. Huge numbers of researchers have various conclusions over the correlation between size and capital structure. For example, Rajan and Zingales (1995), consider capital structure and factors affecting capital structure for a test of G7 countries. They found debt and size are positively related for all G-7 countries and just to Germany showed up for a chance to be negative. Titman and Wessels (1988) presume that firm size and capital structure are connected.

In the findings of Wald (1999) to study size and leverage, a positive relationship was found for organizations in the USA, UK, France and Japan however a negative relationship was recorded for German Organizations.

On the different hand, there are other researchers with an additional conclusion for example Tong and Green, (2005), presume that size and also capital structure are negatively linked.

Growth likewise impacts the capital structure. As indicated by the theory of pecking order theory, initial preference to finance a new investment is with internal funds; therefore, according to Titman and Wessels (1988) show that growth and leverage are negatively connected.

According to Green et al. (2001) trust that this negative association between leverage and growth will be that organizations don't differentiate long term and short-term obligation.

Researchers have demonstrated opposing outcomes in regards profitability furthermore leverage for their investigations. Pecking order theory proposes that profitability and leverage are negatively related. Anyway trade-off theory asserts concerning illustration the organizations would profitability hence they might want to keep their internal funds and might access to outside funds with particular finance their investment.

A few investigations by researchers have demonstrated a negative association the between profitability and leverage according to Chen, 2004; Tong and Green, 2005 which helps to the pecking order theory. Similarly, the forecasts done by pecking order theory show that a firm's profitability tends to employ less debt financing as they are show ability to accumulate profit in large amounts (Jermias and Yigit, 2019).

As stated by Myers and Majluf (1984), tangibility and leverage are relied upon with bring a sure positive association. They stated that organizations by issuing secured debt might have the ability to reduce information asymmetries generally it might a chance to be costly for them similarly as different investors have information over it.

On contrast, Titman and Wessle (1988) argue that this association might be negative as exactly managers might devour more than the optimal level they are permitted.

Non-debt tax shield will be appropriate to the organizations if company's profit is reliably turning into low or it is negative.

DeAngelo and Masulis (1980) state that one alternative to tax shield on debt financing is NDTs.

Studies have demonstrated truly blended outcomes in regards to the association between NDTs and leverage. Bradley et al. (1984) have demonstrated positive relationship the between of the NDTs and leverage however Wald (1999) have indicated a negative relationship between of NDTs and leverage.

Antoniou (2008) and Mazur (2007) specified that leverage and liquidity are negatively linked, something like that organizations having more liquid might issue less debt and utilize their internal return rather to perform their organizations. Abdullah (2005) communicated that short term debt and liquidity show a critical negative relationship.

2.3. Capital Structure and Financial Crisis in Prior studies

Gocmen and Sahin (2014) studied the determinants of bank capital structure and the Global financial crisis of Turkish commercial banks for a period 2004-2011. They figured out that profitability of commercial banks in Turkey and leverage ratios were significant negatively related. With highly fluctuating operating income, Turkish commercial banks prefer to use less leverage before and after the crisis. Also, the results reveal that larger banks with higher potential for growth utilize more leverage.

Proenca et al., (2014) investigates the determinants of capital structure and the 2008 financial crisis of SMEs in Portuguese for period 2007-2010. Results indicate that the most essential factors of capital structure are liquidity, asset structure, and profitability. The findings point to a declining trend in company debt ratios during the financial crisis.

Zhang and Mirza (2015) looked in to the determinants of capital structure of firms in financial crisis with sample 897 Chinese listed non-financial firms during the period between 2003-2012. The investigator reached to the conclusion that liquidity has remained unchanged in both pre and post financial crisis periods, although tax, non-debt tax shield, tangibility, economic development and inflation have all witnessed an extremely significant.

3. Research Methodology

The financial crisis results in the failure of financial markets to function efficiently, significantly lending by financial intermediaries or/ and reducing issuance of security. However, one of the outcomes of the interruption of capital and lending markets created by a crisis in finance is a result of an increment in the amount of debt. So in this study, we find out the impact of recent crises in finance on the capital structure of 15 Cement companies in Listed ISE in Turkey for period between 2005 and 2017. The effect of the crisis in the finance company's capital structure is inspected through panel data regression models. Panel data sets would for the most part portrayed toward a test about units observed over a number for periods permitting analysts or researchers should apply complex models over the ones utilized within cross-sectional or time series analysis.

3.1. Sample and Data

Though ISE Trading Index list seventeen (17) cement firms, a sample of only of fifteen (15) companies are chosen. These 15 companies are shown below: -

-ADANA ÇİMENTO SANAYİ T AŞ

-AFYON ÇİMENTO SANAYİ T. AŞ.

-ÜNİYE ÇİMENTO SANAYİ VE TİCARET A.Ş.

-ASLAN ÇİMENTO AŞ.

-NUH ÇİMENTO SANAYİ A.Ş.

-GÖLTAŞ GÖLLER BÖLGESİ ÇİMENTO SANAYİ VE TİCARET A.Ş.

-MARDİN ÇİMENTO SANAYİİ VE TİCARET A.Ş.

-BURSA ÇİMENTO FABRİKASI A.Ş.

- BATISÖKE SÖKE ÇİMENTO SANAYİİ T.A.Ş.
- ÇİMENTAŞ İZMİR ÇİMENTO FABRİKASI T.A.Ş.
- KONYA ÇİMENTO SANAYİİ A.Ş.
- BOLU ÇİMENTO SANAYİİ A.Ş.
- BATIÇİM BATI ANADOLU ÇİMENTO SANAYİİ A.Ş.
- AKÇANSA ÇİMENTO SANAYİ VE TİCARET AŞ
- ÇİMSA ÇİMENTO SANAYİ VE TİCARET A.Ş.

Data used in the study is mainly secondary data. It is obtained from the cement firms listed on ISE public disclosure platform (www.kap.gov.tr) for the period 2005-2017. The data was analyzed using STATA software package GMM to create a model that was used to achieve the objective of the study.

3.2. Measurement of Variables

3.2.1. Dependent Variable (DV)

The study uses three dependent variables to measure the financial debt (Leverage), i.e. the capital structure, are:

1. Total debt ratio (TD) is a proxy measure of the firm's capital. TD is measured as the following
Debt ratio= Total debt/ Total asset.
2. Short-term debt ratio (STD) is a proxy measure of a firm's capital structure, measured by
Short term debt ratio= total short term debt / Total assets.
3. Long term debt ratio (LTD) is dependent variable. It is proxy of the capital structure of the corporation, measured by
Long term debt ratio= Total long term liabilities / Total assets.

3.2.2. Independent Variable (IV)

To investigate the effect financial crisis on capital structure the researcher uses the following variables and formulas:

1. **Size:** it was used as independent variables and the formula to calculate it is as the following:

The Natural Logarithm of Total Assets

2. Growth: it was used as independent variable and the formula to calculate growth is calculated as the following:

$$[(\text{Sales}_t - \text{Sales}_{t-1}) / \text{Sales}_{t-1}]$$

3. Tangibility: it was employed as independent variable and Tangibility is calculated as following:

$$\text{Tangibility} = \text{Fixed asset} / \text{Total asset}$$

4. Profitability: return on asset (ROA) is the independent variables, it is proxy of the firm's profitability and it computed as the following:

$$\text{Return on Asset} = \text{Net sales} / \text{total asset}$$

5. Non Debt Tax Shield (NDTS): NDTS calculated as shown below was the independent variable.

$$\text{Depreciation Ratio} = \text{Depreciation} / \text{total assets}$$

6. Liquidity: in this study, current ratio (CR) is independent variables, it is proxy of the firm's liquidity and it calculates as;

$$\text{Current Ratio} = \text{current assets} / \text{current liabilities}$$

Dummy Crisis: this study assumes that crisis occurred in 2008-2010 and takes value of 1 for mentioned period, while it accepts that no crisis in finance happed in these years 2005, 2006, and 2007, 2011-2017 and takes value of 0.

Table below is indicating all variables of the study.

Table 1: Variables

| Variables | Measurement | Abbreviation |
|------------------------------|--|--------------|
| Dependent variable | | |
| Leverage | Debt ratio= Total debt/ Total asset. | Lev |
| Independent variables | | |
| Size | The Natural Logarithm of Total Assets | Size |
| Growth | $[(Sales_t - Sales_{t-1}) / Sales_{t-1}]$ | Growth |
| Profitability | ROA = Net Income / Total Assets. | ROA |
| Tangibility | Tangibility= Fixed asset/ Total asset | Tan |
| Non Debt Tax Shield | Depreciation Ratio =Depreciation /total assets | NDTS |
| Debt Ratio | DR= Total Debt / Total Assets. | DR |
| Liquidity | Current Ratio= current assets /current liabilities | CR |

We can generalize equation (1) to write a dynamic panel model as (Flannery and Hankins, 2013):

$$y_{it} = \alpha + \rho y_{i,t-1} + \beta X_{it} + (v_i + u_{it})$$

The study utilizes the below model:

$$Lev_{it} = \beta_0 + \beta_1 Tang_{it} + \beta_2 ROA_{it} + \beta_3 CR_{it} + \beta_4 NDTS_{it} + \beta_5 Growth_{it} + \beta_6 Size_{it} + \beta_7 Crisis_{it} + \epsilon_{it}$$

4. Results

The outcomes of the dissection like the impacts of financial crisis on capital structure are introduced below. The section including Lev, Tang, ROA, Growth, Size, CR, NDTS, and Crisis may be comprised of three parts as Descriptive Statistics, Correlation, and Dynamic Panel Data (GMM) Estimator.

4.1 Descriptive Statistics

Table 2: Descriptive Statistics

| Descriptive Statistics | | | | | |
|------------------------|-----|---------|---------|---------|----------------|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Lev | 195 | .01 | .74 | .2537 | .14030 |
| Tang | 195 | .00 | 5.06 | .6577 | .41275 |
| ROA | 195 | -.03 | 1.27 | .5552 | .27643 |
| Growth | 195 | -.30 | 1.76 | .1117 | .20231 |
| Size | 195 | 13.43 | 21.90 | 19.5659 | 1.68615 |
| CR | 195 | .15 | 12.27 | 3.3055 | 2.19092 |
| NDTS | 195 | .00 | .07 | .0374 | .01092 |
| Crisis | 195 | .00 | 1.00 | .2308 | .42241 |
| Valid N (listwise) | 195 | | | | |

For a total of 195 observations in the time period of study from 2005 to 2017, the analysis has been summarized above table. The findings of the analysis show that leverage have a lowest of 0.01 and a highest of 0.74. The average of the sample is 0.2537 with standard deviation of 0.14030. The mean tangibility is 0.6577 with a standard deviation of 0.41275 minimum of 0.0 and maximum 5.06. It is found that return on assets has a mean value of 0.5552 with standard deviation of 0.27643. The growth ranges (-0.30 – 1.76) with the mean of 0.1117 with standard deviation of 0.20231. The size ranges from 13.43 to 21.90, the average of 19.57 with standard deviation of 1.68615. Current Ratio gave the highest value of standard deviation at 2.19092, indicating a wide variation in leverage among cement companies. At the same time CR provided the minimum value of 0.15 and the maximum 12.27, the average value of 3.3055. The NDTS

ranges from 0.00 to 0.07 with the average of 0.0374 with standard deviation of 0.01092. The crisis ranges from 0-1 and has a mean value 0.2308 with standard deviation of 0.42241.

4.2 Correlation Analysis

Table 3 shows the relationships for the greater part based on the computation of financial statements of 15 companies for the period of 2005-2017. It indicates that capital structure is associated with financial crisis for all variables under this study namely, Lev, Tang, ROA, Growth, Size, CR, NDTS and Crisis.

Table 3: Correlations

| | | Lev | Tang | ROA | Growth | Size | CR | NDTS | Crisis |
|---------------|--|-----|------|---------|--------|-------|---------|---------|---------|
| Lev | | 1 | .019 | -.336** | .140 | .095 | -.651** | -.223** | -.206** |
| | | | .796 | .000 | .052 | .187 | .000 | .002 | .004 |
| | | | | | | | | | |
| Tang | | | 1 | -.013 | .076 | -.041 | -.024 | -.121 | .061 |
| | | | | .862 | .293 | .569 | .743 | .092 | .401 |
| | | | | | | | | | |
| ROA | | | | 1 | .035 | -.076 | .206** | .396** | .125 |
| | | | | | .625 | .290 | .004 | .000 | .081 |
| | | | | | | | | | |
| Growth | | | | | 1 | -.014 | -.112 | -.022 | -.289** |
| | | | | | | .849 | .119 | .762 | .000 |
| | | | | | | | | | |
| Size | | | | | | 1 | -.010 | -.075 | -.063 |
| | | | | | | | .891 | .299 | .384 |
| | | | | | | | | | |
| CR | | | | | | | 1 | .032 | .138 |
| | | | | | | | | .656 | .054 |
| | | | | | | | | | |
| NDTS | | | | | | | | 1 | .121 |
| | | | | | | | | | .092 |
| Crisis | | | | | | | | | 1 |
| | | | | | | | | | |

The findings indicate that companies' capital structure does not have significantly altogether through financial crisis. Additionally; the relationships between leverage and, CR, NDTS, ROA, Crisis are negative correlated due to significant links are seen among the dependent variables, while Size, Tang, Growth, and leverage have a positive correlation, as evaluated.

4.3. Dynamic Panel Data (GMM) Estimator

We utilize the dynamic panel approach or GMM model for the estimation of factors that may determine NPL over time as proposed by Holt-Eakin et al (1988) Arellano and Bond (1991). Using a series of instrument variables produced by lagged variables, we were able to solve the endogeneity problem in the independent variables.

GMM is a common method used in econometric theory to estimate parameters of economical and statistical models using an alternative technique instead of normal least square or maximum likelihood. First introduced in 1982 by Lars Hansen, it has found many applications in analysis of economic and financial data.

Advantages of GMM:

- GMM controls for endogeneity issue of lagged dependent variable using instrumental variables (IV): internal and external instruments
- Addresses the unobserved panel heterogeneity (individual effects)
- Reduces omitted variable bias in addition to the impact of measurement errors.

Limitations of GMM:

- More complicated compared to other panel models
- Possibility for manipulation
- Does not account for cross-sectional dependence (contemporaneous correlation). So, include time dummy into the model.
- Depends on the assumption that N is large. Not for long T panels. Use $N > 20$.

| Dependent variable: LEV (LEV i,t) | |
|-----------------------------------|-----------------------|
| | System GMM |
| NDTS, it | -2.175** (-2.08) |
| TANG, it | 0.00399 (1.48) |
| ROA, it | -0.0837** (-2.52) |
| Growth, it | 0.0235 (0.70) |
| SIZE, it | 0.00779* (1.79) |
| CR, it | -0.0355*** (-7.53) |
| CRISIS | -0.00527 (-0.29) |
| cons | 0.342*** (3.62) |
| Observations | 195 |
| Number of group | 17 |
| No. of instrument | 13 |
| AR(1): p-value | 0.197 |
| AR(2): p-value | 0.619 |
| Hansen test: p-value | 0.492 |
| Sargan test: p-value | 0.106 |

The result of the GMM estimation is shown in table above. The table 4 indicates the findings of two-step system GMM. Our result indicates that the number of instrument variables is 13 against 17 groups, making our instrument valid. As a result of the AR (2) test given in table 4, null hypothesis is accepted due to p-value of AR (2) greater than 5 percent as well as there is no autocorrelation problem in the model. Hence when the result of Sargan test is examined; high p-value of sargan test ($p=0.106 > 0.05$) indicates that the instrumental variables are valid, in other words over identifying restrictions are valid in the model. Thus, the sargan test with a p-value above 5 percent fails to reject the null hypothesis.

5. Conclusion

This paper contributes to the existing literature by examining the financial leverage, i.e. the capital structure of cement firms in Turkey around financial crisis. The study evaluated a period of 2005 -2017 which is segregated as it accepts that crisis occurred in 2008-2010, same time there is no any financial crisis happened over these years 2005, 2006, 2007, 2011-2017. According to descriptive analysis, the leverage of the sample companies range from 1 % to 74%, with the average of about 25.37% with standard deviation 14.03%. Tangibility (Tan) shows a statistically positive and insignificant effect on leverage. With a coefficient of 0.00399, it indicates that one percent increase or decrease in Tan will lead to 3.99 percent increase or decrease in leverage of Cement companies. Leverage and ROA show negative correlation. A one-unit increase in ROA will reduce leverage by -0.0837. Bank's liquidity measured current asset divide current liability a statistically negative and significant relationship with leverage. Similarly, a one –unit increase in liquidity will decrease the leverage by -0.0355. Our results also indicate a statistically positive effect growth on leverage. With a coefficient of 0.0235, it means that when growth increases by 1 percent, it will result in 2.35 percent increase in leverage. The present study suggests that if firm size increase by one unit, it will lead to increase to leverage by 0.7 percent. The result suggests a significant negative relationship between NDTs and Leverage. This means a unit increase in NDTs will decrease leverage by -2.175.

Also, the results express that firm size, growth, and Tang are positive associated with leverage while profitability, liquidity, NDTs, financial crisis and leverage are negatively connected. Lastly, the findings point to a declining trend in company debt ratios during the financial crisis. Hence, firms need to make some adjustments to the leverage of the firm to meet their need for equity and debt financing.

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