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Testing capital structure models for Turkish non-financial firms: the analysis of firm-specific financial factors and agency variables

Abstract

This study investigates the determinants of the capital structure of non-financial firms listed on ISE (Istanbul Stock Exchange). The paper contributes to the literature by selecting as its locus the capital structure in Turkey with the sample covering a longer period (1996-2004) and a larger number of firms (247) than the previous studies regarding Turkish firms. This study finds out that profitability, tangibility, size and liquidity have a significant negative relationship, whereas growth and risk have a significant positive relationship with leverage. Stock price performance (SPP) has a significant negative relationship with short-term debt. It follows that there exists a significant negative relationship between the debt and size of the board of the directors too. In addition, the analysis of the 2001 financial crisis' effect on capital structure decisions indicates that the risk factor is significant particularly for the period following the crisis.

Keywords: capital structure, leverage, financial crises, ownership structure, agency costs.
JEL Classification: G32.

Introduction

Most Turkish firms are owned and managed by individuals and family members. The sources of capital are provided individually by their owners as well as affiliated companies like holdings and banks. In Turkey an important number of big corporations have their own banks which furnish their main financial assets. Due to high level government borrowing with high interest rates, a private bond market has never been active even though it is legally organized in Turkey. Because of high inflation rates and capital insufficiency of the Turkish banks, lending maturity has usually been short-term. However, significant economic factors have changed recently. Although government still provides high real rates of return on its debt securities, so far it has been successful in fighting with high inflation and interest rates on the one hand, and in conducting reforms on the path to the European Union on the other. All these events have been welcomed in financial markets. The flow of funds in Turkey has increased in recent years thanks to the effect of high liquidity supply in the world markets and increasing participation of foreign banks in the Turkish banking system. In addition, the foreign liabilities of Turkish companies have increased due to low foreign exchange rates. All these improvements in the economic indicators and positive expectations have increased the demand for the Turkish stocks thereby arising the number of initial public offerings.

Studies on capital structure unfold some firm-specific financial factors and agency variables as the major determinants of the capital structure decisions. The first analytical model of the capital structure was developed by Modigliani and Miller (MM) (1958) in the late 1950s. According to this model, independent of taxes and bankruptcy costs, the markets were always efficient; the changes in debt or equity financing preferences of the firms would not affect the value of the firm. Consequently, there was not an optimal capital structure for the firm. Although these assumptions were far from reality, the MM model inspired the following studies and new models were created mostly falsifying the MM assumptions. These models have shown that the firm tried to determine the optimal debt ratio which provided a balance between the benefits and the costs of debt and equity financing. These models can be singled out as trade-off (tax based/bankruptcy cost) model, agency cost model and pecking order hypothesis.

In Myers' (1984) trade-off model, it can be possible to reach the optimum capital structure if one considers the positive effect of tax and negative effect of bankruptcy on the cost of capital together. According to the pecking order hypothesis developed by Myers and Majluf (1984) and Myers (1984), the firm finances its investments firstly by its own sources such as retained earnings, then by borrowing from others and lastly issuing new shares of common stock. This hierarchy among the financing sources is due to the asymmetric information. Once there are two types of equity financing sources which are retained earnings and the common stock issuance, the former is at the beginning and the latter is at the end of the financing order; there is not a well defined optimum capital structure according to this model.

The empirical studies on capital structure models approve the usefulness of these models in developed countries. However, empirical studies on these models' applications to developing countries are

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limited (Booth et al., 2001; Deesomsak, 2004; Wiwattanakantang, 1999; Huang and Song, 2006). There are a few studies which examine the capital structure decision factors for Turkish firms (Durukan, 1997; Gönenç, 2003; Gonenc and Aslan, 2003; and Kuçukkocaoglu et al., 2006). Different results are observed from the studies including Turkish firms.

The primary objective of this article is to examine the effects of firm-specific financial and agency factors on capital structure decisions of the firms in Turkey. I try to find out whether these factors that are commonly used as the determinants of capital structure in both developed and developing countries are also similarly related with debt ratios in Turkey. In this study, the relationship between debt ratios and the firm-specific financial and agency variables is examined for 247 non-financial firms listed on ISE between 1996 and 2004. I believe that this paper can make its contribution to the literature by presenting a sample that handles a longer period and comparatively a larger number of Turkish firms than the previous studies did. In addition, the period of the study is divided into two sub-periods such as the pre-crisis period (1996-2000) and post-crisis period (2002-2004). I try to find out whether the capital structure determining factors are different before and after the 2001 financial crisis. By the way, in the previous studies only the book value leverage ratios were used as dependent variables. However, in this study both book and market value leverage ratios are adopted as dependent variables. This study covers a wider range of independent variables than the previous ones. In this study, firm specific financial variables such as profitability, tangibility, size, growth and risk as well as agency variables such as institutional ownership, managerial ownership and capital concentration are reanalyzed. Firm specific financial variables such as liquidity and stock price performance (SPP) and agency variables such as individual ownership, age of the company, and the size of board of directors are firstly analyzed.

The rest of the study is organized as follows: in the first part the relationship between the corporate factors and capital structure is summarized. In the second part, financial leverage and the capital structure of the Turkish firms are argued, in the third, data and methodology are presented. The empirical results take place in the fourth part, and the last part is assigned to evaluation and concluding remarks.

1. The determinants of capital structure

Table 1 shows the relationship between the corporate factors and debt ratios based on capital structure models and results mostly reported in the empirical studies.

Table 1. The relationship between the corporate factors and capital structure (both in models and empirical studies)

Variables	The sign of the relationship based on models	General results from the empirical studies	General results from the empirical studies on ISE	Theories
Profitability	-	-	-	Bankruptcy Cost Based Model Pecking Order Model Agency Cost Model
	+			Tax-benefit Based Model Agency Cost Model
Tangibility	+	+	+	Agency Cost Model: Agency Cost of Debt Bankruptcy Cost Based Model
	-		-	Agency Cost Model
Size	+	+	+	Bankruptcy Cost Based Model Agency Cost Model: Agency Cost of Debt
	-		-	Asymmetric Information Model
Growth	-	-	-	Agency Cost Model: Agency Cost of Debt Bankruptcy Cost Based Model
	+		+	Pecking Order Model
Liquidity	-	-	?	Agency Cost Model: Agency Cost of Debt Pecking Order Model
Risk	-	-	-	Bankruptcy Cost Based Model
	+		+	Agency Cost Model

Table 1 (cont.). The relationship between the corporate factors and capital structure (both in models and empirical studies)

Variables	The sign of the relationship based on models	General results from the empirical studies	General results from the empirical studies on ISE	Theories
Common stock price performance	-	-	?	Market Timing Model
Age of the firm	-	-	?	Agency Cost Model
Size of the board of directors	+	+	?	
Managerial ownership	+/-	+/-	-	
Ownership concentration	+/-	+	+	
Individual-family	+/-	+	?	
Institution	-	-	-	

2. The financial leverage and ownership structure of the Turkish firms

Figure 1 depicts the annual average leverage ratios of the present study's sample firms. In this study, I use six measures of debt. Similar to the studies of Huang and Song (2006) debt ratios are examined in two groups as book and market value debt ratios. Book short-term debt ratio (LEV_1) is defined as short-term debt divided by total assets. Book long-term debt ratio (LEV_2) is defined as long-term debt divided by total assets. Book total debt ratio (LEV_3) is defined as total debt divided by total assets. Market short-term debt ratio (LEV_4) is defined as short-term debt divided by sum of total debt and market value of equity. Market long-term debt ratio (LEV_5) is defined as long-term debt divided by sum of total debt and market value of equity. Market total debt ratio (LEV_6) is defined as total debt divided by sum of total debt and market value of equity. Short-term debt ratios were higher than the long-term debt ratios. Majority of the total debt is short-term. The short-term and the total debt were at their peak values during the crisis in 2001 and went down afterwards. The decrease in long-term debt was lower than that of short-term and total debt after the crisis.

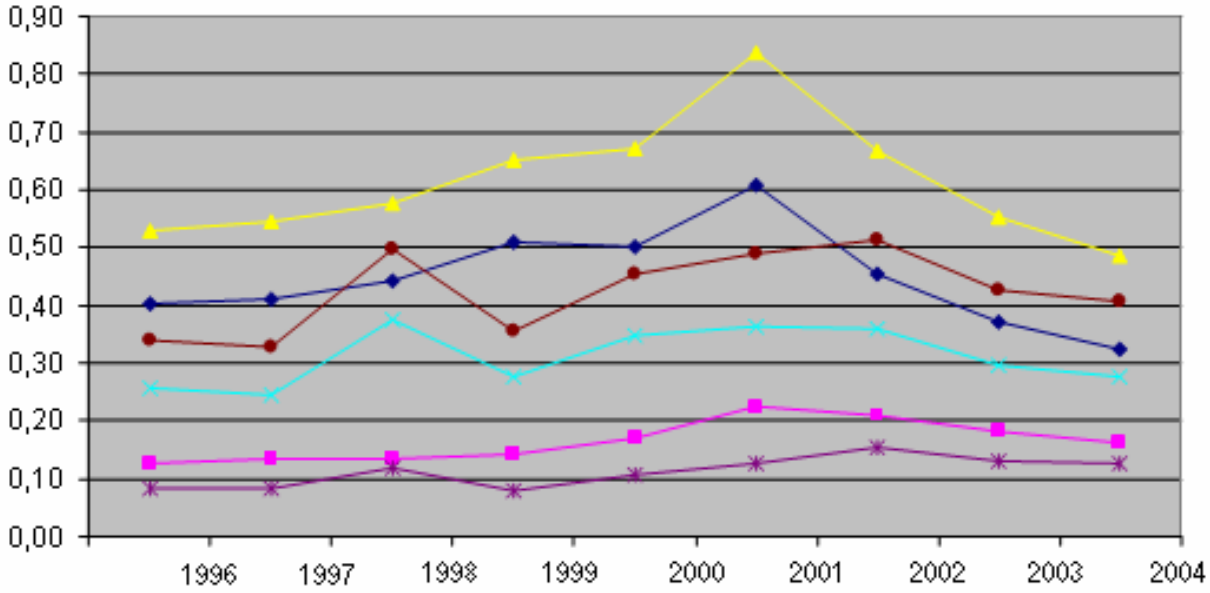

Fig. 1. Leverage ratios (1996-2004)

The general picture of the ownership structure of Turkish non-financial firms in the sample is shown in Table 2. The largest shareholder is the corporations. In Turkey, families can control the firms indirectly through holding, financial or non-financial firms. The aim of the establishment of the holdings is to control the affiliated firms. It is known that banks can be used to control the firms other than holdings. Furthermore, the families can also directly control the firms without any intermediary.

Table 2. Percentage of outstanding shares held by investors (1996-2004)

	Average percentage of shares (%)
Individuals	14.20
Corporations	39.61
Foreigners	7.41
Government	3.95
Others	33.52
Total	100

Table 3 denotes that the largest shareholder controls almost 45%, the largest three shareholders have almost 61%, the largest five shareholders have 65% of shares outstanding, all indicators of the high capital concentration of Turkish firms. Based on this finding, in this study we use the percentage of shares held by the largest three shareholders to measure ownership concentration.

Table 3. Capital concentration (1996-2004)

	Mean	Median	Min.	Max.
Largest shareholder	0.45	0.44	0.06	0.93
Largest 3 shareholders	0.61	0.64	0.07	0.97
Largest 5 shareholders	0.65	0.70	0.08	0.99

In Turkey it is often observed that the family members are the CEO, board of directors or top managers of the firms. Because of that the management control is in the hands of these family members (Yurtoğlu, 1998; Demirağ and Serter, 2003). Table 4 shows that CEO, board of directors and top managers have almost 13% of shares outstanding.

Table 4. Managerial ownership (1996-2004)

	Mean	Median	Min.	Max.
CEO, Board of directors and top managers	0.13	0.03	0.00	0.79

3. Data and methodology

This study includes 247 non-financial firms listed on ISE. Majority of data was obtained from the balance sheets and income statements of the sample firms issued by ISE at the end of the years between 1996 and 2004. The firms which prepared consolidated financial statements were excluded from the sample in year 2004. And also, I could not extend the sample period since the firms listed on ISE were obliged to prepare their financial statements according to International Financial Reporting Standards (IFRS) after 2005. Market values of the firms were collected from the Monthly (December) Bulletins of ISE for each year during the sample period. Data on ownership structure and agency variables were obtained from the annual reports which were also issued by ISE. In line with the studies of Deesomsak et al. (2004) and Huang and Song (2006), the measures of debt ratios as well as explanatory variables are averaged from 1996 to 2004. Deesomsak (2004) indicates that this process reduces the possibility of measurement error and the effects of random movements in the variables.

I use the regression analysis to measure the relationship between the debt ratios and the characteristics of the firms. The study employs six measures of leverage ratios as dependent variables. The independent variables of the study are profitability, tangibility, size, growth, liquidity, risk, and stock price performance. In addition to them agency variables are also examined. The descriptive statistics for the dependent and independent variables are presented in Table 5.

Table 5. Descriptive statistics

Variable	Mean	Std. dev.	Min.	Max.	N
LEV_1	0,4510	0,28568	0,02	2,05	247
LEV_2	0,1663	0,19411	0,00	1,45	247
LEV_3	0,6173	0,39233	0,05	2,94	247
LEV_4	0,3136	0,16721	0,00	0,81	247
LEV_5	0,1114	0,09443	0,00	0,64	247
LEV_6	0,4250	0,20336	0,00	0,89	247
PRO	0,1545	0,13703	-0,60	0,78	247
TANG	0,3336	0,18830	0,00	0,96	247
SIZE	7,4547	0,63363	5,36	9,42	247
GRWT	1,6965	0,78846	0,59	5,46	246
LIQ	1,6949	1,09576	0,27	8,78	244
RISK	0,1122	0,09283	0,01	0,78	237
SPP	-0,0554	0,10606	-0,63	0,32	246
BOARDSIZE	0,7776	0,13185	0,46	1,11	247
MANOWN	0,1296	0,19980	0,00	0,79	247
CAPCON(3)	0,6135	0,16985	0,06	0,97	214

Notes: Book short-term debt ratio (LEV_1) is defined as short-term debt divided by total assets. Book long-term debt ratio (LEV_2) is defined as long-term debt divided by total assets. Book total debt ratio (LEV_3) is defined as total debt divided by total assets. Market short-term debt ratio (LEV_4) is defined as short-term debt divided by sum of total debt and market value of equity. Market long-term debt ratio (LEV_5) is defined as long-term debt divided by sum of total debt and market value of equity. Market total debt ratio (LEV_6) is defined as total debt divided by sum of total debt and market value of equity. PRO (profitability) is the ratio of earnings before interest and taxes (EBIT) to total assets. TANG (tangibility) is the ratio of net fixed assets to total assets. SIZE (size) is the natural logarithm of net sales. GRWT (growth) is measured by Tobin's Q that is the market to book value of total assets. Market value of total assets is book value of total debt and market value of equity. LIQ (liquidity) is a ratio of current assets to current liabilities. RISK (risk) is measured by standard deviation of the last five

years EBIT to total assets ratios. SPP (stock price performance) is measured as first differences of logs of annual stock prices. BOARDSIZE (number of the board of directors) is measured as logarithm of number of directors. MANOWN (managerial ownership) is the fraction of shares held by CEO's, Board of Directors and Other Top Managers. CAPCON(3) (capital concentration) represent the percentage of shares held by three largest shareholders.

4. Empirical results

Regression results on the factors determining book and market value leverage ratios are given in Table 6. Profitability has a negative and significant relationship with debt ratios except market long-term leverage ratio, and liquidity has a negative and significant relationship with all leverage ratios. These results are consistent with the predictions of the pecking order model arguing that the firms prefer internal sources when their profitability and liquidity are high.

Tangibility has a positive significant relationship with long-term debt, whilst negative significant relationship with both short-term and total debt. Since the capital structure models argue both positive and negative relationships, most of the previous studies found a positive relationship between tangibility and debt ratios. The findings of this study imply that firms having high level of fixed assets use them as collateral in order to borrow for long term. Hence, there is a positive relationship between the long-term debt and tangibility such a way as to support debt agency cost model. Firms with low level of fixed assets could not borrow for long term and were forced to borrow for short term. For short-term borrowing, there can be lesser or no need for collateral. Short-term debt is generally related with the close relationship with the creditors and heavy ownership of families. For this reason a negative relation exists between the tangibility and short-term debt. This point supports the predictions of agency cost model.

A negative relationship was found between size and both short-term and long-term debt ratios. A positive relationship was found between size and long-term debt. All of them are statistically significant except the relationship between size and long-term debt. Although empirical studies indicated a positive relationship, they also argued the possibility of the existence of a negative relationship when asymmetric information was taken into consideration. According to the asymmetric information model, the big firms that are resolved to suffer less asymmetric information problem will prefer equity to debt. The negative relationship between size and leverage in this study points out that the big firms mostly prefer equity financing.

Growth has a positive relationship with book debt ratios and a negative relationship with market debt ratios. Although the capital structure model points out both positive and negative relationships, most of the empirical studies found a negative relationship. The result of this study props up the pecking order model. According to this model, firms having a growth potential and are growing rapidly will increase the use of debt when their internal sources are insufficient.

Risk has a positive relationship with debt, a significant setting for all regressions models. The result is consistent with the agency cost model. Turkish firms which want to share their high risk will borrow more.

The relationship between stock price performance (SPP) and debt is negative as predicted. However, only the book short-term debt, market short-term debt ratios have statistically significant relationships with stock price performance. ISE firms prefer equity instead of debt when stock prices are increasing, such a way as to support the market timing model.

The findings of this study on profitability, tangibility, size and growth are in line with most of the studies for the developing countries and Turkey. However, the findings on risk are only similar to the results of the study of Gönenç and Aslan (2003) for Turkish firms.

Table 6. Cross-sectional results between debt ratios and firm-specific factors

	LEV_1	LEV_2	LEV_3	LEV_4	LEV_5	LEV_6
PRO	-0,227 (-2,104)**	-0,190 (-2,045)**	-0,417 (-2,755)*	-0,178 (-3,451)*	-0,043 (-0,904)	-0,221 (-3,095)*
TANG	-0,468 (-6,115)*	0,121 (1,830)***	-0,347 (-3,228)*	-0,353 (-9,631)*	0,134 (3,950)*	-0,219 (-4,313)*
SIZE	-0,097 (-4,357)*	0,001 (0,041)	-0,096 (-3,080)*	-0,031 (-2,935)*	0,007 (0,676)	-0,025 (-1,667)***
GRWT	0,039 (2,037)**	0,058 (3,534)*	0,097 (3,623)*	-0,089 (-9,783)*	-0,016 (-1,883)	-0,105 (-8,321)*
LIQ	-0,158 (-11,534)*	-0,036 (-3,094)*	-0,194 (-10,115)*	-0,098 (-15,058)*	-0,019 (-3,141)*	-0,117 (-12,970)*
RISK	0,515 (3,368)*	0,634 (4,803)*	1,148 (5,348)*	0,209 (2,858)*	0,174 (2,569)**	0,383 (3,780)*

Table 6 (cont.). Cross-sectional results between debt ratios and firm-specific factors

	LEV_1	LEV_2	LEV_3	LEV_4	LEV_5	LEV_6
SPP	-0,308 (-2,136)**	0,101 (0,814)	-0,207 (-1,021)	-0,179 (-2,595)*	0,037 (0,585)	-0,142 (-1,483)
Adj. R^2	0,525	0,251	0,505	0,662	0,145	0,561
F-statistic	37,861	12,149	34,938	66,182	6,630	43,479
P-value	0,000	0,000	0,000	0,000	0,000	0,000

Note: *, ** and *** denote significant at 1%, 5% and 10% levels respectively, (2,576) (1,960) and (1,645).

When agency and ownership structure variables are included, adjusted R^2 values increased for models including book debt ratios. The results in Table 7 indicate no change in signs but changes in the significance of some estimated coefficients of the proxies discussed before. I do not observe significant results from some of the estimated coefficients on profitability, size and stock price performance.

AGE usually has a positive relation but only significant estimation associated with the level of market short-term leverage. The result implies that the young firms prefer short-term debts or can borrow only for short-term. AGE has a negative relation with market long-term debt. The result is consistent with the model which argues that the well known firms can borrow easily. However, the result is not statistically significant.

The size of board has a negative relation with leverage. The estimated coefficient of SIZE is significant across all the equations except one. In Turkey, members of the board of directors provide funds who are usually the owners directly or indirectly. Hence, when the number of the board members increases, these firms tend to borrow less. Wiwattanakantang (1999) found out a negative but statistically insignificant relationship.

Managerial ownership is negatively related to the debt ratios, but not significant. Huang and Song (2006) argue that firms are expected to borrow less with the increase in managerial ownership. The reason for the reverse relation is that the management is generally risk averse. In this study, individual shares of the board of directors and top managers are taken into consideration to determine managerial ownership. However, some of the board members or top managers may control the firm through their affiliated firms. Because of the difficulty of data collection, the indirect ownership of the managers can not be measured. The result is consistent with the agency cost model, however inconsistent with studies of Huang and Song (2006) and Gönenç (2003) which argue a positive statistically significant relationship.

The coefficients of the three largest shareholders are negative but insignificant across all the estimations. The reason may be the preference of these owners using their own sources instead of debt. The result is consistent with the study of Wiwattakantang (1999), yet inconsistent with the findings of Gönenç and Aslan (2003) which point out a significant positive relationship.

INDIV and INSTITU have a positive relation associated with the level of short-term and total debt, and a negative relation associated with long-term debt. However, these relations are insignificant in all regressions. Wiwattanakantang (1999) argues that the shareholder of the single-family owned firm always concerns with the possibility to lose his control and consequently tends to use debt. The sign of the relationship is consistent with the study of Wiwattanakantang (1999). However, in his study he found a significant relationship. The result on the institutional ownership is similar to the studies of Wiwattanakantang (1999) and Huang and Song (2006), however it does not support the findings of Gönenç (2003).

Table 7. Cross-sectional results between debt ratios and firm-specific factors (including agency variables)

	LEV_1	LEV_2	LEV_3	LEV_4	LEV_5	LEV_6
PRO	-0,159 (-1,368)	-0,194 (-1,885)***	-0,352 (-2,112)**	-0,156 (-2,902)*	-0,051 (-0,957)	-0,207 (-2,686)*
TANG	-0,446 (-5,308)*	0,122 (1,635)	-0,324 (-2,681)*	-0,369 (-9,488)*	0,136 (3,520)*	-0,233 (-4,165)*
SIZE	-0,071 (-2,561)**	0,011 (0,449)	-0,060 (-1,505)	-0,009 (-0,674)	0,011 (0,841)	0,002 (0,110)
GRWT	0,065 (2,859)*	0,084 (4,149)*	0,149 (4,547)*	-0,086 (-8,065)*	-0,010 (-0,971)	-0,096 (-6,299)*

Table 7 (cont.). Cross-sectional results between debt ratios and firm-specific factors (including agency variables)

	LEV_1	LEV_2	LEV_3	LEV_4	LEV_5	LEV_6
LIQ	-0,153 (-10,595)*	-0,039 (-3,049)*	-0,192 (-9,249)*	-0,094 (-14,095)*	-0,018 (-2,784)*	-0,113 (-11,758)*
RISK	0,357 (2,157)**	0,625 (4,262)*	0,981 (4,126)*	0,173 (2,257)**	0,190 (2,497)**	0,363 (3,298)*
SPP	-0,184 (-1,112)	0,196 (1,341)	0,013 (0,054)	-0,055 (-0,724)	0,063 (0,836)	0,008 (0,072)
AGE	0,020 (0,670)	0,015 (0,558)	0,035 (0,810)	0,028 (2,003)**	-0,001 (-0,087)	0,027 (1,338)
SIZEBOARD	-0,416 (-3,255)*	-0,217 (-1,911)***	-0,633 (-3,445)*	-0,209 (-3,515)*	-0,075 (-1,270)	-0,283 (-3,329)*
MANOWN	-0,219 (-1,698)***	0,022 (0,191)	-0,197 (-1,061)	-0,095 (-1,583)	-0,011 (0,178)	-0,084 (-0,982)
CAPCON(3)	0,026 (0,282)	-0,079 (-0,964)	-0,053 (-0,400)	-0,003 (-0,060)	-0,006 (-0,139)	-0,008 (-0,138)
INDIV	0,079 (1,251)	-0,076 (-1,351)	0,003 (0,034)	0,029 (0,988)	-0,031 (-1,080)	-0,002 (-0,049)
INSTITU	0,040 (1,102)	-0,005 (-0,157)	0,035 (0,671)	-0,002 (-0,096)	-0,009 (-0,530)	-0,010 (0,433)
Adj. R^2	0,528	0,305	0,524	0,662	0,129	0,542
F-statistic	18,231	7,766	17,957	31,091	3,283	19,188
P-value	0,000	0,000	0,000	0,000	0,000	0,000

Note: *, ** and *** denote significant at 1%, 5% and 10% levels respectively.

The 2001 financial crisis affected capital markets of Turkey severely because of the outflows of foreign investments. Cost of capital for the firms increased due to the increase in interest rates and decrease in the value of the stock in the market. We know nothing about the possible effects of 2001 crisis on corporate capital structure decisions. After the crisis, positive developments were witnessed in the Turkish economy, which affected the debt financing decisions of the firms. Hence, the analysis of the determinants of capital structure before and after the crisis provides information about the decision making process in the Turkish firms regarding financial affairs. In this part of the study, I divide the whole period into two sub-periods such as pre-crisis period and post-crisis period and test all the regressions models in the study for these two sub-periods.

Table 8 reports the descriptive statistics for the variables for the pre- and post-crisis periods. After the crisis short-term and total debt decreased, long-term debt increased. In addition, tangibility, size, liquidity and risk increased. Profitability, growth and SPP deceased

Table 8. Descriptive statistics

Variable	Mean		Std. dev.		Min.		Max.		N	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
LEV_1	0,4509	0,3852	0,22634	0,30541	0,06	0,02	1,73	2,70	232	216
LEV_2	0,1421	0,1826	0,11797	0,31075	0,00	0,05	0,85	4,18	232	216
LEV_3	0,5929	0,5683	0,26391	0,51131	0,08	0,05	1,98	4,18	232	216
LEV_4	0,3015	0,3109	0,16933	0,17873	0,03	0,00	0,79	0,77	232	216
LEV_5	0,0939	0,1365	0,07669	0,13890	0,00	0,00	0,35	0,76	232	216
LEV_6	0,3954	0,4478	0,19987	0,22828	0,03	0,00	0,89	0,97	232	216
PRO	0,1827	0,1136	0,13951	0,21090	-0,49	-0,66	0,63	2,27	233	216
TANG	0,3187	0,3898	0,18071	0,22053	0,01	0,00	0,92	1,56	232	216
SIZE	7,1994	7,8529	0,59055	0,68287	5,52	5,60	9,15	9,97	232	216
GRWT	1,8442	1,3173	0,85067	0,73272	0,52	0,39	5,62	5,30	232	214

Table 8 (cont.). Descriptive statistics

Variable	Mean		Std. dev.		Min.		Max.		N	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
LIQ	1,5156	1,9412	1,09362	1,42532	0-,49	0,23	9,05	9,17	232	212
RISK	0,0982	0,1342	0,06651	0,17791	0,01	0,00	0,55	1,70	203	234
SPP	-0,0695	-0,0760	0,17381	0,14950	-1,02	-0,63	0,32	0,29	231	212
SIZEBOARD	0,7766	0,7723	0,13695	0,14034	0,43	0,48	1,07	1,15	232	215
MANOWN	0,1378	0,1127	0,19617	0,19246	0,00	0,00	0,85	0,75	232	215
CAPCON(3)	0,6109	0,6017	0,17481	0,18907	0,06	0,06	0,97	0,97	198	59

Table 9 presents the regression results between firm specific financial variables and leverage. The relation between the profitability and leverage is negative and significant across all the equations except the models including the market debt ratios after the crisis. Tangibility has a significant negative relationship with short-term debt for two sub-periods; however, a positive relationship with long-term debt that is only significant for the post-crisis period can be vividly observed. Similar to the study of Deesomsak et al. (2004) which examined the effect of Asian crisis, I found that the tangibility is unaffected by the crisis. Only after the crisis, usage of long-term debt increased for the firms having more fixed assets. Size has a significant negative relation with short-term and total debt and a significant positive relation with market long-term debt before the crisis. In the same vein, small firms had high level of usage of short-term debt and large firms had high level of long-term debt before the crisis. In contrast to the study of Deesomsak et al. (2004), no significant relationship is found between size and leverage after the crisis.

Growth has a positive and significant relation with book debt ratios except long-term debt before the crisis and it has a negative and significant relation with market debt ratios except long-term debt after the crisis. The result is consistent with the findings of Deesomsak et al. (2004) for Malaysian firms. Turkish economy recovered the effects of the crisis and firms with great investment opportunities tend to borrow more with the effect of more liquidity supply to the emerging markets. Liquidity has a negative and significant relation with debt ratios except market long-term debt ratio before the crisis. Similar to the study of Deesomsak et al. (2004), the importance of liquidity increased in capital structure. During the pre-crisis period, the relationships between risk and debt ratios are negative except the market long-term debt ratio. However, these relations are insignificant across all the regressions. During the post crisis the relation is found to be positive and statistically significant in all regressions. Firms used to borrow less before the crisis and tended to borrow more after they overcame the crisis. Firms increased their borrowing tendency after the crisis when the interest rates dropped and international funds began to flow to the country. SPP has a positive relation for all equations except market short-term debt ratios. However, the estimates are insignificant across all the regressions except book long-term debt ratio for pre-crisis period. Before the crisis, firms used to prefer long-term debt when their stock performed well. The estimated coefficient of SSP for the whole period was found more significant than that for the sub-periods. However, Deesomsak et al. (2004) found that the effects of risk and SPP did not change after the crisis.

Table 10 presents the results consisting of the agency variables. After adding agency and ownership structure variables into the models, I found that the size of the board had a negative and significant relation with almost most of the debt ratios before and after the crisis. In addition, AGE has a positive and significant and CAPCON(3) has a negative and significant relation with market short-term debt ratios before the crisis.

Table 9. Cross-sectional results between debt ratios and firm-specific factors for pre- and post-crisis periods

	LEV_1		LEV_2		LEV_3		LEV_4		LEV_5		LEV_6	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
PRO	-0,317 (-2,799)*	-0,184 (-1,801)***	0,230 (-3,355)*	-0,212 (-1,687)***	-0,547 (-3,918)*	-0,399 (-2,348)**	-0,239 (-3,117)*	-0,048 (-0,808)	-0,154 (-3,695)*	-0,061 (-0,938)	-0,393 (-4,257)*	-0,111 (-1,316)
TANG	-0,531 (-6,477)*	-0,431 (-6.133)*	0,008 (0,170)	0,247 (2,860)*	-0,522 (-5,173)*	-0,185 (-1,583)	-0,355 (-6,407)*	-0,325 (-7,879)*	0,020 (0,654)	0,164 (3,669)*	-0,335 (-5,033)*	-0,161 (-2,763)*

Table 9 (cont.). Cross-sectional results between debt ratios and firm-specific factors for pre- and post-crisis periods

	LEV_1		LEV_2		LEV_3		LEV_4		LEV_5		LEV_6	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
SIZE	-0,080 (-3,400)*	-0,023 (-0,906)	0,014 (1,013)	-0,004 (-0,149)	-0,065 (-2,263)**	-0,028 (-0,704)	-0,042 (-2,682)*	-0,014 (-0,981)	0,015 (1,736)***	-0,001 (-0,056)	-0,028 (-1,447)	-0,015 (-0,742)
GRWT	0,037 (2,183)**	0,144 (6,182)*	0,004 (,385)	0,231 (8,074)*	0,040 (1,961)**	0,374 (9,643)*	-0,073 (-6,455)*	-0,081 (-5,930)*	-0,031 (-5,022)*	0,022 (1,482)	-0,104 (-7,631)*	-0,059 (-3,045)*
LIQ	-0,135 (-8,681)*	-0,113 (-10,283)*	-0,003 (-0,341)	-0,042 (-3,109)*	-0,138 (-7,214)*	-0,155 (-8,481)*	-0,076 (-7,278)*	-0,080 (-12,418)*	0,006 (1,032)	-0,020 (-2,782)*	-0,070 (-5,586)*	-0,099 (-10,905)*
RISK	-0,004 (-0,021)	0,460 (2,732)*	-0,020 (-0,171)	0,757 (3,668)*	-0,024 (-0,101)	1,220 (4,364)*	-0,042 (-0,322)	0,173 (1,757)***	0,009 (0,129)	0,191 (1,783)***	0,033 (-,210)	0,363 (2,602)*
SPP	0,013 (0,153)	0,082 (0,764)	0,089 (1,775)***	0,138 (1,042)	0,101 (0,995)	0,226 (1,260)	-0,015 (-0,269)	-0,016 (-0,259)	0,043 (1,430)	0,091 (1,326)	0,028 (0,421)	0,076 (0,854)
Adj. R^2	0,407	0,538	0,063	0,398	0,336	0,574	0,503	0,517	0,197	0,129	0,482	0,402
F-statistic	19,814	33,786	2,838	19,610	14,864	38,955	28,794	31,147	7,711	5,159	26,516	19,953
P-value	0,000	0,000	0,008	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

Note: *, ** and *** denote significant at 1%, 5% and 10% levels respectively.

Table 10. Cross-sectional results between debt ratios and firm-specific factors (including agency factors)

	LEV_1		LEV_2		LEV_3		LEV_4		LEV_5		LEV_6	
	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis	Pre-crisis	Post-crisis
PRO	-0,254 (-1,822)***	-0,196 (-2,126)**	-0,289 (-3,402)*	-0,240 (-1,693)***	-0,543 (-3,099)*	-0,440 (-2,430)**	-0,161 (-1,840)***	0,007 (0,115)	-0,177 (-3,431)*	-0,079 (-1,089)	-0,338 (-3,075)*	-0,075 (-0,822)
TANG	-0,479 (-5,199)*	-0,374 (-5,041)*	0,024 (,427)	0,411 (3,594)*	-0,455 (-3,924)*	0,037 (0,257)	-0,328 (-5,652)*	-0,373 (-7,222)*	0,032 (0,936)	0,256 (4,413)*	-0,296 (-4,072)*	-0,122 (-1,656)***
SIZE	-0,066 (-2,174)**	0,022 (0,803)	0,028 (1,508)	0,033 (0,794)	-0,038 (-0,996)	0,055 (1,033)	-0,038 (-1,964)**	0,029 (1,542)	0,020 (1,751)***	0,013 (0,616)	-0,018 (-0,747)	0,042 (1,547)
GRWT	0,059 (2,580)*	0,111 (5,051)*	0,021 (1,474)	0,309 (9,141)*	0,080 (2,766)*	0,418 (9,700)*	-0,074 (-5,121)*	-0,098 (-6,410)*	-0,030 (-3,511)*	0,047 (2,766)*	-0,104 (-5,730)*	-0,050 (-2,318)**
LIQ	-0,147 (-8,394)*	-0,093 (-8,929)*	-0,008 (-0,741)	-0,043 (-2,660)*	-0,155 (-7,030)*	-0,135 (-6,633)*	-0,082 (-7,415)*	-0,066 (-9,115)*	0,005 (0,780)	-0,018 (-2,177)**	-0,077 (-5,552)*	-0,084 (-8,103)*
RISK	-0,034 (-0,164)	0,512 (3,366)*	-0,028 (-0,219)	0,779 (3,324)*	-0,062 (-0,236)	1,295 (4,332)*	-0,102 (-0,778)	0,096 (0,906)	-0,007 (-0,094)	0,213 (1,792)***	-0,109 (-0,665)	0,311 (2,058)**
SPP	0,074 (0,789)	0,095 (0,940)	0,049 (0,847)	0,126 (0,813)	0,123 (1,038)	0,229 (1,155)	0,041 (0,692)	0,009 (0,131)	0,021 (0,607)	0,062 (0,782)	0,062 (0,837)	0,072 (0,716)
AGE	0,039 (1,218)	0,008 (0,280)	-0,015 (-0,790)	0,011 (0,229)	0,024 (0,585)	0,019 (0,328)	0,047 (2,338)**	0,014 (0,695)	-0,007 (-0,585)	0,003 (0,128)	0,040 (1,592)	0,018 (0,598)
SIZEBOARD	-0,405 (-3,161)*	-0,309 (-2,532)**	0,030 (,388)	0-,337 (-1,792)**	-0,374 (-2,323)**	-0,645 (-2,690)*	-0,240 (-2,967)*	-0,285 (-3,351)*	0,029 (0,609)	-0,094 (-0,987)	-0,211 (-2,083)**	-0,374 (-3,094)*
MANOWN	-0,096 (-0,865)	-0,028 (-0,239)	-0,010 (-0,148)	0,124 (0,696)	-0,106 (-0,759)	0,092 (0,408)	-0,083 (-1,184)	-0,018 (-0,224)	-0,007 (-0,167)	0,077 (0,853)	-0,089 (-1,023)	0,065 (0,567)
CAPCON(3)	-0,168 (-1,261)	-0,028 (-0,347)	0,001 (0,014)	-0,040 (-0,318)	-0,166 (-0,995)	-0,070 (-0,436)	-0,152 (-1,810)***	-0,072 (-1,267)	-0,016 (-0,318)	-0,005 (-0,080)	-0,167 (-1,593)	-0,077 (-0,941)
INDIV	-0,049 (-0,794)	0,046 (0,754)	0,011 (0,294)	-0,158 (-1,680)***	-0,038 (-0,488)	-0,110 (-0,919)	-0,013 (-0,331)	0,023 (0,545)	0,017 (0,738)	-0,060 (-1,256)	0,004 (0,081)	-0,040 (-0,658)
INSTITU	0,008 (0,203)	0,047 (1,288)	0,025 (1,092)	-0,030 (-0,528)	0,033 (0,691)	0,016 (0,224)	-0,003 (-0,109)	0,037 (1,458)	0,018 (1,288)	-0,001 (-0,027)	0,015 (0,516)	0,035 (0,979)
Adj. R^2	0,445	0,608	0,084	0,521	0,367	0,645	0,542	0,569	0,172	0,190	0,482	0,429
F-statistic	9,920	18,331	2,017	13,121	7,450	21,231	14,204	15,718	3,321	3,610	11,387	9,368
P-value	0,000	0,000	0,020	0,000	0,000	0,000	0,000	0,000	0,000	0,002	0,000	0,000

Note: *, ** and *** denote significant at 1%, 5% and 10% levels respectively.

Conclusion

Most of the results of this paper are consistent with the findings of the similar studies for the firms both in developed and developing countries. Turkish firms borrow less when their profitability and liquidity increase. The result is consistent with pecking order model and supports most of the empirical findings. Firms having few fixed assets usually borrow for short-term and rarely borrow for long-term debt. Although the result is inconsistent with most of the studies, it is as expected for Turkish firms and consistent with the studies that are already conducted for the Turkish firms. In general, customer checks and promissory notes are enough for short-term borrowing in Turkey. Hence, they are mostly at small amounts, property mortgage is not required. However, for long-term borrowing, the firm has to give its fixed assets as collateral.

As different from the previous studies, I found a negative relationship between size and leverage. When firms get larger, short-term debt and total debt decrease. Consistent with the asymmetric information model, big firms with few asymmetric information problems prefer equity financing. The result is consistent with our expectations when I consider the characteristics of Turkish capital markets. Big firms can easily issue common stocks, there can be demand for their shares and cost of equity may be lower for them. The finding supports the previous studies for Turkish firms. Firms having more growth opportunities prefer debt financing not to share their future profits. The result is consistent with the pecking order model. Risky firms borrow more to share their risk with the creditors. The result supports the agency cost model and is consistent with the studies for Turkish firms. Parallel to market timing model and empirical findings, Turkish firms prefer short-term debt when their stock price is low.

Adjusted R^2 of the estimated results including agency variables, reveals higher goodness of fit. When the number of the board of directors increases, usage of debt decreases in Turkey. Although most of the estimated coefficients of the agency and ownership structure factors are insignificant, their signs are consistent with the model.

In addition, the paper investigates the effect of February 2001 crisis on capital structure decisions of firms. The relationship between debt and profitability declines and lost its significance after the crisis. The relationship between long-term debt and tangibility is found significant only after the crisis. The relationship between debt and size is found insignificant after the crisis. The significance of the relationship between leverage and growth as well as liquidity increases after the crisis. The sign of the relationship between risk and debt is negative and insignificant before the crisis, however positive and significant after the crisis. With the effect of financial crisis, risk became the main determinant of capital structure and size lost its importance. The results clearly show that the crisis had an impact on the capital structure decision of the Turkish firms.

Three significant results are obtained from this study. Firstly, all firm specific financial factors are the main determinants of the capital structure decision. The negative relationships of profitability and liquidity and positive relationship of growth with leverage support the pecking order model. The negative relationship between size and debt supports asymmetric information model. The negative relationship between tangibility and debt as well as the positive relationship between risk and debt endorse agency cost model. Secondly, when I add agency variables into the models, their goodness of fit again increases. Thirdly, 2001 financial crisis changed the role of firm specific factors; growth, liquidity and risk variables are found out as the significant determinants of the capital structure decision after the crisis for Turkish firms.

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