

THE DETERMINANTS OF CAPITAL STRUCTURE: THE CASE OF LONG-TERM DEBT CONSTRAINT FOR JORDANIAN FIRMS

Rami Zeitun*, Gary Tian**

Abstract

This paper contributes to the capital structure literature by investigating the determinants of capital structure of Jordanian companies with the constraint of inadequate long-term debt as their source of financing and regional risk. We firstly document that Jordanian companies mostly depend on short-term debt, as a result of the banking credit policy that promotes short-term debt. Our results suggest that the level of gearing in Jordanian firms is positively related to size, tangibility, and earning volatility, and negatively correlated to profitability, the level of growth opportunities, liquidity and stock market activities. The level of gearing measured by short-term debt is, however, negatively correlated to tangibility. The Gulf Crisis between 1990 and 1991 is also found to have a significant but positive impact on Jordanian corporate leverage. We conclude that the capital structure decision with inadequate long-term debt access is influenced more strongly by factors such as Stock's Market activity (SMA).

Keywords: capital structure, determinants, Jordan

*Assistant professor of finance in the Finance Discipline, Department of Finance and Economic, College of Business and economic, Qatar University. Emails: R_zaiton2005@yahoo.com and rami.zeitun@qu.edu.qa.

**Corresponding author Associate Professor Gary Tian is an associate professor of finance in the Finance Discipline, School of Accounting and Finance, University of Wollongong, Northfields Ave, 2522 Australia. Tel: +61 2 4221 4301. Email: gtian@uow.edu.au. We would also like to thank Steve Keen for his comments on the earlier draft of this paper. The authors remain responsible for all errors.

1. Introduction

An ongoing debate in corporate finance concerns the question of a firm's optimal capital structure. Three major theories of capital structure have been proposed to explain the determinants of capital structure. These are: the trade-off theory (Modigliani and Miller, 1963, Baxter, 1967 and Ross, 1977), the pecking order theory (Myers and Majluf (1984)), and the agency theory (Jensen and Meckling (1976)). However, the results from the empirical evidence on capital structure were not conclusive and also most results were based on matured markets (Titman and Wessels (1988), Rajan and Zingales (1995), Bevan and Danbolt (2002) and Antoniou et al. (2002)). There are a small number of studies that provide evidence from developing countries including Booth et al. (2001), Pandey (2001), and Chen (2004).

This paper examines the determinants of the capital structure in a representative sample of 167 Jordanian companies during 1989-2003. The Jordanian firms provide a unique case for studying this issue since most Jordanian firms are not able to borrow long-term debt as their source of financing. Only a few firms have long-term debt in their capital structure. Therefore, a large percentage of credit facilities are short term. According to Creane et al.

(2003) financial intermediation through the banking system in Jordan is mostly short-term. The reason why bank credit is short-term is that the banks seek to match maturities of deposits. Also, banks' credit policies may be more conservative since the Jordanian market is very small, and as Jordanian exports depend on Arabic countries which have a high level of political risk (For more details see Zeitun, 2006). For example, in 2002 Jordanian exports to the Arabic countries amounted to JD 740.8 million out of total exports of JD 1556.7 million to other countries, which is about 47.6 percent of total exports. A potent example of the political risk that affects these markets is the first Gulf War in 1991, when Jordanian exports to the Arab countries decreased by 33.12 percent (Zeitun, 2006).

This study extends the existing empirical work on this special market in three ways. Firstly, it examines a much broader set of explanatory variables such as stock market's activity, in order to investigate the firm's financing behaviour under the constraint of inadequate long-term debt. Secondly, the firm sample used in this study is much larger than those previously analysed. Compared with the six year data used in the very limited previous studies, this study used a much longer period of data. Thirdly, this study provides more robust results since, in this study, we used

dummy variables to control for the effect of industrial sectors and years on firms' capital structure. The Jordanian economy is vulnerable to external shocks especially those occurring within the Middle East region such as the Gulf Crisis 1990-1991. There is very little known about the possible effect of the regional risk such as Gulf Crisis 1990-1991 and the outbreak of Intifadah in September 2000 on corporate decision making and bankruptcy costs. This study examines the impact of the Gulf Crisis and the outbreak of Intifadah on the performance of corporations. Therefore there are two important and interest questions we will explore in this article. First what are the determinants of capital structure in the case of long-term debt constraint for Jordanian firms? Secondly, are political risks the major factors influence the capital structure for Jordanian firms?

The remainder of the paper is organized as follows. Section 2 examines the debt structure of Jordanian companies during the period 1989-2003. Section 3 discusses the determinants of capital structure. Section 4 discusses the methodology and the empirical model used in this study. Section 5 presents the analysis and discussion of results. Section 6 concludes the paper.

2. Capital Structure in Jordan

Heavy reliance on debt finance, mainly from the domestic banking system, is a major feature of developing countries and is reflected in the high leverage of Jordanian firms. Table 1 depicts the annual average leverage ratios for non-financial listed companies on the Amman Stock Exchange (ASE) over the period 1989-2003. This set of figures reveals that Jordanian firms were more heavily leveraged in terms of short-term debt compared with long-term debt. For example, in 2000 the reported mean ratio for the short-term debt to total assets (STDTA) is 0.33, which is very high compared with the third measure of leverage, long-term debt to total assets (LTDTA), which is 6 percent. The mean ratio for LTDTA is extremely low compared with developed nations such as Germany (55%) and the US (67%). This long-term debt is also much lower than the emerging markets in East Asia with an average of approximately 30% in Malaysia, Taiwan, and Thailand (Claessens et al., 1998, p11).

The average ratio of the total debt over total capital (TDTC)¹⁰ is about 127.44%, with the highest ratio being 170% observed during the Gulf Crisis of 1990-1991. The ratios of short-term debt (STD) and

long-term debt (LTD) to total equity (TE)¹¹ show similar results compared with long-term debt (LTD) and short-term debt (STD) to total assets (TA). For example, in 2000 the STDTE was about 121%, which is very high compared with 16% for the LTDTE.

Insert Table 1 Here

It was argued that a firm's capital structure could affect the firm's health and affect the default risk, so the capital structure of defaulted firms and non-defaulted firms should be different. Figure 1 shows the average of the leverage ratio in both default and non-defaulted firms over the period 1989-2002. Moreover, Figure 1 shows that defaulted firms have a high leverage ratio of total debt to total assets (TDTA) over the period 1989-2002. The leverage ratio TDTA increased sharply over the periods 1989-1993 and 1998-2001. Both defaulted and non-defaulted firms have their lowest leverage ratio over the period 1994-1997. Furthermore, Figure 1 shows that the Gulf Crisis of 1990-1991 had a strong impact on the defaulted firms as a result of an increase in the demand for debt finance. The highest leverage ratio for distressed firms over the period 1998-2001 could be explained by the growth in banks' credit facilities over the period 1997-1999, which encouraged distressed firms to borrow more and more. Due to the high economic growth rate during the period 1992-1995 (boom period), the leverage ratio for defaulted firms continued to decrease, while it started to increase in 1996 due to the poor economic performance.

Insert Figure 1

Table 2 shows the leverage ratios in both defaulted and non-defaulted firms. Both defaulted and non-defaulted firms have a low long-term debt to total assets (LTDTA) ratio, while short-term debt to total assets (STDTA) is more prevalent in defaulted firms. For example, in 2002 the LTDTA and STDTA ratios for the defaulted firms were 16% and 63%, respectively, compared with 7% and 44%, respectively, for the non-defaulted firms. However, the long-term debt to total assets (LTDTA) ratio is lower for the defaulted firms over the period 1990-1992 which means the defaulted firms were unable to borrow long-term debt, while they borrowed more in the short-term to pay their short-term obligations.

Insert Table 2 Here

The total debt to total capital (TDTC) ratio is higher in the non-defaulted firms compared with the defaulted firms. The reason could be that non-

¹⁰The total capital (TC) is defined as the paid capital. The choice of total debt to total capital ratio instead of debt to equity ratio is because our sample includes some firms that had negative equity during 1989-2003, when equity values fell as a result of the Gulf Crisis, the outbreak of Intifadah 2000, or distress and default.

¹¹ The purpose of including different measures of capital structure is to provide a comprehensive explanation of the Jordanian firms' capital structure, as some firms have a high debt to equity ratio and lower debt to assets ratio.

defaulted firms are able to borrow as a result of a high profitability ratio which gives them the ability to access external sources of funds, while the defaulted firms are unable to do so as a result of decreasing assets. Total debt to total equity (TDTE) is higher in the defaulted firms as a result of financial distress, but it is still high in the non-defaulted firms. Defaulted firms have a negative value for the TDTE as a result of distress and of facing a level of leverage that exceeds their shareholders' equity.

3. Determinants of Capital Structure and Hypotheses Development

To assess the determinants of capital structure in Jordan, the individual firm's leverage ratios are modelled as a function of several firm-specific factors in a cross-sectional framework. The theoretical literature on capital structure suggests a number of factors that may influence the capital structure of companies based on the agency cost of debt and equity and other costs associated with asymmetric information (Jensen and Meckling, 1976; Myers and Majluf, 1984; Harris and Raviv, 1991)¹². The vector of firm-specific variables incorporates the following factors:

1. Tangibility

Agency theory suggests that firms with a high leverage ratio tend to under-invest as the cost of debt increases and, thus, transfer wealth away from debt holders to equity holders. So, the more tangible assets a firm has, the greater the ability of that firm to secure its debt. Firms unable to provide collateral value (fixed assets to total assets) have to pay a higher interest rate as a result of increased agency costs, or will encourage investors to issue equity instead of debt (Scott, 1977). Furthermore, the tangibility of assets decreases the bankruptcy costs and increases the liquidation value of the firm. Thus, a positive relationship between tangibility of assets and leverage is expected and a negative relationship between tangibility and short-term debt. In Jordan, the banks' credit policies are more conservative as the Jordanian market is very small. Therefore, the tangible assets increase a firm's ability to access to more debt. Based on the theoretical and empirical evidence, the Hypothesis to be tested is as follows:

H_{1a} : *There is a positive relationship between leverage ratio total debt to total assets (TDTA) and tangibility.*

H_{1b} : *There is a negative relationship between leverage ratio short-term debt to total assets (STDTA) and tangibility.*

2. Profitability

It is argued that firms with a high profitability ratio tend to have a high level of debt, as a result of the tax deductibility of interest payments (Modigliani and Miller, 1963). The high profitability also implies potential lower probability of bankruptcy (default). Zeitun (2006) showed that the average profitability of Jordanian companies has increased considerably over the period 1988-2004. He also suggested that the majority of Jordanian firms do not realise a profit which could be used as internal sources of fund. Therefore, profitable Jordanian firms will depend less on leverage. Based on the theoretical and empirical evidence, the Hypothesis to be tested is as follows:

H_2 : *There is a negative relationship between leverage ratios and profitability.*

3. Firm Size

Trade-off theory suggested a positive relationship between firm size and leverage, since large firms tend to be more diversified and have been shown to have lower bankruptcy risk and lower bankruptcy cost (Rajan and Zingales, 1995). Furthermore, large firms are expected to incur lower agency costs for issuing debt or equity, less cash flow volatility, and have easier access to the credit market. Therefore, large companies are expected to hold more debt in their capital structures than small firms to get the benefit of the tax shield. Also, it is argued that smaller firms tend to have large short-term debt and less long-term debt due to the conflict between shareholders and debtholders (Titman and Wessels, 1988; Michaelas et al., 1999). The Jordanian banks have restricted credit policies which make it is difficult for small firms to borrow money compared with large firms. Therefore, firm size affects leverage ratio for the Jordanian companies. Based on the theoretical and empirical evidence, the Hypothesis to be tested is as follows:

H_3 : *There is a positive relationship between leverage ratios and firm size*

4. Growth Opportunities

Growth opportunity can be defined as a firm's opportunity to invest in profitable projects. The growth opportunity can be measured by the annual growth of the firm's total assets. Myers (1977) argued that, due to information asymmetries between insiders and outsiders, companies with high leverage ratios might have the propensity to undertake activities contrary to the interests of debtholders or to invest in risky projects that expropriate wealth from debtholders¹³. Based on the above theoretical argument, the Hypothesis to be tested is as follows:

¹² For an extensive review of the theoretical literature on the determinants of capital structure see Harris and Raviv (1991).

¹³ Myers (1984) refers to this as a pecking order theory, which states that firms prefer the internal sources of funds to finance projects rather than debt. Therefore, it can be argued that firms with higher growth opportunities tend to

H_4 : *There is a negative relationship between leverage ratios and growth opportunities.*

5. Corporate Tax (Non-debt Tax Shield)

Modigliani and Miller (1963) argued that, as interest payments on debt are tax-deductible, firms with enough taxable income have an incentive to issue more debt to get the benefit from the tax deduction. However, a non-debt tax shield, such as depreciation, can be used to reduce the corporate tax. Thus, higher taxes might increase the demand for debt and reduce the benefit of the non-debt tax shield (Kremp et al., 1999). Jordanian companies are subject to tax on income generated in Jordan. The tax rates vary depending on the nature of the business activities. For example, the tax rate on Mining, Industry, Hotels, and Transportation is 15 %, while on other firms it is about 35%.

6. Liquidity

According to Pecking Order Theory, firms with high liquidity will borrow less as they prefer to use their internal sources of funds. Thus, a negative relationship between liquidity and leverage is expected and, therefore, a lower risk of default. This argument is supported by the empirical findings of Ozkan (2001), Antoniou et al. (2002), Deesomsak et al. (2004), and others. Based on the above theoretical and empirical evidence, the Hypothesis to be tested is as follows:

H_5 : *There is a negative relationship between liquidity and leverage ratios.*

7. Earnings Volatility

According to Pecking Order Theory, the volatility of earnings decreases the firm's debt capacity. So, a higher volatility of earning increases the firm's failure (default), as a firm may not be able to fulfil its obligations according to the distress theory (Deesomsak et al., 2004). The volatility of earnings is defined as the absolute difference between the annual changes in the earnings before interest and tax (EBIT) and the average of the change in earnings before interest and tax over the sample study. Thus, a negative relationship is expected between earnings volatility and the leverage ratio, and a positive relationship with the firm's default (failure). Thus, the Hypothesis to be tested is as follow:

H_6 : *There is a negative relationship between the volatility of earnings and leverage ratios.*

8. Share Price Performance or Market Performance

According to market timing theory, the share price performance negatively affects the leverage ratios (Baker and Wurgler, 2002), as firms prefer equity

have low leverage ratios, as they tend to use the internal sources of funds rather than debt.

rather than debt when their share prices increase. So, the history of share prices has an impact on the firms' capital structure, firms' health, and their default or failure. Thus, the Hypothesis to be tested is as follows:

H_7 : *There is a negative relationship between leverage ratios and share price performance.*

9. Stock Market Developments

Another important variable to be considered in this study is the Stock's Market activity. According to Demircug-Kunt and Maksimovic (1996), financial market development plays a significant role in a firm's financing decision. Firms' preference for debt over equity decreases as the stock market's activity increases. Amman Stock Exchange (ASE) was considered to be the most efficient stock exchange in the Arab world, as well as the largest and fastest growing market in the region open to investors (JIB, 2005). The efficiency of the ASE could affect the firm's leverage ratio as it provides liquidity to the firm's. Thus, the Hypothesis to be tested is as follows:

H_8 : *There is a negative relationship between the leverage ratios and Stock Market capitalisation.*

10. Regional Crises (Gulf Crisis)

During our sampling period of 1989-2003, Jordanian macroeconomic factors such as interest rates, political instability around Jordan, or regional crises such as the Gulf Crisis in 1990-1991 and Intifadah in 2000 affect the Jordanian economy. The Gulf Crisis in 1990-1991 and Intifadah in 2000 severely affected the capital market in Jordan as the Jordan market depends on Iraq, the Gulf States, and Palestine to export its production. For example, market capitalisation fell by about 14% in 1990 and 20.5% in 2000. Following 1990, the Jordanian capital market experienced a significant growth of investment as a refuge from the Gulf States and Iraq. Also, the outbreak of the Intifadah in September 2000 affected the Jordanian capital market negatively, which also had an impact on the increasing number of defaulted and distressed firms in Jordan. Raising capital during the Gulf Crisis 1990-1991 and the Intifadah became costly, and yet necessary, for most Jordanian companies that depended on the Iraqi, Gulf States, and Palestinian markets. Therefore, these regional crises may cause time-series effects on corporate leverage. Based on the above argument, the Hypothesis to be tested is as follows:

H_9 : *Political Instability around Jordan (regional crises) affects leverage ratios*

11. Uniqueness (Industry Effect)

Each industry may have specific features that affect the debt structure of firms in that industry (see Hovakimian et al. (2001). These may arise from the

different business environments of industries, the degree of competition in product markets, the capital required in these industries, and the skill composition of the industries (See Wei, Xie and Zhang, 2005). Thus, the Hypothesis to be tested is as follows:

H_{10} : Firm's Industrial Sectors Affect Corporate Leverage.

The objectives of this paper are to examine the determinants of capital structure for Jordanian firms, to examine the effect of industrial sector, Gulf Crisis 1990-1991, and the outbreak of Intifadah in September 2000 on the firm's capital structure. The next section introduces the research method.

4. Data and Methodology

4.1. Data

Annual data were obtained from the Amman Stock Exchange (ASE) to cover the period 1989-2003. This resulted in a panel database of 1595 cases for 167 companies¹⁴. Appendix 1 depicts the Number of Listed Firms used in the Study by Sector over the period 1989-2003. The data used in the analysis is constructed from balance sheet and income statement information from the Amman Stock Exchange (ASE)¹⁵, and from the tax department. Furthermore, firms' annual share prices and capitalisation are constructed from the Amman Stock Exchange (ASE). The sample includes all non-financial firms listed on the Amman Stock Exchange (ASE). A sub-sample was extracted from the main sample that included healthy firms to check the effect of bankruptcy on the leverage ratio. Our main sample includes both financially sound companies and defaulted companies to avoid bias, as the probability of bankruptcy may have a significant effect on a firm's financing decisions.

4.2. Explanatory Variables

The selection of the dependent and independent variables is guided by the previous empirical studies and the theoretical issues. In this study five variables are used to measure leverage. These are the ratio of total debt to total assets (TDTA), short-term debt to total assets (STDTA), long-term debt to total assets (LTDTA)¹⁶. The logarithm of total assets is used to measure a firm's size (SIZE)¹⁷. To measure a firm's

profitability (PROF), we use earnings before interest, tax, and depreciation (EBITD), divided by total assets. Tangibility (TANGB) is measured by the ratio of net fixed assets to total assets. The growth is proxied by the annual growth of the firm's total assets (Growth)¹⁸.

The liquidity (LIQ) is measured by the ratio of current assets to current liabilities. The volatility of earnings (VOE) is measured by the absolute difference between the annual percentage change in earnings before interest and tax (EBIT) and the average of this change over the sample period. The share price performance (SPPR) is measured by the difference of the logs of annual share prices. The stock market activity (SMA) is measured by the ratio of the market value of a firm's traded shares to market capitalisation (See Table 3 for variables definitions).

Insert Table 3 Here

4.3. Econometrics models

To assess the determinants of capital structure and to investigate the effect of the default risk on the capital structure, an individual firm's leverage ratios are modelled as a function of several factors that affect the capital structure. We estimate the following model for the two samples of companies in a panel data approach:

$$\begin{aligned} Leverage_{it} = & \beta_0 + \beta_1 TANGB_{it} - \beta_2 PROF_{it} + \beta_3 SIZE_{it} - \beta_4 Growth_{it} - \beta_5 LIQ_{it} \\ & - \beta_6 VOE_{it} - \beta_7 SPPR_{it} - \beta_8 SMC_{it} - \beta_9 TAX_{it} + \mu_i + u_{it} \end{aligned} \quad (1)$$

where $Leverage_{it}$ denotes leverage and is computed as the ratio of total debt to total assets (TDTA), short-term debt to total assets (STDTA), and long-term debt to total assets (LTDTA), in alternative estimations; TANGB refers to the firm's tangibility, PROF refers to the profitability measured by earnings before interest, tax and depreciation, divided by total assets, LIQ refers to the liquidity, VOE the volatility of earnings, SPPR refers to the share price performance, SIZE refers to the logarithm of total assets, Growth refers to the annual growth of the firm's total assets, and SMA refers to the stock market activity. μ_i is used to capture the unobserved individual effects (either Fixed Effects model or Random Effects model), and u_{it} is the error term, which represents the measurement errors in the independent variables and any explanatory variables that have been omitted. The non-debt tax shield was not included as there is a strong correlation with the profitability variable PROF. Pooled ordinary least squares (OLS) will be estimated to compare their results with the panel data

¹⁴ To have a list of the companies used in this study please contact the author.

¹⁵ It is worth noting that the data related to tax, depreciation, interest payments, and cash flow was collected manually with enormous effort.

¹⁶ It is worth noting that the total debt to total equity (TDTE) and total debt to total capital (TDTC) were tried in this study.

¹⁷ The logarithm of total sales and the logarithm of market capitalisation are tried in this study.

¹⁸ The annual growth of the firm's total sales and the book value of total assets less the book value of equity plus the market value of equity divided by the book value of total assets are used in this study.

in order to decide whether the panel model is appropriated.

5. Empirical Results

5.1. Descriptive Statistics

Table 4 reports the summary statistics of mean, standard deviation, maximum, minimum, coefficient of variation (CV)¹⁹, skewness, and kurtosis for all variables used in the analysis. Based on the first measure of leverage TDTA, the reported mean ratio is about 0.36 and it is relatively small and close to the ratio 0.377 reported by Omet and Mashharawe (2004) for Jordanian companies. Table 4, also shows that the leverage of ratio LTDTA has the lowest standard deviation. Note that there is a large difference in the variance of the dependent variables used in the analysis as measured by the standard deviation. For example, the variable TDTA has a standard deviation of 3.56, which is significantly higher than the 0.85 standard deviation of TDTE.

Insert Table 4 Here

The coefficient of variation indicates that there is a significant variation among the explanatory variables used in the study. The mean for the profitability (PROF) of the Jordanian companies is 9 percent, which is very low, the main reason being that the sample includes defaulted firms. The ratio of fixed assets to total assets (TANGB) is about 47 percent which is higher than other countries such as Thailand (0.44), Malaysia (0.38), and Australia (0.33) (Deesomsak, Paudyal and Pescetto, 2004). The growth opportunities measure for Jordanian companies is quite small at 0.66 compared to Oman for example, with 1.58, as reported by Omet and Mashharawe (2004).

5.2. Diagnostic Tests

In order to control for multicollinearity, a diagnostic test using the correlation matrix and the variance inflation factors was employed. Table 5 presents the correlation matrix of the explanatory variables. The low intercorrelations between the explanatory variables used in the regressions indicate that there is no reason to suspect serious multicollinearity²⁰. However, there is a high intercorrelation between PROF and the non-debt tax shield (NTS), so it is not

¹⁹ The coefficient of variation CV is defined as the standard deviation over the mean.

²⁰ The Breusch-Pagan Lagrange Multiplier test (1980) for a diagonal matrix (that is, no cross-section correlation) is carried out. The statistic test is: $\lambda LM = T \sum_{i=2}^N \sum_{j=1}^{i-1} r_{ij}^2$

where r_{ij}^2 is the ij th residual correlation coefficient.

possible to include both of them. In this case, the PROF variable is used in the study as it is expected to have a more significant impact on a firm's capital structure.

Insert Table 5 Here

To ensure the robustness of the estimates, several diagnostic tests on the chosen estimations are performed. The Breusch-Pagan Lagrange Multiplier test (1980) for random effect is reported at the bottom of each table of the results for the determinants of capital structure. The Breusch-Pagan Lagrange Multiplier test is used to examine the suitability of the Random Effects model over the pooled Ordinary Least Square (OLS) estimation. STATA software allows the estimation of White's corrected covariance matrix for group-wise heteroskedasticity (Greene, 2003, p.315). The overall significance of the models was tested using the Wald test, which has a Chi-square (χ^2) distribution under the null hypothesis that all the exogenous variables are equal to zero.

5.3. Empirical Results

The analysis of the results is presented here in different sub-sections. It begins with an analysis of the determinants of capital structure for two samples using the leverage ratio TDTA, and then the results of different measures of leverage are presented. The analysis then moves on to examine the effect of the Gulf Crisis (1990-1991) on Jordanian firms' capital structure. This includes an analysis of the statistical significance of each variable. The pooled OLS regression and Random-Effects model are used in this analysis. Also, the results of the Fixed-Effects model are reported. The Random-Effects model and OLS are then used to examine the effect of the Industrial sectors on capital structure decisions. Specifically, the results of the five measures of leverage using the same explanatory variables are presented in this section.

In order to explore the appropriateness of a Random-Effects model, a Breusch-Pagan Lagrange Multiplier test is conducted for the overall significance of these effects. According to the Breusch-Pagan test, the null hypothesis is that the random components are equal to zero. This test also provides support for the rejection of a pooled Ordinary Least Squares (OLS) over a Generalized Least Squares (GLS). The Breusch-Pagan test for the TDTA, STDTA, and LTDTA provides support for using the Random Effects model over a pooled OLS. Additional support for the Random-Effects model was further obtained from the Hausman test of model specification, given that the results failed to reject the null hypothesis of "no difference" between the coefficients of the Random and Fixed-Effects models. Also, the Random-Effects model has an important advantage over the Fixed-Effects model, as it has the

ability to account for time-invariant predictors. As the industrial dummy variables are important in this analysis, the Random-Effects model may be more efficient and robust than the Fixed-Effects model.

The overall significance of the models was tested using the Wald test, which has a Chi-square (χ^2) distribution under the null hypothesis that all the exogenous variables are equal to zero. The overall significance of the models is very high, significant at least at the 1% level in all estimations using the Random-Effects model. The overall goodness of fit (R^2) for the Random-Effects model is greater than the goodness of fit of the Fixed-Effect model in all estimations. For example, the goodness of fit for TDTA for the full sample using the Random-Effects model is about 33% while it is 28% using the Fixed-Effects model.

The estimation results of Equation (1) using two samples are presented in Table 6 using the OLS, Random-Effects model, and Fixed-Effects model. Table 6 reports the determinants of TDTA for two samples with defaulted firms and without defaulted firms. Table 7 reports the determinants of short-term debt to total assets (STDTA) and long-term debt to total assets (LTDTA). The results of the heteroskedasticity test show that our models do not suffer from a heteroskedasticity problem²¹. The observed Chi-squared value is not significant at the 5 percent level in our estimations.

Insert Table 6 Here
Insert Table 7 Here

From hypothesis 1, the variable representing the tangible assets is expected to have a positive and significant impact on a firm's leverage TDTA and LTDTA, while a negative and significant relationship between STDTA and tangibility is expected. Based on the reported results in Table 6, the relationship between leverage (TDTA) and tangibility (TANGB)²² is positive and significant at the 1 percent level. The result of the tangibility is consistent with the agency theory proposition that there are agency costs associated with the use of debt. It is also consistent with the hypothesis that there is a positive relationship between debt and the cost of bankruptcy which causes financial distress and increases the firm's likelihood of default. In other words, tangible assets increase the firm's ability to raise debt and reduce the likelihood of default. As predicted, Table 7 shows that there is a negative and significant relationship between tangibility and short-term debt. Table 7 also shows

that there is a positive and significant relationship between long-term debt and tangibility.

The finding of a positive relationship between tangible assets and leverage is consistent with the prior research based on developed country capital markets, including Titman and Wessels (1988), Rajan and Zingales (1995), among others. The results also similar to those of Wiwattanakantang (1999) and Omet and Mashharawe (2004), who examined firms, traded on emerging markets. However, for Thailand firms, Booth et al. (2001) reported different results. They found a negative and significant relationship between tangibility and leverage. The findings of a negative relationship between tangible assets and short-term debt and a positive and significant relationship between long-term debt and tangibility are consistent with those of Bevan and Danbolt (2002).

Hypothesis 2 predicts that firms with a high profitability ratio tend to decrease their leverage ratio, thus the coefficient of PROF is expected to be negatively related to leverage. From the regression results in Table 6 and Table 7, as predicted, profitability (PROF) is found to have a negative and significant effect on the firm's leverage ratios TDTA, STDTA, and LTDTA, with a high level of significance²³. This result is consistent with, and supports, the pecking order theory, which argues that external finance is costly and firms prefer internal sources of finance. It is also consistent with the Trade-off theory hypothesis that high profitability increases the firm's debt financing capacity and the strength of the accompanying tax shield and, hence, decreases the firm's likelihood of default.

These results, reported in Table 6 and Table 7, are consistent with most of the prior research based on developed capital markets including Titman and Wessels (1988), Rajan and Zingales (1995), Bevan and Danbolt (2002), Zoppa and McMahon (2002), and Cassar and Holmes (2003), among others. The results are also similar to those of Wiwattanakantang (1999), Booth et al. (2001), Chen (2004) from emerging markets, which is notable since our study includes additional firm specific variables. It is worth noting that NTS is used instead of PROF and found to be negative, but not significant, at any level of significance, which is not consistent with the previous findings such as Wiwattanakantang (1999) and Deesomsak et al. (2004), among others.

From hypothesis 3, the firm's size is expected to have a positive impact on the firm's leverage. From the regression results in Table 6 and Table 7, as predicted, firm size (SIZE) is found to have a positive and statistically significant impact on a firm's leverage ratios TDTA, STDTA, and LTDTA at the 1 percent level²⁴. The positive and significant relationship

²¹ The heteroskedasticity test for across panels can be run using the `xtgls` command in Stata 8.

²² It is worth noting that TANGB is found to have a positive and significant impact on total debt to total equity (TDTE) but insignificant impact on total debt to total capital (TDTC).

²³ It is worth noting that PROF is found to have a negative but insignificant impact on TDTE and TDTC.

²⁴ It is worth noting that a firm's size is found to have a significant impact on TDTE and TDTC.

between leverage and size indicates that large firms have a lower risk of default as they have access to external sources of funds. This finding is consistent with the trade-off theory, that larger firms might be more diversified and tends to have better borrowing capacity compared with smaller firms. Also, large firms tend to have a lower bankruptcy cost and are less likely to default (Bevan and Danbolt, 2002). So small firms are expected to borrow less than large firms and tend to have a high likelihood of default.

The finding of a positive relationship between size and leverage is consistent with the prior research based on developing countries including Wiwattanakantang (1999) and Booth et al. (2001). The result is also consistent with research based on developed countries including Titman and Wessels (1988) and Rajan and Zingales (1995). On the other hand, the result for long-term debt is inconsistent with Bevan and Danbolt (2002) who report that size is found to be positively related to the long-term debt and negatively related to the short-term debt.

From Hypothesis 4, growth opportunity is expected to have a negative impact on leverage. The regression result in Table 6 and Table 7 shows that the impact of growth opportunity (Growth)²⁵ on leverage is positive, but is not significant using the Random-Effects model. This result does not give statistically significant support to the prediction of the pecking order theory that growing firms are likely to choose debt rather than equity. Our result is consistent with that of Omit and Mashharawe (2004) which finds that growth opportunity does not affect the leverage ratio for Jordanian firms. It is also inconsistent with other previous studies (e.g. Pandey (2001), and Buferna, Bangassa and Hodgkinson (2005)). This result is also not consistent with the prediction of agency theory that high growth firms use less debt since they do not wish to expose themselves to possible restrictions imposed by lenders. Another variable found to be a determinant of corporate leverage in Jordan is the liquidity (H_5). The results reported in Table 6 and Table 7 show that liquidity (LIQ) has a negative and significant impact on the leverage ratios TDTA and STDTA, while it has a negative but not significant effect on the leverage ratio LTDTA. The negative and insignificant effect between the LTDTA and liquidity could be because most Jordanian firms depend on short-term debt rather than long-term debt as a result of the banks credit policy. This finding is consistent with agency theory and pecking order theory propositions that firms

prefer to use their internal sources of funds to finance their investment²⁶. It is also consistent with the free cash flow theory as firms prefer the internal source of funds since it decreases the risk of default. The higher liquidity ratio increases the firm's ability to meet its short-term obligations and, hence, decreases the risk of default (failure). This finding is consistent with prior empirical research such Ozkan (2001), Antoniou et al. (2002), and Deesomsak et al. (2004), among others. Hypothesis 6 predicts that volatility of earnings is negatively related to leverage. From the regression results in Table 6 and Table 7, VOE is found to have a positive but not significant effect on all measures of leverage, and this result is consistent with other studies such as Wiwattanakantang (1999) and Deesomsak et al. (2004). The finding is not consistent with the trade-off theory that firms with a high volatility of earning have a high risk of default and a lower debt capacity. Hypothesis 7 tests whether share price performance can be a significant determinant of corporate leverage in Jordan. From the regression results in Table 6 and Table 7, the coefficient of share price performance (SPPR) is negative, as expected, but does not have a significant effect on TDTA and LTDTA²⁷. The finding does not support the market timing theory that firms prefer equity to debt when share prices increase. This result could reflect the view that most of Jordanian firms depend on banks as a source of funds rather than using the equity market, or it could be that firms ignore the volatility of earnings if the cost of entering into liquidation is low (Deesomsak et al., 2004).

Hypothesis 8 predicted a negative relationship between SMC and leverage. From the regression results in Table 6 and Table 7, the relationship between stock market activity (SMC) and the leverage ratios TDTA and LTDTA is found to be significant and negative²⁸. This result is consistent with the Demircuc-Kunt and Maksimovic (1996) argument, that financial market development plays an important role in firms' financing choice. However, the SMC is found not to have a significant impact on STDTA. It also shows that the activity of the Amman Stock Exchange (ASE) decreases the demand for debt. Therefore, as the ASE activity increased as companies' preference for equity over debt increased.

5.4. Regional Crises (Gulf Crisis)

From Hypothesis 9, regional crises; Gulf Crisis 90-91 and outbreak of the Intifadah in September 2000, are

²⁵ The other two measures of growth were used in the study and found to have a positive effect on firm's leverage. Growth in sales is found to be not significant, while the growth ratio (Growth3) measured by book value of total assets minus book value of equity divided by the book value of total assets has a positive and significant impact on the leverage ratio, at the 1% level of significance. Due to the high correlation between Growth3 and PROF we used Growth is assets in our analysis.

²⁶ It is worth noting that LIQ is found to have a negative and significant impact on TDTC, while it has a negative but insignificant impact on TDTE.

²⁷ ²⁷ It is worth noting that SPPR is found to have a positive and significant impact on TDTC, while it does not have any significant impact on TDTE.

²⁸ ²⁸ It is worth noting that SMC is also found to have a negative and significant impact on TDTC and TDTE reflecting the importance of stock market activity on corporate finance decisions.

expected to have a significant impact on corporate leverage. The results for the estimated effect of the Gulf Crisis of 1990-1991 and Intifadah and the macroeconomic factors are presented in Table 6 and Table 7.

The estimated coefficients on time dummies suggest significant effects of macroeconomic variables on firms' leverage, implying that major changes to the overall economic environment may significantly affect a firm's choice of capital structure. From 1990 to 1993, time dummies almost had a significant effect on the firm's leverage ratios TDTA and LTDTA. The significance of the time dummies DUM1990, DUM1991, DUM1992 and DUM1993 show that the Gulf Crisis 1990-1991 had a positive impact on the leverage ratio as firms' demand for debt to finance short-term obligations increased. Another reason that could have led to an increase in the leverage ratios during the Gulf Crisis is that banks' credit policies may have encouraged firms to borrow and invest.

The time dummy variable DUM1995 had a significant effect on the capital structure. The time dummies DUM1994, DUM1996, DUM1997, DUM1998, DUM1999, DUM2000, DUM2001, and DUM2002 had no significant effect on the firm leverage ratios TDTA and LTDTA. The outbreak of the Intifadah in September 2000 is found to have had no significant impact on the firm leverage ratios TDTA and LTDTA²⁹.

From Hypothesis 10, industrial sectors are expected to have a significant impact on corporate leverage. The results of including dummy variables for industries are reported in Table 8. This Table shows that the results have changed very little. For example, the growth (Growth)³⁰ becomes highly significant as we control for industrial sectors in the Random Effects model.

In this study, 16 dummy variables are included in the regression. It is worth noting that the Hotels and Tourism, Transportation, and Educational services are dropped from the regression; therefore, they are excluded from the analysis. The dummy variables for the Foods sector, Paper, Glass, and Packaging sector, Steel, Mining and Heavy Engineering sector, Chemical and Petroleum sector, Textiles and Clothing sector, Utilities and Energy sector, Construction and Engineering sector, Real Estate sector, and Trade,

Commercial services, Rental, and Communication sectors, have a positive and significant impact on the financial leverage. This indicates that these sectors have a high demand for debt and have high leverage ratios in capital structure compared with other sectors. It also shows that firms in these sectors have the ability to borrow more, which increases their ability to manage debt in their capital structure.

The dummy variable for the Medical services sector has a negative and significant impact on the leverage ratio. The negative coefficient of Medical services indicates that these firms have a lower ability to increase their leverage. It may also indicate that these firms have a lower demand for debt. The other industrial dummy variables for Medical and Pharmaceutical services, Tobacco, and Media sectors do not have a significant impact on firms' leverage TDTA. The finding is consistent with prior empirical research such as Titman (1984) and Bradley, Jarrell and Kim (1984), that that firm industry sectors affect corporate leverage.

It is worth noting that the other two measures of size, the logarithm of total sales (SAL) and the logarithm of market capitalization (CAP) are significant. Regarding the other two measures of growth, the book value of total assets less the book value of equity plus the market value of equity divided by the book value of total assets had a positive and significant impact on leverage in the three models, while the annual growth of the firm's total sales had a positive but not significant effect in the three models.

6. Conclusion

This paper analyses the capital structure of the listed firms on the Amman Stock Exchange (ASE) from 1989 to 2003. The issue of how firms in developing countries finance their activities attracts considerable interest since most of the theoretical and empirical work on capital structure considers only developed countries. Hypotheses were developed to test which capital structure theories best explained the Jordanian companies' capital structure, by comparing the relationships between long-term debt, short-term debt, total debt to total assets, total debt to total capital, and total debt to shareholders equity and eight explanatory variables that represent profitability, growth, tangibility, liquidity, size, volatility, market performance, and financial market development.

Based on the time period 1989-2003, our results indicate that Jordanian companies mostly depend on short-term debt, as a result of the banking credit policy that promotes on short-term debt. Our results suggest that the level of gearing in Jordanian firms is positively related to size, tangibility, volatility of earnings, and negatively correlated with profitability, the level of growth opportunities, liquidity and stock market activities. The level of gearing measured by short-term debt is, however, negatively correlated with tangibility. The Gulf Crisis between 1990 and

²⁹ It is worth noting that, the outbreak of the Intifadah in September 2000 had a significant impact on other measures of leverage, such as TDTE and TDTC, at a high level of significance. The significance impact of DUM2000 on TDTE and TDTC shows that most Jordanian firms increased their debt to equity and capital during 2000 as a result of the impact of Intifadah.

³⁰ The growth ratio measured by book value of total assets minus book value of equity divided by the book value of total assets is also found to be significant and positive in both the Random Effects model and the OLS, while the growth in sales is found to have a positive but not significant effect in the three models.

1991 is also found to have a significant and positive impact on Jordanian corporate leverage. The rationale behind this finding is that most Jordanian companies export their products to Gulf markets, and the demand for the exporting product increased, leading to many not having enough liquidity to finance their expansion. The outbreak of Intifadah in September 2000, however, does not have a significant impact on the firms' leverage ratios, measured by TDTA, LTDTA, and STDTA.

The finding of a strong positive relationship between size and leverage, as well as between the size and the leverage measured by short-term debt, suggests that the capital structure decision with inadequate long-term debt access is influenced more strongly and positively by factors such as the bankruptcy cost which is represented by SIZE. Furthermore, the finding of a very strong negative relationship between market activity and gearing further supports our previous finding that Jordanian firms have inadequate long-term debt access as their source of financing. Once the ASE activity increased, companies' preference for equity over debt increased substantially due to their inadequate long-term debt access and the high cost of short-term debt. We conclude that the capital structure decision with inadequate long-term debt access is influenced more strongly by factors such as bankruptcy costs and Stock Market Activity (SMA).

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Appendices

Table 1. The Average of Leverage Ratios for Jordanian Listed Firms 1989-2003

Year	STDTA	LTDTA	TDTA	STDTE	LTDTE	TDTE	TDTC
1989	0.389	0.101	0.508	0.966	0.3242	1.359	1.634
1990	0.433	0.075	0.523	1.708	0.471	2.279	1.691
1991	0.429	0.065	0.518	1.674	0.182	1.983	1.630
1992	0.344	0.058	0.423	0.957	0.143	1.200	1.409
1993	0.329	0.054	0.401	0.262	0.129	0.471	1.345
1994	0.261	0.043	0.314	0.437	0.096	0.595	1.194
1995	0.250	0.042	0.305	0.468	0.098	0.636	1.227
1996	0.248	0.046	0.313	0.504	0.109	0.690	1.287
1997	0.249	0.057	0.328	0.691	0.082	0.857	1.224
1998	0.255	0.073	0.353	0.506	0.117	0.725	1.055
1999	0.249	0.071	0.357	1.213	0.367	1.670	1.039
2000	0.327	0.062	0.365	1.209	0.163	1.572	1.144
2001	0.238	0.068	0.345	0.542	0.216	0.876	1.087
2002	0.226	0.069	0.338	0.331	0.165	0.643	1.096
2003	0.214	0.057	0.309	0.324	0.123	0.625	1.056
Average	0.296	0.063	0.380	0.786	0.186	1.079	1.274

Source: Amman Stock Exchange and author's calculation based on data from annual reports.

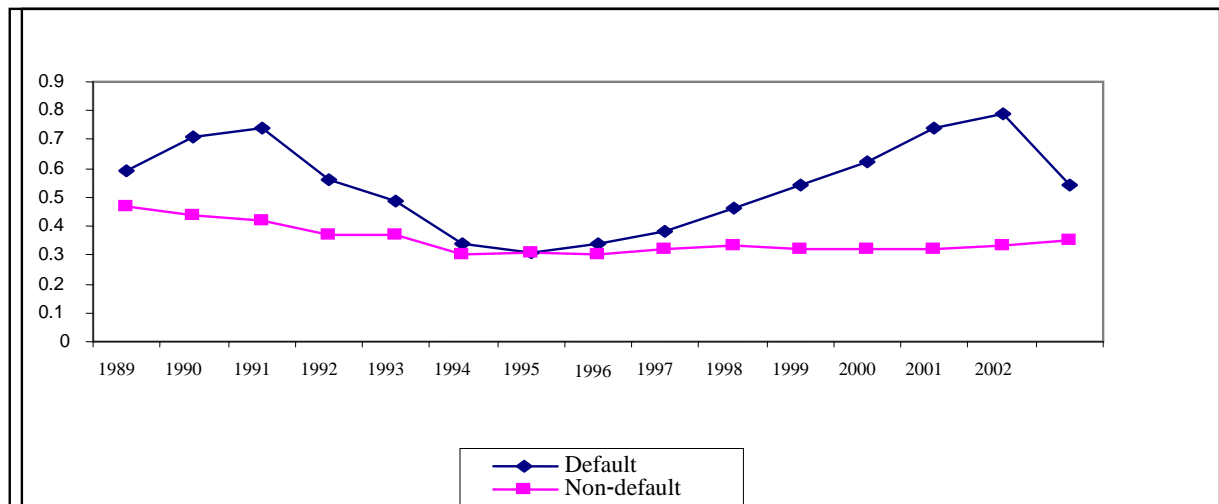


Figure 1. Average Leverage Ratio TDTA in Defaulted and Non-Defaulted Firms: 1989-2002

Source: Amman Stock Exchange and author's calculation based on data from annual reports.

Table 2. Average Leverage Ratios in both Defaulted and Non-Defaulted Firms over 1989-2002

Year	LTDTA		STDTA		TDTE		TDTC	
	Default	Non-default	Default	Non-default	Default	Non-default	Default	Non-default
1989	0.11	0.10	0.47	0.35	1.40	1.34	1.51	1.69
1990	0.05	0.09	0.64	0.34	2.66	2.11	1.62	1.72
1991	0.04	0.07	0.66	0.33	3.16	1.45	1.70	1.60
1992	0.04	0.07	0.48	0.29	2.22	0.82	1.24	1.47
1993	0.05	0.05	0.42	0.29	-0.27	0.74	1.07	1.44
1994	0.05	0.04	0.29	0.25	0.59	0.60	1.32	1.15
1995	0.04	0.04	0.26	0.25	0.66	0.63	1.05	1.28
1996	0.07	0.04	0.27	0.24	0.88	0.63	1.11	1.34
1997	0.12	0.04	0.25	0.25	0.46	0.94	0.57	1.37
1998	0.16	0.05	0.29	0.25	0.74	0.72	0.67	1.14
1999	0.09	0.07	0.32	0.23	6.49	0.66	1.01	1.05
2000	0.06	0.06	0.40	0.31	4.97	0.98	1.44	1.09
2001	0.24	0.06	0.48	0.36	2.62	0.77	1.46	1.06
2002	0.16	0.07	0.63	0.44	4.89	0.57	0.93	1.10
Average	0.09	0.06	0.42	0.30	2.25	0.93	1.19	1.32

Source: Amman Stock Exchange and author's calculation based on data from annual reports.

Table 3. Variables Definitions

Variable	Variable Definition
TDTA	Total debt/Total assets
TDTE	Total debt/Total equity
TDTC	Total debt/Total capital
STDTE	Short-term debt/Total equity
LTDTA	Long term debt/ Total assets
TANGB	Total Fixed assets/Total assets
PROF	(Earnings before interest and tax plus Depreciation)/Total assets
LIQ	Current liabilities/Total assets
SIZE	Logarithm of Assets
Growth	Changes in Total Assets
NTS	Depreciation/Total assets
SPPR	Share Price Performance ($\log P_1 - \log P_0$)
VOE	Volatility of Earnings ($EBIT_1 - EBIT_0 - Average$)
SMC	Stock Market Activity (Market value of traded shares/market value of stock market capitalisation)

Table 4. Description Statistics for the Dependent (s) and Independent Variables

Variable	Mean	Std. Dev.	Minimum	Maximum	CV	Skewness	Kurtosis
TDTA	0.366	3.56	0	3.555	9.73	2.95	18.31
STDTA	0.311	0.85	0	26.71	2.73	23.97	673.52
LTDTA	0.062	0.115	0	2.023	1.85	5.005	62.428
TDTE	1.899	35.28	-15.67	1407.99	18.58	39.21	1562.01
SIZE	6.9	0.6	5.07	9.04	0.09	0.73	4.24
PROF	0.09	0.25	-6.25	0.7	2.78	-15.46	349.14
TANGB	0.47	0.26	0	0.98	0.55	0.03	2
Growth	0.33	8.68	-0.87	328.61	26.30	37.71	1427.29
NTS	0.12	2.05	0	76.86	17.08	34.28	1236.87
LIQ	17.72	127.06	0.02	3331.44	7.17	16.83	362.16
VOE	0.68	11.96	-278.85	53.58	17.59	-16.77	371.72
SPPR	-0.01	0.18	-1.58	0.88	-18.00	-0.14	10.86
SMC	0.01	0.02	0	0.23	2.00	8.23	89.63

Note: See Table 3 for variable definitions.

Table 5. Correlation Matrix for the Explanatory Variables

	SIZE	PROF	TANG	Growth1	NTS	LIQ	VOE	SPP	SMC
SIZE	1								
PROF	0.057	1.000							
TANGB	0.078	0.041	1.000						
Growth	-0.022	0.018	-0.067	1.000					
NTS	-0.029	-0.911	-0.081	-0.002	1.000				
LIQ	-0.176	-0.070	-0.096	0.022	0.031	1.000			
VOE	-0.025	0.001	0.007	0.001	-0.001	0.040	1.000		
SPPR	0.022	0.086	-0.024	0.044	-0.002	-0.034	-0.025	1.000	
SMC	0.571	0.078	0.066	-0.012	-0.014	-0.056	-0.021	0.034	1.000

Note: Annual growth of total assets SMC (Stock market capitalisation) is the ratio of traded value to the market capitalisation. See Table 3 for variable definitions.

Table 6. Regression Results for Total Debt to Total Assets (TDTA)

Independent Variables	Full Sample (defaulted and non-defaulted Firms)			Sample without defaulted Firms		
	OLS	Random Effect	Fixed effect	OLS	Random Effect	Fixed Effect
Constant	-1.0873 (-11.21)***	-0.7158 (-4.34)***	-0.7950 (-2.79)***	-1.1255 (-11.27)***	-0.6461 (-3.78)***	-0.5765 (-1.98)**
TANGB	0.156 (5.63)***	0.2010 (5.53)***	0.2238 (4.88)***	0.1448 (5.07)***	0.1931 (5.00)***	0.2081 (4.12)***
PROF	-0.0459 (-1.97)**	-0.0623 (-2.38)**	-0.1740 (-4.23)***	-0.0254 (-1.09)	-0.0253 (-0.97)	-0.0822 (-1.98)**
SIZE	0.1938 (14.52)***	0.1386 (6.06)***	0.1519 (3.84)***	0.2015 (14.66)***	0.1308 (5.55)***	0.1237 (3.09)***
LIQ	-0.0051 (-7.03)***	-0.0060 (-6.95)***	-0.0075 (-6.29)***	-0.0048 (-6.48)***	-0.0062 (-7.09)***	-0.0078 (-6.52)***
VOE	0.0003 (0.6)	0.0003 (0.71)	0.0003 (0.80)	0.0004 (0.62)	0.0003 (0.71)	0.0003 (0.73)
SPPR	-0.0669 (-1.58)	-0.0304 (-1.04)	-0.0163 (-0.55)	-0.0472 (-1.09)	-0.0318 (-1.09)	-0.0275 (-0.93)
Growth	-0.0002 (-0.45)	0.0007 (1.39)	0.0027 (3.6)***	-0.0003 (-0.61)	0.0002 (0.46)	0.0013 (1.670)*
SMC	-3.0248 (-7.06)***	-1.4483 (-3.01)***	-1.0426 (-2.02)**	-3.0266 (-7.09)***	-1.3493 (-2.88)***	-1.0476 (-2.090)**

Table 6 continued

DUM1990	0.1744 (5.02)***	0.1407 (5.69)***	0.1453 (5.62)***	0.1548 (4.33)***	0.1115 (4.51)***	0.1055 (4.08)***
DUM1991	0.1646 (5.05)***	0.1253 (5.43)***	0.1254 (5.27)***	0.1376 (4.1)***	0.0951 (4.13)***	0.0882 (3.71)***
DUM1992	0.1606 (4.94)***	0.1172 (5.11)***	0.1160 (4.94)***	0.1280 (3.8)***	0.0817 (3.55)***	0.0751 (3.18)***
DUM1993	0.1335 (4.08)***	0.1007 (4.39)***	0.1000 (4.29)***	0.1059 (3.14)***	0.0672 (2.93)***	0.0605 (2.59)***
DUM1994	0.0619 (1.87)*	0.0370 (1.61)	0.0363 (1.56)	0.0479 (1.39)	0.0151 (0.65)	0.0090 (0.38)
DUM1995	0.0630 (1.93)**	0.0395 (1.75)***	0.0361 (1.58)	0.0429 (1.27)	0.0125 (0.55)	0.0053 (0.23)
DUM1996	0.0427 (1.31)	0.0158 (0.7)	0.0089 (0.39)	0.0177 (0.52)	-0.0108 (-0.48)	-0.0190 (-0.83)
DUM1997	0.0552 (1.71)*	0.0315 (1.41)	0.0259 (1.15)	0.0312 (0.93)	0.0061 (0.27)	-0.0016 (-0.07)
DUM1998	0.0443 (1.35)	0.0265 (1.17)	0.0218 (0.96)	0.0200 (0.59)	0.0023 (0.1)	-0.0037 (-0.16)
DUM1999	0.0355 (1.11)	0.0115 (0.52)	0.0045 (0.20)	0.0028 (0.08)	-0.0188 (-0.85)	-0.0253 (-1.14)
DUM2000	0.0504 (1.55)	0.0226 (1.00)	0.0164 (0.72)	0.0070 (0.21)	-0.0194 (-0.86)	-0.0252 (-1.1)
DUM2001	-0.0027 (-0.1)	-0.0001 (0)	0.0022 (0.12)	-0.0166 (-0.62)	-0.0186 (-1.09)	-0.0186 (-1.09)
DUM2002	0.0010 (0.04)	0.0022 (0.13)	-0.0008 (-0.05)	-0.0129 (-0.5)	-0.0147 (-0.88)	-0.0176 (-1.06)
Observation	834	834	834	763	763	763
Adjusted R-square	0.3344	0.3283	0.2835	0.3413	0.3294	0.2955
Wald-test	F= 20.92 (0.00)***	$\chi^2 = 212.12$ (0.00)***	F= 8.31 (0.00)***	F= 19.34 (0.00)***	$\chi^2 = 191.79$ (0.00)***	F= 7.16 (0.00)***
Huaman Test			$\chi^2 = 23.56$ (0.3149)			$\chi^2 = 23.51$ (0.318)
Breusch and Pagan Lagrangian	$\chi^2 = 1190.59$ (0.00)***				$\chi^2 = 1188.96$ (0.00)***	

Notes: *** Significant at 1% level, ** Significant at 5% level, and * Significant at 10% level. TANGB (tangibility) is the ratio of total fixed assets to total assets. PROF (profitability) is the ratio of earnings before interest, tax and depreciation to total assets. NTS (non-debt tax shield) is the ratio of depreciation to total assets. LIQ (liquidity) is the ratio of current assets to current liabilities. VOE (volatility of earnings) is the absolute difference between annual change in earnings before interest and tax and the average of this change. SPPR (share price performance) is measured as the first difference of logs of annual share prices. SIZE is the natural logarithm of total assets. Growth (growth opportunity) is the annual growth of total assets. SMC (Stock market capitalization) is the ratio of traded value to the market. See Table 3 for variable definitions.

Table 7. Regression Results for Short-term Debt to Total Assets (STDTA) and Long-term Debt to Total Assets (LTDTA) ratio, 1989-2003

	STDTA			LTDTA		
	OLS	Random-effect Model	Fixed-effect Model	OLS	Random-effects model	Fixed-Effects Model
Constant	0.0768 (0.36)	0.0293 (0.12)	-0.0043 (-0.01)	-0.4327 (-11.76)***	-0.3802 (-5.55)***	-0.389 (-3.18)***
TANGB	-0.2623 (-4.26)***	-0.2346 (-3.54)***	0.1004 (1.13)	0.1062 (10.08)***	0.0976 (6.42)***	0.096 (4.89)***
PROF	-3.7320 (-72.4)***	-3.7716 (-75.39)***	-2.0239 (-25.5)***	-0.0167 (-1.89)*	-0.0204 (-1.87)*	-0.042 (-2.38)**
SIZE	0.0828 (2.8)***	0.0875 (2.63)***	0.0600 (0.79)	0.0625 (12.34)***	0.0560 (5.89)***	0.057 (3.36)***
LIQ	-0.0076 (-4.74)***	-0.0069 (-4.34)***	-0.0069 (-3.02)***	-0.0003 (-1.06)	-0.0003 (-0.87)	0.000 (-0.21)
VOE	0.0012 (0.96)	0.0012 (1.04)	0.0008 (1.14)	0.0002 (0.84)	0.0001 (0.52)	0.000 (0.46)
SPPR	0.4522 (4.83)***	0.4380 (5.05)***	0.2018 (3.56)***	-0.0153 (-0.96)	-0.0122 (-0.99)	-0.011 (-0.85)
Growth	0.0009 (0.74)	0.0001 (0.11)	-0.0334 (-22.8)***	0.0001 (0.43)	0.0003 (1.19)	0.001 (2.01)**
SMC	0.3040 (0.32)	0.6271 (0.61)	1.2602 (1.27)	-0.1499 (-0.92)	-0.3375 (-1.66)*	-0.354 (-1.6)
DUM1990	0.5744 (7.46)***	0.5771 (8.09)***	0.3375 (6.77)***	0.0387 (2.94)***	0.0393 (3.77)***	0.043 3.86

Table 7 continued

DUM1991	0.3883 (5.37)***	0.3909 (5.84)***	0.2373 (5.17)***	0.0376 (3.04)***	0.0386 (3.96)***	0.041 (4.04)***
DUM1992	0.3856 (5.35)***	0.3886 (5.82)***	0.2345 (5.17)***	0.0277 (2.24)**	0.0275 (2.83)***	0.030 (2.99)***
DUM1993	0.4200 (5.79)***	0.4201 (6.26)***	0.2532 (5.63)***	0.0101 (0.81)	0.0114 (1.18)	0.014 (1.41)
DUM1994	0.3499 (4.76)***	0.3559 (5.24)***	0.2012 (4.47)***	-0.0001 (0.00)	0.0018 (0.18)	0.004 (0.42)
DUM1995	0.3047 (4.21)***	0.3108 (4.65)***	0.1778 (4.03)***	-0.0046 (-0.37)	-0.0032 (-0.34)	-0.001 (-0.1)
DUM1996	0.1642 (2.27)**	0.1683 (2.52)**	0.0892 (2.03)**	-0.0063 (-0.51)	-0.0053 (-0.56)	-0.004 (-0.39)
DUM1997	0.1783 (2.5)**	0.1834 (2.78)***	0.1093 (2.52)**	-0.0046 (-0.38)	-0.0032 (-0.34)	-0.002 (-0.17)
DUM1998	0.1308 (1.8)*	0.1345 (2.01)**	0.0807 (1.84)*	0.0009 (0.07)	0.0020 (0.21)	0.003 (0.31)
DUM1999	0.0529 (0.75)	0.0564 (0.87)	0.0261 (0.61)	0.0024 (0.2)	0.0029 (0.31)	0.004 (0.37)
DUM2000	0.0564 (0.78)	0.0611 (0.92)	0.0343 (0.78)	0.0011 (0.09)	0.0005 (0.05)	0.001 (0.09)
DUM2001	0.0618 (1.04)	0.0544 (1.00)	-0.0184 (-0.54)	-0.0034 (-0.34)	-0.0037 (-0.5)	-0.004 (-0.49)
DUM2002	0.0137 (0.24)	0.0060 (0.11)	0.0054 (0.16)	0.0057 (0.57)	0.0047 (0.64)	0.004 (0.49)
No. of Observations	834	834	834	834	834	834
Adj R-squared	0.8644	0.8676	0.5635	0.2998	0.3144	0.296
Wald-test	F=253.92 (0.00)***	$\chi^2 = 5838.5$ 0.00)***	F= 321.14 (0.00)***	F=17.99 (0.00)***	$\chi^2 = 105.930$ (0.00)***	F= 3.250 (0.00)***
Huasman Test		$\chi^2 = 732.32$ (0.00)***			$\chi^2 = 6.60$ (0.9988)	
Breusch and Pagan Lagrangian	$\chi^2 = 537.68$ (0.00)***			$\chi^2 =$ 469.49 (0.00)***		

Notes: *** Significant at 1% level, ** Significant at 5% level, and *Significant at 10% level. See Table 3 for variable definitions.

Table 8. Regression Results for Total Debt to Total Assets (TDTA) with Industry Dummies

Independent Variables	Pooled OLS regression	Random-effect Model
Constant	-1.0724 (-10.42)***	-0.8978 (-5.07)***
TANGB	0.1969 (7.35)***	0.2264 (6.22)***
PROF	-0.0717 (-2.89)***	-0.0999 (-3.38)***
SIZE	0.1742 (12.44)***	0.1467 (6.19)***
LIQ	-0.0038 (-5.65)***	-0.0058 (-6.6)***
VOE	0.0004 (0.82)	0.0003 (0.73)
SPPR	-0.0383 (-1.04)	-0.0272 (-0.94)
Growth	0.0005 (0.97)	0.0014 (2.43)**
SMC	-2.0820 (-5.16)***	-1.3090 (-2.75)***
Dummy for Food Sector	0.0935 (4.24)***	0.1368 (2.72)***
Dummy for Paper, Glass, and Packaging	0.1128 (4.79)***	0.1181 (2.13)**
Dummy for Steel, Mining and Heavy Engineering	0.0667 (3.14)***	0.0870 (1.79)*
Dummy for Medical Pharmacy	0.0015 (0.05)	0.0345 (0.53)
Dummy for Chemical and Petroleum	0.2308 (10.75)***	0.2299 (4.19)***
Dummy for Textiles and Clothing	0.1467 (4.94)***	0.1750 (2.27)**
Dummy for Utilities and Energy	0.2938 (10.78)***	0.2907 (4.42)***
Dummy for Tobacco	0.0582 (0.88)	0.0808 (0.75)

Table 8 continued

Dummy for Construction and Engineering	0.2151 (7.37)***	0.2287 (3.02)***
Dummy for Real Estate	0.0228 (0.65)	0.1735 (2.43)**
Dummy for Media Sector	0.0171 (0.51)	0.0343 (0.35)
Dummy for Medical Services	-0.1482 (-1.71)*	-0.2257 (-1.75)*
Dummy for Trade, Commercial Services, and Rental	0.1343 (4.52)***	0.1385 (2.22)**
DUM1990	0.1519 (5.00)***	0.1412 (5.73)***
DUM1991	0.1349 (4.73)***	0.1245 (5.42)***
DUM1992	0.1285 (4.52)***	0.1157 (5.06)***
DUM1993	0.1071 (3.75)***	0.0990 (4.34)***
DUM1994	0.0384 (1.33)	0.0345 (1.51)
DUM1995	0.0426 (1.5)	0.0366 (1.63)
DUM1996	0.0225 (0.79)	0.0117 (0.52)
DUM1997	0.0362 (1.29)	0.0277 (1.25)
DUM1998	0.0271 (0.95)	0.0222 (0.99)
DUM1999	0.0130 (0.47)	0.0062 (0.28)
DUM2000	0.0249 (0.88)	0.0171 (0.76)
DUM2001	-0.0020 (-0.08)	0.0001 (0.01)
DUM2002	0.0033 (0.15)	0.0016 (0.09)
Adjusted R-square	0.53	0.53
Wald-test	F= 27.72 (0.00)***	$\chi^2 = 284.53$ (0.00)***
Huasman Test		11.53 (0.9515)
Breusch and Pagan Lagrangian		436.26 (0.00)***

Notes: *** Significant at 1% level, ** Significant at 5% level, and *Significant at 10% level. *t*-statistics are in parentheses. See Table 3 for variable definitions. 16 industrial dummy variables are included in the regression. The Hotels and Tourism, Transportation, and Educational Services are dropped from the regression, therefore not reported

Appendix 1. Number of Listed Firms used in the Study by Sector over the Period 1989-2003

Sector	No. of Firms
Foods	19
Paper, Glass, and Packaging	12
Steel, Mining and Heavy Engineering	20
Medical Pharmacy	11
Chemical and Petroleum	11
Textiles and Clothing	8
Utilities and Energy	11
Tobacco	3
Construction and Engineering	10
Hotels and Tourism	11
Real Estate	10
Media	6
Medical Services	5
Trade and Commercial Services and Rental, Communication	17
Educational Services	3
Total	167