"Analysis of Capital Structure Determinant" A case from Pakistan's chemical sector companies listed at Karachi stock exchange

Pervez Akhtar
Lecturer in the department of management sciences
National University of Modern Languages Islamabad Pakistan
E-mail: pervez.akhtar@numl.edu.pk

Sabeen Masood
Lecturer in the department of commerce
Govt. College University Faisalabad
E-mail: Sabeenmasood@ymail.com

ABSTRACT

This paper explores and analyzes the capital structure determinants of chemical sector of Pakistan. The sample is comprises over 34 listed chemical companies of Pakistan. All companies are listed at Pakistan's national stock exchange "Karachi Stock Exchange (KSE). Debt/Equity is taken as dependent variable and five independent variables are Profitability, Growth, Financial Cost, Size, and Tangibility. The Results showed that financial cost and tangibility are positively related while other variables have negative relationship with the dependent variable (Debt/Equity).

Key Words: Capital Structure Determinants, Chemical Sector, KSE Pakistan.

1. Introduction

The capital structure of a company is a particular combination of debt, equity and other sources of finance that it uses to fund its long-term asset. The key division in capital structure is between debt and equity. The proportion of debt funding is measured by gearing or leverages. There are different factors that affect a firm's capital structure, and a firm should attempt to determine what its optimal, or best, mix of financing. But determining the exact optimal capital structure is not a science, so after analyzing a number of factors, a firm establishes a target capital structure which it believes is optimal. Capital structure policy also involves a trade-off between risk and return. Using more debt raises the risks in the firm's earnings stream, but a higher proportion of debt generally leads to a higher expected rate of return and the higher risk associated with greater debt tends to lower the stock's price. At the same time, however, the higher expected rate of return makes the stock more attractive to investors which in turn ultimately increases the stock's price. Therefore, the optimal capital structure is the one that strikes a balance between risk and return to achieve our ultimate goal of maximizing the stock prices.

1.1 Research Question

This study will focus on the identification of the determinants of capital structure which are closely relevant to the business sector of Pakistan. After identification of the determinants of capital structure this study will also try to analyze these determinants, how strongly these are related with the leverage ratio of chemical sector of the economy. The research will also explore that how much leverage is dependent on these determinants.

1.2 Objectives of the study

a) To identify the determinants of capital structure in the chemical sector of Pakistan economy.
b) To analyze which are the main determinants that influence the financing decision in the choice of capital structure in chemical sector of Pakistan economy?
c) To explain the relationship between leverage and the determinants of capital structure in chemical sector of Pakistan economy.
d) To recommend some determinants which are of considerable attention for capital structure decision in chemical sector of Pakistan economy?

1.3 Significance of the study

This study will attempt to analyze determinants of capital structure in a systemic manner and will provide practical and applicable guideline for anyone who wants to have insight of the topic. Research will introduce the main determinants of capital structure and their influencing factors. In general, it will cover each and every aspect of the subject but specifically it is related to capital structure of chemical sector firms listed in Karachi stock exchange and their financing decision making. It will explore a variety of factors that influence the determinants of capital structure and manipulate the financial decision taken by the manager as well the success or the failure to these decisions.

2. Literature Review

Although there is considerable debate on the issue of capital structure in literature however the most relevant literature to study is presented below.

According to Modigliani and Miller (1958), the rate of return required by shareholders increases linearly as the debt equity ratio is increased.

Robicheck and Myers (1966) state that if debt is risk less, changes in the cash flow associated with financing are not required, since funds are available to meet promised payments to investors. On the other hand, when debt is risky, it exposes the firm to the risk of default if cash flows from operations are insufficient to meet its fixed payments the firm may be prone to bankruptcy. The set of two propose that additional funds will be required if bankruptcy is to be avoided.

The Robicheck and Myers's analysis generated enormous criticism. Stiglitz, (1962); Baumol and Malkiel, (1967); Rubinstein (1973) and Scott (1976), share a general consensus that this traditional theory fails to consider the detrimental effects of increased debt on a firm.

According to Scott (1976), the use of the traditional theory in such a manner can have negative implications on a firm because it fails to consider the effects which increased debt can have on firm. Scott suggests that what is required, is a more effective theory that accounts for the costs as well as the benefits of debt within a useful framework.

Baumol and Malkiel (1967) have argued that capital structure will not be irrelevant if investors incur transaction costs when engaging in arbitrage activities. Rubinstein (1973) shows that if security markets are partially segmented, that is, if the sets containing both investors and available securities in each market are disjointed, and if debt is traded in a separate market where traders are more risk averse than are investors in the firm's equity holders, then a sufficiently large increase in debt can lower the total value of the firm. Similarly, Stiglitz (1962) demonstrated that if debt is traded in a separate market in which investors are more pessimistic about the firm than its equity holders, then a sufficiently large increase in debt can lower the total value of a firm. More plausibly, Robichecks and Meyers (1966) and Baxter (1967), have argued that debt policy is not relevant and that an internal optimal capital structure can exist.

Robicheck and Myers, (1966); Baumol and Malkiel (1967); Baxter (1967) and Miller, **(**1977) studies share a common view that the use of the theory fails to capture the fact that an increase in the level of debt, also increases the probability of incurring the costs of bankruptcy.

Harris and Raviv (1995) identify variables that are considered to influence the firm's leverage ratio such as: size, tangibility, tax shields, growth opportunities, bankruptcy probability and assets.

3. Conceptual Framework and Methodology

This research study will be based on the data taken from the State Bank of Pakistan publication "Balance Sheet Analysis of Joint Stock Companies Listed on The Karachi Stock Exchange Volume-II 2004-2009". The research included all 34 firms listed in Karachi Stock Exchange.

3.1 Hypotheses of the study

On the basis of the literature review discussed above following hypotheses are proposed for the research.

H1: Profitability has significant impact on leverage.
H2: Size has significant impact on leverage.
H3: Growth has significant impact on leverage.
H4: Financing cost has significant impact on leverage.
H5: Assets tangibility has significant impact on leverage.

The variables involved of the model in linear equation form will be put as follows:

$$D/E = \alpha + \beta 1\,(PFT) + \beta 2\,(SZ) + \beta 3\,(GTW) + \beta 4\,(F.C) + \beta 5\,(TG) + \varepsilon i$$

Where as
D/E = measure of Leverage
PFT = Profitability
SZ = Size
GTW = Growth Opportunities
FC = Financial Cost
TG = Tangibility of Assets
DFL = Degree of leverage
ε = the error term

3.2 Conceptual Framework

Dependent Variable:

1. Debt/Equity (Leverage)

Independent Variables:

1. Profitability
2. Size
3. Growth
4. Financing Cost
5. Assets Tangibility

3.3 Description of the variables

Profitability is known to be the firm's earning power or capability which is a central concern to shareholders. The profitability has considerable debate in literature to be the integral determinant of capital structure.

Myers (1984) observes that the higher the probability of a firm from the use of internal financing, the lesser the dependence on debt financing. Therefore, the amount of retained earnings available and the past profitability should be an important determinants of its current capital structure, Titman and Wessels (1988).

According to the trade off theory, profitable firms will make use of more debt as they have more tax benefit and are exposed to low bankruptcy risk. Profitable firms may select debt financing due to the benefit of tax shield. They are also capable of tolerating increase in debt as they are in a position of honoring debt payment without any strain. Gross (2008) observed that if past profitability history is a credible measure for the future profitability, then profitable firms can borrow more as they have the capability to pay back the loan without any difficulties.

The connection between the size of the firm and leverage has gained some considerable amount of attention in recent years. The size of the firm is positively and directly related to its use of debt Remmers et al (1975); Scott and Martin (1972). Empirical studies carried out during the (1970) and (2000) share a common view in support of size as a factor that shapes up a firm's debt-equity mix in its capital structure. Taub (1974); Scott and Martin, (1976); Ferri and Jones, (1979); Titman and Wessels, (1988); Harris and Raviv, (1991); Rajan and Zingales, (1995)
The trade off theory is based on the argument that size has a positive relationship with leverage. This belief lies in the evidence that according to Titman and Wessels (1988); Wald (1999) larger firms may be more diversified, enjoy easier access to capital markets, receive higher credit ratings for their debt issue, borrow at better conditions and pay lower interest rates on borrowed funds, making them less prone to bankruptcy, Pinches and Mingo (1973). This implies that larger firms should be more highly geared.

Empirical studies regarding the relationship between debt and growth opportunities seem to be controversial. Titman and Wessels, (1988); Barclays et al, (1995), found a positive relationship between growth and leverage, but Kester (1986) argue otherwise that there is a negative relationship between debt and growth opportunities. Hall et al, (2004) stated that the growth cycle of a firm exerts more pressure on internally generated funds leading to a higher demand for funds forcing the firm to substitute debt for equity in its initial capital structure. This leads the firm into further borrowing. In turn this implies that firms experiencing higher growth opportunities will relatively issue higher debt.

Financial cost has a relationship with debt to equity ratio which simply means that when the debt ratio of any company will increase there will also be sure increase in the financing cost of the company.

The empirical studies conducted on this variable are such as (Rajan– Zingales, 1993), (Kim – Sorensen, 1984) or (Titman – Wessels, 1988), Kester (1986) and Huang and Song (2002) demonstrate a positive relation between financial cost and leverage.

Almost all theories of capital structure agree that the types of assets owned by a firm, affects its debt to equity choice of financing. Assets of a firm play an important role to determine its capital structure. The liquidation value of the firm is affected by the level of tangibility of a firm's asset. Scott (1977) suggests that firms should be encouraged to invest heavily on tangible assets because of the benefits associated to it. Firms would borrow at lower interest rate and secure their debt with their assets hence increasing their financial leverage. It is proposed that by selling secured debt, firms increase the value of their equity by taking away wealth from their existing unsecured lenders. Myers and Majluf (1984), argue that firms may find it beneficial in selling their secured debt.

4. Chemical Sector Statistical Analysis

In chemical sector there are 34 firms listed on Karachi Stock Exchange. On the basis of availability of data all these firms are taken for analysis purpose. The following tests are used on all these firms' financial data taken from their financial statements.

Table-4.0 Descriptive Analysis

	Debt/equity	Financial Cost	Growth	Profitability	Size	Tangibility
Mean	159.0206	3.3115	0.3475	0.1149	7.4960	0.4075
Median	107.2	2.9575	0.0609	0.1007	7.3864	0.3787
Maximum	1365.2	9.3701	49.1111	0.4547	12.6968	0.9923
Minimum	0	-2.3025	-1	-0.3746	4.1463	0.0299
Std. Dev.	186.7105	2.3923	4.0574	0.1361	1.8877	0.2241
Observations	170	170	170	170	170	170

The results of descriptive analysis show that the mean to the dependent variable Debt/Equity is 159.02 and the maximum value of dependent variable is 1365.2 and minimum value is 0 which means that the mean value is extracting by incorporating all the maximum and minimum values. The standard deviation of the dependent variable is 186.71 which is a higher value of standard deviation. Total numbers of observation in this sector are 170. The first independent variable financial cost has a mean value of 3.31 with a standard deviation of 2.39 which means that financial cost variable can deviate that much from its means value . The maximum value of financial cost is 9.37 and the minimum value is -2.30 and the total observations are 170. The second variable growth has a mean value of 0.34 with a standard deviation of 4.05 the maximum value in this variable is 49.11 and the minimum value is -1 and the total number of observations are 170. The profitability as independent variable has a mean of 0.11 with a standard deviation of 0.13 which means that it can deviate 0.13% from mean value the maximum value in this variable is 0.45 and the minimum value is -0.37 and the total number of observations are 170. The fourth variable of study is size with a mean value of 7.49 with a standard deviation of 1.88. The maximum value in size is 12.66 and the minimum value in the series is 4.14 and the total number of observations is 170. The last variable of study is tangibility with a mean value of 0.40 with a standard deviation of 0.22 the maximum value in this variable is 0.99 and the minimum value is 0.02 the total number of observations in this variable are also 170.

Table-4.1 Correlation Test

	Debt/equity	F.cost	Growth	Profitability	Size	Tangibility
DEBT_EQUITY	1.0000	0.0843	-0.0291	-0.4793	-0.134	0.2478
FINANCIAL_COST	0.0843	1.0000	-0.0340	0.1514	0.824	0.0987
GROWTH	-0.0291	-0.0340	1.0000	0.0000	-0.081	0.2626
PROFITABILITY	-0.4793	0.1514	0.0000	1.0000	0.444	-0.2747
SIZE	-0.1342	0.8244	-0.0813	0.4448	1.000	0.0070
TANGIBILITY	0.2478	0.0987	0.2626	-0.2747	0.007	1.0000

Financial cost shows a positive relationship with debt/equity with a coefficient value of 24.64626 (Table-4.2.2). This relationship is insignificant with a t-value 2.671095 and p-value 0.0082 (Table-4.2.2). This result shows that with an increase in financial cost the debt level will also increase this result is in line with MM theory (1984) which suggests that higher financial cost and debt level will give benefit in the tax shield to any firm.

Growth has a negative relationship with the dependent variable having coefficient value of -3.264102 (Table-4.2.2). This relationship is significant as proved by the statistical values the t-value -1.116215 and p-value 0.02657 (Table-4.2.2) which means that as the firms grow, they prefer to use the internal financing for their financial needs pecking order theory (1984).

Profitability shows negative relationship with a coefficient value of -535.1463 (Table-4.2.2) with debt of the firm which means that with the increase in profitability of the firm, lesser tends to be financed with debt pecking order theory (1984). Relationship is significant with the t-value -4.9901 (Table-4.2.2) and p-value of 0 (Table-4.2.2). This fact is true and is proved in many other studies that as the firms earn more and more profit reliance on internal financing increases. The firms use their profit for the purpose of their investment and other financial needs.

Size also shows a negative relationship with leverage of the firm with a coefficient statistic value of -22.50714 (Table-4.2.2). The relationship between size and debt ratio is significant proved by t-value of -1.731929 (Table-4.2.2) and p-value 0.0048 (Table-4.2.2).With increase in size the debt financing decreases and the firms use the internal funds available to meet their financial needs pecking order theory (1984). The bigger size firms rely on their internal profits and retained funds because they have internal funds in huge amount and these can be used for profitable projects without any restrictions or legal obligations (Mayer 1984).

Tangibility is found to have a positive relationship with the leverage of the firm with a coefficient value of 107.96 (Table-4.2.2). This relationship is significant with a t-value of 1.952537 (Table-4.2.2) and p-value of 0.0523 (Table-4.2.2). It means that as many tangible assets a firm will have that much borrowing it can enjoy from the external market. The fact of positive relationship is that because the financial institutions prefer lending to those firms which have more tangible assets for collateral. So in chemical sector the tangible assets value determines how much a firm can barrow from the market.

Table-4.2 Regression Analysis

Variable	Coefficient	Std. Error	Prob.
C	264.7915	69.68342	0.0002
FINANCIAL_COST	24.64626	9.227023	0.0082
GROWTH	-3.264102	2.92426	0.0265
PROFITABILITY	-535.1463	107.2416	0
SIZE	-22.50714	12.99542	0.0048
TANGIBILITY	107.96	55.29219	0.0523
R-squared	0.278441	Mean dependent var	159.020
S.E. of regression	160.5906	Akaike info criterion	13.0245
Sum squared resid	5106288	Schwarz criterion	13.1221
Log likelihood	-1322.506	Hannan-Quinn criter.	13.0640
Prob(F-statistic)	0.0000		

In chemical sector 34 companies listed on Karachi stock exchange are taken for analysis purpose. In this study the independent variables are causing 27% variation in the dependent variable in form of R-square value. It means that 73% variation in the dependent variable is caused by the other variables which are not the part of our study and they all are presented in error terms. The regression analysis results show that independent variables are causing less change as compare to cement sector where their effect was even stronger and the value of R-square was 52%. So this model is stronger in cement sector as compare to chemical sector.

The results of chemical sector are interestingly similar to cement sector. In cement sector the three variables profitability, size, and growth was negatively related and two variables financial cost and tangibility was positively related. Similar is the case in chemical sector similar three variables have negative relationship while two have positive relationship with the leverage of the firms. Growth and size have negative and significant relationship with the dependent variable. So concluding this discussion overall we can say that the capital structure decision in both sectors "cement and chemical" is effected almost by the similar variables.

4.1 Overall Findings of the Chemical Sector

Following table shows the overall results of the chemical sector. Three variables are negatively related with dependent variables while two variables are positively related with debt/equity.

Variables	**Debt/Equity Chemical Sector**
Financial Cost	Positive
Growth	Negative
Profitability	Negative
Size	Negative
Tangibility	Positive

References

Modigliani F and Miller H, (1958), *The Cost of Capital, Corporation Finance and the theory of Investment*, American Economic Review pp. 261-297.

Modigliani F and Miller H, (1963), *Corporation Income, Taxes and the Cost of Capital: A Correction*, American Economic Review

Murinde V and Woldie A, (2003), *African Business Finances Development Policy,* Haworth Press.

Myers S (1977), *Determinants of Corporate Borrowing*, Journal of Financial Economics, 9, pp 147-76.

Myers S (1984), *The Capital Structure Puzzle,* Journal of Finance, 39, pp 572-92

Myers, S, (2000), *Outside Equity*, Journal of Finance, 3, 1005-1037.

Myers S (2001), *Capital Structure,* Journal of Economic Perspectives, Vol. 15, no. 2, pp 81-102.

Myers S and Majluf N (1984), *Corporate Financing and Investment Decisions, When Firms Have Information Investors do not have,* Journal of Financial Economics, Vol. 13, pp 187-221.

Pinches and Mingo K, (1973), *Multivariate Analysis of Industrial Bond Ratings,* Journal of Finance, Vol. 28

Rajan and Zingales, (1995), *What do we know about Capital Structure? Some Evidence from International Data,* Journal of Finance, vol. 50, no. 5 pp 1421-60.

Robichecks A and Meyers S (1966), *Problems in the Theory of Optimal Capital Structure*, Journal of Financial and Quantitative Analysis, Vol. 1, pp.1-35.

Remmers, Stonehill, Wright and Beekhusein (1975), Industry and Size as Debt Ratio Determinants in Manufacturing Internationally, *Financial Management, Vol. 3*

Harris, M and Raviv A, (1991), *The theory of capital structure,* Journal of Finance, Vol. 46, pp. 297-355.

Saunders M, Lewis P and Thornhill A, (2003), *Research Methodology for British Students,* 3rd Edition, Financial Times, Prentice Hall.

Scott D and Martin J, (1976), *Industry Influence on Financial Structure*, Financial Management Vol. 1

Scott J (1976), *A Theory of Optimal Capital Structure*, Bell Journal of Economics, 8, pp 33-54.

Scott J, (1977), *Bankruptcy, Secured Debt and Optimal Structure*, Journal of Finance, Vol. 33, pp 1-20.

Shyam-Sundler L and Myers, 1999, *Testing Static Tradeoff Against Pecking Order Models of Capital Structure,* Journal of Financial Economics, Vol. 51, pp 219-44.

Smith C, (1977), *Alternative Methods of Raising Capital: Rights versus Underwritten Offerings,* Journal of Financial Economics, 5, pp 273-307.

Titman S and Wessels R, (1988), *The Determinants of Capital Structure*, Journal of Finance, Vol. pp 1- 19.D