



Capital Structure Impact on Profitability a Case Study of Chemical Sector Pakistan

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ARTICLE INFO

Article history:

Received: 16 May 2015;

Received in revised form:

15 October 2015;

Accepted: 21 October 2015;

Keywords

Impact of capital structure,
Asset and return on equity,
Debt financing.

ABSTRACT

The research work is conducted on the firms in the chemical sector of Pakistan. This is a capital intensive industry and an important sector of the economy. The data has been collected from 2009-13 and includes cross sectional regression analysis. The dependent variables are accounting based return on equity and returns on assets while independent are the debt ratio and total debt to total equity ratio. The results indicate that the capital structure holds a significant positive relationship with return on asset and return on equity. The firms in this sector have a high debt to equity and debt to asset ratio and the results are against the pecking order theory that states that firms prefer to generate funds from internal sources and have a least preference for debt financing.

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Introduction

This chapter deals with the basic background of the study regarding the impact of capital structure on the profitability of the firms listed in Karachi Stock Exchange in sector of chemical manufacturing. It gives a brief overview about capital structure, sources of capital and its importance in modern dynamic business world. Capital is the basic source of funds for any business to exist and carry out business operations. The two basic sources are internal source of capital and the external source of capital. Internal source is owner's equity while external includes debts and borrowings.

When talking about a corporate capital structure, it gets even more complicated and dynamic because of new modes of financing that are being used in present era. It includes common equity, preferred equity, bonds, notes, commercial papers, bonds with options, convertible bonds and many other structured instruments used to get funds required at a given cost.

The research work is intended to find out the impact of the debt equity mix capital structure on the profitability of the firms in order to find out which mix is more feasible for the firms in the chemical sector and may be used to get a somehow observation about firms in other sectors as well within the economy. It further lists down briefly the problem statement, the objective of the study, significance and scope of the study.

Background of the study

The question about capital and its sources is very much crucial for any organization because it influences the value of the firm in many ways. A number of factors like bankruptcy risk, interest rate factor, tax implications and cost of capital are depending on the proper mix of debt and equity.

A number of researchers have put forth their arguments supported with logical reasoning and interpretation of collected data regarding how the capital structure affects profitability and what is the relationship between debt equity mix and the profitability of the firm. This is the reason why organizations have a diversified set of securities both for equity and debt in the form of common stock, preferred stock, convertible bonds and

others. The firm accumulates capital from these securities and uses them in its operations to generate earnings.

Capital structure attempts to explain the mix of securities and financing sources used by companies to finance investments (Myers, 2001). Capital structure is the way by which a firm finances its operations which can either, be through debt or equity or combination of both (Brigham, 2001).

So the capital structure tells explains the sources and securities using which the firm has managed to get capital in order to carry out its operations with the objective of generating more earnings and creating more value. Debt commonly consists of long term debt, specific short term debt while equity mainly comprises of common stock and preferred stock.

Broader Area of Study

The broader area of the study is to analyze the capital structure variables that affect the profitability.

Problem Statement

The problem statement of the study to enhance the effect of independent variables on return on asset and return on equity of firms in chemical sector of Pakistan.

Objective of the study

To find out the impact of capital structure on profitability
How the capital structure affects the profitability of the firms in the chemical sector.

Literature Review

This chapter deals with the past research work that has been conducted by various researches in different areas about the relevant subject matter under study that is how the capital structure impacts profitability of corporate.

Conceptual Literature Review

Literature review section covers the theories about capital structure and the empirical literature that comprises of researches undertaken across world to find out impact of capital structure on profitability.

Modigliani Miller Irrelevance Theory

This theory is considered to be the breakthrough in theories of optimum capital structure.

It is also known as MM theory or theory of irrelevance presented by Modigliani –Miller in 1958. The theory states that the financial decisions taken by a firm are irrelevant to the firm's value. In order to invest funds, the investor should get a required rate of return equal to the cost of capital, no matter from where the funds will come from. The marginal cost of capital should be equal to the average cost of capital. The constant cost of capital is referred to as hurdle rate. The assumptions to the theory are perfect and frictionless markets, no taxation, no default risk, no transaction costs, both firms and investors can borrow at the same interest rate, equal information excess and homogenous expectation and risk.

Baxter (1976) improved the theory by adding the issue of bankruptcy and its effect on value of indebted firms. A firm that has higher proportion of debt in capital structure would incur higher bankruptcy cost. These costs consists of legal fee, liquidation fee and reorganization cost.

Berens and Cuny (1995) criticized the theory by introducing the effects of corporate tax. A firm with higher debt would enjoy more tax benefits and hence the value of firm is highly affected by tax implications. The more a firm has debt, the lesser it would pay tax. It indicates that the optimal capital structure should be all debt because more tax benefits are available. Modigliani –Miller in 1963 also improved their theory of irrelevance and included the effects corporate taxes as well.

Shuetrim, Lowe and Morling (1998) stated that the cash flows generated by a firm are divided between the debt holders, the equity holders and the government. The optimal capital structure is one that provides minimum cash flows to the government in the form of taxes. Corporate tax effects hold a special discussion in context of debt financing.

Pecking Order Theory

The theory states that firms have a defined hierarchy to be followed while financing. The firms would prefer to acquire funds from internal sources firstly. In case of insufficiency, the external sources are employed to acquire capital. The debt financing is carried out through debt and convertible stock followed by preferred stock and common stock. This order shows a tendency of managers to resist the control over firms being diluted. Myers (1984).

The assumption is that the financial managers have information about the company's present earnings as well as future growth opportunities. The internal funds allow them to retain the information within and not disclosing to public on large. Another assumption is that the manager's work in best interest of present stock holders and try to direct maximum cash flows towards them. Myers and Majluf (1984). However the theory says nothing about the effects of taxes, financial distress, agency costs and security issuance costs.

Trade off theory

The trade off theory states that the firms have a prescribed debt equity ratio and steadily move towards it. The firms set a level of debt that provides trade off between the tax advantage of debt and leverage related costs. Thus, the additional risk of debt, particularly during financial distress, is compensated by the tax benefit. The theory states that the debt equity ratio varies from firm to another because of firm specific characteristics. The firms that have more of tangible assets prefer debt than equity. Firms with more of intangibles prefer equity than debt because value of intangibles will vanish during liquidation. With respect to profitability, the firms with higher profits have tendency to service more debt and avail tax shield, thus have a higher debt ratio. Firms should borrow less in financial distress, specially those with high growth opportunity, because there is likelihood

to lose value during financial distress under trade off. Briefly, the firm balances the costs and benefits of debt keeping its assets and investment projects constant. Myers (1984)

Agency cost theory

The theory states that the firm optimal structure is determined by the agency costs. These costs are related to both debt and equity. The costs related to equity are the monitoring expenses of the owner (the principal) and the bonding costs of the agents (the manager). Since both debt and equity have related agency costs, the optimal capital structure requires a tradeoff between the two types of costs.

Agency costs are the consequence of conflict between the interests of shareholders and managers. Jensen and Meckling (1976) broadly categorized the conflicts into two categories.

Shareholders-Managers conflict

The main cause of conflict is the segregation of ownership and control, also termed as the divorce of ownership and control. Managers are not the owners of the firm, so they are interested only in the increment of value that maximizes their control. Managers tend to increase the size of the firm and enjoy more control over them rather than maximizing the shareholders value. Jensen (1986) states that this agency cost can be lowered by debt financing. Because it includes a promise to pay to the debt holders and it is disciplinary feature of debt. The conflict on shareholders and managers occur because they do not own the firm a whole and are only interested in part of earnings they get from value enhancement acts while they have to bear the risk of these activities a whole.

Bondholders –Managers conflict

This conflict arises when the shareholder tend to diverse the cash flows to bond holders. The bondholders, in such circumstances, demand a higher return due to exposure of their funds to wealth expropriation. Jensen and Meckling (1976) state that this conflict can be reduced by the firms with high growth opportunities and lower leverage costs. The issue of convertible debt and debt with warrants can also avoid the conflict than issuance of plain debt.

Information signaling theory

The theory denotes that the capital structure decision signals the inside information of the firm to the outside investors. Another matter worth considering is incomplete or asymmetric information that makes it difficult for the investors to accurately assess the risk. Managers are urged to provide information publically through stock markets. Ross (1977) stated that firms signal an increase in assets due to higher leverage. The price is calculated using Ross model. On contrary, Leland and Pyle (1977) said that the firms signal an increase in value through reduction in level of leverage (debt). The price based on this hypothesis is calculated using Leland and Pyle price model.

Free Cash flow theory

The theory describes that the free cash flows of firms are mitigated by making payment to debt holders. Free cash flow is what is left after making all the payments, including investment. The firms are bound by law to make payment on debt firstly and pay dividends later. The payment of interest to debt and dividends to equity prevent the abuse of firm's income by manager for own incentives. Free cash flows provide opportunity to increase shareholder's wealth and enhance shareholder's welfare. Jensen (1986)

Life Cycle Theory

The theory states that there a various stages that a firm has to pass through. The firms are conceived, and grow to adulthood followed by up stars. There are different financing decisions in each stage. In early stage, entrepreneurs use personal resources

and personal guarantees for acquiring the required capital. There are no assets to be offered as collateral. There is no line of difference between the ownership and control, both are in same hands. Capital decisions are taken to ensure flexibility as there is no certainty about future prospects. Growth and up stars has similar features. In early periods of fast growth, firms do not borrow but the need to borrow becomes significant in older growth. The ownership and control get separated. The investment needs of firms become quite predictable and firms can forecast their financial needs and plans. In older ages, firms are not able to predict their financial needs and they tended to retire most part of their debts. Disiboshi (1989)

Contemporary Capital Structure Theories

Many theories have been put forth about the capital structure recently and is still an ongoing debate in corporate finance. Different opinions and findings exist about optimal capital structure and its effect on value and profitability of the firm.

Graham and Harvey (2001) put forward the observation that the Chief Financial Officers in the firms prefer to use funds from internal sources and avoid debt due to risk and possible losses in financial distress. The important factor to be observed is financial flexibility, keeping the part of debt in capital lower.

Kumarat el al (1999) in Buringuriza and Hyltenstam (2002) further added that the industries on external funds have smaller firms, show low growth and performance like countries having low financial development. The industry dependant on equity finance show lower growth rate in developed countries. In financially developed countries, the industry dependant on banks show higher growth as banking system develops.

Watkins(2002) stated that the firms tend to use debt because it increases the scale of operations and increases the average return on equity. The debt financing will increase the value only if the required rate of return on investment is greater than rate of return to be paid on debt.

Empirical Literature Review

Abor (2005) studied the relationship between the capital structure and profitability of firms listed in Ghana Stock exchange. Twenty five firms were selected and data collected from 1998 to 2002. The regression analysis was used to find out the impact of capital structure measures on return on equity. The long term debt was in a negative relationship with return on equity. Total debt and return on equity were positively related. The research further showed that profitable firms preferred short term debt that is an important part of the total debt.

Hung et al (2007) studied the relationship between profitability, cost of capital and capital structure. Regression analysis was used to find out the results. The results revealed that capital structure is negatively related to profitability.

Chen et al (2009) studied the impact in Insurance industry of Taiwan. The companies were also taken as a sample from American stock exchange. Factor analysis and path analysis was used to study the relationship between capital structure, operational risk and profitability. Close relationship was found and capital structure was negatively related to profitability if the equity ratio increase or reserve-to-liability ratio decreases as it leads towards higher profitability.

Ebaid (2009) studies the impact to debt equity mix on the profitability of the firms. Multiple regression was used for data analysis and the findings revealed that short term and total debt are negatively related to return on assets. Capital structure is not related significantly with return on equity and gross profit margin. Findings also revealed that ROA and firm performance are negatively related.

Abor (2007) studied the impact of capital structure on the financial performance of Small Medium Enterprises (SMEs) in Ghana and South Africa. The study showed that there exists a significant positive relationship between the capital structure and financial performance of SMEs in presence of managed variables. The results showed that long term debt and gross profit margin are positively related while short term debt possesses a significant negative relationship with gross profit margin. It is also found that the total debt ratio has a significant negative relation with gross profit ratio. In Ghana, return on asset in all the firms has a negative significant relationship with all the measure of capital structure. The performance of SMEs is significantly negatively affected by long term debt and total debt.

Madan (2007) also studied the relationship between the capital structure and performance of Indian firms. The study revealed that both high and low leverage is not fruitful for firms. The firms operating at breakeven levels also used debt to secure profits. Capital structure was also assessed in the study. It showed that on average Indian firms use a debt equity ratio of 30/70 or 40/60 and any deficiency is met by reserves and surplus or capital.

Zeitun and Tian (2007) studied the impact of capital structure on profitability of Jordanian firms. Dependent variables used were accounting based ROA and ROE while independent variables were the debt ratio and debt to equity ratio. The debt ratio was a measure for capital structure and short term, long term and total debt was used to find out total debt ratio. Findings were that all the firms in Jordan had an insignificant negative relation with ROE. The relation between capital structure and performance measure ROA was also found insignificant.

Eriotis et al (2000) studied the relationship between the debt-equity ratio and profitability of the firms in various industries. Data of firms from various industries was taken from 1955-1956. The results depicted that there is a key role of debt-equity ratio in profitability and making strategies. The profitability depends on the debt-equity ratio and this ratio varies from firm to firm. The debt-equity ratio makes the financial strategies fruitful and for this purpose some firms choose high debt while others go for lower debt. The findings are that the debt-equity ratio has a negative impact on profitability of the firm. The study also showed that firms with high equity make more profits than the firms that largely gather finance from borrowings.

Gill et al (2011) made an effort to advance the findings of Abor (2005) regarding the effect of capital structure on profitability. The investigational study was carried out in America and a sample of 272 firms listed on New York Stock Exchange, engaged in service and manufacturing, was taken for three periods starting from 2005-2007. The findings showed that there is positive relationship between short term debt to total assets and profitability, long term debt to total assets and profitability, and total debt to total assets and profitability.

San and Heng (2011) also studied the impact of capital structure on profitability in Malaysian firms of construction industry. They studied the impact after the financial crisis of 2007-08. They used leverage as a variable for capital structure and performance was measured using return on asset, return on equity and profitability. The results showed a weak negative relation between leverage and performance measures in all small, medium and large scale firms in construction industry of Malaysia.

Serrasquero and Marcia (2009) conducted a research on the capital structure of Portuguese companies. The results showed that there prevails a statistically significant negative relationship between the level of debt and the profitability of the firms. The study also revealed that firms majorly rely on internal source of funds or bank financing in under developed financial markets. High leveraged firms show low profitability than those having lower debt and high equity.

Methodology

Introduction

This chapter explains about the material and methodology of the research. This will explain in brief the variables involved in study, sources and instruments for data collection, population and sample size as well as sampling criteria, the theoretical framework, development of hypothesis and statistical tools for testing the hypothesis. This serves as a guideline through which the data will be collected, processed and interpreted thereof using statistical tools.

Theoretical Framework

The framework explains the independent variables, dependent variables, and the dimensions of the variables.

Variables

The variables under study are the “capital structure” and its effect on “profitability”. As it is evident from the discussion in the literature review, that capital structure has impact on the profitability of the firm in various ways. The capital structure is the independent variable in the study and profitability is dependent variable.

Variables defined

Capital structure

Brockington (1990) defined capital structure as

The capital structure of a firm is described as the components of its sources of financing, broadly categorized as equity and debt finance.

Brealey and Myers (2003) defined the capital structure as

Capital structure is a mix of different securities issued by a corporate. It may issue dozen of different securities but these are meant to find an optimum capital structure that minimizes the cost of capital and maximizes the overall market value.

Dimensions

The theoretical framework is based upon four dimensions of the variables under the study to find out their mutual relationship and effects on dependent variables. The dimensions of the variables in the study are the debt ratio as independent variable, also used by J.Abor (2005), Ebaid (2009), to check out the effect of capital structure on profitability. The second independent variable is debt to equity ratio; used by Zeitun and Tian (2007) and many other studies for capital structure. These two variables are used to find out affect on Return on Asset (ROA) and Return on Equity (ROE). ROA and ROE are considered better measures to profitability than Net profit ratio or others and are used widely by number of researchers in the hypothetical framework when sorting out the impact of capital structure on both accounting based ROA and ROE.

Dimensions defined

Debt Ratio (TD/TA)

This is the first dimension for the independent variable; the capital structure. The debt ratio is an important indicator that explains the level of debt used to finance total assets. The total debt in this context is viewed as total liabilities. The ratio explains the amount that has been invested by getting funds from external parties apart from shareholders. This ratio gives an indication to the investor about the leverage a firm is using. Higher ratio means that the firm is using more leverage while

lower ratio signals a lower debt and a higher equity portion used to finance the total assets of the firm. Total debt includes short term debt, current portion of long term debt and long term debt. Moreover, both operational and interest bearing debt are components of total debt. It is calculated as

The debt ratio (TD/TA) = Total debt /Total assets

The debt to Equity Ratio (D/E)

The second dimension for capital structure is total debt to total equity ratio. This ratio explains the capital structure as debt equity mix and also indicates proportion of debt with respect to equity. Total debt comprises of total liabilities, both short and long term liabilities as well as both operational and interest bearing liabilities. Higher debt ratio means that the leverage is greater than portion of equity in the capital structure. A prudent level of leverage is useful because it increases the earnings if the benefit of debt exceeds the cost of the debt leaving remaining portion for the shareholders. Various studies indicate that the bigger and higher profitability firms have a high debt to equity ratio and more interest coverage ratio as they can serve debt easily. On contrast, smaller firms maintain a low level of leverage to avoid risks during financial distress. It is calculated as

Debt to Equity Ratio= Total debt /Total Equity

Return on Asset (ROA)

ROA tells how much earnings are generated by the company using the invested capital (assets). This is also referred to as Return on Investment (ROI). ROA is an important indicator that shows the real picture of the firm's profitability and management efficiency. A higher ROA means that firm has generated more out of its investments while a lower ROA means that firm has not allocated the resources properly. ROA measures the efficiency of generating earnings from available resources irrespective of size of the firm. ROA is measured as:

ROA = Net income /average assets

Return on Equity (ROE)

ROE tells about how much earnings have been derived from the equity by the firm. ROE tells the earnings derived from equity while ROA tells the earnings derived from whole capital (debt and equity). ROE is particularly useful for investors who want to invest in equity and not debt. Higher ROE is better than lower ROE because it denotes that the firm has generated more earnings from the given equity during a period. ROE is expected higher for high growth firms. It is a potential indicator to measure profitability of firms within the same industry. ROE is measured as:

ROE=net income /average shareholder's equity

Illustration for theoretical framework

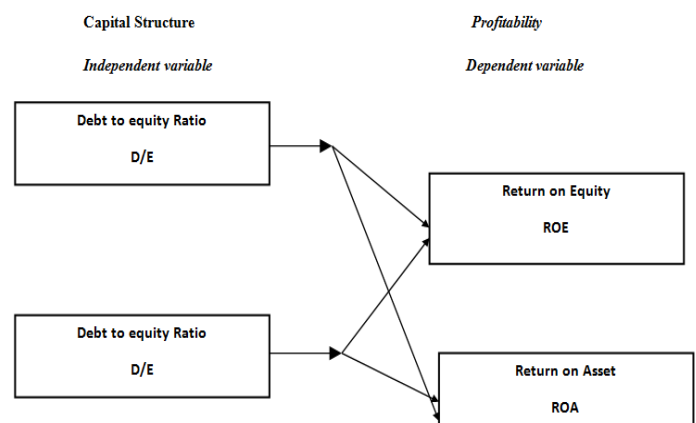


Figure 1. Shows the hypothetical relationship between dependent and independent variables

Hypothesis Development

Based on the above stated theoretical framework, the hypothesis is developed accordingly to be tested by the statistical operations on the data. A hypothesis is a testable statement based on some observation or reasoning to be tested by experimentation. In quantitative research, hypothesis is tested by collection of data for the variables involved in study during a stated period of time and then statistical procedures are applied on the data. The hypothesis is accepted or rejected in the light of findings out of the available data. The hypothesis has been developed individually for each independent variable having effect on the dependent variable.

H₀ There is insignificant impact of capital structure on ROA

H₁ There is significant impact of capital structure on ROA

H₀ There is insignificant impact of capital structure on ROE

H₁ There is significant impact of capital structure on ROE

Model

The relationship and effect of capital structure measured by leverage and level of debt and equity in the capital structure on ROA and ROE respectively will be measured using regression analysis as follow:

$$ROA = \alpha + \beta_1(TD/TA) + \beta_2(D/E) + e_{1,t}$$

$$ROE = \alpha + \beta_1(TD/TA) + \beta_2(D/E) + e_{1,t}$$

Where

ROA Return on Assets

ROE Return on Equity

TD/TA Total debt to total assets ratio

D/E Debt to equity ratio

α Intercept

β_1 Coefficient of the debt ratio

β_2 Coefficient of the debt to equity ratio

$e_{1,t}$ Error term

Population and sample

Pakistan is a developing country and the capital market is in development phases than that of those found in developed countries. The population comprises of 34 companies listed in Karachi Stock Exchange in chemical sector. The sample is selected on basis of market capitalization for a period of 2009-2013 and consists of fifteen companies selected. Each member in the panel comprises of equal observation. The reason for selecting chemical sector as target sector for the study is that it is a not a labor intensive industry and it required enormous capital investments for operations of business. So the proper debt equity mix is a crucial question for the firms operating in this sector. Table I shows the companies selected as sample from the chemical sector.

Statistical tools

The data is processed using the statistical tools in order to find out the relationship between variables and impact of independent variable upon dependent variable. This includes arithmetic mean, minimum and maximum values of observations, standard deviation and correlation. Descriptive statistics describes various characteristics of the data. Regression model is used for the cause and effect study between said variables. Ordinary pool least square analysis is used on the cross sectional data.

Finding and Analysis

This chapter includes the discussion on the results of the data, findings from the data and brief explanation thereof. Table I shows the companies that have been selected as a sample from the population. Each company is a member in panel and there are total fifteen members each having five observations for a time period of five years.

Table II shows the debt to equity ratio of the firms selected as sample from 2009-13. There are fifteen elements in the cross section each having five observations. Most of the firms tend to show a higher proportion of external source financing in the capital structure. The observations show that more stable and growing firms have a major portion of debt on their balance sheets. Also the short term debt forms a major portion of the total debt because long term debt is expensive, banks a major lenders and capital market is underdeveloped.

Table III shows the debt ratio for the firms selected as a sample form 2009-13. The debt ratio explains what portion of the total assets has been financed by external sources. Most of the firms show a tendency of having greater proportion of debt in financing total assets.

Table IV explains the descriptive statistics about the variables and explains characteristics of the data. The independent variables are the debt ratio and total debt to total equity ratio. The dependent variables are accounting based ROA and ROE. The table explains that the mean return on asset has been 0.185 (18.5) while mean return on equity has been 0.098 (9.8%). Table further explains that sector firms have an average debt to equity ratio of 1.29(129%) while the average debt to total assets ratio is 0.50 (50%).The highest return on asset for the sector is 0.50 (50%) and return on equity is 0.77 (77%). The maximum debt to equity ratio is 0.51 (51%) and maximum debt ratio is 0.93 (93%). The standard deviation is 0.15 (15%) for ROA, 0.28(28%) for ROE, 0.83(83%) for debt to equity and 0.46(46%) for the debt ratio in the chemical sector for the selected firms.

Table V shows the result for correlated random effect-Hausman test. The table states the result as insignificant which means that the elements in cross section does not throw a random effect on ROE rather they have a fixed effect. Fixed effect cross section test is used on the data.

Table VI shows the result of cross section effect as fixed. Eleven panel members have a negative significant impact on the return on equity while four has a significant positive impact. For the whole effect specification of the model, results show a significant positive relation and effect between said variables. The regression coefficient is 0.73 (73%) while adjusted coefficient is 0.65 (65%). This shows a significant positive and strong impact on profitability. The results are not in favor of pecking order hypothesis and firms have a tendency to acquire funds more from debt rather than internal sources. Moreover, the firms that have higher profits used more debt and has a higher proportion of debt in capital structure as well as high debt ratio. The performance measures are higher for profitable and capital intensive firms of the sector and the investment majorly comprise of debt.

Table VII explains the results for the Hausman test for return on asset as dependent variable. The result is insignificant due to which the cross section effect as fixed test will be used.

Table VIII shows the impact of capital structure on dependant variable that is accounting based Return on asset. On individual basis, only five panel members have a significant positive impact on return on asset while all the others have a significant negative impact. The results show a significant positive relationship between capital structure and return on asset. The results show that because of underdeveloped equity markets firms rely on debt and leverage more than that of equity. The large scale firms hold assets that have been financed by external sources. The firms show high debt to equity ratio showing that assets have more money invested by external parties apart from shareholder's equity. The regression coefficient is 0.69 (69%)

and adjusted coefficient is 0.60 (60%). There is strong positive relation between capital structure and return on assets.

The results indicate that the firms in the chemical sector have a significant positive relationship with return on assets and return on equity. The firm rely more on external source of finance rather than using internal sources. Firms have a high debt to equity ratio as well as a high debt ratio. The capital structure has a significant strong relation with profitability. The regression coefficient is high for both the variables of capital structure. However, higher debt can be risky in financial distress but higher leverage has a positive impact on profitability.

Conclusion and Recommendations

The results have shown a significant positive relation between capital structure variables and profitability measures. The same findings were from Ebaid (2009), Chen et al (2011). The results indicate a strong positive relationship and have the potential to be replicated in other sectors of economy. The results are against the pecking order theory and firms prefer to borrow than generating funds from internal sources. The firms in chemical sector acquire funds from long term and short term borrowings. The short term borrowings form a major portion of total debt because of its lower cost and less strict covenants. Smaller firms mostly rely on short term debt. Large scale and more profitable firms of the industry have more proportion of debt in the capital structure. Banks are major lenders in long term borrowings because of underdeveloped and thin capital markets. Overall, the debt ratio and the total debt to total equity ratio hold a positive strong relation with return on asset and return on equity.

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Appendices

Table I. Companies selected as sample from the chemical sector listed in KSE

Serial	Companies (Alphabetical arrangement)	Symbol
I.	Arif Habib Limited	AH
I.	Biafo Limited	BL
I.	Dawood Hercules Limited	DHL
✓.	Dynea Limited	DL
✓.	Decon Oxychemicals Limited	DOL
I.	Engro Polymers and Chemicals Limited	EPCL
I.	Fatima Fertilizer Limited	FFL
I.	Fauji Fertilizer Bin Qasim Limited	FFBQL
κ.	Fauji Fertilizer Limited	FFL
κ.	Ittehad Chemicals Limited	ICL
I.	ICI Limited	ICIL
I.	Liener Pak Gelatine Limited	LPGL
I.	Lotte Pakistan Limited	LPL
✓.	Linde Pakistan Limited	LIPL
✓.	Nimir Chemicals Limited	NCL

Table II. Debt to Equity Ratio of selected companies (2009-2013)

Serial	Company	2008-09	2009-10	2010-11	2011-12	2012-13
i.	Arif Habib Limited	0.36	0.65	0.69	0.24	0.21
i.	Biafo Limited	0.22	0.27	0.40	0.47	0.69
i.	Dawood Hercules Limited	0.49	0.39	0.01	0.01	0.05
✓.	Dynea Limited	0.27	0.52	0.83	0.69	0.45
✓.	Descon Oxychemicals	2.18	2.51	2.47	2.37	2.31
i.	Engro Polymers and Chemicals	2.55	2.49	3.00	303	2.64
i.	Fatima Fertilizers Limited	2.19	1.82	1.72	1.63	1.42
i.	Fauji Fertilizer Bin Qasim Limited	2.40	1.89	1.95	2.22	1.70
κ.	Fauji Fertilizer Limited	1.95	1.79	1.41	1.33	3.48
κ.	Ittehaad Chemicals Liitmted	2.43	2.08	2.03	1.73	1.55
i.	ICI Limited	0.52	0.45	0.52	1.14	1.07
i.	Liener Pak Gelatine Limited	1.07	1.12	1.34	1.43	1.84
i.	Lotte Pakistan Limited	0.76	1.38	0.92	0.79	0.80
✓.	Linde Pakistan Limited	0.59	0.60	0.75	1.17	1.46
✓.	Nimir Chemicals Limited	1.41	1.42	0.79	0.75	0.83

Table III. The debt ratio of selected companies (2009-13)

Serial	Company	2008-09	2009-10	2010-11	2011-12	2012-13
i.	Arif Habib Limited	0.26	0.40	0.41	0.19	0.18
i.	Biafo Limited	0.34	0.35	0.43	0.45	0.53
i.	Dawood Hercules Limited	0.33	0.28	0.01	0.01	0.04
✓.	Dynea Limited	0.21	0.34	0.45	0.41	0.31
✓.	Descon Oxychemicals	0.72	0.82	0.77	0.79	0.81
i.	Engro Polymers and Chemicals	0.72	0.71	0.75	0.75	0.73
i.	Fatima Fertilizers Limited	0.69	0.65	0.63	0.62	0.59
i.	Fauji Fertilizer Bin Qasim Limited	0.71	0.65	0.66	0.69	0.63
κ.	Fauji Fertilizer Limited	0.66	0.64	0.58	0.57	0.63
κ.	Ittehaad Chemicals Liitmted	0.57	0.54	0.54	0.51	0.50
i.	ICI Limited	0.33	0.30	0.32	0.51	0.50
i.	Liener Pak Gelatine Limited	0.41	0.41	0.46	0.40	0.46
i.	Lotte Pakistan Limited	0.60	0.58	0.50	0.46	0.46
✓.	Linde Pakistan Limited	0.37	0.38	0.43	0.54	0.59
✓.	Nimir Chemicals Limited	0.93	0.93	0.49	0.42	0.42

Table IV. Descriptive Statistics

	ROA	ROE	DTE	TDTA
Mean	0.185529	0.098899	1.294403	0.506431
Median	0.061236	0.133943	1.338460	0.502885
Maximum	0.507044	0.773140	3.026305	0.931724
Minimum	-0.33842	-0.564344	0.005955	0.005920
Std. Dev.	0.157336	0.289127	0.831116	0.461468
Skewness	0.885657	1.107526	6.665600	6.016248
Kurtosis	4.157849	5.163046	47.80081	46.85844
Jarque-Bera	13.99427	29.95381	6827.605	6463.574
Probability	0.000914	0.000000	0.000000	0.000000
Sum	7.501881	13.94621	885.3942	41.78819
Sum Sq. Dev.	1.831853	6.185987	331302.4	15.75847

Table V. Correlated Random Effects - Hausman Test

Dependent variable: ROE				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		0.118206	2	0.9426
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
DTE_?	-0.000123	-0.000119	0	0.958
TDTA_?	0.066971	0.062848	0.000144	0.7311

Table VI. Dependent Variable: ROE

Method: Pooled Least Squares				
Cross section effects as fixed				
Total pool observations: 75				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.150082	0.03667	4.09241	0.0001
DTE_?	-0.00012	0.00036	-0.336302	0.7379
TDTA_?	0.066971	0.05493	1.219102	0.2277
Fixed Effects (Cross)				
AH--C	-0.23088			
DHL--C	-0.13773			
DL--C	0.016076			
FFL--C	0.71567			
BL--C	0.220643			
DOL--C	-0.31904			
FAFL--C	-0.06909			
LIPL--C	-0.02106			
EPCL--C	-0.22937			
ICL--C	-0.02209			
NCL--C	-0.01129			
LPGL--C	-0.11756			
ICIL--C	-0.0541			
LPL--C	-0.04217			
FFBQL--C	0.301993			
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.730723	Mean dependent var		0.185949
Adjusted R-squared	0.65644	S.D. dependent var		0.289127
S.E. of regression	0.169469	Akaike info criterion		-0.51601
Sum squared resid	1.665742	Schwarz criterion		0.00929
Log likelihood	36.35026	Hannan-Quinn criter.		-0.30626
F-statistic	9.836991	Durbin-Watson stat		2.485054
Prob(F-statistic)	0.000			

Table VII. Correlated Random Effects - Hausman Test

Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		0.355012	2	0.8374
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
DTE_?	-5.4E-05	-4.9E-05	0	0.9155
TDTA_?	0.026079	0.021495	0.000059	0.5519

Table VIII. Dependent Variable: ROA

Method: Pooled Least Squares				
Cross section as fixed				
Total pool (balanced) observations: 75				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.086132	0.021392	4.026428	0.0002
DTE_?	-5.40E-05	0.000213	-0.254093	0.8003
TDTA_?	0.026079	0.032044	0.813862	0.4191
Fixed Effects (Cross)				
AHL--C	-0.119838			
DHL--C	-0.072086			
DL--C	0.020020			
FFL--C	0.227437			
BL--C	0.360816			
DOL--C	-0.147786			
FAFL--C	-0.055541			
LIPL--C	-0.008767			
EPCL--C	-0.114187			
ICL--C	-0.056216			
NCL--C	0.007991			
LPGL--C	-0.075422			
ICIL--C	-0.021866			
LPL--C	-0.023193			
FFBQL,--C	0.078638			
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.690608	Mean dependent var		0.100025
Adjusted R-squared	0.605258	S.D. dependent var		0.157336
S.E. of regression	0.098852	Akaike info criterion		-1.594094
Sum squared resid	0.566761	Schwarz criterion		-1.068797
Log likelihood	76.77854	Hannan-Quinn criter.		-1.384349
F-statistic	8.091511	Durbin-Watson stat		2.681256
Prob(F-statistic)	0.000000			