



## The Determinants of Capital Structure in Chemical and Pharmaceutical Sector of KSE Listed Companies

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### ABSTRACT

*This paper presents the determinants of capital structure of Karachi Stock Exchange listed firms in the chemical and pharmaceutical sector. This paper selected four independent variables i.e. size of the firm, growth, profitability and tangibility. A total of 28 major firms listed at Karachi Stock Exchange for the period of 1999-2005 were selected and analyzed. The result of the sample data is consistent with the pecking order model but contradicts the trade-off model i.e more profitable firms use less leverage. This research also shows that leverage is closely related to growth and tangibility of assets which is consistent with the trade-off theory.*

**Key Words:** capital structure; pecking order model; trade-off model; leverage; pooled data

**JEL Classification:** G31; G34; G11

### INTRODUCTION

Corporate finance concerns the question of a firm's optimal capital structure. How should firm finance their operations? What factors influence these choices? Financial sector has always been concerned how to maximise value of firm by using debt and equity in firm's capital structure (Graham and Harvey, 2001). After Miller and Modigliani (1958) a remarkably a number of ideas and theories have been proposed on capital structure and to determine factors affecting capital structure. Trade off theory, Pecking order theory and Signalling theory are some of the more important one.

Every firm tries to maximise its value but supports different capital structure. This in turn give rise to different capital structure theories. These theories try to explain capital structure

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formation in financial sector of both the developed and developing world.

The aim of the research is to see whether the determinants described by Rajan and Zingales (1996) and referred by Attaullah Shan and Tahir Hijazi (2004) as well as Syed Tahir Hijazi and Yasir Bin Tariq (2006) provides an explanation for the formation of capital structure in the Pakistan. The scope of the research will cover the chemical and pharmaceutical sector of the Karachi Stock Exchange.

The remaining part of paper is organized as follows. In section 2 brief review of theories about the capital structure will be presented. In section 3 paper will discuss the data and possible variables that can act as proxy for different influences for analysis. In section 4 paper will establish the model and section 5 will present result and draw conclusion.

## **Background Literature**

The question "Is there an optimum debt level?" has long been discussed in the literature of corporate finance and financial management research (Myers, 1977). (Myers & Majluf, 1984) (Jensen, 1986) (Fama & French, 2000). The optimum debt level represents the debt level that maximises firm value. Various theorists look at this problem from different angles. In an empirical framework, the trade-off argument predicts that firms adjust (increase or decrease) their actual debt ratios towards a target debt level. While the pecking order argument suggests that it is a residual decision based on the decisions like dividend payout and investment policy.

The industry in Pakistan like any other developing country has its own unique attributes, and here too, the question of an optimal debt structure agitates the minds of financial managers just as in any other economy. This study is therefore an effort to research what factors determine the level of debt financing in Pakistan's chemical and pharmaceutical sector.

Very recently efforts by researchers have focused on the optimal capital structure for Pakistani firms, (Shah & Hijazi, 2005) analysed non financial listed firms of Karachi Stock Exchange as well as (Tariq, 2006) worked on capital structure cement sector. This study on the other hand focuses on chemical and pharmaceutical sector because this sector has not been studied in any detail.

## **Literature Review**

### **2.1 Modigliani-Miller Theorem**

A great deal of controversy has developed over whether the value of a firm is affected by its capital structure. Traditionalists took the point that the firm can lower its cost of capital and increase market value by using leverage. In 1958, Modigliani and Miller(MM) proved with very restrictive set of assumptions that capital structure is irrelevant and firm's value is not affected by its financing mix. MM later added tax in model and concluded that structure does matter and to maximize firm's value 100 percent debt should be used.

The Modigliani-Miller theorem does not provide a realistic description of how firms should finance their business operation but it opens a new area of research to find reasons why

financing may matter. It influenced the development of both the trade-off theory and the pecking order theory.

## **2.2 The Trade-off Theory**

The trade-off theory has been extensively researched by academicians and theorists (Barclay, Smith, and Watts, (1995), Rajan and Zingales (1996), Drobetz and Fix (2003), Shah and Hijazi (2004), Hijazi and Tariq (2006). This theory states that optimal leverage is influenced by taxes, bankruptcy cost and agency cost. These factors would be considered by firm when deciding optimal leverage to increase value of firm.

Interest payment is tax deductible expense and increase firms after tax cash flow. Firms will use higher level of debt to take the benefit of tax so there is a positive relationship between the tax shield and the value of the firm but probability of bankruptcy increases as the level of debt increases. There are deadweight costs that arise in the case of corporate bankruptcy. They come in two forms, direct and indirect costs( Andrade Gregor and Kaplan N. Steven, 1998). Direct cost are legal and administrative expenses. Indirect cost may be, changes in investment policy which will reduce firm value, reduction or no provision of research and development expenditure as well as reduction in advertising expense.

## **2.3 Signaling Effects**

Ross (1977) argues that investors interpret larger levels of leverage as a signal of higher quality. He argues that debt and equity differ in an important way that is crucial for signaling insider information. Debt is a contractual obligation to repay interests and the principal. Failure to make these payments can lead to bankruptcy and managers may lose their jobs. In contrast equity is more lenient. No doubt that shareholder expect dividend but in case of financial distress managers can cut it. Therefore, adding debt to capital structure can be interpreted as a credible signal of high future cash flows and managers confidence about their own firm. Ross(1977) further concluded that investors take larger levels of debt as a signal of higher quality and that profitability and leverage are thus positively related.

## **2.4 Pecking order theory**

Pecking order theory was offered by Myers (1984). Myers (1984) argues that adverse selection implies that retained earning are better than debt and debt is better than equity. This ranking was motivated with reference to the Myers and Majluf's (1984) adverse selection model. The key idea is that the owner-manager of the firm knows the true value of the firm's assets and growth opportunities. Outside investors can only guess these values. If the manager offers to sell equity, then the outside investor must ask why the manager is willing to do so. In many cases the manager of an overvalued firm will be happy to sell equity, while the manager of a undervalued firm will not. Myers (1984) argues that a firm's capital structure reflects the accumulation of past financial requirements. There is a pecking order of corporate financing. Firms prefer internal finance, if internal finance is not sufficient and firms require external finance, they issue debt securities



and select stock as a last option.

## **2.5 Agency theory**

The idea that managers prefer internal financing to external financing is, of course, old (e.g., Butters 1949). Traditionally the argument was that outside financing required managers to explain the project details to outside investors, and expose themselves to investor monitoring. Managers dislike this process. Thus, managers have a preference for retained earnings over external financing but there is no direct prediction about the relative use of debt versus equity when seeking external financing. These ideas were subsequently developed into agency theories with Jensen and Meckling (1976) being a prominent contribution.

Jensen and Meckling (1976) were the first to develop a comprehensive agency theory of the firm. They define agency costs as the sum of the monitoring expenditures by the principal, bonding costs by the agent, and a residual loss. They show that regardless of who makes the monitoring expenditures, the cost is borne by stockholders. Agency costs are an important determinant of firms' capital structure (Harris and Raviv, 1991).

Myers (2003) points out that some versions of agency theory imply a financing hierarchy. In short there lies a conflict between managers being agents for the shareholders and their principal, being the shareholders themselves. Typically it is assumed by the theory that managers will try to appropriate wealth away from shareholders to the bondholders by taking more debts and investing in risky projects. There are two major hypothesis to the theory, first that managers with lesser stake in the firm may try to use free cash flows sub-optimally or to their own advantage rather than to increase value of the firm. Jensen (1986) suggests that this problem may be overcome by increasing the managers' stake in the firm or by increasing the debt in the capital structure thereby reducing the amount of free cash flows (Jensen 1987; Stultz 1990; Shah 2005).

A second facet of the same theory suggests that bondholders or shareholders tend to believe that they sustain more risk because of fixed return as the managers invest the money borrowed in not viable projects aimed at generating more than normal returns. Thus, if the project yield is high, shareholders receive more benefit, but if the loss occurs the bondholders sustain the same risk for a fixed return. This happens because management, being primarily responsible to shareholders, do not concern itself with the overall increase in value of the firm rather it tries to increase the value of equity only (Myers and Majluf 1984)

## **3 Dependent and Independent Variables**

Objective of this study is to determine factors that have impact on leverage of chemical and pharmaceutical sector of KSE. This paper is taking all companies listed in KSE. Leverage is dependent variable and this paper is taking four independent variables i.e. tangibility, size, growth and profitability. These variables are discussed here.

### **3.1 Leverage**

Leverage gives advantage of debt-tax shield, which is not available in all equity firm. Leverage has been defined in literature in different ways. Leverage as referred to Rajan and Zingales (1995) is defined by Drobetz and Fix(2003) in four different ways.

The first definition of leverage is the ratio of total (nonequity) liabilities to total assets. This is what left for shareholders in case of company liquidation. However, this is not a good indication of whether the firm is at risk of default in the near future. In addition, since total liabilities also include items like accounts payable, which are used for transaction purposes rather than for financing, it is likely to overstate the amount of leverage.

A second definition of leverage is the ratio of debt (both short term and longterm) to total assets. This measure of leverage only covers debt in a narrower sense (i.e., interest-bearing debt) and excludes provisions. It fails to incorporate the fact that there are some assets that are offset by specific nondebt liabilities. For example, an increase in the gross amount of trade credit is reflected in a reduction in this measure of leverage. Because the level of accounts payable and accounts receivable may differ across industries, Rajan and Zingales (1995) suggest to use a measure of leverage unaffected by the gross level of trade credit.

A third definition of leverage is the ratio of total debt to net assets, where net assets are total assets less accounts payable and other current liabilities. This leverage is unaffected by non-interest bearing debt and working capital management.

Fourth and final definition of leverage is the ratio of total debt to capital, where capital is defined as total debt plus equity. This measure of leverage looks at the capital employed and thus best represents the effects of past financing decisions. It most directly relates to the agency problems associated with debt, as suggested by Jensen and Meckling (1976) and Myers(1977).

Fama and French (200) argued in his paper that most of the theoretical predictions apply to book leverage. In a similar way Thies and Killock (1992) suggests that book ratios better reflect management's target debt ratios.

In this paper researcher selected ratio of total debts to total assets because this measure of leverage looks at the capital employed and thus best represents the effects of past financing decisions. It most directly relates to the agency problems associated with debt, as suggested by Jensen and Meckling (1976) and Myers(1977). On the other hand it is also possible for researcher to derive from State Bank of Pakistan report.

## **4 Explanatory Variables**

Haris and Raviv (1991) suggested that "leverage increases with fixed assets, nondebt tax shields, investment opportunities, and firm size and decreases with volatility, advertising expenditure, the probability of bankruptcy, profitability and uniqueness of the product. This paper selected four variables as used by Shah and Hijazi (2004), Hijazi and Tariq (2006).

### **4.1 Tangibility**

Tangibility of assets is typically measured by the ratio of fixed assets to total assets. Titman and

Wessels (1985), Rajan and Zingales (1995), Drobetz and Fix (2003) found positive relation between leverage and firm's assets i.e. tangible assets will increase leverage ratio of the firm. Tangible assets are easier to collateralize and static trade-off theory predicts a positive relation between leverage and tangibility of assets, (Jensen and Meckling, 1976; and Myers, 1977).

On the other hand Grossman and Hart (1982) argue that managers consuming more than the optimal level of perquisites is higher for firms with lower levels of assets that can be used as collateral. Managers of highly levered firms will be less able to consume excessive perquisites, since bondholders more closely monitor such firms. This agency model predicts a negative relationship between tangibility of assets and leverage. Harris and Raviv (1991) argued that the low information asymmetry associated with tangible assets makes equity less costly, resulting in a negative relation between leverage and tangibility.

#### **4.2 Size**

Trade-off theory predicts that large firms will have more debts because larger firms are more diversified and have less default risk. These firms have good market reputation and it is easy for these companies to get lower agency costs of debt. Therefore trade-off theory predicts positive relationship between size and leverage. On the other hand pecking order theory of the capital structure has different view and considers negative relationship between leverage and size. According to pecking order theory size can be considered as a proxy for information asymmetry between firm insiders and the capital markets. Large firms have been around longer and are better known and closely observed by analysts therefore can more easily issue equity.

Following Titman and Wessels (1988), Shah and Hijazi (2004), Hijazi and Tariq (2006), this paper will measure size as the natural logarithm of net sales.

#### **4.3 Growth**

According to pecking order theory, a firm will use first internally generated funds and then move to debt financing. Drobetz and Fix (2003) referred to Jensen and Meckling (1976) and Myers (1977) who argued that associated agency costs are higher for firms with substantial growth opportunities.

Where some research studies have used different measure of growth like ratio of book to market equity (Drobetz and Fix, 2003). This paper will take annual percentage increase in total assets to measure growth (Titman and Wessels, 1988).

#### **4.4 Profitability**

Empirical studies found negative relation between profitability and leverage which is also suggested by pecking order hypothesis Rajan and Zingales (1995), Myers and Majluf (1984) also suggested that profitable firms will have less amount of leverage. However trade off theory predicts that leverage increases with profitability Jensen, Solbergf and Zorn (1992). In this paper ratio of net income before taxes divided by total assets is used to measure profitability.



## 5 Empirical results

### 5.1 Sample Selection for Leverage in KSE Chemical and Pharmaceutical Sector

Data is selected from Chemical and Pharmaceutical sector of Karachi Stock Exchange as given by State Bank of Pakistan in their publication "Balance Sheet Analysis of Joint Stock Companies Listed on The Karachi Stock Exchange 1999-2004 and 2000-2005". The period of study covers seven years, from 1999 to 2005. However several companies are not included in data because complete information is not available and overall 28 companies data is collected.

### 5.2 Panel Data Analysis

This study uses panel data regression analysis.

This paper estimate that

$$LV_{it} = \beta_0 + \beta X_{it} + \varepsilon$$

$LV_{it}$  = The measure of leverage of a firm  $i$  at time  $t$

$\beta_0$  = The intercept of the equation

$\beta_i$  = The change coefficient for  $X_{it}$  variables

$X_{it}$  = The different independent variables for leverage of a firm  $i$  at time  $t$

$\varepsilon$  = The error term

**Table 1**

Model	R Square	F	Sig
1	.313	18.565	.000

Table 1 above showed F ratio for the regression model is significant which indicates that regression model is best fit. Total variation in the dependent variable explained by the regression model as indicated by R square is 0.313.

**Table 2**

Model	B	t	Sig
size	0.01	0.139	0.889
growth	-0.27	-3.894	0.000*
profit	-0.356	-4.86	0.000**
tan	0.163	2.267	0.025

\*significant at 5%

\*\*significant at 1%

Table 2 reports the ordinary least square results of the regression analysis. Results indicate that size of firm is not explanatory variable of leverage because regression coefficient is not statistically significant, off course size is positively correlated with leverage as reported by ah Shah and Hijazi (2004) but large firms are not borrowing more debt as compared to small firms. The result of Shah and Hijazi (2004) was significant at 10 percent but this paper result is not significant.

Growth is statistically significant as shown in Table 2 and shows that growth is negatively related to leverage. This result concludes that growing firms are issuing more stock to finance their expansion plan rather than borrowing loan.

Profitability is also statistically significant and negatively correlated with leverage as shown in Table 2 and shows that more profitable firms are using less debt and more dependent on internal financing and later on issuing stock.

Tangibility is positively correlated with leverage which is significant at 5% level of significance. This shows that more tangible firms are using more debt and confirm Jensen and Meckling's (1976) version of trade-off theory which states that leverage ratio should increase with more fixed tangible assets.

## CONCLUSION

This paper covers only four independent variables to measure their effect on leverage of chemical and pharmaceutical sector of Karachi Stock Exchange. The paper use pooled regression model of panel data analysis covering from 1999 to 2005. The results indicate that size of the firm is not statistically significant. Growth is statistically significant which shows that firms who are growing are taking less debt and using internally generated fund and issuing stock. More profitable firms are taking less debt and firms having more tangible assets are using more debts.

## REFERENCES

- BARLAY, M.J., C. SMITH, AND R. WATTS, (1995). The determinants of corporate leverage and dividend policies, *Journal of Applied Corporate Finance* 7, 4-19
- FAMA, E. F., & FRENCH, K. R. (2000). Testing Tradeoff and Pecking Order Predictions about Dividends and Debt. In CRSP Working Paper. Retrieved , , from <http://>
- GRAHAM, J., AND C. HARVEY, (2001). The Theory and Practice of Corporate Finance: Evidence from the Filed, *Journal of Financial Economics*, 60,187-243.
- JENSEN, M., AND W. MECKLING, (1976) Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure, *Journal of Financial Economics* 3, 305-360.
- JENSEN, M., D. SOLBERG, AND T. ZORN, 1992, Simultaneous Determination of Insider Ownership, Debt and Dividend Policies, *Journal of Financial and Quantitative Analysis* 27, 247-261.
- HARRIS, M., AND A. RAVIV, 1991, Capital Structure and the Informational Role of Debt, *Journal of Finance* 45, 321-345.
- MODIGLIANI, F., & MILLER, M.. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *American Economic Review*, 48, 261-297.
- MYERS, R., & MAJLUF, N. (1984). Corporate Financing and Investment Decisions when Firms have Information Investors do not have. *Journal of Financial Economics*, 13, 187-222.
- MYERS, S. C. (1977). Determinants of Corporate Borrowings. *Journal of Financial Economics*, 5, 147-175.



- RAJAN, R., & ZINGALES, L. (1995). What do we know about capital structure? Some evidence from International data. *Journal of Finance*, 50, 1421-1460.
- SHAH, ATTAULLAH., & HIJAZI, TAHIR. (2005). The Determinants of Capital Structure of Stock Exchange Listed Non-Financial Firms In Pakistan. *The Pakistan Development Review*, 43(4), 605-618.
- STIGLITZ, J. E. (1969). A Re-Examination of the Modigliani-Miller Theorem. *American Economic Review*, 59, 784-793.
- TARIQ, YASIR BIN. (2006, JAN. 2). Determinants of Capital Structure: A Case for Pakistani Cement Industry. Retrieved Dec. 14, 2006, from [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=892157](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=892157)
- TITMAN, S., AND R. WESSELS, 1988, The Determinants of Capital Structure Choice, *Journal of Finance* 43,1-19.
- WOLFGANG DROBETZ AND ROGER FIX, (2003). What are the Determinants of the Capital Structure? Some Evidence for Switzerland, WWZ/Department of Finance, Working Paper No.4/03