

## **Determinants of Capital Structure: Evidence from Pakistani Panel Data**

Attaullah Shah \* and Safiullah Khan \*\*

*Using two variants of panel data analysis, we attempt to find the determinants of capital structure of KSE listed none-financial firms for the period 1994-2002. Pooled regression analysis was applied with the assumption that there were no industry or time effects. However, using fixed effect dummy variable regression, the coefficients for a number of industries were significant showing there were significant industry effects hence we accepted the later model for our analysis. We used six explanatory variables to measure their effect on leverage ratio. Three of our variables were significantly related to leverage ratio whereas the remaining three variables were not statistically significant in having relationship with the debt ratio. Our results approve the prediction of trade-off theory in case of tangibility variable whereas the earning volatility (EV), and depreciation (NDTS) variables fail to confirm to trade-off theory. The growth (GT) variable confirms the agency theory hypothesis whereas profitability (PF) approves the predictions of pecking order theory. Size (SZ) variable neither confirms to the prediction of trade-off theory nor to asymmetry of information theory.*

Field of Research: Finance

### **1. Introduction**

Capital structure refers to the mix of debt and equity used by a firm in financing its assets. The capital structure decision is one of the most important decisions made by financial management. The capital structure decision is at the center of many other decisions in the area of corporate finance. These include dividend policy, project financing, issue of long term securities, financing of mergers, buyouts and so on. One of the many objectives of a corporate financial manager is to ensure the lower cost of capital and thus maximize the wealth of shareholders. Capital structure is one of the effective tools of management to manage the cost of capital. An optimal capital structure is reached at a point where the cost of the capital is minimum. Whether or not such an optimal capital structure exists? What are the potential determinants of such optimal capital structure? These are the questions to be answered by a researcher.

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\* Faculty Member of Institute of Management Sciences, Peshawar. Pakistan  
Email: [attashah15@hotmail.com](mailto:attashah15@hotmail.com)

\*\* Faculty Member, Kohat University of Science and Technology

In other words, the job of a researcher is to identify the potential determinants of capital structure in a given institutional settings, industries and/or capital markets. The corporate financial managers thus can benefit from this to make an optimal mix of debt and equity in order to minimize the cost of capital.

Quite a large strand of theoretical and empirical research has focused on the area of capital structure since the path-breaking paper on capital structure by Miller and Modigliani published in 1958. However, most of the research work has been carried out in developed economies and very little is known about the capital structure of firms in developing economies. With this very little research, we are not sure whether conclusions from theoretical and empirical research carried out in developed economies are valid for developing countries too; or a different set of factors influence capital structure decisions in developing countries? We are not sure whether conclusions from research on capital structure are portable across countries in general. Rajan and Zingales (1995) studied the G-7 countries while Booth et al (2001) extended this work by including some data from emerging markets. The conclusions from these studies were that there were some common features in the capital structures of firms in different countries but that further research was necessary to identify the determinants of capital structure in particular institutional settings or countries.

Pakistan is a developing country with three stock exchanges, the Karachi Stock Exchange (KSE) being the largest one. More than 700 companies are listed on KSE. Like other developing economies, the area of capital structure is relatively unexplored in Pakistan. Limited research work exists on this area, like Booth et al (2001) studied 10 developing countries including Pakistan. However, this study was confined only to top 100 index companies. Second study by Shah and Hijazi (2004) was an improvement on the first one as it included all non-financial firms listed on KSE for the period 1997-2001. However, the second study too was basic in nature in terms of its use of pooled regression model avoiding the fixed effects and random effects models. The purpose of this study is to extend the work of Shah and Hijazi (2004) by including more years, using relevant models of panel data and including more explanatory variables.

The paper is organized as follows: first section of the paper gives a brief introduction of the background of the study. Section 2 summarizes the related literature. Section 3 gives description of the data and measurement of the variables. Section 4 presents the discussion on specification of model. Section 5 discusses the results from the models used and section 6 presents the conclusion.

## 2. Related Literature

The first paper on capital structure was written by Miller and Modigliani in 1958. They conceptually proved that the value of firm is not dependent upon the capital structure decision given that certain conditions are met. Because of the unrealistic assumptions in MM irrelevance theory, research on capital structure gave birth to other theories. The trade off theory says that a firm's adjustment toward an optimal leverage is influenced by three factors namely taxes, costs of financial distress and agency costs. Baxter (1967) argued that the extensive use of debt increases the chances of bankruptcy because of which creditors demand extra risk premium. He said that firms should not use debt beyond the point where the cost of debt becomes larger than the tax advantage. Kraus and Litzenberger (1973) argue that if a firm's debt obligations are greater than its earnings then the firm's market value is necessarily a concave function of its debt obligations. DeAngelo and Masulis (1980) worked further on Miller's differential tax model by including other non-debt shields such as depreciation charges and investment tax credits. They concluded that each firm has an internal optimal capital structure that maximizes its value. The capital structure is determined only by the interactions of personal and corporate taxes as well as positive defaults costs. Altman (1984) was the first to identify direct and indirect costs of bankruptcy. By studying 12 retail and 7 industrial firms, he found that firms in the sample faced 12.2% of indirect bankruptcy costs at time t-1 and 16.7% at time t. He concluded that capital structure should be such that the present value of marginal tax benefits is equal to marginal present value of bankruptcy costs. Bradley, Jarrell and Kim (1984) used a model that synthesized modern balancing theory of optimal capital structure. They found strong direct relationship between non-tax shields and the firm's debt level.

Agency theory suggests that there exists an optimal debt level in capital structure that can minimize the above agency costs. To mitigate the agency problems, various methods have been suggested. Jensen and Meckling (1976) suggest either to increase the ownership of the managers in the firm in order to align the interest of managers with that of the owners or increase the use of debt which will reduce the equity base and thus increase the percentage of equity owned by managers. (Grossman and Hart, 1982) suggest that the use of debt increases the chances of bankruptcy and job loss that further motivate managers to use the organizational resources efficiently and reduce their consumption on perks. Jensen (1986) present free-cash flow hypothesis. Free cash flow refers to cash flow available after funding all projects with positive cash flows. Managers having less than 100% stake in business and their compensation tied to firm's expansion may try to use the free cash flows sub-optimally and increase firm size resulting in greater compensation (Baker, Jensen, and Murphy, (1988); Donaldson, 1984). Jensen (1986) suggests that this problem can be somehow controlled by increasing the stake of managers in the business or by increasing debt in the

capital structure, thereby reducing the amount of “free” cash available to managers.

Harris and Reviv (1990) gave one more reason of using debt in capital structure. They say that management will hide information from shareholders about the liquidation of the firm even if the liquidation will be in the best interest of shareholders because managers want the perpetuation of their service. Similarly, Amihud and Lev (1981) suggest that managers have incentives to pursue strategies that reduce their employment risk. This conflict can be solved by increasing the use of debt financing since bondholders will take control of the firm in case of default as they are powered to do so by the debt indentures. Stulz (1990) said when shareholders cannot observe either the investing decisions of management or the cash flow position in the firm, they will use debt financing. Managers, to maintain credibility, will over-invest if it has extra cash and under-invest if it has limited cash. Stulz (1990) argued that to reduce the cost of underinvestment and overinvestment, the amount of free cash flow should be reduced to management by increasing debt financing.

Another approach to explain the capital structure of firms is the differences in the level of information, which the insiders and outsiders have about the investment opportunities and income distribution of the firm. Myers (1984) provided theoretical basis for this theory. He said that there exists a degree of asymmetry of information between the firm’s managers and investors concerning the real value of firm’s present and future investment. Ross (1977) says that managers have better knowledge of the income distribution of a firm. When they issue debt, it may generate positive signals to the outside world about the firm’s income distribution suggesting that the firm has stable income and is able to pay the periodic installments and interest payments. In this regard, higher debt may show higher confidence of managers in the firm’s smooth income distribution and adequacy of the income. Thus firms in their efforts to increase investors’ confidence and thus increase the value of equity will use higher debt in the capital structure.

### **3. Data And Measurement Of Variables**

The study is based on the data taken from the State Bank of Pakistan publications “Balance Sheet Analysis of Joint Stock Companies Listed on The Karachi Stock Exchange Volume-II 1993-1999” and Volume-II 1997-2002. This publication provides useful information on key accounts of the financial statements of all listed firms of KSE. We excluded all firms in financial sector from our analysis as the capital structures of these firms are not comparable to the capital structures of firms in non-financial sector. Specifically, we excluded banks, insurance companies, and investment companies. We also excluded those firms from our analysis for which complete data was not available for the stated period. To avoid outlier in the data that could possibly distort the analysis,

we excluded all observations that had values at least three standard deviation from the average value of all firms. Finally we were left with the sample of 286 firms in non-financial sector industries listed on Karachi Stock Exchange from 1993 to 2002. As we shall discuss next, two of our variables required the computation of yearly change and because of that one year had to be dropped. Thus we were left with 9 years excluding year 1993.

### ***3.1 Dependent And Independent Variables***

After discussing the various theories of capital structure, now we discuss the dependent variable and its potential determinants. We take the debt to total assets ratio as a proxy for leverage (dependent variable). For potential determinants of leverage, we study six independent variables namely tangibility, size, growth, profitability, earning volatility, and non-debt tax shields.

#### **3.1.1 Measure of Leverage (LG)**

Previous studies suggest that the level of leverage depends upon the definition of leverage. Several research studies have used both market and book value based measures of leverage (Titman and Wessels 1988, Rajan and Zingales 1995). The former measure divides book value of debt by book value of debt plus market value of equity and the later measure divides the book value of debt by book value of debt plus book value of equity. We use the book value measure of leverage. This can be justified with the argument that optimal level of leverage is determined by the trade-off between the benefits and costs of debt financing. The main benefit of leverage is the cash savings generated because of the debt-tax shield. This tax shield benefits are not changed by market value of the debt once it is issued (Banerjee, S. et al 2000). This is why market value of debt becomes irrelevant. On the other hand, the primary cost of borrowing is the increased chances of bankruptcy. If a firm falls in financial distress and goes into bankruptcy, then the relevant value of the debt is the book value of debt. Finally, book value measure provides relative ease and accuracy with which it can be calculated.

Another consideration in deciding the appropriate measure of leverage is to take total debt or only long term debt as a percentage of total assets. Though capital structure theories consider long term debt as a proxy for financial leverage, we use the measure of total debt because in Pakistan firms have mostly short-term financing as the average firm size is small which makes access to capital market difficult in terms of cost and technical difficulties (Shah and Hijazi 2004). The main sources of debt in Pakistan have been commercial banks, which do not encourage long term loans, with almost no reliance on market based debt until mid 1994 when government moved to remove most of the constraints among

which one action was to amend company law to permit corporate entities to raise debt directly from the market in the form of TFCs (Term Finance Certificates). So corporate bond market has limited history and is in the process of development. This explains why firms on average in Pakistan have more short term financing than long term financing. Booth et al (1999) also pointed in their study on determinants of capital structure in developing countries including Pakistan that the use of short term financing is higher than long term financing in developing countries.

### **3.1.2 Independent Variables**

#### **3.1.2.1 Tangibility of Assets (TG)**

A firm with large amount of fixed asset can borrow at relatively lower rate of interest by providing the security of these assets to creditors. Having the incentive of getting debt at lower interest rate, a firm with higher percentage of fixed asset is expected to borrow more as compared to a firm whose cost of borrowing is higher because of having less fixed assets. Thus we expect a positive relationship between tangibility of assets and leverage. We measure tangibility of asset (TG) as a ratio of fixed assets divided by total assets. We take total net amount of fixed assets as the numerator. Using total net amount of fixed assets means the cost of fixed assets minus accumulated depreciation. Our first hypothesis is:

Hypothesis 1: A firm with higher percentage of fixed assets will have higher debt ratio

#### **3.1.2.2 Size (SZ)**

There are two conflicting viewpoints about the relationship of size to leverage of a firm. First, large firms don't consider the direct bankruptcy costs as an active variable in deciding the level of leverage as these costs are fixed by constitution and constitute a smaller proportion of the total firm's value. And also, larger firms being more diversified have lesser chances of bankruptcy (Titman and Wessels 1988). Following this, one may expect a positive relationship between size and leverage of a firm. Second, contrary to first view, Rajan and Zingales (1995) argue that there is less asymmetrical information about the larger firms. This reduces the chances of undervaluation of the new equity issue and thus encourages the large firms to use equity financing. This means that there is negative relationship between size and leverage of a firm. Following Rajan and Zingales (1995), we expect a negative relationship between size and leverage of the firm. We measure size (SZ) of the firm by the taking the natural log of the sales as this measure smoothens the variation in the figure over the periods of time.

Hypothesis 2: There is negative relationship between size and leverage of the firm.

### 3.1.2.3 Growths (GT)

Empirically, there is much controversy about the relationship between growth rate and level of leverage. According to pecking order theory hypothesis, a firm will use first internally generated funds which may not be sufficient for a growing firm. And next options for the growing firms is to use debt financing which implies that a growing firm will have a high leverage (Drobetz and Fix 2003). On the other hand, agency costs for growing firms are expected to be higher as these firms have more flexibility with regard to future investments. The reason is that bondholders fear that such firms may go for risky projects in future as they have more choice of selection between risky and safe investment opportunities. Deeming their investments at risk in future, bondholders will impose higher costs at lending to growing firms. Growing firms, thus, facing higher cost of debt will use less debt and more equity. Congruent with this, Titman and Wessels (1988), Barclay et al. (1995) and Rajan and Zingales (1995) all find a negative relationship between growth opportunities and leverage. Initially we expect that firms with higher growth opportunities will have lower level of leverage. Different research studies have used different measures of growth; like market to book value of equity, research expenditure to total sales measure and annual percentage increase in total assets (Titman and Wessels, 1988). Given the structure of data we measure growth (GT) as a percentage increase in total assets, as the data was taken from the State Bank of Pakistan publication which does not contain information on annual stock prices and research expenditure of the listed firms.

Hypothesis 3: Firms with higher growth rate will have lower leverage.

### 3.1.2.4 Profitability (PF)

Given the pecking order hypothesis firms tend to use internally generated funds first and then resort to external financing. This implies that profitable firms will have less amount of leverage (Myers and Majluf 1984). We expect a negative relationship between profitability and leverage. We measure profitability (PF) as the ratio of net income after taxes divided by total sales.

Hypothesis 4: Firms with higher profitability will have lesser leverage.

### 3.1.2.5 Earning volatility (EV)

Earning volatility is considered to be either the inherent business risk in the operations of a firm or a result of inefficient management practices. In either case earning volatility is proxy for the probability of financial distress and the firm will have to pay risk premium to outside fund providers. To reduce the cost of capital, a firm will first use internally generated funds and then outsider funds. This suggests that earning volatility is negatively related with leverage. This is the combined prediction of trade-off theory and pecking order theory. However, Cools (1993) says that agency theory suggests positive relationship between earning volatility and leverage. He says that the problem of underinvestment

decreases when the volatility of firms returns increases. Following the prediction of trade-off theory and pecking order theory, we expect negative relationship between earning volatility (EV) and leverage. We use the value of the deviations from mean of net profit divided by total number of years for each firm in the given year as proxy of earning volatility.

Hypotheses 5: Earning volatility (EV) is negatively related to leverage

### 3.1.2.6 Non-Debt Tax Shields

Non-debt tax shields (NDTS) include depreciation and investment tax credits. DeAngelo and Masulis (1980) say that non-debt tax shields can be substitutes for the tax benefits of debt financing and a firm with larger non-debt tax shields is expected to use less debt. We expect negative relationship between NDTS and leverage. The empirical evidence on use of proxy for NDTS is almost the same. For example, Bradley et al. (1984) used the sum of annual depreciation charges and investment tax credits divided by earnings before depreciation, interest, and taxes to measure NDTS. They find leverage is positively related with NDTS. Wald (1999) uses the ratio of depreciation to total assets and Chaplinsky and Niehaus (1993) employ the ratio of depreciation expense plus investment tax credits to total assets to measure NDTS. Both studies find that leverage is negatively correlated with NDTS. In this study, we use annual depreciation charges divided by total assets to calculate non-debt tax shields.

Hypothesis 6: NDTS are negatively related to leverage.

The following table presents descriptive statistics for the variables discussed above.

**Table 1 Means of selected variables by industries**

	Textile	Chemicals	Engineering	Sugar	Paper	Power	Cement	Misc:
Leverage(LG)	0.723	0.505	0.698	0.601	0.618	0.662	0.596	0.663
Depreciation(NDTS)	0.052	0.038	0.034	0.100	0.035	0.039	0.053	0.036
Profitability(PF)	-0.014	0.049	-0.029	-0.012	0.040	0.055	-0.015	0.000
Tangibility(TG)	0.552	0.393	0.351	0.613	0.463	0.386	0.655	0.384
Size(SZ)	6.290	6.239	6.091	6.593	5.329	8.696	7.189	5.860
Growth(GT)	0.074	0.084	0.072	0.066	0.062	0.129	0.067	0.086
Volatility(EV)	4.628	7.506	6.552	4.235	3.849	28.300	12.000	5.113

Analysis of the above table shows that leverage ratio is the highest in textile industry followed by engineering industry. Textile industry has an average of 0.723 leverage against the mean leverage of 0.666 of all industries. Two possible explanations can be given. First, textile industry is relatively more capital intensive. Hence, the hypothesis that asset tangibility is positively related to leverage may be true in this case. However, the tangibility ratio of .665 is highest for cement followed by average tangibility ratio of 0.613 for sugar industry. Textile



industry comes at third position with regard to tangibility ratio of 0.552. Hence, the first explanation is not powerful.

The second explanation may be given from the point of view of family control on textile industry. Like Ghani and Ashraf (2005) found that most of the textile firms are in the ownership of groups and family members. They found that 60% of the total group firms belong to the Textile and related sectors as against 47% for the non-group firms. They say this is consistent with the fact that Bhutto's regime, in 1972, did not nationalize textile holdings of the 22 families, which in turn, subsequently helped families consolidate and expand, in these sectors. Based on the anecdotal evidence, family controlled firms try to take profits out business in forms other than dividend so as to avoid income and dividend taxes. This is done either through inflating the cost of production or by deflating sales figures. The result is negative net income figure in the income statement year after year and negative equity figure in the balance sheet. Because of this phenomenon, leverage ratio is above one for many textile firms. And hence the average leverage ratio for textile industry is higher than average leverage ratio of any other industry. Even though we excluded many observations from our analysis that were 3 standard deviation from the average of all observations, still there were many such firms whose debt ratio was more than 0.90 or above one in the textile industry.

Again consistent with the above discussion, average profitability ratio is negative in textile industry. It is also negative in engineering, cement and sugar industries. Most of these industries are owned by groups and families. Profitability is positive in chemical, power, paper and miscellaneous industries. Many firms in these industries are in foreign ownership and hence report true profits. Power industry has the largest firms followed by cement industry. Log of sales (proxy for size) value is 8.696 for power industry and 7.189 for cement industry. Power industry has several very large firms like Pakistan Refinery, Shell Pakistan, National Refinery, Pakistan State Oil, Sui Northern Gas Pipeline; The Karachi Electric Supply Company etc. All of these firms have sales figures in billions. Power industry has also the highest growth rate. In summary, power industry has higher sales, positive profitability and highest growth rate. The pecking order theory holds true here that growing firms first finance their projects from internally generated funds. Too, in the following table of correlation among independent variables, we find that profitability is positively correlated with growth.

#### **4. Model Specification**

Panel data follows a given sample of individuals over time, and thus provides multiple observations on each individual in the sample. Panel data combines the features of time series and cross-section. It provides information on a number of statistical units for a number of years. Panel data for economic research has several advantages over cross-sectional or time-series sets. Panel data usually provides the researcher a large number of data points, increasing the degrees of

freedom and reducing the collinaerity among explanatory variables; hence improving the efficiency of econometric estimates.

**4.1 Constant Coefficient Model**

This is also known as pooled regression. This is the simplest of all the panel data models. The model disregards the time, space or individual effects. All the observations are stacked on one another of each company. The assumption of the model is that all firms are similar with regard to capital structure and there is no significant industry or time effect on leverage.

$$LG_{it} = \beta_0 + \beta X_{it} + \varepsilon_{it} \dots\dots\dots (1)$$

- LG<sub>it</sub> = the measure of leverage of a firm i at time t
- β<sub>0</sub> = The intercept of the equation
- β = The change co-efficient for X<sub>it</sub> variables
- X<sub>it</sub> = the different independent variables for leverage of a firm i at time t
- i = the number of the firms i.e. i = 1, 2, 3....N
- t = The time period i.e. t = 1, 2, 3...T

The estimated model assumes that the intercept values of all the firms are the same. It also assumes that the slope coefficients of the seven X<sub>it</sub> variables are all identical for all the firms in the sample. Therefore, the pooled regression may distort the true picture of the relationships between leverage and the independent variables across firms if the assumptions of the models are not met. Therefore, to capture the firm or industry or random effects, we need to apply some other models of panel data.

**4.2 The Fixed Effects Model**

To capture the individual firm effect on leverage or control for omitted variables that differ among firms but are constant over time, we use fixed effects model. The individuality of each cross section unit is taken into account by letting the intercept vary for each unit but still assume that the slope coefficient are constant across firms. To see this, the model is specified as follows:

$$Y_{it} = a_{0i} + \beta_1 X_{1it} + \beta_2 X_{2it} + u_{it} \dots\dots\dots (3)$$

The subscript i on the intercept term suggests that the intercepts for each cross section unit will be different. Suppose we, create dummies for each industry, then the difference may be due to special features of each industry, such as assets intensity, research expenditures, subsidies or tax favors by government for a

specific industry. To apply the model while using panel data analysis, we use dummies for each industry to which a specific firm belongs for controlling the industry effect. We have followed the classification of firms into eight industries by the State Bank publication, "Balance Sheet Analysis of KSE listed companies" from which the companies' data has been obtained. The said publication classifies firm into these industries; textile, engineering, sugar, paper sack, cement, energy, and miscellaneous.

## 5. Discussion of the Results

Using fixed effects model, we find that confidents for a number of industries were statistically significant. Hence we report the results of the fixed effect model only. The regression output for fixed effects dummy variable model (given in Table 2) shows that industry classification does matter in the determinants of capital structure. The intercept values for all industries except miscellaneous industry are statistically different. We set the paper industry as the intercept.

**Table 2 Fixed effect dummy variable regression**

Independent Variables	Coefficient	Std. Error	t-Statistic	p-value
Leverage(LG) intercept	0.5922	0.03101	19.09	0.000
Tangibility(TG)	0.1304	0.02340	5.56	0.0000
Size(SZ)	0.0002	0.0034	0.07	0.940
Growth(GT)	-0.0511	0.0209	-2.44	0.015
Profitability(PF)	-0.7945	0.0366	-21.68	0.000
Earning Volatility(EV)	0.0000	0.0003	-0.16	0.869
Depreciation(NDTS)	-0.0141	0.0232	-0.61	0.542
Cement	-0.0904	0.0314	-2.88	0.004
Chemical	-0.0959	0.0284	-3.37	0.001
Engineering	0.0398	0.0259	1.53	0.125
Miscellaneous	0.0238	0.0247	0.97	0.334
Paper	Benchmark			
Power	-0.0772	0.0265	-2.91	0.004
Sugar	-0.0772	0.02657	-2.91	0.004
Textile	0.0509	0.0239	2.13	0.034
R Square	0.2593	F-statistic		63.49
Adjusted R Square	0.2552	Prob(F-statistic)		0.0000

We also ran regression with dummies for each year, but none of the coefficient for years was significant. In the above regression output, we find three of our variables significant and three insignificant. Results for each of our selected variables are discussed below.

## DISCUSSION OF VARIABLES

### **5.1 Tangibility**

Tangibility, with coefficient of 0.1304 is significantly related to debt. It has the second highest t-value of 5.56 against a very low p-value of 0.0000. This shows that tangibility is one of the most important determinants of leverage ratio in Pakistan. Thus our first hypothesis is confirmed by the statistically significant positive relationship between tangibility and leverage. This finding is in contrast to the earlier finding by Shah and Hijazi (2004). They found that tangibility was not significantly related to leverage ratio. However, the reason may be that they used only five years data from 1997 to 2001 and we use data from 1993 to 2002. Second, there measure of tangibility differs from that of ours. They used gross fixed assets divided by total assets and we used net fixed assets after accumulated depreciation. Maybe that total gross value of fixed assets does not matter to bankers and that only net value after accumulated depreciation is of interest to them. Significant relationship between tangibility and debt confirm to the prediction of Jensen and Meckling's (1976) and Myers' version of trade-off theory. The reason why tangibility is significantly related to debt ratio is quite obvious. The main benefit of debt investment to creditors is that they receive uninterrupted stream of income except in case of bankruptcy. If the firm is performing well, creditors are then relaxed about the interest payment by firm. To avoid the trouble of continuously overseeing the operation and performance of the firm, creditors can ask for the security of fixed assets like land, building, machinery etc. Thus creditors will be more willing to advance credit to those firms that have got more fixed assets to be presented as security against debt.

### **5.2 Size**

Size has a positive coefficient but is insignificant. The coefficient value is 0.0002. However, the t-value of 0.07 is value is very small and the p-value is 0.940. This shows that size variable is not a proper explanatory variable of debt ratio. This finding does not confirm to our second hypothesis. Our second hypothesis was based on the Rajan and Zingales' (1995) argument that there is less asymmetric information about the larger firms which reduce the chance of undervaluation of new equity. Our finding does not confirm to the Titman and Wessels' (1988) argument as well that larger firms are more diversified and have lesser chances of bankruptcy that should motivate the use of debt financing. Why our finding on size of a firm with relation to the leverage ratio does not confirm to the established theories. Trade off theory suggests that firm size should matter in deciding an optimal capital structure because bankruptcy costs constitute a small percentage of the total firm value for larger firms and greater percentage of the total firm value for smaller firms. As debt increases the chances of bankruptcy, hence smaller firms should have lower debt ratio. Incase of Pakistan, the court process is very slow. We see negative equity figure in the balance sheet of a firm year after year and the firm still manages to survive. Among our total

observations of equity figure, 15% were in negative. This means that firms are not much fearful of bankruptcy. They manage to survive even with negative equity figure. In the given scenario, size will not matter. Facing no or very low bankruptcy costs, firms will employ debt regardless of its size. Rajan and Zingales(1995) argue that the problem of undervaluation of new equity issue for large firm is not sever as there is less information asymmetry about them. Hence size should be negatively related to leverage. However, IPOs (initial public offerings) are negligible in Pakistan both for small and large firms. There are only a few cases of selling ownership in government owned enterprises to public in the recent past. It means that size is not the determinant of new equity issue rather other factors like family control, capital market development, managerial control etc. determine the issue of new equity. Hence, size should not necessarily be a significant determinant of leverage ratio.

### **5.3 Growth**

Our growth variable is significant at 10% level and is negatively related to leverage. As expected, this negative coefficient of -0.0511 shows that growing firms do not use debt financing. Our results are in conformity with the result of Titman and Wessels (1988); Barclay, et al. (1995) and Rajan and Zingales (1995). The usual explanation is that growing firms have more options of choosing between safe and risky firms. Managers, being agent to shareholders, will try to go for risky projects and increase return to shareholders. Creditors will be unwilling to give funds to such firms as they will bear more risk for the same return. To compensate for the additional risk in growth companies, creditors will demand risk premium. Facing extra cost of debt, growing firms will use less debt and more equity. Another explanation can be given from the point of view of managers' concern about their jobs. Managers want continuation of their services. Since growing firms run more risk of project failure as compared to businesses that are static and are run in conventional ways, managers may not want to add financial risk in addition to the high operational risk of the new projects. Thus, the managers' unwillingness to add financial risk to firm results in lower debt ratio for growing firms.

### **5.4 Profitability**

The most important explanatory variable is beyond doubt the profitability variable which has a very high t-statistics of -21.68 and p-value of 0.0000. The coefficient is -0.7945. The negative sign and statistical significance validates the acceptance of our fourth hypothesis. The prediction of information asymmetry hypothesis by Myers and Majluf (1984) is approved by the negative sign whereas the predictions of bankruptcy theory and free-cash flow hypothesis by Jensen (1984) are not substantiated. It is thus proved that pecking order theory dominates trade-off theory. Frydenberg (2001b) describes retained earning as the most

important source of financing. Good profitability thus reduces the need for external debt.

One possible bias in this finding can come from the fact that many firms are family controlled in Pakistan. They inflate the cost of production and the controlling shareholders take out profit in forms other than dividend. The result is the unreal negative profit figure in income statement. The year to year negative profit figure reduces the owner's equity and increase the debt percentage in overall financing. In our initial sample, 32% of all observations for profit were negative. Even though we removed outliers from our analysis that were 3 standard deviations from the overall mean, still we had 20.1% negative observation for the profitability variable. This is also evident from the fact that average profitability ratio is negative for four industries in the sample years. To check for this bias, we removed all observation of negative profitability and ran regression, the coefficient for profitability was still negative, but this time the p-value was 0.83 against a very small t-value of -0.17. This shows that profitability has no significant relationship with leverage. This is why the results of our main regression model should be interpreted with care with regard to profitability.

### ***5.5 Earning Volatility***

The coefficient for earning volatility is 0.0000 and has a very large p-value of 0.869. This indicates that volatility of income has no impact on the debt level. The magnitude of earning volatility is a sign of expected bankruptcy. Firms with higher volatility are considered risky because they can go bankrupt. The cost of debt for such firm should be more and thus these firms will employ low level of leverage. As discussed above that court process is slow in Pakistan and there are very few cases of bankruptcy, this could be the possible explanation for the insignificant relationship between earning volatility and leverage. Creditors do not consider the income source or the variation in income for the repayment of loan and interest by the firm. They rely more on the security of fixed assets.

### ***5.6 Depreciation (NDTS)***

Depreciation is not significantly related to debt. Thus our seventh hypothesis is not confirmed. Literature on capital structure suggests that none-debt tax shields like depreciation reduce the need for debt to stop net income from going to next high tax brackets. This way debt should be negatively related to leverage. However, this prediction of trade-off theory is not supported by the insignificant relation of depreciation to debt. One explanation for the insignificant relationship of depreciation to debt level is that tax rate in Pakistan does not vary with the level of income. There are three straight rates; one applicable to public limited companies; second to commercial organizations in government ownership and third to organizations in financial sector. Companies in a given group thus face a constant rate of tax. Depreciation thus does not work as a substitute to debt to

stop net income from going into a next high tax bracket. In other words, capital structure decisions are made without considering the amount or level of depreciation.

## 6. Conclusion

Using two variants of panel data analysis, we attempt to find the determinants of capital structure of KSE listed non-financial firms for the period 1994-2002. The effect of seven explanatory variables is measured on leverage ratio which is calculated by dividing the total debt by total assets. We first present some descriptive statistics on our selected variables. The most interesting finding of our descriptive statistics is the highest leverage ratio for textile industry whereas the average profitability of textile industry is negative. Our explanation of this fact is the continuous year to year understatement of the profit by family controlled firms in the textile industry in order to deprive government of taxes and minority shareholders of dividend. The profit figure is thus negative on average for all years that brings down the equity figure and raises the debt percentage in overall financing. Pooled regression analysis was applied with the assumption that there were no industry or time effects. However, using fixed effect dummy variable regression, the coefficients for a number of industries were significant showing there were significant industry effects hence we accepted the later model for our analysis. We used six explanatory variables to measure their effect on leverage ratio. Three of our variables were significantly related to leverage ratio whereas the remaining three variables were not statistically significant in having relationship with the debt ratio. Our results approve the prediction of trade-off theory in case of tangibility variable whereas the earning volatility (EV), and depreciation (NDTS) variables fail to confirm to trade-off theory. The growth (GT) variable confirms the agency theory hypothesis whereas profitability (PF) approves the predictions of pecking order theory. Size (SZ) variable neither confirms to the prediction of trade-off theory nor to asymmetry of information theory.

Tangibility is significantly related to debt. In Pakistan, where court process is slow and accounting profits do not reflect a true picture of firm performance, creditors prefer the security of specific claim on fixed assets. The prediction of trade-off theory is confirmed by our result. Size, measured by natural log of sale, has a positive coefficient but is insignificant. It means that firms in the sample do not consider their sizes as an active variable in deciding the leverage level. Size gives a comparative advantage of lower asymmetric information when a large firm makes an IPO. However, in case of Pakistan, IPOs are negligible both for small and large firms. Hence the asymmetry of information problem does not have significant effect on leverage ratios of either large or small firms. Growth variable is significant at 10% level and is negatively related to leverage. The negative sign confirms to prediction of the agency costs hypothesis. Agency costs for growing firms are more and hence these firms employ lower level of leverage. Profitability is the most significant explanatory variable and is

negatively related to leverage. However, our sample had a very higher percentage of negative profit observations. To account for that, we ran an auxiliary regression after deleting all negative profit rows. This time the profitability variable was not significant at any conventional level of significance. One may conclude, after controlling for the bias in the data, that creditors do not look too much towards the profitability of the firm, rather they prefer the security of the fixed assets. Finally, we did not find any evidence that earning volatility influence the decision of leverage of the sample firms.

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