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DETERMINANTS OF CAPITAL STRUCTURE: A CASE OF LISTED PHARMACEUTICAL AND CHEMICAL FIRMS OF PAKISTAN

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ABSTRACT

Financing decision by the firm is considered to be an important decision because of its influence on the riskiness of the firm and firm value. Financial researchers around the world have shown deep interest in finding out what determines the firm capital structure. The aim of the paper is to analyse the critical factors that influence the financing decisions of the firms listed in the chemical and pharmaceutical sector of Pakistan Stock Exchange (PSX), Pakistan. Financial data from 2008 to 2015 was used in this study. Fixed effects model was used to analyse the influence of independent variables on the dependent variable. The findings of the study revealed that taxes, non-tax debt shields and tangibility of assets significantly influence capital structure decisions. Moreover, taxes, growth opportunities and non-tax debt shields are positively related to leverage whereas profitability, liquidity, firm size and tangibility of assets are negatively related to leverage.

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1. INTRODUCTION

Capital structures came into prominence after the path-breaking study of Modigliani and Miller in 1958 in which they claimed that firm value is not influenced capital structure mix, hence, it is irrelevant. The theory sparked a debate among researchers and since then numerous studies have focused on capital structures to understand whether it matters or not. Subsequent studies from Modigliani and Miller (1963), Fama and French (1998), Nguyen and Wu (2011), Keshtkar et al. (2012), Lim (2012) Memon et al. (2015) provide sufficient evidence that capital structure decisions become relevant and important considering market imperfections. Several factors in these studies have been identified that could affect financing decisions, however, the significance and effect of these factors vary across countries and industries. Therefore, capital structure decisions are important

in the context of its influence on firm value. Selecting the appropriate mix of financing shall positively influence firm value and vice versa.

From the managerial decision point of view, financial managers come across two important situations regularly in which they have to make a decision as to what to do with the surplus cash? Should they pay it out to shareholders or invest in the business and secondly, how to finance new investments? Should they use debt or raise equity capital. The decision in both situations will affect the financing mix as well as firm value. Hence, the management aims to find out an optimal capital structure that will maximize the total value of the business. But many academicians and practitioners have been challenged when it comes to defining the appropriate mix of financing that will maximize firm value (Handoo & Sharma, 2014).

Capital structure theory revolves around two well-known competitive models: the trade-off model presented by Kraus and Litzenberger in 1973 and pecking-order, presented by Myers and Majluf in 1984. Trade-off model predicts that there is an optimal capital structure which can be achieved through a trade-off between debt's benefit i.e. tax advantages and the associated disadvantage of debt i.e. cost of financial distress. Increase in profitability leads to a decrease in the financial distress costs allowing firms to increase their leverage levels to exploit maximum tax advantages. Firms tend to prefer debt over equity but to a point. Firms will carry on increasing their gearing levels as long as the tax shield advantages outweigh the cost of financial distress. Additionally, the type of assets possessed by the firm plays an important role in determining bankruptcy costs. For instance, if the firm invests more intangible assets like land, building and machinery, the financial distress costs will be low as compared to if it invests in intangible assets. On the other hand, it is important to understand that large firms are more likely to exploit tax shield advantages because of their ability to generate higher profits which is less likely in case of small firms. So for small firms, it is not beneficial to increase gearing levels to exploit tax shield advantages.

Pecking order theory states that no appropriate mix of financing exists that will help maximize business value. According to pecking order theory organizations follow an order of fondness while making financing decisions. Firms favour internal mode of financing (retained earnings) over the external mode of financing (common stock and debt). The preference for the type of financing is based on the cost associated with each form of financing. Issuing new capital is considered to be the costliest, followed by debt whereas there are no such costs with the use of internal funds. As a result, firms favour using internal funds first followed by debt and common stock respectively.

The development of financial markets is an integral part of a country's economic development. They not only provide access to finance for needing firms but also provide opportunities for investment. Pakistan Stock exchange, an important component of the Pakistani financial market has played an important part in the economic development of Pakistan. The performance of PSX has been outstanding during the last decade or so. Currently, there are 559 listed firms on PSX with a market capitalization of 9.45 trillion rupees (PSX, 2018). All listed companies are divided into 36 broad industrial sectors including financial and non-financial sector.

The paper aims to analyse the factors that are influential in making capital structure decisions in listed Pharmaceutical and Chemical firms of Pakistan. The sub-objectives include a) identifying the

kind of connection between the independent variables and leverage, b) to measure the strength and impact of determinants of capital structure on leverage. Pharmaceutical and chemical companies are required to undertake enormous research and development activities for the development of new medicines and chemicals that will be more effective in curing diseases. Since research and development is an on-going activity in the pharmaceutical and chemical industry, the research and development costs will be invariably high and so will be the need for funds for carrying out research and development in the pharmaceutical and chemical industry. For this particular reason, it is essential to analyse how various factors influence capital structure decisions in the pharmaceutical and chemical industry of PSX, Pakistan and what kind of relationship these factors have with leverage levels in the pharmaceutical and chemical sector of PSX.

2. LITERATURE REVIEW

2.1 GROWTH OPPORTUNITIES

Myers (1977) argued that growth opportunities of a firm can be measured as “share of firm’s value accounted by assets in place; greater the proportion of firm value accounted for by assets in place, lower will be the firm’s growth opportunities” and vice versa. Firms having opportunities to grow are those that have the capacity to expand, introduce new product lines, able to acquire other firms.

Theoretically, a firm’s growth opportunities are a significant determinant of its capital structure. Myers (1977) claims that in companies where firm value is represented by future investment opportunities, there is a greater potential for shareholders to take actions that are conflicting with the interests of debtholders. At the same time, Myers (1977) also opposes the notion that growing companies may be affected by debt overhang problems. Since debt is considered as risky it may force companies to forego some very profitable investment opportunities. In addition to these companies that are growing may not want to take on debt if their future manoeuvrability is restricted by high-interest rates or agreements that are bounding on the organization. Consistent with these forecasts, studies by Titman and Wessels (1988), Chen and Zhao (2006), Tomschik (2015) and Pepur, Curak and Poposki (2016) all find that growth opportunities negatively influence leverage. However, this relationship varies when we considered the duration of debt (Stohs & Mauer, 1996; Michaelas, Chittenden & Poutziouris, 1999). Michaelas et al., (1999) claimed that “the agency problem can be alleviated if the firm issues short term instead of long-term debt”. Nevertheless, they found growth opportunities positive effect on debt irrespective of the duration of debt. Similarly, Baltaci and Ayaydin (2014) and Amjed and Shah (2016) also found growth opportunities positive influence on leverage. So it is reasonably safe to say that the empirical evidence on growth opportunities impact on gearing levels is rather mixed.

H₁ Growth opportunities does not cause leverage

2.2 FIRM SIZE

Effect firm of firm size on capital structures has been widely researched over the past few years. From the capital structures perspective, firm size is significant for a number of reasons. It is generally claimed that firms enjoy certain advantages because of their large size. They can use their size advantage to borrow loans at cheaper rates and enjoy easy access to capital markets (Ferri & Jones,

1979). Also, these large firms have a better chance of being able to fully exploit tax shield advantages from interest expenses (Smith & Stulz, 1985). Additionally, Rajan and Zingales (1995) concluded that while measuring the probability of bankruptcy size may be used as an inverse proxy because as large firms are more diversified their chances of failure are comparatively low. For small firms, agency conflicts may be more severe between creditors and shareholders. The risk associated with lending to small companies can be effectively managed by creditors by curtailing the maturity period. Therefore, it is expected that the percentage of short-term loans in the financing mix will be higher small companies whereas large companies will have a higher percentage of long-term loans in their financing mix. For small firms, informational asymmetries between firm insider's capital markets are higher whereas they are lower for large firms.

While measuring the firm size and its impact on the capital structure it is important to highlight the fact that the conclusions of empirical studies are inconclusive. Many researchers using various econometric models concluded positive consequence of firm size on leverage levels, for example, Fama and French (2000), Bauer (2004), Huang and Song (2002), Gaud et al. (2005), Huang and Song (2006), Daskalakis and Psillaki (2008). However, there are some studies including Titman and Wessels (1988), and Gonzalaz and Gonzalaz (2012) that report the negative impact of firm size on leverage.

H₂ Firm size does not cause leverage

2.3 PROFITABILITY

Theoretically, the influences of profitability on gearing levels are not consistent. Capital structure theories offer different approaches to debt financing. The trade-off model holds that since organizations earning higher profits have higher incomes to shield from taxes, therefore, they should use more debt to exploit these tax advantages. The free cash-flows theory states that in order to discipline managers, more debt should be used by organizations that are profitable. This will help to inspire managers to pay cash rather than spending on projects that are inefficient. However, pecking-order perspective, firms prefer internal mode of financing over external. Therefore, the urge for external funds is lower in profitable firms and will have lower leverage as well.

Modigliani and Miller (1963) claimed that borrowing externally offers significant tax advantages in terms of interest expense; firms may prefer debt over equity to exploit these advantages. This suggests that in order to exploit tax shield advantages, large and more profitable firms are anticipated to have a higher proportion of debt in their mix of financing (Oztekin, 2015). However, in a study conducted by Feidakis and Rovolis (2007) found out that tax shields associated with interest may be insignificant to firms if other tax shields are there, for instance, depreciation. On the other hand, due to asymmetric information, firms favour internal capital sources over external capital sources (Myers & Majluf, 1984). The theory of pecking order is evident here as companies favour to use their internal funds to finance their investments instead of debt finance. Consistent with the theory, Jean (2008) and Rafiq et al., (2008) find that gearing is inversely related to profitability.

H₃ Profitability does not cause leverage

2.4 TANGIBILITY

Theoretically, tangible assets could be used as security. Since there is a probability of conflict of interest between lenders and owners as pointed out by (Jensen, 1976), lenders may demand

security as they face the risk of adverse selection. Therefore the risk of creditor's decreases with the higher tangibility of assets and in case of insolvency increases the value of assets. Booth, Aivazian, Demircug-Kunt, & Maksimovic, (2001) argued that the possession of more tangible assets increases the ability of the firm to issue secured debt and less information will be shown about future earnings. So a positive relationship is predicted between assets tangibility and gearing levels. Many empirical studies such as Shah and Hijazi (2004), Jean (2008), Jacelly (2008) Oztekin, (2015) provide evidence that asset tangibility positively influences gearing levels. On the contrary, empirical studies from Booth et al., (2001) and Bauer (2004) further endorse that asset tangibility negatively influence gearing levels.

H₄ Tangibility does not cause leverage

2.5 NON-DEBT TAX SHIELDS

Apart from interest expenses which offer tax advantages, the depreciation on fixed assets and investments tax credits are also useful in reducing the tax payment. Lowering the amount of tax as a result of the deduction of investment tax credit and depreciation is called non-debt tax shields (NTDS). NTDS can be treated as a substitute for tax benefits exploited while using debt (DeAngelo & Masulis, 1980). Consequently, organizations having higher NTDS are expected to borrow less from external sources. Studies from Wald (1999), Chen (2004) and Gao (2016) found out that NDTs is negatively related. At the same time, Titman and Wessels (1988) find no evidence and Acaravci (2015) finds a weak impact of NTDS on leverage. Contrarily, studies from Chaplinsky and Niehaus (1993), Huang and Song (2006), all found out that NDTs positively influences debt level.

H₅ Non – debt Tax Shields does not cause leverage

2.6 LIQUIDITY

Another factor that influences an organization's capital structure is liquidity. The risk of bankruptcy for a firm is lower if its level of liquidity is high. In a study on US firms, Sibilkov (2004) concluded that organizations maintaining liquidity levels tend to use more debt in their mix of financing. In contrast, Lipson and Mortal (2009), Sarlija (2012) and Ghasemi and Razak (2016) found out the negative impact of liquidity on leverage. They argued that more liquid firms are less levered because they use internal sources for most of their financing. Even investors have more confidence in such firms and are considered safe because in case of the inability of these firms to repay their current liabilities they have enough liquid assets that can be used to meet the short-term obligations.

H₆ Liquidity does not cause leverage

2.7 TAXES

Based on the assumptions of Trade-off theory, organizations are expected to use more debt if its tax rate is high and it has more earnings to shield from taxes. Empirical evidence suggests that the influence of taxes on capital structure decisions is ambiguous. Fama and French (1998) argued that debt has no tax shield advantages. Studies from Mackie-Mason (1990), Ashton (1991) etc. argued that taxes significantly influence financing decisions of the businesses and concluded that financing decisions of the firm are affected by changes in marginal tax rates. Graham (1996) while providing support to Mackie-Mason's claim concluded that corporate financial decisions are influenced by taxes but to a limited extent. Rajan and Zingales (1995) while acknowledging the importance of taxes in financing decisions concluded that tax rate variation across countries has some predictive power in

explaining financing decisions. Studies from Memon et al., (2015) and Tomschik (2015) reveal a positive influence of taxes on leverage.

H₇ Taxes does not cause leverage

3. METHODOLOGY

Since the study aims to identify the capital structure determinants in the Pharmaceutical and chemical industry of Pakistan, Panel data regression was used for this study. Secondary sources of data collection were used for this study. Firm-level data was collected from the State Bank's database. State Bank of Pakistan database contains financial statements of all listed firms in Pakistan. The sample contained all listed firms of the pharmaceutical and chemical industry of Pakistan. Data for the study were collected from 2008 to 2015. The primary reason for restricting the study to eight years was that for most of the listed firm's data beyond 2008 was not available.

During data collection, it was identified that some of the data concerning the variables used in this study were missing. Dropping variables with missing values may affect the scope of our analysis. Hence, it was decided to retained variables with missing values. Furthermore, academic literature provides several techniques that are useful in handling missing data. They include multiple imputations, single imputation, maximum likelihood, available case analysis, complete case analysis etc. For this study, multiple imputations were used to handle missing values because of its superior advantages over other methods. According to this technique, for each missing value, a set of possible estimates are generated and the average value of these estimates is used as a probable value for the missing value. The reason for using the average value of the possible estimates is that it will give us an unbiased estimate. But the question is how many possible estimates are enough to get an unbiased estimate. While clarifying this ambiguity, Schafer (1997) highlighted that five data sets are more than enough to get an unbiased estimate for the missing values.

Initial analysis of collected data revealed that data for leverage, corporate taxes, current ratio and growth opportunities were not normally distributed. Hence, log transformations were applied to these variables to satisfy the basic conditions before carrying out regression analysis.

Independent variables employed in this study are the firm size (FS), the tangibility of asset (TAN), growth opportunities (GO), profitability (ROA), taxes (TAX), current ratio (CR) and non-tax debt shields (NDTS). For firm size natural log of sales was used, asset tangibility was measured through fixed assets/total assets, taxes were measured through effective tax rates (tax expense/profit before tax), current ratio was measured as current assets/ current liabilities, growth opportunities was estimated through market value/book value, profitability was measured as profit before tax/total assets, and NTDS was measured as depreciation/total assets whereas leverage was calculated through total debt/total debt + total equity.

3.1 ESTIMATED MODEL

Panel data regression was used to measure the determinants of capital structure. In literature, we find two commonly used models while analysing panel data. They are random effects and fixed effects. The primary assumption of the random effects model is that “the intercept of an individual firm is randomly selected from a much bigger population with constant mean value whereas the fixed effect model assumes that individual firm differs in its intercept term” (Gujarati, 2004). In order to

avoid selection bias between the two models, the Hausman test is used to find out which model is appropriate for our study. “Hausman test is a specification test used to determine whether a random effect model is more appropriate or fixed effects in a given situation”. The results of the Hausman test show that the fixed effect model is appropriate in this study.

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	37.54	7	<0.001

$$LEV_{it} = \alpha_0 + \beta_1 TAX_{it} + \beta_2 CR_{it} + \beta_3 GO_{it} + \beta_4 ROA_{it} + \beta_5 NDTS_{it} + \beta_6 TAN_{it} + \beta_7 FS_{it} + \mu_{it}$$

Since we are using panel data regression to measure capital structure determinants, multicollinearity and heteroscedasticity are important aspects that must be considered before running a regression. Table 1 presents the variance inflation factors of independent variables whereas table presents the correlation among the variables. Values from Table 1 and Table 2 indicate that multicollinearity is not an issue in this study. For measuring and handling issues of heteroscedasticity, white test along with estimated generalised least squares (cross-section) weights were used to handle heteroscedasticity.

Table 1: Variance Inflation Factors (VIF)

Variable	VIF
TAX	1.341
CR	3.032
NDTS	1.286
ROA	1.982
TAN	3.102
GO	1.163
FS	1.645

Table 2: CORRELATION MATRIX

	LEV	TAX	CR	GO	ROA	NDTS	TAN	FS
LEV	1.000							
TAX	0.075	1.000						
CR	0.050	-0.129	1.000					
GO	-0.074	-0.129	0.118	1.000				
ROA	-0.019	-0.459	0.449	0.269	1.000			
NDTS	0.070	0.135	-0.026	-0.161	-0.103	1.000		
TAN	-0.267	0.109	-0.416	-0.037	-0.310	0.204	1.000	
FS	-0.146	-0.196	0.334	0.214	0.468	0.020	-0.080	1.000

4. RESULTS

4.1 DESCRIPTIVE STATISTICS

Table 3: Descriptive statistics.

	LEV	TAX	CR	GO	ROA	NDTS	FS	TAN
Mean	23.22	0.47	1.09	0.13	8.19	0.03	6.32	0.51
Median	28.12	0.32	1.04	0.16	6.97	0.03	6.43	0.50
Maximum	87.73	21.37	11.06	2.57	53.13	0.08	8.19	0.99
Minimum	0.00	0.005	0.01	0.001	-72.72	0.00	3.39	0.01
Std. Dev.	0.32	0.96	0.48	0.64	15.83	0.02	0.95	0.25
Skewness	-1.03	0.34	-1.96	-1.04	-0.57	0.42	-0.56	0.08
Kurtosis	37.11	2.71	8.78	3.89	7.53	2.56	3.16	2.09
Jarque-Bera	12573.32	5.92	524.83	55.24	234.10	9.67	13.64	9.25
Probability	<0.01	0.05	<0.01	<0.01	<0.01	0.01	<0.01	0.01

Table 3 presents a descriptive summary of the variables. The mean value of leverage is 23.22 whereas standard deviation, highlighting the dispersion from mean is 0.32. The skewness value of leverage is -1.03. Mean value and standard deviation of taxes are 0.47 and 0.32 respectively. The skewness value of taxes is 0.34. Mean value and standard deviation of liquidity are 1.09 and 1.04 respectively. The skewness value of liquidity is -1.96. Mean value and standard deviation of growth opportunities are 0.13 and 0.16 respectively. The skewness value of growth opportunities is -1.04. Mean value and standard deviation of profitability are 8.19 and 15.83 respectively. The skewness value of profitability is -0.57. Mean value and standard deviation of non-tax debt shields are 0.03 and 0.02 respectively. The skewness value of non-tax debt shields is 0.42. Mean value and standard deviation of firm size are 6.32 and 0.95 respectively. The skewness value of firm size is -0.56. Mean value and standard deviation of the tangibility of assets are 0.51 and 0.25 respectively. The skewness value of tangibility of assets is 0.08.

4.2 PANEL REGRESSION ANALYSIS

Table 4: Regression analysis.

Variable	Coefficient	Std. Error	t-stat	Prob.
C	2.377	0.276	8.625	<0.010
TAX	0.073	0.035	2.091	0.038
GO	0.059	0.048	1.227	0.221
CR	-0.069	0.057	-1.219	0.224
ROA	<-0.014	<0.014	-1.04	0.299
FS	-0.038	0.048	-0.786	0.433
NDTS	5.304	1.741	3.046	<0.013
TAN	-0.498	0.104	-4.804	<0.010
R-squared	0.324			
S.E. of regression	0.291			
F-statistic	12.166			
Prob(F-statistic)	<0.010			

Empirical results generated through regression analysis indicate that taxes, growth opportunities and NTDS are positively influencing financial leverage whereas liquidity, firm size, profitability and tangibility of assets are negatively influencing financial leverage. Furthermore, the impact of taxes, NTDS and tangibility of assets is statistically significant.

The use of debt offers tax shield advantages to the firm because interest payments are treated as an expense. Therefore, leverage levels of firms are expected to rise in the presence of these tax shield advantages. Similarly, depreciation on fixed assets also results in tax savings thus encouraging firms to use more debt. Studies from Mackie-Mason (1990), Ashton (1991), Chaplinsky and Niehaus (1993), Huang and Song (2006), Memon et al., (2015) and Tomschik (2015) also found a positive impact of corporate taxes and NDTS on financial leverage. Growth opportunities positively influence leverage because firms may not have enough internally generated funds to finance their growth ambitions thus resulting in increased borrowing. Empirical studies from Baltaci and Ayaydin (2014) and Amjed and Shah (2016) also provide strong evidence of the positive effect of growth opportunities on leverage.

Results from Table 4 indicate that profitability and firm size have a negative impact on firm leverage. A possible explanation for this can be that as firms grow in size, their ability to generate more profits increase due to an increase in market share and economies of scale. As a result, firms have more internally generated funds to be used to fund their growth plans thus reducing the

dependence on external borrowing. Studies from Bauer (2004), Jean (2008) and Gonzalaz and Gonzalaz (2012) also provide evidence of the negative impact of firm size and profitability on firm leverage.

The tangibility of assets and liquidity are also negatively related. Firms with high liquidity will probably have lower levels of leverage because they have more internally generated funds (Lipson & Mortal, 2009; Sarlija, 2012; Ghasemi & Razak, 2016). The findings of the study with respect to the tangibility of assets are line with the conclusions of many studies on developing countries whereas a negative relationship is found between tangible assets and leverage (Booth et al., 2001; Bauer, 2004)

5. CONCLUSION

The paper aimed to analyse capital structure determinants in the Pharmaceutical and chemical industry of Pakistan. For this reason panel regression analysis was used to analyse the effect firm size, liquidity, taxes, growth opportunities, NTDS, the tangibility of assets and profitability on leverage. The findings of the study revealed that taxes, NTDS and tangibility of assets significantly influence leverage. Moreover, the impact of growth opportunities, taxes and NTDS is positive on leverage whereas tangibility of assets, liquidity and profitability are negatively impacting leverage. However, the outcomes of this study are restricted to only one industry i.e. the Pharmaceutical and chemical industry of Pakistan. Considering the importance of financing decisions in relation to its impact on firm value, it is necessary to find out whether factors that influence financing decisions have similar effects in other industrial sectors of the economy or not. Since the nature of businesses differs from one industrial sector to another, expanding our investigation to other industrial sectors may provide meaningful insights into understanding whether nature of business has any effect on the factors that affect borrowing decisions or not. It would also be helpful in establishing what kind of relationship (positive or negative) exists between capital structure variables and how these factors influence capital structure decisions.

6. POLICY IMPLICATIONS

The financing decision is an important decision for a firm considering the associated risks and costs. Firms will be able to make better financing decisions if the economic environment is conducive and have reasonable knowledge about the factors and their behaviour that could influence financing decisions. Currently, the economy of Pakistan going through challenging times and it is important for the economic managers of the economy to draft and implement policies that will stabilize the economy thus making it easier for firms to borrow from the financial markets. Moreover, steps need to be taken by the state to further improve access to finance in an efficient and effective through further development of the financial markets including the stock market as well as the banking system. Furthermore, the study will be helpful for financial managers while making financing decisions considering the impact of these factors on the financing decisions of the firm.

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