

Study of the Static Trade-Off Theory determinants vis-à-vis Capital Structure phenomenon in context of Pakistan's Chemical Industry

*¹Ashiq Ali, ¹Saba Mahmood, ²Li Hui, ³Muhammad Rizwan

^{*1}*School of Finance and Business, Shanghai Normal University, Shanghai, People's Republic of China, 200234.*

¹*Department of Business Administration, Shaheed Zulfikar Ali Bhutto Institute of Science and Technology, Islamabad, Pakistan, 44000.*

²*School of Finance and Business, Shanghai Normal University, Shanghai, China, 200234.*

³*College of Communication and Information Engineering, Shanghai University, Shanghai, China, 20044.*

Abstract: *This paper investigates the application of the Static Trade-Off theory regarding the capital structure of the Pakistani Chemical Industry. We have used panel data analysis for the sample of 31 listed chemical firms from the period 2005 to 2013. The study is unique in its type as unlike to Shah & Hijazi (2005) who studied many industrial sections, this study only focuses on the listed Chemical Firms. We used five independent variables such as Profitability (P), Tangibility (T), Liquidity (L), Firm Size (FS) and Total Assets Growth (TAG) to study the effect on independent variable Financial Leverage (FG). The results confirmed the relationship of Profitability, Liquidity and Firm Size. However the results were not confirmed for Tangibility and Firm Assets Growth. Even though the results for Tangibility were positive, however the significance of the coefficients failed to support the hypothesis. This study hold a unique position for researchers for future research and also has significance for the investors helping them to make wise investment decisions when investing in Pakistani Chemical Industry since this industry holds a major portion of industrial GDP of the country.*

Keywords: *Static Trade-Off Theory, Capital Structure, Corporate Finance, KSE Pakistan.*

I. INTRODUCTION

Financing behavior of the firms reflected by Capital Structure has been a topic of research for many scholars and researchers for a long time. The research in the Capital Structure field is influenced mainly by two theories i-e Static Trade-Off Theory and Pecking Order Theory. And the current study is based on Static Trade-Off Theory in context of Pakistani Chemical Industry. Pakistan has a semi-industrialized economy, which encompasses majorly textiles, chemical, food processing, agriculture and other industries. Shah & Hijazi (2005)^[1] introduced the first ever study of the factor affecting the capital structuring of the listed companies in Pakistan. Their study holds a vital importance in the research of financial economics in Pakistan as it was considered one of the neglected research fields in Pakistan. However their study has potential loop holes such as small data sample and overall listed companies. By included some significant explanatory variables and industry focused study, this research will produce more reliable and significant results for future research and investors.

The Static Trade-Off Theory emerged in the stream line from the path-breaking works of Modigliani & Miller (1958)^[2]. They assumed perfect and frictionless capital markets to prove their irrelevance theorem, which was later generalized by Stiglitz (1974)^[3]. According to the irrelevance theorem of Modigliani and Miller (1958)^[2] the firm's financing policy should not affect the firm's value or its cost of capital. The firm's value is solely determined by its investment decisions. This obviously implies that there is no interaction between corporate finance and investment decisions. A logical conclusion to this argument is that, firm's financing and investment decisions can be studied and analyzed separately. Modigliani and Miller (1958)^[2] irrelevance theorem, also known as M&M Irrelevance Theorem is based on the unrealistic assumption of perfect capital markets. And market imperfections are a prerequisite for capital structure to matter for the M&M Irrelevance Theorem. By introducing market imperfections, firms seem to get an optimal and value maximizing debt-to-equity ratio by trading off the advantages of the debt against the disadvantages.

Every corporation across the globe regardless of the size and geographical location, invests to maximize the firm value and try to design the capital structure that overcomes hurdles towards the value maximization. Even after a vast research conducted for optimal capital structuring, this topic is still under discussion by many scholars

and researchers. The current study also focuses on the applicability of Static Trade-off Theory in context of Pakistani Chemical Industry. The leverage level of Pakistani Chemical Industries with determine the applicability of Static Trade-Off theory through profitability, Sales Size, Total Asset Growth and Asset Structure of the firms.

II. LITERATURE REVIEW

Myers (1984)^[4] defined the contemporary thinking of capital structuring into two segments. One of such is Static Trade-Off Theory, which argues that a firm follows a targeted debt-to-equity ratio and shows the according behavior. He further argues that the benefits and the costs associated with the debt determines this target ratio of debt-to-equity. These includes taxes, cost of financial distress and agency cost. When choosing from debt and equity, debts are subjected to some tax benefits such as interest payments are tax-deductible expense, therefore firms will use higher level of debts to take the advantage of the tax benefits if the taxes are higher. However if the firm incur losses, the tax benefit will fade away.

However the chances of the firm getting bankrupt increases as the firm crosses the optimal level of the debt. If the firm crosses its optimal debt level, it is more likely that firm will default on the repayment of the loan. As a consequence the control of the firm will shift from the shareholders to the bondholders who will attempt to recover their investments by liquidating the firm. And because of such threat, the firms usually incur two types of the cost which are direct and indirect costs associated to bankruptcy. Direct costs are linked to the administrative costs of the bankruptcy process. If the firm size is large, these costs constitute only a small percentage to the firm. However for small firms, these costs constitute a higher percentage and are considered as an active variable when deciding the debt optimal level.

The other type of cost is indirect cost which arise because of the changes in the investment policies of the firms, in case the firms forecast a possible financial distress. To avoid the possible bankruptcy, the firm will cut down expenses on R&D (Research and Development), Employee Trainings and Marketing etc. This will indirectly affect the company identity and image as the consumer will be forced to think about the same quality of goods/services. As a result the revenues will decreases and eventually the market share price of the firm will drop down. Chaplinsky and Niehaus (1990)^[5] also identified the above mentioned costs and implied that the potential benefit from the leverage are shadowed by the potential cost of the bankruptcy.

According to Myers (1984)^[4] the Static-Trade off Theory focuses on the benefits and costs of the issuing debt and predicts that an optimal financial debt ratio exists which maximizes the value of the firm. He further stated that the optimal point can be attained when the marginal value of the benefits associated with debt offsets the increase in the current value of the costs when accessing more debt. Quoting Modigliani and Miller (1958)^[6] and DeAngelo & Masulis (1980)^[7], debts accompany the benefit of tax shields and these shields encourages the corporates to use more debts. They however further argue that the tax shield effect can be complicated by the existence of personal taxes and non-debt tax shields.

When discussing the benefits of the debt financing, Jensen and Meckling (1976)^[8] identified that it mitigates the manager-shareholders agency conflicts. They argued that corporate manager has authority to utilize the available capital on bad investments. And debt financing limits the availability of the capital to the managers and hence helps to control this agency problem. Another argument presented by Jensen & Meckling (1976)^[8] and Modigliani & Miller (1963)^[9] found that the costs associated with issuing more debts increases the cost of bankruptcy which triggers the agency cost from the conflicts of the shareholders and financiers. Cost of financial distress are likely to increase when firms use excessive debt and are unable to meet the interests and principal payments.



Figure 1: Conceptual Framework

Profitability

According to Gabriela and Raluca (2009)^[10]; Mehmet and Eda (2008)^[11]; Chen (2004)^[12] and Rataporn et. al. (2004)^[13], financial surplus of a firm is derived from its profitability. So if a firm has achieved financial surplus, it is termed as profitable and vice versa. In their further studies, they observed a negative relationship between firm's profitability and leverage level. However Jensen (1986)^[14] contradicted these results and he argued that lower bankruptcy costs and tax advantages results in higher profits for the firm. The ability of the firm to meet the financial deficits with internal finances increases, therefore there is a positive relationship between the firm's profitability and leverage level. This conflict created our first hypothesis which is:

H₁: *Profitability of the firm has negative relationship with leverage level as the profits provides ability to finance internally.*

Tangibility

According to Chen (2004)^[12]; Rajan & Zinagle (1995)^[15]; Titman & Wessels (1988)^[16] and Jensen (1986)^[14], debt providers are more comfortable to issues debts against any tangible collateral assets. Gabriela and Raluca (2009)^[10]; Mehmet & Eda (2008)^[11] and Eugene Nivorozhkin (2002)^[17] found opposite and argued that there is a negative relationship between firm's tangibility and leverage level. The study was based on Romanian firm and one logical explanation to it was the lack of access to the long-term debts. So our second hypothesis is:

H₂: *Profitability of the firm and its leverage level has a positive relationship in regards to tangible assets and debt financing.*

Liquidity

According to Mehmet & Eda (2008)^[11] liquid assets are considered to be one of the most important aspect of internal financing. According to them these types of the assets can be used to solve the financial deficit issues and to overcome the information asymmetry issues. Liquid assets can develop a free cash flow to the firms, thus making an easy access to the debt financing. The financiers are more comfortable as they sort of find a collateral. Hence according to the abovementioned arguments, we developed our third hypothesis which is:

H₃: *Liquid assets enables firms to give preference over internal financing as compared to external thus a there exists a negative relationship between liquid assets and firms leverage level.*

Firm Size

Quoting Titman & Wessels (1988)^[16], Firm Size is an important phenomenon when determining the capital structure policy of any business. Large firms are more diversified and have less chances of bankruptcy when compared with small firms. They further stated when arguing Static Trade-Off theory, the larger the firm, the higher is the access to the debts, because of the less risk of bankruptcy. As stated earlier, large firms do not consider bankruptcy cost as an active variable when deciding the leverage level and optimal debt limits. Thus our fourth hypothesis will test the following:

H₃: *There exists a negative relationship between firms size and leverage level i-e. The bigger the firm, the lower will be the leverage level.*

Total Asset Growth

According to the pecking order theory presented by Myers (1984)^[4], when firms announces to issue new equities, it sends a bad signal because of the asymmetry of information. This directly effects the stock value as it drops down. However there has been observed less effect of the asymmetry of information for the larger firms. Hence large firms can finance their new investment opportunities via issuing sensitive securities like equity financing. Therefore our fifth hypothesis will be:

H₅: *There exists a positive relationship between firm's growth and leverage level for larger firms as asymmetry of information has a reduced and lower effect on them.*

III. DATA COLLECTION

The current study examines the applicability of Static Trade-Off Theory which is applied on Chemical Sector Firms listed in Karachi Stock Exchange (KSE). The sample consists of 31 listed companies on the basis of data availability from the year 2005 to 2013. Secondary data has been used which has been extracted from KSE 100 Index website and balance sheets acquired from State Bank of Pakistan (SBP). The data has been also verified from audited financial reports of the selected listed firms.

Sample Classification

Number of Companies:	31
Category:	Listed (KSE)
Industry:	Chemical Industry
Country:	Pakistan
Number of Years:	2005 - 2013

IV. METHODOLOGY

The study consists of panel data (Cross Sectional and Time Series) analysis. This method is used to determine the authentication of the Static Trade-Off Theory on basis of relationship among selected variables using regression analysis. The regression model used in the study is:

$$FL = \alpha + \beta_1 (P) + \beta_2 (T) + \beta_3 (L) + \beta_4 (FS) + \beta_5 (TAG) + \varepsilon$$

Table I: Variable Classification

Variable	Description	Classification
FL	Financial Leverage	Dependent Variable
P	Profitability	Independent Variable
T	Tangibility	Independent Variable
L	Liquidity	Independent Variable
FS	Firm Size	Independent Variable
TAG	Total Asset Growth	Independent Variable

The variables are measured as following:

$$\text{Financial Leverage} = \frac{\text{Total Debts}}{\text{Total Assets}}$$

$$\text{Profitability} = \frac{\text{Net Profit}}{\text{Total Assets}}$$

$$\text{Tangibility} = \frac{\text{Total Fixed Assets}}{\text{Total Assets}}$$

$$\text{Liquidity} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

$$\text{Firm Size} = \text{Natural Logarithm of Net Sales}$$

$$\text{Total Asset Growth} = \frac{\text{Total Assets in year } t}{\text{Total Assets in year } t - 1}$$

V. RESULTS & DISCUSSION

The panel data of the KSE listed Chemical Firms is run in E-Views to examine the hypotheses stated above. Below Tables consist of *Simple Pooled Panel Least Square*, *Fixed Effect Panel Least Square* and *Cross-Section Weight Panel Least Square* results. A balanced panel regression has been applied on the data of thirty one (31) KSE listed Chemical Industry firms of Pakistan in the Tables below. The dependent variable is Financial Leverage whereas the independent variables are Tangibility (T), Firm Size (FS), Total Assets Growth (TAG), Profitability (P) and Liquidity (L).

Table II: Simple Pooled Panel Least Square Results

Dependent Variable	FINANCIAL_LEVERAGE			
Method	Panel Least Squares			
Sample	2005- 2013			
Cross-Sections Included	31			
Total Panel (balanced) Observations	279			
Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	0.6718	0.0713	9.4116	0
PROFITABILITY	-2.6762	1.1879	-0.2271	0.8206
TANGIBILITY	0.0231	0.0660	1.8644	0.0642
LIQUIDITY	-0.1357	0.0143	-6.2724	0
FIRM SIZE	0.0779	0.0202	2.8737	0.0629
TOTAL_ASSETS_GROWTH	-0.0854	0.0623	-1.3693	0.1729
R-Square	0.4110	Mean Dependent Var.		0.5463
Adjusted R-Square	0.3913	S.D. Dependent Var		0.2243
S.E. of Regression	0.1750	Akaike Info Criterion		-0.6097
Sum Squared Resid	4.5647	Schwarz Criterion		-0.4919
Log Likelihood	53.256	F-Statistic		20.802
Durbin-Watson Stat	0.4552	Prob (F-Statistic)		0

Table III: Panel Least Square Results (Fixed Effect)

Dependent Variable	FINANCIAL_LEVERAGE			
Method	Panel Least Squares			
Sample	2005- 2013			

Cross-Sections Included			31	
Total Panel (balanced) Observations			279	
Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	0.4013	0.2750	1.4590	0.1473
PROFITABILITY	-3.9360	1.3240	-2.9737	0.0036
TANGIBILITY	0.0565	0.1416	0.3992	0.6905
LIQUIDITY	-0.1807	0.0146	-5.4993	0.0000
SIZE	0.0768	0.0896	2.7459	0.4572
TOTAL_ASSETS_GROWTH	-0.0120	0.0430	-0.2795	0.7804
Effect Specifications				
Cross Section Fixed(Dummy Variable)				
Period Fixed (Dummy Variable)				
R-Square	0.8404	Mean Dependent Var.		0.5463
Adjusted R-Square	0.7863	S.D. Dependent Var.		0.2243
S.E. of Regression	0.1037	Akaike Info Criterion		-1.4768
Sum Squared Resid	1.2368	Schwarz Criterion		-0.6914
Log Likelihood	154.4568	F-Statistic		15.53119
Durbin-Watson Stat	1.3986	Prob (F-Statistic)		0.0000

Table IV: Panel Least Square Results (Cross Section Weight)

Dependent Variable	FINANCIAL_LEVERAGE			
Method	Panel Least Squares			
Sample	2005- 2013			
Cross-Sections Included	31			
Total Panel (balanced) Observations	279			
Linear estimation after one-step weighting matrix				
Variable	Coefficient	Std. Error	t-Statistic	Probability

Constant	0.6899	0.0316	21.8268	0.0000
PROFITABILITY	-7.7764	5.9735	-1.3021	0.1949
TANGIBILITY	0.0693	0.0371	1.8652	0.0641
LIQUIDITY	-0.1193	0.0095	12.5461	0.0000
SIZE	0.0890	0.0098	3.9557	0.0001
TOTAL_ASSETS_GROWTH	-0.0425	0.0331	-1.2814	0.2020
Weighted Statistics				
R-Square	0.8404	Mean Var.	Dependent	0.5463
Adjusted R-Square	0.7863	S.D. Var.	Dependent	0.2243
S.E. of Regression	0.1037	Sum Square Resid.		-1.4768
F- Statistics	1.2368	Durbin-Watson Stat		
Probability (F- Statistics)	154.45			
Un-Weighted Statistics				
R-square	0.3854	Mean Var.	Dependent	0.5463
Sum Square Resid.	4.7632	Durbin-Watson Stat		0.4576

Quoting Tariq & Hijazi (2006)^[18] and Shah & Hijazi (2005)^[11], Profitability of the firm is negatively related to the Firms Leverage level. After analyzing the results of Simple Pooled Results, Fixed Effect Results and Cross-Section Weight Results, we found same results thus confirming the past studies. This behavior explains that firms in Pakistan give preference to Equity Financing over Debt Financing. Thus it can be concluded that the more the firms will be profitable, the less dependency they will have on debt Financing. Therefore our Hypothesis 1 (H₁) is supported in this case.

The second independent variable tested for our studies is Tangibility. All three (03) models used in this study showed a positive relationship of tangibility. However the coefficients are not significant enough to support the Hypothesis 2 (H₂). Even though the positive signs acknowledges the tangibility of the assets to the debts but the insignificance of the coefficients fail to support the Hypothesis 2 (H₂). These results are aligning the results of Shah & Hijazi (2005)^[11], but negating the results of studies conducted previously by Myers (1977)^[19] and Jensen & Meckling (1976)^[8]. They argued that the level of the debts increase with the increase in assets of the firm.

According to Hypothesis 3 (H₃), Liquidity of the firm is negatively related to the leverage level. The results in all three models demonstrated the same results. The coefficients were found significant and thus it supported the Hypothesis 3 (H₃). Mehmat Sen et. al. (2008)^[11] argued free cash flow theory which states that if firms have more liquid assets, they have more access to debts and equities as the lender is more confident to lend the money as the assets act as a collateral.

Hypothesis 4 (H₄) examines the positive relationship of Firms Size and Leverage Level. Firm Size in this study is measured by the natural algorithm of the total sales. Firm in Pakistan provided a mixed behavior. According to Static Trade-Off theory, larger the firm is the more chance is to get the financial aid in shape of debts of equities. In case of Pakistan, large firm borrow more as compared to small firms. The results confirmed the Hypothesis 4 (H₄) with reasonably significant coefficients. The findings of our results opposed the earlier study conducted by Rajan & Zingales (1995)^[15], where they argued information asymmetry. The findings are also

supporting the theory presented earlier regarding the bankruptcy. Large firms will not be reluctant to get more debts fearing bankruptcy, as bankruptcy cost constitute a small portion of firm value for large firms.

Hypothesis 5 (H₅) which determined the relationship of Net Assets Growth with leverage demonstrated negative behavior. This predicts that in Pakistan, firms are more dependent on equity as compared to debt as they grow. This also explains that, especially in Chemical industry huge capital is required to grow the assets. Hence internal sources and debts are not sufficient to support the huge expansion so firms have to look for Angel Investors, Strategic Partners, and Public Offerings etc. Quoting Shah & Hijazi (2005)^[1] observed the same negative behavior, whereas Tariq & Hijazi (2006)^[18] explained an opposite behavior. It is worth mentioning here that the explanatory power of the variables have increased to 84% in Fixed Effect Model. This was stronger in Cross-Section Weight Model reaching to 95%.

Table V: Summary of the results

Variable	Expected Result	Simple Pooled Results	Fixed Effect Results	Cross Section Weight Results
PROFITABILITY	<i>Negative</i>	<i>Negative</i>	<i>Negative</i>	<i>Negative</i>
TANGIBILITY	<i>Positive</i>	<i>Positive</i>	<i>Positive</i>	<i>Positive</i>
LIQUIDITY	<i>Negative</i>	<i>Negative</i>	<i>Negative</i>	<i>Negative</i>
FIRM SIZE	<i>Positive</i>	<i>Positive</i>	<i>Positive</i>	<i>Positive</i>
TOTAL ASSETS GROWTH	<i>Positive</i>	<i>Negative</i>	<i>Negative</i>	<i>Negative</i>

VI. CONCLUSION

Table VI: Summary of the Hypothesis

Variable	H1	H2	H3	H4	H5
PROFITABILITY	<i>Support</i>				
TANGIBILITY		<i>No Support</i>			
LIQUIDITY			<i>Support</i>		
FIRM SIZE				<i>Support</i>	
TOTAL ASSETS GROWTH					<i>No Support</i>

The current empirical investigation studied the Chemical Firms of Pakistani Economy listed in Karachi Stock Exchange (KSE) in relevance to Static Trade-Off towards the firm’s Capital Structuring. Pooled regression model was used in this study to analyze the elements of Capital Structure decisions of the above mentioned firms. The reason behind this empirical evidence is to enrich the existing literature and rectifying the flaws while filling the loopholes in the results of previous studies conducted. Another significance of the study is the analysis of the capital structuring elements which are industry focuses.

The results supported the relationship of Profitability, Liquidity and Firm Size. Whereas Tangibility and the Total Assets Growth failed to support the hypothesis. Quoting Eugene Nivorozhkin (2004)^[17], the negative

relationship between debts and leverage influences the Debt-to-Equity ratio. Even though the results found positive relationship between two (02) but with less significant coefficients. Therefore this cannot be generalized for Tangibility, hence the results failed to support the hypothesis. The reason that was understood that why firm's prefer Equity on Debts when growing is that the sources like Internal Financing and Debt Financing proves to be less sufficient for the Chemical industry, hence firms look for equity financing as an alternative. This behavior is also against the Myers (1984)^[4] Pecking Order Theory.

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