The Determinants of Capital Structure in Energy Sector

(A study of Pakistani listed firms)

Abubakr Saeed

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Supervisor: Anders Hederstierna

Blekinge Institute of Technology
School of Management
SE-371 79, Karlskrona
SWEDEN
Abstract

This master thesis is concerned to test if financial patterns of listed firms in energy sector of Pakistan follow any foremost capital structure theories. The analysis was implemented on a sample of 22 listed firms during the period 2001 to 2005. The results of pooled regression model show that both Static trade-off theory and Pecking order theory are pertinent corporate capital structure theories to the firms in Pakistani energy sector.

Title: The Determinants of Capital Structure in Energy Sector: (a study of Pakistani listed firms)

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Author: Abubakr Saeed

Supervisor: Anders Hederstierna

Theoretical perspective: The theoretical framework includes the corporate capital structure theories and modern research work in this field. Hypotheses are formulated on the basis of theoretical background.

Methodology: Regression model is used to analyze the data taken from Pakistani firms in energy sector, listed on Karachi Stock Exchange, during the period 2001-2005.

Keywords: Static trade-off theory, Pecking order theory, Agency cost theory, leverage ratio, listed firms, corporate capital structure.

Conclusion: Financing pattern of firms partially supports the Static trade-off theory and Pecking order theory.
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Abbreviations and Definitions

MM: Modigliani and Miller
STT: Static Trade-off Theory
POT: Pecking Order Theory
CVA: Collateralizable Value of Assets
NDTS: Non Debt Tax Shield
Leverage: The amount of debt used to finance a firm's assets
Capital structure: A combination of firm’s finances its overall operations and growth by using different sources of funds.
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1. Introduction

In the opening chapter, the background, problem discussion and purpose of the study are presented. The chapter ends with targeted group and limitation of study.

1.1 Background and problem discussion

Capital structure is one of the most prolific domains of research in corporate finance. Research is spinning around a few theoretical models of capital structure since over than forty years but could not be able to provide the conclusive assistance to managers and practitioners for choosing between debt and equity in financial decisions.

“Given the level of total capital necessary to support a company’s activities, is there a way of dividing up that capital into debt and equity that maximizes current firm’s value? And, if so, what are the critical factors in setting the leverage ratios for a given company?” [1]

Modigliani and Miller’s (M&I) theory (1958) is considered as fundamental corporate structure model in the modern corporate finance. The theory ascertained the irrelevance of capital structure to firm’s value in perfect markets, without taxes and transaction costs [2]. Following on the this perfect classification of market, most subsequent research focused to demonstrate that a firm’s capital structure decision does consider corporate and personal taxes, agency costs, contact law, bankruptcy cost, and other frictions. These aspects of corporate environment are referred as “determinants of capital structure”. Main research in corporate structure is focused on following two competitive theories:

In Static Trade-off theory [3], the optimal capital structure is attained by balancing of agency cost of financial distress and the tax advantage of debt financing. This theory has been reinvestigated in numerous literatures with the empirical evidence that claim against the optimal capital structure. Although, there are various researchers that argue that firm’s investment decisions can’t be succeed in the absence of optimal capital structure theory.

The Pecking Order Theory (POT), developed by Myers and Majluf [4], which emphasis on the asymmetric information, between the insiders of the firm and the outsiders. As the mangers have privileged information about tangible and intangible assets (growth opportunities), this asymmetry of information affects the firm’s financial investments decisions. More specifically, managers follow a financial hierarchy descends from internal financing to external financing, and risky debt to equity.

Many empirical studies have tried to explain the factors that affect on capital structure’s choice. One of the most renowned initial empirical studies is made by Rajan and Zingales [5] and they explain the various institutional factors of firm’s capital structure in the leading industrial countries.
Predominantly ongoing debate in corporate finance research sustains the significance of above discussed theories. Majority of research work is based on the facts taken from western and American’s non-financial firms [37]. For example, Rajan and Zingale’s study is made on G-7 countries [5], Linda and et al use Dutch data [6], Gaud et al utilize Swiss non-financial firm’s financial facts [7], Hansen Staffan bases his study on Finish data [8] and Heshmati Almas uses data from Sweden [9]. There are few studies that cover non-financial firms from emerging economies that experiencing transition from a planned to economic system phase, for instance: Booth et al [10] provide evidence from ten developing countries (Brazil, India, Pakistan, Mexico, South Korea, Jordan, Malaysia, Thailand, Turkey and Zimbabwe) and Kai Li et al [11] and Qian et al [12] analyzes data from China.

According to studies, industry classification is a significant factor in firm’s capital structure decisions. It has been found that industries digress on the bases of their industry-specific attributes: i.e. ownership structure, maturity level and business risks [12]. Energy sector is regarded as unique, due to its importance in country’s economy, ownership structure and its usage as “political tool”. For instance: financial investment decisions of Russian energy sector (monopolized by state-owned firm, Gazprom), Venezuela’s energy sector (captured by state-owned PDVSA) and Iran’s energy sector (entirely controlled by Ministry of Petroleum) are used as political weapon. As a whole, energy sector has distinctive aspects that effect on the capital structure decisions.

Although Booth et al [10] have included Pakistan, in his empirical study of developing countries but Hijazi and Shah [13] are the first to study determinants of firm-level capital structure in Pakistan. They discuss the all listed non-financial firms from period 1997 to 2001. But so far energy sector of Pakistan has not been analyzed independently. This report presents an empirical analysis of capital structure of energy sector in Pakistan with most recent available data.

1.2 Purpose

The purpose of this report is to analyze the determinants of the capital structure in Energy sector of Pakistan. By performing this analysis we try to find out that if Pakistani listed firms of energy sector follow any capital structure theory during the period 2001-2005.

1.3 Targeted Group

This report predominantly concerns to researchers and individuals who are related with the capital structure sphere. Those who have interest to know the relevancy of capital structure theories and its determinants in developing countries may concern analysis and results of this report and especially industry specific financial patterns can be useful to them.
1.4 Limitations

This study is based on most accredited factors that are used in previous researches to reveal the choices of capital structure. Primarily we selected the four attributes identified by Rajan and Zingalas (1996) and planned to test few other attributes that are used in various studies. But we could not find out enough financial data to test them and were able to pick just one additional attribute.
2. Theoretical framework concerning capital structure

This section presents the prior research on the corporate capital structure. Section starts with the capital structure irrelevancy propositions. Following subsections gives the overview of theories that suggest that the capital structure affects firm’s value. These theoretical research models provide a theoretical base to our intended analysis.

2.1 Theory of irrelevancy of capital structure

Corporate finance theory bases on the Modigliani and Miller (1958) propositions that specify certain conditions under which various corporate financing decisions are irrelevant. The MM propositions provide a base for analysing how financing decisions can create and destroy the value for a corporation. Theory of irrelevancy was presented in an era when research was dominated by assumption that there is no interaction between the firm’s investment and financial decisions of the firm.

MM proposition-1 [2] states that in a perfect competitive market the value of a firm depends on its operating income and level of business risk. Simply, value of firm does not relate to its capital structure. Financing and risk management choices will not affect firm’s value if the capital market is perfect. A perfect market has following traits:

- All investors are price takes.
- All market participants can borrow and lend at the risk free rate.
- There are no costs of bankruptcy.
- Firms issues two types of claims: risk free debt and risky equity.
- Homogenous risk free classification of firms.
- Neutral taxes
- Managers always maximize shareholders wealth.
- Information symmetry

Taxes are neutral means tax system is unbiased. Same tax rate for each tax payers and for all income sources. But in general it is assumed that tax rate is zero. Modigliani and Miller grouped every firm to a certain risk class and a risk class is described as an array of firms each of which has a matching pattern of earnings payoffs. Further, No transaction costs and no institutional restrictions create frictionless capital markets in which every investor can undertake the same financial transactions as firms. Firm’s financial choices do not give any signals to investors about firm’s financial position. If, on the contrary, leverage can signal the firm’s profitability by altering investor’s beliefs about the firm’s payoffs, then its choice would affect investors’ decisions and the firm’s market value. That contradicts with MM proposition-1. In perfect market assumption, investors can form a portfolio with any desired cash flow pattern so there is no need for corporations to design their capital structures in ways that tailor their securities to satisfy these desires. In start, MM propositions were considered as, for firm’s debt equity choices. But applications of propositions have since expended to debt maturity, risk management, mergers and spin-offs.
MM proposition-2 states that:

“A firm’s cost of equity is a linear function of the firm's debt to equity ratio. A higher debt-to-equity ratio leads to a higher required return on equity, because of the higher risk involved for equity-holders in a company with debt.” This proposition also holds the assumption of perfect market.

MM proposition-3 focuses on dividend payments and value of firm. It states that:

“Under certain conditions, the value of a firm is independent of its dividend policy. Expressed more loosely: two identical firms that belong to same risk class will have equal market value, even they have different dividend policies.”

Several researches has been done and shown evidence of certain regularities that exist between capital structure and other variables. For showing the reliance between investment and financial decision, Kraus and Litzenberger [14] in 1976, present the bankruptcy model of capital structure in which they discuss the significance of tax shelter. Tax reduction attracts firms to issue more debt, but high level of debt offsets the tax reduction advantage. Subsequently, optimal capital structure balance these paybacks and costs of tax shelter.

In order to understand the vast work on the question of capital structure, we classify the literature in three categories. Agency theories that are focused on diminishing the interest conflict between shareholder and managers. Static trade-off theory, that focuses on bankruptcy cost and tax shelter. The asymmetric information theories and their variations.

2.2 Theories based on agency costs

Jensen and Meckling [8] are most prominent figures in research of agency cost domain. They started their model with identification of two types of interest conflicts that can be possible: conflict between manager and shareholders, conflict between debt holder and shareholders. They suggest that as manager possess less then 100% residual claims and it causes conflicts between shareholder and managers. Subsequent type of conflict between debtholder and shareholder can arise when issuance of debt gives more incentive to shareholder. More explicitly, debt investment is inclined towards shareholders, if an investment yields large return, well above the face value of debt, shareholders captures most of the gain. But if investment goes fail and firm approaches to bankruptcy, equityholder just skip away and debtholders bear the whole consequences.

According to Jensen and Meckling, agency relationship is an agreement between two parties. One of them (agent) performs certain services on the behalf of other (principal). The problem of stirring an agent to behave as if he were maximizing the principal’s welfare is rather common. In this relationship both parties are utility maximizer, therefore there is always a chance that agent will not always performs its responsibilities to maximize the benefits of principal. Principal have to restrain this problem by fixing an
appropriate level of incentives for agent and to monitor the agent’s actions (by incurring monitoring cost). In this relation principal incur certain cost, called “agency cost”, which can explain as the sum of following activities:

- The monitoring expenditures by the principal
- The bonding expenditures by the agent
- The residual loss.

Principal incurs monitoring cost to limit the unexpected activities of agent. Bonding expense can be describe as “in some conditions it will pay the agent to expend resources (bonding costs) to guarantee that he will not take certain actions which would harm the principal or to ensure that the principal will be compensated if he does take such actions.” In some cases, even both parties incur the agency cost but still agent’s certain decision for profit maximization would not increase the welfare of agent. This loss is termed as “residual lost” and it can be defined as “the dollar equivalent of the reduction in welfare experienced by the principal as a result of agent’s divergence from principal’s expectation is also a cost of the agency relationship and that is referred as the residual loss”.

According to Grossman and Hart (1982) use of debt, reduces the conflict between mangers and shareholders. Their model spotlights the bankruptcy cost in debt scenario and shows that manager can prefer between investing in lucrative projects and consuming perks that benefit to manager only. The additional perks manager use, more likely firm goes bankrupt. It seems bankruptcy is costly to managers because they loose benefits, so debt can create an enticement for managers to make better investment decisions and consume less perks.

Narayanan (1987) brought up a new factor to extend Grossman and Hart’s investigation, usage of convertible debt. Harris and Raviv [21] agree that managers like to continue the current operations of the firm even when investors prefer liquidation. In this situation the optimal capital structure trade off between liquidation cost and investigation cost (that incur on firm’s performance inspection).

As M&M propositions suggested that in perfect market, there is no bankruptcy cost and tax shield but these have been shown to be significant factor of capital structure. The static trade-off theory shows that optimal capital structure is obtained when present value of tax shield with debt financing is just offset by increase in the present value of cost of distress.

2.3 Static Trade-off Theory (STT) of capital structure

Trade-off theory, deals with financial distress and tax advantage of debt financing. Financial distress indicates a condition when promises to creditors are broken or honored with difficulty and it can leads to bankruptcy [2]. Cost of financial distress depends on the likelihood of distress and cost of bankruptcy.
Since according to MM’s propositions [2], firm can have 100% debt in its capital structure for receiving utmost benefit of tax shield but in reality capital structure compose of entirely with debt is not possible. Consequently, STT [4] suggests the limited amount of debt and proposes that the optimal leverage ratio of the firm is determined by the trade-off between tax shields with debt financing against higher bankruptcy cost.

![Figure 1: The static trade-off theory of capital structure (Myers, 1984)](image)

Figure 1 shows that PV (tax shield) increases initially as debt increases and at that level PV (financial distress) is insignificant but at certain point PV (tax shield) starts to reduce and PV (financial distress) increase with additional borrowing.

According to STT, optimal debt ratio varies from firm to firm. Firm having safe and tangible assets and plenty of taxable income have high debt ratio. Such firms will be in a position to provide collateral for debts and in case of default, tangible assets will be apprehended but still firm may be in a place to avoid bankruptcy. According to theory profitable firms take more benefit of the tax shield by debt financing because there is fewer chance for them to go bankrupt therefore profitable firms are capable to raise its debt ratio more than a less profitable firm.

### 2.4 Theories based on asymmetric information

There is significant branch of literature centering on the firm’s financial behavior. This domain of research focuses information distribution as a determinant of corporate capital structure. Their research work can be split in to two distinct categories: one who claims that firm uses capital structure to signal private information to the uninformed agents in capital markets and second who asserts that capital structure that minimizes the problems of information asymmetry can lead the firm to invest sub optimally. [14]
Signaling theory

According to Ross (1977), managers often use capital structure as a signal of firm to investors. Ross elucidates that; debt issuance is a positive signal to capital market about firm’s better prospects and more debt signifies the confidence of manager in firm’s future returns. Thus outside investors view the level of debt as a positive signal, but over exceeded debt leads to bankruptcy. As MM claims that managers and investors have same information but in reality it does not true, managers can sell stock if stock is overvalued or sell bond if bond is undervalued and by knowing this, investors take new stock sale as negative signal.

In the Rose model, managers know the true distribution of firm’s returns, but investors do not, managers benefit if firm’s securities are more highly valued by the market but are penalized if the firm goes bankrupt. Firms with higher value are predicted to issue more debt as a signal to investors in order to differentiate them from lower value firms. Further model shows positive relation between profitability, debt level, and bankruptcy probability.

Pecking order theory (POT)

Idea of prioritizing the different sources of finance was initiated by Donaldson (1961) and proposed that firms should prefer internal financing over external financing and debt to equity. In 1984 Myers and Majluf argued that that if a firm maintain its liquid financial resources (cash and market securities), issue no new securities and use only its available retained earnings for financing new investment then information disparity can be disappeared. POT is proposed by Myers and Majluf [4], by explaining the affects of information asymmetries between insiders and outsiders of firm. Their model contradicts the MM’s proposition that, all market participants have same information and proposes that, due to information costs, managers prefer to finance corporate investment by first tapping less agency costly sources. More specifically, they prefer internal financing to external financing and risky debt to equity.

The usage of internal and external funds hierarchically, based on certain hypothetical foundations “firm has no well defined debt to equity ratio” Myers [4] that’s why firm should prefer to finance new investments first with retained earning, then issue debt and finally with issue of equity. Second foundation is “market value of firm’s existing shares decrease with announcement of equity issue. If firms issue equity for financing new investment, the value loss of existing shareholder’s assets could increase the Net Present Value (NPV) of new investment. In this situation new project even with positive NPV may be rejected. POT argues this way of sourcing new investment and recommends securities (internal funds or low risk debts) that are not undervalued by the market.

Theory explains that why most profitable firms use source of internal funding and low profitable firms use debt financing due to insufficient internal funds. Unlike MM’s theory, POT weighted less to tax shield in capital structure. Profitable firms with limited investment opportunities work down to low debt ratios. In firm’s financial deficient, debt ratio goes up and in surplus it goes down. [2]
Various research studies have been conducted to test the POT and found more or less empirical support. For instance, Krasker [16] confirms the results of POT by studying the relationship between stock issue and stock price. He shows that larger the stock issue the worse the signal to firm in form of tumble of stock price. De Haan et al [6] study the information asymmetry for Dutch firms. They show that 75% of his interviewed firms have a definite financial hierarchy, 54% give preference to internal funding over external and 18% prefer debt source. Further, most of firms responded in his study that they do not have a target capital structure. This study gives sound support to POT and information asymmetry, as determinant of capital structure. In Shyam Sunder and Myers [17] propose the new POT with time-series explanatory power. Narayanan (1998) uses slightly different approach to show the consistent results with PTO and claims that firms either issue debt or reject new investment to be financed.

Fama et al. [18] disagree with POT and explain the trend that “why firms go after POT’s last resort first, equity issue when they can utilize internal funds or issue debt”. Most large listed companies raise funds by issue equity, which is a violation of POT. Large companies prefer internal funding, due to being more profitable and strikingly, even in presence of more access to debt financing due to high tangibility. Fan et al [19] show that firms use equity financing as a first choice especially in firm’s calamity period. They observe the financial decisions of managers in Hon Kong under the Asian Crisis. Ihamuotila [14] oppose the POT argument by saying that if old shareholders (and large shareholders) are better informed than others then it is expected that equity will not tremble and equity will be more attractive compared to debt.

**2.5 Comparative look on capital structure theories**

MM’s propositions show the irrelevancy of capital structure with respect to firm’s value. This study could not respond on taxes, growth factor, transaction cost, and information asymmetry. While seeing this, MM’s model appears less realistic. Although, MM’s research is among the most important contributions in the theory of corporate finance. But it is widely believed that the MM’s predictions are incompatible with empirical evidence.

Static trade-off theory recognized that firms hold target capital structure and target debt ratios, it may vary from firm to firm. Firms with huge tangible asset and profit lead to have high target ratios. A less profitable firm will likely to have a low debt ratio. Financial investment decisions to choose debt or equity are assumed as a trade-off between interest shield provided by debt and cost of distress. STT successfully explains the many industry differences in capital structure. Firms with high tangible assets can borrow heavily, for instance high technology firms. On the other hand firms with plenty of taxable income, instead of borrowing more to get tax shelter they borrow less. Here the STT could not able to provide sufficient support for this sort of firm’s behavior.

Pecking order theory is based that firms follow certain pattern, which has no effect on firm’s value, as STT does. It also explains stock market reactions to leverage increasing or decreasing events. POT does consider managerial motivations, financial slacks, and
capital market as signals. The most important contribution of the POT is the explanation of relation between leverage decreasing events such as new stock offerings and equity-for-debt exchange schemes with firm’s stock price decline. Further Pecking order theory explained that how financial institutes can reduce the information asymmetry. By introducing, repeated contacts of financial institutes with firm and proprietary access to the firm’s financial statements information asymmetry can be minimized.

Quan criticizes the POT as [36]:

“Pecking order hypothesis does not explain how taxes, bankruptcy costs, security issuance costs, as well as other factors such as the firm’s investment opportunity set have impacts on the capital choice. The hypothesis is also thought to have ignored agency problems - those created by conflicts of interests held by various claimants to the firm’s value. Therefore, although of an intuitive appeal by its simplicity in explaining the rational of leverage changes as well as in predicting the priorities with which a firm selects its means of financing, the pecking order hypothesis still suffers from a lack of compelling rational justification, resulting in a limitation of its acceptance among financial academia”.

Theories surveyed in this chapter showed the disagreement over “guideline principles” in corporate structure domain. Cai et al [20] concluded that both theories are necessary for explanation of capital structure, but POT is superior due to its dynamic in nature. Stefan [8] found that STT is more comprehensive theory because of its intuition that investment decisions matter more than capital structure decisions.

2.6 Differences of capital structure across industries

Research studies have shown that capital structure differ across industries. Extensive evidence show the debt ratio changes across industries, for instance Harris and Raviv [21] show that leverage changes across industries because of difference in tangibility of assets. Manufacturing companies maintain high debt ratio compared to high technological firms.

Generally, companies maintain their debt ratio under 50 percent but industry distinctiveness are more visible in financial sector, for instance banks and insurance firms which keeps their debt ratio often above 90 percent. [22]

Studies show the positive relation between leverage and tangibility of assets [5], it is explained like this: creditors tend to lend capital to companies with collateralizable assets. Other dominant observed factors of industries are size, growth, ownership structure and foreign investment.

2.7 Determinants of capital structure

This part is devoted to factors that company ought to take in consideration while deciding capital structure. In general, companies have three sources to raise funds for new investment: use retained earning, issue debt and issue equity. These three sources make the capital and ownership structure. There are certain restraints for utilization of these
components of capital structure. Firms do not invest completely by retained earning, for maintaining current assets. Debt is considered as cheaper source, compared to equity issue and it provides tax shelter but access of debt plus with high interest rate leads to bankruptcy. Issue of equity direct changes the ownership structure and give no tax shelter. A firm is said to be unrevealed if it has no debt, while firm with debt liability is leveraged.

In corporate capital structure literature, different factors have been discussed, that effect on capital structure decisions.

2.7.1 Collateralizable value of assets

Collateralizable assets are those assets that creditors can accept as security for issuing the debt. In an uncertain world, with asymmetric information, collateralizable assets are most widely accepted source for bank borrowing and raising secured debt. Creditor, who gives wealth to shareholders, owned public firm requires some security against their wealth and collateralizable assets are use as security. Otherwise creditor demands high interest repayment or generous discounts to diminish the suffering of agency cost.

In contrast, if a firm with little collateralizable assets face the difficulty to raise funds via debt financing. This affiliation between debt and collateralizable assets shows positive relationship between them. Empirical evidence on this determinant was provided by Bradly, Jarrel and Kim [24], they found that collateralizable assets positively correlated with debt. These findings are consistent with Rajan and Zingalas [23], who showed positive relationship in context of European countries. Further consistent support provided by Marsh [24], who describes that large firms with huge tangible assets use more debt.

In diverse scenario, as debt bring in, the hazard of bankruptcy therefore debt can be use to limit the manager’s tendency to consume excessive perks because bankruptcy leads to diminishing of manager’s job security and incentives (agency cost theory). Grossman and Hart [24] suggest the idea that firms with less collateralizable assets should use more debt to monitor managerial activity, even at high cost of debt. Agency cost theory shows positive relation with leverage and collateralizable assets.

2.7.2 Non-debt tax shield

Internationally, tax law allows more and less tax deduction in taxable income. This debate of tax impact on capital structure is commencing by MM proposition-2 [3], which stats that profitable firms use interest payments on debt and depreciation expenses as a tax shield. Firms with high debt ratio, gain more advantages from tax shield. The trade-off theory focused on costs of bankruptcy and financial distress that reduce the tax benefit of debt. Miller [15] shows the equilibrium in which tax advantage of debt at firm level is traded-off against the tax disadvantage of debt income at personal level. Pecking order theory rank tax shield as second order (external financing).
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Theories of capital structure have been found contradictory results on this issue. Earlier studies like Bradly, Jarrell and Kim [24], Titman and Wessels [25] could not lead to any result, this might be due to differences in accounting regulation and tax laws and usage of average tax rate instead of marginal rate. The marginal tax rate is described as the present value of current and expected future taxes paid on an additional dollar of income earned today.

2.7.3 Volatility

Volatility can be defined as company's financial and business risk, which is linked to leverage. It increases with debt because of bankruptcy risk. Volatility is measured by the firm's "unleveraged beta," (beta in absence of any debt. If the firm uses no financial leverage, then each stockholder would bear that business risk in proportion to their share of the stock. However, in case of debt financing, business risk will be more intense on its stockholders.

Pecking order theory shows negative relationship between volatility and financial leverage. Firms with high volatility accrue cash during healthy financial years to evade under-investment in the upcoming periods. [27]

2.7.4 Size

Size is one of the most widely accepted determinants in research of capital structure. Relationship between size and leverage is mixed. Researchers who focus on bankruptcy cost (static trade-off theory), they justify the positive relationship between size and financial leverage like this: as large firms are more diversified, have low transaction costs for issuing new equity, and probability of bankruptcy for large firms is less than smaller firms therefore size positively relate to leverage. [24].

Theories base on asymmetric information, state that large firms have to inform more to their investors therefore they prefer equity over debt. Therefore size and leverage holds negative relationship between them. Pecking order theory also agrees on negative relationship.

2.7.5 Industry effects

Each industry has particular characteristics, that likely to play important role in determining capital structure. These traits can vary across countries, and most likely it is considered that firms belonging to same industry in same country have almost similar traits. Some industries are considered as high leverage ratios, for instance utility firms. On the other hand, high technological firms, have low leverage ratios.

Titman [25] discusses that bankruptcy cost of unique firms are higher than less specialized firms. All stakeholders of unique firms suffer in case of bankruptcy, for instance specialized employees are less employable due to their high cost and supplier also face same crisis. While seeing these risk factors, specialized firms maintain low debt levels.
2.7.6 Profitability

Profitability has diverse relationship with leverage. Theories based on asymmetric information show positive relationship. According to Ross [24] signaling theory, choice of capital structure signals to outsiders and debt indicates the excellent performance of firm. If this claim is true then this pattern shows positive relationship between leverage and profit. In Mayer’s pecking order theory firm prefer internal financing over external and in case of firms with high retained earning (profitability) likely to finance their investments with retained earning instead of debt or equity. This rationale predicts negative relationship between profitability and leverage. However, this relationship can spin to positive sign if larger firm’s financial behavior is observed in context of bankruptcy cost [25]. Larger firms can maintain high leverage level due to less bankruptcy costs and have ability to diversify.

2.7.7 Growth opportunities

Assets of any firm are classified in two categories: tangible assets and intangible assets. Growth opportunities are consider as intangible assets of firm. High ratio of intangible assets causes hurdle to borrow long term debt because intangible assets are not collateralizable. This reason shows negative relation between growth opportunities and leverage. However, long term debts can alleviate with short term debt and relation not remains same any more. Hence, short term debts have positive relation with leverage. [24]

Pecking order theory implies the positive relation between leverage and growth opportunities and suggests that higher growth provide room for more demand of funds and it can make with external debt financing.

2.7.8 Earning volatility

Earnings volatility associates negatively with leverage due to many reasons. Titman and et al shows [25] that investors prevent themselves to invest firms with volatile earnings because it amplifies the chances of negative earnings surprises and default. Smoothness in earning depicts stable financial picture and make easier for firms to borrow.

According to Pecking order theory smooth earning reduces the informational advantage of informed investors over uninformed investors. Rajan and [23] found strong correlation between earning volatility and creditor rights. In their cross countries analysis, they show that credits are not much feared about earning volatility in countries having strong creditor’s rights because firms tend to maintain low debt level. Nevertheless, as a whole creditor rights are negatively linked with earning volatility.
2.7.9 Cash holding

Internal funds available for future investments are called firm’s cash holding. As Pecking order theory rotates around internal and external funds and shows that firm having access to internal funds should not go for external funds (leverage). That’s mean cash holding is negatively associates with leverage.

Jensen [24] discuss cash holding stats that firm with high cash holding are likely to more takeover targets. He argues that as managers are more concerned with their esteem, that links to firm’s size. That’s why managers desire to increase the size of firm by further investments, irrespective of projects with negative net present values. To financing these investments, managers use cash holdings or external funds (debt) that can alert stakeholders. According to Jensen, for limiting managers, financial decision should make partially with debts.

2.7.10 Ownership structure

Term ownership structure generally deals with state owned firms, public firms and firms whose major stocks are held by management. Firm’s capital structure depends intensely on ownership structure. Jensen and Meckling [28] state two different points of views for more concentrated ownership firms, first: if shareholder of more concentrated ownership firm like to have low debt level due to securitization of creditors. Secondly, issuance of equity losing of control therefore firm prefer debt over equity and this behavior correspond to pecking order theory. On the other hand, stockholders of firms with low concentrated ownership prefer to issue equity because they are not concern with firm control.

Managerial stocks in firm’s capital structure play substantial role in investment decisions. Generally it increases due to part of managerial compensation scheme. Managers prefer maintain same capital balancing in firm to continue their higher incentives from their holdings, therefore they avoid debt.
3. Energy sector

*This chapter provides the financial details and significance of energy sector in Pakistan. Chapter commences with brief preamble of energy sector in Pakistan then discusses its financial state.*

There is a strong link between country’s economy and energy sector. Five pillars are used to define as major participants of economy: energy sector, transport, communication, human resources and water resources. Energy demand, supply and pricing have massive influence on all the aspects of economic development of a country. The economic structure and current macroeconomic circumstances are imperative determinants of energy demand and supply. Before 1973, demand and supply of energy was increased at almost same rate but later, industrialization, quick economic growth and steadily rising income combined with the long term declining trend in energy prices to produce increased the global energy demand. This situation emerged the new energy centered age.

3.1 Changes in global energy sector

Since beginning of new century, global oil and gas industry has witnessed dramatic changes. Global reliance on oil as prime energy source has increased consumption by 9 million barrels a day. Study shows the certain reasons behind these changes [30]:

- Prices of oil and gas rose.
- China and India emerged as major economies in international market.
- Demand of renewable energy sources (water, wind, solar, biofuel and etc), which is alternative energy source, fell internationally, from 7% to 6%.
- Russian oil production decreased to more than half its last decade’s peak period.
- Energy demand of Europe and Eurasia increased rapidly, natural gas consumption rose by almost 70% and oil consumption increased by 11%.

3.2 Ownership structure of global energy sector

Energy has underpinning relationship with different aspects of economics and has generated a phenomenon of “energy economics”, which relates economics with energy. Due to significant role of energy sector in country’s development, governments used to have involvement in it. World energy council [31] demonstrates extent of liberalization within global energy sector. According to their report, liberalization of global energy sector can be classified in to three categories: substantial liberalize, substantial liberalize but before un-liberalized and ongoing liberalization. In Western Europe, UK and Germany are only two countries that have substantial liberalized oil and gas industries. Rest most of countries including Sweden fit in second category where oil, gas and electricity industries are substantial liberalize but before these were un-liberalized. Russia has 25% share of global natural gas industry and is reluctant towards linearization of its gas industry (monopoly is controlled through state-owned Gazprom). In Africa, Middle
East and Asia, nearly all countries are on the way of substantial liberalization, except Japan and South Korea who have substantial liberalization but before they had un-liberalization. USA’s oil and gas industry is substantial liberalized but gas industry is on the way to linearization.

### 3.3 Introduction of energy sector of Pakistan

The energy sector in Pakistan comprises oil, gas and power. Country’s GDP growth rate is 6.6% and energy sector’s growth rate is 8.6%. Pakistan has indigenous reserves of natural gas, oil and coal, which provide 61.0 percent (24.7 million Tones of Oils equivalent) of the total net primary energy supplies. The main energy supply consists of natural gas (51 percent), oil (28 percent), hydroelectricity (13.0 percent), coal (7 percent) and other sources (1 percent). In new century, due to combination of increased oil utilization and steady oil production, import of oil has increased. Gas demand increased with 7 percent, electricity demand has also increased rapidly.

![Primary energy supply sources](image)

**Figure 2: Primary energy supply sources [29]**

Transport sector is the largest consumer of petroleum products (48%), followed by power generation (35%) and industry (11%). Current total energy need met by domestic resources is 72%. Over the next 20 years, overall demand will raise by 350 percent. In this phase, domestic sources will be sufficient for 38% of total energy needs of Pakistan.
The Determinants of Capital Structure in Energy Sector

<table>
<thead>
<tr>
<th></th>
<th>Fiscal year 2006</th>
<th>Fiscal year 2015</th>
<th>Fiscal year 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Gas</td>
<td>29</td>
<td>34</td>
<td>19</td>
</tr>
<tr>
<td>Coal</td>
<td>2</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Hydel</td>
<td>7</td>
<td>13</td>
<td>29</td>
</tr>
<tr>
<td>Renewable + Nuclear</td>
<td>1</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Total indigenous supply</td>
<td>41</td>
<td>61</td>
<td>75</td>
</tr>
<tr>
<td>Total energy requirement</td>
<td>58</td>
<td>114</td>
<td>211</td>
</tr>
<tr>
<td>Deficit</td>
<td>17</td>
<td>53</td>
<td>136</td>
</tr>
<tr>
<td>Deficit in term of energy requirement</td>
<td>29%</td>
<td>46%</td>
<td>64%</td>
</tr>
</tbody>
</table>

Table 1: projected energy supply deficit [32] (used units TOE)

Unbalance of supply and demand of energy is shown by above picture. Total energy deficit will increase 29% to 46%, by 2015. There is need to development of a competitive energy sector and in particular the electric market that will meets the energy needs of country.

3.4 Capital structure of Pakistani energy structure

The oil and gas sector has a considerable influence on the economy, it attracts the high level of foreign direct investments in the country. Economic sectors in Pakistan are classified in nine groups and following figure illustrates the size of each group in year 2005. As we can see the number of energy sector is RS 141,411.1 million, which is largest industry, followed by transport and communication with RS 84,396.8 million.
As we have discussed in section 3.2, Pakistan fit in category in which countries are on the way to liberalize the industry. But prior, the government has a predominant position in the power sector, which includes exploration, production of oil and gas reserves, refining or in distribution channel. Government has economics tools, licenses for relevant activities, tax, policy instruments to control the industry. Further, governmental policies restrict private capital access.

Being a transition economy [30,31], it is changing from a planned economy to free market. Government is implementing all aspects of transition process: Liberalization, macroeconomic stabilization, restructuring, privatization and legal and institutional reforms. Liberalization and macroeconomic stabilization are considered as swift process, unlikely privatization and reforms of large-scale ventures require long term plans. Government of Pakistan has adopted several policies aiming to create a competitive, efficiently-run, financially-viable, and largely privatized oil and gas sector. Considerable improvement has been made in the restructuring and reform of energy sector, deregulation of prices, privatization of selected assets, new licensing rounds, no obligation to joint venture with state owned company, relaxation on import and export and unrestricted distribution activities. Due to privatization, government has less contribution in production of oil and gas and its distribution channels.

Capital structure of firm shows the composition of its liabilities. Leverage to equity ratio show the percentage of leverage to equity financing. High debt-equity ratio usually means that a company is aggressive in financing its growth with debt and it can be risky. Following figure shows the comparison of debt-equity ratios among industries. Although debt-equity ratio varies according to industries involved but we can see the decline from 4.68:1 to 1.47:1 in ratio, period 2001 to 2002 as a result of government’s reforms. Afterwards, it maintains a steady pace.

From these figures we have observed that energy sector is the largest sector by size in Pakistan’s economy and after 2001, its debt-equity ratio is decreased considerable which made the industry less risky and attractive for investors.
4. Methodology and empirical data

This chapter holds the detailed description of analytical method used in the report. Further the hypothesis and the sample data are also shown in it.

4.1 The measurement system

We use five explanatory attributes as proxy for the determinants of capital structure (which have discussed in the section 2.6) and by using them as independent variable we construct the regression model to analyze the reliance of leverage (dependent variable) on these proxies. Our intention is with these attributes is to investigate the relevancy of different capital structure theories for the capital structure choice in the energy sector of Pakistan. Extensively acceptance among the capital structure research motivates us to select these attributes as determining attributes in our study. Few early studies who utilized these five factors for determining the capital structure are as follows: Titman & Wessles [25] conduct the empirical research on the capital structure determinants in the USA. Toys, et al [6] investigate the manufacturing sector of Japan, France, Norway, Netherlands and USA. In the same way, Rajan and Zingales [5] investigate the determinants of capital structure of G7 countries and Booth et al. [10] provide evidence from developing countries (including Pakistan). These attributes are: collateralizable value of assets, size, profit, growth opportunities and non-debt tax shield.

In present report we examine that to what extent, the leverage of industry can explained by five attributes. Many attributes explained in section 2.6 are not applicable to our data set because they are not significant to industry analysis of developing country. Volatility and ownership structure are more related to our analysis but due to unavailability of data and given time limitation it is not possible to test them. However, chosen five attributes are most comprehensive set that describe firm’s capital structure. Following subsections describe that how these attributes are measured and show the relationships of previous studies to them.

4.1.1 Financial leverage

Following Booth et al, Rajan & Zingales and Beven & Danbolt [10, 5, 33], we calculate leverage (LEV) of firm as the ratio of total liabilities to total assets. Rationale behind using total debt rather than long term or short term debt is to avoid their contradictory relations with leverage. These inconsistent relations are shown by Myer’s [4] investigation, positive association of short term debt with financial leverage and negative with long term debt.

As nearly all covenants in loan settlements and accounting numbers are reported in terms of book value rather than market value. There is theoretical elucidation about preference of book value in Mayer [4], which suggests that book values are related to the values of assets already in place which are used to support debt. While market value of firm depends on present value of growth opportunities, that are not collateralizable and
supports less debt. Hence in debt contracts, firms likely to use book value. So we measure
debt in terms of book values rather than market values.

4.1.2 Collateralizable value of assets (CVA)

According to agency cost theory, firms with more collateralizable assets can borrow more
debt. So we expect to have positive relation between financial leverage and

collateralizable assets. Due to imperfection of information among insider and outsider
(asymmetric information theory), lender (bank) can have imperfect information about
firm’s financial behavior so lender protects themselves by requiring collateralizable
assets as pledge. It shows the positive association between financial leverage and
collateralizable assets. Pecking order theory states that firms with less collateralizable
value of assets are more likely to face asymmetric problems and are more likely to use
short term debt for external financing.
To determine collateralizable value of assets we use proxy: ratio of collateralizable assets
to total assets.

4.1.3 Size

Most studies report positive relationship between size of firm and financial leverage [5,
10, 13, 18, and 33]. Static trade-off theory supports this statement by augmenting that:
larger firms can issue debt at low cost compared to small firms because larger firms can
diversify to avoid bankruptcy. Asymmetric information theory suggests negative relation
between size and financial leverage. Pecking order theory also suggests negative relation
because large firms prefer equity over debt.
In this report the natural logarithm of sales is used as a proxy of size.

4.1.4 Profit

Pecking order theory states that firm prefers internal funds over external funds so
profitable firm should use more internal funds. This demonstrates the negative relation
between leverage and profitability. Static trade-off theory explains contradictory results,
profitability shows the ability to payback the debt so profitable firms can borrow more.

The ratio of net income before income tax over total assets is used as measure of
profitability.

4.1.5 Growth

Pecking order theory shows positive relation between leverage and growth opportunities
because growth of firm creates a demand of new funds that fulfill through debt financing.
Agency cost theory arguments that growth opportunity is intangible asset, can’t use as
collateralizable asset to borrow so it has negative relation with financial leverage.
Growth rate of total assets (percentage change of total assets) is used as a measure to calculate growth.

### 4.1.6 Non-debt tax shield (NDTS)

Non-debt tax shield is incentive that firm acquire from tax deduction against depreciation and interest payments. Long term debt has negative relation with it because tax advantage of debt financing decreases with it. But it has positive relation with short term debt.

Titman and Wessels [25] have used another measure for non debt tax shield as:

\[
NDTS = \frac{OI - i - T}{0.42}
\]

Where “OI” shows operating income, “i” represents income and “T” is income tax payments. This measure does not fit in our analysis because in many observations income tax figure is not available. In addition, corporate tax rate is different depending on nature of company and changes yearly. According to KPMG annual survey of corporate tax rates [34], Pakistan tax laws provide different corporate tax rates depending upon the status of companies. For instance for a tax year 2004, rate of tax on private firms was 41%, 35% tax rate was applicable to public firms while 44% to financial sector.

Ratio of depreciation over total assets is used as measure of non-debt tax shield.

### 4.1.7 The regression model

Panel data analysis is performed by regression model. We prefer ordinary least squares (OLS) test to perform regression analysis because it gives the similar results that can obtained by using other similar techniques, for instance Tobit model. Generalized form of our regression model is as under:

\[
LEV_{it} = \alpha + \sum_{i}^{n} \beta_{i} X_{it} + \epsilon_{it}
\]

Where \(LEV_{it}\) is the dependent variable and it is the leverage of firm (i) to the period t. \(\alpha\) is intercept of equation. \(\beta_{i}\) is the slope coefficient for \(X_{it}\) independent variables. \(X_{it}\) denotes the different independent variables in general but in our case it represents to five independent variables. \(\epsilon\) represents the error term.

If we transfer equation (1) to more specific to our data then new equation seems as follow:

\[
Leverage Measure_{it} = \alpha + \beta_{1} CVA_{it} + \beta_{2} Size_{it} + \beta_{3} Profit_{it} + \beta_{4} Growth_{it} + \beta_{5} NDTS_{it} + \epsilon_{it}
\]

Where i=1,..., 22 and t=1,..., 5. CVA is collateralizable value of assets and NDTS is non-debt tax shield. Leverage measure is dependent variable and CVA, size, profit, growth, NDTS are independent variables.
Conclusively, in plain words, we can illustrate the flow of our analysis like this: figures for these five independent variables and one dependent variable (financial leverage) will be obtained from firm’s financial statements by using proxies (data is shown in table:2). Then this data will be analyzed by performing pooled regression model and we will obtain the associations of independent variable with financial leverage (results are shown in table: 4 and 5). Further these associative signs are going to tally with predictions of capital structure theories to test if financial patterns of listed firms follow any foremost capital structure theories (theoretical and expected associations are shown in table:6).

4.2 Hypothesis

Based on above presented theories and their relationship with financial leverage, we formulate three hypotheses for Pakistani firms in energy sector. First hypothesis is formulated for Static trade-off theory, hypothesis two is for Pecking order theory and hypothesis three is for Agency cost theory. We test these hypotheses to know that whether STT, POT and Agency cost are relevant in Pakistani energy sector. These hypotheses are constructed in terms of alternative hypothesis (H1) and null hypothesis (H0). Rejection or acceptance of the null hypothesis is based on significance of result\(^1\). Hypothesises are inspired by Beferna et al [37].

**Hypothesis 1**

\(H1a\)

\(H1a\)\( Hi: \) There is positive relationship between financial leverage and collateralizable value of assets.

\(H1a\)\( Ho: \) There is negative relationship between financial leverage and collateralizable value of assets.

\(H1b\)

\(H1b\)\( Hi: \) There is positive relationship between financial leverage and size.

\(H1b\)\( Ho: \) There is negative relationship between financial leverage and size.

\(H1c\)

\(H1c\)\( Hi: \) There is positive relationship between short term financial leverage and non debt tax shield.

\(H1c\)\( Ho: \) There is negative relationship between short term financial leverage and non debt tax shield.

**Hypothesis 2**

\(H2a\)

\(H2a\)\( Hi: \) There is positive relationship between capital structure and financial performance.

\(H2a\)\( Ho: \) There is negative relationship between capital structure and financial performance.

\(^1\) Null hypothesis is rejected if result is significant at 1% or 5% level.
**Hypothesis 3**

**H3a**

*Hi: There is positive relationship between financial leverage and size.*

*Ho: There is negative relationship between financial leverage and size.*

### 4.3 Data selection

The data set analyzed in this report is composed of both market and accounting data of publicly listed companies in energy sector of Pakistan, from 2001-2005. There are 28 firms listed on Karachi Stock Exchange in energy sector by year 2005. To conduct panel regression, we include firms of which we have at least five consecutive years of data. So this leaves us with a sample pf 22 firms and total of 104 observations for analysis.

**4.3.1 Primary and secondary data**

We use annual financial statements of firms extracted from State Bank of Pakistan, which contains the balance sheet analysis of listed companies on Karachi stock exchange 2001-2005.

**4.3.2 Reliability**

For ensuring the reliability of thesis report, financial data is taken from reliable source. Furthermore, selected explanatory attributes and used regression model have taken from most prominent research studies in the area of capital structure. Results are shown with used data for providing validity and are ensured by showing the related research work on determinants of capital structure.
5. Analysis and results

This chapter first describes the statistics summary of the panel data that we use to test our hypotheses. Later analysis and empirical results are presented.

5.1 Descriptive statistics

All the firms belong to the energy sector of Pakistan. Following table demonstrates the summary statistics for the variables used in our analysis. The data contain the 22 firms listed on Karachi stock exchange from 2001-2005. Descriptive statistics includes the mean, median and standard deviation from year 2001-2005. Table shows, there are minimum values that are less then zero because we have included the observations that even contain negative figures in net income for calculating profit.

<table>
<thead>
<tr>
<th></th>
<th>Leverage</th>
<th>CVA</th>
<th>Size</th>
<th>Growth Op</th>
<th>Profit</th>
<th>NDTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>1.5013</td>
<td>0.955</td>
<td>4.8271</td>
<td>0.4301</td>
<td>0.4875</td>
<td>0.2722</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.1317</td>
<td>0.0698</td>
<td>1.9133</td>
<td>-0.4337</td>
<td>-0.2709</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>0.5845</td>
<td>0.5049</td>
<td>3.6618</td>
<td>0.0458</td>
<td>0.0698</td>
<td>0.0443</td>
</tr>
<tr>
<td>Median</td>
<td>0.6263</td>
<td>0.5165</td>
<td>3.84415</td>
<td>0.0298</td>
<td>0.06505</td>
<td>0.03945</td>
</tr>
<tr>
<td>Stad Dev</td>
<td>0.2243</td>
<td>0.2463</td>
<td>0.8233</td>
<td>0.1407</td>
<td>0.1118</td>
<td>0.0311</td>
</tr>
</tbody>
</table>

Table 2: Descriptive statistics of 22 firms

Collinearity is the term used to explain the dependence of one variable to other. When variables are highly correlated they both express basically the same information. Statistically we do not need multicollinearity because if they exist, then independent variables are redundant and do not add any predictive value over each other. In general, independent variables having collinearity at 0.70 or greater would not include in regression analysis. In our data we have highest correlation value is -0.49174 (in table 3) that’s mean collinearity should not constitute a problem in our regression analysis.

<table>
<thead>
<tr>
<th></th>
<th>CVA</th>
<th>Size</th>
<th>Growth</th>
<th>Profit</th>
<th>NDTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVA</td>
<td>1</td>
<td>0.0239</td>
<td>-0.2318</td>
<td>-0.4917</td>
<td>0.4169</td>
</tr>
<tr>
<td>Size</td>
<td>0.0239</td>
<td>1</td>
<td>0.1849</td>
<td>0.2374</td>
<td>-0.2165</td>
</tr>
<tr>
<td>Growth</td>
<td>-0.2318</td>
<td>0.1849</td>
<td>1</td>
<td>0.3353</td>
<td>-0.1380</td>
</tr>
<tr>
<td>Profit</td>
<td>-0.4917</td>
<td>0.2374</td>
<td>0.3353</td>
<td>1</td>
<td>-0.2657</td>
</tr>
<tr>
<td>NDTs</td>
<td>0.4169</td>
<td>-0.2165</td>
<td>-0.1380</td>
<td>-0.2657</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3: Correlation matrix

Table shows that size correlates positively with all other independent variables except NDTs and it has negative correlation with others except CVA.
5.2 Analysis

To test our hypotheses we perform the regression test and result is as follows:

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t Stat</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.2718</td>
<td>0.1048</td>
<td>2.5921</td>
</tr>
<tr>
<td>CVA</td>
<td>-0.1438</td>
<td>0.1013</td>
<td>-1.4189</td>
</tr>
<tr>
<td>Size</td>
<td>0.1161</td>
<td>0.0259</td>
<td>4.4667</td>
</tr>
<tr>
<td>Growth</td>
<td>0.0379</td>
<td>0.1508</td>
<td>0.2513</td>
</tr>
<tr>
<td>Profit</td>
<td>-0.8931</td>
<td>0.2170</td>
<td>-4.1143</td>
</tr>
<tr>
<td>NDTGS</td>
<td>0.4666</td>
<td>0.7222</td>
<td>0.6461</td>
</tr>
</tbody>
</table>

Table 4: Result of regression analysis

Intercept is $\alpha$ in our equation. Standard error measures the variability in our approximation of the coefficient and lower standard error means coefficient is closer to the true value of coefficient. Leverage is dependent variable and CVA, size, growth, profit and NDTGS are independent variables. Result shows that CVA and NDTGS are not statistically significant, size and profit are significant at 1% and Growth is significant at 5%.

Table 5: Regression Statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple R</td>
<td>0.4897</td>
</tr>
<tr>
<td>R Square</td>
<td>0.2398</td>
</tr>
<tr>
<td>Adjusted R Square</td>
<td>0.2010</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.2004</td>
</tr>
<tr>
<td>Observations</td>
<td>104</td>
</tr>
</tbody>
</table>

R square represents the percent of the movement of the dependent variable is captured by the intercept and the dependent variable(s). Our results explain roughly 24% of the variation in leverage is captured by independent variables. F-value shows that overall model is satisfied at the 1% level.

5.3 Discussion of results

Results obtained from analysis, expressed in terms of the signs and statistical significance of the coefficients for the selected five independent variables are presented in table 4 and 5. Result discussion below is categorized on the basis of these independent variables and focuses on their associations with capital structure theories.
The Determinants of Capital Structure in Energy Sector

<table>
<thead>
<tr>
<th>Proxy</th>
<th>Definition</th>
<th>Static-trade off theory</th>
<th>Pecking order theory</th>
<th>Agency cost theory</th>
<th>Observed sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVA</td>
<td>Ratio of collateralizable assets to total assets</td>
<td>+</td>
<td>+ (long term debt)</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Size</td>
<td>The natural logarithm of sales</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Growth</td>
<td>Percentage change of total assets</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Profit</td>
<td>The ratio of net income before income tax over total assets</td>
<td>+</td>
<td>-</td>
<td>?</td>
<td>-</td>
</tr>
<tr>
<td>NDTS</td>
<td>Ratio of depreciation over total assets</td>
<td>- (long term debt)</td>
<td>?</td>
<td>?</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 6: Expected and observed theoretical signs with independent variables

Collateralizable value of assets (CVA)

The coefficient of the CVA (collateralizable value of assets) variable is negative and is not statistically significant. This result contradicts with various previous research findings. Static trade-off theory, asymmetric theory and agency cost theory state the positive relation between leverage and CVA. Rajan and Zingales [5], Frank and Goyal suggest that firm’s borrowing capability depends upon collateralizable value of assets. The observed sign concords with Pecking order theory, that argues in a way that firms with less CVA tends to finance their investments with external financing and they ought to prefer debt over equity, most likely short term debt. In the study on developing countries including Pakistan Booth et al [10] showed the higher utilization of short term leverage compared to long term debts. Hijazi and Shah [13] also observe that the use of short term debts is higher than long term debts. They support their claim by saying that as majority of firms are smaller is size therefore their access to capital market is difficult in terms of cost and technical difficulties. The major source of financing in Pakistan is bank and they do not appreciate long term debts. According to policy research department of World Bank’s report [35] there are three potential sources that affect on accessibility of long term financing: first, macroeconomic factors limiting the long term financing second, institutional factors specific to the financial sector; and third, the characteristics of the firms. Macroeconomics factors that limit the long term financing are high inflation and unstable macro policies. In institutional factors, there most likely be less information about small firms available to financial institutions, not only due some of them will be new but also because it is costly to obtain such information and size is considerable characteristic of firms that affects on access to long term financing.

2 Not known
3 Report also includes Pakistan, in survey of financial markets in developing economies.
In energy sector’s capital market of Pakistan where short term financing is higher than long term financing, our result (negative sign) is significant under short term financing and consistent with Pecking order theory. But as our result does not have enough statistical support that’s why we can assume that in energy sector of Pakistan, CVA has no link with firm’s debt ratios and does not affects on their capital structures.

**Size**

Size is found to have statistically significant at the 1% \(^4\) level for all estimation and positive impact on the firm’s leverage. This suggests that larger firms in Pakistan tend to have higher leverage ratios and large firms borrow more than smaller firms. This result is consistent with the implementation of static trade-off theory, which suggests that for obtaining the optimal capital structure if firm needs a change in the capital structure, it involves substantial fixed costs. This cost is relatively small for larger firms and it makes easy for them to go for debt. Further, larger listed firms in energy sector of Pakistan have state ownership (partial or complete state controlled) that facilitates them with less chance of bankruptcy and easy access to bank debts. Therefore high cost of bankruptcy is not a big threat for state-owned firms in Pakistan to have high leverage level. Majority of empirical studies that include the data from developing countries find a positive relation between size and financial leverage. For instance: Titman and Wessels [25], Rajan and Zingales [5] and Booth et al [10] provide the evidence of significant direct relationship between size and financial leverage.

Since our observation has a significant statistics so we can claim that size does have significant role in making debt ratio and determining the capital structure of Pakistani firms in energy sector. Larger firms use more debt rather than equity to raise their financing.

**Growth**

Growth is estimated to have positive impact on leverage and is significant at 5 % \(^5\) level. Our result contradicts with STT and Agency cost theory but supports to Pecking order theory that suggest that if firms ought to use external financing then prefer debt over equity. This result implies that firms with higher growth rate maintain higher leverage ratios in Pakistani energy sector.

Growth is founded a significant factor for deciding the capital structure decisions in Pakistani energy sector and firms with high growth rates borrow more than firms with low growth rates.

**Profit**

Profit is estimated to be a negatively associated with firm’s leverage ratio and this association is found statistically 1% significant. It implies that profitable firms in

\(^4\) P-value in Table: 4, P-value=0 is considered as 1% significant.
\(^5\) If \(0<P-value<0.05\) then it is considered as 5% significant.
Pakistani energy sector maintain low debt ratios. This result is consistent with implication of Pecking order theory that firms prefer to finance first with internal funds before raising external financing. Further our outcome is also consistent and Titman & Wessels [25].

Hence, with highly significance at 1% for inverse association between profit and financial leverage, we can conclude that high profitable firms maintain low debt ratio and they utilize more equity source compared to debt for making their capital structure.

**Non-debt tax shield (NDTS)**

NDTS is found to have a positive relationship with leverage and is not statistically significant. This result is consistent with Static trade-off theory for short term loans but contradicts with long term loans. As we have discussed earlier that in Pakistan, being a developing country, most firms use short term financing due to macroeconomic and institutional factors, and the characteristics of the firms. Therefore our result, not surprisingly does have consistency only with STT for short term financing.

Thus, NDTS does not influence on debt ratio and capital structure in Pakistani energy sector but direct relationship between financial leverage and NDTS supports short term STT. There are few studies that predict the same relation, for instance: Brandley and et al (1984), MakKie-Mason (1988) and Sharpe and Pooley (1990) [24, page 7].

Overall, the findings of this analysis appear diverse. Our three results CVA, growth and profit are consistent with Pecking order theory, size is consistent with both Static trade-off theory and Agency cost theory. Relationship between NDTS and financial leverage is consistent with Static trade-off theory.

### 5.4 Testing hypothesis

On the basis of obtained results from conducted analysis we test our proposed hypotheses.

Hypothesis 1 is formulated for assessment of Static trade-off theory, hypothesis 2 is based on Pecking order theory and hypothesis 3 is for Agency cost theory. These hypotheses are made up for firms of Pakistani energy sector.

#### 5.4.1 Static trade-off theory

**Hypothesis 1a**

*Hi:* There is positive relationship between financial leverage and collateralizable value of assets.

*Ho:* There is negative relationship between financial leverage and collateralizable value of assets.

Since Static trade-off theory ascertains that firms with more tangible assets can raise more leverage and in case of bankruptcy, uncollateralizable assets disappear and reducing
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the value of total assets. STT shows positive relation between leverage and CVA. We observe a negative relation between CVA and leverage, that’s mean, firms in energy sector of Pakistan can not raise their debt ratios with the help of high CVA.

Thus, as result is not statistically significant therefore we can not reject Ho.

_Hypothesis 1b_

_Hi: There is positive relationship between financial leverage and size._

_Ho: There is negative relationship between financial leverage and size._

We examine the statistical significance of positive association between financial leverage and size and find that larger firms maintain high debt ratios.

Thus we reject Ho in favor of Hi.

_Hypothesis 1c_

_Hi: There is positive relationship between short term financial leverage and non debt tax shield._

_Ho: There is negative relationship between short term financial leverage and non debt tax shield._

Conducted analysis provides vague results for NDTS. STT proves indirect relationship of NDTS with long term debt and direct relationship with short term debts. In our sample data, firms use short term debts for further investment. This point of view implies the consistency with STT for short term.

For total debt STT predicts the negative sign because it reduces the benefits of debt tax shield. As we have used total debt in measuring the leverage therefore we follow the STT’s positive sign for total debt. But we could not get the significance of result.

Since, we use the total debt for measuring the leverage therefore we can not reject Ho.

Our overall result suggests that STT is not supported entirely. One (size) out of four correlations is consistent with STT’s predicted signs and fifth (NDTS) is partially consistent. Consequently we claim that firms in Pakistani energy sector do not follow the STT and they do not make optimal target.

5.4.2 Pecking order theory

_Hypothesis 2a_

_Hi: There is positive relationship between financial leverage and collateralizable value of assets._

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6 See table 6
Ho: There is negative relationship between financial leverage and collateralizable value of assets.

The result of analysis shows the negative association between CVA and financial leverage. This outcome supports the extended version of POT, in which POT distinguish between short term and long term debts but contradicts with abstract version of POT.

So, by pursuing the primary description of POT and statistically insignificance of result, we can not reject Ho.

Hypothesis 2b

Hi: There is positive relationship between financial leverage and growth.  
Ho: There is negative relationship between financial leverage and growth.

Obtained result for growth factor is positive and statistically significant that is consistent with our hypothesis.

Thus we reject Ho in favor of Hi.

Hypothesis 2c

Hi: There is negative relationship between financial leverage and profitability.  
Ho: There is positive relationship between financial leverage and profitability.

Analysis shows the statistically significant negative relation between profitability and financial leverage. Firms having high profitability use more equity source for raising external funds and maintain low leverage ratio. This behavior of firms is consistent with POT prediction for profitability.

So we reject Ho in favor of Hi.

The total result shows that firms support POT in greater extent. Two (growth and profit) out of three achieved results match with POT’s predictions. One determinant (CVA) is partially consistent with POT.  

5.4.3 Agency cost theory

Hypothesis 3a

Hi: There is positive relationship between financial leverage and size.  
Ho: There is negative relationship between financial leverage and size.

In larger firm’s agent and principal both like to expend their firm’s size, especially managers want to gain more self esteem. For expansion, both prefer debt financing rather then equity because debt creates the probability of bankruptcy and in case of bankruptcy

7 See table 6
managers loose their benefits. Therefore debt creates a temptation for agents to make better investment decisions and consume less perks to avoid bankruptcy. As agency cost theory exhibits the positive sign between size and financial leverage and it matches with our result.

Thus, as result is statistically significant therefore we reject \( H_0 \) in favor of \( H_1 \).

The complete result does not support Agency cost theory. One (size) out of three determinant’s association with leverage is consistent with Agency cost theory.\(^8\)

\(^8\) See table 6
6. Conclusion

In this chapter we sum up the conclusion of the thesis report short but in comprehensive manner. Later, essential vision of capital structure theories and answer of questions at issue are presented. Chapter ends up with recommendation on future work.

6.1 Inference

In this report we have analyzed the five years panel data of listed firms in energy sector of Pakistan 2001-2005. For analysis we selected pooled regression model. Foremost intention was to test if listed Pakistani firms in energy sector follow any capital structure theory during the period 2001-2005. To measure this we have selected five explanatory attributes that are most accredited in academic and literacy sphere of corporate capital structure. Afterwards we used these attributes in regression model to answer the proposed question.

We followed the three capital structure theories: Static trade-off theory, Pecking order theory and Agency cost theory and tried to find out which one explain better the financial behavior of our sample firms. All these theories possess different traits to explain the corporate capital structure. Static trade-off theory suggests that optimal capital structure is a trade off between net tax benefit of debt financing and bankruptcy costs. Firms with high tangible assets will be in a position to provide collateral for debts, so these firms can raise more debt. Larger and high profitable firms maintain their high debt ratio, while firms with high growth rate use less debt financing. Pecking order theory states that firms prefer internal financing to external financing and risky debt to equity due to information asymmetries between insiders and outsiders of firm. Agency cost theory illustrates the financial behavior of firms in context of agent and principal relationship.

To achieve our intended goal we have formulated nine hypotheses and classified them on the bases of followed capital structure theories into three groups. For testing these hypotheses we have selected five explanatory attributes from array of renowned previous research works on the capital structure. In addition, sample data is taken from listed firms of Pakistani energy sector during the period 2001-2005, against each attribute and we analyzed it by performing panel regression model.

Our results show that collateralizable value of assets has indirect relation with financial leverage but we could not get enough statistical significance. It shows that collateralizable value of assets does not have influence on firm’s financial decisions. This association is consistent with extended form of Pecking order theory of capital structure that deals with debt in context of short term and long term financing. While Static trade-off theory and Agency cost theory are not supported to our result. Size displays a positive relation with financial leverage and is found to be a most important determinant of corporate financing patterns. Larger firms in Pakistani energy sector maintain high leverage ratios. Size’s association with financial leverage supports Static trade-off theory and Agency cost theory but contradicts with Pecking order theory. Positive relation between growth and leverage also found out as important determinant of
firm’s financial behavior. In Pakistani energy sector firms with high growth rate use more debt financing source. This positive relation between growth and financial leverage supports only Pecking order theory of capital structure. For profitability we attained an inverse relation that supports Pecking order theory but opposes to Static trade-off theory. The results suggest that more profitable firms do not often finance their investments by debt source in energy sector of Pakistan. Non debt tax shield displays a positive relation with financial leverage and found statistically insignificant. This positive relation verifies that firms with high non debt tax shield use more debt then equity. This evidence is consistent with Static trade-off theory for only short term debts.

From our results we claim that both Static trade-off theory and Pecking order theory are partially accepted in energy sector of Pakistan, though we have more evidence for Pecking order theory.

6.2 Future research

In future work, it would be appropriate to focus on following aspects:

- Differentiating between long term and short term debts.
- Ownership structure should consider.
- Macro economic factors should be included, for instance non debt tax shield could be adjusted for inflation to find out the actual economic depreciation.
7. Reference:


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37. “Determinants of Capital Structure: Evidence from Libya”, by Fakher Buferna, Kenbata and Lynn Hodgkinson, University of Liverpool, GB, 2005