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Relationship between Leverage and Cumulative Abnormal Returns: A Study of Chemical Sector of Pakistan

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Abstract

In this study, cumulative abnormal return (CAR) is taken to check its relationship with leverage. This study focuses on the empirical relation between cumulative abnormal returns and book leverage pertaining to the financial risk component of leverage. This study uses a sample of 26 PSX listed chemical companies and period of 11 years (2007-2017). It considers sales growth, change in market value of equity, asset turnover and dividend payout along with leverage. The study uses penal data regression to analyse the data. Our analysis show that leverage is negatively influencing CAR, and almost all other control variable are also negatively impacting on CAR.

Key Words: Returns, Abnormal returns, Cumulative abnormal returns, Leverage, Panel data.

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1. Introduction

In the financial dictionary, an abnormal return, a term defined in order to label the revenues produced from a specific portfolio or a security in each time period that is unlike the projected rate of return. The projected return rate would be the predictable return, dependent upon an asset pricing model, by utilizing multiple valuations or a long-run historical average. Abnormal returns play a pivotal role in defining a portfolio's or security's risk-adjusted results when associated with a benchmark index or the overall market. Abnormal returns may assist in defining a manager's skill of a portfolio, on a risk-adjusted basis, and whether stockholders have been satisfactorily rewarded for the volume of risk presumed.

In this study, CAR (Cumulative Abnormal Return) is taken to check its relationship with leverage. It is just the sum-up of the abnormal returns for the specific period. Basically, the calculations of an abnormal return are simple, and it consists of minus the index's performance (which is normally described as positive or negative) by the specific portfolio or stock's performance. It gives a simple measurement of the performance of a stock over a given period of time, although there is a deficiency in defining the changes that obviously arise in a specific time period. To overcome the deficiencies in defining the normal variations, the CAR formula is described as the percentage of sum of all abnormal returns in a given time period. So, following is the formula of both simple abnormal return and the CAR (which in this study is cumulative abnormal return. Whereas, leverage is one of the vital issues regarding the company risk and its stocks. Hamada (1972), has established the connection between systematic risk and leverage. Numerous empirical researchers have reached the finding that leverage is a key factor in association tests on value and risk of firms. The concept is founded on market-value procedures of leverage and debt. Calomiris et al. (1994) give their own opinion that debt to equity or leverage is a key factor in defining the value of a firm. According to "Debt Overhang" or debt "Deflation Model", firms' financial position especially its leverage influences the firm investment decisions.

This study considers sales growth, change in market value of equity, asset turnover and dividend payout along with leverage. These variables may have both direct and indirect effects on returns as well as affecting the relationship between returns and leverage.

The objective of this study is to test MM's Proposition II. Particularly, in the context of Pakistan, where abnormal stock returns in Pakistan's chemical sector are affected by leverage. This is also because firms face unique financing constraints, tax structures, and market inefficiencies. The study represents yields to stockholders as abnormal stock yields projected by means of the well-recognized "asset

pricing models of CAPM" (Fama-French & Carhart, 1997). Fama-French (1993) express four featured model which encompasses all the normal risk element and is possibly an extra strong estimator for yields (Rehman & Gul, 2025).

This study examines the leverage as the book values' ratio of total debt to total equity. There is a requirement to practice a wider explanation of fiscal structure to justify for the greater amount of replaceability among the different types of loan. Applying the book values which includes the sum of all obligations and ownership rights (Schwartz, 1959). The usage of book values in explaining the capital structure which ensure that the consequences of past financing are rightly demonstrated (Rajan and Zingales, 1995). Later, Barclay et al. (2006) demonstrated that how book leverage is desirable when regressing financial leverage, when applying market values in the denominator may correlate with exogenous variable quantities.

Modigliani and Miller (1958) original study explains the irrelevancy of equity versus debt in the capital structure of a firm. Miller (1977) and Miller and Modigliani (1963) explain this problem more precisely, presenting that under some circumstances the balanced capital structure can only be complete with debt finance owing to tax shield. In many countries interest payments on debts are subtracted from firm taxes. So, increase in debt ratio generates more funds due to less payment of taxes to the state. So, this surplus fund can be distributed to the investors. This theory raises a question, whether firm who have more equity in its capital structure waste the funds in payments of more taxes. Miller (1977) answered this question by explaining that firm can attain higher level of income by extending debt ratio and this higher income would be distributed among bondholder and stockholders, meanwhile the firm's value does not necessary to be increased.

Leverage has been treated as an important factor in deciding the corporate finance strategy. Modigliani and Miller (1958) proposal determined that in some specific conditions the value of a company does not respond to the capital structure. In their research they determined that the leverage ratio has no considerable impact on the cost of capital. Cuthbertson and Nitzsche (2005) adjusted their past research by considering that tax protection in structure of debt financing growths the value of a firm. This explains the view that two identical firms with different level of leverage may have different expected rate of return. Several researcher including confronted the MM (Miller & Modigliani) proposition by arguing that capital structure significantly impact on firm value or firm investment decisions. (Jensen & Meckling, 1976; Jensen, 1986b; Masulis, 1983; Chava & Roberts, 2008; and Nizam, Ijaz, & Raza, 2023)

Ullah and Shah (2014) explain the reports of an indication of constructive impact of leverage on stock returns in Pakistan. This indication has numerous credible clarifications. Though based on varying underlying reasoning, yet agency theory, trade-off theory, bank debt signalling model, and

management timing hypothesis predict favourable impact of leverage on stock returns. Khan et al. (2012) explain, that display the association with CAPM and the premium size is optimistic and noteworthy relating to the portfolio returns whereas the premium of leverage is positively insignificant. It has been experiential that the high market capitalization firms outclass the firms with little market capitalization. Therefore, the financial instrument forecasters, organized investors, fund executives and other stakeholders must study the premium size.

2. Literature Review

Literature reveals that financial structure of companies influences corporate investment philosophy in the dynamic ways and operates in the mystic way. On study of Hall (1992) conducted an influential study on U.S. manufacturing firms during the 1980s to explore how financial structure influences corporate investment psychology. The findings revealed a clear and measurable link between increasing debt levels shrink investment activity. This study observed that around 250 firms that increased their leverage by half of their book value experienced, on average, a 2.5% reduction in investment spending. This outcome was attributed to a change in tax policy that reduced the benefits of debt financing by nearly 50%, discouraging firms from borrowing further. The researcher found decline in investment stemmed from two possible factors. First, some firms may have overinvested priory , leaving them with limited internal resources and a greater dependence on costly external financing. Second, tightened internal cash flows increased the cost of capital, making additional investments less attractive or feasible. Overall, Hall's study provided persuasive evidence that high debt burdens can constrain firms' investment capabilities that hinger financial decision and affordable fundings.

McConnell and Muscarella (1985) was prominent advocator of two main strategic decisions 1) financing and 2) investment. They explain how managers follow market forces to maximize value in capital expenditure decisions. When returns from existing projects rise, capital expenditure increases and vice versa. However, Earlier studies gave mixed results on the link between leverage and investment. Modigliani and Miller (1958) rejected this link, they stated investment depends on demand, profitability, cash flow, and firm value. In contrast, later researchers argued that capital structure influences investment through agency conflict, asymmetric information, and market imperfections (Myers,1977; Masulis,1983; Jensen, 1986b; Lang et al., 1996). These researchers challenged the Modigliani and Miller (1958) view

and endorsed that capital structure affects firm value and investment decisions due to agency conflict, asymmetric information, and market imperfections.

The recent scholars like , Shengnan and Jianbo (2005) showed that the relationship between investment and debt level depends on the shareholding proportion; a higher proportion reduces the negative impact, while a lower proportion increases it. Similarly, Xin and Lin (2006) found that in non-state listed companies, investment is sensitive to debt levels, but this sensitivity decreases as state-owned shares increase. Mingan and Ying (2008) concluded that debt negatively affects investment, especially in low-growth firms, and that high leverage further strengthens this negative effect, though moderate debt can help control overinvestment. Aivazian et al. (2005) states that the non-positive association between growth and leverage could occur even in regression which enable to regulate for development prospects, since owing to its anticipation with potential investment, manager reduced leverage. So leverage simply shows mangers information for investment opportunities.

Research shows that financial leverage negatively affects investment sensitivity in high-growth firms. Ahn, Denis, and Denis (2006) found that in high Q segment (high growth opportunity) of diversified firms the investment is more responsive to high leverage, and this response is negative towards the leverage. Although low Q segment (low growth opportunity) are less responsive to higher leverage.

In actual, investment and financial restriction are two fundamental determinants which impact investment (Bao, 2010a). Without adequate capital, it becomes difficult for a firm to invest regardless of profitable opportunities Vis-à-vis without valuable investment opportunities it is also difficult for a firm to invest regardless of availability of funds at any time. Owing to asymmetry information, liquidity constraint and other restrictions, extra debts would lessen financing ability of the firm and hence leave negative impact on investment. In nutshell, firms with high leverage normally experience high cautious investment strategies.

Ozdagli (2012) states that financial leverage influences business risk and investments because it impacts the effective scale of investment irrepressibility delt by the owner of the company. When investment is financed with leverage, the cost of capital is reduced owing to tax saving linked with debt financing.

Literature focusses the sensitivity of investment on company's level depend upon the capital structure and risk level of business. Xin and Lin (2006) endorsed and founded that investment is sensitive with debt level. When proportion of state-owned share increases the sensitivity level also decreases. By applying empirical tests, Mingan and Ying (2008) reached on some conclusions, that there exists a negative relation of debt on investments. Along with this they concluded that this negative relation of debt on investment is high for low growth (low Q firms). However the certain level of debt would dilute the difficulties unnecessary investment it is convincing that high level of leverage influences investment.Saleem et al. (2011) who conducted their study on oil and gas sector of SAARC countries explain that leverage occupies crucial importance owing to its fixed financial interest in every firm. It

enables organizations to use fixed financial charges to boost their profits. Every firm acquires debts owing to earn extra benefits on fixed charges than to their costs. They found that there is a close relationship between financing mix and fixed expense decisions which are significantly affect of firms' profit capacity. Their study substantiates that when profit of the firms are greater than to their financial charges, the leverage influence is positive. The leverage is an important element which influences the profitability firm and the wealth of the shareholders.

Theory says that if debt generates possible estimated lesser investment inducements, the influence may be increase from the critical action taken by the firm and decreasing its debt financing, if potential progress are acknowledged quite timely. Ozdagli (2012) states that financial leverage influences business risk and investments because it impacts the effective scale of investment irrepressibility delt by the owner of the company. When investment is financed with leverage, the cost of capital is reduced owing to tax saving linked with debt financing. But during disinvestment the firm has to pay back its debts, so firm has to leave the shield of tax saving associated with particular debt investment.

3. Methodology

3.1 Data and Sources

In this study, the data are of an empirical nature. Penal data is used for 11 years, ranging from 2007 to 2017. Due to time constraints, data could not be fetched more. The selection for 11 years is aimed at working out on full business cycle (Rakshit, 2006; Misra et al., 2007), because a full cycle of business has a substantial effect on returns (Abdeen et al., 2002). The data of companies from the chemical sector listed on Pakistan Stock Exchange (PSX) from 2007 to 2017 is used. Thus, each company is considered a unit of analysis (Misra et al., 2007). The data for the study have been taken from the annual financial statements of the selected firms. For the market value of shares, data was taken from the stock exchange's website. The sample of our companies included the listed companies of chemical sectors of Pakistan Stock Exchange. To authenticate the study plenty of companies are needed. Because this study is based on chemical sector, we took data of all listed companies. There are 34 listed chemical companies in Pakistan stock exchange. Due to unavailability of data to take data of 26 listed chemical companies to validate our results.

3.2 Variables of the Study

The objective of this study is to test the relationship between leverage and cumulative abnormal returns. In this study, the dependent variable is cumulative abnormal returns (CAR). Leverage (DE) is the independent variable. To control the effects of other variables (Campello, 2003) this study also uses few other variables such as market value of equity (ΔMVE), Size (SIZE), dividend payout (DPR), market to book value (MB), beta (BETA), and industrial growth (Ind_g).

3.3 Dependent Variable

Due to consistent developing concern in the return for investors regarding inability of accounting-based performance gauges to capture real image of shareholders value, the study adopted cumulative abnormal return measures. In dealing with this, the academe and practiced researchers reached several value-based measures. This list included variables like size of company, the markup value on loan and shareholder interest in their financing. This study uses *Cumulative Abnormal Return (CAR) as the dependent variable. It is the totality* of all day-to-day abnormal returns of specific stock or portfolio – CAPM Return.

The definition of abnormal returns are the variances amid portfolio's outcome or an individual stock and the anticipated return over a given period of time. Generally, it was analyzed that a comprehensive index, likewise the S&P 500 or a national index like the Nikkei 225 are utilized as a yardstick to regulate the anticipated return.

If we calculate the formula mathematically, an abnormal rate of return is that return that beats which was assumed by econometric model for example the CAPM. For more understanding, the formula is explained below:

$$r_a = r_{rf} + B_a (r_m - r_{rf})$$

Where:

r_{rf} = the rate of return for a risk-free security

r_m = the broad market's expected rate of return

B_a = beta of the asset

3.4 Independent Variables

To check the trend of tendency of leverage on cumulative abnormal return, several independent variables are considered. These variables include leverage as the prime independent variable and other control variables like a variation in marketplace worth of equity, firm's size, and DPR the (dividend payout ratio), market to book value ratio, beta, industrial growth and. All these variables are taken to support the main independent variable - leverage that how leverage behaves with cumulative abnormal return. A brief description of these variables is here as under:

a) ***Leverage:*** *It is determined by dividing the total debt over total owners' equity for any given year.*

b) **Beta:** The beta can be defined as a coefficient that can be either negative or positive and have a *t*-value and significance of that *t*-value associated with each.

c) ***Size****: The firm's size defines* the strength of company. Here the value of total asset value is used to determine size of company.

d) ***Industrial Growth Rate:*** The rate at which sales revenue of overall non-financial sector grew over the previous year. It is determined by taking the difference in the overall non-financial sector's sales revenue of the current and previous years and dividing this difference over the previous year's sales revenue.

e) ***Dividend Payout Ratio:*** It is computed by dividing the yearly dividend over the corresponding income after tax. The DPR or dividend payout ratio is that amount which is paid to individuals out of the total amount of net profit of the company. The dividend can be given quarterly or annually depending on the company policy and amount of profit.

f) M/B: The book-to-market ratio is a yardstick to gauge the company's value. This ratio associates the book value of a firm by its market value. The book value of a firm can be ascertained by dividing its owners' equity over its outstanding common shares.

g) Change in owners' equity: It measures percentage change within the market value of the company's common shares over the previous period. To compute it, first the difference between the market price of a firm's ordinary shares at the end of the current and previous year is determined. Then, this difference is divided by market price of a firm's ordinary shares at the end of the previous year.

3.5 Econometric Model

This study uses following econometric model:

$$CAR_{it} = \alpha_{it} + \beta_1(D/E_{it}) + \beta_2(\Delta MVE_{it}) + \beta_3(SIZE_{it}) + \beta_4(DPR_{it}) + \beta_5(MB_{it}) + \beta_6(BETA_{it}) + \beta_7(IND\_g_{it}) + \varepsilon_{it}$$

Where;

CAR - dependent variable is the cumulative abnormal return for a firm *i* at time *t*

Other variables are;

α = Constant

D/E$_{it}$ = independent variable – total debt to owners' equity of a firm *i* at time *t*

β_1 = regression coefficient of D/E is the total debt to owners' equity of the company which shows the rate of change in D/E responsible to bring corresponding change in CAR

ΔMVE_{it} = independent variable – change in market value of equity of firm *i* at time *t*

β_2 = regression coefficient of ΔMVE_{it} of the company which shows the rate of change in market value of owners' equity responsible to bring corresponding change in CAR

SIZE$_{it}$ = independent variable – size of the company for a firm *i* at time *t*

B_3 = regression coefficient of size of the company which shows the rate of change in Size responsible to bring corresponding change in CAR

DPR$_{it}$ = independent variable – dividend payout ratio of a firm *i* at time *t*

B_4 = regression coefficient of DPR dividend payout ratio of the company which shows the rate of change in DPR responsible to bring corresponding change in CAR

M/B_{it} = independent variable – market book value for a firm *i* at time *t*

B_5 = regression coefficient of M/B is the ratio of Market value of equity and its book value responsible to bring change in CAR

$BETA_{it}$ = independent variable – Riskiness of firm *i*'s stock in relation to the market risk at time *t*

β_6 = regression coefficient of BETA is the riskiness of a firm's stock market price in relation to the market risk which shows the rate of change in this riskiness responsible to bring corresponding change in CAR

IND_g_{it} = independent variable – overall sales growth ratio for all non-financial sector *i* at time *t*

β_7 = regression coefficient of overall sales of non-financial sector which shows the rate of change in IND_g responsible to bring corresponding change in CAR

ε_{it} = Error term.

The panel data in our study is balanced; the data is said to be balanced if the numbers of observations are same for each variable. To see the influence of independent variables on dependent variables in the panel data technique Panel OLS regression is used.

4. Results & Discussion

4.1 Descriptive Statistics

In these analyses CAR – dependent variable was used as proxy return to shareholders. On the other hand, independent variables like leverage (total debt to total capital), Sales /TA's Sales G, Size, D.P.Out. P/E. Table 1 carries some descriptive statistics. The mean value Leverage is 3.27 and stander deviation value is 2.71 which means that there is more than 100% variation in the data of leverage of different companies of chemical sectors. The mean value of Size (total assets) is 6.3226 and its stander deviation value is .8193 which shows that there is also high variation in the data of total assets.

Table 4.1

Descriptive Statistic

Variable	Obs.	Mean	S.D	Min.	Max.	Kurtosis	Skewness
CAR	286	-.0383231	.6138116	-1.551	3.9067	11.448	1.637462
D/E	286	3.437915	3.361188	.0281	33.9161	27.33811	3.607817
ΔMVE	286	.2406339	.8340659	-.987	6.1667	2.860971	15.53294
Size	286	14.57587	1.89484	11.2658	18.3557	.005642	1.808419
DPR	286	.5512979	3.199665	-4.0198	39.0114	10.88561	126.1857
M/B	286	5.496764	9.606062	0	64	3.991004	21.07143
BETA	286	.7105101	.5654473	-1.7225	2.5937	.1394775	3.69999
Ind_g	286	.0898818	.0945376	-.0968	.1907	.9966412	2.750046

The mean value of the CAR is -0.038. This mean value is in negative which shows that the average abnormal return of cumulative abnormal return is negative. So, these negative values indicate that abnormal return gives negative return that the actual return. The mean value of industrial growth is 0.089 and stander deviation value is 0.094 which shows that there is also more variation in the data of sales growth. The mean value of dividend payout ratio is 0.55 which explains that companies pay 55% dividend to its stockholders. The standard deviation value of dividend payout ratio also tells more variations between companies of chemical sectors. The mean value of change in market value of equity is more than 1, which substantiate that the market value of share is higher than the earnings ratio of share. The Standard Deviation value is higher than other variable that is .834.

4.2 Correlation Matrix

In table 2, correlation matrix is explained. The values of almost all variables are less than 0.6. The majority of the variables indicate that there is no serious issue of multicollinearity in the model. The relationship between CAR and leverage is negative which broadly tells that there is negative impact of leverage on cumulative abnormal return.

Table 4.2

Correlation Metrix

	CAR	***D/E***	***IND_g***	***Size***	***DPR***	***BETA***	***M/B***	***ΔMVE***
CAR	1.0000							
D/E	-0.0515	1.0000						
Δ*MVE*	0.4848*	-0.0738	1.0000					
Size	-0.2484*	0.1827*	-0.0380	1.0000				
DPR	-0.0476	-0.0707	-0.0578	-0.0844	1.0000			
M/B	0.0774	0.2342*	0.0756	0.1985*	0.0183	1.0000		
BETA	-0.2496*	-0.0491	-0.0734	0.2773*	0.0204	-0.1526*	1.0000	
IND_g	-0.1566*	-0.0179	-0.1061	-0.0339	-0.0795	-0.0790	-0.1095	1.0000

$^{*}P < 0.05$

In the above table 3, Correlation matrix is explained. Correlation matrix is applied to check the relationship within the independent variables with each other. Its also give the initial estimation that who variables are impacting each other. In the table, the values of almost all variables are less than 0.6. The majority of the variables indicate that there is no serious issue of multicollinearity in the model. The relationship between CAR and leverage is negative which broadly tells that there is negative impact of leverage on cumulative abnormal return.

4.3 Multicollinearity

Multicollinearity arises in the circumstances when regressor variables in a regression model resulted in correlated. So, the problem of correlation arises because independent variables are not independent to each other. If there is high correlation among the variables it may lead to complications when we

apply the model and find the outcomes. Table 3 shows that the 1/VIF value is more than 0.80 its mean that there is no multicollinearity issue.

Table 4.3
Test of Multicollinearity

Variable	Size	Beta	MB	D/E	Ind_g	ΔMVE	DPR	Mean VIF
VIF	1.2	1.17	1.16	1.1	1.04	1.04	1.03	1.1
1/VIF	0.83497	0.85623	0.86527	0.90992	0.95975	0.96332	0.97351	

4.4 Test for autocorrelation:

Post-estimation data screening for autocorrelation in STATA through Wooldridge test.

H_0: no first-order autocorrelation

F(1, 25) = 1.001

Prob > F = 0.3267

By looking above results we can see that the P value is not significant, so we will accept null hypothesis that no auto correlation, which tells that there is no auto correlation issue in the data.

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4.5 Pooled OLS Regression:

An integrated Pooled OLS model is another type of model with permanent coefficients, targeting both intercepts and slopes. In this model we can combine all the data and use the standard square regression model. The fixed effect model is the difference in all the short-cut unit units that can be held indiscriminately over time and the regression model time varies for all shortcut unit units. In this model, FE a shortcut that represents a fixed effect. On the other hand, in the random outcome model, each result is randomly distributed across all cross-sectional units and in order to obtain individual results, the regression model is defined by a term cutter representing the common term (Seddighi, 2000). Following are the results of Polled OLS regression.

Table 4.4
Pooled OLS Regression – Estimation

Dependent Variable: CAR				
Ind. Var.	**Coefficient**	**S.E**	***t*-statistics**	***p*> t**
ΔMVE	.3263481	.0366807	8.90	0.000
SIZE	-.0655546	.0173426	-3.78	0.000
DPR	-.0091639	.0095115	-0.96	0.336
MB	.0032278	.0033605	0.96	0.338
Beta	-.181649	.05739	-3.17	0.002
Ind_g	-.8744005	.3242206	-2.70	0.007
D/E	.0013846	.0093655	-0.15	0.883

C	1.03839	.2423271	4.29	0.000
R^2	0.3347			
Adjust R^2	0.3179			
Prob > χ^2	0.00000			
Observations	286			

By looking above table, we can see that there is the coefficient value of constant (intercept value) that is positive and significant. If we see our primary independent variable that is leverage (debt to equity) its coefficient value is .0013846 which shows that there is positive relation between leverage and CAR but this relation is insignificant as its p value is more than 10%. The relationship of CAR with other control variable is negative except MVE and MB. The size of the company shows that if the size of the company is smaller, there will be less return (the cumulative abnormal return) and the relationship is also statistically significant which shows the authenticity of the data. The value of R square is 0.3347, which indicated that overall there is 33.47% change in dependent variable is due to selected variables in this study.

4.6 Fixed Effect & Random Effect Test:

The FE model permits the intercepts variations in the model as dummy variables - fixed coefficients. Assume, i = 1, 2,…, N cross-sectional observations, and t = 1, 2, …, T time-series observations, the i^{th} and t^{th} observation on the dummy variable model can be expressed econometrically as:

$$y_{it} = \sum_{j=1}^{N} \beta_{I\,j} D_{jt} + \sum_{k=2}^{K} \beta_k x_{kit} + \varepsilon_{it}$$

Table 4.5

Fixed Effects Regression – Estimation

Dependent Variable: CAR				
Ind. Var.	**Coefficient**	**S.E**	***t*-statistics**	***p*> t**
ΔMVE	.3165215	.038017	8.33	0.000
SIZE	.0355765	.1225545	0.29	0.772
DPR	.0005011	.0118118	-0.04	0.966
MB	.0070189	.0091114	0.77	0.442
Beta	-.1955186	.0815496	-2.40	0.017
Ind_g	-.7714589	.3399041	-2.27	0.024
D/E	.0033239	.0122999	-0.27	0.787
C	-.4516665	1.766843	-0.26	0.798
R^2	0.2318			
F(7,253)	14.09			
Prob > χ^2	0.00000			
Observations	286			

if we see the above Table 5, we can see that there is the coefficient value of constant (intercept value) that is negative and insignificant.

If we see our primary independent variable that is leverage (debt to equity) its coefficient value is .0033239 which shows that there is positive relation between leverage and CAR and this relation is also significant as its p value is less than 10%. The relationship of CAR with other control variable is positive except ind_g (index growth and beta. The size of the company shows that if the size of the company is bigger there will be more return (the cumulative abnormal return). But the relationship is not statistically significant which shows the authenticity of the data. The value of R square is .2318 which indicated that overall there is 23.18% change in dependent variable is due to selected variables in this study.

Table 4.6

Random Effects Regression - Estimation

Dependent Variable: CAR				
Ind. Var.	**Coefficient**	**S.E**	***z*-statistics**	***p*> z**
ΔMVE	.3263481	.0366807	8.90	0.000
SIZE	-.0655546	.0173626	3.78	0.000
DPR	-.0091639	.0095115	-0.96	0.335
MB	.0032278	.0033605	0.96	0.337
Beta	-.18649	.05739	-3.17	0.002
Ind_g	-.8744005	.3242206	2.70	0.007
D/E	-.0013846	.009365	-0.15	0.882
C	1.03839	. 2423271	4.29	0.000
R^2	0.3435			
Wald chi2(7)	139.85			
Prob > χ^2	0.00000			
Observations	286			

If we see the above Table 6, we can see that there is the coefficient value of constant (intercept value) that is positive and significant.

If we see our primary independent variable, that is leverage (debt to equity) its coefficient value is. -.0013846 which show that there is negative relation between leverage and CAR however this relation is significant as its p value is more than 10%. The relationship of CAR with other control variable is negative except MVE and MB. The size of the company shows that if the size of the company is smaller, then there will be more return (the cumulative abnormal return and the relationship is also statistically significant which shows the authenticity of the data. The value of R square is 0.3435 which indicated that overall there is 34.35% change in dependent variable is due to selected variables in this study. Now for model selection, use of Hausman TEST to determine either FE or EF estimation

4.7 Hausman Test:

The choice of selecting fixed effect model or random effect model is best, the hasuman test will be applied. In Huasman test we apply that;

H_0: Random effect model is appropriate

H_1: Fixed effect model is appropriate.

Table 4.7
Hausman Specification Test

	Coefficient		(b-B) Difference	sqrt(diag(V_b-V_B))
	b_Fixed	B_Random		
ΔMVE	0.316522	0.326348	-0.0098266	0.009909
SIZE	0.035577	-0.06555	0.1011311	0.1213212
DPR	-0.0005	-0.00917	0.0086682	0.0070036
MB	0.007019	0.003228	0.0037911	0.0084691
BETA	-0.19552	-0.18165	-0.0138696	0.0579373
IND_g	-0.77146	-0.8744	0.1029416	0.102058
D/E	-0.00332	-0.00138	-0.0019393	0.0079734

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: H_o: difference in coefficients not systematic

$chi^2(7)$ = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 2.28

$Prob>chi^2$ = 0.9428

In the above results we can see that the chi2 prob value is more than 0.05 which tell us to choose our null hypotheses that random effect model is appropriate in our study.

In order to decide between RE & Pooled OLS, we further applied Breusch and Pagan Lagrangian multiplier test in STATA for which the results again favored RE]. So we run RE Regression Model

4.8 Test for Heteroscedasticity

Breusch-Pagan Test is used to test heteroskedasticityin the model. The heteroscedasticities supposed to happen as the divergence of the unwatched error u, restricted on predictors variables, is not constant. On the contrary, when the variance of unobservable error, conditional on predictor variable are persistent, this said to be homoscedasticity.

Following is the Breusch-Pagan test to check heteroscedasticity in the data.

Table 4.8
Test for Heteroscedasticity

Regression	Chi^2	Prob.
CAR=f(leverage)	461.74	0.0000

By looking above table, we can see that Prob. value of $Chi^2$is highly significant which the identification of heteroskedasticity in the data is. There may be assumed that the model has not heteroskedasticity. We can see that in the models of leverage the heteroskedasticity exists in the data. Heteroskedasticity has grave importance for the OLS estimation. While the OLS estimation remains unbiased. If there heteroskedasticity exists in the data, it can be rectified by appropriate transformation of the data. Now we run RE regression with "robust" command to remove hetro in the data.

Table 4.9

Random Effect GLS Regression with Robust

Dependent Variable: CAR				
Ind. Var.	**Coefficient**	**Robust S.E**	***z*-statistics**	***p*> Z**
ΔMVE	0.3263481	0.0842245	3.87	0.000
SIZE	-0.0655546	0.0180587	-3.63	0.000
DPR	-0.0091693	0.003088	-2.97	0.003
MB	0.0032278	0.0016078	2.01	0.045
Beta	-0.181649	0.0613636	-2.96	0.003
Ind_g	-0.8744005	0.290908	-3.01	0.003
D/E	-0.0013846	0.0080262	-0.17	0.863
C	1.03839	0.2545483	4.08	0.000
R^2	0.3347			
Wald χ^2 (7)	152.410			
Prob > χ^2	0.00000			
Observations	286			

Regression analysis is applied to test that how the selected independent variables affect the dependent variable in given conditions. As we concluded in our hausman test that random effect model is appropriate to select. So if we see Table 10, we can see that there is the coefficient value of constant (intercept value) that is positive and significant.

If we see our primary independent variable that is leverage (debt to equity) its coefficient value is -0.0013846 that displays that there is non-positive association between leverage and CAR but this relation is insignificant as its p value is more than 10%. The relationship of CAR with other control variable is negative except change in market value of equity, and market to book value. The size of the company shows that if the size of the company is lesser there will be more return (the cumulative abnormal return). But the relationship is not statistically significant which shows the authenticity of the data. The value of R square is 33.5%, which indicated that overall there is 33.5% change in dependent variable is due to selected variables in this study.

5. Conclusion

This study aimed to find the influence of leverage on Cumulative Abnormal Return. This study also distinguishes from rest of the related studies Bao (2010), Franklin and Muthusamy (2011), Khursheed et al. (2013) who followed the Aivazian et al. (2005) model, in which they used 'Capital Expenditure' from the CompStat List item 128, which uses the capital expenditure from cash flow statement of the company. But in cash flow statements only cash items are recorded and other than cash items are ignored. But in the current study control variables are taken from financial statements of the companies. This study use debt to equity ratio as leverage, firm assets as a size of company, difference in market value of equity, sales growth ratio, firm's sales to assets ratio and dividend payout ratio.

In the current study, primarily chemical sector of Pakistan's companies' data was analyzed to see the influence of leverage on CAR. This data was analyzed with above mentioned control variables with main independent variable; leverage. We set leverage as main independent variable to see the impact of outer funds on the chemical sector companies of Pakistan. The main 30 companies were selected. And finally, the data of 26 companies we extracted due to unavailability of data of 4 companies.

The results of this explain that leverage is negatively influencing CAR value in chemical sector of Pakistani companies. This negative relation explain that the more external funds reduce the value of CAR. The results of this study are not in line with MM Proposition in which they explain that the interest value reduce the tax for companies and tax work as shield for companies to enhance their business and ultimately it enhances the profitability for investors. This study presents different results than MM proposition in given context.

5.1 Limitation

The limitation in this study is that the endogeneity was not tested while testing the relationship between leverage and return, as used by (Aivazian et al., 2005). Aivazian et al. (2005) explains that tangibility as an instrumental variable is used owing to two reasons; first, bankruptcy costs have an impact on a firm's leverage and tangible assets, likely to offset the effects of bankruptcy and boost the use of leverage. Thus, tangibility is extremely connected with the company's leverage. Second, tangibility is not highly connected with the investment occasions of the companies.

5.2 Recommendations

Further studies can be conducted including the role of instrumental variables which may be tangibility of assets or some other variables which might affect the relation of leverage and CAR. The data should be available as it is available in developed countries. The synchronized and easily assessable data helps to find the best results. Furthermore, it is recommended for financial analysts that this research should

be implemented with cautions because the data had problem and this problem is solved by applying Generalized Least Square Method.

6. References

Ahn, S., Denis, D. J., & Denis, D. K. (2006). Leverage And Investment In Diversified Firms. Journal Of Financial Economics, 79(2), 317-337.

Aivazian, V. A., Ge, Y., & Qiu, J. (2005). The Impact Of Leverage On Firm Investment: Canadian Evidence. Journal Of Corporate Finance, 11(1), 277-291.

Bao, H. (2010a). A Study On Leverage And Firm Investment: Chinese Evidence. Master Of Science Thesis, Royal Institute Of Technology.

Bao, H. (2010b). A Study On Leverage And Firm Investment: Chinese Evidence. Master Of Science Thesis, Program Economics Of Innovation And Growth, Royal Institute Of Technology (Kth).

Black, F., & Scholes, M. (1973). The Pricing Of Options And Corporate Liabilities. The Journal Of Political Economy, 637-654.

Calomiris, C. W., Orphanides, A., & Sharpe, S. A. (1997). Leverage as a state variable for employment, inventory accumulation and fixed investment. In *Asset Prices and the Real Economy* (pp. 169-196). London: Palgrave Macmillan UK.

Chava, S., & Roberts, M. R. (2008). How Does Financing Impact Investment? The Role Of Debt Covenants. *The Journal Of Finance, 63*(5), 2085-2121.

Chowdhury, K. (2004). Convergence Of Per Capita Gdp Across Saarc Countries. Faculty Of Commerce-Economics Working Papers, 91.

Cuthbertson, K., & Nitzsche, D. (2005). Quantitative Financial Economics: Stocks, Bonds And Foreign Exchange: John Wiley & Sons.

Fazzari, S., Hubbard, R. G., & Petersen, B. C. (1988). Financing Constraints And Corporate Investment: *National Bureau Of Economic Research Cambridge*, Mass., Usa.

Firth, M., Lin, C., & Wong, S. M. (2008). Leverage And Investment Under A State-Owned Bank Lending Environment: Evidence From China. *Journal Of Corporate Finance, 14*(5), 642-653.

Franklin, J. S., & Muthusamy, K. (2011). Impact Of Leverage On Firms Investment Decision. *International Journal Of Scientific And Engineering Research, 2*(4), 14-28.

Gavish, B., & Kalay, A. (1983). On The Asset Substitution Problem. J*ournal Of Financial And Quantitative Analysis, 18*(01), 21-30.

Green, R. C. (1984). Investment Incentives, Debt, And Warrants. *Journal Of Financial Economics, 13*(1), 115-136.

Gunn, A. (1973). Requirement That A Capital Expenditure Create Or Enhance An Asset, *The. Bc Indus. & Com. L. Rev., 15*, 443.

Hall, B. H. (1992). Investment and research and development at the firm level: does the source of financing matter?.

Harris, J. R., Schiantarelli, F., & Siregar, M. G. (1994). The effect of financial liberalization on the capital structure and investment decisions of Indonesian manufacturing establishments. *The World Bank Economic Review*, *8*(1), 17-47.

Hite, G. L. (1977). Leverage, Output Effects, And The Mm Theorems. *Journal Of Financial Economics, 4*(2), 177-202.

Jensen, M. C. (1986a). Agency Cost Of Free Cash Flow, Corporate Finance, And Takeovers. Corporate Finance, And Takeovers. *American Economic Review, 76*(2).

Jensen, M. C. (1986b). Agency Costs Of Free Cash Flow, Corporate Finance, And Takeovers. *The American Economic Review,* 323-329.

Jensen, M. C., & Meckling, W. H. (1976). Theory Of The Firm: Managerial Behavior, Agency Costs And Ownership Structure. *Journal Of Financial Economics, 3*(4), 305-360.

Khursheed, A., Syed, Z. A. S., Hazrat, B., & Habib, A. (2013). Impact Of Financial Leverage On Firm Investment. *African Journal Of Business Management, 7*(14), 1115-1125.

Lamont, O. (1997). Cash Flow And Investment: Evidence From Internal Capital Markets. *The Journal Of Finance, 52*(1), 83-109.

Lang, L., Ofek, E., & Stulz, R. (1996). Leverage, Investment, And Firm Growth. *Journal Of Financial Economics, 40*(1), 3-29.

Lo, A. W. (1985). A Dynamic Model Of Optimal Investment And Financial Policies With Costs Of Adjustment And Leverage: Wharton School Rodney L. White Center For Financial Research.

Masulis, R. W. (1983). The Impact Of Capital Structure Change On Firm Value: Some Estimates. *The Journal Of Finance, 38*(1), 107-126.

Mcconnell, J. J., & Muscarella, C. J. (1985). Corporate Capital Expenditure Decisions And The Market Value Of The Firm. *Journal Of Financial Economics, 14*(3), 399-422.

Mcconnell, J. J., & Servaes, H. (1990). Additional Evidence On Equity Ownership And Corporate Value. *Journal Of Financial Economics, 27*(2), 595-612.

Mcconnell, J. J., & Servaes, H. (1995). Equity Ownership And The Two Faces Of Debt. *Journal Of Financial Economics, 39*(1), 131-157.

Miller, M. H. (1991). Leverage. The Journal Of Finance, 46(2), 479-488.

Mingan, Y., & Ying, K. (2008). The Impact Of Leverage On Firm Investment-The Empirical Study With Centralized Shares. *Accounting Research*, *4*, 33-40.

Minton, B. A., & Schrand, C. (1999). The Impact Of Cash Flow Volatility On Discretionary Investment And The Costs Of Debt And Equity Financing. *Journal Of Financial Economics, 54*(3), 423-460.

Modigliani, F., & Miller, M. H. (1958). The Cost Of Capital, Corporation Finance And The Theory Of Investment. *The American Economic Review*, 261-297.

Myers, S. C. (1977). Determinants Of Corporate Borrowing. *Journal Of Financial Economics, 5*(2), 147-175.

Myers, S. C., & Turnbull, S. M. (1977). Capital Budgeting And The Capital Asset Pricing Model: Good News And Bad News. *The Journal Of Finance, 32*(2), 321-333.

Nizam, K., Ijaz, M. M., & Raza, A. (2023). An Investigation of Financial Leverage Influences on the Financial Performance of Chemical Sector Listed Companies in Pakistan. *Journal of Asian Development Studies*, *12*(3), 723-734.

Opler, T. C., & Titman, S. (1994). Financial Distress And Corporate Performance. *The Journal Of Finance, 49*(3), 1015-1040.

Ozdagli, A. K. (2012). Financial leverage, corporate investment, and stock returns. *The Review of Financial Studies*, *25*(4), 1033-1069.

Parrino, R., & Weisbach, M. S. (1999). Measuring Investment Distortions Arising From Stockholder–Bondholder Conflicts. *Journal Of Financial Economics, 53*(1), 3-42.

Rehman, M. S. U., & Gul, F. (2025). Decoding temporal anomalies in interday stock returns: calendar and seasonal patterns in the Pakistan Stock Exchange. *Journal of Islamic Accounting and Business Research,* Advance online publication. https://doi.org/10.1108/jiabr-02-2025-0108.

Rothberg, F. (2012). The Importance Of Strategic Capex Planning 1-2. Retrieved From Cfo Edge Website:http://Www.Cfoedge.Com/Resources/Articles/Cfo-Edge-Strategic-Capex-Planning.Pdf

Saleem, Q., Rahman, R. U., & Sultana, N. (2011). Leverage (Financial And Operating) Impact On Profitability Of Oil And Gas Sector Of Saarc Countries.

Shengnan, L., & Jianbo, N. (2005). Empirical Studies On Corporate Liabilities And Investment. *Securities Market Herald, 3*, 44-48.

Stulz, R. (1990). Managerial Discretion And Optimal Financing Policies. Journal Of Financial Economics, *26*(1), 3-27.

Titman, S., & Wessels, R. (1988). The Determinants Of Capital Structure Choice. *The Journal Of Finance*, *43*(1), 1-19.

Tobin, J. (1968). Notes On Optimal Monetary Growth: Cowles Foundation For Research In Economics At Yale University.

Vogt, S. C. (1997). Cash Flow And Capital Spending: Evidence From Capital Expenditure Announcements. *Financial Management*, 44-57.

Xin, Q.-Q., & Lin, B. (2006). Debt Leverage And Corporate Investment: A Duplicate Soft Budget Constraint Perspective [J]. Journal Of Finance And Economics, 7, 32.

Yu, H., & Chen, H. (1999). The Relationship Among Growth, Leverage And Tobin's Q In Taiwanese Stock-Listed Companies. *Journal Of Risk Management, 1*(1), 81-101.