

“IMPACT OF DISCOUNT RATES ON STOCK PRICES: AN EMPIRICAL STUDY OF PHARMACEUTICAL SECTOR OF KARACHI”

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ABSTRACT:

How the stock prices of the stock reacts to the changes in discount rates is an important factor to the overall risk assessment of any particular stock .Discount rate is the interest rate at which banks and other financial institutions borrow credit from the Federal Reserve bank (state bank of Pakistan) The discount rate turn out to be the base interest rate for most customer borrowing as well because banks usually discount rate is used as a benchmark for the interest charged on the loans by most of the banks. Whereas, A share price is the price of a solo share of a number of marketable stocks of a company, derivative or other financial asset. The stock price is the maximum amount somebody is eager to pay for the stock, or the lowest amount that it can be accepted for. Some empirical studies have been done on the topic in the past taken in account the relationship of discount rates with the stock prices and the stock return.

The study is carried out focusing on the changes in stock prices of the pharmaceutical stocks of Karachi in response to the changes in the discount rate. Pharmaceutical sector is been focused as it's one of the most revenue generating sector of the country and there is more demand of medicines in Pakistan. The research is an empirical study conducted for the period 2010 to 2014 and is completely based on the secondary data sources and quantitative analysis of data is done. The study took a random sample of five pharmaceutical stocks listed in KSE100 (namely Abbot Laboratories (Pakistan) Limited, Otsuka Pakistan Ltd, GlaxoSmithKline (Pakistan) Limited, Sanofi-Aventis Pakistan Limited and The Searle Comp Limited). Quarterly stock price data of the companies from **Google finance** (<http://www.google.com/finance>) is used as a proxy for stock prices. The data of discount rates has been taken from www.tradingeconomics.com .

Past data is analyzed to find out the whether there is a relationship exists between the variables and if there is an existence of relationship then what is the direction of the relationship. For analysis study used SPSS Software (statistical package for social science) for finding the statistical relationship between discount rates and stock prices. **Descriptive statistics, spearman correlation and linear regression tests** are being run on the specified data set.

The results of the tests clearly indicated that these variables are very strongly correlated with each other having a strong intensity of relationship and with an increase in the discount rate the stock price of the sector of KSE 100 will ultimately increase and vice versa as the effect size (r_s) is **-0.822**. Stock's predicted price is equal to **[-6.816 (Discount Rate) +118.345]** in Rupees when discount rate is measured

in percentage (%). Stock price will be decreased Rs 6.816 for each percent of discount rate. From the overall research, statistics and analysis we have concluded so far that stock price of the pharmaceutical stocks of Pakistan listed in Karachi stock exchange KSE 100 index are strongly influenced by the discount rate changes but in the negative direction.

As new trends are emerging, the need to focus on these relationships becomes more important as these relationships have strong implications in the formation of monetary policy, risk assessment of the stock, hedging (risk management and stock valuation).

Key words: Discount rate, stock, stock price, interest rate, Pharmaceutical sector, Karachi ,Karachi Stock Exchange, KSE-100.

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ACKNOWLEDGEMENT

I thank Allah for guiding me through the phases of compiling this research study and helping me in all the difficulties.

Foremost, I would like to express my sincere gratitude to my instructor **Ms. Samreen Lodhi** for the continuous support ,patience, motivation, enthusiasm, and immense knowledge and encouragement, which she have offered me for this research. Her guidance helped me in all the time of researching and writing of this paper

Most importantly, it could not have been made without the love and patience of my family. My family has been a constant source of love, concern, support and strength for me all the time I had been researching. I would like to express my heart-felt gratitude to my family. They have aided and encouraged me throughout this endeavor. Without their support and the amount of time that they gave me, this report would not have existed.

Thank You

DEDICATION

I want to dedicate this piece of my research to my parents because whatever I am today is just because of them.

They always stood by my side, they gave me courage, they taught me that the best kind of knowledge to have is that which is learned for its own sake and who always told me that even the largest task can be accomplished if it is done with full effort and pure heart 😊

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1 INTRODUCTION

An important factor to the overall risk assessment of any particular stock is the reaction of the stock prices (or the returns) to discount rates. i.e. how the stock prices of the stock reacts to the changes in discount rates.

Discount rate is the interest rate at which banks and other financial institutions borrow credit from the Federal Reserve bank (state bank of Pakistan) The discount rate turn out to be the base interest rate for most customer borrowing as well because banks usually discount rate is used as a benchmark for the interest charged on the loans by most of the banks. Whereas, A share price is the price of a solo share of a number of marketable stocks of a company, derivative or other financial asset. In layman's terms, the stock price is the maximum amount somebody is eager to pay for the stock, or the lowest amount that it can be accepted for.

Some empirical studies have been done on the topic in the past taken in account the relationship of discount rates with the stock prices and the stock return. As these relationships have strong implications in the formation of monetary policy, risk assessment of the stock, hedging (risk management and stock valuation. Theoretically, we have studied that the changes in discount rates potentially alters the stock returns and that of stock prices but the degree is often depends on the individual stock (I.e. the degree of change is different for different stocks).

Stock exchange and interest rate are two critical factors which effect the valuation of the company; fluctuations in interest rates brings changes in the discount rates that brings changes in the net present value of the firm's future cash flows and ultimately affects the stock price of the firm; and which in turn effects the economic growth of the country.

The study aimed to focus on the changes in stock prices of the pharmaceutical stocks of Karachi in response to the changes in the discount rate. Pharmaceutical sector is been focused as it's one of the most revenue generating sector of the country and there is more demand of medicines in Pakistan.

1.1 PROBLEM STATEMENT:

The primary objective of this study is to find out whether the stock prices are influenced by the changes in discount rates in the Pakistani market (Karachi) and to what extend the stocks of pharmaceutical industry of Pakistan shows incorporate it in them. The data is collected for 5 years (i.e. from 2010-2014) and we have taken five pharmaceutical companies into consideration which are listed in KSE 100.

1.2 SIGNIFICANCE OF STUDY:

This study is done to investigate the relationship of discount rate on stock prices in Pakistan as there is no study done on the concern variables focusing Pakistani market; we have taken Karachi as our target

because most of the industries are located here. The past researches conducted on the topic are outdated so there is a need of this research to provide an updated knowledge about the association between the variables and also find out what have changes occurred in these relationships as compared to the past research's prospective.

As new trends are emerging, the need to focus on these relationships becomes more important as these relationships have strong implications in the formation of monetary policy, risk assessment of the stock and hedging (risk management and stock valuation).

1.3 OBJECTIVES OF STUDY:

- To find out the existence of the relationship between the discount rates and the stock prices.
- To investigate how changes in discount rates effects the stock prices?
- To find out direction of relationship between the discount rates and the stock prices?
- To what extend the pharmaceutical stocks of Karachi are affected by the changes in the discount rates?
- To predict stock prices of the pharmaceutical stocks of Karachi with changes in discount rates.

1.4 LIMITATIONS OF STUDY:

Despite of all the limitations and hurdles we had, we took care not to sacrifice the quality of the research at any cost. The research has successfully achieved the desired objectives.

The limitations of the study were:

- The shortage of time for the research and the burden of other courses were also there.
- The data of a limited time period is observed, i.e. from 2010-2014
- Pharmaceutical sector of Pakistan is being focused and five companies from the sector are taken into consideration which includes:
 - ✓ **ABOT** - Abbot Laboratories (Pakistan) Limited
 - ✓ **OTSU** - Otsuka Pakistan Ltd.
 - ✓ **GLAXO** - GlaxoSmithKline (Pakistan) Limited
 - ✓ **SAPL** - Sanofi-Aventis Pakistan Limited
 - ✓ **SEARL** - The Searle Comp Limited

1.5 SCOPE OF STUDY:

As new trends are emerging, the need to focus on these relationships becomes more important as these relationships have strong implications in the formation of monetary policy, risk assessment of the stock, hedging (risk management and stock valuation).

2 LITERATURE REVIEW

The study is focused on the relation between stock returns of the Karachi Stock Exchange (KSE) and the short term interest rates in Pakistan. KSE100 index is used for the calculation of stock returns whereas returns on six monthly T-bills are used for short term interest rates (for the period of 1994 to 2014). The researchers conducted the error correction mechanism and co-integration test to find out the short term relationship as well as long term relationship between stock returns and interest rates. Granger Casualty test is conducted to know whether the interest rates are the cause of changes in stock prices or the changes in stock price causes changes in interest rates. Results of the study show no such relationships in Pakistan. (Arif Hussain, 2014)

(Md. Mahmuudul Alam, 2009) The research focused is on finding the relationship between stock price /index and interest rates by taking data from share market from January 1988 to March 2003. The sample of the research contains fifteen countries of developed and developing countries, the countries which included are Australia, Chile, Colombia, Italy, Malaysia, Germany, Mexico, Philippine, Japan, S. Africa, Bangladesh, Spain, Canada, Jamaica and Venezuela, through stationarity test it was found that no stock market follows random walk model and is not efficient in weak form. Reasons of market inefficiency are investigated by determining the relationship between stock price & interest rates of the markets and the changes in stock price and changes in interest rates by applying time series and panel regression techniques. Results from all fifteen countries showed a negative relationship of interest rates with stock price and that of changes of interest rate with changes of stock price, because as interest rate rises it lowers the stock price. Controllable actions for interest rates in these countries will be beneficial for their stock exchange as it will pull the demand and push the supply of extensional investment of companies.

The study examined the long-term relationship between KSE 100 index return and inflation rate in Pakistan (Faiza Saleem, 2013). The objective of the study was to find out that do the changes in interest rates causes any changes in stock returns? And in what direction? .The sample contains quarterly data of January 1996 to December 2011. Different techniques and tests applied in the study include Augmented Dickey Fuller (ADF) unit root test, Johansen Cointegration Technique, Granger Causality Test and cointegration test. The results of Granger causality tests show no such causality between the two variables in any direction whereas the results of cointegration test a negative relationship between them because Pakistan is one of the underdeveloped countries of the world so when inflation rises it effects the economy in budget deficit and other economic downfalls which in turn effects the returns of the stocks. The research suggested that the inflation should be controlled to have improvements in the capital market.

An important attempt to find out the association of Interest rates with subsequent earnings and that of equity values was (PENMAN, 2003). The analysis is started by examining the effects of changes in interest rates on subsequent earnings by the use time-series regressions. The results showed positive relationship between the variables because as interest rate rises it positively affects the revenue,

expenses and earnings. The effects of changes in interest rates on equity values are determined by the help of residual income model which conclude that the effect is negative on equity values because of the net (numerator and denominator) effect of the valuation model.

To determine the effects of interest rate changes on returns of banking stock during up market (positive market returns) and down-market (negative market returns) in Indian market. To find out correlation between the interest rates and returns OLS (ordinary least square) and correlation analysis was used. the results showed that there is an existence of a weak correlation between the variables in India as banking stocks are not found to be significantly associated with the interest rates so interest rates changes doesn't effects the returns of banking stocks of India(Ghosh, 2013)

(MUKTADIR-AL-MUKIT, 2012)The research seeks to find out the effects of exchange rates on the performance of stock market in Bangladesh. For this purpose, monthly time series data is taken from 1997-2010. To determine the long term as well as short term relationship between the variables different econometric techniques are used which includes Cointegration and Error Correction Model, Granger causality test and analysis of Variance Decomposition. The results showed that Bangladesh market index is affected positively by exchange rates and negatively by interest rates in the long run.

The research study seeks to find out the relationship between the three variables, i.e. call money rates, stock returns & exchange rates in Indian market (Gupta, 2013). For this purpose, monthly time series data is taken from April 1992 to March 2011. Substantial lead-lag relationship was found from call money rates to exchange rates & stock returns and that from exchange rates to call money rates & stock returns but no such effect was viewed from stock returns to call money & exchange rates. The results of the study have implications for the policy makers and the investors. Investors, by the use of call money rate's historical information can predict the movement of stock returns whereas policy makers can make and adopt appropriate policies towards exchange rates and interest rates to stabilize the fluctuations in the stock market.

The study seeks to find out the long term relationship between the stock prices and monetary variables. For this purpose, monthly time series data of Pakistani market is taken from 1998-2008. Monetary variables included were money supply, foreign exchange, Treasury bill rates, and the (CPI) consumer price index. Different tests and techniques used by researchers include multivariate cointegration and Granger causality analysis .Results off multivariate cointegration provided the existence of dynamic long-term relationship between the two variables and unidirectional causality is found in the results of Granger causality analysis. The results showed that there is a negative impact of interest shock on equity returns, exchange rates also effects the equity returns negatively in the short run and inflation has little impacts on equity returns. Results of Variance decomposition analysis showed that money supply,

interest rates and exchange rate shocks are significant source of volatility for equity returns. The study suggests that monetary policy should be considered an important factor in determining and predicting stock market movements as the monetary variables plays significant role in moving the stock returns up and down .Policy makers should carefully make monetary policies as they have impacts on both the stability and the cash inflows to the capital market. (Javed, 2009)

The research study which search for the impact of various macroeconomic variables (like GDP, Money Supply, inflation, exchange rate and Size of firm) on stock market prices in Karachi market stocks. (khan, 2014) For this purpose, data of Karachi market is taken from 1971 to 2012 is used from Exchange (KSE). The study used Autoregressive Distributed lag model (ARDL) technique. The outcome showed that the macroeconomic factors have significant impacts on the stock price in the long run which some factors were significant in the short run also and some are not. The conclusion proposed that the factors must be targeted correctly for the smoothness in the stock market.

(Muhammad Akbar, 2012) Determines the relationships between the stock price (KSE100 index) and some macroeconomic variables. For this purpose, data of Karachi market is taken from in January 1999 to June 2008 is used from Exchange (KSE). The study used Granger causality, Co-integration and error correction tests to analyze the relationship the two variables. The result from the co-integrating tests proposed that stock prices and macroeconomic variables are co-integrated and uni-directional causality exists between them. Moreover, the conclusion suggested that the stock prices are positively associated with the money supply and interest rates (short term); rising short term rates put forward a higher real return on investment and economic growth which are both favorable for higher stock prices; and negatively with foreign exchange reserves and inflation (i.e. stocks are not an effective hedge next to inflation).

(Amarasinghe, 2015) Explores the causative affiliation between stock price and interest rate in market of Sri-lanka. For this purpose, data from in from January 2007 to December 2013 is used from Colombo Stock Exchange, interest rate have been taken from the statistics given by the Central Bank of Sri Lanka. The study used Augmented Dickey Fuller test, The Granger Causality and regression to analyze the relationship the two variables. Augmented Dickey Fuller test was used to analyze the stationary between the two variables and the results showed that stock price and interest rates are stationary. The Granger Causality test was conducted to test any causative affiliation between stock returns and interest rate and results indicated that, there is a uni directional causation between the variables .i.e. stocks returns are not a granger cause of interest rates but interest rates are a granger cause of stock returns. In the end, to analyze the results of the Granger Causality Test, a regression was preceded and the results of the regression test showed that interest rate is a major cause for stock return ups and downs and interest rate are negatively related with stock prices.

Company's dividend policy is an essential issue from the viewpoint of the investors as well as the company managers because unexpected change in the stock prices shows its riskiness (Muhammad Musarrat, 2012). The main aim of this study is to explore the consequences of dividend policy on the instability of stock prices on the financial sector firms of Pakistan. The firms taken in to consideration

are listed in the Karachi Stock Exchange, after monitoring for earning volatility, firm size, assets growth, and leverage. Fixed effect regression test was conducted to analyze the influence of dividend policy on the stock price volatility. The results showed that there is a negative association between dividend yield and price volatility and that of dividend payout and price volatility in the concerned firms. The study specifies that dividend policy is a vital tool in setting share prices in an economy like Pakistan.

(Md. Reaz Uddin, 2013) This study has placed a pronounced step to pinpoint the factors which determines the share prices of stock market concentrating completely on the financial sector of Bangladesh. Data have been gathered from Bank, Insurance and Leasing Companies linked with financial sector. Data of 2005 to 2011 is used from Dhaka Stock Exchange (DSE). Some prominent variables like Net Profit after Tax (NPAT), Net asset value (NAV), Price earnings ratio (P/E), Earnings per share (EPS) have been taken in to consideration for determining the stock price. A regression test with some descriptive statistical tools was conducted using SPSS. Outcomes showed that Earnings per share (EPS), Net profit after tax (NPAT) Net asset value (NAV), and Price earnings ratio (P/E) have strong association with stock prices.

The research study tries to analyze the influence of dividend policy on the stock price instability in the market of Pakistan. For this purpose, 160 listed companies in KSE are observed for a period from 1981 to 2000. The experiential assessment is built on a regression analysis of the association among stock price volatility and dividend policy after regulating for firm size, leverage, earning volatility, and asset growth. Dividend yield and payout ratio have major influence on the share price volatility. The association is not reduced greatly even after controlling for the above factors. This recommends that dividend policy influences stock price instability and it offers indication supporting the arbitrage realization, duration effect and info effect in Pakistan. The sensitivity of the dividend yield to the stock price volatility showed an increment during the period of 1991-2000. Whereas payout ratio has been found having a significant impact at lower level of significance. In the overall observed period the size and leverage have an optimistic and major influence on stock price instability. The size influence is bad during the period of 1981-1990 but constructive during reform period. The earnings volatility influence is negative and major only during reform period. Despite of the fact that the results are not strong enough as in the case of developed country markets but are stable with the performance of emerging markets. (Irfan, 2000)

(Zhao, 2013), researcher have analyzed the association between the stock returns, investment risks and corporate performance with the sample of listed stock companies in the agricultural, financial industries and construction in the A-share stock market. Whereas, Descriptive statistical tests, regression analysis and correlation test specify that there is no association between stock returns and company performance, but there is a positive correlation between the two variables (stock returns and investment risks) in the construction and financial sector.

3 METHODOLOGY

It is an empirical study to find out the impact of changes in discount rates on stock prices in Pakistan by estimating a relationship between the two variables. For this purpose, the study used SPSS Software (statistical package for social science) for finding the statistical relationship between discount rates and stock prices.

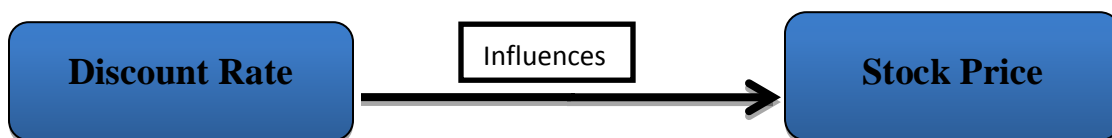
3.1 HYPOTHESIS:

The study seeks to find out the impact of changes in discount rates on stock prices in Pakistan by testing the following hypotheses:

H₀: There is no impact of changes in discount rates on stock prices.

H₁: There is an impact of changes in discount rates on stock prices.

3.2 MODEL:



The research has taken “**Discount Rate**” as independent variable and “**Stock Price**” as dependent variable. The aim is to observe that how discount rates changes ‘**influences**’ the prices of stocks of the selected companies.

3.3 DATA SOURCES

- This research study is based on the secondary data sources.
- The sample observed in the study consists of five pharmaceutical stocks listed on KSE (Karachi stock exchange):
 - ✓ **ABOT** - Abbot Laboratories (Pakistan) Limited
 - ✓ **OTSU** - Otsuka Pakistan Ltd.
 - ✓ **GLAXO** - GlaxoSmithKline (Pakistan) Limited
 - ✓ **SAPL** - Sanofi-Aventis Pakistan Limited

✓ **SEARL - The Searle CompLimited**

- Periodic stock price data (quarterly) of the companies from **Google finance** (<http://www.google.com/finance>) is used as a proxy for stock prices.
- The sample spans the period from 2010 to 2014.
- The data of discount rates has been taken from www.tradingeconomics.com

3.4 TARGET MARKET:

The research has taken the pharmaceutical companies of **Karachi** as the target of study i.e. the study is based on the pharmaceutical companies of Karachi city listed in KSE (Karachi stock exchange).

3.5 QUANTITATIVE OR QUALITATIVE ANALYSIS:

This study is based on the quantitative analysis of data to find out the impact of changes in discount rates on stock prices of pharmaceutical companies of Karachi.

3.6 STATISTICAL TECHNIQUE:

The research analyzed past data to find out the whether there is a relationship exists between the variables and the direction of the relationship.

For this, the study used SPSS Software (statistical package for social science) for finding the statistical relationship between discount rates and stock prices. Descriptive statistics, spearman correlation and linear regression tests are being run on the specified data set.

4 HYPOTHESIS TESTING & DATA ANALYSIS:

During the research, different tests have been conducted to analyze the null hypothesis i.e.

H₀: There is no impact of changes in discount rates on stock prices.

4.1 DESCRIPTIVE STATISTICS:

Descriptive Statistics							
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
SP	20	28.49	91.95	43.8801	18.62208	1.587	.512
DR	20	8.50	13.50	10.9250	1.71122	.247	.512
Valid N (listwise)	20						

TABLE 4-1: Results of Descriptive Tests

The descriptive analysis shows different statistic measures of the 5 year data sample of 5 pharmaceutical stocks of kes100 and 5 year discount rates. We have taken the averages of the data of stock price of the five stocks for calculation. The statistics includes a measure of central tendency i.e mean and measures of variability i.e. standard deviation and skewness.

- **Valid N (listwise)** - This is the no of non-missing values, here non missing values are **20**.
- **N**- This is the no of observations for the variable. The total number of observations is the sum of N and the number of missing values. **20** observations are taken here for both variables.
- **Minimum** - This is the smallest value of the variable in N observations. The minimum value of stock prices of the pharmaceutical stocks over the observed 5 years is **28.49** whereas for discount rate it is **8.50**

- **Maximum** - This is the largest value of the variable in N observations. The maximum value of stock prices of the pharmaceutical stocks of KSE 100 over the observed 5 years is **91.95** whereas for discount rate it is **13.5 (%)**
- **Mean** - This is the arithmetic average across the observations. It is the most commonly used measure of central tendency. The mean value of stock prices of the pharmaceutical stocks of KSE 100 over the observed 5 years is **43.8801** whereas for discount rate it is **10.9250**. The mean is sensitive to extremely large or small values.
- **Std. Deviation** – This is the square root of the variance. It measures the dispersion of a set of observations. The greater the standard deviation is, the more dispersed the observations are. The value of standard deviation of stock prices of the pharmaceutical stocks of KSE 100 over the observed 5 years is **18.62208** whereas for discount rate it is **1.71122**. This means that the data stock prices is more dispersed as compared to discount rates, there are more fluctuations observed in the stock prices over the period than that of discount rates.
- **Skewness** - Skewness measures the direction and degree of asymmetry. A symmetric distribution (normal distribution) has a skewness of 0. When the data is skewed to the left the skewness statistic has a negative sign and vice versa. Here the skewness statistic of stock prices of the pharmaceutical stocks of KSE 100 over the observed 5 years is **1.587** whereas for discount rate it is **0.247**.

But these statistics shows that the data is not normally distributed as it doesn't lie in the range of (-1 to +1) so we can't apply Pearson correlation on this data. As the data is not normally distributed out of the range of (-1 to +1), we will apply **Spearman correlation test** on it in the next step to find out whether there is an existence of relationship between these variables or not.

4.2 SPEARMAN CORRELATION TEST:

Correlations				
			SP	DR
Spearman's rho	SP	Correlation Coefficient (r_s)	1.000	-.822**
		Sig. (2-tailed)	.	.000
		N	20	20
	DR	Correlation Coefficient (r_s)	-.822**	1.000
		Sig. (2-tailed)	.000	.
		N	20	20

** . Correlation is significant at the 0.01 level (2-tailed)

TABLE 4-2: Results of spearman correlation test.

Spearman's correlation coefficient is a statistical measure of the intensity of a monotonic relationship between paired data. It is denoted by r_s , the closer the r_s to ± 1 the stronger would be the tendency of the relationship and vice versa.

Spearman test was conducted between the variables i.e. discount rate (DR) and stock price (SP). As the significant value is **0.01** which is less than 0.05 that means that the H_0 is rejected claiming an existence of relationship between discount rate and stock price of the pharmaceutical stocks of KSE 100 index.

Here the correlation coefficient (r_s) between discount rate (DR) and stock price (SP) is **-0.822** which shows that these variables are very strongly correlated with each other having a strong intensity of relationship.

Hence, The results of the test clearly indicated that there is a significant & negative relationship between the two variables such that that with an increase in the discount rate the stock price of the sector will ultimately increase and vice versa i.e. an increase or decrease in discount rate has a strong effect on the stock price values of the pharmaceutical sector stocks of KSE 100 as the effect size (r_s) is **-0.822**.

4.3 REGRESSION:

ANOVA ^b						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2584.835	1	2584.835	11.620	.003 ^a
	Residual	4004.018	18	222.445		
	Total	6588.853	19			

a. Predictors: (Constant), DR
 b. Dependent Variable: sp

TABLE 4-3.1: Results of Linear Regression test (ANOVA)

A simple linear regression was conducted to predict stock price of pharmaceutical stocks of KSE100 based on discount rate. A significant regression equation was found ($F(1, 18) = 11.620, p < .000$).

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	118.345	22.098		5.355	.000
	DR	-6.816	2.000	-.626	-3.409	.003

a. Dependent Variable: sp

TABLE 4-3.2: Results of Linear Regression test (Coefficients^a).

Regression equation:

Stock's predicted price is equal to $[-6.816 (\text{Discount Rate}) + 118.345]$ in Rupees when discount rate is measured in percentage (%). Stock price will be decreased Rs 6.816 for each percent of discount rate.

5 CONCLUSION & FINDINGS

The study is carried out focusing on the changes in stock prices of the pharmaceutical stocks of Karachi in response to the changes in the discount rate. Pharmaceutical sector is been focused as it's one of the most revenue generating sector of the country and there is more demand of medicines in Pakistan. As new trends are emerging, the need to focus on these relationships becomes more important as these relationships have strong implications in the formation of monetary policy, risk assessment of the stock, hedging (risk management and stock valuation).

The research study is conducted for the period 2010 to 2014 and is completely based on the secondary data sources. Periodic stock price data (monthly) of the companies from **Google finance** (<http://www.google.com/finance>) is used as a proxy for stock prices. The data of discount rates has been taken from www.tradingeconomics.com. Past data is analyzed to find out the whether there is a relationship exists between the variables and if there is an existence of relationship then what is the direction of the

$$\text{Stock Price} = -6.816 (\text{Discount Rate}) + 118.345$$

relationship.

For analysis study used SPSS Software (statistical package for social science) for finding the statistical relationship between discount rates and stock prices. **Descriptive statistics, spearman correlation and linear regression tests** are being run on the specified data set.

Results of **Descriptive Statistics** showed that; the minimum value of stock prices of the pharmaceutical stocks over the observed 5 years is **28.49** whereas for discount rate it is **8.50**, The maximum value of stock prices of the pharmaceutical stocks of KSE 100 over the observed 5 years is **91.95** whereas for

discount rate it is **13.5 (%)**, The mean value of stock prices of the pharmaceutical stocks of KSE 100 over the observed 5 years is **43.8801** whereas for discount rate it is **10.9250**. The mean is sensitive to extremely large or small values; the value of standard deviation of stock prices of the pharmaceutical stocks of KSE 100 over the observed 5 years is **18.62208** whereas for discount rate it is **1.71122**. This means that the data stock prices is more dispersed as compared to discount rates, there are more fluctuations observed in the stock prices over the period than that of discount rates; and the skewness statistic of stock prices of the pharmaceutical stocks of KSE 100 over the observed 5 years is **1.587** whereas for discount rate it is **0.247** and the data is not normally distributed.

Spearman Test was conducted between the variables, the results rejected the null hypothesis(H_0) claiming that there is an existence of relationship between discount rate and stock price of the pharmaceutical stocks of KSE 100 index and also indicate that an increase or decrease in discount rate has a strong effect on the stock price values of the pharmaceutical sector stocks of KSE 100 as the effect size (r_s) is **-0.822**.

From the Results **Linear Regression Test** Stock price is predicted as $[-6.816 (\text{Discount Rate}) + 118.345]$ in Rupees when discount rate is measured in percentage (%). Stock price will be decreased Rs 6.816 for each percent of discount rate.

From the overall research, statistics and analysis we have concluded so far that stock price of the pharmaceutical stocks of Pakistan listed in Karachi stock exchange KSE 100 index are strongly influenced by the discount rate changes but in the negative direction.

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7.1 STOCK PRICE DATA

Month Ended/Year	Abbot	Gsk	Sanofi	Searle	Otsuka	Average
2010						
March	26.34	38.52	37.36	18.68	39.49	32.078
June	23.39	34.01	30.06	21.05	33.95	28.492
September	26.12	39.52	33.25	22.12	28.8	29.962
December	23.96	39.22	32.23	21.55	32.81	29.954
2011						
March	24.52	38.41	35.22		33.89	30.974
June	26.31	42.9	40.17	19.39	31.75	32.104
September	25.57	41.29	32.8	20.39	32.5	30.51
December	28.12	45.63	36.54	17.68	32.8	32.154
2012						
March	30.52	44.91	38.75	17.37	35.4	33.39

June	32.24	45.57	37.78	18.68	35.85	34.024
September	34.28	46.24	43.06	22.77	47	38.67
December	32.75	43.47	47.38	23.36	37.75	36.942
2013						
March	35.32	46.91	51.08	32.42	31.73	39.492

YEARS	JANUARY- MARCH (%)	APRIL- JUNE (%)	JULY- SEPTEMBER (%)	OCTOBER- DECEMBER (%)
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June	34.87	49.97	51.51	43.4	45	44.95
September	33.19	50.17	50.63	48.47	39.81	44.454
December	38.33	53.39	53.63	88.26	47.38	56.198
2014						
March	38.51	53.43	52.28	106.7	48.66	59.916
June	40.9	53.48	53.17	124.67	62.01	66.846
September	41.59	45.97	56.43	174.96	103.76	84.542
December	45.02	42.74	45.61	241.84	84.54	91.95

DATA SOURCE: Google Finance

8 APPENDIX II

8.1 DISCOUNT RATES DATA:

2014	9.5	9.5	9.5	9
2013	9	9	8.5	9.5
2012	11.5	11.5	10	9.5
2011	13.5	13.5	13	11.5
2010	12	12	12.5	13.5

Data Source: [Http://Www.Tradingeconomics.Com/Pakistan/Interest-Rate](http://www.Tradingeconomics.Com/Pakistan/Interest-Rate)

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