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Prediction of stock performance by using logistic regression model: evidence from Pakistan Stock Exchange (PSX)

Syed Shahan Ali[a], Muhammad Mubeen[b], Irfan Lal[c], Adnan Hussain[d]
[a] Department of Commerce, Benazir Bhutto Shaheed University, Karachi & Department of Business Administration, MAJU, Karachi, Pakistan
[b] Department of Management, Bilkent University, Ankara, Turkey and Department of Management Sciences, SZABIST, Karachi, Pakistan
[c] Department of Economics, Institute of Business Management, Karachi, Pakistan
[d] PhD Scholar; Department of Economics, University of Karachi, Pakistan Department of Economics, Benazir Bhutto Shaheed University, Karachi, Pakistan
muhammad.mubin@bilkent.edu.tr (Corresponding author)

(Corresponding author)

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ABSTRACT

The key purpose behind the study is to use logistic regression model to predict stock performance. For this purpose different financial and accounting ratios were used as independent variables and stock performance (either "good" or "poor") as dependent variable. The result shows that financial and accounting ratios significantly predict the stock performance. Our study consists on the sample period of annual data from 2011-2015 and comprises of 109 listed non-financial firms of Pakistan's Stock Exchange (PSX). Our sample was shortlisted on the basis of available data of Market Capitalization. Our research examines sales growth, debt to equity ratio, book to price ratio, earning per share, return on equity and current ratio for the prediction of stock performance. The findings indicate that our prediction was 89.77 percent accurate for prediction good as well as bad performance of stock. Although we did not consider macroeconomic variable to forecast stock return performance but our six firm specific accounting and financial ratios were good enough to predict stock performance. This study shows that Logistic regression model can be used by investors, individual as well as institutions or fund managers to enhance their ability to predict "good or poor" stock.

Contribution/ Originality
This paper contributes by applying the logistic regression model of Altman (1968) and Ohlson (1980) using ML technique for the stock performance prediction of nonfinancial firms in Pakistan Stock Exchange. To increase prediction power of stock performance accounting and financial ratios as suggested by Fama and French models (1988 and 2017) were incorporated.

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1. INTRODUCTION

Nowadays, predicting of stock performance trends is gaining more consideration. The fact behind that if the investor forecast the market trends successfully he or she may gain abnormal profits. Most of the past studies shows that statistical forecast methods are forfeited. Ordinary least square method (OLS) have been the midpoint of all traditional method. Most of the past studies shows that rarely demonstrated successful due to the existence of noise and nonlinearity in past and historical data. Most of the non-linear method proposed advance approach of perceiving stock prices.

A stock market performance or bubble in the financial markets is a term that applies to a self-propagating increase in the stock prices of different sector such as textile, allied engineering, banks etc. The term stock market performance can only accurately predict. In stock market bubble happens when speculators notice the immediate rise in the share prices and then make decision to buy more stocks as a way of forecasting further increase in the price. This act further increases in the prices of stock or shares and this can cause to further increases in stock or share prices and stock or share become over valued or vice versa of opposite situation. After some extent of time the bubble bursts and it can cause the stock price start to decline drastically or harshly. The above effects most of listed companies of stock market are run out their business whereas businesses want to grow their capital. However, the growth of capital is not subject to any limit. In Literature, the theoretical point of view in this regard, capital may grow unlimited. None the less, such an estimation of capital is not accurate.

Due to volatile situation in 2006-07 in developed and emerging economy, domestic and international crashes lead to unexpected worldwide crashes. Local crisis has a tendency to disturb developed markets and so sincere attention should be given to these markets despite under conditions where the investors in the emerging stock markets are not evident. In addition, reliance is applicable too, in that policy rate, bond yields and marginal productivity of capital volatility also influences the chances of the various kinds of capital market recession. It is crucial for investor and stockholder to analyze the pertinent financial facts and figure to equip them to undertake rational investment choices in the money & capital market. It is always complicated to forecast stock and share performance. Historically and to this date there cannot be found any complete, accurate and comprehensive model for the prediction of stock market performance.

Company's annual reports are used to be analyzed the financial ratios to determine the stock's performance. Famous financial literatures i.e. Basu (1983) and Fama and French (1988, 1992, 2017) have suggested that financial & accounting ratios are very imperative apparatuses to analysis imminent stock market performance. Research Analyst and investors use financial and accounting ratios extensively to predict future stock price developments. Financial ratios and indicators can be materialized as a very important estimator used by mutual fund managers to ascertain the core significance of stock. Emerging crises in United States, Asian Stock Markets and Stock Markets in various part of Europe in late 90s and early 2000s have given enough evidence to the evolving study of financial ratios.

Nowadays, financial ratios are being widely used in essential examination to determine the impending stock performance (Mubin *et al.*, 2014). Different new ratios have been developed in this regards, such as book value, price earnings ratio, cash flows price ratio etc. to build up the foundation for investor in order to effectively analyze the stock price predictions. Financial ratios are used to stimulate rational investment choices. Significance of financial ratios can be judged differently amongst various industries (Mubin *et al.*, 2014) and from country to country (Tsai *et al.*, 2011). Thus, choosing suitable ratios are very crucial in increasing forecast success rate.

The purpose of this study is to smear numerical methods for review and examination of financial information to design an abridged model for explanation. The main purpose of the study to apply binary model for classifying stock or firm into two parts good performance stock and bad performance stock, based on their marginal productivity of capital. A firm's stock is categorized as "good" if its

shareholder's profit is high compared to the market returns gained from the PSX benchmark Index i.e. KSE 100 index or vice versa. In this study, the maximum likelihood method via Logistic regression model is being applied to categorize listed nonfinancial firms, based on their shareholder equity returns. The Logistic Regression model, by applying variable to logistic curves, can be used to forecast the likelihood of good performing stocks. Thus, Logistic Regression is applied to categorize a bunch of independent variables into either two or more mutually exclusive classes. It contains exploring a linear mixture of regressors that echoes large variances in group means.

2. LITERATURE REVIEW

Pakistan Stock Exchange has always been a subject matter of rigorous financial studies in case of developing markets or emerging market. However, while measuring the stock performance, not enough consideration has been given to this subject. Nonetheless, the market's robust growth and increased potential for worldwide investment opportunities, has interested the researchers to provide extensive focus in this area of study.

However, prevailing researches shows that Logistic Regression is not very often used in the construction of model for prediction of out-performing stocks. Contrary to that Logistic regression seems to be more reliable in forecasting business downfall and financial fiasco. It has up till now not been used to predict stock market performance in Pakistan, which is one of the top performing emerging markets in Asia. Only exception was found by Dutta (2015) who applied logistic regression in case of India but his prediction power was 74.7% and sample comprises on 30 non-financial firms based on market capitalization. So, to serve this very purpose, this research will try to generate valuable evidence for the investors and stockholders for them to be able to make sound investment choices.

In this context, we adopted a chronological literature review stating previous researches that have contributed to this subject area highlighting the need for prediction of stock performance and the various models applied for this purpose over the years are being discussed.

In the late 60's, Altman (1968), who is considered as the pioneer in this area of research, advocated that in order to evaluate its likely impact thoroughly, different financial ratios were collaborated as a set on which discriminate analysis approach was taken into account the problem of predicting insolvency of companies. The concept was that if ratios when analyzed under a multivariate data analysis framework, tend to assume superior significance at 5% as compared to the general statistical technique of sequential ratio comparisons. This propels highly promising results, since the multiple discriminate analysis model verified to be enormously accurate in forecasting insolvency. The model accuracy was around 94 % of the initial sample with approximately 95 % of all firms in the actual group categorization of the solvent and insolvent sets assigned.

Moreover, reliability of the model was also tested in several secondary samples incorporated, suggesting accurate discriminate function. Examination of the individual ratio movements before the bankruptcy verified the results of the model, elaborating that insolvency can be successfully forecasted for 2 years even before the actual failure with the preciseness fading swiftly in the subsequent years. Apart from being genuine predictors of corporate failures, financial ratios can also be used for categorizing industries as per the level of risk. Horrigan (1965) discovered that to efficiently predict bond ratings, financial ratios may effectively be used. Likewise, Metnyk and Mathur (1972) also utilized ratios in order to categorize firms on the basis of risk groups and attempted to connect them to firms' market rate of return which on the contrary didn't report favorable results. Five ratios were studied by Connor (1973) which include: Total debt to equity, WC to sales, cash flow towards shareholder's equity, EPS to market value per unit of share and payable behavior to the supplier, however, were acknowledged not to be so reliable indicators of shareholder's equity.

Abdel-Khalik and Lusk (1974) indicated that upon analyzing the strictures of the regression of the principal sample to anticipate the rate of return of the hold-out sample, it can be observed that the trustworthiness of the prediction is a direct function of the reliability of the strictures and the regression equation itself. He believed that the regression equation and the strictures estimated were not useable for predictive purposes for 3 main reasons: (1) the choice of the explanatory ratios was peculiar, (2) the issue of the ratios' multi-co-linearity, and (3) the use of unadjusted R square as a measure of the explanatory power.

Ohlson (1980) had made use of Logistic Regression and constructed the default-prediction model. Previous researches on the default prediction were hooked on categorizing firms on the basis of defaulters and non-defaulters. Ohlson also resoluted the assumption of default prediction as an equal payoff state, because mis-categorization of a defaulted firm as a non-defaulted firm would lead to crucial ramifications for an investor or a lender and vice versa. His study, therefore, concentrated mostly accuracy of the models in prediction of defaulted and non-defaulted firms. Ohlson applied LR technique to assess credit-risk information and indicated that these models are highly efficient in forecasting financial distress and bankruptcy. Other researchers such as Zmijewski (1984) and Zavgren (1985) have also worked on similar patterns for profit analysis.

The theory of efficient portfolio selection also presents a notion of significant research area. One limitation that may create hindrance in this research area would be in the accurate exhibition of financial instruments and portfolio investment policies that are crucial in balancing the combination of securities and ultimately avoid the negative volatility. The perfect tactic would be to comprise those financial instruments that possess negative co-variance with other securities in the portfolio. Though, these financial instruments are difficult to figure out, altogether. The issue becomes to a certain extent resolvable if a technique that discards financial instruments with high negatively volatility or consist in the context of short-selling. Here to handle this problem effectively, discriminate-ratio model contains the necessary counter elements. However, much research still needs to be conducted to explore this subject area more effectively various techniques and many financial ratios have been utilized to categorize the performance of firms. McConnell *et al.* (1986) have observed that to gain a better insight in the methods of predicting stock performance, qualitative data is also more supportive.

Lapedes and Farber (1986) reported for NN Models to be successful techniques in prediction or forecasting across many disciplines. They successfully applied MLP designed through logistic map and the Glass–Mackey equation, which have the ability to imitate and forecast ever changing non-linear systems. Following their footsteps Poh and Yao (1995) discovered that to efficiently predict bond ratings, financial ratios may effectively be used. Likewise, Metnyk and Mathur (1972) also utilized ratios in order to categorize firms on the basis of risk groups and attempted to connect them to firms' market rate of return which on the contrary didn't report favorable results. Five ratios were studied by Connor (1973) which include: Total debt to equity, WC to sales, cash flow towards shareholder's equity, EPS to market value per unit of share and payable behavior to the supplier, however, were acknowledged not to be so reliable indicators of shareholder's equity.

Fama and French (1992) suggested that across the United States a number of studies have observed a cross-sectional relationship existing between stock returns and fundamental variables. These fundamental variables are constituted on the basis of analysis of different financial ratios like earnings yield, cash flow yield, book to market value and size of firm and they have proven out to be significant indicators in determining the performance of stocks and have been observed to exercise substantial impact on prediction of stock returns.

European based researches have also identified similar findings to have occurred in the European Markets. The model generated by Ferson and Harvey (1993) that is being used extensively throughout the European Markets e.g. UK, France and Germany allowed sensible prediction of returns.

Aminian *et al.* (2006); Yu *et al.* (2009) and Aiken and Bsat (1999) applied MLP technique to successfully predict advertising and marketing trends, macroeconomic data, financial time series forecasting and stock market trends respectively.

Harvey (1995) studied fresh equity markets that have emerged in Europe, Latin America, Asia, the Mideast and Africa and provided an innovative set of opportunities for investors. He elaborated that high expected returns and increased volatility are the features common to these markets. More importantly, he identified significant reductions in unconditional portfolio risk of world investors due to low correlations with developed countries' equity markets. In contrast, he identified that for explaining the cross section of average returns in emerging countries, standard global asset pricing models that undertake complete integration of capital markets are not suitable. His investigation of the predictability of returns revealed that local information deeply influence the emerging market returns.

Studies carried out by Jung and Boyd (1996) suggested that in predicting stock performance of UK stock prices the models of stock performance tend to be fairly effective. According to Cheng *et al.* (1996); Van and Robert (1997) to create a framework for financial time series, artificial neural networks (ANN) have been fruitfully used.

Al-Loughani and Chappell (2001) while conducting a study on the Kuwait Stock Exchange witnessed the emergence of institutional investors as the leading performers in the market. They estimated that analysis of financial ratios and Logistic Regression techniques play a significant role in the forecasting of out-performing stocks.

Chen *et al.* (2003) forecasted the trends in the returns on market indices of the Taiwan Stock Exchange by applying a probabilistic NN model. The findings were then equated with the generalized methods of moments (GMM) along with the Kalman Filter. Lee (2004) and Pardo *et al*. (2005) also upheld the advantages of Logistic Regression by confirming that through the accumulation of a suitable association function to the standard linear regression model, there may either be continuous or discrete variables, or any combination of both types, which don't essentially have normal distributions.

Yumlu *et al.* (2005) applied a series of NN models and Linear regression models to Istanbul stock exchange and New York Stock Exchange respectively. The composite index data from the periods ranging from 1990-2002 of the Istanbul Stock Market and from 1981-1999 in the New York Stock Exchange were analyzed and successfully predicted the role of trading volume in the respective stock exchanges.

Lee *et al.* (2007) emphasized that Logistic regression can come in handy in conditions where prediction of the existence or deficiency of an outcome or feature is dependent on values of a set predictor variable. In this, the Logistic regression model is very much like the linear regression model, however, it is more convenient where there exists a dichotomy of dependent variable. The models with Logistic regression coefficients have a tendency to use estimated odd ratios for every independent variable. A multi-variant regression can be formed between dependent and independent variables under Logistic regression.

Kumar and Ravi (2007) conducted a wide-ranging evaluation of various studies related to bankruptcy prediction problems and discovered that neural network is the highly-accepted mode of statistical modelling for prediction of stock performance.

Öğüt *et al.* (2009) figured out that data-mining methods such as Artificial Neural Networks and Support Vector Machines are more appropriate to spot manipulation of stock price as compared to econometrical methodology's and multivariate data analysis techniques for example Logistic Regression Model and Multiple Discriminate analysis, this is because data-mining techniques perform better and accurate classifications rather than multivariate techniques. These studies proposed a

different binary classification method, founded on genetic algorithms, for forecasting corporate failure and suggested for authentication an empirical analysis as its prediction strategy.

Other methods for forecasting accuracy were equated by Min and Jeong (2009), like multivariate data analysis such as MANOVA, Factor Analysis, Structural Equation Modeling and Multiple discriminant analysis, logistic regression, decision tree, and artificial neural network, and the results indicated that the binary classification technique which they suggested, has the tendency to prove out to be an encouraging substitute to prevailing techniques for predicting insolvency.

Mostafa (2010) by using the neuro computational model to predict the stock exchange movement in emerging markets, analyzed that quasi newton training algorithm is effective as compared to training algorithms and exhibit few forecasting errors. He concluded that the results of neuro-computational model are much more reliable than the results of Logistic regression model and Auto regressive integrated moving average.

Studies conducted on the Taiwan Stock Exchange (TSEC) by Chen (2011) explored the reasons of financial distress predication model. In his study, he made use of 37 financial rations on a sample consisting 100 listed firms at the Taiwan Stock Exchange. In order to exclude or combine the variables he carried out PCA (Principal Component Analysis). Chen (2011) suggested that continuous and robust growth in stock and derivative securities markets throughout the world has allowed for quick market developments and enterprise operating status is to be disclosed periodically on financial statement. However, it is very unfortunate when company executives purposefully design financial statements up, it becomes very difficult to point out any chances of financial distress either in the short or long run.

Guresen *et al.* (2011) supported the notion that predicting stock exchange rates is an important financial problem and deserves due attention and recognition. They advocated that in recent times, for generating genuine forecasting results, several neural network models and hybrid models have been introduced that attempted to beat the old linear and nonlinear approaches. Their study assessed the efficacy of neural network models that have the reputation to be dynamic and useful in stock-market predictions. They analyzed the multi-layer perceptron (MLP), dynamic artificial neural network (DAN2) and the hybrid neural networks models to objectify the autoregressive conditional hetero-scedasticity (GARCH) for extracting different input variables. Each model contained two major points of discussion: Mean Square Error (MSE) and Mean Absolute Deviate (MAD) using real exchange daily rate values of NASDAQ Stock Exchange index.

Dutta *et al.*, (2008 and 2015) investigated that logistic regression (LR) when applied on different financial ratios as various independent variables specify significant mark on the performance of stocks which are being actively exchanged on the Indian stock exchange. This research utilized a sample of ratios from thirty big market capitalizing companies over a duration of four years. The research conducted an investigation on 8 financial ratios, which categorized these companies in to two groups – "good" or "poor" –, up to an accuracy of 74.6%, gauging their market rate of return. The study declares that the framework created can improve the stock price forecasting aptitude of the investors. However, other Macro-economic variables that can exert significantly affect the stock prices, were not considered. The study elucidated the applied inferences of using the Logistic Regression model in order to forecast the prospects of good performing stocks. Author's claim that to expand the capability for selecting good stocks, this model is useful for investors, fund managers, and investment. Upadhyay *et al.* (2012) also applied multi nominal logistic regression to forecast stock performance in Indian market and found similar results.

Wang (2014) studied that to provide a preliminary guideline for short term investors the early forecasting of the direction of share market may become imperative as warning strategy to ultimately prevent financial distress for long term shareholders. Most of the stock prediction researches emphasize on using macroeconomic indicators, such as CPI and GDP, to gauge the prediction model.

Although, the daily data from these macroeconomic indicators are just as difficult to gather and it becomes inaccessible to apply these methods practically. In his research, Wang suggested a technique that makes use of prices data in order to predict stock price and market index directions. He carried out a far-reaching empirical research using the suggested technique presented in his paper on the Korean Composite Stock Price Index (KOSPI) and Hang Sang Index (HSI), as well as the individual constituents included in the indices. The experimental results notably indicated a rise in hit ratios for predicting the movements of the individual constituents in the KOSPI and HSI.

3. ECONOMETRICS METHODOLOGY AND MODEL FRAME WORK

Binary logistic regression model is also known predictive model. It is used where data in dichotomous or binary (0 or 1) dependent variables like in this study where we are interested in whether there was stock performance is above the Karachi stock exchange 100 index or below Karachi stock exchange 100 index. In this types of studies we used categories 0 and 1. In our study 0 means share or stock returns are below the Karachi stock exchange 100 index, while 1 means share or stock returns above Karachi stock exchange 100 index. The logistic regression model or logit probit model is given below.

$$\pi(x_i) = P(y_i = 1 : x_i)$$
$$= [1 + \exp(-X^T \beta]^{-1}$$

Where *yi* is equal to 1if share or stock price is above the Karachi stock exchange 100 index and share or stock price and *yi* is equal to 0 if share or stock price is below the Karachi stock exchange 100 index or Karachi stock exchange 100 index and share or stock price is equal.

$$X^T \beta = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_n x_n$$

X1, x2,…….. is independent variables.

β is coefficient.

According to Kleinbaum *et al.* (2014) logistic regression model the relationship between the dichotomous dependent variables. In logistic regression model is depend upon odds ratios. In this research odds ratios are the probability that share or stock price will above or below the Karachi stock exchange 100 index. Odds is the ratio of the probability that particular outcome is above or below the Karachi stock exchange 100 index.

An odds ratio is used to identified that odds of success (stock or share price is above the Karachi stock exchange 100 index) is equally likely to the odds of failure (stock or share price is below the Karachi stock exchange 10 index). A value is less than one shows that the case is not likely to be attainable and when odds is above or greater than one case is likely to be attainable. So it can be concluded that odds ratio is more than one, a high likelihood for fitting to the group or vice versa.

$$\frac{\pi(x)}{\pi(1-x)} = [\exp(-X^T \beta]^{-1} = \text{odds}$$

Taking natural log both side.

$$\log \frac{\pi(x)}{\pi(1-x)} = [(-X^T \beta]^{-1}$$

above transformation in log is known is logistic transformation.

3.1. Sampling framework

In this study, we started with Top 200 companies[1] of PSX on the basis of Market Capitalization for every year from 2012 to 2015. However, every year there were 10-20 companies which were changing. Thus combining all the Top 200 companies of PSX from 2012 to 2015. We also exclude financial firms due to difference in disclosure requirement of financial and nonfinancial sectors. Typically, Banks and financial institutions informed investors about their performance on quarterly basis which is a bit frequent than disclosure of performance on annual basis by nonfinancial sectors. Thus, we were left with 109 nonfinancial firms. Then, we analysis the association between stock performance and financial ratios of this 109 non-financial listed firm of PSX by using binary logistic regression. The key purpose of this study is to apply the logistic regression framework utilizing financial ratios of the listed nonfinancial firms in order to forecast outperforming shares in the Pakistan stock exchange. This study aims, therefore, to answer two questions.

1. Can the returns of stocks be explained with the help of different financial ratio?
2. Can we analyze stock returns using a logistic regression model?

The study also examines the efficiency of ratios as predication of stock returns. Panel A of Table 1, shows the dichotomous classification of stock performance. Panel B of Table 1, shows the Six Independent Variables (Financial and Accounting Ratios). As a dichotomous dependent variable, stock performance was classified as POOR=0 and GOOD=1, to signify the investment choice 109 non-financial firms listed in Pakistan stock exchange.

Table 1: Classification and description of variables

Panel A: Dependent Variables. Types of Company (Based on Stock Market Returns)	
GOOD (coded as 1)	Return above market returns. i. e. KSE 100 index 1
POOR (coded as 0)	Return below market returns. i. e. KSE 100 index 0
Panel B: Independent variable (Financial and Accounting Ratio)	
Name of Variables	**Description of Variables**
EPS	Earnings per share
PB	Price to Book value
ROE	Return of Equity
CR	Current Ratio
DE	Debt to Equity
Sales	Percentage changes of Net Sales

The final logistic regression equation is estimated by using the maximum likelihood estimation for classifying the stock performance:

$$Z_{it} = \beta_1 + \beta_2 EPS_{it} + \beta_3 PB_{it} + \beta_4 ROE_{it} + \beta_5 CR_{it} + \beta_6 DE_{it} + \beta_7 SALES_{it} + \upsilon_{it}$$

where:

$z = \log\left(\frac{p}{1-p}\right)$ and 'p' is the probability that the outcome is GOOD

4. RESULTS

4.1. Logistic regression

The result of the logistic regression is given in below tables. Stock price returns along with the other accounting fundamental variables with whole sample summarized is given in the table.

$$Z = -.327 + 0.002 * EPS + 0.034 * PB + 0.006 * ROE + -0.04 * CR + 0.003 * SALES + -0.001 * DE$$

[1] It represents 90% of PSX's Market Capitalization

Table 2: Logistic regression results

		B	S.E.	Wald	Df	Sig.	Exp(B)
Independent Variables	EPS	0.002	0.004	0.235	1	0.628	1.002
	PB	0.034	0.032	1.106	1	0.293	1.034
	ROE	0.006	0.004	2.519	1	0.113	1.006
	CR	-0.040	0.080	0.253	1	0.615	0.961
	Sales	0.003	0.003	0.868	1	0.352	1.003
	DE	-0.001	0.001	0.775	1	0.379	0.999
	Constant	-0.327	0.188	3.020	1	0.082	0.721

a. Variable(s) entered on step 1: eps, PB, ROE, CR, sales, DE

Above logistic regression model equation, which is calculated on the basis of Maximum likelihood method shows that firms classify into good or poor. On the basis of Z values, we calculated the P value. If P value is above the 0.5 (Cut off rate) than companies predicted as good otherwise poor. Agresti (1996) favours MLM technique for Wald statistics for small sample size. Although Menard (1995) identified that large coefficients, standard error is leads to lower the value of Wald statistic or chi square value, but as our results does not have that characteristics, thus we can go ahead with Wald statisitics.

Table 3: Hosmer and Lemeshow test

Chi-square	df	Sig.
22.775	8	0.004

Hosmer and Lemeshow (1989) suggested goodness of fit test known as H and L test shown in Table 3. This test is useful, when data is collected on the basis of simple random survey. This procedure involves grouping of the observations based on the expected probabilities. After determine the expected probabilities, we test the hypothesis that the difference between expected value of probabilities and observed value of probabilities. Null hypothesis that expected value and observed value difference is zero for all tested groups. H and L (Hosmer and Lemeshow, 1989) test the statistic through simulation. This distribution is based on chi square technique because no replication in the subpopulation. H and L test is only used for binary response models or logistic regression model. The Hosmer and Lemeshow (1989) statistic assesses the goodness of fit. The method is working on 10 ordered groups of subjects and then compares. The results show that chi square value and p values both are statistically significant at 4 percent level. Hosmer and Lemeshow test shows indicates acceptance of the null hypothesis of the logistic regression model. There is no statistically difference between observed and predicated values.

4.2. Summary of the result

Table 4: Stock performance classification

		Performance Predicted		
		Poor	Good	Correct Prediction (in %)
Performance Observed	Poor	217	25	89.7
	Good	25	170	87.2
Overall				88.4

In Table 4, the result of Stock performance classification shows the overall performance prediction. The performance of the model is analyzed with the help of cross tabulating observed response categories versus predicted performance categories. In the above table if predicated value is greater than cut off rate it is considered as one or below the cut off rate it is considered as zero. The cut off value is set in this study is equal to 0.5. The analysis of the observed and predicted performance of the companies shows that accuracy of our logistic regression model. In this table, we specify the degree

of correct prediction of our model. It shows that our model is 88.4% accurately predicting the performance. The results provided the evidence that Earning per share, price book ratio, return on equity, current ratio, sales growth and debt to equity are used as identifier of the company's probability of performing good or poor. Our result predicts 89.7 percent poor companies and 87.2 percent good companies result accurately.

5. CONCLUSION

This research used logistic regression model to predict the performance by accounting and financial variables of the nonfinancial firms listed in Pakistan stock exchange. The key advantage of this study is that, it is very helpful for fund managers, investors, commercial bank and brokerage houses to form an opinion about the share of nonfinancial firms traded in stock market. The model is very helpful for investor to increase their predication power regarding the stock price movement. For prediction of stock performance, the accounting and financial ratios i.e. sales growth (percentage change in sales), return on equity, debt to equity, current ratio, earning per share and book to price ratio were used. The result of our study shows that 88.7 percent level of accuracy of our model.

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