

# PREDICTABILITY OF RETURNS: A CASE STUDY OF KARACHI STOCK EXCHANGE, PAKISTAN

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## ABSTRACT

The study has been designed to investigate the information efficiency in the Karachi stock market. This is examined using stock market indices from July 1997 – July 2007. Weekly stock indices are used for evaluation of KSE. The daily stock indices are not used because of several biases such as bid ask spread, non-trading etc. The Efficient Market Hypothesis (EMH) was tested using a GARCH model. It is concluded that Karachi Stock Exchange is information inefficient and the predictability of returns and risk is possible. These tests indicate non-randomness in the behavior of Karachi Stock Exchange indices and hence cast a shadow on the efficiency at the KSE. These are the powerful test and hence their results can be relied upon. The study recommends that SECP step up its regularity measures in the general interest of the public.

## INTRODUCTION

The theory of random walks implies that a series of stock price are unpredictable. In another words, the past performance of the securities can not be used to predict the future in any way. The future price levels of a security are random numbers. Hence the market is regarded as efficient.

Contrary to this concept, there are other methods which suggest that stock prices do not follow a random behavior and hence the future values of stocks are conventional. One of the theories that is the Chartist theories unreservedly suggests that the successive price changes are reliant. Correspondingly, the Fundamental Value Analysis also believes in foretelling the future values of stocks. Thus the two schools-of-thoughts differ in their assertions.

In Pakistan so far some degree of work has been done on stock market. Still very commonly used econometrics models have not been tested in our markets. This study applies a classical framework of testing market efficiency.

### Theoretical Framework

The Random Walk Hypothesis (RWH) affirms that stock market prices cannot be predicted. Researchers have traditionally accepted the random walk hypothesis. However there are others who think that the market is conventional to some degree. These people believe that there are trends in the prices and one can find out whether the stock is on the rise or fall. So now there are two schools of thoughts: one in favor of Random Walk Hypothesis and the other against it.

Louis Bachelier (1900) observed that changes of prices of French government papers are unpredictable. So he concluded that “*the mathematical expectation of the speculator is zero*”. However his research remained largely anonymous until 1930s. Kendall (1953), and Fama (1965), and others found that successive stock price changes are autonomous and uncorrelated which caused him to assert that they are generated randomly. Their researches mostly concentrated on the statistical approach to testing stock price independence. However, subsequent researches of Lo & MacKinlay (1988) showed that stock prices do not follow the random walk in the long run. The concept of efficient market was introduced by EUGENE F. FAMA (1970). He described information efficiency as a situation where all the information (news) about a given stock is reflected in its price. The faster a market adjusts to new information the more it is considered efficient. This is known as Random Walk Hypothesis (RWH).

Random walk hypothesis has been put to scientific tests in many stock exchanges of the world. Several researches have been done on this topic on various stock markets of different countries or regions. Some studies have found that selected stock market follow random walk Fama (1970). While some studies have found selected stock market don't follow random walk such as Pant & Bishnoi (2001) and Lo & MacKinlay (1988).

Koh & Goh (1994) evaluated the efficient market paradigm on Malaysian stock indices. The results discovered that the Malaysian equity prices were unpredictable in the long-run.

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Lo & MacKinlay (1988) discarded the random walk hypothesis. Similarly, Kim, Nelson & Startz (1991) examined the stock prices by using weekly and monthly returns in five Pacific-Basin stock markets. They rejected the hypotheses of randomness for both daily and weekly market returns for Korea and Singapore and accepted the null hypothesis in case of Japan. The hypotheses for Hong Kong daily returns index and the Taiwan weekly returns index were also rejected. Their results showed that all the returns based on the five market indices were positively auto correlated except for Japan.

Barman & Madhusoodanan (1993) study based on industry wise indices accomplished that in general Indian market is mean reverting. In his further study Madhusoodanan (1998) concluded that the Bombay Stock Exchange is market inefficient. Ming, Nor & Guru (2002) demonstrated that Kuala-Lumpur stock exchange did not follow random walk. Darrat & Zhong (2000) scrutinized the random walk hypothesis for the two capital markets in China. They rejected the random walk in newly created Chinese stock exchanges using both the methodologies.

Grieb & Reyes (1999) revisited the Brazilian and Mexican stock markets. Their findings pointed out non-random behavior in the Mexican market where as the Brazilian market followed the random walk.

In short, the above literature shows that still it cannot be said with certainty that whether stock markets follow random walk or stock prices are predicable. The squabble between random walk believers and believers of non-random behavior of asset prices has not ended yet.

### **Karachi Stock Exchange**

The KSE is the main stock market in Pakistan and in 2002 it was affirmed as the "Best Performing Stock Market of the World" by "Business Week". Till date, 671 companies are listed. The market capitalization is to the tune of Rs. 4364.312 billion (US \$ 73 Billion). KSE has been described as the best performing markets of the world from the last four years. It has been noticed by "Business Week" the USA Today. Foreign buying interest had been very active on the KSE in 2006 and has continued in 2007 so far. According to estimates from the State Bank of Pakistan, foreign investment in capital markets total about \$523 Million US. According to a research analyst in Pakistan, around 20pc of the total free float in KSE-30 Index is held by foreign participants.

The KSE-100 is a capital weighted index and consists of 100 companies representing about 86 percent of market capitalization of the Exchange.

In 1995 the need was felt for an all share index to corroborate the KSE-100 and also to provide the basis of index trading in future. On August 29, 1995 the KSE all share index was constructed and was subsequently launched on September 18, 1995.

KSE has also pioneered the KSE-30 Index which is calculated using "Free Float Market Capitalization Methodology". The chief intent of the KSE 30 Index is to have a bench mark by which the stock price recital can be contrasted to over a period of time. In particular, the KSE-30 Index is intended to provide information as how hefty company's scrip's of the Pakistan's equity market are performing.

### **Data and Hypotheses**

The data of this study consists of the monthly and weekly returns of all shares included in KSE- 100 index. Ten years data has been used for present study. (the maximum online available data on KSE-100 index), starting from July 1997 to July 2007. The daily closing prices of KSE-100 index were used as a source document which was used to arrive on weekly and monthly basis and from that data weekly and monthly returns were calculated. Because of the various biases in the daily data, it was not considered. It is hypothesized that the Karachi stock market does not follow the random walk.

### **Sources of Data**

Weekly and monthly closing values of kse-100 index from July 1997 to July 2007 were taken from www.finance.yahoo.com. The data is spread over 121 months and 519 weeks. After getting the data, returns were calculated as the logarithmic difference between the two consecutive prices in a series yielding continuously compounded returns. Its equation is

$$R_t = \ln\left(\frac{P_t}{P_{t-1}}\right)$$

Or

$$R_t = \ln(P_t) - \ln(P_{t-1})$$

Whereas;

$P_t$  = current closing index price

$P_{t-1}$  = opening or pervious period closing price

$\ln$  = Natural log

Monthly returns were calculated by taking log difference between two consecutive month's prices and weekly returns were calculated by taking log difference of two consecutive weeks' prices.

### **Analytical technique for Market Efficiency**

The weekly data of the KSE-100 index was analyzed by employing a GARCH test. Bollerslev (1986) have introduced a generalized model which essentially generalizes the ARCH by modeling the conditional variance as an ARMA process. The general specification of the model is as under

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + u_t$$

Where,

$$u_t \sim N(0, \delta^2)$$

$$\delta^2 = \Pi_0 + \Pi_1^2 e_{t-1} + \Pi_2 \delta_{t-1}^2 + v_t$$

In this specification of the model  $Y_t$  is submitted as the mean equation and the  $\delta^2$  represents the variance equation. The mean equation is specified as an autoregressive process ARMA (p,q), which assumes that the time series depends upon its lag value. The choice of selecting was done using standard econometric technique.

## RESULTS & DISCUSSION

The following table reports the result of an ARMA (1, 0) model and the GARCH (1, 1) model. The significant value of Alpha (1) and Beta (1) are indicative of the fact that conditional volatility changes over time due to volatility clustering. Moreover, the sum of these coefficients is very high which entails that the shock tends to last for longer periods. The sum of these coefficients is less than one and is pinpointing the stability of the model.

### ARMA (1, 0) & GARCH (1,1) estimates

Variable	Co-efficient	P-Value
const	0.00284517	0.05982
ldv_1	0.159088	0.00087
Alpha (0)	0.000102677	0.01270
Alpha (1)	0.173243	0.00005
Beta (1)	0.772830	0.00001
AIC = -1922		
Loglikelihood ratio = 973.131		

## CONCLUSION

The randomness or the nonrandomness of the stocks and other financial assets is an issue which has been widely explored by a number of researchers in the wake of market efficiency debate and keeping in view the growing activities of the speculators and other investors across the globe. Our primary concern was to investigate the efficiency at the Karachi Stock market following the recent crash and call for investigation regarding the manipulation by the stock brokers.

Based on the result of the robust tests applied on KSE-100 Index, it is finally concluded that Karachi Stock Exchange doesn't follow the random walk hypothesis. The findings of this study are also consistent with the past researches that reject Random Walk Hypothesis for KSE.

The results of the study shall aid the investors and other stakeholders in their practice at the stock market. It will also help the policy maker in devising policy to overcome the inefficiency in the market. The study recommends that the Security and Exchange Commission of Pakistan (SECP) should review its existing regularity procedure and should step up measure to ensure the trans-

parency in transaction to achieve the information efficiency at the market.

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