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STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

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THE RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES AND CEMENT INDUSTRY RETURNS: EMPIRICAL EVIDENCE FROM PAKISTANI CEMENT INDUSTRY

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ABSTRACT

This particular study has been conducted in order to find the empirical relationship between macroeconomic variables and cement industry returns for the period of 01/1999 to 01/2008. The variables include Interest rate, Inflation, Exchange rate and Stock Index. The data have been examined using multivariate cointegration analysis, Granger causality analysis, and Impulse response and variance decomposition. After confirmation of the stationarity of the data, the researcher applied multivariate Co integration Analysis showed that the null hypothesis of co integration between the cement industry returns and macroeconomic variables can not be rejected. Therefore, the results provide evidence of a long-term relationship between macroeconomic variables and cement industry returns. The result shows that the relationship between Cement Industry Returns and macroeconomic variable is not strong. It is found that return of T-Bills & Exchange rate does Granger Causes the return of cement industry; these results are consistent with Hassan & Javeed (2009) results. Returns of T-Bills to returns of cement, returns of exchange rate to returns of Index, and returns of Inflation to T-Bill have unidirectional relationship. While return of T-bill to Index, and Index to T-Bill have a Bi-directional relationship. Variance Decomposition Analysis shows that the prices of cement fluctuate itself by 96% while T-Bill is main sources of volatility followed by Inflation rate. Thus the finding of the study is appearing that there is long term relationship between the macroeconomic variables and cement industry returns. The impact of the behavior of these variables helps the investors to take a wise decision about the trading of cement stocks.

KEYWORDS
Macroeconomic, Cement Industry, Stationarity, Co Integration.

INTRODUCTION

The causal relationship between monetary variables and equity returns has been one of the most debated topics in finance during the last few decades. The idea of whether stock prices and exchange rates are related has been studied since the 70's. Franck and Young (1972) was the first study that examined the relationship between these two variables. Equity prices are the most closely observed asset prices in an economy and are considered the most sensitive to economic conditions; high volatility or abnormal movements in equity prices from fundamental values can have adverse implications for the economy. Thus, it becomes imperative to understand the relationship and dynamics of monetary variables and equity market returns.

Financial economists, policy makers and investors have long attempted to understand dynamic interactions among macroeconomic variables, exchange rates and stock prices. Theoretically, their causal interactions may be motivated using such models as the standard stock valuation model, monetary and portfolio allocation models of exchange rate determination, and standard Aggregate Demand – Aggregate Supply (AD-AS) textbook models. According to the stock valuation model, stock price represents the discounted present value of the firm's future cash flows. This means that any change in such economic variables as real output, money supply, exchange rates and others may affect stock prices through their influences on firms' cash flows and discount factors. At the same time, changes in stock prices may also influence variations in economic activities and act as a channel of monetary transmission mechanisms.

As for the effect of macroeconomic variables such as money supply and trade balance on stock prices, the efficient market hypothesis (EMH) suggests that competition among the profit-maximizing investors in an efficient market will ensure that all the relevant information currently known about changes in macroeconomic variables are fully reflected in current stock prices, so that investors will not be able to earn abnormal profit through prediction of the future stock market movements. This response is neither equal nor homogeneous across all economic changes, and it becomes imperative to investigate the interactions among monetary factors Causal Relationship among Monetary Variables and Equity Return. Therefore, it can be concluded that, in an information efficient market, past (current) levels of economic activity are not useful in predicting current (future) stock prices. Stated in Granger jargon,

Although Ibrahim (1999) covered a wider range of macroeconomic variables, he mainly concentrated on bivariate interactions between the stock price, on the one hand, and a macroeconomic variable of interest, on the other. Secondly, the existing studies normally end at reporting co integration and Granger causality test results as a way of describing the strength of the interactions. However, better measures for the strength of dynamic interactions are variance decomposition and impulse-response functions (Lastrapes and Koray, 1990). In particular, unlike Granger causality tests, these measures capture both the direct and indirect effects of innovations in one variable, on other variables in the model. Accordingly, the dynamic interactions among these variables can be fully addressed.

In this study the researcher attempts to evaluate the dynamic interactions among various macroeconomic variables and the stock price for the case of Cement industry in Pakistan. The macroeconomic variables considered include inflation, interest rate, the exchange rate and KSE 100 Index.

The purpose of the present study is to investigate the empirical relationship between cement industry's stock prices and macroeconomic aggregates: inflation, interest rate and the exchange rate, using monthly data that span from 1/1999 to 01/2007, the present analysis has a main focus on identifying dominant macroeconomic factors for stock price fluctuations in Cement industry in Pakistan. It also aims at evaluating dynamic behavior of other variables emphasizing and the roles of exchange rates in domestic economic performance.

The rest of the Paper is structured as follows. In the next chapter, I overview the cement industry in Pakistan and chapter third is all about the literature review. In chapter four of the paper outlines the empirical approach used in the analysis, which is based on co integration tests which capture the presence of a long-run relationship among the variables, variance decomposition and impulse-response functions are to gauge the strength of these dynamics. Next in the paper, I describe the data and present the results from the co integration tests. Lastly, section concludes with the main findings.

LITERATURE REVIEW

Kandir (2008) has studied the impact of Macroeconomic Variables on Stock Returns based on Turkish economy. The findings of the literature suggest that there is a significant linkage between macroeconomic factors and stock return in the countries examined. The impact of pricing common stocks has been a great concern in the finance literature. Building on Markowitz'(1952) mean variance portfolio model, Sharpe (1964), Lintner (1965) and Mossin (1966) introduced the first and generally accepted asset pricing theory, commonly called capital asset pricing model (CAPM). CAPM uses just one factor, namely stock market index, in order to explain common stock returns.

Hassan and Javaid (2009) in their study examined the lead lag relationship among stock prices and four important monetary variables which include money supply, T-bill rates, exchange rates, and inflation for the period 6/1998 to 6/2008 by using multivariate co integration analysis and the Granger causality test. The results provided evidence on information transmission in equity markets and explained the impact of changes in monetary variables on the stock market. Multivariate regression analysis provided evidence of one co integration vector, which is an indicator of a long-term relationship among the variables concerned. Hassan and Javaid (2009) concluded that monetary variables have a long-run as well as short-run relationship with equity returns. The identification of the impact of monetary variables on stock market behavior facilitates investors in making effective investment decisions as by estimating expected trends in exchange rates; interest rate, and money supply, investors can estimate the future direction of equity prices and thus allocate their resources more efficiently.

Another interesting point of the results is the relationship observed between respective stock market prices and monthly oil prices. As hypothesized, the relationship would be inverse. However this relationship was not consistent for all of the BRIC countries, which alternated between a positive or negative relationship as the time-frame was carried forward, with significance value only for India at MA(1). Since this study did not include other macroeconomic variables, such as inflation, it may be that oil prices themselves may not have as much of a profound effect as expected. Instead, the change in oil prices may be better reflected in the inflation rate, which may have a more profound effect on stock market prices. Also the exponential growth in oil prices did not occur until after the beginning of 2004, which is towards the end of the timeframe of this study.

The same alternation between positive or negative relationships was observed for the dependent variable and its moving average except for Russia at MA(1). It appears past stock market prices overall did not have a significant impact on current stock prices, as their respective regression parameters appeared to be considerably low in nature.

The stock market of Pakistan remained highly volatile for the last fifty months. Three intense financial crises were observed during this period. First, stock market was crashed in March 2005. Second collapse was observed in the second quarter of the year 2006. Third and the most serious crash were observed from May 2008 to January 2009. The major source of this volatility was political uncertainty and instability — such as judiciary crisis, terrorist attacks, assassination of Benazir Bhutto (Chairperson, Pakistan Peoples Party, and former Prime Minster of Pakistan) — for the last crisis in the stock market but the first two crashes were due to bad governance and hold of speculators in the stock market. Hence, there was a need to study the behavior of stock market and determine the economic factors for policy recommendations that could safeguard the investors of stock markets.

This study investigated long-run and short-run relationships between five macroeconomic variables and stock prices in Lahore Stock Exchange. All the series used in this analysis was found non-stationary at levels but stationary at first difference. Two long-run relationships were found between macro economic variables and LSE25 Index. In the long-run, inflation had a negative impact on stock prices while Industrial production index, real affective exchange rate, and Money supply affected stock returns positively. However, three month Treasury bills rate showed insignificant positive impact on stock returns in the long-run. The VECM analysis depicted that the coefficient of ecm1 (–1) and ecm2 (–1) was significant showing speedy adjustment. The results of Variance Decomposition illustrated that among the macroeconomic variables, inflation was explaining the maximum variance.

Ibrahim and Yusoff (2001) explored Macroeconomic Variables, Exchange Rate and Stock Price from Malaysian perspective. The study analyzes the dynamic interactions among financial variables, the stock price and exchange rate, and three basic macroeconomic variables-real output, price level and money supply-using time-series techniques of co integration and vector auto regression. Some important results are detailed as follows. The inclusion of the macroeconomic variables and the exchange rate improve the predictability of the Malaysian equity prices. Conversely, the movements of the stock market also contain information on future variations of these variables particularly the consumer prices. We note specifically that movements in the Malaysian stock market are driven more by domestic factors, particularly the money supply, than by the external factor (i.e., the exchange rate).

Mehrara (2006) examined the causal relationship between stock prices and macroeconomic aggregates in Iran, by applying the techniques of the long–run Granger non–causality test recently proposed by Toda and Yamamoto (1995). The informational efficiency of major stock markets has been extensively examined through the study of causal relations between stock price indices and macroeconomic aggregates. The findings of these studies are important since informational inefficiency in stock market implies on the one hand, that market participants are able to develop profitable trading rules and thereby can consistently earn more than average market returns, and on the other hand, that the stock market is not likely to play an effective role in channeling financial resources to the most productive sectors of the economy. The findings imply that macroeconomic variables are significant in predicting changes in stock prices. Thus, it can be claimed that stock price variability is fundamentally linked to economic variables, although the change in stock price lags behind those economic activities. In other words, while macro variables Granger-caused stock prices, no reverse causality was observed. So, the stock price index is not a leading indicator for economic variables, which is inconsistent with the findings that the stock market rationally signals changes in real activities (Fama, 1991; Geske & Roll, 1983). More over, it may be concluded that Iran stock market does not have informational efficiency at least with respect to three macroeconomic variables: money Supply, trade balance and industrial production.

Ismail and Isa (2006) in their study on Modeling the Interactions of Stock Price and Exchange Rate in Malaysia studied the nonlinear interactions between stock price and exchange rate in Malaysia using a two regimes multivariate Markov switching vector auto regression (MS-VAR) model with regime shifts in both the mean and the variance. It reveals that a nonlinear model is more appropriate compared to linear models for all series being analyzed but did not give information regarding the nature of the nonlinearity. Therefore, instead of modeling the returns of stock price and changes of exchange rate series as a linear VAR model we employed a nonlinear two regimes multivariate Markov switching vector autoregressive (MS-VAR) model with regime shifts in both the mean and the variance to extract common regime shifts behavior.

Mohammad, Hussain and Ali (2009) studied the Impact of Macroeconomics Variables on Stock Prices from Pakistan's perspective. They intended to find the relationship between macroeconomic variables and prices of shares in Karachi stock exchange in Pakistan context.

They find out that changes in the macroeconomics variables cannot be used as a trading rule by investors to earn consistently abnormal profits in the stock market. Current as well as past information on the growth on the variables are fully reflected in assets prices so that investors are unable to formulate some profitable trading rule using the available information.

Léon (2008) investigates the effects of interest rates changes on the stock market returns and volatility in Korea. It estimates two GARCH (1,1) models: model 1 without interest rates, and model 2 which includes interest rates in both the conditional mean and variance. Konan found that estimates of conditional market returns and variance parameters are nearly identical for both models. Meanwhile, the conditional market returns is shown to have a negative and significant relation with the interest rates conforming to the results reported in the U.S. market. The conditional variance is positively related to the interest rates but this correlation is not significant as compared to the one documented in the U.S. market. These results indicate that interest rates have a strong predictive power for stock returns in Korea, and a weak predictive power for volatility. Finally, diagnostic checks confirm that the models are fairly specified. The results of this paper have an important policy implication for investors. It is well known that the interest rate is the price of capital allocation over time. A high interest rate attracts more savings, whereas a reduction in the interest rate encourages higher capital flows to the stock market by those expecting a higher rate of return. Investors should therefore pay attention to the monetary policy as a mean for adjusting their investments.

Maysami, Howe and Hamzah (2004) investigated that An efficient capital market is one in which security prices adjust rapidly to the arrival of new information and, therefore, the current prices of securities reflect all information about the security. What this means, in simple terms, is that no investor should be able to employ readily available information in order to predict stock price movements quickly enough so as to make a profit through trading shares. This study examined the relation between macroeconomic variables and the Sector Stock Indices represented by the SES All-S Equities Finance Index, SES All-S Equities

Property Index and SES All-S Equities Hotel Index, as well as the Singapore's composite stock index, using Johansen's (1990) VECM, a full information maximum likelihood estimation model.

This study found different degrees of statistical relationships, between the inflation, GDP, unemployment, money supply and stock price. The research found that, our variables have different effects on the companies we selected, which belong to the same industries. But it has different sensitivity to our variable, the research can say that another forces affect the price in this company to give us this result. It could be internal or external forces, so we have different results. According to the variable choose by researcher, the strongest variable effect among our collection was money supply. It has strong positive influence on most companies in our sample. The researcher can depend on this variable for forecasting the stock price. The second variable was CPI, it has a strong effect on most companies, but this effect have unlimited direction, (positive and negative) we can say that this variable must be studied with another one to be able to determine the effect on stock price. As for inflation and unemployment, both have a weak influence on most companies. Therefore, the study depends on estimating the stock price from this variable is a weak estimate.

Naeem and Rashid (2006) conduct a study on the relativity on stock prices and exchange rates (Stock Prices and Exchange Rates: Are they Related? Evidence from South Asian Countries), in long run and short run. If stock prices and exchange rates are related and the causation runs from exchange rates to stock prices then crises in the stock markets can be prevented by controlling the exchange rates. Moreover, developing countries can exploit such a link to attract/stimulate foreign portfolio investment in their own countries. Similarly, if the causation runs from stock prices to exchange rates then authorities can focus on domestic economic policies to stabilize the stock market. If the two markets/prices are related then investors can use this information to predict the behavior of one market using the information on other market. There is no theoretical consensus on the relationship between stock prices and exchange rates either. For instance, portfolio balance models of exchange rate determination postulate a negative relationship between stock prices and exchange rates and that the causation runs from stock prices to exchange rates. In these models individuals hold domestic and foreign assets, including currencies, in their portfolio. Exchange rates play the role of balancing the demand for and supply of assets. An increase in domestic stock prices lead individuals to demand more domestic assets. To buy more domestic assets local investors would sell foreign assets (they are relatively less attractive now), causing local currency appreciation. Results show no long run and short-run association between stock prices and exchange rates for Pakistan and India. No short-run association was also found for Bangladesh and Sri- Lanka. However, there seem to be a bi-directional long-run causality between these variables for Bangladesh and Sri Lanka. Our results suggest that in South Asian countries stock prices and exchange rates are unrelated (at least in the short-run), therefore, investors cannot use information obtained from one market (say stock market) to predict the behavior of other market. Moreover, authorities in these countries cannot use exchange rate as a policy tool to attract foreign portfolio investment; rather they should use some other means to do this (e.g., use interest rates, reduce political uncertainty, improve law and order situation, produce conducive investment climate etc.). The above results provide evidence against the portfolio balance models of exchange rates determination that postulates a uni-directional causation that runs from stock prices to exchange rates; neither do these results support the traditional models that hypothesized causation from exchange rates to stock prices. We, however, suggest that the significance of our results could possibly be improved upon by applying daily or weekly data.

Aydemer & Dimerham in (2009), study the relationship of stock index with exchange rate. The results of empirical study indicate that there is bidirectional causal relationship between exchange rate and all stock market indices. While the negative causality exists from national 100, services, financials and industrials indices to exchange rate, there is a positive causal relationship from technology indices to exchange rate. On the other hand, negative causal relationship from exchange rate to all stock market indices is determined.

DATA DESCRIPTION AND METHODOLOGY

This study investigates the long-term relation between the Cement Industry returns and macroeconomic variables that includes Stock Index, Interest rate/T-Bills, Inflation and Foreign Exchange Rate by using monthly data for the period 01/1999 to 12/2007. The preference for monthly data is in line with earlier work done by Chan and Faff (1998) and Arshad & Tariq (2009) to explore the long-run relationship between macroeconomic variables and capital markets. In this particular study 14 cement companies have been selected on the basis of availability and trading through out the under study period.

CEMENT INDUSTRY RETURNS

Cement Industry returns has been calculated by using following equation

Rt = ln (Pt / Pt-1) ---------- (I)

Where Rt is return for month 't' and Pt and Pt-1 are closing values of cement industry average returns for the month 't' and 't-1' respectively.

INTEREST RATE

T-Bill rates are used as proxy for the interest rate. The change is measured by by the following formula.

Change in Interest Rate = Ln (TBt / TBt-1)-----(II)

FOREIGN EXCHANGE RATE

The change in the foreign exchange is measured by using the end-of-month USD and PKR exchange rate and the change in calculated by the following formula.

Change is foreign exchange rate = Ln (XRt / XRt-1) ----(III)

Where "X" is the Foreign Exchange rate USD vs PKR

INFLATION RATE

In this study we use Consumer Price Index (CPI) as the best proxy for inflation. The change in CPI is calculated by the following formula.

Change in Inflation/CPI = Ln (CPIt / CPIt-1)

The following methods can also be used testing the long term relationship between the Cement Industry Returns and Monetary Variables.

- Descriptive statistics matrix
- Correlation Matrix
- Co integration Tests
- Correlation Matrix
- Granger causality test
- Impulse response analysis
- Variance Decomposition Analysis

For using the above techniques we need the data to stationary. So in order to check the stationarity of the data the researcher have to check the unit root test by using Augmented Dickey-Fuller (ADF) test and Phillip-Perron test. The basic autoregressive model is $Zt = \alpha Zt-1 + ut$, where Zt is the variable studied, t is the time period, α is a coefficient, and ut is the disturbance term. The regression model can be written as

$\Delta Zt = (\alpha - 1) Zt-1 + ut = \delta Zt-1 + ut$, ---------(IV)

The ADF tests assume that the error terms are statistically independent and have a constant variance. This assumption may not be true for all the data used, and so the Phillip-Perron test is used to in order to confirm the correction of the the above assumptions and permit the error disturbances to be heterogeneously distributed. This can be represented mathematically by

$Zt = \alpha o + \alpha 1\, Zt-1 + \alpha t \{t- T/2\} + ut$----------(V)

Test statistics for the regression coefficients under the null hypothesis that the data are generated by Zt = Zt-1 + ut, where E (ut) = 0 ----------(VI)

If a time series is non-stationary but becomes stationary after differencing, then it is said to be integrated of the order one i.e. I (1). If two series are integrated of order one, there may exist a linear combination that is stationary without differencing. If such a linear combination exists then such streams of variables are called cointegrated.

Cointegration tests are divided into two broader categories: (i) residual-based tests, and (ii) maximum likelihood-based tests. Residual-based tests include the Engle-Granger (1987) test while maximum likelihood-based tests include the Johansen (1988, 1991) and Johansen-Juselius (1990) tests. During this study, the

researcher apply the Johansen and Juselius test to determine the presence of cointegrating vectors in a set of nonstationary time series data. The null hypothesis is that there is no cointegration among the series. The vector autoregressive (VAR) approach is employed to test multivariate cointegration. This assumes that all the variables in the model are endogenous. The Johansen and Juselius procedure is employed to test for a long-run relationship between the variables. Johansen and Juselius suggest two likelihood ratio tests for the determination of the number of cointegrated vectors. The maximal eigen value test evaluates the null hypothesis that there are at most "r" cointegrating vectors against the alternative of r +1 cointegrating vectors. The maximum eigen value statistic is given by,

$\lambda max = - T \ln (1 - \lambda r+1)$ ----------(VII)

Where λ r+1,…,λn are the n-r smallest squared canonical correlations and T = the number of observations.

A trace statistic tests the null hypothesis of r cointegrating vectors against the alternative of r or more cointegrating vectors. This statistic is given by

λ trace = $-T \Sigma \ln (1 - \lambda i)$ ----------(VIII)

In order to apply the Johansen procedure, lag length is selected on the basis of the Schwarz criterion.

If cointegration is present in the long run, then the system of equations is restructured by inserting an error correction term to capture the short-run deviation of variables from their relevant equilibrium values. This is necessary as the impact of financial development is generally more apparent in the short run and disappears in the long run as the economy expands and matures. According to Granger (1988), the presence of cointegrating vectors indicates that Granger causality must exist in at least one direction. A variable Granger causes the other variable if it helps forecast its future values. In cointegrated series, variables may share common stochastic trends so that dependent variables in the VECM must be Granger-caused by the lagged values of the error correction terms. This is possible because error correction terms are functions of the lagged values of the level variables. Thus, evidence of cointegration between variables itself provides the basis for the construction of an error correction model (ECM). The ECM permits the introduction of past disequilibrium as explanatory variables in the dynamic behavior of existing variables and thus facilitates in capturing both the short-run dynamics and long-run relationships between variables. The chronological Granger causality between the variables can be explored by applying a joint F-test to the coefficients of each explanatory variable in the VECM. The variance decomposition of cement industry returns is based on an analysis of responses of the variables to shocks. When there is a shock through the error term, the researcher study the influence of this shock on other variables of the system and thus obtain information on the time horizon and percentage of the error variance. The F test is in fact a within-sample causality test and does not allow us to gauge the relative strength of the causality among variables beyond the sample period.

In order to examine out-of-sample causality, the researcher use variance decomposition analysis which partitions the variance of the forecast error of a certain variable into proportions attributable to shocks to each variable in the system. Variance decomposition analysis presents a factual breakup of the change in the value of the variable in a particular period resulting from changes in the same variable in addition to other variables in preceding periods. The impulse response analysis investigates the influence of a random shock to a variable on other variables of interest. Impulse responses of returns in various markets to a shock in oil innovations are also examined. Impulse responses show the effect of shocks separately for different days whereas variance decomposition analysis exhibits the cumulative effect of shocks.

RESULTS AND DISCUSSION

Table-1 exhibits descriptive statistics. The average monthly returns in percentage terms in the Cement Industry are 1.84%. This is equivalent to an annualized return of 24.46%. Average inflation per month is 0.2% whereas T bill rates appear to change at a rate of 0.31% per month. The Percentage changes in exchange rates range from a minimum of -3.06% to a maximum value of 3.86%. However, significant volatility is observed in cement industry returns and monitory variables especially change in exchange rate and inflation.

TABLE-1: DESCRIPTIVE STATISTICS

	R_Cement	R_Index	Change in T bill rate	Change in X rate	Inflation
Mean	0.018383	0.025693	-0.00319	0.001911	0.001943
Median	0.023694	0.02224	0	0.000485	-0.00301
Std Dev	0.107044	0.084726	0.102147	0.008842	0.161215
Skewness	0.531802	-0.02321	-0.59647	1.111967	-0.19013
Minimum	-0.24485	-0.21278	-0.4242	-0.03067	-0.46618
Maximum	0.376752	0.241106	0.320027	0.038597	0.476291

Significant correlation is observed between cement industry returns and monetary variables except Interest rate. Interest rates are negatively correlated with cement industry returns, which is in line with economic rationale but this relationship is weak. An increase in interest rates leads to an increase in discount rates in the economy. Since the price of equity shares is theoretically equal to the present value of cash flows, higher discount rates lead to a reduction in prices. Similarly, the interest rate parity theory is also confirmed by our results as the interest rate is negatively correlated with exchange rates.

TABLE-2: CORRELATION MATRIX

	CEMENT	INDEX	T-BILL	XRATE	INFLATION
CEMENT	1				
INDEX	.970**	1			
T-BILL	-.087	-.147	1		
XRATE	.455**	.498**	-.033	1	
INFLATION	.716**	.694**	.206*	.184	1

Correlation analysis is a relatively weaker technique. The causal nexus among monetary variables has been investigated by employing multivariate cointegration analysis. Cointegration analysis tells us about the long-term relationship among cement industry returns and set of monetary variables. Cointegration tests involve two steps. In the first step, each time series is scrutinized to determine its order of integration. To meet this requirement, unit root tests designed by Dickey and Fuller (1979) and Phillips and Perron (1988) have been employed. In the second step, the time series is analyzed for cointegration by using the likelihood ratio test, which includes (i) trace statistics and (ii) maximum Eigen value statistics.

A financial time series is said to be integrated to order one i.e, I (1), if it becomes stationary after differencing once. If two series are integrated to order one and a linear combination of these is stationary without requiring differencing, then the data streams are cointegrated.

Our first step is to test the stationarity of the index series. For this purpose, the ADF test for unit roots has been used at level and first difference. Table-3 exhibits the results of the Dickey-Fuller (ADF test), which clearly show that the time series is not stationary at level but that the first differences of the logarithmic transformations of the series are stationary. Thus, the series is integrated to the order of one I (1).

TABLE-3: UNIT ROOT ANALYSIS

	ADF- Level	ADF- Ist Diff	PP- Level	PP- Ist Diff
Ln Cement	-1.1053	-8.4316	-0.42177	-8.36124
Ln Index	-0.49463	-10.312	-0.421	-10.4592
Ln T bill rate	-1.87384	-3.22524	-1.611	-7.15766
Ln X rate	-2.30593	-5.9441	-2.322	-5.89088
Ln Inflation	-1.59794	-9.96236	-1.639	-9.95774
1% Critic. Value	-3.49252	-3.49313	-3.493	-3.49313
5% Critical Value	-2.88867	-2.88893	-2.889	-2.88893
10% Critical Value	-2.58131	-2.58145	-2.581	-2.58145

The Dickey-Fuller test requires that the error terms be statistically independent and data homoskedastic. However, in certain cases these assumptions may not be true for some data, and so the researcher uses another important technique, the Phillips-Perron test, to test the stationarity of the time series. Table-3 also reflects the results of the Phillips-Perron test, which confirms the results of the ADF test. Thus, we can conclude that the series is I (1).

Having met these prerequisites, we can now perform cointegration analysis. The maximum likelihood-based Johansen (1988, 1991) test and Johansen-Juselius (1990) procedure is used to determine the presence of cointegrating equations in a set of nonstationary time series. A trace statistic has been used to test the null hypothesis of "r" cointegrating vectors against the alternative of "r" or more cointegrating vectors. Table-4 exhibits the results of the multivariate cointegration test for the entire sample period.

TABLE-4: MULTIVARIATE COINTEGRATION ANALYSIS TRACE STATISTIC

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	Critical Value0.05	Prob.
None *	0.292	74.000	69.819	0.022
At most 1	0.189	37.404	47.856	0.329
At most 2	0.079	15.203	29.797	0.767
At most 3	0.052	6.475	15.495	0.639
At most 4	0.007	0.790	3.841	0.374

The trace test indicates one cointegrating equation at $\alpha = 0.05$.

The trace test indicates the presence of one cointegrating equation at the 0.05 level. Therefore, the result provides evidence of a long-term relationship between monetary variables and cement industry share prices. However, it must be noted here that the Johansen cointegration tests do not account for structural breaks in the data.

According to the representation theorem, if two variables are cointegrated then Granger-causality must exist in at least one direction. The results of Granger causality are reported in Table-5. Rejection of the null hypothesis at 5% indicates that there exists unidirectional Granger causality between the Interest rate and cement industry returns at the 5% level. Similarly, unidirectional Granger causality also exists between the interest rate and inflation, exchange rate and Index. There exists bidirectional Granger causality between the Interest rate and Index returns at the 5% level this indicates that monetary variables are Granger-causing cement industry returns.

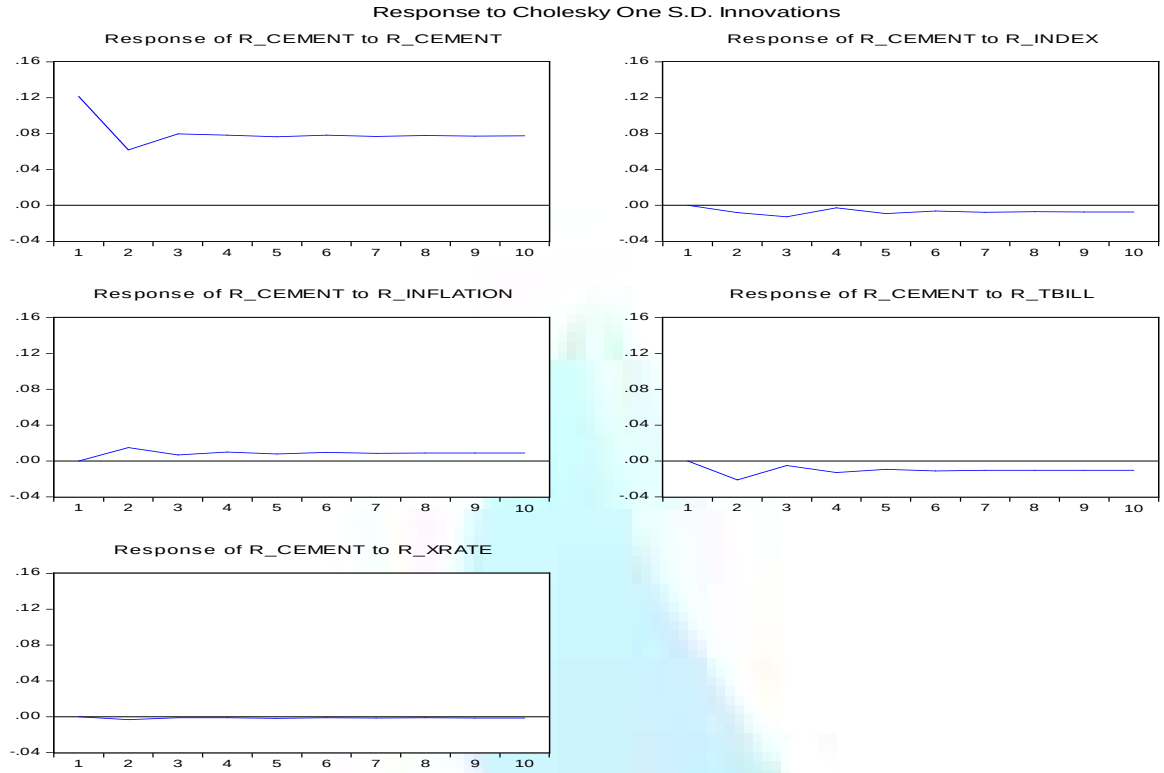
TABLE-5: GRANGER CAUSALITY TEST

Null Hypothesis:	Obs	F-Statistic	Prob.
R_INDEX does not Granger Cause R_CEMENT	106	0.04346	0.8353
R_CEMENT does not Granger Cause R_INDEX		0.94456	0.3334
R_TBILL does not Granger Cause R_CEMENT	106	4.65641	0.0333
R_CEMENT does not Granger Cause R_TBILL		1.14757	0.2866
R_XRATE does not Granger Cause R_CEMENT	106	1.80564	0.182
R_CEMENT does not Granger Cause R_XRATE		0.59262	0.4432
R_INFLA does not Granger Cause R_CEMENT	106	0.46904	0.495
R_CEMENT does not Granger Cause R_INFLA		5.22049	0.0244
R_TBILL does not Granger Cause R_INDEX	106	7.69112	0.0066
R_INDEX does not Granger Cause R_TBILL		3.86979	0.0519
R_XRATE does not Granger Cause R_INDEX	106	7.67458	0.0066
R_INDEX does not Granger Cause R_XRATE		0.06488	0.7995
R_INFLATION does not Granger Cause R_INDEX	106	0.86024	0.3558
R_INDEX does not Granger Cause R_INFLATION		0.74239	0.3909
R_XRATE does not Granger Cause R_TBILL	106	0.8848	0.3491
R_TBILL does not Granger Cause R_XRATE		3.5746	0.0615
R_INFLATION does not Granger Cause R_TBILL	106	0.5425	0.4631
R_TBILL does not Granger Cause R_INFLATION		4.18214	0.0434
R_INFLATION does not Granger Cause R_XRATE	106	1.2118	0.2735
R_XRATE does not Granger Cause R_INFLATION		0.02546	0.8736

The responses of cement industry returns have also been examined by using impulse response analysis (IRF) in the VAR system and results are shown in Figure-1. Impulse response functions capture the effect of, T-bill rates, exchange rate and inflation and Index on cement industry returns in Pakistan.

Figure-1 shows the impulse response of cement industry returns from a one standard deviation shock to monetary variables. The statistical significance of the impulse response function has been examined at 95% confidence bounds. These figures confirm that there is no statistically significant impact has been observed with reference to a variation in exchange rates. This is reasonable because Pakistan has had a managed floating rate system and, during the last five years, exchange rates have been managed within a small range by the State Bank of Pakistan through open market operations.

FIG.-1: IMPULSE RESPONSE ANALYSIS



Impulse response functions display the response of an endogenous variable over time to a given innovation. On the other hand, variance decomposition analysis expresses the contributions of each source of innovation to the forecast error variance for each variable. Thus, the researcher conducted a variance decomposition analysis to measure the degree to which shocks to the Cement Industry are explained by cement returns, stock index, T-bill rates, exchange rates and inflation. It also helps identify the pattern of response transmission over time.

Table 6 exhibits the decomposition of forecast error variance for the equity market that is explained by monetary variables.

TABLE-6: VARIANCE DECOMPOSITION ANALYSIS

Period	S.E.	R_CEMEN	R_INDE	R_INFLATIO	R_TBILL	R_XRATE
1	0.121	100.000	0.000	0.000	0.000	0.000
2	0.139	96.112	0.342	1.184	2.309	0.054
3	0.161	96.204	0.877	1.055	1.820	0.045
4	0.180	96.119	0.726	1.153	1.962	0.039
5	0.196	96.111	0.842	1.130	1.875	0.041
6	0.212	96.098	0.816	1.167	1.880	0.039
7	0.226	96.097	0.835	1.171	1.859	0.039
8	0.239	96.106	0.831	1.179	1.846	0.038
9	0.252	96.103	0.835	1.186	1.838	0.038
10	0.264	96.106	0.837	1.191	1.828	0.037

Variance Decomposition analysis suggests that the change in T-bill rates considerable sources of volatility in cement industry returns followed by Inflation.

CONCLUSION

This research paper has been conducted to investigates that how macroeconomic variables affect the cement industry returns. The macroeconomic variables include, KSE100 Stock Index, T-Bills Rate, Exchange Rate and Inflation for the period 01/1999 to 12/2007.

Multivariate co integration analysis and Granger causality test has been used to test the relation of cement industry returns and macroeconomic variables.

For the confirmation of co integration analysis, the researcher needs to find the stationarity of the data so the researcher used Augmented Dicky Filler Test and Phillip-Perron test. The data was found stationary at first difference by experiencing both the test.

After confirmation of the stationarity of the data, the researcher applied multivariate Co integration Analysis showed that the null hypothesis of co integration between the cement industry returns and macroeconomic variables can not be rejected. Therefore, the results provide evidence of a long-term relationship between macroeconomic variables and cement industry returns.

The result shows that the relationship between Cement Industry Returns and macroeconomic variable is not strong. It is found that return of T-Bills & Exchange rate does Granger Causes the return of cement industry; these results are consistent with Hassan & Javeed (2009) and Nishat (2001). That indicates that Interest rate and Exchange have negative relationship.

Returns of T-Bills to returns of cement, returns of exchange rate to returns of Index, and returns of Inflation to T-Bill have unidirectional relationship. While return of T-bill to Index, and Index to T-Bill have a Bi-directional relationship.

Impulse response of the data have been also checked and found that one standard deviation change in Index causes decrease the values cement stocks. Similarly, one standard deviation change in T-Bill rate leads to a reduction in the prices of the cement stocks due to increase the discount rate. This result is consistent with Hassan & Javeed (2009).

Variance Decomposition Analysis shows that the prices of cement fluctuate itself by 96% while T-Bill, Inflation, Index and Exchange rate contribute 2.3%, 1.184%, 0.342%, and 0.054 respectively for the first period. For all the rest of the 9 periods the significant contribution is of T-Bill rates followed by Inflation.

Thus the finding of the study is appearing that there is long term relation between the macroeconomic variables and cement industry returns. The impact of the behavior of these variables helps the investors to take a wise decision about the purchase of cement stocks.

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