Impact of Macroeconomic Variables on Stock Returns: Evidence from KSE-100 Index of Pakistan

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Abstract
Increasing attention is being paid to the relationship between macroeconomic variables and Karachi Stock Exchange (KSE-100) return. Inflation, exchange rate, GDP, gold prices and T-bills rate were taken as independent variables and KSE-100 index was taken as dependent variable. The monthly data of all independent variables Inflation, exchange rate, GDP, gold prices and T-Bills and dependent variable Stock Return was taken from January 2002 to December 2012. Descriptive Statistics showed KSE-100 index provide highest return with minimum standard deviation. Regression and correlation techniques were also used. Correlation showed that Stock Return was negatively correlated with each independent variable GDP, gold prices, Inflation, exchange rate and T-bill. All independent variables Inflation, T-bill, exchange rate, GDP and gold prices were positively correlated with each other’s. Regression results found that insignificant positive relationship of exchange rate and Stock Return. Gold prices have positive insignificant relation but GDP has insignificant negative relation with Stock Return. Inflation has significant negative relation with Stock Market Return. T-Bill has insignificant negative relationship with Stock Market.

Key words: Inflation, Exchange rate, GDP, T-Bills, stock return, gold prices

1.0 Introduction
Economic prosperity only possible when working of capital market is efficient. International capital markets are progressing rapidly after the globalization. This combination of international capital markets positively affected the economy, prevent the economy from financial crises and mitigate risk. The efficient market hypothesis suggests relevant and necessary information to investors for profit maximization, and the possibility of supernormal profit earning is falls by the macroeconomic variables. Macroeconomic variables current position is reflecting from the stock prices (Chong and Koh 2003). Investment advisers and portfolio managers cannot help the investors to earn supernormal profit continually because macroeconomic factors can affect stock return positively or negatively.

Due to Stock market economic development can be speed up by diversifying the risk, adding liquidity of financial assets and to make intelligent investments. But some forces are hurdle in making wiser investment these forces are economic forces. These economic forces have great positive and negative impact on stock market. If these economic factors affect the stock market positively the investor can become billionaire but if economic factors affect the stock market negatively it bring the investor on road. Stock market returns are affected by the economic variables.

Economic information of any country can be evaluated from country change in exchange rate, gross domestic product, oil prices, consumer price index, inflation rate and interest rate .but non-economic information can be evaluated by disaster in the country, political disputes in the country and...
some other circumstances. There are different methods and ways to invest funds in stock market, but always investors use suitable way to invest funds into stock market.

We can say stock market is mirror of economy and macroeconomic variables are used to settle on the stock market price. Investors know that economic variables have strong impact on stock return such as; Ross and Chen (1976) develop the arbitrage pricing theory and shows that economic variables have positive and negative impact on stock return. Many studies are conducted and results are explored change in term formation, change in risk premium and industrial production positively influence the stock return and inflation negatively affect the stock return.

The topic of this type remains always the favorite topic of researchers. Inflation, exchange rate and T-Bill show the negative relation with stock market (Sohail and Hussain, 2011). Due to Inflation value of currency decreased and quantity of currency increased prices of goods increased the results low savings. When savings are low then investment also low. So investor has no investment to invest in stock market. Investor wants more return from its investment when investor take more return with less risk from T-Bills investor make investment in T-Bill instead of stock market.

When exchange rate increased investor make investment in stock market and when exchange rate decreased investor make investment in foreign currency. The basic purpose of this study is to find the impact of macroeconomic variables like Inflation, exchange rate and T-Bill on stock market return. There are a number of studies to find the impact of macroeconomic variables on stock market taulbee (2001) & sing (2009). The investor wants more return from its investment but economic variables effect stock market negatively, so it’s not possible for investor to get maximum return.

1.1 Objectives of the Study

The objective of the study is to find out the relationship between macroeconomic variables and stock market return (KSE-100) Index. Also evaluate the positive and negative impact of Inflation, Exchange Rate, Treasury Bills Rate, GDP and Gold Prices on KSE-100 Indexes.

1.2 Problem Statement

Stock Market plays a vital role for the development of the economy. An economy cannot be developed without stock market. The country resources are invested in the stock market through listed companies (Comincioli, 1995). Stock market shows the performance of the companies such as KSE100 index. Some macroeconomic variables affect the stock market and some political, social and international circumstances effects the stock market. When stock market negatively exaggerated its performance decreased so the companies listed in stock markets its share value also decreased.

2.0 Literature Review

Rjoub and Tursoy (2008) evaluate the macroeconomic Factor, The APT and the Istanbul Stock Market. They were taken industrial production, inflation, term structure, Market return and employment rate as Independent Variables and Stock Return was taken as dependent variable. They used Market Pressure Index and Regression model. They conclude that Negative relationship between Macroeconomic Variables and stock market return, Portfolios are exaggerated in different industries in different ways by Macroeconomic Variables, Variables effects one industry negatively but in the same time it may effects another industry positively.

Khalid (2012) Conduct the study Long run relationship between Macroeconomic variables and stock return Evidence from the Karachi stock exchange. He was taken Inflation, T-bill and Exchange rate as independent and stock return was taken as dependent variable. Correlation and Co-integration model were used. No positive significant relation between stock return and independent variables, Results shows that most of the changes ensue in stock returns due to changes in Inflation a little change accrue due to other variables.

Singh and Mehta (2011) conduct study on macroeconomic factors and stock return Evidence from Taiwan. They were taken GDP, inflation, exchange rate, employment and money supply rate as independent variables and stock return was taken as dependent variable. Regression, mean, variance, and the Kolmogorov D-statistic normality test were used as model. They taken 50 Taiwan companies
data, they revealed that GDP and exchange rate effects all portfolios returns, while exchange rate, inflation rate and money supply have negative impact on standard and big company’s returns.

Husam and Turgut (2009) found that the effects of macroeconomic factors on stock return evidence from Istanbul stock exchange. Interest rate, unanticipated inflation, risk premium, exchange rate and were taken as independent variables and stock return taken as dependent variable. The APT model, CAPM, Correlation and Regression models were used. They experiment that, inflation has significant relation with stock return. Unanticipated inflation, money supply, risk premium and term structure of interest rate have significant impact on various portfolios of stock return. On the base of findings these results have week expounding power. There are many other macroeconomic variables that affect the returns of the stock market.

Benakovic (2003) found do macroeconomic factors matter for stock returns? Evidence from estimating a multifactor model on the Croatian market. They used regression analysis, Factor models and estimated sensitivities model to calculate macroeconomic factors matters for stock return. Inflation, industrial production, oil prices, short term interest rate and the Market index were taken as independent variables and stock return was taken as dependent variable. They found that, Negative correlation between inflation and stock market. The results of the analysis show that there is largest statistical market significance for stocks and have positive relation with stock return. Oil prices, industrial production and interest rates are positively related with stock return, but inflation negatively influence the stock return.

Kuwornu (2012) investigated effect of macroeconomic variables on Ghanaian stock return A co-integration model. They used Co-integration model to inspect relation between macroeconomic variables and stock return. Crude oil, inflation rate, exchange rate and T-bill were taken as independent variables and stock return was taken as dependent variable. There is significant relation between inflation and stock return. They perused that, In Ghana stock return is affected from inflation in short and in long run. In short run investor cannot reimburse from inflation but in long run can be compensated.

Menike (2006) concluded The Effect of Macroeconomic Variables effect on Stock Prices in emerging evidence from Sri Lanka stock exchange. They used Single and multifactor models, regression and coefficient models. Inflation, exchange rate, interest rate and money supply were taken as independent variables and stock return was taken as dependent variable. There is significant negative relation between inflation and stock return. They found that, inflation cannot be hedged in diversified, trending and manufacturing sectors. Inflation and stock prices negatively but exchange rate positively affect the stock market.

Sohail and Hussain (2011) conduct a study Macroeconomic variables and stock return in Pakistan the case of KSE 100 index. They were taken Consumer price index, Industrial production, real effective exchange rate, Money supply and treasury bills rate as independent variables and stock return was taken as dependent variable. They used Stationary Tests, Augmented Dickey Fuller Test, Phillips-Perron Test, KPSS Test, Co integration Test and Vector Error Correction Model, Unit Root Analysis and Unrestricted Co integration Rank Test for calculation relation between dependent and independent variable. In long run results revealed that GDP growth, Inflation and exchange rate was positively affect the KSE100 index, three months treasury bills rate and money supply had negative impact on the stock returns.

Buyuksalvarci (2010) studied effect of macroeconomic variables and stock return evidence from Turkey. They were taken Consumer price index & money market interest rate, gold price, industrial production index & oil price, foreign exchange rate and money supply as independent variables and stock return was taken as dependent variable. Multiple regression models were used for calculations. Paper results indicate exchange rate, oil prices, interest rate and industrial production index negatively affected ISE100 index return, but money supply positively affected ISE100 index. Gold price and inflation rate have not significant impact on ISE 100 index return.

Samadi et al. (2012) Measure the Relationship between Macroeconomic Variables and Stock Returns in the Tehran stock exchange. They used Arbitrage pricing theory, mean, variance. Coefficient, ARCH model for evaluate monthly exchange data for the period 1379 to1389 by GARCH.
The inflation, liquidity and oil price, exchange rate and gold prices were taken as independent variables and stock return was taken as dependent variable. Independent variables have significant relation on stock market. They find out stock return affected from inflation, gold price and exchange rate but not affected from liquidity and oil price.

Rodolfo and Aquino (2002) observed determinants of cross-sectional stock returns variation. They used Correlation Matrix of Macroeconomic Variables, Rotated Factor/Component Sensitivity Matrixy models to determine determinants of cross-sectional stock returns variation. Growth rate of an index of industrial production, inflation, default risk premium, Interest rates, treasury bills, change in consumption and change in oil prices were taken as independent variables and stock return was taken as dependent variable. Inflation has significant relation with stock return. They found that regression showed fluctuation in macroeconomic factors effects stock return of individuals significantly.

Mansor and Dinniah (2009) investigated stock return and macroeconomic variables evidence from six Asian pacific countries. They were taken foreign exchange rates, industrial production index and consumer price index as independent variables and stock return was taken as dependent variable. Monthly data on consumer price index, stock price indices and industrial production were taken for the period from January 1993 to December 2002. They used Multivariate Johansen, Empirical Models, Co-integration Test, statistics Return Series, Estimates of the Error Correction Model and Co-integration Test used for calculation. The results indicate there is long run relation between variables. In short run all countries shows equal interactions except Thailand and Hong.

3.0 Theoretical Framework

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>Stock Return</td>
</tr>
<tr>
<td>T-Bill</td>
<td></td>
</tr>
<tr>
<td>Exchange Rate</td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td></td>
</tr>
<tr>
<td>Gold Prices</td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis

H1: There is a negative association with Inflation and Stock Return.
H2: There is a negative relationship between T-Bill and Stock Return.
H3: Exchange Rate has negative impact on Stock Return.
H4: Gold Prices has negative relationship on Stock Return.
H5: GDP has positive impact on Stock Return.

4.0 Methodology

4.1 Source of data

It’s a secondary data based time series study covering the period of ten year from January 2002 up to December 2012. CPI is used as proxy for inflation so the data of CPI is collected from the “Economic Survey of Pakistan” which is published by the Government of the Pakistan, Ministry of Finance. Data of Exchange Rate and T-Bill is collected from the Official Website of State Bank Of
Pakistan and Federal Bureau of Statistics. Data of GDP and Gold prices are taken from many different websites which include Open Door for All, Google Scholar and Official Website of Karachi Stock Exchange. Monthly data of KSE100 Index is retrieved from Official Website of Karachi Stock Exchange and Business Recorded.

4.2 Dependent Variable
Stock Return
A security’s loss or gain for a specific period of time. Capital gain and income are two main objectives of return for an investment. Return quoted as percentage. Return includes capital appreciation, dividend and return on capital. Annual return rate can be calculated on initial invested amount by using geometric mean instead of simple arithmetic mean. Following Model is used for calculation of Equity market return.
Return = $R_t = \ln \left( \frac{P_t}{P_{t-1}} \right)$
Where $R_t = \text{Return for Given Period} \ t$
$P_t = \text{Ending price}$
$P_{t-1} = \text{Opening price}$
$\ln = \text{Natural Log}$

Independent Variables
Inflation
Consumer price index (CPI) is used as proxy for inflation. CPI is measured by the average goods and services price for a specific time period. Steadily increase in goods and services prices evaluated by purchasing power standard level where goods and services supply declined and prices of the goods increased. Supply of money increased value of money decreased and purchasing power of people also decreased. Following formula is used to calculate Return
Inflation Rate = Current year price – base year price/ base year price×100

T-bills
Interest rate is used as proxy for T-bill. Treasury Bills are issued by the central bank of the country usually for the period less than one year typically for three month. The maturity of the bill is the responsibility of the Government. Interest Rate was calculated by using
Simple interest= $(P \times R \times T/100)$
$P = \text{Principal loan amount}$
$R = \text{Rate of interest in percentage}$
$T = \text{Total time period}$

Exchange Rate
Change in foreign exchange rate value is measured by taking natural log. Every month end Foreign exchange rate is taken $/Rs exchange rate Exchange rate is a specific price rate at which one country currency exchanged with another country currency.

Gross Domestic Product
Value of GDP is retrieved for data analysis by taking natural log of values.
GDP Return= Current year price – base year price/ base year price×100

Gold Prices
Gold prices are fixed twice daily by the London Gold Market Fixing Ltd. Gold prices are fixed on the base of economic principals demand and supply. In all over the world these gold prices are used for gold and bullion related products. Gold Prices are used for data analysis and prices are exerted by taking natural log of values.
Gold Price Retune = Current year price – base year price/ base year price×100

Model
$Y = \beta_0 + \beta_1(X_1) + \beta_2(X_2) + \beta_3(X_3) + \beta_4(X_4) + \beta_5 (X_5) + \varepsilon$
$Y = \beta_0 + \beta_1 (\text{Inflation/CPI}) + \beta_2 (\text{Interest rate/RFR}) + \beta_3 (\text{Exchange rate/ER}) + \beta_4 (\text{Gold Price/GP}) + \beta_5 (\text{Gross Domestic Product/GDP}) + \varepsilon$
5.0 Empirical Results

Table 1

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock Return</td>
<td>131</td>
<td>-.45</td>
<td>.20</td>
<td>.0179</td>
<td>.08055</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>131</td>
<td>4.05</td>
<td>4.57</td>
<td>4.2348</td>
<td>.18166</td>
</tr>
<tr>
<td>Gold Price</td>
<td>131</td>
<td>8.60</td>
<td>10.89</td>
<td>9.6656</td>
<td>.73463</td>
</tr>
<tr>
<td>GDP</td>
<td>131</td>
<td>15.27</td>
<td>16.50</td>
<td>15.9760</td>
<td>.43452</td>
</tr>
<tr>
<td>T-Bill</td>
<td>131</td>
<td>1.21</td>
<td>14.01</td>
<td>8.6706</td>
<td>3.88764</td>
</tr>
<tr>
<td>Inflation</td>
<td>131</td>
<td>1.41</td>
<td>25.33</td>
<td>9.8194</td>
<td>5.30981</td>
</tr>
<tr>
<td>Valid N (list wise)</td>
<td>131</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1 shows the descriptive statistics analysis sample of 5 macroeconomic variables with Stock Return. The table consists of Mean values and Standard deviation with maximum and minimum values of independent and dependent variable.

In first column variables are shown. In second column total number of observations is shown which are 131. Stock Return is taken as dependent variable the Mean value is .0179 and standard deviation is .08055 the maximum value is .20 and minimum value is -.45.

The mean value of exchange rate which is taken as independent variable is 4.2348, gold price 9.6656, GDP 15.9760, T-Bill 8.6706 and inflation is 9.8194. The standard deviation of exchange rate is .18166, gold price .73463, GDP .43452, T-Bill is 3.88764 and Inflation is 5.30981. Its revealed that stock market provide high return.

Table 2

<table>
<thead>
<tr>
<th>Variables</th>
<th>Stock Return</th>
<th>Exchange Rate</th>
<th>Gold Price</th>
<th>GDP</th>
<th>T-Bill</th>
<th>Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock Return</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>-.081</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gold Price</td>
<td>-.123</td>
<td>.946(**)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>-.141</td>
<td>.909(**)</td>
<td>.978(**)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-Bill</td>
<td>-.192(*)</td>
<td>.807(**)</td>
<td>.848(**)</td>
<td>.894(**)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>-.314(**)</td>
<td>.563(**)</td>
<td>.590(**)</td>
<td>.667(**)</td>
<td>.704(**)</td>
<td>1</td>
</tr>
</tbody>
</table>

Pearson correlation shows the degree of liner relationship between variables. The results of correlation are There is negative insignificant relation between stock return and exchange rate, gold prices, GDP, T-Bill and inflation is also negatively correlated with stock return. Exchange rate is negatively insignificant correlated with stock return and positively insignificant correlated with gold price, GDP, T-Bill and inflation. Gold Price is negatively correlated with stock return and positively correlated with exchange rate, GDP, T-Bill and inflation.

Table 3

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-2.480</td>
<td>.055</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>.229</td>
<td>.062</td>
</tr>
<tr>
<td>Gold price</td>
<td>-.120</td>
<td>.073</td>
</tr>
<tr>
<td>GDP</td>
<td>.175</td>
<td>.096</td>
</tr>
<tr>
<td>T-Bill</td>
<td>-.004</td>
<td>.285</td>
</tr>
<tr>
<td>Inflation</td>
<td>-.007</td>
<td>.001</td>
</tr>
</tbody>
</table>
In table number 3 the Regression results shows that there is an insignificant positive relation between exchange rate and Stock Return with .062 values. There is insignificant negative relation between gold prices and Stock Return with .073 value. Insignificant positive relationship between GDP and Stock Return with .096 value. Negative insignificant relation between T-bill and Stock Return with .285 values and Inflation has significant negative association with Stock Market Return with .001 values. R Square is .138 it means that dependent variable is 13.8% explained by independent variables. Overall results of all independent variables on dependent variable are .002."N" shows the number of observations the total number of observations are 131.

6.0 Conclusion

A large number of studies have been conducted on this topic the impact of macroeconomic variables on stock market return. In this study descriptive static, Pearson correlation and regression test is applied on secondary data. The data is taken for the period from 2002 to 2012. Inflation, Exchange rate, gold prices, GDP and T-Bill rate are taken as independent variables. KSE 100 index is used as dependent variable. Analysis is made on the base of KSE100 index. Stock return which is taken as dependent variable negatively co-related with all independent variables inflation, GDP, exchange rate, T-Bill and gold prices. All independent variables Inflation, exchange rate, GDP, gold prices and T-Bills are positively co-related with each others. Results show that insignificant positive relationship between exchange rate and stock market. Relationship between inflation and stock market is negative insignificant. Treasury bills are insignificant negatively co-related with Stock Market Return. Gold prices are negatively insignificant and GDP has positively insignificant relation with Stock Return.

7.0 Recommendation

The aim of this research is to see the impact of macroeconomic variables on Karachi Stock Exchange. On the basis of this research some recommendations for the researchers and investor are there. Researcher should include more economic variables as independent variables. In this paper Inflation, exchange rate, GDP, gold prices and T-Bills rate is used as independent variables. There are many other economic variables such as oil prices, industrial production, money supply, employment rate and gold prices. Some variables positively and some of them negatively affected the stock market. If more variables are used in further research more reliable results can be accrue from it.

Before investing in to the KSE-100 index the investor should analysis the economic variables effect on the KSE. Though market exposure is a most important variable, but investor must analysis the effect of other economic variables on KSE. Value of Pak rupee is decreasing consistently which have adverse impact on KSE-100 index. Stock return not only adversely effected by the inflation but also increased the consumption and decrease the savings of the investors. When savings of the investors are decreased so the investment in stock market also decreased.

8.0 References