

# Impact of Macro Level Economic Factors on Capital Market Returns: Evidence from the Emerging Market of Asia

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## Abstract

This study examines the impact of macroeconomic variables on stock returns of Pakistan, India and Sri Lanka for the period of 1997-2014. GMM approach is used to analyze the impact of macroeconomic variables on stock returns. Variables of the study were T-Bills, Exchange Rate, Consumer Price Index (CPI) and the Industrial Production Index (IPI). The results of study show that T-bills rate has significant negative impact while Exchange rate has a significant positive impact on the Stock Returns of the study period. The results of study show that T-bills rate has significant negative impact while Exchange rate has a significant positive impact on the Stock Returns of Pakistan for the study period. T-Bills have significant negative impact, Exchange rate and Consumer price index having significant positive impact on the stock returns of the India. In the case of Sri Lanka only T-bills rate having significant negative impact on stock returns.

**Keywords:** T-bills rate; Exchange rate; Consumer price index; Industrial production index; Stock returns

## Introduction and Background of Study

The economic growth of a country largely depends on the development of its financial sector. Stock market is a vital actor of financial sector and provides a platform to the users and suppliers of the financial resources for investment purpose in the stocks of companies. A well-functioning and sound stock market prefers the stocks of successful companies and values more than those of unsuccessful companies. The shares of a successful company are seen to be related to other companies listed in the same stock market. The expected dividend growth and the prices of the shares are well reflected in the stock market.

The stock markets show the volatile behavior over time. In volatility, the prices of shares move up and down in a very short period of time. Excessive volatility is a hurdle in the smooth functioning of financial markets and adversely affects the economies as experienced in the past. This volatility may compel the investors to shift their investments to risk-free assets rather than investing in riskier assets. Therefore, it is necessary for financial analysts, macroeconomists and policy makers to understand the dynamic behavior of stock markets. Most important to note is that the investors are interested in understanding the nature of stock markets behavior as their investment spending is guided by these volatility patterns. The various economic activities of a country influence the returns in the stock market [1]. There is a long history of determinants of stock returns in the literature. Different variables are potentially more important in explaining the variations in the stock returns than a single market factor.

Efficient stock markets are critical for the development and growth of any economy. It is the characteristic of this efficient market that it reflects the information in the share prices prevailing in the economy. With increasing globalization process the economies of nations are also globalizing. This global integration is useful for the progression of economies on one end but on the other hand, it has an adverse exposure as the financial disaster of one market leads to the disaster of another market very badly when it is integrated with a big market and disaster originates from that market. The world economy has gained considerable economic growth strength in financial markets. Pakistan has also enjoyed historical performance of the stock market

in the last decade. Macroeconomic indicators show the overall strength or weakness of the economy in a country. The most important macroeconomic indicators are Gross Domestic Product, inflation, money supply, T-Bill interest rates, exchange rates, foreign direct investment and industrial production etc. It is a matter of great interest for academicians, researchers, investors, regulators and government bodies to identify impact of macroeconomic factors on the stock market. Stock markets being a leading indicator of an economy reflect the level of economic activities in the country. According to Fama an efficient market is one which reflects relevant information in the share prices. Investors have to determine the intrinsic value of stock by applying fundamental and technical analysis. The analyses of stock returns help them to know the sensitivity of these returns with the macroeconomic variables. This research study extends the conjectural evidence of relationship between T-Bills rate, exchange rate, consumer price index, industrial production index and stock returns of Pakistan, India and Sri Lanka. Abdullah and relationship between exchange rate and equity prices in India and Pakistan also the relationship between exchange rates and equity prices [2].

This study tries to see which of the macro economic variables impact more and in greater extend on the stock returns and in comparison, with the other countries. The idea is to find out in which direction these variables direct the stocks returns. This study is focus on the stocks returns which is more useful for the future planning of the investment in the countries. There are multiple factors to consider in explaining the decline in stock returns. Macro-economic variables have researched in decline stocks returns. Stock prices are generally believed to be determined by some fundamental macroeconomic variables such as T-bills, exchange rate and Consumer price index and Industrial production rate. Several studies have attempted to capture the effect of

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economic forces on stock returns in different countries. For example, using, the Arbitrage Pricing Theory (APT), developed by Ross and Chen used some macroeconomic variables to explain stock returns in the US stock markets [3,4].

## Literature Review

In this section review of literature related to the impact of macroeconomic variables such as T-Bill interest rate, exchange rate, Consumer Price Index and Industrial Production Index has been discussed from various scholar sources.

Acikalin et al. investigated the relationship between macroeconomic variables and stock returns in Istanbul Stock Exchange (ISE) [5]. Four macroeconomic variables i.e., Gross Domestic Product, interest rate, exchange rate and current account balance were used as independent variables and Istanbul stock index was used as the dependent variable. Time series quarterly data was obtained for all the variables. By applying Johnson Cointegration and Vector Error Correction model on the quarterly data they found a long term and stable relationship between ISE index and macroeconomic variables [6]. By using causality test it was discovered that there existed uni-directional causation between macro indicators and ISE index.

Gunsel and Cukur analyzed the effect of macroeconomic factors on the London stock returns for the period between 1980 and 1993 [7]. They developed seven prespecified macroeconomic variables. The term structure of interest rate, the risk premium, the exchange rate, the money supply and unanticipated inflation, sectorial dividend yield and sectorial unexpected production were used as independent variables and London stock returns as the dependent variable. The results indicate that macroeconomic factors have a significant effect in the U.K stock exchange market however; each factor may affect different industry in a different manner. That is, a macroeconomic factor may affect one industry positively, but affect the other industry negatively.

Chen et al. investigated the relationship between macro and non-macroeconomic factors and the hotel stock returns on the Taiwan stock exchange [8]. Money supply, the growth rate of industrial production, expected inflation, the change of unemployment rate, and the yield spread were taken as macroeconomic variables. On the contrary, presidential elections, the 9/21 earthquake, the 2003 Iraqi war, the outbreak of SARS, sports megaevents, the Asian financial crisis, and the 9/11 terrorist attacks were considered as non-macroeconomic factors. Among the macroeconomic factors only money supply and the unemployment rate significantly explained the movement of hotel stock returns. All the non-macroeconomic factors had a significant influence on the stock returns.

Liu and Shrestha investigated the long-term relationship between the macroeconomic factors and the stock returns in Chinese market [1]. They used exchange rate, inflation, money supply, industrial production and interest rate as independent variables and stock exchange indices as a dependent variable. By using the heteroskedastic cointegration they found the long-term relationship between the macroeconomic factors and the stock returns. Industrial production and money supply were positively associated with the stock returns while inflation, exchange rate and interest rate were negatively associated with the stock returns. Chinese stock market was found as reactive to the macroeconomic information.

Pal and Mittal examined the long-term relationship between key macroeconomic variables and the Indian capital markets [9]. They attempted to explore how Indian stock market reacts to different

macroeconomic variables. Macroeconomic variables such as interest rates, inflation rate, exchange rates and gross domestic savings (GDS) of Indian economy were used as independent variables and two popular stock indices of India i.e., BSE (30 share) SENSEX and S&P CNX Nifty (50 Shares) have been taken as the dependent variable. Quarterly time series data from January 1995 to December 2008 had been used.

Yang and Doong explored the mechanism of exchange rate and the stocks prices. The weekly data collected from 6-7 countries. They used Autoregressive (VAR) model for lag length and also GARCH model for the studies. Empirical evidence showed that stock prices cause future exchange rate. On the other side exchange rate have less effect on the stock prices [10]. Doong and Chia-Hao investigated the relation between stock prices and the exchange rate and used weakly data from Korea, Philippines, Indonesia Taiwan and Thailand from period 2000 to 2008. They EGRACH model for examine the correlation between stock returns and exchange rate. The results showed that higher correlation between emerging countries except Philippines. Rahman and Uddin investigated the relationship between stock prices and exchange rates in Bangladesh. They considered monthly nominal exchange rates of US dollar, euro, Japanese yen, pound sterling and monthly values of Dhaka Stock Exchange General Index for period of June 2003 to March 2008. The results showed that there is no co integrating relationship between stock prices and exchange rates [10,11].

Daferighe and Emmanuel explore the relationship between T-bills and the equity prices from Nigeria stock market for the period of 1997 to 2006. The regression analysis shows that decrease the prices of T-bills leads increase the prices of equity prices. Odhiambo investigated the impact of T-bills on financial growth [12]. The results showed that there was positive relationship between T-bills and financial developments. Nazir reveal the relationship between market liberalization and macroeconomic variables in Pakistan stock market [13]. The results showed that T-bills hiving negative relationship between Pakistani stocks markets. The relationship between macroeconomic factors and stock returns is extensively investigated. The findings of the literature suggest that there is a significant linkage between macroeconomic factors and stock return. Results showed that there is positive relationship between Industrial production index and stock returns.

Nishat and Rozina explored relationship between industrial production index, exchange rate and stock returns [14]. The results of this study indicated that there is positive relationship between stock prices and the industrial production. Mukherjee and Maghayereh investigated the relationship between macro-economic variables and the equity market. The results of both studies showed positive relationships between industrial production and equity market [15].

All of the above cited studies show that factors other than the market return, which are industrial and economic, are critical in predicting the stock return variability. Among the key factors in predicting the stock returns other than the market factors are company's size, price volatility of energy, interest rate, money supply, risk free rate, exchange rates, inflation and industrial production index. A review of the literature reveals that there has been no well-known study of the strength and direction of interaction between stock returns and economic variables in three countries Pakistan, India and Sri Lanka at the firm and industry level. Most of the work is either focusing on the relationship between stock prices and macroeconomic variables or measuring the stock return volatility caused by economic and political events. This study is contributing to the existing literature by analyzing the impact of economic variables on stock returns in an emerging Asian market which has a different structure and institutional characteristics

from developed stock markets. This is a sectoral study examining the variation of stock returns to economic variables at the firm and industry level. The outcomes of this study can be useful to understand the relationship between economic variables and stock returns.

## Variables Description

This study explores the short run and long term causal relationship between macroeconomic variables on stock returns in Pakistan, India and Sri Lanka for the period 7/1997 to 12/2013 by using monthly data from the websites of formerly Karachi Stock Exchange now Pakistan Stock Exchange, Mumbai Stock Exchange, Colombo Stock Exchange and Data Stream. The set of macroeconomic variables included in the study are Exchange Rate, T-bills, Consumer Price Index and Industrial Production Index.

### Dependent variable

The stock market returns are calculated by using the following equation;

$$R_t = \ln(I_t/I_{t-1})$$

Where:  $R_t$  is Return for month 't'; and

$I_t$  and  $I_{t-1}$  are closing values of KSE-100 Index for month 't' and 't-1' respectively.

### Independent variables

**Industrial production index (IPI):** IPI is the independent variables that have been used the measure the manufacturing production rate in the economy. It describes the overall economic activity in the economics of the country. It is hypothesized that an increase in industrial production is positively related to equity prices.

**Consumer price index (CPI):** Inflation rate is also used as a proxy for Consumer Price Index. It measures the average change in price of goods and service for the specific time period. Jaffe and Mandelker pointed the inverse relationship between inflation and the stock prices. Increase in CPI leads to increase in nominal T-bills and there is positive relationship between nominal T-bills and discount rate. So, increase in CPI also leads to increase in discount rate [16].

**Foreign exchange rate:** Exchange rate of individual countries has been taken because the basket of exchange rate could not be developed for the courtiers under study. The depreciation of currency is positive relative for the exporting economy and deprecate in currency for importing economy is negative relative.

**T-bills rate:** T-Bill rates also used as proxy of Interest rate. The Hasan and Nasir explored the same relationship in their study [17]. Increase in T-bills rate will increase the cost of capital, the increases in T-bills will increase the production cost so it will decrease the prices of stocks. Rise in T-bills lead to rise in discount rate and the results in decrease in present value of future cash flows. Therefore, it is hypothesized that an increase in interest rate is negatively related to equity market returns [18].

## Data and Methodology

The estimation approach in this paper involves two steps and combines the models introduced by Pettengill et al, and Basher and Sadorsky. In the first step, we estimate the coefficients beta on the risk factors for each industry in each year using Generalized Method of Moments (GMM) Approach to Times-Series regression. Study focus on the GMM because, in our opinion, it is the most important

innovation in empirical methods in finance within the past fifteen years. The approach is simple, flexible, valid under general statistical assumptions, and often powerful in financial applications such as the estimation the linear asset pricing models [19-21].

In order to obtain more efficient and consistent estimates of the parameters, Arellano and Bond developed the Generalized Method of Moments (GMM) and Arellano and Bover and Blundell and Bond developed the System Generalized Method of Moments (SGMM) estimation models where there are no initial condition restrictions. These methods utilize more instrumental variables that hold some important properties. One of these is that independent variables uncorrelated with the subsequent disturbances for error terms. The second one is that the instrumental variables are uncorrelated with the disturbances. The third one is that the instrumental variables are highly correlated with those variables that are used as instruments. Finally, that the disturbances are serially uncorrelated. These assumptions should be tested beforehand in order to obtain consistent and unbiased estimates. In this paper, all of these methods will be applied and compared. Furthermore it should be noted that when the number of time periods is small, the A&H estimator may be subject to a large downward finite-sample bias. This problem may be eliminated with the inclusion of explanatory variables [21-23]. These methods are applied to the stock exchange and macroeconomic data's in panel type studies.

Moreover, study chose to use the GMM model because of their main advantage. Firstly, unlike the maximum likelihood (ML) estimator, the GMM estimator does not require the specification of the joint distribution of the observed variables. Secondly, in the GMM model, the instrument vector does not need to be economically exogenous. The only requirement is that this vector be predetermined in the period when the agent forms his expectations [24,25]. Both past and present values of the variables in the model can be used as instruments. Model estimator is consistent even when the instruments are not exogenous or when the disturbances are serially correlated:

$$R_{it} = c + \beta_{it}^{T-Bills} + T.Bills_{dt} + \beta_{it}^{Exch} + \beta_{it}^{CPI} + CPI_{dt} + \beta_{it}^{IPI} + IPI_{dt} \quad (1)$$

The daily return  $R_{it}$  is computed with this (Theriou et al.):

$$R_{it} = \log(T_{it}/R_{it-1}) \quad (2)$$

Where  $i$  is the Company,  $t$  is the time,  $R_{it}$  is the return of industry  $i$  stock on time  $t$ ,  $c$  is a constant.  $\beta_{it}$  are estimated coefficients denoting the T-bills, exchange rate, CPI and IPI. This coefficient is estimated by GMM Model.

In the second step, a pooled data set consisting of the stock returns and the risk factor betas for each industry from eqn. (1) using GMM data estimation. Eqn. (3) is an unconditional relationship between return and risk factors.

$$R_{it} = Y_0 + Y^{T.bills} \beta_{it-1}^{T.bills} + Y^{exch} \beta_{it-1}^{CPI} + Y^{IPI} \beta_{it-1}^{IPI} + \epsilon_{it} \quad (3)$$

Where  $\beta_{it}$  is the coefficient estimated from the first step for each stock/Company in time  $t$ .

## Empirical Results

### Descriptive statistics (Pakistan)

Following results shows the descriptive statistics of macroeconomic variables and the stock returns of Pakistan. It includes the mean, standard deviation, skewness, kurtosis and range etc. Result shows that the index return is 8.2% with 7% standard deviation, the other variables exchange rate, Consumer price index, industrial production rate, and

the T-bills rate are respectively 4.06%, 4.55%, 4.37%, -0.4112% have returns and 1.4%, 2.1%, 2.6%, 5.1%, have standard deviation (Table 1A).

### Descriptive statistics (India)

Following results shows the descriptive statistics of macro-economic variables and the stock returns of India. It includes the mean, standard deviation, skewness, kurtosis and range etc. Result shows that the Index return is 8.80% with 5.1% standard deviation, the other variables Consumer price index, industrial production rate, T bills rate and the exchange rate respectively are 4.58%, 4.54%, 2.48%, 3.79%, have returns and 1.6%, 2.1%, 08%, 0.5%, have standard deviation (Table 1B).

### Descriptive statistics (Sri Lanka)

Following results shows the descriptive statistics of macro-economic variables and the stock returns of Sri Lanka. It includes the mean, standard deviation, skewness, kurtosis and range etc. Result shows that the Index return is 7.12% with 05.9% standard deviation, the other variables Exchange rate, T Bills rate, Consumer price index, and Industrial production respectively 4.5%, 0.11%, 4.53%, 4.66%, have returns and 1.7%, 7.5%, 3.0%, 4.9% have standard deviation (Tables 1C, 2 and 3).

The results in the table reflect that the Exchange rate and T-bills have statistically significant values and can greatly influence the stock return in both short and long run. The Exchange rate has positive relationship with stock return, while T-bills and Consumer Price Index has negative relationship with the stock return. The Industrial

Production Index also have the positive relationship with the stock return. The two variable of significance in the study are the Exchange Rate and T-Bills which reflects that the stock return can vary greatly with the increase in both T-Bill rate and Exchange Rate. The Increase in the exchange rate results the increase in the stock return and the increase in the interest rate on T-Bills can decrease the stock return as well as the value of underlying stock. The results are consistent with the related studies Hasan and Nasir [17].

### Conclusion and Policy Implications

The study has used the GMM approach for the impact of macroeconomic variables on stock returns. Results of GMM coefficients reveal that that consumer price index and the industrial production index are statistically insignificant while T-bills and the exchange rate has significant long run effect on Stock returns of Pakistan.

The study shows that the selected stock market is reactive to the changes in the macroeconomic

variables in the long run irrespective of high volatility and immaturity. The selected market has the characteristics of developing market i.e., low liquidity, concentrated shareholdings, high leverage and low informational and operational efficiency. The study shows that there is an impact of macroeconomic indicators on the stock market. The stock returns at specific point in time does not depend on a variable at that time but on the happenings of past too. It means that the returns are volatile. The economic indicators can be considered as explaining the stock market behavior.

	Stock Index	T-bills	Ex Rate	CPI	IPI
Mean	8.287315	-0.41272	4.068724	4.558364	4.373748
Standard Error	0.072729	0.051119	0.014654	0.021639	0.026382
Median	8.549052	-0.27225	4.085145	4.45851	4.392707

Table 1A: Descriptive statistics of variables of Pakistan.

	Index Series	CPI	IPI	T-Bills	Ex Rate
Mean	8.802591	4.58927	4.547651	2.480574	3.798993
Standard Error	0.051238	0.016884	0.021886	0.008149	0.005497
Median	8.615249	4.543613	4.513802	2.484907	3.807662
Standard Deviation	0.652148	0.214896	0.278561	0.10372	0.06997
Sample Variance	0.425297	0.04618	0.077596	0.010758	0.004896
Kurtosis	-1.4331	-0.5393	-1.0753	3.845692	0.700354
Skewness	0.342609	0.460588	0.255062	-1.41442	-0.83592
Range	1.987449	0.8688	1.055418	0.559616	0.355316
Minimum	7.941175	4.201568	4.096115	2.079442	3.575431
Maximum	9.928623	5.070369	5.151533	2.639057	3.930747

Table 1B: Descriptive statistics of Variables of India.

	Stock Index	T-Bills	Ex Rate	CPI	IPI
Mean	7.12975	0.113627	4.526242	4.533578	4.662495
Standard Error	0.059505	0.075858	0.017193	0.030153	0.049902
Median	7.174545	0.009536	4.591694	4.453137	4.517096
Mode	0	-0.4502	4.516642	4.576707	4.291375
Standard Deviation	0.757381	0.965516	0.218835	0.383781	0.635144
Sample Variance	0.573625	0.93222	0.047889	0.147288	0.403407
Kurtosis	-1.10595	40.77479	3.364574	-1.24204	70.00655
Skewness	0.199367	6.155432	-1.59849	0.226575	7.092317
Range	2.852844	7.31322	1.237276	1.23581	7.046635
Minimum	6.000424	-0.539	3.550824	3.948056	4.152401
Maximum	8.853268	6.774224	4.7881	5.183866	11.19904
Sum	1155.02	18.40749	733.2511	734.4396	755.3242

Table 1C: Descriptive statistics of VARIABLES of Sri Lanka.



	Coefficient	Std. Error	t-Statistic	Prob.
C(1) <sup>1</sup>	0.000611	0.001637	0.37323	0.0495
C(2) <sup>2</sup>	-0.00525	0.0024	-2.18626	0.0304
C(3) <sup>3</sup>	-0.00027	0.000996	-0.26982	0.7877
C(4) <sup>4</sup>	0.032511	0.058011	0.560425	0.576

<sup>1</sup>Condition (1), <sup>2</sup>Condition (2), <sup>3</sup>Condition (3), <sup>4</sup>Condition (4).

**Table 2:** Estimates of generalized method of moments.

Equation: $R=C(1)*EXCHN + C(2)*T\_BILL + C(3)*CPI + C(4)*C$	
Instruments: EXCHN(-1) CPI(-1) T\_BILL(-1) C	
Adjusted R-squared	0.628215
S.E. of regression	0.094187
Durbin-Watson stat	1.768713
Mean dependent var	0.01191
S.D. dependent var	0.09604
Sum squared resid	1.321806

**Table 3:** Estimation of exchange rate and T-bills.

Based on the above findings we can derive some important policy implication. T-Bills have negative effect on stock return so regulatory institutions should properly regulate the T-Bills rates so the investors should invest more in the stocks market resulting in higher level of productive cash flow for the economies. In a country's economic environments, significant macro-economic variables should be properly regulated for optimum benefit to the economy.

The relationship between real exchange rates and stock prices may be useful for portfolio managers interested in global asset allocation or investors trying to hedge against foreign exchange risk. The results have implications for domestic as well as foreign investors, stock market regulators, policy makers and stock market analysts. Investors and stock market analysts could forecast stock prices and earn profits. Stock market regulators could take initiatives for the accountability of companies to prevent manipulation of stock prices and to educate layman investors for stock market and encourage them to invest in stocks. Policy makers should be acquainted of these macroeconomic effects on stock market and help them to take efficient and effective decisions.

## Limitations

The study is limited to the time period between 1997 and 2014. The policy makes do not portray all the rationale behind a particular shock to macro-economic factors. The goal to why and how much shock is to be given always remains under a cloud and ambiguous. Thus the policy making, beneath observation of the statistical guideline, might not have been followed strictly by the policy makers. Conceding the argument, the shock other than the macro economic shock may also influence the stock prices. The study is also confined to the macroeconomic variables used in the analysis only. More powerful econometric models can be employed to further investigate the long run relationship which will give us new policy implications for the developing market.

## Further Research

Besides macroeconomic conditions, there are many other factors that affect the prices of stocks and its movements. A host of such factors are found in the microeconomic variables. The idea is that the performance of particular companies and their results matter in determining the price of a stock. Indeed, high corporate profits lead to higher stock prices due to high demand. Moreover, rumors of positive news for firms and the re-purchase of shares listed give a positive impact and lead to higher stock prices. Thus, for further study, we

could discuss the role of micro economic factors on stock price and how an investor can reduce microeconomic risk by undertaking a strong portfolio diversification strategy.

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