**IMPACT OF MACROECONOMIC VARIABLES ON EQUITY RISK PREMIUM EVIDENCE FROM CEMENT SECTOR OF PAKISTAN**

**Assignment # Two**

**SUBMITTED TO**

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**I. INTRODUCTION**

Macroeconomic variables affect the performance of the stock market. As investors value stocks they consider macroeconomic variables. Exchange rates, Interest rates, GDP and inflation are very significant among those macro-economic variables that affect stock market efficiency. During the past, a number of studies were carried out to establish the relationship between the macroeconomic indicator and stock prices in the Past.

Findings of different studies explicates that there is a strong relationship between stock price and macroeconomic variable. While some studies carried out depicted no relationship between financial market and the economies of under developed of less developed countries i.e. market of south Asian markets.

Fung and Lie (1990) told that “for stock market price movements; macroeconomic factors cannot be reliable indicators especially in Asian markets due to the stock market inability to fully gain information about the regular occurrence of changes in macroeconomic fundamentals.”

Several researchers like Pilinkus (2009) instigated an association in countries, between financial market and macroeconomic indicators. Major findings of several studies indicated that with low variation and changes there exists association between stock market process and basic macroeconomic variables.

According to Hoguet (2008), a negative association always exists among stock price and inflation. A positive relation is always shown by the Smith (1992a, 1992b) between stock prices and exchange rates, while some other studies by Soenen and Hennigar (1998) in this connection depicted a negative relationship.

Stock Market operations are jointly enjoyed by creditor and investors. Reallocation of money from different firms of economy are engaged by stock market. In this connection negative growth range from 50.7 % (Pakistan) to 2.9%, (China) remained the leader in world stock markets during the fiscal year 2008-09 (Economic Survey of Pakistan, 2008-09).

**Cement Sector of Pakistan**

In early days of Pakistan the cement production was among the small industries, but with the passage of time cement industry grew very fast. Presently, cement industry is among one of the important industries of Pakistan due to its significant contribution in Modernization, contribution to Labour Force, reduction of unemployment, urbanization and enhancement in foreign reserves. In current era, Cement industry of Pakistan has entered to exporting zone after successfully fulfilling of domestic cement demand. Cement industry of Pakistan is facing many challenges because of economics, political nature besides law and order situation but still it is performing brilliantly for the last two decades.

**II. LITERATURE REVIEW**

Several studies have been undertaken to examine the collision of macroeconomic variables on stock prices of urbanized and developing countries. In the past decades, many researchers, financial analysts, and practitioners have attempted to predict the association between stock markets and macroeconomic parameters such as inflation etc. They have conducted studies to establish the outcome of macroeconomic variables on stock prices or vice-versa and the results of all those studies are in different direction.

Mohammad and George (2008) in response to volatility in stock prices, conducted a research and analyzed the relation between dollar exchange rate variances. He conducted data on U.S. stock prices and exchange rates from the 1974-1978 era for this reason. With the help of simple regression technique, he found a positive outcome between exchange rates and stock prices which was more robust in short run as compared to long run.

Solnik (1987) studied a number of variables (inflation, interest rate, exchange rate) and their effect on stock prices. In order to get a valid result he used monthly data of nine most developed countries i.e. (U.S, Germany, U.K, Canada, Japan, France, Switzerland, Belgium and Netherlands). A positive impact on depreciation was found through this study, but findings of this study were statistically insignificant stock market of US compared with changes in interest rates and expected inflation.

Soenen and Hanniger (1988) used data from the period 1980-1986 were used to research the relation between stock prices and exchange rates. The result showed a clear negative correlation between the exchange rate and stock prices. Besides it they formed a negative relationship of revaluation on stock prices when they tried to establish the above association for different times.

The nature of relationship between growth and macroeconomic indicators through capital accumulation was examined in India by Kumar (2010). He also tried to investigate the pattern of domestic savings, GDP growth and market capitalization to understand the future status of Indian stock market. In order to analyze estimation of financial variables and to establish link between variables, mathematical growth function (Gompertz model) was used in which Pearson correlation method was used and it was assumed that financial variables were inter-related. In this study a positive growth of market capitalization and positive association between macro indicators was predicted for next time years.

Nishat and Mustafa (2007) produced an empirical link between Pakistan's real economy and stock market through a study. Model used for this study were production growth, GDP, for representing the liquidity of real economy, stock market and stock market's size that represent the stock prices. Two test error co-integration and correction model were applied for examining the relationship between GDP and stock prices. For this purpose data from 1980 to 2004 was used. Study findings showed that the stock market movement (in short run) explains the output growth and GDP in Pakistan. The short as well as long-term economic variables in Pakistan clarify that the growth of stock market variables depends on the overall economic development. The empirical evidence from their analysis showed that Pakistan's stock market needs to further evolve in order to play its vital role in the economy alongside other financial institutions.

Sprinkle (1971) studied relationship between interest rate and stock prices. Initially he dealt with money supply and stock prices. His study showed that decrease in money supply result in increase of interest rate while due to increase money supply decreases the interest rate. This study was conducted in US and the period of 1918 to 1968 was taken in consideration for this study.

In his research about the relation between stock price and interest rate Lobo (2000) examined the behavior of stock market. He found that there is huge impact of news of over-pricing over stock market as compare to underpricing news. He found that the announcement of target rate have significant impact on conveying new information and stock prices.

**III. METHODOLOGY**

## Macroeconomic Variables

After deep study of relevant literature of different macroeconomic factors and its importance relative to equity premium, the following set of macroeconomic variables has been selected to find out relationship of these selected variables and equity risk premium. The study has been divided into two parts based on analysis as descriptive analysis and exploratory analysis. The descriptive part includes basic description of data while the exploratory includes the econometric model exploration.

## Research Objectives

To observe the impact of selected macroeconomic variables on equity risk premium of top fifteen sugar industries of Pakistan stock exchange.

## Research Hypothesis

: There exists no long term linear relationship between macroeconomic variables and equity risk premium.

: There present no significant impact of independent variables i.e. macroeconomic variables on dependent variable i.e. equity risk premium.

**Descriptive Analysis**

This include the estimated descriptive statistic results of equity risk premium and selected macroeconomic variables. This comprises basic summary statistics of the collected sample data of ten years from 2009 to 2018.

**Summary Statistics**

Data is collected from top fifteen sugar industries listed on Pakistan stock exchange from January 2009 to December 2018. The summary statistics of equity risk premium (ERP) and macroeconomic factors i.e. Exchange Rate (ER), consumer price index (CPI), Foreign Direct Investment (FDI), Money Supply (MS), Industrial Production Index (IPI) and Treasury Bills Rate (TB rate) are presented in Table 1.

**IV. DATA ANALYSIS**

**Table 1: Summary Statistics**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Descriptive Statistics | | | | | | | |
|  | ERP | ER | CPI | FDI | MS | IPI | TB |
| Mean | -0.06 | 82.06 | 98.66 | 362.24 | 6300.91 | 105.42 | 0.10 |
| Maximum | 2.14 | 106.27 | 140.59 | 743.41 | 10410.85 | 123.38 | 0.13 |
| Minimum | -1.78 | 59.78 | 56.90 | 201.68 | 3201.68 | 94.24 | 0.08 |
| Std. Dev. | 0.51 | 16.13 | 29.46 | 148.87 | 2324.27 | 9.61 | 0.01 |

Before examining the different models output, it is imperative to look the descriptive statistics of collected samples data. Table 1 presents the descriptive statistics which includes mean, maximum, minimum and standard deviation to describe the data. The maximum value for ERP is noted 2.14, minimum value -1.78 and mean value for ERP is noted -0.06 with standard deviation 0.51. Similarly basic descriptive statistics results were observed from collected sample data for macroeconomic variables. Furthermore, the appropriateness of modelling procedure and their assumptions were tested and discussed in detail below.

### Stationarity of Data

To check the collected data stationarity a well-known test, unit root test has been applied on each selected macroeconomic variable. Table 2 presents the results of unit root Augmented Dicky Fuller (1979) test results. The results of the Augmented Dickey-Fuller (1979) unit root test exhibits clearly the data, time series is not stationary at level but stationary at the first differences means the given time series is integrated to order one I (1). Simply the estimated output of unit root test suggests that the selected macroeconomic variables are not stationary at level based on the calculated value of t- statistics which is less than from tabulated value, illustrating to reject the null hypothesis of stationarity. However, at first differences unit root test Results shows stationarity as calculated of t-statistics value is larger than the tabulated values and small p-value less than 0.05.

**Table 2: Unit root Augmented Dickey-Fuller**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | | | | | Level | | 1st difference | |
| **ER** | | | | | t-Statistic | Prob.\* | t-Statistic | Prob.\* |
| Augmented Dickey-Fuller test statistic | | | | | -2.206879 | 0.0758 | -534.8538 | 0.004 |
| Test critical values: | 1% level | | |  | -3.190227 |  | -3.123496 |  |
|  | 5% level | | |  | -2.531211 |  | -2.242323 |  |
|  | 10% level | | |  | -2.323111 |  | -2.173892 |  |
| **CPI** | | | | |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | | | -2.709858 | 0.0749 | -574.8538 | 0.0001 |
| Test critical values: | | 1% level |  | | -3.477487 |  | -3.477487 |  |
|  | | 5% level |  | | -2.882127 |  | -2.882127 |  |
|  | | 10% level |  | | -2.577827 |  | -2.577827 |  |
| **FDI** | | | | | t-Statistic | Prob.\* | t-Statistic | Prob.\* |
| Augmented Dickey-Fuller test statistic | | | | | -3.119876 | 0.1058 | -403.5934 | 0.0001 |
| Test critical values: | 1% level | | |  | -4.024935 |  | -4.024935 |  |
|  | 5% level | | |  | -3.442238 |  | -3.442238 |  |
|  | 10% level | | |  | -3.145744 |  | -3.145744 |  |
| **MS** | | | | |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | | | -2.63743 | 0.0769 | -548.1528 | 0.0001 |
| Test critical values: | | 1% level |  | | -3.376468 |  | -3.172437 |  |
|  | | 5% level |  | | -2.683117 |  | -2.882127 |  |
|  | | 10% level |  | | -2.379837 |  | -2.372823 |  |
| **IPI** | | | | | t-Statistic | Prob.\* | t-Statistic | Prob.\* |
| Augmented Dickey-Fuller test statistic | | | | | -2.737443 | 0.0703 | -78.80573 | 0.0001 |
| Test critical values: | 1% level | | |  | -3.477487 |  | -3.477487 |  |
|  | 5% level | | |  | -2.882127 |  | -2.882127 |  |
|  | 10% level | | |  | -2.577827 |  | -2.577827 |  |
| **TB** | | | | |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | | | -2.710274 | 0.0748 | -358.1036 | 0.0001 |
| Test critical values: | | 1% level |  | | -3.477487 |  | -3.477487 |  |
|  | | 5% level |  | | -2.882127 |  | -2.882127 |  |
|  | | 10% level |  | | -2.577827 |  | -2.577827 |  |

**Co-integration**

The collected sample data has been analysed for co-integration by using the likelihood ratio test, trace statistics to check long term relationship between the dependent variable ERP and selected independent macroeconomic variables. If the variables included in this study are co-integrated there exists a linear long run relationship. The method were used to observe the presence or absence of long run linear connection between the study variables. This method of decides about the co-integrated equations or equation using two different approaches, namely trace and eigenvalue statistic. A large value of both statistics indicate, there exists co-integration equations while small values shows, there is no co-integration equations. Table 3 describes the results of co-integration analysis after achieving the stationarity of study variables on same level it means on first differences. In the analysis of co-integration, six macroeconomic independent variables and one dependent variable are included so the hypothesized numbers of linear equations are seven one each for independent variable and on for intercept only equation. Results of both statistics and P-value illustrates out of seven linear equations only three which are intercept only model or none, at most one and most two are statistically highly significant and the remaining are statistically insignificant. As the estimated value of trace statistics for the significant equations recorded maximum with P-values less than 0.05 the considered level of significance. The same is for eigenvalues as the Eigen values for significant equations are recorded maximum while for insignificant recorded minimum. The co-integration analysis indorses the nominated equations (highlighted on \*) are co-integrated suggests long-run linear relationship between variable are present.

**Table 3. Co-integration analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | Critical Value | Prob.\*\* |
| None \* | 0.415323 | 110.4274 | 68.91989 | 0.000 |
| At most 1 \* | 0.443214 | 72.51331 | 48.95713 | 0.0001 |
| At most 2 \* | 0.342370 | 37.95937 | 28.99797 | 0.004 |
| At most 3 | 0.214432 | 12.93832 | 16.19371 | 0.103 |
| At most 4 | 0.221432 | 12.79390 | 3.945456 | 0.811 |
| At most 5 | 0.134562 | 7.031842 | 3.79871 | 0.904 |
| At most 6 | 0.112302 | 0.301218 | 3.142436 | 0.913 |
| At most 7 | 0.001212 | 0.001398 | 3.001966 | 0.952 |
| “Trace test indicates 3 co-integrating equations at the 0.05 level” | | | | |
| “\* denotes rejection of the hypothesis at the 0.05 level” | | | | |
| “\*\*MacKinnon-Haug-Michelis (1999) p-values” | | | | |

### Regression analysis

The following model has been used to identify the impact of selected independent variables on dependent variable.

Where is the dependent variable, … are independent variables, are regression parameter and is the disturbance term.

The estimated output of this model are present in table 4 given below. Results shows that, exchange rate (ER) and Treasury bill rate (TB) has negative but statistically insignificant impact on equity risk premium (ERP). While consumer price index (CPI), foreign direct investment (FDI), money supply (MS) and industrial production index (IPI) has positive impact on equity risk premium (ERP). Furthermore, the impact of foreign direct investment (FDI), money supply (MS) are recorded statistically significant on equity risk premium (ERP) as the p-value were recorded 0.0334 and 0.0097 less than the considered level of significance 0.05 simultaneously. Furthermore, the value of R-square shows that only 6.69 percent variation is explained in dependent variable based on selected independent variables and F-statistic shows that, the overall model is statistically insignificant.

**Table 4. Regression analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | -1.350989 | 1.623247 | -0.832276 | 0.4066 |
| ER | -0.021890 | 0.018517 | -1.182150 | 0.2391 |
| CPI | 0.012828 | 0.009659 | 1.328045 | 0.1863 |
| FDI | 0.001699 | 0.000791 | 2.148527 | 0.0334 |
| MS | 0.504376 | 0.192350 | 2.622180 | 0.0097 |
| IPI | 0.011732 | 0.019542 | 0.600338 | 0.5492 |
| TB | -0.685502 | 3.480801 | -0.196938 | 0.8442 |
| R-squared | 0.066985 | Mean dependent var | | -0.065652 |
| Adjusted R-squared | 0.027838 | S.D. dependent var | | 0.514814 |
| S.E. of regression | 0.507598 | Akaike info criterion | | 1.527288 |
| Sum squared resid | 36.84472 | Schwarz criterion | | 1.667784 |
| Log likelihood | -107.5466 | Hannan-Quinn criter. | | 1.584367 |
| F-statistic | 1.711093 | Durbin-Watson stat | | 2.428272 |
| Prob(F-statistic) | 0.122480 |  |  |  |

**V. CONCLUSION**

Data collected from top fifteen sugar industries listed on Pakistan stock exchange ranging from January 2009 to December 2018 has been analysed to explore the relationship of equity risk premium and selected macroeconomic variables. The estimated results of co-integration analysis shows that, long term linear relationship between dependent and independent variables present. Further the result of regression analysis confirm that, exchange rate and Treasury bill rate has negative impact on equity risk premium while consumer price index, foreign direct investment, money supply and industrial production index has positive impact. However, the impact of only two macroeconomic variables foreign direct investment and money supply are recorded statistically significant on equity risk premium.

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