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Macro-Economic Variables and Stock Market Performance: Empirical Evidence from Colombo Stock Exchange

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ABSTRACT

Stock market performance is considered as a significant indicator of financial and economic circumstances of a country. In a nutshell, a secured and regulated financial environment is being provided by the stock market where shares can be transacted at lower operational risk. The stock market also functions as a platform through savings, and investments of individuals are channelized into productive investment proposals. It allows capital formation and economic growth for the nation. The ultimate objective of this study is to examine the impact of macro-economic variables on stock market performance. The macro-economic variables (independent variables) used in this research study are Inflation, Interest Rate, and GDP. Stock market performance (All-Share Price Index) is the dependent variable. 120 Monthly observations from January 2009 to December 2018 had been taken for the study. The Augmented Dickey Fuller's unit root test, Ordinary Least Squares Regression and Correlation analysis were applied to the variables. The results of correlation analysis indicated that inflation and Stock market performance are positively associated meanwhile interest rate, and GDP and Stock market performance are negatively correlated. The Ordinary Least Square results showed that nearly 75% of the variation in all share price index is explained by the three macroeconomic variables, GDP, TB and WPI. The study suggested some of the possible reasons for the positive impact of Inflation on the Colombo Stock market performance, and negative impact of Interest Rate on Stock market performance and recommended that efforts should be made to improve the Stock market performance.

1. Introduction

Stock market is one of the chief factors in promoting the economic prosperity of a country. The countries stabilized economically can be measured using stock prices based on the stock market. Thus, it can be concluded that the performance of stock market is an integral part of the financial system of any economy, as it plays a role in channelizing funds, connecting savers and investors, which lead to economic growth of a country. Investors closely monitor the macro-economic variables as they impact on stock market behavior. The Arbitrage Pricing Theory (APT) provides the theoretical background of the relationship between stock prices and macro-economic variables (Chen, Roll and Ross, 1986).

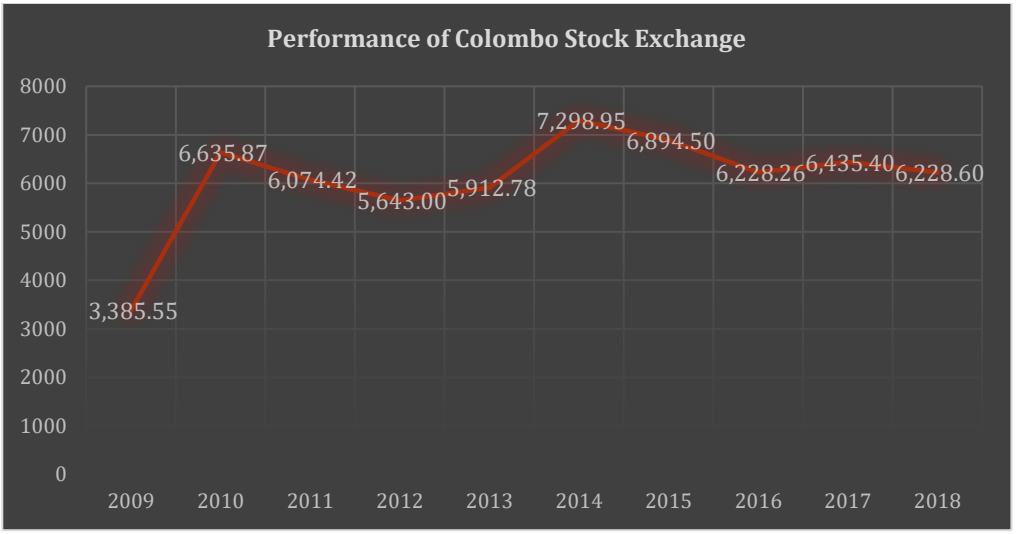

Figure 1. Performance of Colombo Stock Exchange (Source: Colombo Stock Exchange)

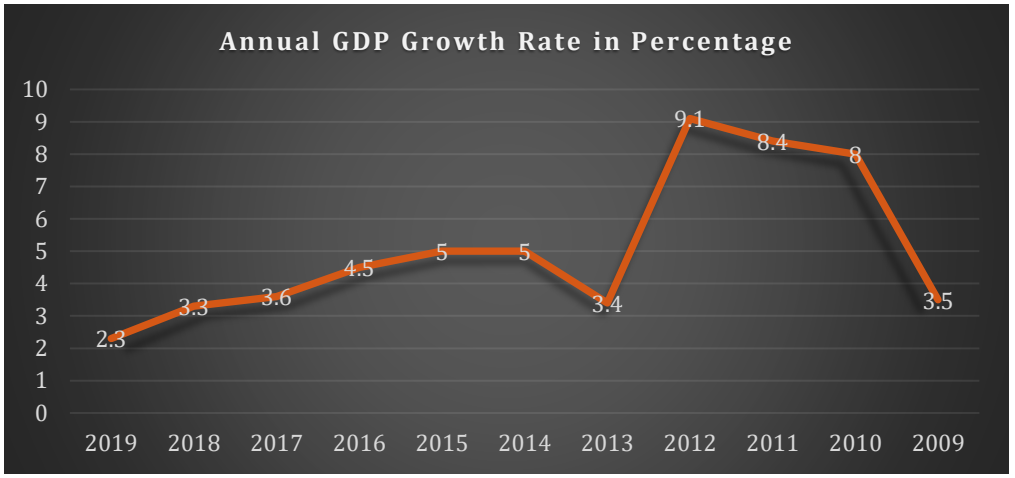

Figure 2. Annual GDP Growth Rate (Source: www.cbsl.gov.lk)

In the context of Sri Lanka, after the end of the civil war in 2009, Sri Lanka's economy grew at an average 5.8% during the period of 2010-2017, reflecting a peace dividend and a determined policy thrust towards reconstruction and growth; although there were some signs of a slowdown in the last few years (World Bank, 2020). By considering the fluctuations in Sri Lankan economy, the researcher developed this study in order to find out the impact of macro-economic variables on stock market performance.

Only a few empirical studies have been done based on the Sri Lankan context investigating the impact of macroeconomic factors on Stock market performance in recent years. For example, the latest research was carried out in Sri Lanka by Badullahewage (2018) in 2018. and the research findings may differ when it is repeated with different sample periods and also in different frequency of the data as observed by Naik and Padhi (2012). Further, there are contradictions in previous studies where both positive and negative association had been found between Inflation, Interest Rate and Stock market performance. For example, Morawakage (2011) found negative association between interest rate and stock market performance but Nijam, Ismail, and Musthafa (2015) found positive correlation between interest rate and stock market performance. The results of both studies are contradictory. Moreover, Nijam, Ismail, and Musthafa (2015) found significant and negative relationship between inflation and stock market performance. In the meantime, Mohanamani and Sivagnanasithi (2014) who investigated the impact of macroeconomic variables on the behaviour of Indian Stock market found that Indian stock market is positively related to wholesale price index. A limited number of research studies have been carried out in the Sri Lankan context using same variables with monthly frequencies under same sampling period. Wholesale price index (WPI) has been rarely used as the proxy for inflation in studies conducted in Sri Lanka because Consumer Price Index (CPI) was widely taken as the proxy for measuring inflation by Sri Lankan analysts. Therefore, the investigations on how and to what extent the Sri Lankan stock market responds to macroeconomic variables still remain an open empirical question. Understanding the macroeconomic variables that could impact the Sri Lanka stock market index, with the recent data can be useful for investors, traders as well as policy makers for being prudent on their economic decisions and actions. Therefore, there is an inevitable requirement for carrying out an investigation regarding the relationship between macro-economic variables and Colombo Stock market performance.

This research tends to improve current knowledge associated with the influence of the three macroeconomic factors (GDP, Inflation and Interest Rate) on the Stock market performance in Sri Lanka. According to Badullahewage (2018) who investigated the effects of inflation, gross domestic product, interest rate, money supply and exchange rate on the performance of stock market in Sri Lanka proved that all these factors have an inseparable impact over the performance of the stock market. It shows that inflation, GDP and interest rate significantly impact on the stock market performance. Further, Omodero and Mlanga (2019) suggested that macroeconomic variables such as interest rate, exchange rate and inflation should be regulated in an appropriate manner by the relevant authorities to restrict the inverse impact on stock market performance. Therefore, these variables were chosen in this study.

Badullahewage (2018) using inflation, gross domestic product, interest rates, money supply and exchange rates as independent variable, analyzed the effects of macroeconomic factors on the performance of Stock Market in Sri Lanka for the period

from 1990 to 2012. The results of the study revealed that all these factors have an inseparable impact over the performance of the stock market and Sri Lankan stock market performance and inflation and Exchange rates have comparatively higher effects on the stock market performance.

Mohammad, Ullah, Islam, Alam and Khan (2018) investigated the effect of macroeconomic variables on stock market performance of SAARC countries by employing OLS multiple regression model. Annual data from 2005 to 2015 was used in this study. The research findings indicated that macroeconomic variables i.e. exchange rate, foreign currency reserve and interest rate are statistically significant in affecting stock market performance of SAARC countries but inflation and money do not have a significant relationship in affecting stock market performance.

Keswani and Wadhwa (2018) analysed the effect of macroeconomic variables on stock market and the findings revealed that inflation, market price, industrial production price index, consumption price index, money supply, treasury bill, GDP and GDP savings have positive relationship with stock prices. Inflation, industrial production price index, consumption price index, money supply and GDP have high effect on the stock prices. National income has negative relationship with stock prices. Consumption, oil prices, exchange rate and interest rates have no significant impact on share price.

Omodero and Mlanga (2019) assessed the impact of macroeconomic variables on stock market performance in Nigeria by using annual time series data covering a period from 2009 to 2018. The research findings of regression analysis indicated that exchange rate and interest rate do not have significant impact on share price index while inflation rate exerts a significant negative influence on share price index. On the contrary and in line with the concept of GDP and stock market performance, GDP significantly and positively impacts on share price index.

Further, Silva, Perera and Silva (2017) investigated the relationship between stock market performance and economic growth in Sri Lanka by employing simple regression model and correlation analysis. The study findings revealed a strong and positive relationship between stock market performance and economic growth of Sri Lanka. Wickremasinghe (2011) researched the long run relationship between Sri Lankan capital markets (CSE) and six macroeconomic variables such as three month fixed deposit rate, consumer price index, US stock market index, narrow money supply and GDP of Sri Lanka. The monthly data from January 1985 to December 2004 were used to carry out the research and with the help of unit root test, co integration, variance decomposition and error correction mechanism. They found out that a short term and a long term relationship exist between stock prices and macroeconomic variables. Results of this study also suggested that a Bi-directional relationship exists between stock market index and fixed deposit rate, stock prices and US Share price and GDP while remaining variables which are consumer price index, money supply and exchange rate also have causal bi-directional relationship. Results of variance decomposition suggested that GDP and money supply play an important role in longer horizon to forecast variance in stock prices.

Mukit, Uddin, Islam and Arif (2014) investigated the relationship between stock market development and economic growth in five SAARC countries: Bangladesh, India, Pakistan, Sri Lanka and Nepal using collected secondary data of 15 years from 1996 to 2010. The relationship had been measured in terms of market capitalization, total value of stocks traded, stock turnover ratio and volume of the stock market determined through the total number of companies listed in the stock exchange of each country in this region. By using linear log model, it was found

out that stock market affects economic growth significantly in SAARC countries. In addition, the research result of the study by employing the stepwise regression analysis indicated that the most representative indicator of capital market that is positively associated to the real economic growth of each country is market capitalization.

Jahfer and Inoue (2014) researched the relationship between stock market development and economic growth in Sri Lanka using quarterly data from 1996 to 2011. The stationary of the data was tested using Augmented Dickey Fuller (ADF) test. It was found that all variables are stationary on first differencing. The relationships between economic growth and indicators of stock market development were investigated using Johansen co-integration tests, and Vector Error Correction Model. Co-integration results economic growth in Sri Lanka. VECM results show unidirectional causality from stock market development to economic growth despite different variables used to measure the stock market development. The findings supported the theoretical prediction that development of stock market would play a key role in economic growth. The research concluded that stock market development leads to the economic growth in Sri Lanka and efforts should be devoted to develop the stock market.

Mohanamani and Sivagnanasithi (2014) investigated the impact of macroeconomic variables on the behavior of Indian Stock market, using monthly frequency data from April 2006 to July 2013, employing variables, namely, BSE Sensex, call money rate, exchange rate between Indian Rupees and US dollar, Foreign Institutional Investment, Industrial productivity, money supply and wholesale price index. The Granger Causality test was employed to carry out the research study. The empirical analysis of the study revealed that Indian stock market is positively related to wholesale price index, money supply and industrial productivity. Further, the results of the Granger Causality showed that the wholesale price index and industrial productivity influence the stock market to a great extent.

Singh (2014) investigated the relationship between macroeconomic variables and the Indian stock market. Multivariate stepwise regression analysis and Granger's causality test were employed and monthly frequency data from January 2011 to December 2012 were taken for the study. The explanatory variables were the index of industrial production, wholesale price index, money supply (m3), interest rate, trade deficit (TD), foreign institutional investment (FII), exchange rate, crude oil price (CP) and gold price (GP). The research results proved that macroeconomic variables significantly impact on the Indian stock market. The gold prices negatively impact on the stock market. Further, the study showed that the Indian Stock market improves with the increase in the inflow of foreign investment. The exchange rate showed adverse effect on the stock market during the study period. The granger causality test confirmed that there is unidirectional causal relationship from the exchange rate to stock market. On the other hand, the causality runs from index to trade deficit and foreign institutional investors.

Issahaku, Ustarz and Domanban (2013) investigated the existence of causality between macro-economic variables and stock returns in Ghana (Ghana Stock Exchange), using monthly time series data from the period January 1995 to December 2010. The methodology employed was VECM and Granger Causality tests. Exchange rate (Cedi/United State dollar rate), the consumer price index, treasury bill rate, money supply and foreign direct investment were used as macro-economic variables. The findings of the study revealed that a significant long run relationship exists between stock returns and inflation, money supply and foreign direct investment. In the short-run, a significant relationship exists between stock returns and macroeconomic variables such as interest rate, inflation and money supply. Further, a

causal relationship running from stock returns to money supply, interest rate and foreign direct investment has also been revealed.

Haroon and Jabeen (2013) investigated the impact of macroeconomic variables, i.e. 3Months, 6-Month and 12 Month treasury bill rate (proxy of interest rate), consumer price index wholesale price index and Sensitive Price Index (proxy for inflation) with Karachi Stock Exchange - KSE 100 Share index of Pakistan, using monthly frequency data from July 2001 to June 2010. Coefficient of correlation and regression analysis have been used to test the hypothesis. The study examined the impact of inflation indices, interest rate (treasury bills), on KSE movement. The research findings revealed that there was a significant relationship between macroeconomic variables and KSE-100 Share index. The study further revealed a significant impact of treasury bills on KSE-100 index.

Ray and Sarkar (2014) investigated the dynamic relation between the stock market and the selected macroeconomic variables in India, by employing monthly data for the period from January 1991 to April 2008. The index of industrial production, wholesale price index, money supply (M3), Yields on 91-day treasury bills (YTB), yields on long-term (10-year) government bonds (YLGB), competitiveness of domestic currency measured by the price of one US $ expressed in terms of the rupee (EX) and the BSE Sensex 30 (Index) to represent stock market prices were the selected macro-economic variables. The methodologies used for the study were co-integration analysis and Granger causality tests. The research findings indicated that the long-run stock market behaviour is positively related to output and exchange rate, and negatively related to short- and long-term interests, money supply and inflation. Further, the results of the causality and innovation analysis revealed that the stock market influences the economic activities, more specifically the industrial activities and the market are expected to be more sensitive to the shocks of itself over the projected period of the study.

Naik and Padhi (2012) examined the relationships between the Indian stock market index (BSE Sensex) and five macroeconomic variables, namely, industrial production index, wholesale price index, money supply, interest rate and exchange rate over the period from 1994 to 2011. Johansen's co-integration and vector error correction model were employed to explore the long-run equilibrium relationship between stock market index and macroeconomic variables. The research findings revealed that there is a long-run equilibrium relationship between macroeconomic variables and the stock market index. It is also observed that the stock prices positively related to the money supply and industrial production but negatively related to inflation. It is also found that bidirectional causality exists between industrial production and stock prices, whereas unidirectional causality from money supply to stock price, stock price to inflation; and interest rate to stock prices. Venkatraja (2014) examined the relationship between the Indian stock market performance (BSE Sensex) and five macroeconomic variables, namely, index of industrial production, wholesale price index, gold price, foreign institutional investment and real effective exchange rate over the period from April 2010 to June 2014 using monthly data. The multiple regression was carried out in this research study. The study results indicated that the wholesale price index, index of industrial production, foreign institutional investment and real effective exchange rate have a high degree of positive influence on the Sensex. It was also found that Sensex is inversely influenced by changes in the gold price. Rakesh (2013) investigated the effect of macroeconomic factors on Indian stock market performance, using monthly frequency data from January 2001 to May 2013. The data reduction technique of factor analysis was used to derive the factors which

determine the performance of the stock market in India. money supply (M3), consumer price index, gold prices, crude oil prices, foreign exchange reserves, foreign direct investment, call money rate, balance of trade, foreign exchange rate, repo rate and industrial growth rate were used as variables in this study. The findings of the study revealed that the industrial growth rate performance plays a significant role in influencing the stock market.

Inyiama and Ekwe (2014) investigated the relationship between all share index (the proxy for capital market performance) and real gross domestic product, monetary policy rate, inflationary rate and foreign exchange rate (the proxy for macroeconomic variables of the study), applying annual frequency data from 1985 to 2013. The methodologies employed in this research were Granger causality procedure, multiple regression models in the form of ordinary least square method, correlation technique and Johansen co-integration procedure. The findings of the study indicated that there is a unidirectional causality running from log of all share index to foreign exchange rate. Johansen co-integration tests revealed a long run relationship among the variables.

Momani and Alsharari (2012) examined the impact of macro-economic variables on the stock prices at Amman Stock Market of Jordan. Interest rate, national product, money supply and industrial product index were analyzed from 1992 to 2010 to discover the relationship between macro-economic variables and stock prices. As per the results, interest rate impacts on the stock prices of Amman Financial Market significantly. The production index impacts the stock prices as well where its impact was negative for general and sectors index except the insurance sector, which had a positive impact.

Dey (2013) examined the relationship between foreign ERs, foreign exchange reserve and BSE Sensex return (India) using monthly frequency data from March 1992 to June 2012. Correlation analysis, regression analysis, Johansen co-integration test and granger causality were the methodologies employed in this research study. The results of regression analysis found that there is a significant impact of returns of exchange rate, foreign exchange reserves on the returns of BSE-Sensex return. The findings of Johansen co-integration test proved that, variables are not co-integrated and hence, have no long term relationship. Further, the Granger causality test concludes that, foreign exchange rate causes the BSE Sensex return. Hasan, Arshad and Nasir (2008) surveyed the relationship between macroeconomic variables, namely inflation, industrial production, oil prices, short term interest rate, exchange rate, foreign portfolio investment, money supply and the stock prices of Pakistan (Karachi Stock Index), by using monthly data from June 1998 to June 2008 by employing ARDL approach. The results of ARDL long run coefficients reveal that industrial production, oil prices and Inflation are statistically insignificant in determining equity prices in the long run while interest rate, exchange rate and money supply have a significant long run effect on equity prices. The error correction model based upon ARDL approach captures the short term dynamics of prices and it also confirms that changes in industrial production, oil prices and Inflation are not statistically significant in the short run while changes in interest rate, exchange rate, and money supply have significant short term effect. However, foreign portfolio investment has significant short term effect in the short term and no long term effect in the long term.

Singh (2010) investigated the casual relationship between macro-economic variables and stock market. Sensex and three key macro-economic variables of Indian economy by employing correlation analysis, unit root stationarity tests and Granger causality test. Monthly data had been used from April,1995 to March, 2009 for all the variables, like, BSE Sensex, wholesale price index, index of industrial production and

exchange rate. The research findings indicated that the stock market index, index of industrial production, exchange rate, and wholesale price index contained a unit root and were integrated of order one. Granger causality test was then employed. The Granger causality test indicated that index of industrial production is the only variable having bilateral causal relationship with BSE Sensex. Wholesale price index has strong correlation with Sensex but it has unilateral causality with BSE Sensex. Therefore, it was concluded that, Indian stock market is approaching towards informational efficiency at least with respect to two macroeconomic variables; exchange rate and inflation (wholesale price index).

Ibrahim and Yusoff (2001) examined dynamic interactions among macroeconomic variables such as real output, price level, and money supply, exchange rate, and equity prices for the Malaysia (Kuala Lumpur Composite Index (KLCI)), using co-integration and VAR techniques. Monthly time series data from January 1977 to August 1998 was considered for the study. The research findings showed that the money supply exerts a positive effect on the stock prices in the short run. However, money supply and stock prices are negatively associated in the long run. Robert (2008) had conducted a study on the effect of macroeconomic variables on stock market returns for four emerging economies of Brazil, Russia, India and China affirmed that there was no significant relationship between present and past market returns with macroeconomic variables, suggesting that the markets of Brazil, Russia, India and China exhibit weak form of market efficiency. Also, study results showed that there was no significant relationship between respective exchange rate and oil price on the stock market index prices of the four countries studied.

Adam and Tweneboah (2009) investigated the impact of macroeconomic variables on stock prices in Ghana, by using quarterly data from 1991-Q1 to 2007-Q4. The Databank stock index, inward foreign direct investments, the treasury bill rate, consumer price index, average crude oil prices, and the exchange rate were used as macroeconomic variables. For the study, co-integration test and VECM were adopted to examine both long-run and short-run dynamic relationships. The research results indicated that there is long-run co-integration between macroeconomic variable and stock prices. The VECM analysis showed that the lagged values of interest rate and inflation has a significant influence on the stock market. Humpe and Macmillan (2007) examined whether macroeconomic variables influence stock prices in the US and Japan, using co-integration analysis. Monthly data from January 1965 to June 2005 was used for the study. Index of industrial production, consumer price index, money supply, long term interest rate and stock prices of the US and Japan were used as variables in this study. The results revealed that for the US, stock prices are positively related to industrial production and negatively related to both the consumer price index and a long term interest rate. However, for Japan, stock prices are influenced positively by industrial production and negatively by the money supply. Wongbangpo and Sharma (2002) investigated the role of GDP, consumer price index, money supply, interest rate and exchange rate on the stock prices in five ASEAN countries, such as, Indonesia, Malaysia, Philippines, Singapore and Thailand using co-integration and Granger causality test. The data set consisted of monthly data from 1985 to 1996 for Jakarta composite stock price index (JCSPI) for Indonesia, Kuala Lumpur Stock Exchange Composite Index (KLSE) for Malaysia, Philippines Stock Exchange Composite Index (PSE) for Philippine, Stock Exchange of Singapore Index (SES) for Singapore and the Stock Exchange of Thailand Index (SET) for Thailand. The study results proved that both long term and short term relationships exist between stock prices and the macroeconomic

variables. Yusof and Majid (2007) examined both short-run and long-run dynamics between the macroeconomic variables and stock market behavior in Malaysia (Kuala Lumpur Composite Index (KLCI)) during the post 1997 financial crisis, using Autoregressive Distributed Lag (ARDL) model. Monthly frequency data from May 1999 to February 2006 was used for the study. Index of industrial production, federal funds rate (FFR), real effective exchange rate and interest rate (T-bill rate) were used as macro-economic variables. The study concluded that changes in the FFR, seems to have a significant direct impact on the Malaysian stock market behavior during the period of analysis. This implies that any changes in the US monetary policy may affect the Malaysian stock market.

Gunasekarage, Pisedtasalasai and Power (2004) investigated the influence of macroeconomic variables on stock market equity values in Sri Lanka, using the Colombo All Share Price Index to represent the stock market and the money supply, the treasury bill rate (as a measure of interest rate), the consumer price index (as a measure of inflation) and the exchange rate as macroeconomic variables and with monthly data for the duration of 17 years from January 1985 to December 2001 by employing a series of econometrics models inclusive of unit roots, co-integration, Vector Error Correlation Model (VECM), Impulse Response Function (IRFs) and Variance Decompositions (VDCs). The principal method according to VECM lagged values of inflation, money supply and treasury bill rate have a considerable influence on the stock market.

Gan, Lee, Yong and Zhang (2006) have investigated the impact of macroeconomics variables on stock market performance. They studied a set of seven macroeconomic variables and used co-integration tests, Johansen maximum likelihood and granger-causality tests. They also investigated the short run dynamic linkages between NZSE40 and macroeconomic variables using innovation accounting analyses. In general analysis it was found that the NZSE40 is consistently determined by the interest rate, money supply and real GDP but there is no evidence that the New Zealand Stock Index is a leading indicator for changes in macroeconomic variables. Coleman and Tettey (2008) examined the effects of macroeconomic indicators on the performance of Ghana Stock Exchange (GSE), using co-integration and the error correction model techniques. Quarterly time series data from the period 1991:Q1 to 2005:Q4 were used to conduct the research study. Variables used for the study include GSE all-share-index (GSI), inflation, real exchange rate, interest rate (91-days T bill rates) and Ashanti Goldfields Company (AGC) dummy. The findings of the study revealed that lending rate from deposit money banks has an adverse effect on stock market performance and particularly serves as a major hindrance to business growth in Ghana. Further, it was also found that inflation rate has a negative effect on stock market performance. As Badullahewage (2018) formulated, the below conceptual frame work is formulated to assess the impact of macro-economic variables on stock market performance.

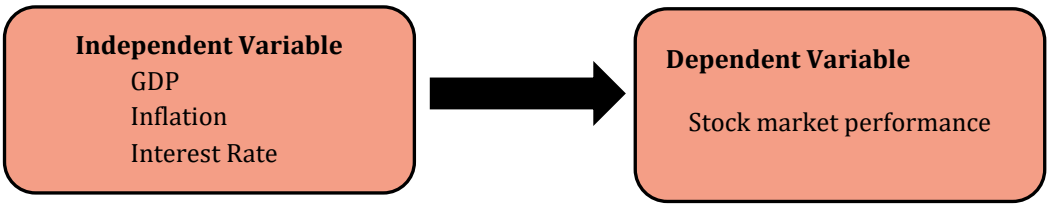

Figure 3. Conceptual Framework (Source: Developed by researcher)

2. Materials and Methods

Data collection and sampling

120 monthly observations from January 2008 to December 2018 were gathered from the Central Bank annual reports published by Central Bank of Sri Lanka and Colombo stock exchange.

Hypothesis of the study: Based on the previous studies, this study has formulated the following hypotheses**:**

H_1: Macro-economic factors significantly impact on stock market performance.

Model of the study

To investigate the impact of macro-economic factors on stock market performance, panel data analysis was employed in this study and the model used is expressed as follows:

$$\mathbf{ASPI = \beta 1_{i,t} + \beta 2\ GDP_{i,t} + \beta 3\ TBR_{i,t} + \beta 4\ WPI_{i,t} + \varepsilon_t}$$ **Equation 1**

Where,
ASPI: All Share Price Index
GDP: Gross Domestic Product
TBR: Treasury Bill Rate
WPI: Wholesale Price Index
ε: Error term

Analysis of the study: Descriptive analysis

Descriptive statistics are also useful to make general observations about the data collected. General description of these variables appears on the Table 02 below.

Table 1. Summary of descriptive analysis

Variables	Obs	Mean	Median	Min	Max	SD
ASPI	120	6058.52	6255.77	2432.15	7798.00	1090.36
GDP	120	135.44	121.08	90.10	234.30	35.97
TB	120	8.19	8.24	5.74	11.93	1.45
WPI	120	4870.48	4998.67	3508.17	6037.28	670.97

Table 02 clearly represents the descriptive statistics of both independent and dependent variables in which 120 monthly observations have been included in the study. The mean of ASPI, gross domestic product, treasury bill rate and wholesale price index are 6058.52, 135.44, 8.19, and 4870.48respectively, while the standard deviation of ASPI, gross domestic product, treasury bill rate and wholesale price are 1090.36, 35.97, 1.45 and 670.97 respectively.

Multicollinearity test

Multi co linearity can be measured using Variance Inflation Factor or Tolerance test. In this study, VIF was used.

Table 2. Multicollinearity test

Variable	Coefficient	Centered VIF
C	0.580	NA
GDP	0.009	2.124
TB	0.007	1.204
WPI	0.013	2.100

According to the Table 03, the centered VIFs are shows the value which is less than 10. Therefore, the finding of this analysis has proved that that there is no multi-collinearity, as the VIF is less than 10.

Unit root test

In order to find out the times series variables are stationary or non-stationary, the ADF's unit root test has been carried out by the researcher.

Results of unit root tests indicate that two out of the four variables are non-stationary (see Table 04). The results of the ADF test indicate that all the integrated variables are stationary at the first difference with varying level of significance. Hence, the present study employs with the first difference for the GDP and WPI meanwhile the ASPI and TB are with level form.

Table 3. Results of the Auckmented Dickey Fuller Unit Root Test

Variables	Augmented Dickey Fuller (ADF) Test			
	Level		First Difference	
	t-statistic	Prob.*	t-statistic	Prob.*
ASPI	-4.418	0.001	-8.876	0.000
GDP	-1.934	0.316	-14.670	0.000
TB	-2.907	0.048	-7.994	0.000
WPI	-2.001	0.286	-7.933	0.000

Correlation Analysis

The primary objective of employing correlation analysis is to explore the relationship between macro-economic variables and stock market performance.

Table 4. Summary of Covariance Analysis

Variables	ASPI	GDP	TB	WPI
ASPI	1.000			
GDP	0.213***	1.000		
TB	0.593 ***	-0.184	1.000	
WPI	0.617***	-0.668	-0.151	1.000

****p<0.01 significance level*

Based on the correlation analysis, we can conclude that there is a high correlation between the independent variables (GDP, TB, WPI) and dependent variable (ASPI). Also, GDP and TB shows a negative relationship with ASPI and WPI shows a positive relationship with ASPI. The correlation analysis was employed by Morawakage (2011), Haroon and Jabeen (2013) and Inyiama and Ekwe (2014) to explore the correlation of variables.

Regression Analysis

Researcher carried out regression analysis in order to examine whether macro-economic variables significantly impact on stock market performance by employing ordinary least square method. It was employed in similar previous studies conducted by Nijam, Ismail and Musthafa (2011), Badullahewage (2017), Fama (l981) and Samarakoon (l996). This is because researcher can incorporate more variables into the model and hence it

helps to identify the impact of macroeconomic variables on stock market performance. The results of the OLS is presented below.

Table 5. Results of Ordinary Least Square

Variables	Coefficient	Std error	t-ratio	p-value
Cons	-0.758	0.761	-0.995	0.322
GDP	0.126	0.096	1.362	0.176
TB	-0.715	0.082	-7.803	0.000***
WPI	1.332	0.151	7.600	0.000***
R-squared	0.750	Durbin-Watson stat	0.146	
Adjusted R-squared	0.743	Prob(F-statistic)	0.000	

****p<0.01 significance level*

As shown in Table 07, the R-squared is 0.75. It implies that the macroeconomic variables account for 75% variation in the all share price index (ASPI). This endorses that 75% of the variation in all share price index is explained by the three macroeconomic variables, GDP, TB and WPI. Further, GDP and WPI are showing positive effects whereas TB is showing a negative effect on ASPI. Also based on the results, it can be concluded that TB and WPI show a significant impact on ASPI.

The findings of the present study are compatible with the following: Nijam, Ismail and Musthafa (2011) who researched about the impact of macro-economic variables on stock market performance and proved that GDP, inflation, interest rate, balance of payment, and exchange rate have significant influence on all share price index which is the prominent parameter of stock market performance; Badullahewage (2017) who investigated the effects of macroeconomic factors on the performance of stock market in Sri Lanka and the results revealed that inflation, gross domestic product, interest rate, money supply and exchange rate have an inseparable impact over the performance of the Sri Lankan stock market; and Aurangzeb (2012) who identified the factors affecting performance of the stock market in three South Asian countries, and concluded that interest rate has significant impact on the performance of stock market in South Asia.

4. Conclusion & Recommendation

This study has analyzed the relationship between macro-economic variables and stock market performance and the impact of macro-economic variables on stock market performance by employing correlation and regression analysis. The research findings of correlation analysis indicated that there is a high correlation between the independent variables (GDP, TB, WPI) and dependent variable (ASPI). Also, GDP and TB shows a negative relationship with ASPI, and WPI shows a positive relationship with ASPI. According to regression analysis, 75% of the variation in all share price index is explained by the three macroeconomic variables, GDP, TB and WPI. Furthermore, to protect the stock market by manipulating macroeconomic variables with better understanding through the policies implementation for policy- makers is imperative. Therefore, in general, research findings indicate that macroeconomic factors significantly impact on the movement of ASPI, the all share price index, the prominent parameter of Colombo Stock Exchange. The implications of the present study are multifaceted and the research findings reveal that macro-economic variables significantly impact on the Stock market performance. The analyzed results will be beneficial for the stock market regulators, stock market analysts, managers, policy makers, and market investors for effective decision making for the maximization of their profit

which reduces Colombo stock market volatility. Therefore, the relevant authorities should closely monitor the movements of macro-economic variables and make necessary actions to promote Colombo Stock market performance. In conclusion, the research results have found that macro-economic variables significantly impact on the Colombo Stock market performance namely Interest Rate and Inflation which showed significant impact on Stock market performance. The findings of the present research are compatible with the findings of Nijam, Ismail and Musthafa, 2011 and Badullahewage, 2012). Though the research was carried out based on only secondary data, it is recommended that, in future, researches be developed by incorporating primary data as well, for more accurate findings, which would rectify any shortcomings in this research.

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