MACRO-ECONOMIC VARIABLES ON STOCK MARKET PERFORMANCE: A CASE OF SRI LANKA

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Abstract

Since Sri Lankan economic and political climate has been favourable for after the conclusion of the war, Sri Lanka is now experiencing a high potential environment for development. So it leads to influence on trend of macro-economic variables which also impact on the stockmarket performance. In this context, the aim of the study is to investigate the impact of selected macro-economic variables namely Gross Domestic Product, Inflation, Interest Rate, Money Supply, Exchange Rate and Balance of Payment on stock market performance of Sri Lanka. To estimate the relationship, unit root test and Regression Model have been used. The study is carried out in Sri Lanka from 2004 to 2015 in quarterly basis. The result of regression model suggests that stock market performances are significantly affected by the macro-economic variable, not only macro-economic variables but also other factors to determine the stock market performance. Based on estimated regression coefficients it is found that interest rate has a significant negative influence on stock market performance and balance of trade have positive significant relationship with the stock market. It indicated that favorable balance of trade induces the interest of foreign investors to invest the stock market in Sri Lanka. In addition, gross domestic product and exchange rate are negatively related to stock market, but it is not significant in the model. On the other hand, money supply and inflation are positively associated to stock prices although not significant.

Keywords: Macro- economic variable, stock market performance, unit root test, liner regression

1. Background of the study

Economics as a science is the study of the human behavior and nature of the economy based on scarce resources and humans' needs and wants. Traditionally, it has been divided into two components namely micro- and macro-economic (Chartered Account of Sri Lanka, 2015). Bayezid Ali (2011) aruges that the micro and macro-economic variables have significant influenced on the stock market performance. As results, the investors, policy makers and government need to be considered this association when making their investment decision, formulating the economic policy like fiscal, monetary and business policy and creating the sustainable growth. Whereas the macro-economic variables are highly influential on the stock market performance as compared to micro-economic variables (Bayezid Ali, 2011; Naik & Padhi, 2012; Zohaib, Sangeen, Lala, Imdadullah, & Wajeeh, 2012). This study examines empirical association between macro-economic variables and stock market performance to improving the efficiency of stock market. The stock is a one of the sensitive resources to deciding economic condition. Any big and aggressive change in stock prices can have negative implications for an economy, and this makes the causal relationship between macro-economic variables and stock returns and performance one of the most debated topics in finance in the past few decades (Mahmoud Ramadan, Sara, & Khaled, 2016; Ozbay, 2009)

As Sri Lanka, it is frequently debating it because that due to the decades of internal political disturbance the Sri Lankan economy had not been able to progress to its full potential (Nijam, Ismail, & Musthafa, 2015). As the internal political climate has been favourable after the conclusion of the war, Sri Lanka is now experiencing a high potential environment for development. Consequently, it is important to understand how macro-economics variables impact on stock market performance in such an emerging market.

With the end to the 30 year ethnic conflict in 2009,the Sri Lankan government has set determined objectives for economic and human development. With a relatively open investment environment and financial system, accompanied by a moderately stable monetary policy and a refining of infrastructure and emerging domestic firms, Sri Lanka has many of the elements to progress economically.

Whereas, there is a dearth of studies on the effects of emerging economics of stock market performance among developing countries. Only few prior studies concentrated on nature of the relationship between macro- economic variables and stock market performance in Sri Lanka. However, Pal and Mittal (2011) reveal that the inflation rate has a significant impact on capital markets whereas Interest Rate (IR) and foreign Exchange Rate (ER) also have some impact on capital market. Nijam et al. (2015) suggest that macro-economic factors continue to affect stock prices and the capital market performance, and they have recommended that upward movement of Gross Domestic Product (GDP), ER and IR may lead to better performance of All Share Price Index (ASPI) of Colombo Stock Exchange (CSE). Zohaib et al.(2012) note that ER is negatively related to stock returns. Increase in ER causes decrease in stock performance. These inconclusive outcomes, in the extent literature, point to a gap in understanding of the relationship between macro-economic proxies and stock market performance in emerging nation.

In addressing the research gap this study uses the following research questions to understand insight into the Sri Lanka macro-economic variables.

RQ_1: What is the impact of macro-economic variables on stock market performance?

RQ_2: What is the empirical association between macro-economic variables and stock market performances?

This study has theoretical contributions namely providing some boost for existing literature especially emerging economies such as Sri Lanka, and also it mostly assists to the Sri Lankan government for developing the economic policy and also the finding of this study would be little contribute to potential local and foreign investors to make optimal economic decisions when macro-economic force vary.

The following Section 1.2 illustrated review of literature and hypotheses development. Section 1.3 presents research design. Section 1.4 presents result analysis. Finally, Section 1.5 presents the conclusion of the research study.

2. Review of Literature and Hypotheses Development

In the past few decades, more researchers, financial analysts and practitioners have made the attempt to predict the association between stock market performance and macro-economic variables (Aurangzeb, 2012; Bayezid Ali, 2011). This section discusses some such theoretical conclusions, previous research works and their empirical conclusions that are related to this study.

The Efficient Market Hypothesis (EMH) theory assumes that all available information should be incorporated with the market price at any point in time. The EMH suggest that the profit from predicted price movements is unlikely and very difficult because that the arrival of new information are the main factors behind price changes. It is clearly stated that stock values are affected by the different kinds of information. Like Present Value Model (PVM) suggested that investment on stock market depends on the discounted factors.

The previous studies about the macro-economic determinants of stock market performance can be divided into two major categories. The first category is to determine the factors impacting on the stock prices studied by Ibrahim and Aziz (2003) and Chen, Roll, & Ross (1986). The second category is to examine factors determining stock return volatility studied by Beltratti and Morana (2006) and Schwert (1989). Both concepts have different research objectives, methodologies, and most importantly the implications of their findings can lead to different conclusions. The former focuses on the stock market performance, which can be measured by the return on the market indices, sectoral indices or individual stocks. On the other hand, the latter is concerned with the volatility of the stock itself, which can be measured via auto regressive conditional heteroscedasticity (ARCH) model. Since this study is about stock market performance it falls under the first group, the following reviews of literature centered on the impact of macro-economic variable on stock market performance are discussed.

The impact of macro-economic variables could vary from one market to another and from one period to another period (Pramod-Kumar & Puja, 2012). Some research studies show empirical evidence proofing causality whereas other studies show no causal relationship (Ali, Adam, Zunaidah, & Ahmad, 2015). In 2012, Bhunia argued that although there are many theoretical and empirical studies that examined the direction of causality between macro-economic variables and stock market performance, the direction of the causality is not yet known clearly in empirical studies as well as in theory. In addition, the direction of the causality changes from one economy to another and from one period to another.

 The real GDP growth rate, rate of inflation, ER, fiscal position, debt position and many other variables can be used to measure the performance of an economy. These variables can also serve as the major determinants of economic growth (Mahmoud Ramadan, Sara, & Khaled, 2016; Stiglitz, Sen, & Fitoussi, 2009). Since the stock market reflects the economic fundamentals, stock market performance should be employed as a leading indicator of future economic activity (Pal & Mittal, 2011).Various studies found that change in the fundamentals of the economy greatly affects the stock market   (Ahmed, 2008). Stock prices and hence market index is considered to be one of the best indicators of changes in economic activities by empirical studies and economic theories. If an investor wants to get more return on their investments, they must focus mainly on the macro-economic variables because of the impact of those variables on the stock market performance (Musílek, 1997). According to Oberuc (2004) the economic factors usually determines the stock prices movement. The economic factors identified by him are dividend yield, industrial production, interest rate, term spread, default spread, inflation, ER, money supply, GNP or GDP and previous stock returns, among others.

Gross Domestic Product GDP

According to the Lokeswar Reddy (2012) GDP is used to measure the economic growth. GDP measures the total value of final goods and services produced within a country's borders in a year, regardless of ownership. If the intermediate goods and services are used for calculating the GDP it would lead to double counting of economic activity within a

country. There are three approaches to calculating GDP. The first one is expenditure approach that is calculated based on the final spending on goods and services. The next is product approach that is calculated based on the market value of goods and service produced. The last is income approach that is calculated based on the sums of the income received by all products in the country (Lokeswar Reddy, 2012).

Ibrahim and Aziz (2003), Chaudhuri and Smiles (2004), and Buyuksalvarci (2010) found a significant relation between stock market and real GDP and also Wickremasinghe (2011), Ifuero Osad and Evbayiro-Osagie (2012), Lokeswar Reddy 2012, Nijam et al. (2015) were concluded GDP has a significant and positive relationship with stock market performance. The higher growth rate of GDP is more favorable to stock market (Chandra 2004) this is express as GDP have a positive relationship with stock market performance. Based on these discussions the Hypothesis is

H_{1a}: *There is a significant and positive relationship between GDP and ASPI*

Inflation

INF means that increasing the prices of goods and services over time (Kimani & Mutuku, 2013). It cannot be measured by an increase in the cost of one product or service, or even several products or services but it is measured as an annual percentage increase in the overall price level of the goods and services in the economy. As INF rises, every currency an investor has low purchasing power which means that they buy a smaller percentage of a good or service. In accordance with Feldstein (1980), when INF rate is at high constant rate it is provided the boots to stock prices. On the contrary, the stock prices fall when the *expected* INF rate rises. The results of Nijam et al. (2015) research study conclude that INF has a significant and negative relationship with ASPI. However, it contrasts from conclusion of Chen et al. (1986), Gjerde and Saettem (1999). Based on these discussions the Hypothesis is:

H_{1b}: *There is a significant relationship between INF and ASPI*

Interest Rate

In simply say that IR is the cost of borrowing funds. IR is impacted on the stock market activities. The IR fluctuation may have impact on the value of nonfinancial corporations through several channels (Moya, Lapena, & Sotos, 2013). First, when IR goes up, that leads increase the interest expense of highly leveraged companies, thus reducing cash flows available for future dividends with the consequent negative impact on share prices. Second, the IR fluctuations have an impact on the market value of financial assets and liabilities held by nonfinancial firms. Third, movements in IR affect the opportunity cost of equity investments. Higher IR make bonds more attractive given their risk-return characteristics, which motivates investors to adjust their portfolios by buying bonds and selling stocks, thus depressing stock prices. Fourth, changes in IR may impact upon the level of real activity in the economy in the short to medium term, and this affects equity prices by altering the expectations of future cash flows.

Ologunde, Elumilade and Saolu (2006) studied the dynamic relationships between stock market capitalization rate and IR in Nigeria. They adopted the ordinary least-square (OLS) regression method and their empirical research study found that the IR has positive impact on stock market capitalization rate. Based on these discussions the Hypothesis is

H_{1c}: *There is a significant relationship between IR and ASPI.*

Money supply

MS refers to the total amount of money in circulation or in existence in a country. There are several standard measures of the MS, including the monetary base, M1, and M2. The monetary base is defined as the sum of currency in circulation and reserve balances (deposits held by banks and other depository institutions in their accounts at the Federal Reserve). An increase in MS growth would indicate excess liquidity available for buying securities, resulting in higher security prices. But Menike (2006) conclude that there is a no significant relationship between MS and price. However it contracts the results of Vladimir (2017) is that the MS has positively influence price of S&P 500. Based on these discussions the Hypothesis is

H_{1d}: There is a significant relationship between MS and ASPI

Exchange Rate

According to O'Sullivan and Steven (2003) ER is the value of one currency for the purpose of exchange to another. It is the price of a nation's currency in terms of another currency.
ER movements significantly affect the stock market performance. When there are high fluctuations in the ERs, the ERs movement, there would be high movements of market return volatility. Some studies have concluded that there is a strong relationship between ER movement and interest rates volatility (Otwoma, 2013), while others have not. Based on these discussions the Hypothesis is

H_{1e}: There is a significant relationship between ER and ASPI

Balance of Trade

Nijam et al.(2015) investigate the relationship between BOP and ASPI and concluded that no significant relationship between them. BOT is a one of the part of BOP, it additionally consist capital and financial account. There is no study conducted in previous year .Based on these discussions the Hypothesis is

H_{1f}: There is a significant relationship between BOT and ASPI

3. Research Methods

This study uses quantitative techniques to assess about impact macro-economic variable on stock market performance in Sri lankan Context and is conducted by using quarterly data for the period periods from 2004 to 2015 and employs time series data which covers 12 years and 48 observations per variables. The study is collected the data from secondary sources, i.e., Central Bank Annual Reports, 2004-2015, economic and social statistics in Sri Lanka 2004-2015 and monthly bulletin from Central Bank website.

The quantitative data were analyzed using EViews 8 to produce descriptive statistics and econometrics tests. Descriptive statistics show the summary of behavior of the variables in a study. And the econometrics tests carried out in this research study for prove the objective of study. These are unit root test, Augmented Dicky Fuller (ADF) test

proposed by Dicky and Fuller (1981) and Phillips-Perron (PP) test and regression analysis. Unit Root Test was applied to see the stationary of the series at the level, first difference and second difference test by using ADF and PP. Regression analysis was conducted to find out the significant relationship and impact of macro-economic variables on stock market performance. ASPI is a one of the variables to measure the stock market performance in Sri Lanka (Nijam et al., 2015). There are six Macro-Economic Variables using as independent variables in this study namely GDP, IFR, IR, MS, ER and BOT.

Table 1: Variables used to study the Macro-Economic Stock Market Performance

Macro-Economic			
Variables	**Indicator**	**Measures**	**Abbreviations**
Gross Domestic Product	GDP at current market prices	Current Prices GDP= Agriculture + Industry + Services	GDP
Inflation Rate	Wholesale price index (Nijam et al., 2015)	Inflation Rate=[(P2-P1)/ P1] *100 P1: - Last Year Price Level P2: - Current Year Price Level	IFR
Interest Rate	Interest on Deposit (Uddin & Alam, 2007)	Commercial Banks- Average Weighted Deposit Rate. (AWDR) source from CB reports	IR
Money Supply	M2 (Hamburger & Kochin, 1971; Kraft & Kraft, 1977)	M2 = Cp+DD+TSD Cp: - Currency held by public DD: - Demand deposits held by public TSD: - Time & Savings deposits	MS
Exchange Rate	National currency Per USD (Adam & Tweneboah, 2008; Gunasekarage, Pisedtasalasai, & Power, 2004)	Source from CB annual reports of Sri Lanka	ER
Balance of Trade	Balance of Trade US$ million	BOT= import - export	BOT
Stock Market Performance			
Variables	**Indicator**	**Measures**	
All Share Price Index	index	ASPI = (Market capitalization all listed companies / Base market capitalization) *100	ASPI

4. Findings and Discussion

Descriptive Statistics Analysis

Table 2 presents the summery of descriptive statistics for the selected dependent and independent variables in Sri Lanka from 2004 to 2015. 48 quarterly observations of all the variables have been used to estimate the descriptive statistics.

Table 2: Descriptive Statistics for 2004 and 2015

Variables	Mean	Median	Maximum	Minimum	SD	Skewness	Kurtosis
ER	115.6238	112.0897	142.1257	97.95090	12.01429	0.454280	1.943759
GDP	1476027	1315744	2884000	416749	782284.6	0.379971	1.868046
INF	0.024693	0.019993	0.127670	-0.07817	0.043254	0.185220	3.173033
IR	7.815625	7.230000	11.63000	4.840000	2.038352	0.415220	1.815922
MS	1849920	1568860	4057191	606390	1013241	0.592246	2.092511
BOT	-1453.821	-1366.850	-396.3	-2911	731.1808	0.338464	1.889672
ASPI	4204.606	3555.100	7299.000	1284.200	2161.849	0.118706	1.327463

As shown in the Table 2 indicates that in MS is at very high level as Sri Lankan Government is involving many infrastructure development and international integrations, as a result current money seems high among the financial intermediaries. Mean of BOT is negative value which indicates that recently exports are less than the imports among the traders. INF rate in Sri Lanka is a near to zero due to that both inflation and deflation in their economy with in sample period. The minimum and maximum value of INF respectively is 0.127670 and (-0.07817) which implies that deflation of economic as mean of INF is near to zero. Of the median, MS has the highest median (1568860) while INF rate has the lowest median (0.019993). The different between the maximum and minimum value of GDP (max 2884000- min 416749) is extent due to the INF (maximum value 0.127670) and deflation (maximum value-0.07817) of economic environment as GDP data is taken for this study in current market price which affected by INF. Of the MS has the highest standard deviation (1013241) while INF rate has the lowest standard deviation (0.043254). All variables show positive skewness which that distribution of all the data series has a long right tail. INF has the highest kurtosis (3.173033) while ASPI has the lowest kurtosis (1.327463).

Unit Root Test

When dealing with time series data, it is essential to look at the existence of unit root in the data series. If the variable is non stationary, the results could be obtaining a high R^2, although there is no meaningful relation between variables (Eduard & Stefan, 2009). A non-stationary process generates the problem of spurious regression between unrelated variables. Before running our linear regression, the researcher needs to test for Unit root and make sure that research is dealing with stationary data before using it. There are numerous unit root tests are available. ADF and PP test are most popular test among them. Therefore, in this study will be carried ADF and PP test for determining whether dependent and independent variables are stationary or not. Further, there are three conditions must be satisfied for determine whether the data are stationary. Those are intercept, trend and and none. ADF and PP show same result, this indicates that there is no conflict arising to draw the conclusion, that is a reject or accept of null hypothesis. On other hand if the result is conflicted between the two tests, that is lead to critical situation for drawing the conclusion. However, Schwert (1989), suggests that if the research study uses a large sample size, PP test will provide more accurate result than ADF test, which is indicated that   PP test's result provides better result than ADF test's result. If any issue rises only consider the PP test's results. The hypothesis for ADF and PP is:

H_0: *Series is non-stationary or unit root*

H_1: *Series is stationary or no unit root*

The null hypotheses will be rejected if p-value is lesser than critical value (5%), otherwise do not reject null hypothesis. Also, condition required data significant at intercept, trend and intercept and none before rejecting the null hypothesis. The rejection of the null hypotheses indicates that data series is stationary. If don´t reject the null hypothesis, that concludes that data is not stationary or have a unit root. If variables are non-stationary, this implies that research need to take the first difference of those variables before running the regression model.

Table 3:Table ADF & PP Test Result at Level

Null hypothesis	ADF			PP			Null hypothesis Reject or not	Results
	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None		
ASPI is non-stationary	0.5311	0.4520	0.9481	0.5505	0.5651	0.9746	Do not reject	ASPI is non-stationary
ER is non-stationary	0.9706	0.0420	0.9831	0.9361	0.3281	0.9967	Do not reject	ER is non-stationary
GDP is non-stationary	0.4706	0.6354	1.0000	0.0003	0.8468	1.0000	Do not reject	GDP is non-stationary
INF is non-stationary	0.0000	0.0000	0.0001	0.0039	0.0001	0.0001	Reject	INF is stationary
IR is non-stationary	0.0073	0.0417	0.6643	0.2544	0.7405	0.6681	Do not reject	IR is non-stationary
MS is non-stationary	0.8787	0.5901	1.0000	0.8757	0.4977	1.0000	Do not reject	MS is non-stationary
BOT is non-stationary	0.0000	0.0000	0.2963	0.0000	0.0000	0.0184	Reject	BOT is stationary

Source: Results from unit root test of time series data

Table 4:Table ADF & PP Test at 1st Difference

Null hypothesis	ADF			PP			Null hypothesis Reject or not	Results
	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None		
ASPI is non-stationary	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000	Reject	ASPI is stationary
ER is non-stationary	0.0001	0.0005	0.0000	0.0091	0.0359	0.0006	Reject	ER is stationary
GDP is non-stationary	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001	Reject	GDP is stationary
IR is non-stationary	0.0866	0.1883	0.0083	0.0492	0.0473	0.0064	Reject	IR is stationary
MS is non-stationary	0.0000	0.0001	0.5266	0.0000	0.0001	0.3041	Do not reject	MS is non-stationary

Table 5:ADF & PP Test at 2nd Difference

Null hypothesis	ADF			PP			Null hypothesis Reject or not	Results
	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None		
MS is non-stationary	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	Reject	MS is stationary

Regression Analysis

In this research study uses a multiple linear regression models to investigate the impact of an independent (responsible) variable on the dependent variable.

With regard to this study, the dependent variable is ASPI and the independent or dependent variables are GDP, INF, IR, MS, ER and BOT. At the beginning all the variables under study is transformed into log data. Then, conducted the unit root test because of the existence of a unit root in the all variables.

The results of the unit root show that INF and BOT are a stationary at level, ASPI, ER, GDP and IR is become a stationary at the first difference of logarithm of all these four variables, and other variable become a stationary at the second difference. Therefore, the multivariate regression model is developed by the following specification:

Equation 0.1: Regression Model

$$DLog(Aspi)_t = \alpha + \beta_1 DLog(Gdp)_t + \beta_2 Log(Inf)_t + \beta_3 DLog(Ir)_t + \beta_4 DDLog(Ms)_t + \beta_5 DLog(Er)_t + \beta_6 Log(Bot)_t + \varepsilon_i$$

Source: Results from "Unit root test" of time series data
Where *D* is the first difference and *DD* are the second difference. The model output is summarized in Table 6 and 7.

Table 6:Regression Model Summary

R^2	0.306061
R^2 Adjusted	0.199301
S.E. of regression	0.054575
F-Statistics	2.866814
Significance level	0.02068
Durbin-Watson stat	2.156605

Source: Results from the time series data analysis

According to the regression analysis, there is a significant impact of macro-economic variables on stock market performance (F= 2.866814; P < 0.05). It means that, ASPI is affected by the macro-economic variables significantly. There are various factors are impacted on the stock market performance which could be micro-economic or internal or firm specific such as earnings per share, dividends and book value and company board's decision and external factors or macro-economic factors (Bayezid Ali, 2011; Birchall & Verry2016). Also, stock market performance is affected by regulatory mechanism of the market such as change of chairman of the Securities Exchange Commission of Sri Lanka economic and political environment (Dayaratne 2014). Therefore, the stock market performance is not only impacted by macro-economic variables but also impact of other variables.   The adjusted R^2 shows only 0.199301 which means that macro-economic variables (BOT, INF, IR, GDP, ER and MS) impact only by 19.93% on stock market performance and remaining 80.07% are determined by other factors.

Table 7:Coefficients and P-value of ASPI

Variable	Coefficient	Prob.
C	0.053648	0.0038
LBOT	2.45E-05	0.0099***
LINF	0.122425	0.5701
DLIR	-0.663725	0.0185***
DLGDP	-0.219534	0.6097
DLER	-0.802172	0.3654
DDLMS	1.9711	0.101

Source: Result from Least Squares Method of Time Series Data

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5.   CONCLUSION AND FUTURE RESEARCH

This study investigates whether: macro-economic variables impact on stock market performance and there is the empirical association between macro-economic variables and stock market performances. It concluded about the impact of macro-economic variables on stock market performance. Also, it notes there is a significant relationship between few macro-economic variables namely BOT and IR on stock market performance.

The future research could have been enriched with additional test on different time frequencies other than quarterly data such as daily, weekly or monthly. Besides, this research only focuses on six independent variables which are GDP, INF, IR, ER, MS and BOT. Future research could include other variables such as consumer price index, BOP, unemployment rate, oil price, Industrial production and so on in order to obtain more accurate result or to explore the model to see the different relationship between stock market performance and macroeconomic variables. Besides, the period of our study is from beginning of year 2004 to end of year 2015, which we could not take in the newest information of variables in year 2016 into consideration. A longer period of data could have been produced a more refined result.

This study used a linier regressive analysis model to examine the relationship between macro-economic variables and stock. On other hand there many methods are available for investigate the impact of macro-economic variable and stock market performance namely "VAR" model uses for choosing lag length, "Johansen test for co-integration" model applies for finding the co-integration test between macro-economic variables and stock market performance, "Granger causality" model for testing the causal relationship and "Long run equation" model uses for testing long run relationship. In future research study will be conduct these methods for investigate the impact of macro-economic on stock market performance. In this research used ASPI for measure stock market performance of Sri Lanka. Further "Standard & Poor's Sri Lanka 20" uses to measure stock market performance, in future research consider it.

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