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**EMPIRICAL INVESTIGATION OF RELATIONSHIP BETWEEN MACRO-ECONOMIC VARIABLES AND STOCK PRICE IN CSE**

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**Abstract**

The starting point of this research is the research problem; Relationship between macroeconomic variables and stock prices in Sri Lanka stock market. Depending on research problem literature review is conducted in order to specify research question and construct framework. The research purpose and research question reveal that this study is primarily descriptive. As theories exist and conclusions are drawn from theories this study is deductive one and quantitative research method is used. Data is collected through secondary data from considering the ASPI index of ten years from 2007 to 2016 as monthly vice. The impact of macroeconomic variables on stock prices in Sri Lanka stock market has been examined through descriptive statistics such as mean, standard deviation and coefficient of variance, and inferential statistics such as correlations and regression models by using E-views time series analysis. Results revealed the research findings that there Interest rate and Exchange rate have insignificantly negative relationship with stock prices. At the same time Inflation rate has significantly positive impact on the Stock price. Further, Money Supply has significantly negative relationship with stock price.

**Key words:** Stock price, Interest rate, Exchange rate, Money supply, Inflation rate, All share price index, Consumer price index

### **Background of the Study**

The relationship between macroeconomic variables and stock prices has been extensively studied in developed capital markets and literature on the above variables date back to 1970s. However, multifactor models have been developed as an explanatory factor of the variation in equity prices and these studies have typically focused on developed markets. The relationship between macroeconomic variables and stock prices has been examined in Emerging Stock Markets (ESMs) after 1980s. However, interest in investing in emerging markets has grown considerably over the past decade. Harvey (1995a) shows that returns and risks in ESMs have been found to be higher, relative to developed markets. Numerous studies have been conducted to determine the determinant of stock price movements.

Stock price is the price of a single share of a number of salable stocks of a company, derivative or other financial asset. Also stock price is the highest amount someone is willing to pay for the stock, or the lowest amount that it can be bought for. Macroeconomic variables are the indication of the overall state of country economy. Stated macroeconomic variables are the inflation rate, interest rate, exchange rate and money supply. As for the effect of macroeconomic variables such as money supply and interest rate on stock prices, the efficient market hypothesis suggests that competition among the profit-maximizing investors in an efficient market will ensure that all the relevant information currently known about changes in macroeconomic variables are fully reflected in current stock prices, so that investors will not be able to earn abnormal profit through prediction of the future stock market movements.

The Sri Lankan government has been offering a number of incentives to boost the stock market. Specially, foreign investors are granted substantial incentives to invest in Sri Lankan company shares. The government has taken several significant steps to boost the Sri Lankan Stock Market. Further, the capital market plays an important part in the economy and companies listed in the CSE are already involved in the development of infrastructure - the Power Sector, Telecom, Water and Health while other sectors in the CSE cover a significant role in the Sri Lankan macroeconomic. By taking into consideration the above factors, the results of a study of this nature will be of enormous importance for both local and foreign investors, stock market regulators, multinational corporations, stock market analysts and policy makers. Therefore, this type of study is very essential to promote the stock market.

### **Statement of the Problem**

The Colombo Stock Exchange acts as the most important market for capital. Well-developed capital market is essential to promote economic development. Capital market plays an important role in the economy and also companies listed in Colombo Stock Exchange are already involved in the development of infrastructure Source: Research Data As mentioned earlier there is paucity of literature on the effect of macroeconomic variables on stock prices and little attention of the responsible parties and the lack of knowledge of this issue in the Sri Lankan context could not be added to the information set available to the above parties. Hence, this type of study is very essential to promote the stock market. Previous researchers found that stock returns are positively related to expected inflation (Khan and Muhammad,2013; Kumar and Puja, 2012). Further it has been found that there is a contra version relationship of macroeconomic variables on stock prices in relate to Sri Lankan context (Lalith, 1996). Menike (2006) found out negative and positive effects of macroeconomic variables on stock prices are found from that study. Hence this study is focus to identify macroeconomic variables effect on share prices in Sri Lankan Stock Market.

Based on the background of the study this research study incorporated many national and international supportive evidence for the argument of research problem (Menike,2006).This led CSE to be consistently dubbed as one of the best performing markets in the world. As of 2005 the

CSE had recorded a consistent annual growth of over 30% in the All Share Price Index (ASPI) for the previous three years. It surpassed that in 2006, with the ASPI growing by 41.6%, and the MPI growing by 51.4% during the calendar year. CSE recorded the highest point in history on 26 February 2007. After the end of the Sri Lankan Civil War on 18 May 2009, CSE indexes increased rapidly creating new records. Market capitalization at the Colombo Stock Exchange reached record high on 6 October 2009 as it reached the Rs.1 trillion marks for the first time in Sri Lanka's history. All Share Price Index (ASPI) broke the record for its previous high by marking 3549.27 points on 11 January 2010.

CSE was the best performing stock exchange in the world in 2009 as it jumped 125.2 percent during that year. Regarding this information that we can identify Sri Lanka has kept good performance in stock market last years after the war period. So we must consider about how far macroeconomic variable effect to the stock prices and which situations it will be positive to increase the economic growth of Sri Lanka for future. So this study attempts to provide a useful picture for the investors that the relationship between macroeconomic variables and stock prices of Sri Lanka for the best decision making and reducing the risk about their investment process.

However, the paucity of literature on the effects of macroeconomic variables on stock prices and little attention of the responsible parties and the lack of knowledge of this issue in the Sri Lankan context could not be added to the information set available to the above parties. In order to fill this gap in the literature in the emerging Sri Lankan Stock Market, this study will add immensely to the existing literature of emerging Sri Lankan Stock Market. Therefore, the research problem of this study is to find out whether there is any relationship between macroeconomic variables and stock prices in the Colombo Stock Exchange. The primary objective of the study is to identify the impact of behavior of macroeconomic variables on stock prices.

### **Research Question**

This research is aimed at achieving the following objectives.

What extent macro- economic variables influence on stock price?

What is the relationship between macro-economic variables and stock price?

### **Objective of the Study**

The objective(s) of the study are to find out the impact of macroeconomic variables on stock price and also to find out the influential relationship between them.

### **Literature Review**

#### **Interest Rates and Stock Price**

Jefferis and Okeahalam (2000) investigate the South African, Botswana and Zimbabwe stock market and hypothesize that interest rates have a negative influence on stock prices through three channels, namely the substitution effect, a rise in the discount rate and a depressing influence on investments. Empirical studies in this context mentioned in general a significant negative influence of interest rates on stock (Reilly, Wright and Johnson, 2007; Aurangzeb, 2012; Aspren, 1989; Muktadir-Al-Mukit, 2012). Moreover, Korkeamäki (2011) and Czaja, Scholz and Wilkens (2010) find also that interest rates have a negative impact on stock, but argue that the influence of interest rate has decreased over time due to the rise in the enhanced tools for handling interest rate risk. The growth in corporate bond markets and derivative markets has played a crucial role in this decreasing relation.

Nwokoma (2002), attempts to establish a long-run relationship between the stock market and some of macroeconomic indicators. His result shows that only industrial production and level of

interest rates, as represented by the 3-month commercial bank deposit rate have a long-run relationship with the stock market. He also found that the Nigeria market responds more to its past prices than changes in the macroeconomic variables in the short run.

Ologunde, Elumilade and Asaolu (2006), examined the relationships between stock market capitalization rate and interest rate. They found that prevailing interest rate exerts positive influence on stock market capitalization. They also found that government development stock rate exerts negative influence on stock market capitalization rate and prevailing interest rate exerts negative influence on government development stock rate. Their findings seem to take interest rate as the lending rate. If deposit rate increases, theoretically, investors will switch their capital from share market to banks. This will exert a negative impact on stock prices. Therefore this work used the deposit rate to express interest rates in Nigeria. Earlier studies have revealed that the impact of oil prices depends on whether a country is an oil exporting or oil importing. Crude oil accounts for over 60% of GDP in Nigeria and findings from the six oil producing countries of the Gulf Cooperative Council (GCC) show that there is a link between oil price and stock returns. Again, Nigeria exports crude oil and at the same time the country is a major importer of oil. In view of the above, oil price is a major variable in the model for this work. With the exemption of Olowe (2007), this variable was omitted in many of the related works in Nigeria.

Alam and Uddin (2009) argue that the effects of interest rate on stock returns provide crucial information for risk management, valuation of securities and government and monetary policy, and investigate this relationship for fifteen developed and developing countries using data between 1988 and 2003. For all of the countries they provide evidence that the interest rate has a significant negative relationship with share prices.

Kasman et al. (2011) and Dinenis and Staikouras (1998) are two of the many studies that investigate the influences of the interest rate on the stock performance in the banking sector. Their results suggest that the interest rate has a negative and significant effect on the stock returns. Empirical research out of the financial sector is relatively scarce, and will be discussed below.

Martinez-Moya et al. (2013) analyses the Spanish stock market. Their results show that there is a significant level of interest rate exposure in the Spanish stock market and notable differences across sectors can be observed. Heavily regulated and indebted sectors such as utilities, financials and real estate are the most interest rate sensitive and hardest influenced. The interest rate sensitivity is also negative, which indicates that the Spanish firms are adversely affected by interest rate increases. Non-financial companies in regulated or highly leveraged sectors such as real estate and utilities are mostly mentioned as the sectors that are hardest influenced (Bartram, 2002; Reilly et al., 2007). The cost of debt in highly leveraged firms is directly linked to the interest rates and regulated firms align the prices of their products with some delay due because of the constraints by the regulators. These both strengthen the negative affect of interest rate increases on the stock returns of the companies in these sectors (Martinez-Moya et al., 2013).

Amarasinghe, (2015) defined this study examines the causal relationship between stock price and interest rate, using monthly data for the period from January 2007 to December 2013. All Share Price Index (ASPI) in Colombo Stock Exchange is used for the stock prices and the details on interest rate have been collected from the data released by the Central Bank of Sri Lanka. Augmented Dickey Fuller test was used to find out the stationary of the data series and the results of the test showed that, ASPI data and the interest rate was stationary at first difference. That is stock returns does not Granger Cause interest rate but interest rate does Granger Cause stock returns. Finally, to check the result of the Granger Causality Test, a regression was run. The

result of the regression shows that interest rate is a significant factor for stock return changes and interest rate has significant negative relationship with ASPI.

### **Exchange Rates and Stock Price**

Theory explained that fluctuations in the currency values influence company's profits and hence their stock performance. The theoretical explanation is clear and may seem obvious at times, although the empirical results are mixed.

However, there is also empirical research available that supports the theoretical linkage between exchange rates and stock performance. Kurihara (2006) investigates the relationship between macroeconomic variables and stock prices. Exchange rate is the main target variable and it is found that the exchange rate influence stock prices.

Phylaktis and Ravazzolo (2005), Pan, Fok and Liu (2007), Sharma and Mahendru (2010) and Chen, Naylor and Lu (2004) shows also a significant causal relation from exchange rates to stock returns. Yang, Tu and Zeng (2014) indicate that most foreign exchange markets and stock markets are negatively correlated for nine Asian markets over the period 1997 to 2010. Moore and Wang (2014) find a also a negative linkage between the stock prices and real exchange rates for the United States market in relation to the developed and emerging Asian markets. Can Inci and Soo Lee (2014) examine the linkage between stock returns and exchange rate fluctuation in five major European countries and show causality from exchange rate fluctuations to stock Returns. They conclude also that the linkage has been more significant and stronger in recent years and during recession periods rather than in former times and expansion periods.

Agrawal et al. (2010) examine the dynamics between the movements of the Indian Rupee value and the stock returns, and indicate a slight negative influence. Chkili and Nguyen (2014) examine the stock prices and exchange rate linkage in a regime-switching environment. The affect from exchange rates to stock market returns is not significant for the BRICS countries, which represent the five major emerging national economies in terms of stock market development and economic growth. The results show that the exchange rate does not impact stock market returns of BRICS countries, regardless of the regimes. Caporale, Hunter and Ali (2014) also examine movements in the exchange rate during times of volatility using data for six advanced economies on the pre-crisis and the crisis period and reach a similar conclusion for the United States and United Kingdom for the crisis period.

As can be seen, the empirical results are mixed. Some authors try to clarify these mixed results with focusing on the industry level. Can Inci and Soo Lee (2014) argue that an industrial analysis of the linkage between stock returns and the exchange rate is warranted, due to the industrial differences and because the exposures could be more relevant at the sector level. Al-Shboul and Anwar (2014) use weekly data from 2003 to 2011 and examine the exchange rate exposure in Canadian industries. They find evidence for four out of thirteen industries. Olugbode, El-Masry and Pointon (2013) examine the sensitivity of 31 non-financial industries in the United Kingdom to the exchange rate from 1990 to 2006, and conclude that competitive industries are harder influenced compared to other industries, as discussed in Aray and Gardezabal (2010). Miao, Zhou, Nie and Zhang (2013) investigate the influence of exchange rate movements on stock returns for 16 Chinese industries and found evidence for seven out of sixteen industries.

### **Inflation Rate and Stock Price**

Fama (1981, 1982), Fama and Schwert (1977), Gallagher and Taylor (2002), Geske and Roll (1983) empirically find that stock returns are negatively affected by both expected and unexpected inflation. Based on the money demand and the quantity theory of money, Fama (1981) and

Geske and Roll (1983) explain the negative linkage among stock returns and inflation. Using post-war data for the US, Canada, Germany and the UK.

Apart from that, Geske and Roll (1983) found that inflation will cause the movement of the stock price. They found that inflation is a signal for stock market performance. When inflation occurs, the stock price will change. This can conclude that inflation will adversely affect the stock price.

Asprem (1989) concluded that inflation is linked by a positive relationship with stock returns, but pilot studies such as Barrows and Naka (1994), Chen et al. (1986) and Chen et al. (2005) have concluded that the negative inflation rates are associated by a statistically significant negative relationship with the capital market returns, so that, and within normal circumstances, the increase in inflation rates will lead to strict monetary policy, which would have a negative impact on stock prices.

Kaul (1990) explains the relationship between stock returns and unanticipated changes in expected inflation under alternative monetary policy regimes. He finds that in countries where there is no change in the policy regime there exists a negative relation between stock returns and changes in expected inflation.

Marshall (1992) finds that negative effect of inflation on stock return is generated by real economic fluctuations, by monetary fluctuations or changes in both real and monetary variables. Tanggaard (2002) finds a moderately positive relationship between expected stock returns and expected inflation for the US and a strong positive relationship for Denmark. Sharfe (2002) suggests that rise in expected inflation reduces equity prices in the US. The negative relationship between inflation and stock returns is supported by Chatrath et al. (1997)-India, Najandand and Noronhal (1998)-Japan, Zhao (1999) –China, Crosby (2001)-Australia.

Furthermore, Fama and Schwert (1997) found a negative relationship between inflation rate and stock market return. The authors used data from Bureau of Labor Statistic Consumer Price Index (CPI) to estimate the inflation rate and used an equally weighted portfolio of New York Stock Exchange as stocks returns. From the result, they found that when the inflation is high, the stock market return will drop.

According to Huybens and Smith (1999), when the inflation rate increases, the stock performance will drop. They found that an increase in inflation rate will cause credit market friction. When there is credit market friction, the financial intermediaries such as banks will reduce their loan to the public. Public cannot have a loan to make investment in the stock market due to the increase of restriction and reduction on loan. It causes the resource allocation not efficient and directly affects the stock market performance.

According to Kullaporn and Lalita (2010), stock market performance is not influenced by inflation in Thailand. In their research, the authors used Thailand data start from 2000 to 2010 to examine relationship between inflation rate and stock market. By using Vector Auto Regression (VAR), it concluded that stock price movement is irrelevant with inflation rate.

Yazdan and Soheila (2012) used panel data regression model during 2000 to 2010 based on Organization of the Petroleum Exporting Countries (OPEC) to examine relationship between inflation rate and stock market. OPEC is an organization which created to coordinate policies between oil producing countries. OPEC members include Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, United Arab Emirates and Venezuela. In the research, they found that inflation rate is insignificant with stock market performance in OPEC

### Money Supply and Stock Price

According to these lifecycle hypothesis there is a parallel movement between interest rate and stock prices. Sprinkle (1971) a monetarist view of relationship between stock prices and interest rate. The study primarily dealt with stock prices and money supply. According to his study a decrease in money supply increase interest rate and increase in the supply of money falls down the interest rate. His study that was counted in USA in 1918 to 1968, 9 out of 12 substantial market falls down during the period of monetary contraction, by changes in the money supply will decline the stock prices.

Ahmed (2008) employed the Johansen's approach of co-integration and Toda – Yamamoto Granger causality test to investigate the relationship between stock prices and the macroeconomic variables using quarterly data for the period of March, 1995 to March 2007. The results indicated that there was an existence of a long-run relationship between stock price and FDI, money supply, & index of industrial production. Causality was found running from stock price movement to movement in industrial production.

Akbar et al. (2012) have studied the relationship between the Karachi stock exchange index and macroeconomic variables for the period of January 1999 to June 2008. Employing a co-integration and VECM, they found that there was a long-run equilibrium relationship exists between the stock market index and the set of macroeconomic variables. Their results indicated that stock prices were positively related with money supply and short-term interest rates and negatively related with inflation and foreign exchange reserve.

### Model of the Study

This study examines the relationship between macroeconomic variables and stock prices in the CSE. Numerous researchers have developed multifactor models relating to a number of macroeconomic variables (Chen et al., 1986; Jorion, 1991; Ely and Robinson, 1997; Bilson et al., 2001; Chen et al., 2005) examined the relationship between macroeconomic variables and hotel stock returns and data were converted into natural log and used the regression analysis. However, macroeconomic variables such as money supply, GDP, interest rate and exchange rate have been used in a number of ESM studies. There are several theoretical justifications to expect a relationship between macroeconomic variables and stock prices (Homa&Jafee, 1971; Mandelker and Tandon, 1995; Boudoukh and Richardson, 1993). Based on the model employed by Menike (2006), the researcher developed the following multiple regression model.

$$ASPI = \beta_1(IR) + \beta_2(ER) + \beta_3(INF) + \beta_4(MS) + \varepsilon$$

Where  $\beta_1, \beta_2, \beta_3, \beta_4$  are coefficients of variables.

Where,

ASPI = All Share Price Index

IR = Interest rate

ER = Exchange Rate

INF = Inflation (CPI is used)

MS = Money Supply

$\varepsilon$  = Error Term

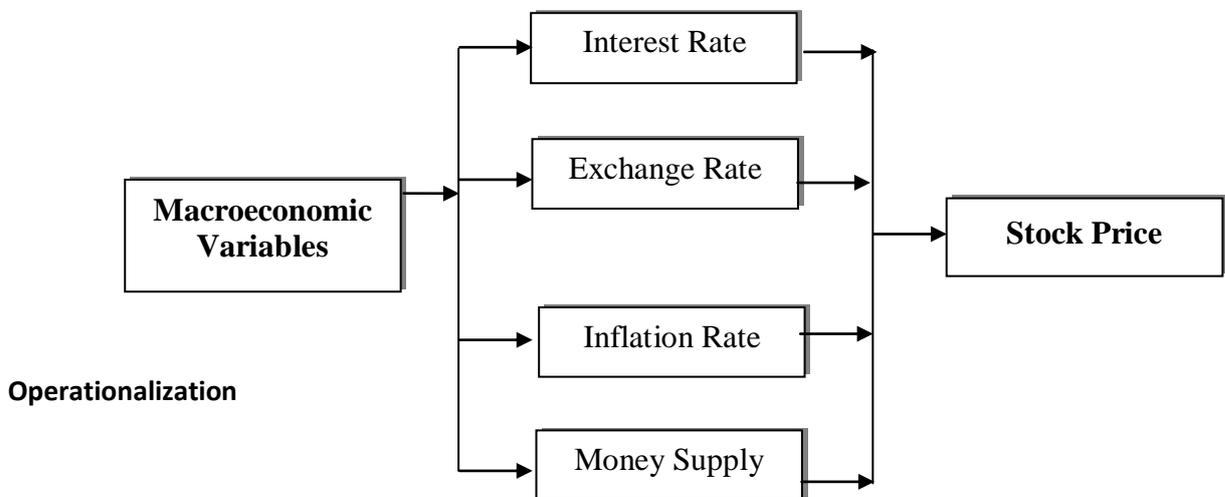
### Conceptualization

It is vital to present a framework for a research and also useful to get the idea behind this research. Through conceptualization one may identify the relationship between variables that are taken into consideration.

**Conceptual Framework**

The conceptual framework means provide visual representation of theoretical constructs and variables of interest. It describes that relationship between dependent variable and independent variable. For the purpose of this study, the following conceptual model is used constituting concepts reflecting the research problem, share price and macroeconomics variables. The original idea was borrowed from Menike(2006), from her study of The Effect of Macroeconomic Variables on Stock Prices in Emerging Sri Lankan Stock. Based on the literature and the avenues identified for potential study the following conceptual frame work is proposed for this study. It considers the interactions among the stock price and the exchange rate, money supply, interest rate, inflation rate.

**Figure No: 1 Conceptual Framework**



**Table 1: Operationalization**

Concept	Variable	Indicators	Measurement
Stock price	Stock Price	Impact of stock price	ASPI
Macro-economic variable	Interest Rate	Change in Interest Rate	$P = A ( 1 + r ) t$
	Exchange Rate	Change in Exchange Rate	USD
	Inflation Rate	Change in Inflation Rate	$(CPI_1 - CPI_0) / CPI_0 \times 100$
	Money Supply	Change in Money Supply	M <sub>2b</sub>

## **Hypotheses Development**

Hypothesis can be testing a concept or it can be developed as a result of study. A testing Hypothesis is one that can be tested meaning can measure both what is being done (variables) and the outcome. A hypothesis is a tentative statement about the relationship between two or more variables. There are two Hypothesis types. They are Null hypothesis (Ho) and Alternative hypothesis (H1). Null hypothesis means predict that no relationship exists between variables. Alternative hypothesis means the expected relationship between variables.

This research observes the effects of macroeconomic variables on stock prices in the Sri Lankan Stock Market. In order to achieve the objective of the study, the following hypotheses are developed.

*H1 – Interest Rate has significant negative relationship on the Stock prices in Colombo stock market.*

*H2 – Exchange Rate has significant negative relationship on the Stock prices in Colombo stock market.*

*H3 – Inflation Rate has significant negative relationship on the Stock prices in Colombo stock market.*

*H4 – Money Supply has significant positive relationship on the Stock prices in Colombo stock market.*

## **Sampling and Data Collection**

### **Sampling Design**

According to Jankowicz (2000) sampling can be defined as the deliberate choice of a number of people, the sample, who are to provide with data from which the researcher will draw conclusion about some larger group, and the population, whom these people represent. Although there are 294 stocks listed on the CSE, most stocks do not trade frequently. In order to ensure a reasonable sample size, those stocks, which we select once a month as the sample element in this research. Further, attention is made on price indexes and other variable factors by 2007 to 2016 as sample period.

### **Method of Data Collection**

According to Jankowicz (2000), a research method is a systematic and orderly approach to the collection and analysis of data. What is collected is data, which is raw, specific, undigested and therefore largely meaningless. Data is collected as secondary data from the considering ASPI index, CPI index of CSE. And also some secondary data will be collected from reports, publications and articles. The data has collected for the period 10 years from 2007 to 2016 as the monthly vice. When the considering macroeconomic variable as inflation rate, exchange rate, interest rate and money supply data collected from the report.

This section starts with a brief review of the methodologies used in aforementioned studies about macroeconomic variables and stock performance. Thereafter, the methodology that will be used in this study will be presented. For studying the relationship between macroeconomic variables and stock price, several data is needed. The dataset includes observations on a monthly interval from January 2007 to December 2016, for a total of 120 observations. The present study uses the time series data. It would be almost impossible to incorporate every potential aspect to explain the stock market behavior we limit to select four macroeconomic variables namely interest rate, exchange rate, inflation rate and money supply. The selection of variables for the present study is based on the existing theoretical propositions and the empirical evidences. For the purpose of this study researcher have taken stock price as a ASPI. Interest rate is used three month primary market treasury bill yield rate, the researcher use the nominal exchange rate as a USD. inflation is

measured by changes in the Colombo consumer price index(CCPI).the money supply data consists of broad money M2b. The choice of study period is based on the availability of data series.

**Data Presentation and Analysis**

Data analysis is a process of inspecting, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision making. When the considering the data analysis we have to move step by step in order to reach for the correct final result. Data analysis technique that focuses on modeling and knowledge discovery for predictive rather than purely descriptive purposes, Business intelligence covers data analysis that relies heavily on aggregation, focusing on business information. Data analysis is a process for obtaining raw data and converting it into information useful for decision-making by users. Data is collected and analyzed to answer questions, test hypotheses or disprove theories. According to the data analyzing, we consider about the Descriptive statistic, Correlation analysis and Regression analysis using the E-views. When descriptive statistics is describe about minimum value, maximum value, mean and standard deviation of ASPI, Inflation, Interest rate, Money Supply and Exchange rate in 120 months. In correlation analysis describes about what kind of relationship build between the ASPI and other macroeconomic variables. Considering the regression analysis is describe about the impact of macroeconomic variables on stock price in Colombo Stock Market.

**Descriptive Statistics**

Descriptive statistics is the discipline of quantitatively describing the main features of a collection of information or the quantitative description itself. Descriptive statistics are distinguished from inferential statistics, in that descriptive statistics aim to summarize a sample, rather than use the data to learn about the population that the sample of data is thought to represent. Descriptive statistics is described about minimum value, maximum value, mean and standard deviation. In this research study descriptive statistics are calculating for ASPI, Inflation, Interest rate, Money Supply and Exchange rate in 120 months in CSE.

**Table No: 2 Descriptive Statistics**

	ASPI	EXCHANGE RATE	INFLATION RATE	INTEREST RATE	MONEY SUPPLY(M2B)
Mean	3.638102	2.080061	0.079492	10.28273	9772.797
Median	3.752087	2.059438	0.064500	8.715000	6.366595
Maximum	3.891983	2.172842	0.283100	21.30000	671989.0
Minimum	3.176965	2.009221	-0.002700	5.740000	6.017260
Std. Dev.	0.211071	0.046084	0.063571	3.930781	79111.93
Skewness	-0.537320	0.353679	1.292563	0.951712	7.960677
Kurtosis	1.700501	1.845097	4.265040	2.699366	64.49421
Observations	120	120	120	120	120

**Source:** Research Data

Considering the table 2 illustrates descriptive statistic from 2007 to 2016 .Regarding this table 120 data values have analyzed of each variable. Table depicts the values of range of minimum, maximum, mean and variance of independent and dependent variables. Money supply (M2b) corresponds with the highest mean value than other variables in the data set. Additionally, money supply has the highest maximum and the standard deviation as well.

**Unit Root Test**

**Individual Unit Root Test**

Based on the ADF analysis there is no stationary at level and stationary at 1<sup>st</sup> difference. Therefore basic assumption in the econometrics as unit root is in the validate one. Unit Root Test has been applied to check the Panel data for stationary of the series at the level and first difference test with the help of the measure as Augmented Dickey Fuller (ADF). If the test shows the significant level in terms of p value, it will be concluded that the variable series is stationary. It means that, the panel data are not in the position of unit root. In contrast, if the stationary test is not in the significant level in terms of p value, it will be statistically explained that the variable series is non-stationary and has a unit root test (Shaari, Hong & Shukeri, 2012; Trung & Vinh, 2011).

**ASPI**

**Table No:3 Individual Unit Root Test: Level**

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.275881	0.6395
Test critical values:		
1% level	-3.480818	
5% level	-2.883579	
10% level	-2.578601	

Source: Research Data

**Table No: 4 Individual Unit Root Test; 1<sup>st</sup> Difference**

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-9.445175	0.0000
Test critical values:		
1% level	-3.481217	
5% level	-2.883753	
10% level	-2.578694	

Source: Research Data

According to Table No: 3 p value is 0.6395 it not significant at significant value 0.05. But 1<sup>st</sup> difference table no 4 observe p value is 0.000 it significant at 0.005. Based on the ADF analysis there is no stationary at level and stationary at 1<sup>st</sup> difference, therefore basic assumption is validate one.

**Interest Rate**

**Table No: 5 Individual Unit Root Test: Level**

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.985167	0.7573
Test critical values:		
1% level	-3.480818	
5% level	-2.883579	
10% level	-2.578601	

Source: Research Data

**Table No: 6 Individual Unit Root Test; 1<sup>st</sup> Difference**

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.985167	0.0007
Test critical values:		
1% level	-3.480818	
5% level	-2.883579	
10% level	-2.578601	

**Source:** Research Data

According to Table No: 5 p value is 0.7573 it not significant at significant value 0.05. But 1<sup>st</sup> difference table no 06 observe p value is 0.000 it significant at 0.005. Based on the ADF analysis there is no stationary at level and stationary at 1<sup>st</sup> difference, therefore basic assumption is validate one

**Exchange Rate**

**Table No: 7 Individual Unit Root Test: Level**

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.411297	0.9028
Test critical values:		
1% level	-3.480818	
5% level	-2.883753	
10% level	-2.578694	

**Source:** Research Data

**Table No: 8 Individual Unit Root Test; 1<sup>st</sup> Difference**

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.398014	0.0000
Test critical values:		
1% level	-3.481217	
5% level	-2.883753	
10% level	-2.578694	

**Source:** Research Data

Based on the ADF analysis there is no stationary at level and stationary at 1<sup>st</sup> difference. Therefore basic assumption in the econometrics as unit root is in the validate one.

**Inflation Rate**

**Table No: 9 Individual Unit Root Test: Level**

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.057651	0.2623
Test critical values:		
1% level	-3.481623	
5% level	-2.883930	
10% level	-2.578788	

**Source:** Research Data

**Table No: 10 Individual Unit Root Test; 1<sup>st</sup> Difference**

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.156796	0.0000
Test critical values:		
1% level	-3.481623	
5% level	-2.883930	
10% level	-2.578788	

Source: Research Data

Here also stationary at level and stationary at 1 difference therefore basic assumption as unit root is in the validated one

**Money Supply**

**Table No: 11 Individual Unit Root Test: Level**

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-11.53496	0.0000
Test critical values:		
1% level	-3.480818	
5% level	-2.883579	
10% level	-2.578601	

Source: Research Data

Based on the ADF analysis there is a stationary at level, because p value is 0.000 it is significant at 0.005 and basic assumption is validated one. Therefore didn't analysis 1<sup>st</sup> level difference for money supply.

**Inferential Statistics**

**Correlation Analysis**

The correlation analysis is carried out to find out the relationship between determinants of the Macro-economic variables and stock price (ASPI). To understand the relationship between these two variables, as indicated earlier, the study is carried out through model.

**The Relationship between Determinants of the Macro-Economic Variables and Stock Price**

According to the correlation between determinants of the macro-economic variables and stock price, determinants of the macro-economic consists of four (4) variables as independent such as interest rate(IR),Exchange rate(ER),Money supply(M2b) and Inflation rate(IFR). Using the Pearson's Product Movement Correlation with two – tailed test of significance, the correlation analysis is carried to investigate the relationship between independent and dependent variables as follows.

1. Correlation between interest rate and stock price.
2. Correlation between exchange rate and stock price.
3. Correlation between money supply and stock price.
4. Correlation between Inflation rate and stock price.

**Table No: 12 Correlation Analysis**

Independent variable	ASPI Pearson Correlation (r)	Significant Level (P)
Interest rate	-.224*	.014
Exchange rate	-.113	.219
Money supply	.166	.071
Inflation rate	-.064	.490

Source: Research Data

\*\* Correlation is significant at the 0.01 level (2-tailed)

\* Correlation is significant at the 0.05 level (2- tailed)

According to the results of the Pearson’s correlation shown in the Table there is weak negative significant correlation between interest rate and stock price. Furthermore correlation values of these exchange rate and inflation rate having with stock price, indicating that though changes in these predictor variables negatively contribute towards changes in stock price but changes would not be significant. Also there is weak positive non-significant correlation between money supply and stock price. The correlation is significant at 0.05 levels (2- tailed)

### Regression Analysis

*The multiple regression analysis is done in order to investigate the simultaneous impacts of all the independent variables on the dependent variable. The results of regression, four (4) indicators of macro-economic variables (independent variables) against the dependent variable (stock price) are shown in the Table.*

### Relationship between Macro-economic variable on ASPI

The results of relationship between macro-economic variables and stock price is shown in the Table no:- 13

**Table No: 13**Regressions between Macro-Economic Variables and Stock Price

Regression Statistics	
R Square	.089
Adjusted R-- Square	.057
Standard Error	0.026
Sum of Square	0.081
F- Value	2.81
Sig.F	0.028
Observations	120

**Source: Research data**

The specification of the four predictor variables in the above model reveals that the ability to predict the stock price. RSquare value of .089 which is in the model denotes that 9 % of observed variability in stock price can be explained by the differences in the independent variables. Remaining 91 % variance in the stock price is attributed to other variables.

The F value is 0.028 that is significant at 0.05% ( $p = 0.000$ ), which suggests that the indicators (independent variable) have significantly explained 9% of the variation in the stock price and also indicates the model is a good fit for the data.

**Impact of independent variable on ASPI**

**Table No: 14 Relationship between ASPI and Interest Rate**

<b>Regression Statistics</b>	
Coefficient	-0.008
R Square	.050
Adjusted R-Square	.042
Standard Error	0.026
Sum of Square	0.085
F- Value	6.231
Sig.F	0.013
Observations	120

**Source: Research data**

As shown in the table coefficient of interest rate is statically significant at (5% level). The coefficient of the interest rate is negatively signed, which indicating that a decrease in interest rate translate to an increase stock price.

**Table No: 15 Relationship between ASPI and Exchange Rate**

<b>Regression Statistics</b>	
Coefficient	-0.664
R Square	.012
Adjusted R—Squar	.004
Standard Error	0.027
Sum of Square	0.088
F- Value	1.526
Sig.F	0.219
Observations	120

**Source: Research data**

As shown in the table coefficient of Exchange Rate is statically non-significant at (5% level). The coefficient of the exchange rate is negatively signed, which indicating that a decrease in exchange rate translate to an increase stock price.

**Table No: 16 Relationship between ASPI and Money Supply**

<b>Regression Statistics</b>	
Coefficient	-0.009
R Square	.004
Adjusted R—Square	.004
Standard Error	0.027
Sum of Square	0.089
F- Value	0.480
Sig.F	0.489
Observations	120

**Source: Research data**

As shown in the table coefficient of Money Supply is statically non-significant at (5% level) the coefficient of the exchange rate is negatively signed, which indicating that a decrease in money supply translate to an increase stock price.

**Table No: 17 Relationship between ASPI and Inflation**

<b>Regression Statistics</b>	
Coefficient	0.345
R Square	.027
Adjusted R--Square	.019
Standard Error	0.027
Sum of Square	0.087
F- Value	3.33
Sig.F	0.07
Observations	120

**Source: Research data**

As shown in the table coefficient of Inflation Rate is statically non-significant at (5% level). The coefficient of the inflation rate is positively signed, which indicating that a increase in interest rate translate to an increase stock price.

### Empirical Findings of the Research and Testing of Hypotheses

The objective of this study is to find out the relationship between macro-economic-variables and stock price. The findings are based on collected data from sample of period of 2007-2016 monthly vice.

**Table 18: Testing of Hypotheses – Model -**

Dependent Variable	Stock Price (ASPI)		
	B	t	Significant (0.05% level)
Interest Rate	-0.008	-2.496	.013
Exchange Rate	-0.665	-1.235	.219
Money Supply	-0.009	-0.69	.0489
Inflation Rate	0.345	1.824	.070

**Under the model – I, the study's first hypothesis (H<sub>1</sub>) is formulated as there is a negative relationship between the interest rate and stock price.**

There is a negative relationship between interest rate and stock price can be observed and the relationship is also statistically significant. Therefore this hypothesis is accepted.

**Under the model – I, the study's second hypothesis (H<sub>2</sub>) is formulated as there is a negative relationship between the exchange rate and stock price.**

The above table exhibits that there is a negative relationship between exchange rate and stock price. Therefore this hypothesis is accepted, although the impact is not statistically significant

**Under the model – I, the study's third hypothesis (H<sub>3</sub>) is formulated as there is a positive relationship between the money supply and stock price.**

The above table exhibits that there is a negative relationship between money supply and stock price. Therefore this hypothesis is rejected, although the impact is not statistically significant.

**Under the model – I, the study's fourth hypothesis (H<sub>4</sub>) is formulated as there is a negative relationship between the inflation rate and stock price.**

According to the above table, there is a positive relationship between inflation rate and stock price. Therefore this hypothesis is rejected. And also the relationship is not statistically significant

**Summary of the testing of hypotheses of the present study is shown in the following table**

**Table 19: Summary of Testing of Hypotheses**

Model	Independent Variable	Dependent Variable	Predicted Sign	Actual Sign	Accepted/ Rejected
<b>S</b>	Interest Rate	<b>Stock Price (ASPI)</b>	Negative	Negative	Accepted
	Exchange Rate		Negative	Negative	Accepted
	Inflation Rate		Negative	Positive	Rejected
	Money Supply		Positive	Negative	Rejected

Source: Analysis Data

**Discussion**

This study investigated the effects of macroeconomic variables on stock prices in Sri Lanka using monthly data for the period from January 2007 to December 2016. A multiple regression model was used to find out relationships and for examining the impact of macroeconomic variables on stock prices. The fitted regression model reveals there are no strong relationship between macroeconomic variables and stock prices. The results indicate that interest rate, exchange rate and money supply have negative relationship; also inflation rate reveals positive relationship between stock prices.

The stock prices mainly appear to have invers relation to three month Treasury bill rate and exchange rate. This result supports the findings of Menike, (2006).Bilson et al. (2001), Lyngre (1981) and Roley (1982). Chen et al. (2005), Bulmash and Trivoli (1991) and Barrows and Naka (1994) The most significant variable – the interest rate- is mainly negatively related to stock prices supporting the findings of Menike (2006), Dwijayanti et al (2012), Pramod K & Puja (2012), Kuwornu, J and Nantwi and Victor (2011), Khan et al (2013). The money supply variables appear to have negative effect on stock price in the sample inconsistent with efficient market hypothesis which indicates that current stock price contain all available information. These findings are compatible with Sprinkle (1964), Homa&Jafee (1971) and Hamburger & Kochin (1972). On the other hand inflation rate negatively co-related to stock price. This finding is compatible with the results of Samarakoon (1996), Firth (1981) and Bilson et al.(2001).

The negative and positive effects of macroeconomic variables on stock prices found in this study have several practical implications. The evidence provides that stock prices appear to react mainly negatively to rising interest rates. One reason suggested for this relation is the expected returns on stocks on which the higher interest rate has a direct bearing. Thus, the higher interest rates would directly affect the returns on stocks causing prices to fall consistent with the theory. Whenever the interest rate on treasury securities increases, the investors tend to switch out of stocks causing fall of stock prices. Therefore, this implies that a certain level of predictability is present in stock prices that can be explained through the behaviour of the three month Treasury Bill rate.

The money supply which reacts mainly positively to stock prices has implications on monetary policy in which the changes in money supply will have a direct impact on equity prices. Since the monetary policy should not be guided by the impact on the stock market, such influences should not be ignored as a result of the influence of the stock market on economic activity. On the other hand, the lagged money supply mainly appears to have a negative impact on equity price

movements implying that investors could earn profits by using a trading strategy based on the past behaviour of the money stock.

The exchange rate variable is clearly the most influential macroeconomic variable, which displays mainly a negative relation to stock prices. The implication of this finding is that, for an export dominant economy, (exports companies listed on the CSE), the currency appreciation has a negative effect on the stock market of which the currency appreciation boosts the stock market for an import dominant economy (imports companies listed in the CSE).

The regression results obtained in deriving the estimates seem to indicate that, contrary to a commonly held belief among economists, the equity prices are mainly negatively related to contemporaneous inflation. This finding implies that the stock prices decline during the inflationary phase.

The results have implications on both local and foreign investors, stock market regulators such as ities and Exchange Commission, policy makers and stock market analysts. Investors and security analysts could predict stock prices and earn profits. Stock market regulators could take steps to monitor the activities of companies to prevent manipulation of stock prices and get the general public educated on the stock market and encourage them to invest in stocks. Policy makers should be aware of these macroeconomic effects on stock market and make their decisions in a more effective and accurate way.

The results of this study are based on the data sets, which are of high quality. Future researchers can investigate the effect of macroeconomic variables on stock prices using alternative methodologies and using sectorial share price indices. Further, they can use data of various frequencies such as daily and weekly and examine whether the results are sensitive to the frequency of data. Other aspects on which future researchers can concentrate on are the longer time periods, larger sample sizes with greater numbers of sectors using other macroeconomic and non-macroeconomic variables.

### **Implications**

This research mainly focused on to identify the effect of macroeconomic variable on stock price Colombo stock Market. Because it is mainly help to take decisions for people who are connect with stock market continue their business purpose. When the completing this research the researcher suggest some of recommendations. Such as,

Suggestion for the investors is that they must closely analyze the exchange rate patterns and forecast the future exchange rates before investing in CSE and based on those forecasted exchange rates they can maximize their profits.

The recommendations for the further research are that more variables can be taken in other researches in order to find out the impact of other variables on stock price.

- When the people who join with stock market, need information about fluctuations of macroeconomic variable to take the best decisions
- Inflation rate change rapidly and analyzing this research hey can face to different situation in time to time flexibility.
- Considering the exchange rate, it controls smoothly helps to enhance foreign investment.
- Considering this research the investors can manage the risk successfully.
- This research helps to people who are connecting with stock market to identify suitable investment method in different economic situation in the country and move to one to another.

- Analyzing the research investors can face to business competition successfully.
- Regarding the research foreign investors can get thoroughly knowledge about the changes of stock price when cause macroeconomic variables and it is big helping hand to attract the foreign investors for increase the foreign reserves in Sri Lanka.
- Considering this research helps to introduce innovative investment project to CSE which is most appropriate for current economic situation in the country.
- The results of is research helps for stock market regulators, multinational corporations, stock market analysts and policy makers.

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