

# RELATIONSHIP BETWEEN SELECTED MACROECONOMIC FACTORS AND THE STOCK MARKET PRICES: EVIDENCE FROM COLOMBO STOCK EXCHANGE, SRI LANKA

**Silva KHGRR**

*Department of Accounting, University of Sri Jayewardenepura*

**Herath R**

*Department of Accounting, University of Sri Jayewardenepura*

## **Abstract**

The stock market plays a vital role in all economies. In 2010, the Colombo Stock Exchange became the second-highest performing stock market in the world as many domestic and foreign investors invested in the Sri Lankan stock market with the end of the war. However, it has created a market bubble and no significant improvements reported since mid-2011. Further, the determinants of share market performance remain unclear. It is generally apparent that macroeconomic factors cause a sound impact on stock market performance. Thus, this study attempts to identify the causal relationship between share prices and the four major macroeconomic factors in the Sri Lankan economy. The dependent variable was the All Share Price Index (*ASPI*). Real gross domestic product (*RGDP*), Money supply (*M<sub>2b</sub>*), Balance of trade (*BOT*) and Net foreign investment (*NFI*) were the independent variables. Monthly data was used for 10 years spanning from January 2009 to December 2018 for all variables. Monthly bulletins of the Central Bank of Sri Lanka and the Colombo Stock Exchange data library were used to get data. Stata13, the statistical software was utilized to analyze the data. Descriptive analysis, correlation analysis, regression analysis, Johansen co-integration test and Vector Error Correction Model (*VECM*) were employed to identify how macroeconomic factors impact share prices. There was a co-integration between the dependent and independent variables. The study revealed that there was a long-run causality between the performance of the capital equity market and macroeconomic variables and the long-run equilibrium could be reached at a speed of 13.90%. Empirical results disclose that *M<sub>2b</sub>* and *BOT* had a positive impact on the *ASPI*. However, *NFI* had a negative influence on the *ASPI*. All variables significantly impacted *ASPI* except *RGDP*. The results of the study may help policymakers, investors, and other professionals to make proper decisions.

**Keywords:** Colombo Stock Exchange, Macroeconomic Variables, Share Prices

## 1 INTRODUCTION

Prices in the stock market are affected by several elements which are firm-specified, and industrial-specified, whereas some belong to an environment in which entities are involved. Based on different models of stock valuation, the actual price of a stock today is equivalent to the current value (PV) of upcoming flows of cash of that stock. It means the present value of dividends. Fluctuations that occurred in the macroeconomic environment will impact projected cash flows and/or expected rate of yield of a stock and that will ultimately affect the current price of that stock. Therefore, the movement of prices in the share market is seen to rely on different elements in macro economy; national and global economic, societal or political affairs; market opinions/intentions regarding upcoming movements of economic development, fiscal and financial policy pronouncements, etc. (Singh, 2010).

In a certain way, the share market can be viewed as the vibration of the economy. Hence stock market reflects every activity that took place in the economic and political environment immediately such as increase or decrease in rates of inflation and interest, budget notices, high valuations of currencies or depreciation or recessions, natural disasters, and attacks by terrorists will reflect immediately and also the internal factors in organizations such as profit announcements, new appointments of CEOs or directors, major transactions, new reforms of the company will also affect immediately on changes in stock market prices.

Eventually, the return of the stock is claimed to reflect the underlying economic activity. Thus, it is expected to observe relationships between different macroeconomic movements and share prices in the long run (Patro et al. 2002).

Cheung and Ng (1998) used facts from Germany, Canada, Japan, Italy, and the United States to examine the impact of domestic economic factors on share market prices. They found that fluctuations in the share market prices were usually integrated with the nation's economic activities, viz. consumption, oil prices, supply of money and production.

The small but growing literature focuses on the relationship between share prices and macroeconomic factors in developing economies. Harvey (1995a, 1995b) observed the impact of a

series of universal macroeconomic factors to describe the cross-sectoral fluctuations in the share prices of 21 developing markets between 1976 and 1992. He identified that the impact of global stock market yields, exchange index returns, oil prices, global industrial production and global inflation is inadequate to describe the yields available in developing markets. However, scholars have recognized a lot of facts that the basic economic activities in economies which are developed are closely related to share market yields, but there is uncertainty regarding whether such a connection is there in less developed markets in developing economies.

The key purpose of this study was to identify the impact of macroeconomic variables on the share prices in Sri Lanka. In 1977, Sri Lanka adopted an open economic policy. Since then, Sri Lankan Government took several actions to expand and liberalize the financial sector to optimize the development of the country. Because of these drastic actions and other privileges given to stock investors, the Colombo Stock Exchange (CSE) get the attention of both domestic and international investors and expanded rapidly from the 1980s to the 1990s. However, in the Sri Lankan context, it is hard to find published literature regarding the stock market in Sri Lanka and its relationship with the selected macroeconomic variables in this research. Hence, it is significantly important to study the role of CSE concerning the connection between macroeconomic factors. Such a study will improve the understanding and make accurate and timely decisions regarding the stock market.

This report contains five sections. The first section of the report gives an overview of the topic of the study. The second section presents the literature review, and it contains definitions, findings, and discussions of the previous studies. The approach of methodology and the different sources of data collection in this study are discussed in the third section. The fourth section elaborated on the presentation of data and analysis of findings and the key findings of the research is elaborated on in the fifth section.

## **2 LITERATURE REVIEW**

Research done to find out the impact on share prices from different macroeconomic factors can be traced back to the late 1970s. Those research focused primarily on the context of developing, developed, and both developing and developed equity share markets. Research methodologies tend to vary, and price fluctuations yield different empirical results. Hence, the literature review will examine how various researchers have analysed the relationship between capital market prices and macroeconomic factors in terms of selected factors, methods, and outcomes.

### **2.1 Concepts**

#### ***2.1.1 Share market prices***

The stock price is the value of a share of a sellable stock of an entity, derivatives, and other financial assets, and on the other hand, the discounted future cash flows of the organization. Hence the future dividends will eventually reflect the actual economic activity. To explore the nature of asset prices, especially in prices of shares in the stock market, the technique of random walk is used by many financial theory analysts and economists (Füss, 2005). This practice assumes that investors act realistically and unbiased and evaluate assets based on future expectations. Coleman and Robert (2006) argued that when new information comes to the market, the share prices will be changed according to the impact of that information. As defined, new information is appeared to randomly affect the asset price. However, empirical research has exhibited that the prices do not adhere to a completely random walk (Lo & MacKinlay, 1988).

Every economy has its measures to recognize stock prices. Since this survey will be conducted in the context of Sri Lanka, the All Share Price Index (ASPI) was considered to obtain stock prices.

#### ***2.1.2 All share price index***

The ASPI demonstrates the fluctuations in prices in listed entities in Sri Lanka and it covers all traded organizations throughout a market day. According to the CSE website the Colombo Stock Exchange (CSE) has 290 entities which represent twenty Global

Industry Classification Standard (GICS) industry groups. 1985 is the year of the base, and the index is based on a base value of 100.

### ***2.1.3 Real gross domestic product***

Real gross domestic product (RGDP) is an economic indicator which measures the inflation-adjusted amount that reflects the value of all produced goods and services in a given period. RGDP is one of the most significant indicators to assess the activities in an economy, the stability of an economy and the growth of produced goods and services in an economy.

To compute RGDP, the prices of the base year are used and multiply it by the current fiscal year amounts of all goods and services produced in a country. In Sri Lanka, the base year was revised multiple times. Since 2015, the base year has been shifted to 2010 to improve the accuracy of constant estimates of price and represent the true structure of the economy in Sri Lanka.

### ***2.1.4 Money supply***

The supply of money is the whole currency stock and other liquid instruments which are flowing in the economy of a country at a certain period. Economists prefer to examine the supply of money and develop strategies by monitoring the rate of interest that increase or reduce the quantity of currency moving into the economy. Money supply can be valued in many ways using narrower or wider definitions. Depending on the various types of financial assets includes in the money supply  $M_1$ ,  $M_2$ ,  $M_{2b}$  and  $M_4$  can be identified which reflect different types of liquidity.

The narrow money supply ( $M_1$ ) includes the money held by people ( $C_p$ ) and demand deposits held by the public in commercial banks ( $DD_p$ ). The broad money supply ( $M_2$ ) includes  $M_1$  and time / fixed, and savings deposits held by the community in commercial banks.  $M_{2b}$  or the consolidated broad money supply includes  $M_2$  in addition to non-residence foreign currency deposits and residence foreign currency deposits of the general public in commercial banks. Very broad money supply ( $M_4$ ) includes fixed and savings deposits in licensed specialized banks and licensed financial entities in addition to  $M_{2b}$ .

### ***2.1.5 Balance of trade***

The variance in the amount of a nation's exports and imports over a specific period can be identified as the balance of trade. This is the biggest element which includes in the balance of payments.

#### **Trade Surplus**

The positive amount in the balance of trade can be identified as the trade surplus which occurs due to exports in the country exceeding its cost of imports. There is a trade surplus in the economy means, that country is receiving local currency from external markets. Leightner (2010) defines this concept as manufacturing goods and services more than is being locally purchased. These excess savings can be used to manage the exchange rate and control the capital inflows and outflows of the economy (Wolf, 2005).

#### **Trade Deficit**

A negative balance in the trade account is referred to as a trade deficit. Hence the domestic currency will outflow from the country to foreign economies due to imports exceeding the exports (Jariya & Hassan, 2018). This happens when an economy doesn't have enough capacity or resources to produce goods and services or prefers to purchase goods from foreign nations due to specialization or due to lower costs.

According to the Central Bank reports, Sri Lanka is recording a deficit in the BOT. In December 2018, the trade deficit in Sri Lanka was USD 701 million and it was USD 1029 million in December 2017.

### ***2.1.6 Net foreign investment***

Net foreign investment or the net capital outflow is the difference between the aggregate value of investment done by domestic people in foreign countries and the total investment done by foreigners in the domestic economy. The net foreign investment includes two forms,

- Foreign direct investment
- Portfolio investment

According to the study done by Stulz (1983), NFI is dependent on technological factors and the investor's preference regarding the investment. He argued that if the domestic country has the most productive technology, the other countries will invest in the domestic market. However, if foreign countries have more productive processes, capital will flow to the foreign countries. Further, the NFI is depending on whether the investor prefers to be a risk-neutral investor or a risk-averse investor.

## **2.2 Empirical Studies of Share Prices and Macroeconomic Variables**

Georgiou (2010) studied how economic growth influences share indices in the long run concerning Japan, Western Europe and the US from 1999-2007 and find out a positive relationship between economic growth and share indices. Further, the researcher argued that any factor that encourages economic growth eventually impacts positively on stock prices and vice-versa. Adjasi and Biekpe (2006) studied the relationship between economic growth and progress of the share market in different 14 African nations and the results show that countries which can be identified as "upper middle income" have a strong positive connection and countries classified as low income have to develop more to gain benefits of the economic growth.

Şenturk, Özkan and Akbas (2014) analysed the relationship between share prices and the growth of the economy in Turkey for the period between 1998 – 2014 and discovered that share prices initiate growth in short periods and growth generates share prices in the medium term. Adam (2015) observed the dynamic relationship between economic growth and share prices of Indonesia during the period 2004 – 2013 and discovered that if stock prices increased by 1%, the economic growth also will be increased by 0.09% and vice-versa by using the general univariate causal model of LVAR.

Haroon and Jabeen (2013) analysed the causal relationship between macroeconomic indices and stock prices in the Karachchi stock market in Pakistan. Treasury bill rate, consumer price index, wholesale price index and sensitive price index are the macroeconomic variables that were selected to analyse the relationship with the Karachi stock exchange (KSE 100). The research was carried out by utilizing monthly data from the period

of July 2001 to June 2010. The analysis discovered that the consumer price index; wholesale price index, sensitive price index and treasury bill rates are negatively correlated with the share price indices.

The relationship between stock exchange prices in Ghana and macroeconomic indices i.e., exchange rate, treasury bill rate, inflation, foreign direct investment (FDI) and money supply were examined by Issahaku, Ustarz and Domanban (2013) by employing monthly time series data ranging from January 1995 to December 2010. The investigation reveals that there is a significant impact from inflation, foreign direct investment (FDI) and money supply on share prices in the long run. Interest rate, supply of money and inflation have a significant relationship with the share prices in the short run. According to the results of the Vector Error Correction (VECM) model, the researcher argued that approximately 20 months will take for the stock exchange market to entirely adjust to the equilibrium status if any macroeconomic shock happens. The results indicate that there is an arbitrage profit opportunity in the Ghanaian share market, which conflict with the Efficient Market Hypothesis (EMH).

### **2.3 Sri Lankan Context**

Menike (2006) examined the relationship between share prices and macroeconomic factors by using a sample of 34 listed entities in the Colombo Stock Exchange out of 242 entities. The sample represented all eight sectors in the CSE. The data was gathered ranging from September 1991 to December 2002 which included 136 monthly data observations. The multivariate regression model was employed to examine the interconnection of four macroeconomic factors on share prices. The results specify that inflation rate, exchange rate and treasury bill rate have a negative relationship with CSE prices and a positive impact on money supply on share price fluctuations. According to the researcher, the exchange rate has the most influential power on stock prices and the money supply was the less influential variable. The researcher further suggests that future research can be carried out by using sectoral stock prices in the CSE or by using alternative techniques for analysis. Despite the study using time-series evidence, the stationarity of the data was not examined which was a drawback of the study.



Gunasekarage, Pisedtasalasai and Power (2004) studied the long-term and short-term underlying relationship between the share market prices and macroeconomic variables in the Sri Lankan context. The monthly data was gathered for the period between January 1985 to December 2001. The researcher used a series of tests for the data analysis. It includes unit roots, cointegration, vector error correction models (VECM), impulse response functions (IRFs) and variance decompositions (VDCs). The VECM model demonstrates that money supply, inflation and the rate of exchange had a substantial impact on share market prices. However, according to the VDC model, the fluctuations of equity prices are not mainly dependent on macroeconomic factors. Researches argued that this occurred due to the social and political situations that happen in Sri Lanka during the period of study. Hence researchers suggest that by employing more variables this can be avoided.

Ratnayake, Wijekoon and Yapa (2014) examined how macroeconomic factors namely the real economy, inflation, exchange rate, rate of interest and the supply of money impact ASPI by considering the quarterly data that spanned from the 1st quarter of 2002 to the 4th quarter of 2011. Time series analysis techniques were used to analyse the data. The study revealed that there is a substantial impact on stock prices from the real economy in Sri Lanka. According to the research, a positive relationship is found between the supply of money ( $M_1$ ) and a negative relationship between inflation with the equity market values. The scholars argued that interest rate and Wholesale Price Index (WPI) are not reliable predictors to assess the movements of stock prices.

Senanayake and Wijayanayake (2012), by utilizing monthly and quarterly data for the period 2003 to 2010, observed the impact of rate of interest, exchange rate, supply of money, inflation, and GDP on share market performance. ASPI, Milanka and five main sector indices were used to measure the performance of the stock market. The analysis indicated that GDP, inflation, interest rate and money supply have significant power in determining the performance of the capital equity market. However, findings revealed that the exchange rate is an insignificant factor when

determining the performance of stock return which conflicted with the results of Menike (2006).

Wickremasinghe (2011) studied the causal relationship between six macroeconomic factors (USD exchange rate, US stock market index (USSP), Colombo consumer price index (CPI), three-month fixed deposit rate, GDP and the narrow money supply and share prices in the Sri Lankan context. Monthly data spanning from January 1985 to December 2004 were used for the analysis. Ng-Perron unit root test, cointegration and Granger causality test, error correction model, impulse response analysis and variance decomposition analysis were adopted by the researcher to analyse the data. According to the Johansen cointegration test, a bi-directional relationship finds out between the three-month FDR, the US share price and the GDP with ASPI. A variance decomposition analysis indicates that in the long run, money supply and GDP are playing a significant role in determining the causality between share prices. In both the short and long run narrow money supply, CPI and three-month fixed deposit rate have an impact on ASPI. US stock price index is the only variable which has a connection with the ASPI in the short run. However, the researcher was not found a relationship between the USD exchange rate with the ASPI and the consumer price index with ASPI.

Kulathunga (2015) investigated how interest rates of lending and deposit, inflation volatility, GDP and exchange rate affected the development of the stock market in Sri Lanka. Share market turnover was taken to measure the development of the stock market. The outcomes of the study revealed that all macroeconomic variables impacted the stock market development. Salimullah (2016) studied the Sri Lankan share market and found that GDP, BOP, and exchange rates positively impacted the stock market prices where interest rates are negatively affected on it. Nanayakkara and Darshi (2020) found that the interest rate of treasury bills and GDP have a positive

impact on ASPI. In addition, exchange rate, interest rate, rate of inflation and fiscal deficit were negatively related to ASPI.

Policymakers, investors, and others who are interested in the stock market need the newest information about factors which are affecting the stock market performance to make appropriate decisions. However, there are no lot of studies which were carried out in Sri Lanka by analysing the selected macroeconomic variables in this research. Hence this research intended to accomplish this gap.

### **3 RESEARCH METHODOLOGY**

This section describes the data, sources, justifications, the data techniques and tools, and overall methodology used to recognize the relationship between macroeconomic variables and Sri Lanka's stock market performance.

#### **3.1 Research Approach**

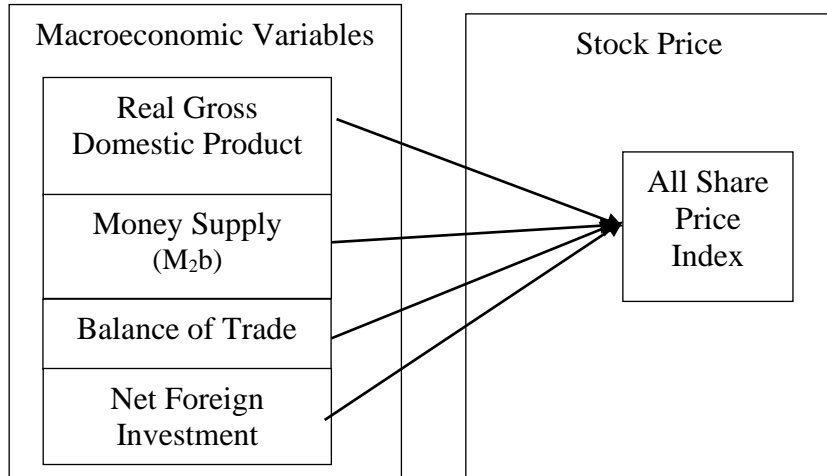
The objective of this research is to identify the underlying relationship between macroeconomic factors, viz. *RGDP*, *M<sub>2b</sub>*, *BOT* and *NFI* with the prices of shares (*ASPI*) in the Colombo Stock Exchange using monthly data ranging from January 2009 to December 2018. 120 monthly observations were used to carry out the research. The quantitative approach is used by several academics to analyse the relationship between macroeconomic factors and share prices. Hence the main strategy for this research was recognized as the quantitative approach.

#### **3.2 Population and Study Sample**

All listed companies in the Colombo Stock Exchange were used for the study. Hence the sample was equivalent to the population. Monthly data were used spanning from January 2009 to December 2018.

### 3.3 Conceptual Framework

The conceptual framework shows the relationship between macroeconomic factors and prices of the equity capital market (Figure 1).



**Figure 1: Overall Conceptual Framework**

Source: Author Constructed

### 3.4 Hypotheses

The relationship between macroeconomic factors and share prices is tested by developing the following hypothesis. These hypotheses are developed through empirical evidence.

H<sub>1</sub>: There is a significant long-term relationship between the *ASPI* and *RGDP*, *M<sub>2b</sub>*, *BOP*, *NFI*.

H<sub>2</sub>: There is a significant relationship between *ASPI* and Real Gross Domestic Product in the listed firms in Sri Lanka.

H<sub>3</sub>: There is a significant relationship between *ASPI* and Money Supply in the listed firms in Sri Lanka.

H<sub>4</sub>: There is a significant relationship between *ASPI* and the Balance of Trade in the listed firms in Sri Lanka.

H<sub>5</sub>: There is a significant relationship between *ASPI* and Net Foreign Investments in the listed firms in Sri Lanka.

Money supply can be valued in many ways using narrower or wider definitions. All the scholars have taken the broad money supply or  $M_2$  for their research (Menike 2006; Gunasekarage, Pisedtasalasai & Power 2004). However, for this research  $M_{2b}$  or the consolidated broad money supply was considered. Further balance of payment (*BOP*) is the variable that most of scholars have used for research. Hence, instead of *BOP*, *BOT* was selected to identify how the difference between export and imports impact *ASPI*. Further, *NFI* is pumping up productivity and boosting local business. Hence, *NFI* was selected to recognize the impact of *NFI* on *ASPI* and *RGDP* was selected to recognize whether the *RGDP* or the size of the economy has a relationship with the behaviour of the *ASPI* (Ratnayake, Wijekoon & Yapa 2014; Senanayake & Wijayanayake 2012).

### 3.5 Operationalization

The operationalization of the variables is indicated in Table 1.

**Table 1: Definitions of the variables**

Variable name	Working Definition	Measurements	Variable
Stock price	The stock price or the share price is the price which is given by an investor to buy a share in a company.	All Share Price Index (ASPI)	<i>ASPI</i>
Real Gross Domestic Product	It is the inflation-adjusted amount that reflects the value of all produced goods and services in a given period.	$\frac{\text{Nominal GDP}}{\text{GDP deflator}}$ GDP – <i>Gross Domestic Production</i>	<i>RGDP</i>
Money Supply	It is the whole stock of currency which are flowing in the economy of the country at a certain period.	Consolidated broad money supply ( $M_{2b}$ )	$M_{2b}$
Balance of Trade	It is the variance in the amount of a	Export (Rs) –	<i>BOT</i>

	nation's exports and imports over a specific period.	Import (Rs)	
Net Foreign Investment	It is the difference between the aggregate value of investment done by residents in foreign countries and the total investment done by foreigners in the domestic economy.	Purchase of overseas properties by domestic people – Purchase of local properties by foreigners	<i>NFI</i>

Source: Author Constructed

### 3.6 Sources and Collection of Data

Published “monthly bulletins of Central Bank of Sri Lanka” were used to get data about macroeconomic factors and the Colombo Stock Exchange data library was used to get data regarding the ASPI.

### 3.7 Data Analysis Strategies with Justification

STATA13, the statistical software utilized to analyse the data which were gathered from the monthly bulletins of the Central Bank and Colombo Stock Exchange data library.

#### 3.7.1 Descriptive statistics

The purpose of the descriptive statistics is to identify the central tendency which comprises mean, median and mode and it will evaluate the variability of the selected variables of the research that comprising standard deviation, minimum and maximum.

#### 3.7.2 Correlation analysis

The correlation analysis is used to recognize the positive or negative relationship among the selected factors which is used to assess the strength and direction.

### 3.7.3 Unit root test

The stationarity of the data should be tested since the research is employed with time-series data. The null hypothesis of the unit root test cannot be rejected. If it is rejected, that means the data set includes unit root. Fake regression results will be generated when time-series data sets include the unit root. ADF test (Dickey & Fuller, 1979) and PP test (Perron, 1989) were conducted to test the unit root. All the variables were stationary at their first difference in both the ADF and Philip Perron tests.

### 3.7.4 Johansen Co-integration test

To recognize the existence of a long-run co-integration relationship between stock prices (*ASPI*) and other macroeconomic factors, Johansen co-integration test was conducted. The hypothesis of the Johansen co-integration test is;

H<sub>0</sub>: No substantial long-term co-integration among variables

H<sub>1</sub>: There is a substantial long-term co-integration among variables

The determination of the optimal number of lag lengths to be utilized is an important part of this study (Table 2). Akaike information criterion (AIC), Schwarz information criterion (SC), Sequential modified LR test statistic (each test at 5% level) (LR), Final prediction error (FPE), and Hannan-Quinn information criterion (HQ) can be used to select the optimal lag length. Each method contributed to the same level, but AIC and SC have widely used approaches when choosing the optimal lag length.

**Table 2: Lag length criteria for LASPI**

Number of lags	LR	FPE	AIC	SC	HQ
0	NA	0.000046	4.20872	4.39992	4.28153
1	581.14	1.1e-09*	-6.41399*	-5.26678*	-5.97713*
2	47.277	1.2e-09	-6.35953	-4.25631	-5.55861
3	42.174*	1.6e-09	-6.20301	-3.14377	-5.03804
4	30.749	2.7e-09	-5.81799	-1.80275	-4.28897

Source: Author Constructed

By minimizing the Schwarz Information Criterion (SC), 1 lag was selected as the optimal lag length. Further, the FPE, AIC and HQ techniques also selected 1 lag as the optimal lag length. Hence, an optimal lag length of 1 was applied throughout the research.

### 3.7.5 Vector Error Correction Model

To recognize the long-run causal relationships between the variables, the VECM model was performed. The VECM model can be used when the variables are stationary and are co-integrated in the long run. According to the results of the unit root test, the data set was stationary at the first difference. Further, a long-run co-integration was found among the variables according to the Johansen Co-integration test. Thus, the VECM model was performed to recognize the causality between the *ASPI* and the macroeconomic variables in the long run.

### 3.7.6 Regression analysis

Through the regression analysis, the researcher tried to understand whether the real gross domestic product (*RGDP*), money supply - (*M<sub>2b</sub>*), the balance of trade (*BOT*) and net foreign investment (*NFI*) affect the share prices. Further, the output of the regression analysis will enhance the predictive power of this research.

The following formula was used to calculate the regression,  
$$ASPI = \beta_0 + \beta_1 RGDP + \beta_2 M_{2b} + \beta_3 BOT + \beta_4 NFI + \varepsilon_i$$

Note 1: Definitions of the above variables are given in Table 1.

## 4 ANALYSIS AND DISCUSSION

This section specifically focuses on elaborating the analysis of data. The first part of this section gives an overview on descriptive statistics. The correlation analysis was done to recognize whether there was a positive or negative impact from the independent variables on the dependent variable. According to the unit root test, all the variables were stationary at the first difference and co-integrated in the same order. Hence, the VECM model is used to analyze the long-run relationship of the variables. The section was concluded with the analysis of the regression model, to identify the different natures of the relationships between the *ASPI* and other tested macroeconomic variables.



## 4.1 Descriptive Statistics

Descriptive statistics are used to recognize the general characteristics of a sample. The mean and median of the data were considered under the central tendency. Further, the standard deviation, minimum, maximum, kurtosis, and skewness were considered under the measures of variability.

### 4.1.1 Descriptive statistics of variables

The mean value of *ASPI* was 5,305, with a maximum value of 7,299 and a minimum value of 1,503 (Table 3). This exhibited a significant fluctuation in *ASPI* between the period of 2009 and 2018, where the range was 5,796. The highest values in *ASPI* were recorded during the post-internal war period in Sri Lanka. This happened due to the positive expectations of investors regarding the share market. A greater degree of variation in *ASPI* can be also guaranteed by the standard deviation of 1,696.

**Table 3: Descriptive statistics for the dependent and independent variables**

	Mean	Median	Maximum	Minimum	Std. Deviation	Skewness	Kurtosis
<i>ASPI</i>	5,305	5,970	7,299	1,503	1,696	0.921	2.460
<i>M<sub>2b</sub></i>	3,862,445	3,353,493	8,364,748	1,258,542	2,160,494	0.556	2.003
<i>NFI</i>	87,520	57,757	292,483	7,121	73,920	1.129	3.589
<i>RGDP</i>	1,379,867	841,950	2,737,830	535,752	820,596	0.358	1.283
<i>BOT</i>	-259,342	277,717	-71,132	-461,486	-107,622	0.162	2.107

Source: Author Constructed

The money supply had a mean value of LKR 3,863 billion and a maximum and a minimum value of LKR 8,365 billion and LKR 1,258.542 billion respectively. The range was LKR 7,106 billion. This depicts that there is a high fluctuation during the observation period with a standard deviation of LKR 2,160 billion. *M<sub>2b</sub>* had a skewness of 0.556 which was positively skewed. The kurtosis of *M<sub>2b</sub>* was 2.003, which suggests that the distribution was a leptokurtic distribution.

Net foreign investments had an average of LKR 87.52 billion and a median value of LKR 57.76 billion as a measure of central tendency. During the observed period, LKR 292.49 billion of the amount recorded as the highest received as foreign investments and the minimum was LKR 7.121 billion. Having a standard deviation of LKR 73.92 billion and a range of LKR 285.361 billion indicated a higher level of variation. The skewness was 1.129 and the kurtosis was 3.589. Therefore, the distribution had heavier tails which were called as a leptokurtic distribution.

The lowest *RGDP* during the observed period was LKR 535.752 billion and the highest *RGDP* was LKR 2,737.830 billion with a mean value of LKR 1,379.867 billion. A range of LKR 2,202.078 billion and a standard deviation of LKR 820.596 billion, indicate that the value deviates significantly from the mean. The skewness of *RGDP* was 0.358 and the kurtosis was 1.283.

The *BOT* recorded a maximum of LKR 711.33 billion and a minimum of LKR 461.49 billion with a mean value of LKR 259.34 billion during the observed period. *BOT* had a skewness of 0.162 which is positively skewed and a kurtosis of 2.107 which indicated that the distribution was a leptokurtic distribution.

## **4.2 Correlation Analysis**

Correlation analysis was performed to recognize the relationship between independent and dependent variables. If a correlation is identified among two variables, that means if one variable has a systematic change, that the other variable also has a systematic change which changes together over a period. If a correlation is found, it can be either positive or negative, depending on the measured numerical number.

### **4.2.1 Correlation analysis – LASPI**

According to Table 4, *M<sub>2b</sub>*, *RDGP* and *BOT* were the variables that had a positive correlation with the *ASPI*. Further, *NFI* had a negative correlation with the *ASPI*. There was a strong positive correlation among the *ASPI* and *M<sub>2b</sub>*, *BOT* and *RDGP*. However, there was a weak negative correlation between the *NFI* and the *ASPI*.

**Table 4: Correlation matrix (ASPI)**

	ASPI	M <sub>2b</sub>	NFI	RDGP	BOT
ASPI	1				
M <sub>2b</sub>	0.6740	1			
NFI	-0.2355	-0.5380	1		
RGDP	0.5842	0.9285	-0.5848	1	
BOT	0.7581	0.8348	-0.2147	0.7597	1

Source: Author Constructed

The findings were consistent with the outputs of the study's descriptive statistics. It can be said that the selected macroeconomic factors could forecast the performance of the Sri Lankan stock market. Hence there was a high correlation among macroeconomic variables and stock market performance in Sri Lanka.

### 4.3 Unit Root Test

The Augmented Dicky Fuller (ADF) test, which is a parametric test and the Philip Perron (PP) test, which is a non-parametric test were used to assessing the stationarity of the data. Table 5 depicts the outcomes of both the Augmented Dicky Fuller and the Philip Perron unit root tests at the first difference of the series.

**Table 5: Unit root test at first differences**

Variables	T- Statistics ADF	T- Statistics PP	Critical Value 1%	Critical Value 5%	Critical Value 10%
ASPI	-4.667*	-6.984*	-4.146	-3.498	-3.179
M <sub>2b</sub>	-4.306*	-5.681*	-4.146	-3.498	-3.179
NFI	-4.866*	-11.957*	-4.146	-3.498	-3.179
RGDP	-6.327*	-8.369*	-4.146	-3.498	-3.179
BOT	-5.134*	-9.787*	-4.146	-3.498	-3.179

Note: \* Stationary at 5% significance level.

All the variables were stationary at their first difference in both the ADF and Philip Perron tests. ASPI, M<sub>2b</sub>, NFI, RGDP and BOT comprised the T statistic of -4.667, -4.306, -4.866, -6.327 and -5.134 respectively which exceeded the critical values at 1%, 5% and 10%. All series include a single unit root. Hence, the series was stationary at the first difference; the cointegration test can be applied to the data.

#### 4.4 Johansen test of Co-integration

The Johansen test of Co-integration was conducted to recognize the long-term co-integration between the variables. To conduct this technique, all the variables should be integrated in the same order. The data were s at the first difference which suggested that all the variables are integrated of the same order. Thus, the Johansen test of Co-integration can be applied. The optimal lag length of 01 was applied (Table 6).

**Table 6: Johansen co-integration output**

<b>Null hypothesis</b>	<b>Trace statistics</b>	<b>5% critical Value</b>	<b>Maximal eigenvalue statistics</b>	<b>5% critical value</b>
r = 0	59.0935*	68.52	26.7557	33.46
r ≤ 1	32.3377	47.21	17.1413	27.07
r ≤ 2	15.1964	29.68	8.8582	20.97
r ≤ 3	6.3382	15.41	5.1971	14.07
r ≤ 4	1.1411	3.76	1.1411	3.76

Note: \* indicates that the test statistics are significant at a 5% significance level.

Source: Author Constructed

If Johansen co-integration test decisions are based on trace statistics; the null hypothesis of the test can only be rejected if the Trace test statistics are greater than the critical value. If the outcome of the test is based on the Maximum Eigen value, the null hypothesis of the test can only be rejected if the Max-Eigen statistic is greater than the critical value. When  $r=0$  ( $r$  - number of co-integration), allows rejecting the null hypothesis since the Trace statistic and the Max-Eigen values are greater than the 5% critical value. The null hypothesis up to one co-integrating equation ( $r=1$ ) was accepted as the Trace statistics while the Max-Eigen value was less than the critical value at the significance level of 5%. According to both results of Trace statistics and the Max-Eigen value statistics, we can conclude that there is one co-integral equation at a significance level of 5%. Thus, it can be determined that macroeconomic factors and the performance of the stock market have been co-integrated over the long term.

#### 4.5 Vector Error Correction Model (VECM)

The VECM model can be used since there is a long-term co-integration between variables (Table 7).

**Table 7: VECM regression output**

Variables	Coefficient	Error term	t-Statistic	Prob.
<i>ECT</i>	-0.139	0.0694	- 1.97	0.049

Source: Author Constructed

*ECT* or the error correction term represents the speed of adjustment toward the long-run equilibrium. This was 13.90% in this model. To confirm a long-term causal relationship between the *LASPI* and the other macroeconomic variables, the coefficient of *ECT* should be a negative value and significant at a significance level of 5%. As per Table 7, error correction term is significant because the p-value is less than the 5% significance level. Further, there is a negative value as the coefficient. Hence, it can be determined that there is a long-term causal relationship between the macroeconomic factors, viz. *LM2b*, *LNFI*, *LRGDP* and *LBOT* to *LASPI*. Further, the long-run equilibrium could be reached at a speed of 13.90%.

#### 4.6 Regression Analysis

The regression analysis was performed to identify the relationship between the dependent variable and the other independent variables. Further, it is used to examine the nature of the relationship between the macroeconomic factors. The following formula was used to calculate the regression.

$$ASPI = \beta_0 + \beta_1 RGDP + \beta_2 M2b + \beta_3 BOT + \beta_4 NFI + \varepsilon_i$$

**Table 8: Model summary of regression analysis**

F	Prob	R <sup>2</sup>	Adjusted R <sup>2</sup>	Root MSE
17.17	0.0000	0.5910	0.5576	0.27919

Source: Author Constructed

Table 8 depicts the validity of the regression model. The coefficient of multiple determinations or the “R square” is 0.5910

in this model. That means 59.10% of the variation in *ASPI* can be explained by the independent variables. Hence it can be concluded that the model is 59.10% fit with its data. Root MSE is a measurement of accuracy. A more accurate model has fewer errors which leads to a smaller Root MSE. In this model Root, MSE is 0.27919 which is a very small amount. Hence, we can determine that this model has fewer errors.

#### 4.6.1 Regression Results

Table 9 shows the relationship between the *ASPI* and the macroeconomic factors, and it depicts the explanatory power of the relationship between the variables.

**Table 9: Regression results**

Model	B	Std. Error	t	Sig.
<i>Constant</i>	1.316352	1.610028	0.82	0.041
<i>M<sub>2b</sub></i>	0.217282	0.2170219	1.00	0.033
<i>NFI</i>	-0.037534	0.0586452	-0.64	0.042
<i>RGDP</i>	-0.187427	0.1743897	-1.07	0.288
<i>BOT</i>	0.563063	0.1561284	3.61	0.001

Source: Author Constructed

The regression equation is as follows,

$$ASPI = 1.316352 + 0.217282 M_2b - 0.037534 NFI - 0.187427 RGDP + 0.563063 BOT + \varepsilon_i$$

It is predicted that 0.217282 units will be increased in *ASPI* for every unit increase in *M<sub>2b</sub>* since the coefficient of *M<sub>2b</sub>* is 0.217282. Further, it is statistically significant, because the p-value is less than 5%, which is 0.033. It can be concluded that there is a positive relationship between the *ASPI* and the *M<sub>2b</sub>*.

Further, the coefficient of *NFI* is -0.037534 and its p-value is 0.042. That means, -0.037534 of the unit will be decreased in the forecasted *ASPI* when every unit increase in *NFI*. Furthermore, it is statistically significant whereas the p-value is less than 5%. Hence it can be determined that there is a negative impact from the *NFI* on the *ASPI*.

The coefficient for *RGDP* is -0.187427. This suggests that for a 1-unit increase in the *RGDP*, it can be projected an approximately

0.187427 point will be decreased in the *ASPI*. However, the variable *RGDP* is technically not statistically significant since the p-value is greater than 5% which is 0.288.

0.563063 is the coefficient of *BOT*. Hence, for each point increase in *BOT* can be expected that a 0.563063 point will be increased in the *ASPI*. Further, this is statistically significant since the p-value, which is 0.001 is less than 5%. Therefore, it can be concluded that there is a positive relationship between the *BOT* and the *ASPI*.

#### **4.7 Testing of Hypothesis**

H<sub>1</sub>: There is a significant long-term relationship between the *ASPI* and *RGDP*, *M<sub>2b</sub>*, *BOP*, *NFI*.

The null hypothesis can be rejected. In the VECM model, the speed of adjustment or the error correction term was significant at the significant level of 5% and it was a negative value. Hence, it can be concluded that there is a long-run relationship between the macroeconomic factors and the performance of the share market in Sri Lanka.

H<sub>2</sub>: There is a significant relationship between *ASPI* and Real Gross Domestic Product

The null hypothesis cannot be rejected at a significance level of 5% since, in the regression model, the p-value of *RGDP* is greater than 5%. Though there was a negative relationship between the *ASPI* and *RGDP*, the relationship will not be technically significant. Hence it can be concluded that there is no significant relationship between the *ASPI* and the *RGDP*.

H<sub>3</sub>: There is a significant relationship between *ASPI* and Money Supply in the listed firms in Sri Lanka.

The null hypothesis has been rejected at a significance level of 5%. Hence there was a significant relationship between the *M<sub>2b</sub>* and the *ASPI*. Whereas the p-value of the *M<sub>2b</sub>* in the regression model is less than 5% of the significance level. Thus, it can be decided that there is a positive relationship between the *ASPI* and the *M<sub>2b</sub>*.

H<sub>4</sub>: There is a significant relationship between *ASPI* and the Balance of Trade in the listed firms in Sri Lanka.

The null hypothesis could be rejected at a 5% significance level whereas the p-value of *BOT* is less than the 5% in the regression model. Hence, it is technically significant. Therefore, it can be determined that there is a positive relationship between the *BOT* and the *ASPI*.

H<sub>5</sub>: There is a significant relationship between *ASPI* and Net Foreign Investments in the listed firms in Sri Lanka.

The null hypothesis can be rejected at a 5% significance level. Thus, there was a significant relationship between the *NFI* and the *ASPI* because the p-value of the *NFI* in the regression model is less than 5%. Hence it can be determined that there is a negative impact from the *NFI* on the performance of the *ASPI*.

According to the research done by Ratnayake, Wijekoon and Yapa (2014), a positive relationship is found between the supply of money and the *ASPI* and the analysis of Senanayake and Wijayanayake (2012) stated that GDP and money supply have a substantial power on determining the performance of the capital equity market, which is consisted with the results of this research. Wickremasinghe (2011), indicate that in the long run, money supply and GDP are playing a significant role in determining the causality between share prices. This is contradictory to the results of this research since although there was a relationship between *ASPI* and *RGDP*, it was not statistically significant.

## 5 CONCLUSION

This research used to identify the relationship between the share prices and macroeconomic factors in Sri Lanka by using monthly data for the period of January 2009 to December 2018. Real gross domestic product (*RGDP*), money supply - (*M<sub>2b</sub>*), the balance of trade (*BOT*) and net foreign investment (*NFI*) were the selected macroeconomic variables for the study to identify the impact of those independent variables on the share market prices in Sri Lanka. *ASPI* was taken as the dependent variable which represents the performance of the stock market. Monthly bulletins



of the Central Bank of Sri Lanka (CBSL) were used to collect data on the above variables.

The analysis of data started with descriptive statistics. To recognize relationships between dependent and independent variables, a correlation analysis was conducted. The variables were then examined for unit root. However, none of them was stationary at level, but all variables were stationary at the first difference. Thus, all the variables were integrated in the same order, I (1). To recognize the long-term co-integration between the selected variables, the Johansen Cointegration test was conducted. The VECM model was employed since there was one co-integral equation between variables. According to the Schwarz Information Criterion (SC), the optimal lag length of 1 was chosen by minimizing the criteria. The VECM model was run to find the long-term relationship between the macroeconomic factors and the performance of the equity capital market. Finally, a multiple regression model has conducted to examine the nature of the relationship between the factors.

According to the results of the descriptive statistics and the correlation analysis, macroeconomic variables, viz. *M<sub>2b</sub>*, *RDGP* and *BOT* had a positive correlation with the performance of the capital equity market. Further, the relationship between the *NFI* with the *ASPI* was negative. However, the results of the regression analysis discovered that there was a negative relationship between the *RGDP* and the *ASPI*, which is contradicting the expected outcomes.

The output of the VECM describes that there was a significant long-term relationship between the macroeconomic factors and the stock prices in Sri Lanka. The speed of adjustment was significant at the significant level of 5% and it was a negative value. Hence, it could be determined that there was a long-run causality running from the macroeconomic variables to *ASPI*. The long-run equilibrium could be reached at a speed of 13.900%. The results of the multiple regression model depict that there was a significant relationship between the macroeconomic variables, viz. *M<sub>2b</sub>*, *NFI* and *BOT* and the dependent variable, *ASPI*.

The coefficient of multiple determinations or the “R<sup>2</sup>” of the multiple regression model was 0.5910. That means 59.10% of the

variation in *ASPI* can be explained by the independent variables. Hence it can be concluded that the model is 59.10% fit with its data. However, 40.9% of the variations in the *ASPI* had been described by some other factors.

Empirical results disclosed that money supply, net foreign investment and balance of trade were the variables that could have an impact on share prices. There was a 0.217 correlation of *M<sub>2b</sub>* with *ASPI* and a -0.037 correlation of *NFI* with *ASPI*. Further, there was a 56% of correlation of *BOT* with *ASPI*. A positive correlation was found between the *M<sub>2b</sub>* and *BOT*. A negative relationship was found between the *NFI* and *ASPI*. Independent variables except the *RGDP* had a significant relationship with *ASPI*. Hence, the null hypothesis of *RGDP* was accepted. It can be concluded that other than the *RGDP*, other macroeconomic factors influenced the behaviour and the pattern of *ASPI* in the Sri Lankan stock market.

The following recommendations can be given based on the results of the research, investing in the share market is an interesting business activity. Consultants, economists, and experts in the industry are continuously attempting to forecast the upcoming patterns of the share market and try to find and outperform the market and they are trying to identify the degree of risks connected with investments. They can take proper investment decisions by understanding the impact of macroeconomic factors on share market indices. Hence based on the findings of this research they can take effective decisions.

Economists may predict how capital markets will change if indicators of macroeconomics such as real gross domestic product (*RGDP*), money supply - (*M<sub>2b</sub>*), the balance of trade (*BOT*) and net foreign investment (*NFI*) vary in any given direction. Policymakers, on the other hand, may try to find the linearity of these indices to develop monetary policy to make adequate and timely adjustments to the CSE. Hence, the Central Bank of Sri Lanka as the responsible party for developing the macroeconomic policies can use this study to formulate better policies.

However, the stock market performance was influenced by factors other than macroeconomic variables consisted in this survey. Since the  $R^2$  of the model was 59.10%, which was 40.90% the

variations in the *ASPI* had been described by some other factors. Factors which are specific to the company or an industry such as different consequences in the environment, stability in politics, the various buying patterns of consumers, societal influences, and business and economic conditions in the country should also be considered by the parties before taking any decision.

## REFERENCES

- Adam, P 2015, 'A model of the dynamic of the relationship between stock prices and economic growth of Indonesia', *Applied Economics and Finance*, vol. 2, no. 3, pp. 12-19.
- Adjasi, CK & Biekpe, NB 2006, 'Stock market development and economic growth: the case of selected African countries', *African Development Review*, vol. 18, no. 1, pp. 144-161.
- Badullahewage, SU & Jayewardenepura, C 2018, 'The effects of macroeconomic factors on the performance of stock market in Sri Lanka', *International Journal of Innovation and Economic Development*, vol. 3, no. 6, pp. 33-41.
- Füss, R 2005, 'Financial liberalization and stock price behavior in Asian emerging markets', *Economic Change and Restructuring*, vol. 38, no. 1, pp. 37-62.
- Georgiou, MN 2010, 'Economic growth and stock prices: an empirical analysis with panel data (1999-2007)', viewed 18 June 2019, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1690086](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1690086).
- Gunasekarage, A, Pisedtasalasai, A & Power, DM 2004, 'Macroeconomic influence on the stock market: evidence from an emerging market in South Asia', *Journal of Emerging Market Finance*, vol. 3, no. 3, pp. 285-304.
- Haroon, MA & Jabeen, H 2013, 'Impact of macro-economic variables on share price behavior of Karachi stock exchange', *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, vol. 7, no. 3, pp. 493-504.

- Homa, KE & Jaffee, DM 1971, 'The supply of money and common stock prices', *The Journal of Finance*, vol. 26, no. 5, pp. 1045-1066.
- Ibrahim, MH & Aziz, H 2003, 'Macroeconomic variables and the Malaysian equity market', *Journal of Economic Studies*, vol. 30, no. 1, pp. 6-27.
- Issahaku, H, Ustarz, Y & Domanban, PB 2013, 'Macroeconomic variables and stock market returns in Ghana', *Asian Economic and Financial Review*, vol. 3, no 8, pp. 1044-1066.
- Jahfer, A & Inoue, T 2014, 'Financial development, foreign direct investment and economic growth in Sri Lanka', *International Journal of Economic Policy in Emerging Economies*, vol. 7, no. 1, pp. 77-93.
- Jariya, MI & Hassan, SLA 2018, 'Analysis of balance of trade: Sri Lankan context', *Journal of Management*, vol. 14, no. 1, pp. 32-38.
- Kmmcb, K 2015. 'Macroeconomic factors and stock market development: with special reference to Colombo Stock Exchange', *International Journal of Scientific and Research Publications*, vol. 5, no. 8, pp. 1-7.
- Leightner, JE 2010, 'Are the forces that cause China's trade surplus with the USA good?', *Journal of Chinese Economic and Foreign Trade Studies*, vol. 3, no. 1, pp. 43-53.
- Lo, AW & MacKinlay, AC 1988, 'Stock market prices do not follow random walks: evidence from a simple specification test', *The Review of Financial Studies*, vol. 1, no. 1, pp. 41-66.
- Menike, LMCS 2006, 'The effect of macroeconomic variables on stock prices in emerging Sri Lankan stock market', *Sabaragamuwa University Journal*, vol. 6, no. 1, pp. 50-67.

- Nanayakkara, Sanjeevani & Darshi, GAN 2020, 'The impact of macroeconomic variables on stock market performance in Sri Lanka', viewed 22 June 2019, [https://www.researchgate.net/publication/341652085\\_THE\\_IMPACT\\_OF\\_MACROECONOMIC\\_VARIABLES\\_ON\\_STOCK\\_MARKET\\_PERFORMANCE\\_IN\\_SRI\\_LANKA](https://www.researchgate.net/publication/341652085_THE_IMPACT_OF_MACROECONOMIC_VARIABLES_ON_STOCK_MARKET_PERFORMANCE_IN_SRI_LANKA)
- Nelson, CR 1976, 'Inflation and rates of return on common stocks', *The Journal of Finance*, vol. 31, no. 2, pp. 471-483.
- Patro, DK, Wald, JK & Wu, Y 2002, 'The impact of macroeconomic and financial variables on market risk: evidence from international equity returns', *European Financial Management*, vol. 8, no. 4, pp. 421-447.
- Ratnayake, RMIP, Wijekoon, P & Yapa, D 2014, 'Relationship between all share price index (ASPI) and macroeconomic variables: evidence from Sri Lanka', *International Journal of Development Research*, vol. 4, no. 1, pp. 1923-1928.
- Reinbold, B & Wen, Y 2019, 'Historical US trade deficits', *Economic Synopses*, vol. 13, no. 1, pp 1-25.
- Salimullah, AHM, 2016. 'Granger causality of interest rate and exchange rate on stock volatility at Chicago Options Market', *Scientia et Humanitas*, vol. 6, no. 3, pp. 35-56.
- Senanayake, D & Wijayanayake, AN 2012, 'Impact of macroeconomic factors on stock market performance of Sri Lanka: a sectoral approach', Proceedings of the First International Research Conference on Humanities and Social Sciences, viewed 23 June 2019, <http://journals.sjp.ac.lk/index.php/IRCHS/article/view/2274>.
- Şentürk, M, Özkan, GS & Akbaş, YE 2014, 'The relationship between economic growth and stock returns: evidence from Turkey', *Doğuş Üniversitesi Dergisi*, vol. 15, no. 2, pp. 155-164.

- Singh, D 2010, 'Causal relationship between macro-economic variables and stock market: a case study for India', *Pakistan Journal of Social Sciences (PJSS)*, vol. 30, no. 2, pp. 263-274.
- Stulz, RM 1983, 'On the determinants of net foreign investment', *The Journal of Finance*, vol. 38, no. 2, pp. 459-468.
- Sriyalatha, MAK 2008, 'Does all share price index represent the Colombo stock market?', *The Meijo Review*, vol. 9, no. 3, pp.75-90.