

IMPACT OF MACROECONOMIC VARIABLES ON STOCK MARKET PERFORMANCES: EVIDENCE FROM SRI LANKA

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Abstract

After eradicating 30 years of war, Sri Lanka has been rising like a phoenix bird from the ashes of its predecessor. With the golden opportunity to experience an impressive development within almost all the sectors inside the country, Colombo stock exchange (CSE) was labeled as the world's best performing stock exchange according to Bloomberg in 2010. Unfortunately, it did not last longer. According to an analysis of Bespoke investment group in 2012, Colombo stock exchange became the second worst performing stock exchange ahead of Dhaka exchange in Bangladesh.

The aim of this paper is to measure the impact of macroeconomic variables on the all share price index (ASPI) of CSE in Sri Lanka. Monthly data collected from publication of Central Bank of Sri Lanka from 2006 to 2016 were employed. In the model specification, two dummy variables were included to test the impact from civil war prevailed in the country and global financial crisis on share prices and the parameters were estimated using Ordinary Least Square (OLS) method. The results indicate that macroeconomic variables have an overall impact towards ASPI of Sri Lanka. Interest rate, industrial production index and civil war affected negatively on ASPI while US Dollar exchange rate and real GDP growth rate reacted positively on the all share price index. Importantly, global financial crisis positively affected the all share price index in Sri Lanka, which is contradictory to the experiences of developed countries. Study concluded that even though there is an uncertainty prevailing within external world, there is a tendency of attracting foreign investment towards capital market when a country is having a positive condition like Sri Lanka ending thirty years of war. Further, it reveals that inflation rate and money supply growth rate

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does not have a significant impact on the share price index of Sri Lanka. These findings can be significantly incorporated in government policy making which will be aimed at creating a strong capital market, investment decisions of local and foreign investor, stock market regulating authorities and financial analysts who develop forecasting models with reference to share price indexes.

Keywords: Macroeconomic Impact, Colombo Stock Exchange, All share price index, Ordinary Least Square Method, Sri Lanka

1. Introduction

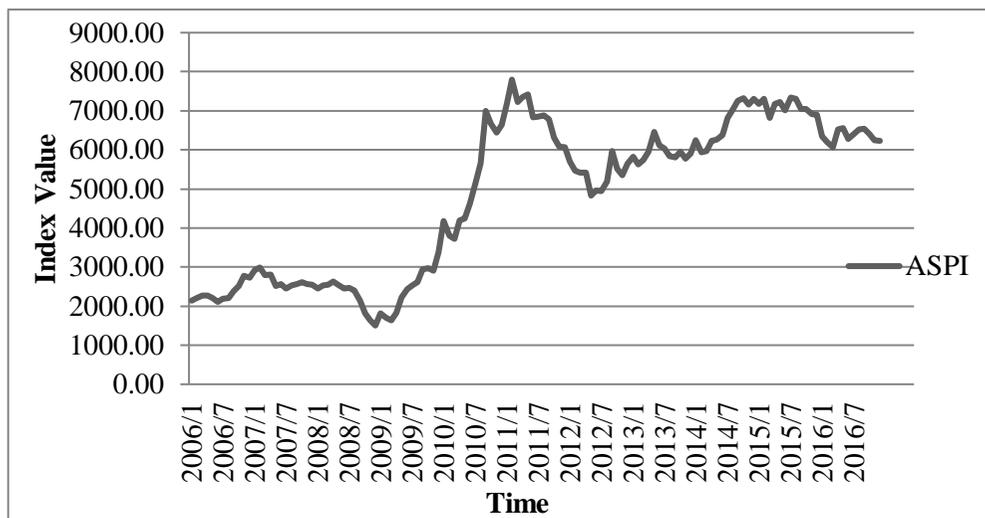
Companies may differ in terms of sizes, the target market and the nature of the business but having a common objective of maximizing shareholders wealth, which result in increasing share prices. Share price is the present value of expected future cash flows of a share. Expected future cash flows attached to a share consist of future dividends plus the capital gain. All these mentioned cash flows would be affected by the performance of the relevant company within the industry. With all the internal factors, other external factors that go beyond the control of the company also effect on determining the performance of the company and ultimately the market prices of shares.

Sri Lanka is a developing country in South Asian region. In 2008, Sri Lanka advanced in to middle lower income category. Since 2009 with the end of a 30 year civil war, Sri Lanka is heading towards a greater development. In 2016 GDP at current market price was 81 million US \$. GDP per capita was 3835 US \$. GNI per capita (PPP) was 11970 PPP dollars which was the highest among South Asian countries(CBSL, 2016).

Colombo Stock Exchange (CSE) is the main stock exchange platform in Sri Lanka. It operates through Colombo stock brokers association. It has been the only stock exchange available in Sri Lanka. As of 2017, 295 companies are listed in CSE representing 20 business sectors. By 2017 September CSE's market capitalization was Rs. 2919.7 bn.(SEC, 2015). All share price index, S and P SL 20, total return indices, total turnover are the indices provided by CSE that represent stock market condition.

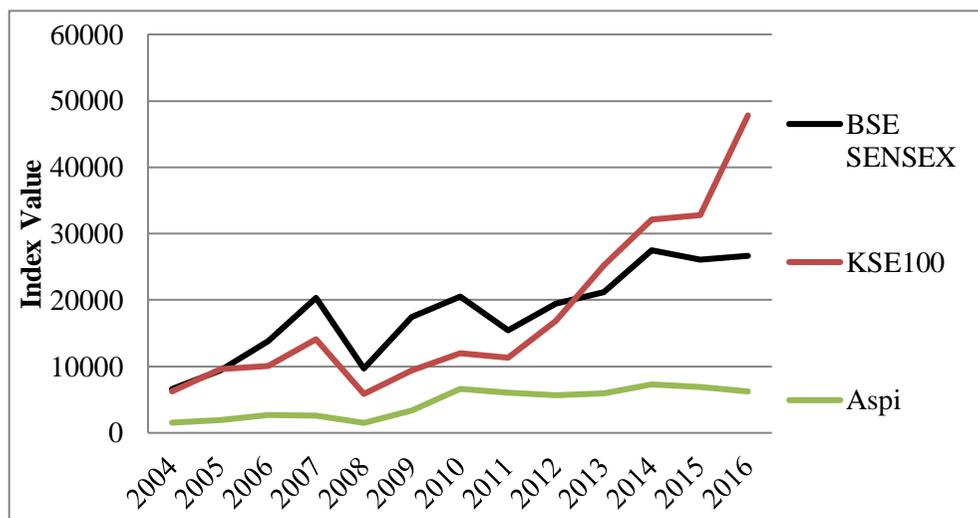
It says that in 2015 all share price index and S&P SL 20 index declined by 5.5% and 11% respectively. CSE claims that this disturbance has arisen mainly due to macroeconomic influences. Marginal increase in domestic interest rates, political uncertainty, depreciation in domestic exchange rate, decline in commodity prices, particularly oil could have affected on this decline (CSE annual report, 2015).

Figure 1: All Share Price Index, CSE



Source: Compiled based on Central Bank data, CBSL, 2006-2016

Figure 2: Share Price Movements in Major Stock Markets in South Asia



Sources: *Historical-Indices*, BSE Ltd., www.bseindia.com/indices/IndexArchiveData.html; "KSE 100 Price History Markets Insider." *Business Insider*. Business Insider, n. d. Web; Central Bank data, CBSL, 2017.

Even though there is a boom in all share price index in CSE after around 2008, as shown in Figure 1, it has not been able to perform as well as other major stock markets within the South Asian region.

According to Figure 2, although, there was a marginal increment in relation to the all share price index in CSE, BSE SENSEX which is the share price index of Bombay stock exchange (BSE) in India and KSE 100 in Karachi stock market (KSE) in Pakistan show a greater expansion in their share price indices compared to the all share price index in CSE. It indicates that the competitive stock markets in South Asian region perform better than what we have in Sri Lanka. This might reduce the foreign investment on stocks in CSE and attract them towards other stock markets in the region.

More importantly, in 2008 with the global financial crisis, BSE share price index and KSE share price index showed a sudden decline in their index values. It is clearly visible in Figure 2. But, behavior of all share price index in CSE shows that it has not been impacted highly compared to other two indices from the global financial crisis.

As the research problem, it is found that though many studies have been conducted to determine the relationship between macroeconomic variables and share price, there is an inconsistency prevailing within those literatures. As shown in Table 1, conclusions of some studies even within the same context consist of a theoretical debate. For instance, when Shafana (2014) concludes that there is a positive relationship between inflation and share prices, Hemamala and Jameel (2016) found that there is a negative relationship existing between inflation and share prices in the Sri Lankan context.

Table 1: Summary of Literature

Variable	Positive Relationship	Negative Relationship	No Relationship
Exchange rate	Nijam et al (2015) Morawakage (2013)	Menike (2006) Joseph (2013)	Perera (2015) Wickramasinghe (2011)
Inflation	Safana (2012)	Menike (2006) Joseph (2013) Hemamala (2016)	Nijam <i>et al</i> (2015) Perera (2015) Wickramasinghe (2011) Lakmali (2015)

Table 1 Continued

Money supply	Menike (2006) Perera (2015)		Joseph (2013)
Interest rate	Nijam et al (2015)	Menike (2006) Amarasinghe (2015)	Perera (2015)

Source: Compiled by authors

Objective of this research is to solve the theoretical debate existing in the previous literature by testing the relationship between macroeconomic variables and ASPI of Sri Lanka. Moreover, the study examined the impact of civil war and global financial crisis, which prevailed within the period towards ASPI in Sri Lanka. This study examined the relationship with macroeconomic variables and Sri Lankan stock prices regarding six factors, which are real GDP growth rate, change in Colombo consumer price index (inflation), three months Treasury bill rate, USD exchange rate, Industrial Production Index, money supply growth rate (m2). This study makes a significant insight when formulating government policies towards economic development. As the government concern on having attractive capital market within the country would result in encouraging domestic as well as foreign investment which ultimately would support to enhance economic development.

Not only the government but also companies that place concern on maximizing their share price will be benefited through this research. The findings of this research will serve effective predictions. If they can predict future policy movements and future economic movements, they can easily forecast the expected movement on share price. Investors who are concerned on investing in stocks or investors who have already invested in stocks will be benefited by this research as they can manage their investments that match with the expected share price movements. Investors can decide when to invest in shares and when to sell their investment based on anticipating macroeconomic movements.

2. Literature Review

2.1 Theoretical Framework

There are many theoretical arguments built to explain the relationship between macroeconomic variables and share prices.

Accordingly, Alam et al (2017) discussed there should be a negative relationship between interest rate and share prices in his research. According to the argument built, if interest rate increases people will shift their money to bank deposits without investing on shares. This leads to a decrease of demand on shares and the price of shares vice versa. Also, he says when there is a higher interest rate prevailing in the market, it discourages investment.

Banawa et al (2015) mentioned in his study, according to the arbitrage pricing theory increasing of inflation rate will reduce purchasing power of people that lead to reduce the demand for stock and ultimately the prices. Also, he says that stock investors are subjected to an inflation illusion. Increase of inflation reflects a risky economic condition. This increases the required rate of return that pushes stock prices down.

Bai (2014) in his study on the impact of inflation on stock market in China highlighted the fact that expansionary monetary policy leads to increased inflation and create asset price bubbles. Also, he mentioned, according to fisher effect, there should be a positive correlation between inflation and stock prices. Also, he mentioned that there can be a negative relationship with these variables according to volatility hypothesis. High inflation rate will discount future cash flows of a stock by higher rate.

Zoa et al (2014) indicated that theoretically there can be a positive relationship between money supply and share prices. According to his argument increase of money supply would lead to increase in money demand and increase economic activities in an economy. Finally, this leads to increase of the prices of the shares. Also, he raised the argument made by Keynesian economists. According to Keynesian economists, expectation of future contractionary monetary policy following a current expansionary monetary policy result in an increase in purchase of bonds which increase the present interest and discount rate. High discount rate reduces share prices.

Aydemir and Demirhan (2009) made a significant argument through their research. They argued that the relationship between share price and exchange rate depends on the compositions of import oriented companies and export-oriented companies. Increase of exchange rate would increase the share price of export-oriented company shares while it decreases the prices of shares, which belong to import oriented companies.

2.2 Land Marks

To date, many scholars have discussed different aspects about stock returns. Eugene Fama, who is considered as a giant in finance discovered efficient market theory, asset pricing model and behavior of stock market, which played a major role in analyzing the stock returns.

In the capital asset pricing model (CAPM): theory and evidence by Fama and French (2004) discussed the fact that investors required higher return for the risk that they are taking. According to CAPM, there are two types of risks associated with financial assets. Systematic risk and unsystematic risk. Systematic risk which cannot be diversified has been evoked mainly with the market conditions like inflation, interest rate movements. So that he argues that higher the systematic risk higher should be the RRR.

Fama (1990), in his study of stock returns, expected returns and real activity, identified three sources of variation in stock returns. (1) Shocks to expected cash flows, (2) variation of time that cash flow generates, (3) shocks to discount rates. Also he analysed stock return behavior with industrial production index, GNP growth rate and gross private investment in 1953-1987. Through his study, he concluded that production growth explains 43% of the total variation of annual stock returns.

Nai-Fu Chen, Richard Roll, and Stephan Ross are some great economists who analyzed different stock market aspects. Also, Stephan Ross is one of the giants in financial economics who contributed by discovering many important theories like arbitrage pricing theory and agency problem. In 1986, Chen, Roll, and Ross have identified that macroeconomic variables have an impact on stock market returns under the research of “Economic Forces and the Stock Market” (Chen, Roll, and Ross, 1986).

2.3 Discussion

Stock Market Performance under Different Macroeconomic Variables

It has been observed that different findings have been discovered related to macroeconomic impact towards share prices through literature.

Menike (2006) in her study of the effects of macroeconomic variables on share prices in emerging Sri Lankan stock market used the monthly panel data of 34 selected companies for the period from September 1991 to December 2002. The study found that there is a negative impact from inflation rate, interest rate and USD exchange rate on share price while money supply affects positively towards share prices. Also in the study of Nijam et al (2015), a negative relationship has been recorded between whole sale price index (inflation) and share price of Sri Lanka within the period of 1980-2012.

Hemamala and Jameel (2016) have found that there is a positive relationship between inflation and share prices of Sri Lanka in simple linear regression analysis. Also, Shafana (2014) in the research of relationship between macroeconomic variables effect on financial sector performance in emerging Sri Lankan stock market in 2012 identified that there is a positive relationship between inflation and share prices.

Bai (2014) mentioned that he found a weak correlation between inflation and share prices variables in china market in the study on the impact on inflation on stock market in china. Amarasinghe (2015) in his study of dynamic relationship between interest rate and stock prices: empirical evidence from Colombo stock exchange discovered a negative significant impact from interest rates to stock prices in Sri Lanka in 2007 to 2013. But Nijam et al (2015) found a positive relationship with interest and share prices.

Accordingly, when measuring relationship with money supply and share prices, Wickramasinghe (2011) found that there is a bi-directional causal relationship existing from ASPI to money supply (M1) and it further says at longer horizons money supply plays an important role in explaining the forecast variance in stock prices. Also, Leenee and Taylor (2014) examined that money supply is having positive impact on share prices in Malaysia. However, Chia and Lim (2015) have proved that there is a significant negative impact from money supply on stock prices in the same context taking real narrow money supply as measurement of money supply.

A rich body of literature has explored the impact of exchange rate on stock prices in several contexts. Most of them have used US dollar exchange rate as the measurement since it is the most recognized currency all over the world. Shafana (2014) examined a negative relationship between exchange rate and stock prices in Sri Lanka from 2008 to 2011 but Morawakage (2013) found different results in Sri Lanka compared to the above researches. He used monthly data within 2000 to 2011 and found a positive relationship between exchange rate and stock prices.

Gay (2008) did a research to investigate the empirical relationship of Oil prices and Exchange rate on stock prices in related to emerging economies, which are Brazil, Russia, India, and China during 1999-2006. The Study has used Box-Jenkins ARIMA model to test the relationship. According to the findings, there is no significant relationship found between respective exchange rates and share prices in either country.

Many research studies have tested the impact of GDP change on share price. Nijam et al (2015) concluded that there is a positive relationship of GDP and stock market index in Sri Lanka. Sireesha (2013) discovered the same in relation to India. Further, Hunjra et al (2014) contends that there is no relationship between GDP and the stock price index in the short run in Pakistan. However, he has found a significant relationship in long run. According to Sohail and Hussain (2009), long run positive relationship was found between index of industrial production and stock prices in Lahore stock exchange. The same result was experienced by Hunjra et al (2014) in relation to Kashmir stock exchange in Pakistan.

To conclude the discussion, through the literature, it is clear that it consists a theoretical debate, which gives inconclusive explanations on the relationship between selected macroeconomic variables and share price indices, which at the end of this study will be solved with reference to the Sri Lankan context.

3. Methodology

The objective of this research is to investigate the relationship between major macroeconomic variables and stock prices in Sri Lanka. Major macroeconomic variables have been selected through literature review. They are inflation rate, interest rate, money supply growth rate, real GDP growth rate, exchange rate and industrial production index.

Before conducting the analysis, unit root test was conducted to test the stationarity of the collected data. After testing Multicollinearity, Heteroscedasticity and Autocorrelation of the collected data, multiple regression analysis was conducted to test the relationship.

3.1 Dependent Variable

All share prices computed by taking the share values of all listed companies in Colombo stock exchange. In 2017 there were 296 companies listed under CSE. ASPI is a representative index which assigned weights according to the proportion of issued ordinary capital of companies. Shares were valued under current market price. Base year of the index is 1985 and the base value is 100.

3.2 Independent Variables

Three months Treasury bill was selected as an indicator to measure the impact of interest rate on share prices of Sri Lanka. The interest rate can have a lag effect on share price. Since people take some time to adjust their investments according to the interest movements there can be an effect on share prices with a lag. So, the study included three months TB rate with lag 2. Also, the broad money supply can have an impact on share prices with a lag. Therefore, in this study money supply growth rate was taken with a three-month lag effect.

Colombo consumer price index (CCPI) was taken as the indicator for measure Inflation. CCPI (based 2002) included all households in Colombo district and the average size of a household unit was 4.5. Totally there were 334 items taken. Weights were given to items to ensure reliability of the measurement. Food items weighed as 46.41% while non-food items as 53.29%. The highest weight was given to housing, Water, electricity and fuel category which falls in non-food sub group (“Colombo Consumers Price Index (Base 2002 = 100),” 2011).

Exchange rate was an important macroeconomic variable for decision-making. The US dollar was taken as the measurement of exchange rate movements since it is widely used in international transactions. In the study USD exchange rate in direct quotation was used. Similar to the interest rate, exchange rate can affect share prices with a lag effect. According to J curve effect the investment decisions of the people may change due to changes of the exchange rate but with a lag. Hence, the study took lag values of six months of the US dollar exchange rate to test the relationship.

Real Gross domestic product measures the value of total output of a country adjusted for inflation. The study incorporated GDP based on 2002 constant prices. In Sri Lanka, the real GDP is calculated on quarterly base. Since the study was based on monthly data, GDP values were converted in to monthly values by taking the simple average. Thus, the quarterly real GDP was distributed equally within the respective period of three months. Industrial production index measures the status of production in the industrial sector of a given period of time. IPI was taken by taking the base year as 2010.

A dummy variable was included in to the model to test the impact of war towards determining share prices. Sri Lanka underwent a dark period because of the civil war since 1983. It went until the mid-2009 causing huge damage to the country and the economy at large. Since there can be an effect on shareholders decisions from war it was incorporated to the model as a dummy variable. Period from 2006 January to 2009 May was recognized as the period which the war has prevailed. Therefore $D_1=1$ means the period Sri Lanka had war and $D_1=0$ means the period which was not affected by the war.

The effect of Global financial crisis which started at the end of 2003 and severed in 2007 and 2008 was incorporated in to the study as a dummy variable to mention the structural break. The crisis started in USA in the subprime mortgage market. Many banks collapsed including Lehman Brothers. Later, it spread throughout the world and Europe entirely being a victim of the crisis. The stock market continued dropping and economic activities collapsed. The world GDP growth rate during the period was 0.6% (CBSL, 2016).

3.3 Data Collection

In order to examine the relationship between selected macroeconomic variables and share price, secondary data were collected. All the research data were obtained from central bank publications which are highly reliable. Because of the limitations of data, study was limited to examine the relationship based on data within 2006 January to 2016 December. Analysis was made based on monthly data. Main reason for using monthly data is share prices show a great deal of volatility which has many ups and downs even within a single day. Since annual data would misinterpret the findings, monthly data were taken to test the relationships. The model included a dummy variable to divide the study period in to two, period that had war and the period that had not war. Also another dummy variable was used to represent the effect of global financial crisis on share prices of Sri Lanka. The global financial crisis has affected some parts of the world until around 2012.

3.4 Model Specification

In order to test the relationship between selected macroeconomic variables and ASPI, Multiple regression analysis tool was used. Many previous researches had used regression analysis tool to test the relationship between macroeconomic variables and share price. Related to Sri Lankan context, Menika (2006) and Perera (2015) used multiple regression model in their studies. Also, Kumara (2014), Silva (2015), Lakmali (2015), Hemamala (2016) and Shafana (2012) used the same tool in their analysis of impact of macroeconomic variables of share prices.

Multiple Regression Model:

$$\text{ASPI} = \beta_0 + \beta_1 \text{GDPG} + \beta_2 \text{INF} + \beta_3 \text{TB} + \beta_4 \text{USD} + \beta_5 \text{IPI} + \beta_6 \text{MS} + \beta_7 \text{D}_1 + \beta_8 \text{D}_2$$

ASPI - all share price index

GDPG - Real GDP growth rate

INF - Monthly inflation rate

TB - Three months Treasury bill rate

USD - US dollar exchange rate

IPI - industrial production index

MS - Money supply growth rate (m2)

D₁ - Civil War

D₁ = 1 within the war period

D₁ = 0 after the war

D₂ - Global financial crisis

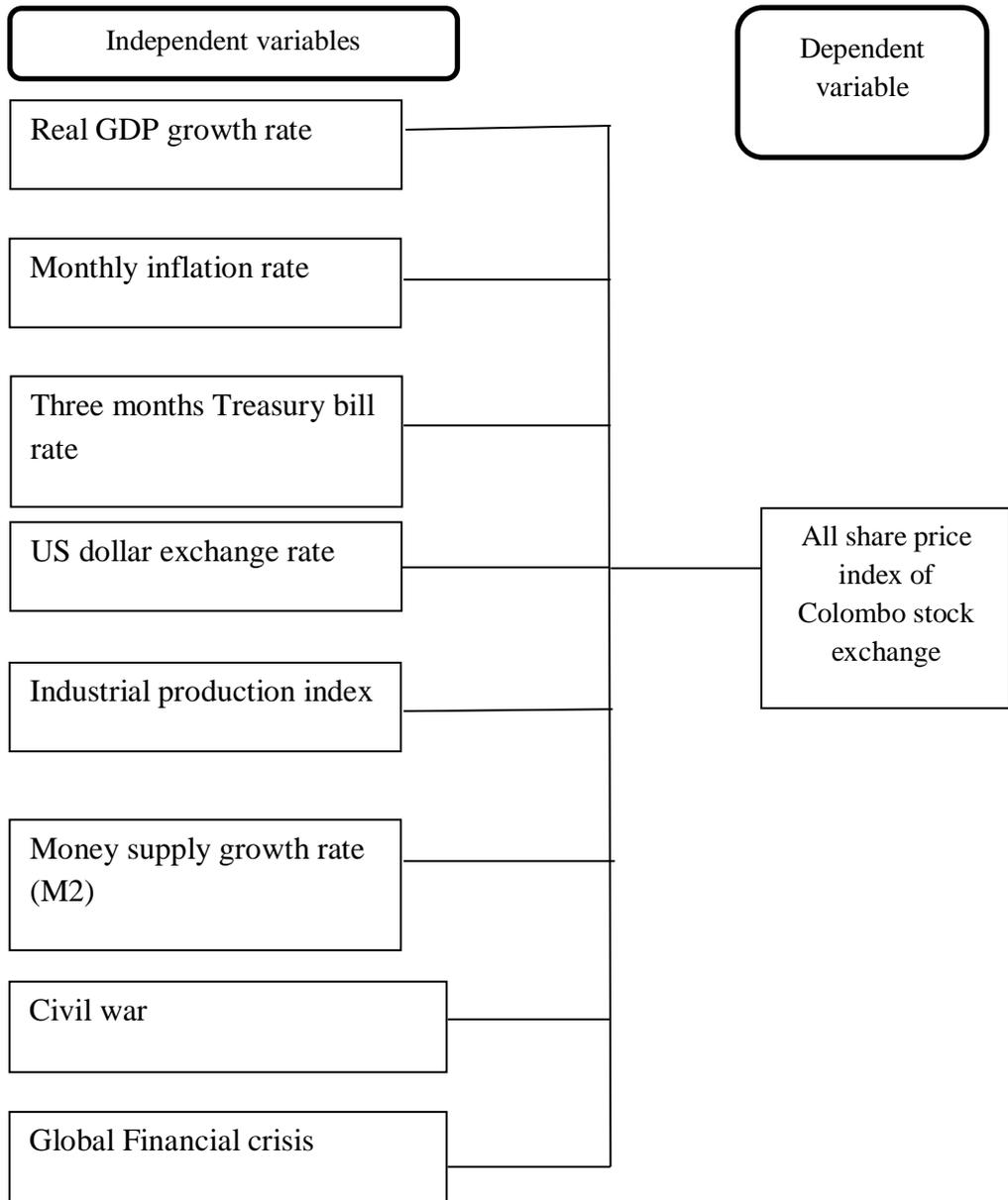
D₂ = 1 Period affected from global financial crisis

D₂ = 0 Period after the global financial crisis

3.5 Conceptual Framework

Figure 3 represents the graphical presentation of dependent and independent variables. The independent variables are in the left and the dependent variable is in the right.

Figure 3: **Conceptual Framework**



Source: Compiled by authors

4. Empirical Result

4.1 Descriptive Statistics

Table 2: Descriptive Statistics

Dependent Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness
ASPI	4922.04	5714.8	7798.0	1503.0	1943.28	-0.3426

Independent Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness
INF	0.0064	0.0056	0.0603	-0.0487	0.0135	0.1703
INT	0.1022	0.0871	0.213	0.0574	0.0388	1.0320
IPI	106.53	107.85	135.40	72.10	14.625	-0.133
GDPG	0.016	-0.003	0.09	-0.040	0.045	0.448
USD	120.07	114.34	148.90	100.30	13.38	0.470
M2	2226659	1957063	4823559	757307	1131043	0.547
MS	0.0137	0.0135	0.2287	-0.1540	0.0248	2.559

Source: Compiled based on Central Bank data, CBSL, 2006-2016

Table 3: Coefficient of Variation

ASPI	INF	INT	IPI	GDPG	USD	M2	MS
0.39	2.109	0.379	0.13	2.812	0.11	0.51	1.810

Source: Compiled based on Central Bank data, CBSL, 2006-2016

According to Table 2, the mean value of ASPI is 4922.04 within the period. The value seems favorable compared to the previous term in the perspective of investors. The maximum value was 7798, which appeared in 2011 while the minimum value is 1503 recorded in 2008. The low coefficient of variation means that it has less volatility compared to other variables.

The mean of the inflation rate is 0.6% per month. Dispersion of inflation is higher comparatively in other variables.

Three months treasury bill rate has fluctuated around the mean of 10.2% per month with positively skewed distribution. Highest value it has reached is 21.3% and the lowest was 5.7% within the study period. Comparatively lower dispersion has been reflected with a coefficient of variation 0.37.

Industrial production index has a mean value of 106.53 with a maximum value recorded as 135.4 in 2016 and the minimum value recorded as 72.1 in 2009. The pattern of the variables shows comparatively low standard deviation. This is the only variable which has a negative skewness.

Real GDP growth rate has a 1.6% of a mean per month. Maximum growth rate has been recorded as 9% per month while the lowest was recorded as a negative growth rate which is -4%. High standard deviation was seen in the variable comparatively others.

The mean value of broad money supply is around 2.2 trillion rupees. The maximum value was recorded in 2016 which surpassed 4 trillion stock of broad money supply while the lowest was 0.7 trillion. Moderate dispersion is to be observed from the pattern of variable and the coefficient of variation is 0.51. When analyzing the M2 growth rates over the period, it has been a high volatile factor with the mean value of 1.3% per month.

The US Dollar exchange rate has a mean value of 120.07 and the highest value recorded in 2016, which is 148. Throughout the study period USD has showed lower variation with a coefficient of variation is 0.11, which was the lowest among the variables.

4.2 Unit Root Test

Here, the stationarity aspect of individual variables to be tested using Augmented Dickey-Fuller test is viewed. Since time series data is used, testing stationarity of the data is crucial for the analysis because unless the results might get biased. The hypothesis for ADF is given below:

H0: Variable has Unit root problem / Series is non-stationary

H1: Variable has not contain Unit root problem / Series is stationary

Decision rule is null hypothesis rejected if p-value is less than significance level (α) which is 5%. Table 4 summarizes the results of unit root test at level.

Table 4: Unit Root test

Series	ASPI	INF	IPI	INT	USD	MS	GDPG
t-	-1.236	-	-0.873	-0.999	-0.066	-	-3.049*
statistic		10.985*				11.22*	
p-value	0.657	0.000	0.793	0.752	0.949	0.000	0.033

* Denotes rejection of the hypothesis at the 0.05 level.

Source: Compiled based on Central Bank data, CBSL, 2006-2016

The test for unit root in level shows inflation rate, money supply growth rate and real GDP growth rate is stationary at 5% significant level. Whereas all share price index, industrial production index, three months TB rate and US Dollar exchange rate contains unit root problem at level. Hence, unit root in 1st difference will be tested to make the variables stationary.

Table 5: Unit Root in 1st Difference

Series	ASPI	INT	IPI	USD
t-statistic	-10.07*	-11.087*	-3.403*	-7.565*
p-value	0.000	0.000	0.012	0.000

* Denotes rejection of the hypothesis at the 0.05 level.

Source: Compiled based on Central Bank data, CBSL, 2006-2016

Test for unit root in 1st difference shows that all share price index, three months TB rate, industrial production index and US Dollar exchange rate is stationary at 5% significant level.

4.3 Testing Assumptions

4.3.1 *Multicollinearity*

Table 6: Correlation Matrix

Variable	INF	INT	IPI	MS	GDPG	USD
INF	1.00	0.21	0.11	0.01	-0.19	-0.22
INT	0.21	1.00	-0.69	0.00	-0.04	-0.52
IPI	-0.11	-0.69	1.00	-0.10	1.00	0.07
MS	0.01	0.00	-0.10	1.00	0.07	-0.03
GDPG	-0.19	-0.04	0.10	0.07	1.00	0.02
USD	-0.22	-0.52	0.50	-0.03	0.02	1.00

Source: Compiled based on Central Bank data, CBSL, 2006-2016

According to Table 6, study concludes that there is no multi-collinearity problem within the explanatory variables.

4.3.2 Autocorrelation

Table 7: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.08845	Prob.F(2,101)	0.9151
Obs*R-squared	0.198453	Prob.Chi-Square(2)	0.9055

Note: P-value = 0.9055

Source: Compiled based on Central Bank data, CBSL, 2006-2016

According to the LM test output given in Table 7, the null hypothesis does not reject under 5% significant level. So, the study concludes that there is no autocorrelation existing among the variables under consideration.

4.3.3 Heteroscedasticity:

Table 8: White Test

F-statistic	0.666994	Prob.F(50,62)	0.9298
Obs*R-squared	39.52309	Prob.Chi-Square(50)	0.8562
Scaled explained SS	71.76518	Prob.Chi-Square(50)	0.0235

Note: P-value = 0.8562

Source: Compiled based on Central Bank data, CBSL, 2006-2016

According to the results of white test in Table 8, the null hypothesis does not reject under 5% significant level. Hence, it will be concluded that the model is homoscedastic or the variance of disturbances are constant.

4.4 Estimation of the Parameters of the Model

Multiple regression analysis was conducted to test the relationship between the all share price index and selected macroeconomic variables. This section discusses the goodness of fit of the derived model, overall significance of the fitted model and significance of model parameters. Regression output is given in Table 9.

In the model three months Treasury bill rate was taken with two months lag, money supply growth rate with three months lag and US dollar exchange rate with a 6 months lag.

Table 9: Regression Output

Variable	Coefficient	T-value	P-value
Intercept	-33.9939	-0.8700	0.3863
Inflation rate	3048.41	1.4400	0.1529
Interest rate	-760.5	-2.127	0.0358**

Table 9 Continued

Industrial production index	-9.6601	-3.4810	0.0007***
Exchange rate	48.500	2.5246	0.0131**
Money supply growth rate	-1089.46	-1.1748	0.2427
Real GDP growth rate	1509.001	2.7160	0.0004***
Civil war (D1)	-309.9194	-3.6391	0.0004***
Global financial crisis (D2)	290.438	3.5948	0.0005***

Notes: Dependent Variable: All share price index; *, **, *** denotes rejection of the hypothesis at 10%, 5% and 1%.

Source: Compiled based on Central Bank data, CBSL, 2006-2016

Table 10: Coefficient of Determination

Model R-squared	0.44
Adjusted R-squared	0.38
S.E. of regression	0.38
F-statistic	5.04
Prob (F-statistic)	0.000

Source: Compiled based on Central Bank data, CBSL, 2006-2016

4.5 Test: Goodness of Fit of the Model

Adjusted R-squared value of the developed model is 0.38. That means 38% of the variations in the dependent variables are explained by the independent variables. It can be concluded the studied model has average explanatory power.

4.6 Overall Significance of the Model

Overall significance of the tested model is examined through the Anova or F statistic. Null hypothesis stated that the overall model is insignificant while the alternative hypothesis stated that the overall model is significant.

According to the regression output p-value is less than alpha. So that it can be concluded that the model is overall significant.

4.7 Significance of the Model Parameters

Significance of the individual variables is tested by using T-test. Also, here, the null hypothesis stated that the variable under consideration is insignificant or there is no relationship between the independent variable and the dependent variable. Alternative hypothesis stated that there is a significant impact from the independent variable on share prices.

According to the regression output in Table 9, Monthly inflation rate shows insignificant effect on share prices of Sri Lanka. The p value was 0.1529 which is lower than the alpha value of 5%. So, the null hypothesis cannot be rejected in this situation.

Three months Treasury bill rate or interest rate that has been taken with a two-month lag stated that there is a significant negative relationship between interest rate and the share prices. According to the carried test, the null hypothesis is rejected under 5% significant level.

The test indicates that industrial production index (IPI) is having significant impact on share prices. According to the results, IPI shows a negative significant impact on share prices under 5% significant level.

The US dollar exchange rate was tested with six lags since exchange rate might have some lag effect towards share prices. According to the regression output in Table 9, exchange rate has a significant positive relationship on share price under 5% significance level.

Money supply growth rate with lag three seems to be having an insignificant impact on share prices. According to the findings, the p-value has been realized as 0.247 which is not significant under any of the significance level which has been considered.

In the test of Real GDP growth rate, it is concluded that the null hypothesis being rejected at 5% significance level. Therefore, it can be concluded that there is a positive relationship between share price and real GDP growth rate.

Two dummy variables which have been taken to incorporate the nature of the period in to the model seem to be having a significant impact on share prices of Sri Lanka. According to the findings in Table 9, dummy variable 1, civil war has a significant relationship with share prices. While it shows a negative significant relationship, the 2nd dummy variable, global finance crisis shows positive and a significant relationship with share price index of Sri Lanka.

According to the multiple regression analysis only six independent variables seem to be significantly affected toward all share price index of Sri Lanka. Among that three months treasury bill rate and US dollar exchange rate significant under 5% significant level. GDP growth rate and two other dummy variables, which represent civil war and the global financial crisis show higher relationship towards ASPI. These three variables are significant under 1% significance level. Monthly inflation rate, money supply growth rate and the intercept do not have relationship with ASPI.

$$\text{ASPI} = -760.65*\text{INT} - 9.66*\text{IPI} + 48.5*\text{USD} + 1509*\text{GDPG} - 309.91*\text{D1} + 290.43*\text{D2} \quad (1)$$

5. Conclusion and Recommendations

The objective of this study was to test whether there is any impact from macroeconomic variables on ASPI of Sri Lanka. Inflation rate, interest rate, exchange rate, money supply growth rate, industrial production index and real GDP growth rate were the macroeconomic variables that were selected to test whether there is any impact from these on all share price index. According to the carried OLS test, it shows that in Sri Lanka there is a macroeconomic impact towards share prices of Sri Lanka.

According to the results, interest rate and IPI show a negative impact towards the ASPI. This negative relationship between interest rate and ASPI was found in Menike (2006), Amarasinghe (2015) and Lakmali and Madhusanka (2015) related to the same context but the negative relationship between IPI and ASPI has not been explained through literature. Hunjra et al (2014) and Sohail and Hussain (2009) explained a positive relationship between IPI and share price indices in their studies. Moreover, the results show, the uncertainty which occurred as a result of the civil war has a negative impact towards ASPI.

According to the findings, USD exchange rate and real GDP growth rate affect positively on the ASPI. With reference to the relationship between USD exchange rate and ASPI, Morawakage (2013) found the same results in their studies related to Sri Lanka. But most Sri Lankan researches including Menike (2006), Lakmali and Madhusanka (2015) and Shafana (2014) examined a completely opposite result. Nijam et al (2015) and Sireesha (2013) affirmed the given results in testing the relationship between GDP and stock market indices.

One major aspect that was found through the study is that the global financial crisis which prevailed within the study period happens to be positively related with share prices in Sri Lanka which shows that even though there is a negative economic condition prevailing in external world specially in developed countries, a developing country can attract domestic and foreign investment towards capital market when there is a positive social and economic condition prevailing within the country. The effect from global financial crisis on ASPI has not been discussed in the literature with reference to Sri Lankan context. In Sri Lanka, ending the thirty years of war created a positive situation which results to attract more domestic as well as foreign investment towards CSE.

Moreover, the findings reveal that the inflation and money supply growth rate do not have a significant impact on the share prices of Sri Lanka. Menike (2006) revealed there is a significant impact from money supply growth rate and inflation on ASPI, but Wickramasinghe (2011), Lakmali and Madhusanka (2015) and Perera (2015) found the same insignificant relationship between inflation and share price index.

In this research, Sri Lanka has proven to have a significant impact from the major macroeconomic variables which are three months Treasury bill rate, industrial production index, US Dollar exchange rate and GDP growth rate.

The findings of the study imply that there is no significant relationship existing between inflation rate and share prices in Sri Lanka. On one hand, currently central bank of Sri Lanka shifted their insight towards an inflation targeting monetary policy, which aimed at achieving stable low-level inflation rate. But, according to the findings, there might not be any positive or negative impact on share prices from those inflation controls.

On the other hand, study found that US Dollar exchange rate has a positive impact on share prices. Currently in Sri Lanka the rupee shows a continuous depreciation against dollar which would create a favourable impact on all share price index. Policy makers who hope to enhance investments towards capital market should allow the exchange rate to be depreciated.

Three months Treasury bill rate has a negative impact towards share prices. When the rate of return on other financial assets increase related to stocks, investors would be more attracted towards financial assets like Treasury bills than investing on stocks. Time to time Central bank changes their policy interest rates. So that all share price index also exposed to those controls indirectly. In order to keep higher share prices which would attract investment, policy makers should keep the interest at a low level.

Time to time central bank of Sri Lanka is taking actions to control money supply in the economy to control price level. Previous Literature stated that asset price bubble and asset price bubble burst can happen related to stocks market when central bank changing their monetary policy. But according to the findings of the study the effects of money supply changes are neutral related with share prices

In addition, GDP growth rate has a positive impact on stock prices. In order to have an attractive share price index, the GDP growth rate of the country must have an increasing trend.

In a nut shell Sri Lankan policy makers who might concern on creating a well-developed and attractive capital market which can increase investment in the country, can incorporate the study findings to their policy decisions. To increase the share prices the interest rate needs to be kept in a low level and let the country's exchange rate to be depreciated. Further, policies should be focused to achieve higher GDP growth in future while making the country more peaceful.

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