

Relationship between Inflation and Stock Market Return: Special Reference to the Colombo Stock Exchange (CSE)

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Abstract

This study investigates the relationship between inflation and Stock market return in Sri Lankan stock market using monthly data including 120 monthly observations for the period of ten years starting from June 2005 to July 2015. The Colombo Consumer price was used as the proxy for the Inflation and All share price Index was used as the proxy for the Stock market return. Descriptive analysis, and regression analysis was employed to identify the relationship between the variables under bivariate and multivariate models. According to the bivariate regression analysis, it indicates that Inflation has a significant positive impact on stock market return in Sri Lanka while; Inflation has negative and significant impact on stock market return with the impact of control variables interest rate, exchange rate and money supply under multivariate regression analysis. Finally it concludes that inflation has a significant positive relationship with the Stock market return under bivariate analysis and when they incorporates with control variables it has a negative relationship with stock market return under multivariate analysis. The above results have implications for the domestic and international investors as well as the industries, policy makers, stock market regulators, investors and stock market analyst

Key words: Colombo Stock Exchange, Exchange rate, Inflation, Interest rate, Money Supply, Stock Market Return

Background

Stock market is the organized exchange where the shares of companies listed on stock exchange are traded. There is a tendency to think that the performance of the stock market is an indicator of the country's economic performance. Stock market movement depends on the rational as well as the irrational behavior of the investor. Some of the factors behind fluctuation in the demand and supply of stock prices could consist of market behavior, company rudiments and macro-economic variables. Investors consider macroeconomic variables when they value stocks. Inflation, Interest rate, exchange rate and money supply are very important among these macroeconomic variables which affect the performance of the emerging market like ours. Economists also believe that there is an effect through the macro economic variables towards the economy and to the stock markets.

Among all these macro-economic variables, inflation can be considered as the major variable which effect to the economy of a country as well as the stock market of a country like Sri

Lanka. Macro-economic factor like inflation, would also affect the over-all returns in the stock market. General rise in the prices of goods and services is the inflation, which has an impact on the whole economy either positively or negatively and is composed of different variables. It can hurt the country in a number of ways such as reducing the purchasing power of the domestic consumer. Unexpected increase or decrease in the inflation rate from its actual level disturbs the investor's expectations and increases the uncertainties about the expected stock returns. So it raises a question in the investor's mind regarding the nature and direction of the relationship between inflation and instability of stock exchange.

Besides that, over the past decades the interaction of the share market and the inflation has been a subject of interest among academicians and practitioners. Therefore numerous empirical studies conducted in developed markets providing substantial evidence in support of the argument that stock market return varies with the macro economic variables. Even though the researches have documented a great deal of evidence that fundamental economic activities in developed countries are strongly linked to stock market performance, it is unclear whether such a relationship exists for emerging stock markets in less developed countries. Since there are different conclusions on this issue, investigation on the result of the relationship between macroeconomic variables and stock market performance should be further enhanced. So, identifying the relationship among macroeconomic variables is very much important for the investors as well as for the companies which is a developing country like Sri Lanka.

Through this study, aims to explore the dynamic relationship between the Inflation based on Colombo Consumer Price Index (CCPI) as a measure of prevailing inflation decided by central bank of Sri Lanka and All Share Price Index (ASPI) as a measure of Stock market return using monthly time series data over the period of ten years starting from June 2006 to July 2015.

Problem Statement

Inflation and other macroeconomic variables seem to substantially affect the behavior of financial aggregates, such as stock markets. The literature gap regarding the relationship between inflation and stock market emphasize two significant sections. In theoretically, Fisher theory it reveals that there is a positive relationship between inflation and the stock market return while Proxy's hypothesis reveals that there is negative relationship between the two variables. Hence, there are conflicting opinions in theoretically, which should be investigated through the study. There are number of empirical evidences which are supporting the Fisher theory and proxy's hypothesis with the different arguments on the relationship between the inflation and stock market.

Some of studies found a significant negative long run relationship between inflation and stock market return (Ionnides, 2012; Hondroyannis, 2006; Irum, 2014) . However, there are some of studies have found a positive long run relationship between inflation and stock market return,(Douglason, 2011; Omotar, 2011; Ibrahim,2013; Tripathi,2014). Further, there are a numerous investigations that have been conducted on the relationship between macro-economic variables and stock market return including inflation variable as one of macro-economic variables, (Hussain et al.,2015; Kalyanaraman and Thuwaraj, 2013). These studies are based on the data of well-established stock markets as well as emerging stock markets. But in case of Sri Lanka, a few studies that have focuses on examining the impacts of impact of inflation on the stock market return under the frame work of macroeconomic variables concern (Menike, 2006; Wickramasinghe, 2011; Shafana, 2012) However, these studies do not specifically focuses on exploring the impact of inflation on Sri Lankan stock market.

Therefore, the research problem is whether there is a relationship between inflation and stock market return in Sri Lankan Economy.

Research Questions

Whether there is a relationship between inflation and the stock market return in CSE under bivariate analysis

Whether there is a relationship between inflation and stock market return in CSE under multivariate analysis?"

Research Question

"What is the relationship between Inflation and the Stock market return of Colombo Stock Exchange?"

Objective of the study

Main Objective:

To identify the relationship between Inflation and the Stock market return

The specific objectives of the study are:

- To investigate the relationship between inflation and stock market return under bivariate analysis
- To investigate the relationship between inflation and stock market return under multivariate analysis
- To investigate the relationship between interest rate, exchange rate and money supply and stock market return

Review of Literature

The linkage between stock market returns and inflation if any has drawn the attention of researchers and practitioners alike particularly since the twentieth century. There are many empirical studies focused on this.

Ionnides et al. (2004) were investigating the relationship between stock market returns and inflation rate for Greece over the period 1985 to 2000. This study attempted to investigate the three types of relationship whether firstly the stock market had been a safe place for investors in Greece. The study found that there is a negative relationship between the stock market returns and inflation.

Geetha et al. (2011) was finding the relationship between inflation and stock returns on the level of economy development of the three countries which are Malaysia, China and US. The secondary data used in this study consists of monthly time series data from January 2000 to November 2009. The study found long run relationship between inflation.

Ibrahim and Akbaje (2013) examined the long-run relationships and dynamic interactions between stock returns and inflation in Nigeria using monthly data of the All Share Price Index from the Nigerian Stock Exchange and Nigerian Consumers Price Index from 1997 to 2010. The analytical technique of Autoregressive Distributed Lag (ARDL) bound test was exploited. From the results, it is evident that there is the existence of a long run relationship between stock returns and inflation. The short run dynamic model also reveals that the speed of

convergence to equilibrium is moderate implying that there is a short run relationship between stock returns and inflation.

Kalyanaraman and Thuwaraj (2013) examined whether there exists a long run relationship among five macroeconomic variables, consumer price index, industrial output, money supply, exchange rate, oil prices along with the global stock prices proxy Standard and Poor 500 index and Saudi all share stock index. Time series analysis is applied using monthly data from January 1994 to June 2013. Application of Johansen Cointegration test finds the existence of a long run relationship among the chosen variables. All macroeconomic variables are found to impact stock prices. Standard and Poor 500 index does not affect Saudi stock prices.

Hussain et al. (2015) explored the relationship between stock returns volatility and macroeconomic variables in Pakistan. This study has used monthly observations covering the period from 2000 to 2011. Inflation, real exchange rate, Industrial sector output, real supply of money and oil prices were considered as the macro economic variables. First, Exponential Generalized Autoregressive Conditional Heteroskedasticity model is used to analyze the volatility in stock returns. Results from ARDL approach revealed that macroeconomic variables are responsible factors in explaining stock market volatility. Inflation, real exchange rate and oil prices are found encouraging factors of stock market volatility while Industrial sector output and real supply of money affects the volatility negatively.

There are also few number of studies in the Sri Lankan context based on the macro economic variables and the stock market. They are mainly focused on the macro economic variables like inflation, interest rate , exchange rate and money supply.

Menike (2006) has investigated the interaction between macroeconomic variables on share prices for a sample of 34 companies which was represented by eight sectors in Sri Lanka. The study has used monthly data for a period from September 1991 to December 2002 by employing multivariate regression analysis for eight macroeconomic variables for each individual stock. The result of the study indicated that majority of the companies report a high R^2 which justifies more explanatory power of macroeconomic variables in explaining stock prices. Findings stated that inflation rate, interest rate and Treasury bill rate are negatively related with the stock prices. The money supply was found to have a positive relationship with the share prices which have a direct impact on the monetary policies in which the changes in the money supply will have an impact on share prices.

Wickramasinghe (2011) examined the long run relationship between Sri Lankan capital markets (CSE) and six macroeconomic variables such as three-month fixed deposit rate, consumer price index, US stock market index narrow M_1 and GDP of Sri Lanka. They used the monthly data from January 1985 to December 2004 and with the help of unit root test, co integration, variance decomposition and error correction mechanism they found out that short term and long term relationship between stock prices and macroeconomic variables. Results of this study suggest that there is Bi-directional relationship exist between stock market index and fixed deposit rate stock prices and US Share price and GDP while remaining variables which are Consumer Price Index, M_1 and exchange rate casual bi-directional relationship exists. Results of variance decomposition suggest that GDP and M_1 play an important role in longer horizon to forecast variance in stock prices.

Shafana (2012) examined the degree and pattern of effect of macroeconomic variables on sectoral share price indices in Sri Lanka over the period from January 2008 to December 2012 from employing macroeconomic factor model for monthly data. The findings from multiple regression analysis reveal that exchange rate, treasury bill rate and inflation rate are common variables to explain the variability of all sectoral share prices for the period of 2008 to 2012 except of Telecom sector which has only R^2 less than 50%. The exchange rate and inflation rate have significant effect on all sectoral share prices in line with negative and positive respectively while treasury bill rate has significant negative weak influence on all sectors except of Information Technology and Telecom. Among the selected variables in this study, the exchange rate and inflation have greater importance on most of the sectors further among these two important variables, inflation rate has more powerful variable than exchange rate to explain the variability of share prices of most of the sectors.

According to the empirical evidences, the investigation on the relationship between inflation and stock market return have been focused in two ways; bivariate and multi-variable analysis. Thus, this study is to investigate how the stock market return responses to the changes in inflation rates under the bi-variable analysis and under multi variable analysis. Further, it is found from the literature, interest rate, money supply and exchange rates are the important variables which have influenced the stock prices,

Data and Methodology

The data which are used for the purpose of this research were collected from Secondary sources and the data are used for nearly 10 years starting from July 2006 to June 2015 which consists of total 120 monthly observations. The Colombo Consumer Price Index (CCPI) was used as the proxy for the Inflation; All Share price Index (ASPI) was used as the proxy for the stock market return in the study, there month treasury bill rate as the proxy for the interest rate, domestic currency units of Sri Lanka per unit of US dollar as the proxy for the exchange rate (ER) and broad money supply (M2) as the proxy for the money supply. Each data series were converted in to natural logarithm value. The use of natural logarithm, rather than levels and percentage changes, mitigates correlations among the variables. The data regarding the study was sourced from central bank reports of Sri Lanka. The descriptive analysis was used to identify the basic characteristics of the data. The data is analyzed by using bivariate and multivariate regression analyses.

The regression models of the study are denoted as bivariate model and multivariate model as in the Model 01 and Model 02:

Model 01

$$ASPI = \alpha + \beta_1 (CCPI) + e$$

Model 02

$$ASPI = \alpha + \beta_1 (CCPI) + \beta_2 (TBR) + \beta_3 (ER) + \beta_4 (M_2) + e$$

Where, α is Intercept; $\beta_1, \beta_2, \beta_3, \beta_4$ are Coefficients of CCPI, TBR, ER and M_2 respectively; e is error term; ASPI is Stock market return; CCPI is Colombo Consumer Price Index; TBR is Three month Treasury bill rate; ER is Exchange Rate; and M_2 is Broad Money Supply.

Table 1 Summary of Descriptive statics of Variables

	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
LnASPI	7.315	8.962	8.281	0.497	-0.193	-1.574
LnCCPI	4.081	4.871	4.576	0.241	-0.657	-0.737
LnTBR	5.740	21.300	10.547	3.963	0.904	-0.345
LnER	4.608	4.897	4.755	0.089	0.273	-1.328
LnM ₂	13.527	15.118	14.349	0.471	0.018	-1.276

Empirical Results

Table 1 shows summary of descriptive statics of each variable related with the study. According to the descriptive statics, a higher standard deviation is represented in Treasury bill rate. The skewness of ASPI and CCPI are negative which shows that the distribution is not normal and they consists of a long right tail and TBR, ER and M₂ shows that the distribution has a long left tail which consists of positive values. The kurtosis of the all variables is negative which implies that the distribution is platykurtic which means that the distribution is too flat. Regression analysis is a statistical tool that can be used to investigate the relationship between variables. Simple regression analysis is employed by the researcher to identify the bivariate and multivariate impact of Inflation with the other control variables on Stock Market Return. Table 2 represents the model summary of under bivariate analysis employed on the Equation 01. Coefficient of determination is 0.64 with reporting as 0.299 of standard error of estimate. This means that 64% of variation in ASPI is explained by inflation. Standard error of estimate represents the average distance that the observed values fall from the regression line. According to the regression model developed by the researcher, it is wrongly used 30% of response variables.

Table 2 Model Summary of of Model 01

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1.000	0.800	0.640	0.637	0.299

Table 3 presents the regression results employed on the equation 01. According to the table, constant value is 0.725 with insignificant p value. The coefficient of CCPI is positive with value of 1.651 and it is significant at the 5% significant level. The results explain that ASPI will increase by 165 % when 100% increase in CCPI. According to the model it shows that there is a significant positive relationship between CCPI and ASPI in the long run.

Table 3: Regression Coefficients of Model 01

Model 1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
α	.725	.522		1.388	.168
CCPI	1.651	.114	.800	14.484	.000*

*significant at 1% level

The study next investigate the relationship between inflation and stock market return incorporating three important macro-economic variables such as interest rate, exchange rate, and money supply. The regression Model 02 is employed to investigate the relationship between stock market return and independent variables. Table 4 present the model summary of equation 02. According to the table,

Table 4: Model Summary of Model 02

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	0.936 ^a	0.876	0.872	0.178

The adjusted R square is 0.872 and this reveals that 87% of variation in ASPI is explained by the all the independent variables in the model. Standard error of estimate represents the average distance that the observed values fall from the regression line which is 0.178. Further, in order to find the long run relationship between stock market return and independent variables the regression coefficients of the variables are used. Table 5 shows the regression coefficient of each independent variable. Coefficient of constant is 2.916 and it is significant at the 5% level.

Table 5: Regression Results of Model 02

Model 1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
α	2.916	1.270		2.296	.023**
CCPI	-0.820	.288	-.397	-2.848	.005*
TBR	-0.017	.007	-.139	-2.648	.009*
ER	-3.724	.545	-.669	-6.830	.000*
M_2	1.882	.223	1.781	8.446	.000*

*, ** significant at the 1% and 5% significant levels respectively.

The coefficient of CCPI is reported as negative sign with the value of -0.820. The p value is less than 1% significant level. Hence, the results explain that 1% increase in CCPI will result to reduce 0.82% in ASPI. According to the results, there is a negative relationship between inflation and stock market return. The result is conflict with the finding of the model under bivariate analysis which is reported as the positive relationship between inflation and stock market return. Further, the coefficients of other independent variable of TBR and ER are negative and significant at 1% significant level. Thus, the interest rate and exchange rate have negative relationship with stock market return. On the other hand, the coefficient of M_2 is positive and significant at the 1% level and the result says that the increasing money supply has positive relationship with stock market return.

According to the results of bivariate and multivariate analysis, the bivariate model summary indicates that the CCPI impacts on ASPI by 64%. But when we combine the CCPI with the control variables the impact on ASPI is 87.2%. The 23.2% is the impact of control variables on ASPI and the rest 12.8% portion could be the impact of other variables such as GDP, unemployment, etc. When considering the coefficient tables, under bivariate model the Beta represents a value of 1.651 which implies that there is a positive relationship between two variables and when CCPI increased by 1% the ASPI will be increased by 165.1%. Under

multivariate model Beta value of CCPI is -0.820 which means that there is a negative relationship between CCPI and ASPI and when CCPI increased by 1% the ASPI will be decreased by 82%. When CCPI is considered individually as well as with the cooperation with the control variables, the impact on ASPI changes from a positive, relationship to a negative relationship.

Conclusion

This study investigated the relationship between inflation and stock market return in Sri Lanka using 10 years monthly data of 120 monthly observations for the period from June 2005 to July 2015. Descriptive analysis and bivariate and multivariate regression models were used to investigate the relationship between inflation and stock market returns. According to the correlation results CCPI, ER and M_2 consist of a positive correlation with ASPI while TBR has a positive correlation with ASPI. The bivariate multiple regression results show that there is a positive relationship between CCPI and ASPI supporting the findings of Ibrahim (2013); Omotar (2011); Tripathi (2014). According to the results of multivariate regression analysis the inflation and stock market return has a negative relationship supporting the findings of Liu et al. (2008); Haroon et al. (2013); Manike (2006). Further it is identified that the relationship between TBR and ER is negative with ASPI and there is a positive relationship between M_2 and ASPI.

References

- Afzal, & Hossain. (2011). An empirical Analysis of the Macro economic variables and Stock prices in Bangladesh. *Bangladesh Development Studies*, 95-105.
- Albulescu, C. T., Aubin, C., & Goyeau, D. (2015). Stock prices, inflation and inflation uncertainty in the US.
- Allahawiah, S., & Amro, S. A. (2012). Factors affecting Stock market Prices in Amman Stock Exchange. *European Journal of Business and Management*, pp.236-246.
- Al-Zararee, A. N., & Ananzeh, I. N. (2014). Relationship between Macroeconomic Variables and Stock Market Return. *International Journal of Business and Social Science*, pp.186-194.
- Chen, N. F., Roll, R., & Ross, S. (2012). Economic Forces and the Stock Market. *The Journal of Business*, pp.383-403.
- Fama, E. (1981). Stock returns, expeted returns and real activity, inflation and money. *American Economic Review*, pp.545-565.
- Geetha, C., Mohidin, R., Chandran, V. V., & Chong, V. (2011). The relationship between Inflation and Stock marker return evidence from malaysia , united States and China. *International Journal of Economics and Management Sciences*, pp.1.-16.
- Haroon M, & Jabeen H. (2013). Impact of Macro Variables on Share Prices. *Pakistan Journal of Commerce and Social Sciences*, pp.493-504.
- Hondroianis, G., & Papapetrou, E. (2006). Stock returns and inflation in Greece. *Review of Financila Economics*, pp.76-94.
- Hussain, M., Zaman, B. u., & Ahmad, N. (2015). Relationship between Stock Market Volatility and Macro Economic Variables. *Pakistan Business Review*, pp.723-743.
- Ibrahim, T. M., & Agbaje, O. (2013). *European Scientific Journal*, pp.146-157.
- Ioannides, D., Katrakilidis, C., & Lake, A. (2004). The relationship between Stock market returns and Inflation evidence using Greek data. *Under Publication*.

- Kalyanaraman, L., & Tuwaraj, B. A. (2013). Macroeconomic Forces and Stock Prices. *International Journal of Finance Research*, pp.81-92.
- Liu, M. H., & Shrestha, K. (2008). Analysis of the Long term Relationship between Macroeconomic variable and the Chinese stock market. *Managerial Finance*, pp.744-755.
- Menike, L. (2006). The Effect of Macroeconomic Variables on Stock Prices in Emerging Sri Lankan Stock Market. *Sabaragamuwa University Journal*, Volume 6, pp 50-67.
- Menike, L., Dunusinghe, P., & Ranasinghe, A. (2015). Macroeconomic and Firm Specific Determinants of Stock Returns: A comparative analysis of Stock Market in Sri Lanka and in United Kingdom. *Journal of Finance and Accounting*, pp.86-96.
- Mgammal, M. H. (2012). The Effect of inflation, Interest Rates and Exchange rates on Stock Prices. *International Journal of Finance and Accounting*, pp.179-189.
- Mohmood, I., Nazir, F., & Junid, M. (2014). Stock prices and inflation. *Journal of Asian Business Strategy*, pp.217-223.
- Omotar, D. (2011). Relationship between Inflation and Stock Market Returns Evidence from Nigeria. *Journal of Applied Statistics*, pp.1-14.
- Pal, K., & Mittal, R. (2011). Impact of Macroeconomic Variables on Sectoral Indian Capital Markets. *Journal of Risk Finance*, pp.84-97.
- Patel, S. (2012). The effect of Macroeconomic Determinants. *NMIMS Management Review*, pp.117-127.
- Perera, P. (2015). Macroeconomic variable effect on All Share Price Index in Colombo stock exchange Sri Lanka. *International Journal of Scientific and Engineering Research*, Volume 6 ,pp 2229-2258.
- Central Bank Reports (2005,2006,2007,2008,2009,2010,2011,2012,2013,2014,2015). Central bank of Sri Lanka.
- Saleem, F., Safar, L., & Rafique, B. (2013). Long run relationship between inflation and Stock Return Evidence from Pakistan. *Part- II :Social Sciences and humanities*, pp.407-415.
- Shafana, M. (2012). Macroeconomic Variables effect on Financial Sector Performance in Emerging Sri Lankan Stock Market. *International Journal of Science and Research*, pp.227-231.
- Tripathi, V., & Kumar, A. (2014). Relationship between Inflation and Stock Returns evidence from BRICS markets. *International Journal of Accounting and finance reporting*, pp.647-658.
- Wang, X. (2011). The relationship between stock market volatility and Macroeconomic Volatility. Evidence from China. *Journal of Chinese economics and finance*.
- Wickremasinghe, G. (2011). Macroeconomic forces and stock prices: Some empirical evidence from emerging stock market. *Accountancy and Finance Working Paper*, pp.6-14.