How do Stock Markets Respond to Political Upheavals? A Study on Sri Lanka

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ABSTRACT

This study empirically examines the response of the stock market in Sri Lanka to the political upheavals occurring from public agitations since the end of March 2022. Daily closing data of the Colombo stock exchange, Sri Lanka including 211 sample observations from January 3, 2022, to December 1, 2022, were collected and a dummy variable, 'political upheavals' is also created where January 3, 2022, to March 30, 2022, represents the pre-political upheaval period, March 31, 2022, to July 22, 2022, represents the political upheaval period, and July 25, 2022, to December 1, 2022, represents the post-political upheaval period. The Phillips–Perron unit root test confirms that the dataset is free from the unit root. The Hodrick-Prescott filter provides the actual, trend, and cyclical components graphically. The Canonical Co-Integrating Regression model indicates that there remains a long-run association between CSE and the dummy variable, 'political upheavals'.

Keywords: Stock Market, Political Upheavals, Hodrick-Prescott Filter, Canonical Co-Integrating Regression, Sri Lanka

JEL Code: B23, C22, D53.

A. Introduction

The island country Sri Lanka has been undergoing a financial crisis since the time of its independence. Factors like scarcity of basic needs including food, fuel, medicines, and many more, cuts in electricity supplies, and inflationary pressures led to agitation among the citizens since the end of March 2022. This induced the President of the nation to flee away from the country following his submission of resignation on July 14, 2022 (Goreau-Ponceaud&Madavan, 2022). This political instability was directed to an escalation in foreign debts, a reduction in foreign exchange reserves, a devaluation of home currency, and an inflationary situation. The existence of the COVID-19 pandemic also catered to the ongoing political upheavals having the root in the contention that occurred three years back. In 2019, the government promised to announce a reduction in taxation which they fulfilled. The total number of taxpayers declined by 33.5 per cent and VAT was reduced to 8 per cent. Moreover, corporate tax was reduced to

24 per cent. This resulted in a decline in government revenues and mounting budgetary deficits. Moreover, the credit rating agencies degraded the sovereign credit ratings that directed to a lesser application of debt. Sri Lanka could gain lesser access to the worldwide markets. Furthermore, the government did not follow the advice of the International Monetary Fund (IMF) and continued printing currency notes that shrunken the economy. 19.08 billion rupees in April 2022, was printed which marked the maximum of the year.

The capital market is a significant factor that explains economic growth. Political incidents are one of the decisive elements impelling the performance of a nation's stock market as extensively claimed by numerous studies. It has a negative effect on the assurance of both domestic as well as overseas investors as the volatility of the stock market increases which directs the uncertainty of the investment's anticipated cash flows (Kongprajya, 2010). The Colombo stock exchange (CSE) plays a pivotal role in explaining the economic development of Sri Lanka. This provides the author with the opportunity to make an in-depth analysis of how the stock market of Sri Lanka responds to political upheavals empirically.

B. Literature Review

Though there is a dearth of existing studies pertaining to the area, an extensive number of studies from both national and international perspectives are minutely examined to arrive at the research gaps. The interesting conclusions of those studies are summarized below.

Mosley and Rosendorff (2023) witnessed years of low-interest rates after the global financial crisis of 2008 that gave many developing countries a rare chance to borrow on the international markets, whether by issuing bonds in their own currencies, obtaining credits from private-sector banks and commodity dealers, or borrowing from China, which established itself as the primary official creditor. During this time, the total external debt of developing nations reached a record high. Many of these nations are at risk of default as central banks substantially boost interest rates to combat a global surge in inflation. It is challenging to manage restructuring due to the synthesis of public and private creditors and the opaque nature of many loan arrangements. Domestic politics may be the deciding factor. George et al. (2022) analyzed the economic crisis in Sri Lanka coupled with elevated inflation and random protests throughout the nation. They concluded that the government should adopt steps for the economic reclamation of the entire nation once the dearth of certain fundamental commodities approaches the termination. Likewise, the study by Subhash, B. (2022) made an analysis of the turmoil in Sri Lanka where he states that the long crisis period unravelled at the commencement of 2022 has highly created an

impact on the citizens concentrating on the causes of the unfortunate situation, such as poor management by previous administrations and poorly timed economic and trade policies, especially the consequences from China's investment.

On the basis of the existing studies, it needs to be cited that practically studies discussing the effects of political upheavals on the stock market of Sri Lanka are hard to find although there are very few studies discussing the political uncertainties in Sri Lanka in the recent times theoretically. Moreover, several empirical works have inspected the consequence of political risks either on some industries or the country's stock market nevertheless much of those works concentrated on the political issues in developed countries, and fewer studies are conceded in the context of emerging or developing countries or in Sri Lankan context. These can be noted as the loopholes in the existing studies that provide a scope for future discussions.

The existing research gaps make the author recognize the objectives of the study which include studying the stock market of Sri Lanka in the context of their response to the recent political upheavals. Moreover, the actual, trend, and cyclical components are also studied by using a graphical representation.

C. Research Methodology

This study is based on daily closing data of the Colombo stock exchange (CSE), Sri Lanka from January 3, 2022, to December 1, 2022. Moreover, a dummy variable, 'political upheavals' is created where January 3, 2022, to March 30, 2022, represents the pre-political upheaval period denoted by '0', March 31, 2022, to July 22, 2022, represents the political upheaval period denoted by '1', and July 25, 2022, to December 1, 2022, represents the post-political upheaval period denoted by '0' (https://thewire.in/south-asia/sri-lanka-protests-timeline). All the stock market data are transformed into equivalent log natural returns to exclude the integral disadvantages connected with time series data. The author is very cautious in using daily data as it is capable to identify the different patterns of the days of the week. Moreover, due to the pay schedule, the days of the month can also be determined. Long weekends starting from a Friday that continues up to a Monday, and Mondays that come after the Friday holidays can all be considered significant. Furthermore, it should also be noted that weekly data cannot deal with holidays and their lead and lag associations (https://www.autobox.com/cms/index.php/blog/entry/advantages-and-disadvantages-of-using-monthly-weekly-and-daily-data). The total number of observations is finalized at 211. The CSE data is collected from the database of investing.com. Econometric tools like the Phillips-Perron unit root test, descriptive statistics, Hodrick-Prescott (HP) filter, and Canonical Co-Integrating

Regression test are applied to address the objectives of the study. Moreover, E-Views 8 statistical package is used for computational purposes.

The Phillips–Perron (PP) Unit Root Test

When testing for a unit root, Phillips and Perron (1988) suggest an alternate (non-parametric) technique of controlling for serial correlation. In order to prevent serial correlation from affecting the asymptotic distribution of the test statistic, the PP approach calculates the non-augmented DF test equation and alters the coefficient's -ratio. The following statistic is the foundation of the PP test:

$$\tilde{t}_\alpha = t_\alpha \left(\frac{\gamma_0}{f_0}\right)^{1/2} - \frac{T(f_0 - \gamma_0)(se(\hat{\alpha}))}{2f_0^{1/2}s} \quad \ldots(1)$$

Where, $\hat{\alpha}$ is the estimate, and t_α the -ratio of α, $se(\hat{\alpha})$ is the coefficient standard error and s is the standard error of the test regression. In addition, γ_0 is a consistent estimate of the error variance calculated as $(T - k) s^2/T$, where k is the number of repressors. The remaining term, f_0, is an estimator of the residual band at frequency zero.

Canonical Co-Integrating Regression (CCR)

Park (1992) propounded a new process for statistical interpretation in co-integrating regressions in the name of canonical co-integrating regressions designed using transformed data. He explains that shifts in CCR nearly eradicate the similarity fashioned by the long-term correlation of combined integration equation inaccuracies and arbitrary slopes. It also leads to rectifications within the rounded bias occurring from the correlation between regression and random regression errors. Hence it can be stated that CCR-based assessments are consequently fairly operational and have a similar neutrality as Full Modified Ordinary Least Square (FMOLS). The bias of second degree in terms of OLS is removed along with a check in the predicted and explanatory variables. The statistical philosophy of the CCR technique is pretty related to that of the technique designed autonomously by Phillips and Hansen (1990). The two approaches, however, were developed for distinct reasons. While the former chooses a canonical regression from a group of models that all describe the same co-integrating relationship, the latter actively adjust variables and estimates to get rid of any unwanted nuisance factors that may still persist. Operationally, the CCR approach is focused on data transformations, whereas Phillips and Hansen utilize both data and estimate transformations. The small squares method has the following model:

$$y_t = \beta_0 + \beta_1 x_t + \varepsilon_t = \vartheta z_t + \varepsilon_t \quad .....(2)$$
$$\Delta x_t = u_t$$

Where, t = 1, ..., T

$z_t = (1, x_t)$

$\vartheta = (\beta_0, \beta_1)$

n*1 - time series of dimensions X_t, Y_t

$$v_t = [\varepsilon_t, u_t] .....(3)$$

Long-term variation of v_t is:

$$\Omega = \sum{}_v + \Pi + \Pi^{'} \quad .....(4)$$

Ω: Contrast Matrix and Common Variation

$$\Lambda = \Sigma_t + \Pi$$

$$\Sigma_v = \lim t - \infty T^{-1} \sum_{t=1}^{T} E(v_t v_t^{'})$$

$$\Pi = \lim t - \infty T^{-1} \sum_{j=1}^{T-1} \sum_{t=1}^{T-1} E(v_t v_{t+1}^{'})$$

splitting the matrices together with v_t and the agents:

$$\Omega = \begin{pmatrix} W_{11} & W_{12} \\ W_{21} & \Omega_{22} \end{pmatrix} .....(5)$$

$$\Lambda = \begin{pmatrix} \lambda_{11} & \lambda_{12} \\ \lambda_{21} & \Lambda_{22} \end{pmatrix} = \begin{pmatrix} \lambda_1 \\ \Lambda_2 \end{pmatrix} ....(6)$$

To define CCR, Y_t, X_t should be modified as:

$$Y_t^* = Y_t - (\hat{\beta}^{'} \hat{\Lambda}_2 \hat{\Sigma}_v^{-1} + [0, \hat{w}_{12} \hat{\Omega}_{22}^{-1}]) \overline{D_t}$$

$$z z_t^* = (1, x_t^*)$$

$$X_t^* = X_t - \hat{\Lambda}_2 \hat{\Sigma}_v^{-1} \overline{D_t}$$

The CCR regression technique is assessed as follows:

$$\hat{\theta}_{ccr} = (\Sigma_{t=1}^{T} Z_t^* Z_t^{*'})^{-1} (\Sigma_{t=1}^{T} Z_t^* Y_t^*) .....(7)$$

The above equation (7) can be written in the logarithmic distribution form as:

$$D(\vartheta_{ccr} - \vartheta) \rightarrow \left(\int_0^1 w_{2(r)} w_{2(r)}^{'} \, d_r \right)^{-1} \int_0^1 w_{2(r)} dw_{1.2(r)}$$
$$.....(8)$$

$$w_{1.2} = w_{11} \Omega_{22}^{-1} w_{21} \quad .....(9) \text{ (Mohamed, 2021)}$$

D. Empirical Results and Discussions

Descriptive Statistics

	Colombo Stock Exchange	Political Upheavals
Mean	0.9984	0.3066
Median	0.9987	0
Maximum	1.0681	1
Minimum	0.9190	0
Std. Dev.	0.0210	0.4621
Skewness	-0.1759	0.8388
Kurtosis	4.7325	1.7037
Jarque-Bera	27.4790	39.7077
Probability	0.0000*	0.0000*
Sum	210.6751	65
Sum Sq. Dev.	0.0931	45.0707
Observations	211	211

(* indicates significance at 1 per cent level)

The above table outlays the results of the descriptive statistics of the select variables namely Colombo Stock Exchange (CSE) and the dummy variable, Political Upheavals. The Colombo Stock Exchange (CSE) rises to its highest 1.0681 and decreases to 0.9190 lowest during the study period. It has a mean value of 0.9984. Likewise, Political Upheavals increase to the highest 1 and decrease to the lowest 0 with a mean value of 0.3066. While studying the characteristics of both variables, it is observed that the variables have moderately skewed data due to the values ranging between 0.5 and 1 and -0.5 and -1 (https://www.simplilearn.com/tutorials/statistics-tutorial/skewness-and-kurtosis). The data of the Colombo Stock Exchange (CSE) bears a positive kurtosis whereas Political Upheavals are within the tolerable range. With 211 sample

observations, the p-value of the Jarque-Bera test suggests that the data is not normal and hence does not have a symmetric distribution.

The Phillips–Perron (PP) Unit Root Test

Variables	At Level (Trend and Intercept)		At Level (Trend and Intercept)	
	t-statistics	p-value	t-statistics	p-value
Colombo Stock Exchange	-10.4772	0.00*	-78.3199	0.00*
Political Upheavals	-1.7037	0.7464	-14.3927	0.00*

(* indicates significance at 1 per cent level)

The above table provides the results of the Phillips–Perron (PP) unit root test where it is noted that the Colombo Stock Exchange is significant at both levels and the first difference at the 1 per cent level with a 99 per cent confidence interval. Hence, it can be stated that the data of the Colombo Stock Exchange is free from a random walk. The dummy variable Political Upheavals is insignificant at level but significant at the first difference at 1 per cent level with a 99 per cent confidence interval. Hence, it can be stated that the data ofPolitical Upheavals is free from a random walk.

The Hodrick-Prescott (HP) Filter

The application of the Hodrick-Prescott (HP) filter is a debatable topic as some of the literature namely Canova (1994, 1997); Cogley and Nason (1995); Harvey and Jaeger (1993); Easterly et al. (1992), and Soderlind (1994) have criticized due to the different limitations of the tool. They are of the view that erratic cycles may be produced if the data is difference stationary, the filter may cause the majority of the cycles in the synthetic data, and it is only in some circumstances optimum (in the sense of reducing the mean square error), and it may result in severe characteristics of second order in the de-trended data (https://pure.uvt.nl/ws/portalfiles/portal/526973/50.pdf). Despite such controversies, the Hodrick-Prescott filter has been the favourite empirical procedure among researchers. This model is capable of eliminating the variation in short-term time series. Moreover, it inclines to best results in circumstances where the error term is distributed normally.

Considering the original series (y_t) is composed of a trend component (τ_t) and a cyclical component (c_t), the equation can be framed as:

$$y_t = \tau_t + c_t \, , \ t = 1, 2, \cdots, T \quad .....(9)$$

Hodrick and Prescott (1997) suggest a way to isolate c_t from y_t by following the minimization problem.

$$Min_{\{\tau_t\}_{t=1}^T} \left[\sum_{t=1}^{T}(y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1}(\nabla^2 \tau_{t+1})^2 \right] \quad .....(10)$$

Where, λ is the penalty parameter. The first term in the loss function, (10) reprimands the variance of c_t, whereas the second term places a recommended penalty to the lack of smoothness in τ_t.

However, in this section an attempt has been made to study the actual, trend and cyclical components by using graphical representation of the said filter.
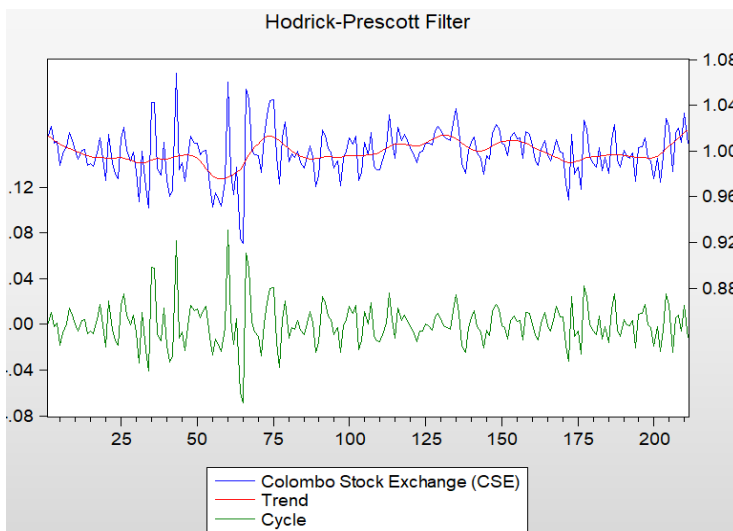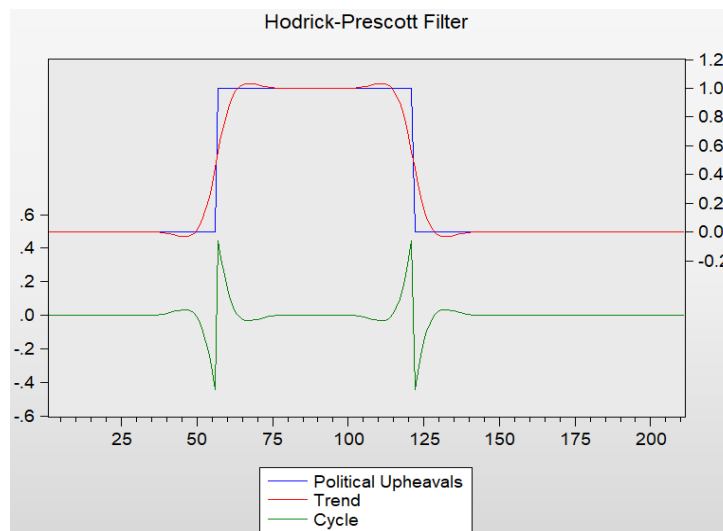
Canonical Co-Integrating Regression (CCR)

Variable	Coefficient	Std. Error	t-Statistic	p-value
Political Upheavals	-2335.01	470.5085	-4.9627	0.00*
C	10040.9	261.4138	38.4099	0.00*
R-squared	0.3311		Mean dependent variable	0.9983
Adjusted R-squared	0.3279		S.D. dependent variable	1784.82
S.E. of regression	0.0210		Sum squared residuals	0.0918
Durbin-Watson stat	1.4324		Long-run variance	0.0004

(* indicates significance at 1 per cent level)

The above table represents the results of the Canonical Co-Integrating Regression (CCR) model where c represents the value of the fixed limit with a positive signal of 10040.9 points, representing the value of the dependent variable (Colombo Stock Exchange) daily when the independent variable in the model is zero. This result shows the impact of the variables left out of the model as well as the fact that the Colombo Stock Exchange is affected by a variety of factors, both quantitatively and qualitatively, and that these broad factors combine to produce the performance of the Colombo Stock Exchange. The coefficient of c is positive indicating the existence of high influence. The independent variable, Political Upheavals bears a high negative coefficient indicating a negative long-term relationship with the dependent variable, Colombo Stock Exchange. Both c and Political Upheavals portray a significant p-value of 1 per cent at a 99 per cent confidence interval.

This enables us to understand that any political disruption is certainly disturb the stock market of the concerned nation (Sri Lanka). Moreover, there is a negative rapid market response to political events and connected broadcasts on any event

day. By confirming that the Colombo stock market negatively reacts to political upheavals which is consistent with the findings from many studies, the spread of such political disturbances and its information in the market leads to a pessimistic effect on the investor's sentiments which downturns the performance of the market.

A Durbin-Watson statistic of 1.4324 is noted for the model indicating a positive autocorrelation. The R square of 0.3311 indicates that the independent variable political upheavals can explain 33.11 per cent of the dependent variable CSE. Moreover, the adjusted R square value is 0.3279 indicating that any inclusion of an exogenous variable within the model can change the predicting power of the model. The long-run variance of the model is 0.0004, which explains the measure of the standard error of the sample mean when there is serial dependence.

E. Significance of the Study

The sudden economic crisis in Sri Lanka prompted the citizens to move for a demonstration throughout the nation which was coupled with high inflation, power cuts, and a shortage of fuel. The nationwide protest led to political disturbances within the country having some further issues affecting the stock market. Moreover, political occurrences disturb the lucks of the companies, and consequently influence investor emotion concerning those businesses' stocks (https://arqwealth.com/how-is-the-stock-market-impacted-by-politics/).Hence, politicscan exercise some impact on that business viewpoint. Furthermore, political uncertainties are to affect the performance of any stock market as they are viewed as a risk factor. They may trade slanted if there is ambiguity. Hence, all these factors turn out to be a prime reason that allows conducting this study to introspect the response of the stock market from Sri Lanka due to political upheavals.

F. Concluding Annotations

On the basis of the above findings, it can be concluded that there persists a long-run negative relationship between political upheavals and the Colombo stock exchange (CSE) which is also in line with similar studies. This induces us to apprehend that political threat broadcast should be one of the dynamics to be considered when developing a stock market volatility study. It is also sufficient to determine the direction of the movements of the stock markets. However, this opens up a new dimension of further study where asymmetric returns from stock markets due to political shocks can be undertaken. Moreover, the actual, trend, and cyclical components are also captured.

This scenario provides Sri Lanka with the opportunity to implement economic reforms that was much needed since its independence. Opting to provide subsidies to restructure state-owned enterprises is a much-needed call during these trying times. This situation is the result of years of budgetary deficits, current account deficits, an overburdened public sector, declining tax collection, and subsidized pricing that led to public oppression followed by political turmoil. The lifting of an embargo on chemical fertilizers should be declared to escalate agricultural output. Furthermore, to pay its debts and recover from this crisis stronger, Sri Lanka needs extensive economic changes for long-term sustainable prosperity. In order to maintain macroeconomic stability and public trust in the local currency, a steady monetary policy is essential. An independent Central Bank is crucial, as demonstrated by the current economic crisis Sri Lanka is experiencing. Fiscal consolidation can only be seriously considered by the Treasury if an independent central bank has the power to forbid money from being printed. It may be possible for Central Bank committees to make long-term policy choices on interest rates and reserve requirements without influence from politics by adding more well-respected experts to them and giving them a set duration. For revenue-based fiscal consolidation, another requirement for economic sustainability, tax reforms are crucial. The government should establish a method to effectively collect taxes and expand the tax base rather than just raising taxes.

In the context of revenue-based fiscal consolidation, another requirement for economic sustainability, tax reforms are crucial. The government should establish a method to effectively collect taxes and expand the tax base rather than just raising taxes. The manufacturing industry in Sri Lanka must follow the current global trend and join global supply chains. Finding specialized value additions, it can implement in the supply chains of multinational corporations is a successful method that developing nations like Vietnam have used to improve their exports. Sri Lanka requires trade liberalization, export-focused FDI, more FTAs, and greater trade facilitation in order to integrate with global supply chains (https://thediplomat.com/2022/08/how-sri-lanka-can-overcome-its-economic-crisis/). All these can be a way out from such political upheavals for the stock markets to revive.

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Conflict of Interests

The author declares that there is no conflict of interest that are directly or indirectly related to this research work.

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