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Aims and Scope

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Asymmetric Information Behavior and Stock Price Volatility: Special Reference to S&P 20 Index

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ABSTRACT

This study examines the impact of asymmetric information behaviour and the impact of major political shifts on asymmetric information behaviour in modelling stock price volatility. Modelling the stock price volatility is significant in making decisions such as asset pricing and investment management. However, stock price volatility has rational and irrational patterns. CSE is a developing stock market with a relatively lower daily turnover. It can be observed that CSE market shows irrational volatility behaviour without any fundamental reason. The main objective of this study is to find the impact of asymmetric information behaviour on CSE price volatility. Further, the impact of asymmetric behaviour has been compared between two major political shifts in Sri Lanka from 2010 to 2019. This study is focused on the behaviour of the S&P 20 index daily price changes as the proxy for CSE price volatility. The variance equation of the EGARCH model was applied to identify the impact of the asymmetric information behaviour, and results were further compared between identified two political clusters. The study finds that there is a significant impact from asymmetric information behaviour in the CSE market on stock price volatility, and results comply with previous studies conducted under the same context as ASPI. The study further identified that political shifts have a significant impact on asymmetric information behaviour in the CSE market.

Keywords: Stock Market, Stock Price Volatility, Asymmetric Information Behavior, EGARCH Model, S&P 20 Index

1. INTRODUCTION

Stock price volatility is an essential phenomenon for an efficient capital market (Hameed & Ashraf, 2006). This is due to an investor can gain profits and avoid losses if the investor can do the price volatility modelling accurately. In simple, stock volatility is the rate at which the price of a stock increases or decreases over a particular period (Fidelity International). Modelling stock price volatility has become a difficult task since stock prices fluctuate as a response to various stock price determinants in a random manner. Volatility cannot be directly observable. This makes predicting volatility also difficult. One reason for this is different models and samples can be used to measure the volatility. For the same sample, different models can give different results as well as a certain model can give different results in different contexts. Another reason is that stock market price has random behaviour and is too difficult to predict. However, modelling the stock price volatility is important in making decisions such as asset pricing and portfolio selection to manage the risk component of a particular asset portfolio, and efficient estimations can be obtained regarding the asset price movements, which will lead to proper market timing decisions (buy, hold, sell). There is an uncountable number of variables that influence the price variations of the stock market. That's because different sources can affect stock market prices. "Past, present or even future expected events, often having nothing to do with the stock market, have repercussions on the prices. (Baillie & DeGennaro, 1990) Thus, the stock price changes were no longer considered to be independent (Christian, 1998). While there is a general consensus on what constitutes stock market volatility, there is far less agreement on the causes of changes in stock market volatility (Mala & Reddy, 2007; Hewamana et al., 2022). That is, the same stock price volatility determinant has inconsistent empirical results among countries and markets. However, behavioural determinants show consistent results. The reason may be the asymmetric information problem among the traders and market participants. If the investor does not possess the right information at the right time, it creates some irrational volatility patterns with behavioural biases.

President Ranil Wickramasinghe stated in one of his keynote speeches that a few people control CSE, and a few people are rigged. Top corporate figure and investor Nimal Perera stated in one of his interviews that many listed company chairmen, directors and even regulators are in a closed community and share lots of corporate information knowingly or unknowingly; when they meet each other on a daily basis at informal and formal events. Therefore, it can be observed that asymmetric information and key-player impact is one main issue in the CSE market. Information asymmetry refers to a large part of investors don't have access to market information over a small part of investors. Therefore, investors survive with the market sentiment rather than the fundamental news. Insider trading regulation would not exist if private information had no value.

There are few studies available to recognize the impact of asymmetric information behaviour on stock price volatility under the CSE market (Hewamana et al., 2022; Jaleel & Samarakoon, 2009; Jegajeevan, 2010; Kumara et al., 2014; Morawakage & Nimal, 2015; Morawakage et al., 2018). Available previous studies used the All Share Price Index (ASPI) to measure the overall CSE market volatility behaviour. However, it is unfair to use a total index value to measure the actual market volatility behaviour. Because; there are listed stocks available in the CSE market representing the ASPI which do not have frequent and continuous trading. Therefore, this study has attempted to use an alternative index of the S&P20 to identify the impact of asymmetric information behaviour on stock price volatility patterns in the CSE market. In addition to that this study has recognized to identify the impact of asymmetric information behavior between two major political shifts in Sri Lanka.

2. LITERATURE REVIEW

Stock price volatility is an important measurement from various perspectives. In investment portfolio management and asset pricing models, stock volatility is a key input variable for optimum investment decisions (Cox & Ross, 1976;

Fama, 1981; Markowitz, 1952; Sharpe, 1964). Further, Goudarzi (2011), Ezzat (2012) and Gokbulut and Pekkaya (2014) mentioned that there is a continuous need for finding out the accurate measurement to model stock price volatility. Nevertheless, stock price volatility plays a vital role in best practices of investment risk management concepts and tools (Black & Scholes, 1972; Cox et al., 1979; Leavens, 1945). Volatility plays a significant role in the pricing of financial assets in emerging economies. The ability to forecast financial market volatility is important for portfolio selection and asset management as well as for the pricing of primary and derivative assets. (Bollerslev et al., 1992) Modelling volatility will improve the usefulness of stock prices as an appropriate signal for the intrinsic value of securities; thereby, better modelling gives a better prediction that, in the end, will provide practitioners and academics with more accurate pricing models for financial assets. That, in return, will make it easier for different interested parties, such as investors, managers, and policy makers, to take various financial decisions, such as raising capital and investment decisions in financial markets (Emenike & Kalu, 2010).

There are different volatility models available for predicting and modelling stock price volatility behaviour. However, models based on the volatility clustering assumption deliver better results in modelling stock price behaviour. Engle's (1982) ARCH family models are the most prominent stock price volatility models with volatility clustering assumptions. Empirical evidence are also in favour of ARCH family models (Hsieh, 1987; Kroner & Lastrapes, 1993; Mccurdy & Morgan, 1988; Mishra & Rahman, 2010; Taylor, 1987). Engle and Ng (1991) attributed the arrival of new and unanticipated news as the key cause for the volatility. Furthermore, Black (1976) and Christie (1982) have discussed the leverage effect of stock price volatility in response to market information. EGARCH model is one of the advanced ARCH family models which can be used for measuring asymmetric information behaviour in modelling stock price volatilities (Epaphra, 2017; Goudarzi, 2010; Olowe, 2009).

Basically, there are two types of factors which effect the stock price volatility behaviour, i.e., fundamental and non-fundamental (behavioural) factors. Macroeconomic factors, company specific factors and behavioural factors can be considered determinants of stock market volatility. Macroeconomic and company specific variables are fundamental volatility determinants, whereas behavioural factors are non-fundamental factors (Hewamana et al., 2022a). When it comes to the macroeconomic factors, Engle, Ghysels, & Sohn (2013) proved that macroeconomic factors such as inflation and industrial production have a significant statistical impact on stock return volatility. Engle & Ng (1991) believed Some of the other attributes, such as changes in trading volumes and patterns driven by the changes in macroeconomic policies, a shift in investor tolerance of risk and increased uncertainty as a cause for volatility. They also considered political changes, civil security situations, and global events also cause return on volatility. When it comes to company specific factors, Campbell in 1996 proved that stock return volatility is determined by dividends. Sugeng Haryanto (2016), Rudangga and Sudiartha (2016), and

Rumondor et al. (2015) state that the increase in sales of the company will increase the positive value of the company among the investors, which will eventually affect the stock price changes. With regard to firms in the banking industry, firm-specific factors such as Asset quality, management quality, earnings and size affect the volatility of stocks (Rjoub et al., 2017). Handayani (2017) mentioned sales growth affects volatility in the manufacturing sector. In addition to the above, firm-specific factor such as corporate default risk, financial stress risk, and commodity prices affect stock volatility (Yfanti & Karanasos, 2021). When it comes to behavioural factors, Pryymachenko (2003) mentioned rational bubbles, fads, the irrationality of agents, incomplete information and learning effects as determinants of stock price volatility. Kumari & Mahakud (2016) findings highlighted the significance of sentiment in explaining the stock market volatility in India. Ghufran et al. (2016), who investigated the Pakistani context, concluded that herd behaviour among investors (especially due to market manipulation), individual investors' dimensions of involvement, risk attitude, and overconfidence are key determinants of stock volatility

However, it can be observed that fundamental factors no longer provide consistent results in modelling stock prices (Abugri, 2008; Addo & Sunzuoye, 2013; Anari & Kolari, 2001; Chue & Cook, 2008; Ferrer et al., 2016; Fun & Basana, 2012; Hamrita & Trifi, 2011; He, 2006; Lee, 2010; Marquering & Verbeek, 2004; Qamri et al., 2015; Wongbangpo & Sharma, 2002). Nevertheless, behavioural factors do provide consistent significant results in modelling stock price volatility (Baker & Wurgler, 2006; Coval & Shumway, 2005; Daniel et al., 2020; De Long et al., 1987; Kengatharan & Kengatharan, 2014; Lee, 1998; Lee, 2006; Stracca, 2004). The reason for this inconsistency may be the asymmetric information behaviour among the market participants. Investors tend to behave in actions based on irrational reasons (non-fundamental factors) due to the inefficiency in the distribution of market information.

CSE is considered to be an emerging stock market (Morawakage & Nimal, 2015). Jaleel and Samarakoon (2009) have initiated to find the asymmetric information impact in the CSE market. They found that the CSE market did not show asymmetric information behaviour and leverage effect. Nevertheless, Jegajeevan (2010) found the presence of asymmetric volatility behaviour and the CSE market has reacted more to a negative shock than a positive shock of the same size. Similar to Jegajeevan (2010), all other later studies have shown asymmetric information behaviour in the CSE market (Hewamana et al., 2022; Kumara et al., 2014; Morawakage & Nimal, 2015; Morawakage et al., 2018). Therefore, it can be identified that the impact of asymmetric information behaviour is a researchable topic in the Sri Lankan context. Several statements made by well-known persons in Sri Lanka confirm that asymmetric information behaviour is present in the CSE market.

President Ranil Wickramasinghe stated in his keynote speech that *"there are many questions about the stock exchange. That a few people control it and a few people rigged"* at the Reform Now Conference: Let's Reset Sri Lanka held on 5th August 2022 hosted by Advocata Institute. An article titled "Insider

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Trading Unavoidable?" done by Jithendra Antonio, published in 2011, sheds light on a particular detail of Sri Lanka's investor community; the geographical distribution of stock market players aids in the speedy transference of material information as well. In that paper, top corporate figure and investor Nimal Perera also noted that many listed company chairmen, directors and even regulators are in a closed community that shares lots of corporate information, knowingly or unknowingly, when they meet each other on a daily basis at informal and formal events including corporate launches, official functions or even funeral houses, private parties, etc. Therefore, the asymmetric information problem is an interesting research topic with reference to the CSE market.

However, all previous studies have employed the ASPI index to measure the performance of the stock price volatility behaviour. But there is no study based on an alternative index which can be used to measure the CSE pricing volatilities. This study fulfils that research gap by undertaking the S&P20 index to represent the overall CSE volatility behaviour.

3. METHODOLOGY

This study followed the positivism research paradigm, and the quantitative research method was applied to achieve its objectives. This research is focused on secondary data. Data comprises CSE market S&P 20 index daily pricing records spanning between January 2010 to December 2019 (approximately 2403 observations). The 2020 to 2021 period is not considered due to the impact of Covid 19. The S&P 20 index represents the performance of the twenty (20) largest and most liquid companies in the CSE market. Engle and Ng's (1993) EGARCH model has been undertaken as the statistical model of the study for identifying asymmetric information's impact on CSE price volatility (Equation 01). The daily pricing data has been converted into a daily price change ratio in order to facilitate the EGARCH model.

$$log(S\&P20_t) = \boldsymbol{\varphi} + \sum_{i=1}^{q} \boldsymbol{\eta}_i \left| \frac{u_{t-i}}{\sqrt{Y_{t-i}}} \right| + \sum_{i=1}^{q} \boldsymbol{\lambda}_i \frac{u_{t-i}}{\sqrt{Y_{t-i}}} + \sum_{k=1}^{p} \boldsymbol{\theta}_k \, log(Y_{t-k}) \dots\dots\dots\dots\dots\dots\dots\dots\dots.(01)$$

Where;
$S\&P20$ = Conditional Price Volatility of S&P20
u = Error Term
φ = Constant Effect
η = ARCH Effect
λ = Asymmetric Effect
θ = GARCH Effect
P = Market Price
t = Time Period

Figure 01 shows the developed conceptual framework of the study based on the past literature. Accordingly, four impacts have been tested with respect to the CSE stock price volatility behaviour. The constant effect measures the current

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period error of the S&P 20, whereas; market responses identify the investor reaction to the previous volatility shocks (ARCH effect), while the volatility persistence indicates the degree of the continued volatility reaction on market information (GARCH effect). The asymmetric information impact on stock volatility (EGARCH effect) has been tested as the fourth variable of this model.

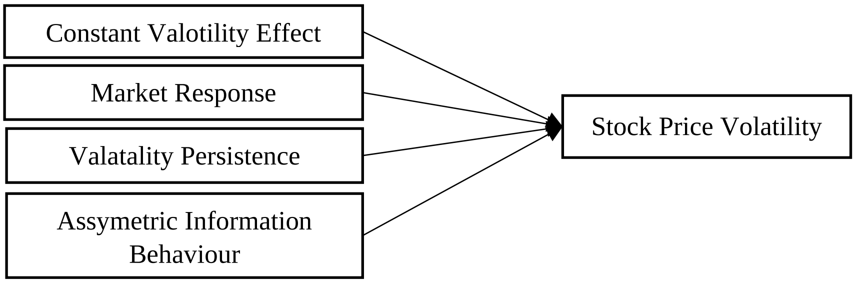

Figure 01. Conceptual Framework

Source: Author Developed

To measure the political impact EGARCH model is considered. Political impact has not been measured through a separate variable and a comparison of outputs in two political changes between two times periods from 2010 to 2014 and from 2015 to 2019 have been considered to identify the political impact of asymmetric information behavior in the CSE market. The measurement of political impact through a variable is out of this study. Therefore, the political impact of EGARCH model results cannot be adopted using this research. Only comparison is done in this study. Since secondary data is considered in this study, to analyze data EViews package is applied.

4. RESULTS AND DISCUSSION

4.1 Descriptive statistics

Figure 2 shows the descriptive statistics of the selected variable. Descriptive statistics [skewness (0.107735), kurtosis (43.90255) and JB test (167515.6)] indicates that S&P 20 price index did not follow a normal distribution pattern. The mean is the average or the most common value in a collection of numbers. S&P 20 price change (SP) has an average daily price deviation (mean) of 0.000169% during the sample 10-year period with a maximum value of 0.118680%.

Table 01. Descriptive Statistics

Statistic	**SP**
Mean	0.000169
Median	-0.000099
Maximum	0.118680
Minimum	-0.120410
Std. Dev.	0.008162
Skewness	0.107735
Kurtosis	43.90255
Jarque-Bera (JB)	167515.6
JB Prob.	0.000000
Observations	2403

Source: Author's Estimation

Based on the Skewness, Kurtosis, and Jarque-Bera (JB) test statistics, S&P 20 price change does not show a normal distribution pattern. This is a primary observation of this study. EGARCH model can be only used for non-normally distributed data sets. Therefore, the EGARCH model can be applied for this sample data.

4.2 Line & Symbol Graph

Based on Figure 02, it can be observed that the S&P20 daily volatility ratio has non-constant volatility. This non-constant volatility pattern has been tested from the Heteroscedasticity test. It also further confirmed that the selected sample data did not show the constant volatility pattern. This further confirms that; considered data set is suitable for ARCH family model. EGARCH model is one of the family models of ARCH. That to use EGARCH model, variance should be unequal.

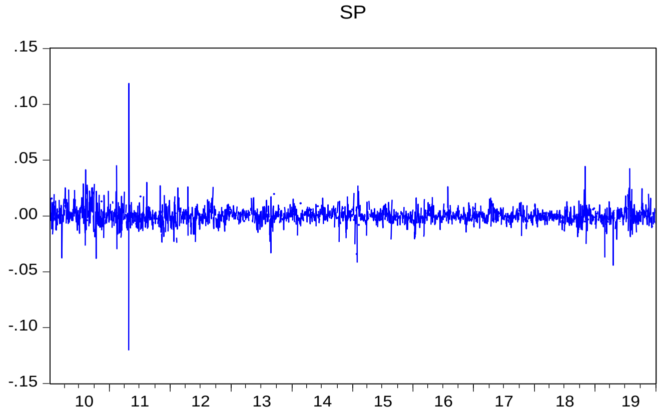

Figure 02. Line Chart of S&P20 Daily Volatility Ratio
Source: Author Developed

4.3 Diagnostic Tests

S&P 20 price change variable was tested for stationarity by undertaking the Augmented Dickey & Fuller (ADF) test & Kwiatkowski-Philips-Schmidt-Shin (KPSS) test.

4.3.1 Augmented Dickey & Fuller (ADF) test

As Hsieh (2013) suggested, the first difference ADF was performed for testing the unit root. If the probability is less than the significance level according to the ADF Test data set is considered to be stationary.

Table 02. ADF Test Result

Statistical Test	T - Statistics	Probability
Augmented Dickey – Fuller Test Statistic	-20.92303	0.0000

Source : Author's Estimation

The probability of ADF t-Statistics is less than 1% for S&P 20 price change variable, which concludes that the given S&P 20 price changes variable is free from the unit-root error (Table 02). Which means the data set is stationary.

4.3.2 Kwiatkowski-Philips-Schmidt-Shin (KPSS) test

In order to further confirm the stationary test, the KPSS test was performed in addition to ADF test. If the probability of KPSS test is more than the significance level, it can be concluded that S&P 20 price changes variable is free from the unit-root error. Which means the data set is stationary. The KPSS test (Table 3) also confirms that the variables are stationary at a 1% and 10% significance level.

Table 03. KPSS Test Result

	LM - Stat
Kwiatkowski – Philips – Schmidt – Shin test statistics	0.064843

Source: Author's Estimation

4.3.3 Heteroscedasticity Test

The Conditional Variance is the basic assumption for employing the ARCH family models. In probability theory and statistics, a conditional variance is the variance of a random variable given the value(s) of one or more other variables. Particularly in econometrics, the conditional variance is also known as the scedastic function or skedastic function. Conditional variances are important parts of autoregressive conditional heteroskedasticity (ARCH) models. The Lagrange Multiplier (LM) test has been accommodated to detect the existence of the Conditional Heteroscedasticity effect in the ASPI, as suggested by Olugbode et al. (2014). Therefore, is LM test is also used here to check the existence of the Conditional Heteroscedasticity effect in the S&P 20 Index as well.

Table 04. Heteroscedasticity Test Result

F - Statistic	694.3198	Prob. F(1,2399)	0.0000
Obs* R - Squared	538.9232	Prob. Chi-Square(1)	0.0000

Source: Author's Estimation

According to the test results (Table 04), the S&P 20 has a Conditional Heteroscedasticity volatility effect at a 5% significance level (Refer to Table 04). Moreover, the S&P 20 has not shown a normal distribution pattern based on the Skewness, Kurtosis, and Jarque-Bera (JB) test statistics (Refer to Table 01). Therefore, the S&P 20 is appropriate for volatility cluster modelling, and no barrier to undertaking the proposed EGARCH model over the traditional Ordinary Least Square (OLS) method.

4.4 Asymmetric Test in S&P 20

The EGARCH test was performed to check the asymmetric impact in S&P20 (Table 05). If the probability value is less than the significance value of a particular variable, that variable is considered significant. According to Table 05 Constant Effect, ARCH Effect, Asymmetric Effect, and GARCH Effect are significant at 1% level.

Table 05. EGARCH statistical output between 2010 – 2019

Variable	Coefficient	Prob.
Constant Effect	-0.617418	0.0000
ARCH Effect	0.250339	0.0000
Asymmetric Effect	-0.026119	0.0008
GARCH Effect	0.955154	0.0000

The above-mentioned variables indicate the following.

i. Constant Effect: Current period error (Constant volatility effect)
ii. ARCH Effect: Previous period error (Market response)
iii. Asymmetric Effect: Asymmetric information behaviour
iv. GARCH Effect: Previous conditional (Volatility persistence)

The results show that the asymmetric information problem presents under the S&P 20 index since the Asymmetric Effect statistical coefficient value is highly significant. Furthermore, the "Minus" coefficient value confirms Black's (1986) leverage effect. This result complies with the other previous studies conducted based on the ASPI index under the CSE market (Hewamana et al., 2022; Jegajeevan, 2010; Kumara et al., 2014; Morawakage & Nimal, 2015; Morawakage et al., 2018). Therefore, asymmetric information impact has no difference between the ASPI index sample and the S&P20 index sample.

4.5 Evaluate the Political impact on Asymmetric Information Behavior

The second objective of this study is to identify the impact of political change on asymmetric information behaviour for the selected sample period. The political clusters have been determined based on the presidential election, which was held from 2010 to 2019. Accordingly, two major political clusters were recognized for the study. The first cluster is the time period between 2010 to 2014, whereas the second political cluster is the time period between 2015 to 2019.

Table 06. Comparison of EGARCH Statistical Outputs between Two Political Clusters

Political Cluster I (2010-2014)			Political Cluster II (2015-2019)		
Variable	**Coefficient**	**Prob.**	**Variable**	**Coefficient**	**Prob.**
Constant Effect	-1.001102	0.0000	Constant Effect	-0.690725	0.0000
ARCH Effect	0.330686	0.0000	ARCH Effect	0.191190	0.0000
Asymmetric Effect	-0.094585	0.0000	Asymmetric Effect	0.009651	0.3998
GARCH Effect	0.919224	0.0000	GARCH Effect	0.945764	0.0000

Source: Author's Estimation

According to the study results (Table 06), the second political cluster did not show asymmetric information behaviour except for other impacts (Constant effect, ARCH effect, GARCH effect); however, the first political cluster presented a significant asymmetric information problem. Therefore, it can be identified that the political change between 2010 to 2019 has had an impact on asymmetric information behaviour in the CSE market.

The above findings were further checked with the ratio of companies listed in the CSE market in relation to the initial number of listings of the particular political cluster. This ratio has been employed to measure the degree of the market float of the political cluster. There is an inverse relationship existing between the market float and the information asymmetry. A low percentage of free float configures a strong stockholding concentration, something which might lead the company to provide less information to the public environment, causing an increased information asymmetry. If the percentage of free float is high, there is a higher potential to disseminate market information, leading to lower information asymmetry in the market. Therefore, it is expected that the percentage of stocks traded in the capital market has a negative relation with information asymmetry (Da Silva Rodrigues & Galdi, 2017). Formula 02 has been undertaken to calculate the above ratio value.

$$Ratio\ Value = \frac{[\text{No. of listed companies at the end of the cluster} - \text{No. of listed companies at the beginning of the cluster}]}{\text{No. of companies listed at the end of the cluster}} \quad \ldots\ldots(02)$$

Table 7: Ratios of Companies Listed in the CSE Market between Political Clusters

Cluster	Ratio Value	Asymmetric Effect
Political Cluster I (2010-2014)	0.27	Very Significant
Political Cluster II (2015-2019)	-0.017	Insignificant

Source: Author's Estimation

According to Table 07, during the period of 2010 to 2014 asymmetric effect should be either low or insignificant since the number of companies listed in the CSE was high during that period. But Table 07 results indicate otherwise. On the other hand, during the period of 2015 to 2019 asymmetric effect should be significant or high since the number of companies listed in the CSE was low during that period. But, Table 07 statistics indicate contradictory results. Therefore, this further confirms the impact of major political shifts on asymmetric information behaviour in the CSE market, especially during the period from 2010 to 2014. However, it is needed further independent analysis for this with more political clusters.

5. CONCLUSION

The objective of this research is to identify the impact of asymmetric information behaviour and its political impact on CSE market price volatilities. The S&P 20 index was employed to measure the overall CSE price variability instead of the regular ASPI index. The variance equation of the EGARCH model was applied to identify the impact of the asymmetric information behaviour, and results were further compared between identified two political clusters. The results of this study comply with the all-other previous studies which have utilized the ASPI to measure the CSE price variability. Therefore, this concludes that there is no difference in asymmetric information behaviour between ASPI and S&P20. Both indexes have the same result for identifying asymmetric information behaviour in the CSE market. This confirms that the asymmetric information problem is present in the CSE market and the leverage effect is present. The second objective is to identify the political change in asymmetric behaviour in the CSE market. Two time periods have been considered as two political clusters for the sample period. The results showed that the first political cluster has significant asymmetric information behaviour, whereas the second political cluster did not show the asymmetric information problem. Therefore, it can be concluded that the political shift in 2015 has impacted CSE market asymmetric information behaviour. This study encourages further study to identify the other reasons for the existence of asymmetric information behaviour in the CSE market.

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