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Dynamic Relationship of the Stock Index with the Trading Volume of the Nepal Stock Exchange: An Empirical Analysis

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Abstract

Knowledge about the linkage between the volume and the index of the stock is crucial for market participants and investors to make informed decisions in trading and forecasting the stock market, as understanding this fundamental Linkage enhances investment decisions. This study relies on time series data to objectively explore the dynamic linkage between the index of the stock and the amount of trade on the Nepal Stock Exchange from mid-December 2018 to mid-January 2023. The outcome of the Autoregressive Distributed Lag (ARDL) model reflects a long- and short-term substantial positive association between the volume of the trade and returns from the stock in the current timeframe. This implies that a change in volume has both a long- and short-term, small but positive effect on the returns from the stock. Conversely, the lagged-period stock index negatively and significantly impacts the present index of the stock. However, the conclusions drawn from the Granger causality test demonstrate no Granger causation from the volume of the trade to return and vice versa, implying that both variables do not affect each other.

Keywords: Stock index, trading volume, ARDL model, Granger causality.

Introduction

Compared to neighbouring countries, the stock market in Nepal is relatively smaller. The level of stock market activity was minimal even after the establishment of the Nepal Stock Exchange on January 13, 1994, formally. However, the cease-fire in 2006, the implementation of the new constitution in 2017, the numerous emergent new policies and laws, and worldwide significant changes in information and technology in recent years have all contributed significantly to the improvement of the index and the volumes in the stock market of Nepal. The association between volume and the index has been studied for a long time. The link between the index and the stock volume influences market efficiency and underpins effective trading strategies (Chen et al., 2004). The fundamental knowledge of the linkage between the volume and the index helps to enhance the understanding of market dynamics for investment decisions. Therefore, the relationship between returns and trade volume has been studied over the past few years. An efficient stock market must provide up-to-date and accurate data on past transactions, liquidity, minimal transaction costs, and stock prices that promptly respond to all available information.

Granger and Morgenstern (1963), Karpoff (1987), Lee and Rui (2002), and Chen (2012) studies and others exist in developed financial markets on the association between the volume of the trade and the returns from the stock, but only a few in emerging financial markets such as Nepal. Therefore, this study analyses the dynamic linkage between these variables on the Nepal Stock Exchange to understand the Nepali stock market's behaviour better. The stock index and prices of the different stocks fluctuate differently with changes in various factors in the market. Macro, as well as microeconomic factors, government change, government rules and policies, monetary and other policies from central banks, and many other news and financial information sources in the market, are playing a significant role in the change in the price of stocks, the index, and the volume of transactions. Similarly, the trading volume and index change on every transaction day. Sometimes, the index and volume both increase together and vice versa.

Price and volume are two essential elements of economic equilibrium that are influenced by the volatility of the stock market. These two aspects are often assumed to be intimately and directly connected. The media frequently reports on stock price and volume figures to give a clear idea of the state of the financial markets and draw in potential investors. Market participants think that having intrinsic information about price movements and trading volumes will be beneficial to better understanding market dynamics and succeeding commercially. Most studies focus on returns rather than prices due to several unfavourable stochastic characteristics of prices of the stock, particularly their non-stationarity. The main supporting pillars at the centre are returns from the stock and the volume of the trade.

The microstructure theory aims to shed light on how prices are determined in the financial markets, which implies that introducing new information into the market impacts both price movements and trade volume. As a result, the speed of information flow influences both price movement and trading volume. Many theories that link stock returns with trading volume have been published in the financial literature. The flow of information, according to the Mixture of Distribution Hypotheses (Clark, 1973; Epps & Epps, 1976), is what causes daily price fluctuations. The volume of the trade impacts the level of trader dispute because traders change market prices in reaction to fresh information. The volume of the trade determines the degree of trader disagreement as traders adjust prices in the market in response to new information entering the market. As the degree of divergence among traders increases, trading activity increases. Because they both rely on a latent information flow variable, the volume of the trade and returns of the stock are connected. The MDH suggests that volume and returns have a positive and contemporaneous relationship. The Sequential Information Arrival Hypothesis (SIAH) says that new information is not distributed to all investors simultaneously but is transmitted sequentially with varying times and speeds. (Copeland, 1976; Jennings et al., 1981; Jennings & Berry, 1983). Fama (1970) enhanced the efficient market hypothesis (EMH), assuming that information is systematically distributed in the market so that any present information cannot be used to forecast future prices. In a market with efficient information flow, prices quickly respond to new information. Under an effective market structure, volume cannot affect price causally.

Research Questions

The research questions help the study narrow a broad area of interest into a specific area (Creswell, 2017). Research questions guide the framework for the study. The research questions for this study are designed as follows:

1. How does the trading volume impact the stock index?
2. What is the causal relationship between the trading volume and the

Nepal Stock Exchange stock index?

Objectives of the Study

The following specific objectives:

1. To examine the impact of the trading volume on the stock index.
2. To identify the causal relationships between the trading volume and the Nepal Stock Exchange stock index.

Literature Review

Despite significant discrepancies, most study data indicate a positive link between returns and stock volume. Chandrapala (2011) analyzed monthly data on the connection between volume and returns at the Colombo Stock Exchange and found a positive association between the returns and volume. In the Indian market, using monthly data, Ravi (2011) disclosed a strong nexus of the index with the volume of the stock. Alhussayen (2022) used daily data from the Saudi stock market, which showed a unidirectional linkage between returns to the volume of the stocks. Daily data on the concurrent association and the dynamic connection between the index and the volume of the BRVM stock market in South Africa were analyzed by Gueyie et al. (2022). Neither the variable significantly influenced the other, and the dynamic specification depicted a causal relationship between the returns and the volume, but the reverse was not valid. Moyo et al. (2018) study revealed that volume and return volatility have a positive but not statistically significant association, showing that volume as an indicator of information flow could be a better source of volatility in returns.

Using daily data from the SENSEX, Mahajan and Singh (2009) examined the relationship between the returns, index and volatility dynamics in the Indian stock market and disclosed a positive as well as significant association between volume and return volatility, indicating that both the MDH and SIAH were correct. Furthermore, the results also validated the hypothesis that volume complements the information signal rather than being an alternative to it. The volume offers information on the accuracy and distribution of information signals. In Malaysia's ACE Market, Tapa and Hussin (2016) revealed a significant positive contemporaneous association between returns and volume and a significant negative concurrent connection between stock return and past-period trading volume. Furthermore, there was a significant negative linkage between the volume and the return volatility and an asymmetric linkage between the volume and the return volatility, indicating that news affects the volume of the trade. Habib (2011) revealed the contemporaneous linkage between volume and volatility on the Egyptian securities exchange and discovered that Lagged volume plays a minor function in predicting the volatility of forthcoming gains, and causality tests depict that volume, as well as volatility, are related in two different ways.

In the case of the Nepali stock market, taking volume of the trade as a dependent variable and the stock index as an independent variable, Poudel and Shrestha (2019) found that volume and returns had a significant positive connection in both the long and short runs but Adhikari (2020) study depicted no correlation between the variables across the entire stock market but a unidirectional causality from volume to the stock returns in commercial banks, finance companies, hydropower companies, and insurance companies in the sector-wise study. However, the study found no evidence of bidirectional causal links in any area.

Methodology

This study explores the association, strength, and direction between the index and volumes on the Nepal Stock Exchange.

Nature and Sources of Data

The association between the factors is examined with secondary data from the Nepal Stock Exchange. Between mid-December 2018 and mid-January 2023, 48 observations of the stock's closing price and trade volume are taken on the last day of each month. The amount in the study is expressed in the local currency.

Variable specification

The monthly returns on stocks and volume of trading are taken into consideration in the study to evaluate the association between the return of stocks and volume of trading.

Stock Returns: The change in the index of the monthly price is regarded as the returns of the stock and computed by taking the log of a price index ratio of the stock (P) from the present month (t) to the preceding (t-1) month as depicted in equation (*i*):

$$R_t = Ln\left(\frac{P_t}{P_{t-1}}\right)x100 \quad \text{(i)}$$

Where R_t represents the monthly stock returns, Pt stands as the closing price of the index of the stock at the current time, and P_{t-1} represents the closing price of the index of the stock of the previous period.

Trading volume: The total value of the shares traded on the closing day of the month is taken as the volume of the trade as equation (ii):

$$V_t = Ln\left(\frac{TV_t}{TV_{t-1}}\right)x100 \quad \text{(ii)}$$

V_t represents the monthly volume of the stocks traded, Ln represents the natural logarithm, TV_t represents the traded volume of the index at the current time, and TV_{t-1} represents the stock's traded volume on the previous month's closing day.

Model Specification

Equations (iii) and (iv) are designed from the perspective of the objective. Since both the return and the volume are dependent and independent variables with each other, alternatively, Equation (iii) shows that the return as a dependent variable is a function of volume in the stock market. Similarly, equation (iv) shows that volume, a dependent variable, is the function of stock return.

$$R_t = f\ (V_t) \quad \text{(iii)}$$

$$V_t = f\ (R_t) \quad \text{(iv)}$$

For evaluating short-term returns and volume dynamics, the study incorporates the Error Correction Model (ECM) from ARDL, while analysing long-term connection, it adopts the bound testing ARDL procedure. The ARDL model outperforms other regression models. It can be applied to different orders of cointegration, performs well even with small sample sizes, and allows for short-run adjustment estimation with the use of ECM derived from ARDL via a simple linear transformation. In general, the bound testing approach from the ARDL model consists of four steps: testing the integration characteristics of variables, using the bounds F-test to determine the existence of long-run cointegration among variables, and estimating short- and long-term relationships in the best model. Equation (v) shows that the return is a dependent variable, and the volume is an independent variable.

$$LnR_t = \alpha + \beta_1 LnR_{t-1} + \beta_2 LnV_{t-1} + \sum_{i=1}^{n} \beta_{1i}\, \Delta LnR_{t-1} + \sum_{j=1}^{n} \beta_{2j} \Delta LnV_{t-1} + \varepsilon_t \quad \text{(v)}$$

Where Δ the difference operator, α is constant, β_{1i} and β_{2i} measure the short-term dynamics. Likewise, and measure the long-run effects of the variables. Similarly, is the white noise error. The co-integration of the variables over the long run is approximated using the specification stated in equation (vi). (vi)

$$LnR_t = \alpha + \beta_1 LnR_{t-1} + \beta_2\, LnV_{t-1} + \varepsilon_t$$

After the confirmation of the long-term link of the variables, the model for error correction is reflected in equation (vii) obtained from ARDL. (vii)

$$\Delta LnR_t = \alpha + \sum_{i=1}^{n} \beta_{1i}\, \Delta LnR_{t-1} + \sum_{j=1}^{n} \beta_{2j} \Delta LnV_{t-1} + \varphi \mathrm{ECT}_{t-1} + \varepsilon_t$$

Where the speed adjustment coefficient parameter is φ and one period lagged error correction term is ECT_{t-1}. Similarly, and are the short-term dynamic coefficients of the model's adjustment of long-run equilibrium. The bounds test is performed to test the long-run cointegration between the variables or not.

The null hypothesis: No long-run cointegration is as follows: H_0: $\theta_1 = \theta_2 = \theta_3 = 0$

The alternative hypothesis of the long-run relationship is as H_1: $\theta_1 \neq 0$, $\theta_2 \neq 0$, $\theta_3 \neq 0$.

The Granger causality approach, first introduced by Granger (1969) employed to investigate the causative link between the variables. Using the Granger causality approach, a variable is regressed on its lagged value and on the next variable. If the second variable is statistically significant, it explains some of the variation in the first variable that is not described by the lagged values of the first variable. This indicates that the second variable causally precedes the first and is believed to lead to the first dynamically. If Y is the first and X is the second variable, equations (viii) and (ix) show the model specification of Granger causality. (viii)

$$LnY_t = \sum_{i=1}^{n} \alpha_i\, LnY_{t-i} + \sum_{j=1}^{n} \beta_j\, LnX_{t-1} + \varepsilon_{1t}$$

(ix)

$$LnX_t = \sum_{i=1}^{n} \gamma_i\, LnX_{t-i} + \sum_{j=1}^{n} \delta_j\, LnY_{t-j} + \varepsilon_{2t}$$

where the null hypothesis (Ho) states that the under-investigation variable does not Granger cause the under-investigation variable. The Granger causality test depends critically on the number of lagged terms introduced in the model. Before the ARDL, the Unit Root Test proceeded to test the stationary. For this, an Augmented Dickey-Fuller (ADF) Test is employed. Similarly, lag selection criteria are incorporated with vector autoregression (VAR). A few diagnostic and testing procedures for the model's dependability, goodness of fit, and stability will be executed in the following phases.

Empirical Result and Discussion

The following sections present the findings and discussion of the study.

Unit Root Test

The ADF test in Table 1 demonstrates how the outcome of the unit root test establishes the stationarity of the variables. By the outcomes, the P-value of LnR is less than 5 per cent in intercept but more than 5 per cent in trend and intercept at the level and below 5 per cent in the first difference, both the trend and in the trend and intercept. Similarly, the P-value of LnV is below 5 per cent both in the trend as well as in the trend and intercept in level and in the first difference. At level, LnR is stationary from the standpoint of intercept but, at first, different from trend and intercept. In the case of LnV, it is already stationary at a level. The ARDL is thus ideal for further computation.

Table 1

ADF Test

At Level		LnR	LnV
With intercept	ADF t-statistics	-3.200835	-6.004615
	Prob.	0.0263	0.0000
With trend and intercept	t-statistics	-3.189250	-5.979174
	Prob	0.0992	0.0001
At First Difference			
With Constant	ADF t-statistics	-13.67477	-7.535192
	Prob.	0.0000	0.0000
With trend and intercept	t-statistics	-13.51401	-7.447610
	Prob	0.0000	0.0000

Lag Selection Criteria

The VAR estimates the lag length for the study; the results are in Table 2, and based on AIC, 2 is the ideal lag length.

Table 2

Lag	Log L	LR	FPE	AIC	SC	HQ
0	61.75876	NA	0.000255	-2.598207	-2.518701*	-2.568423*
1	63.46315	3.186473	0.000282	-2.498398	-2.259879	-2.409047
2	72.46936	16.05454*	0.000227*	-2.716059*	-2.318528	-2.567142

VAR Lag Length Criteria

ARDL Model

Since the ARDL incorporates both exogenous and endogenous components, Table 3 guides (2,2) for optimal lags obtained from the VAR model.

Table 3

ARDL Model

Dependent Variable: LnR				
Variable	Coefficient	Std. Error	t-Statistic	Prob*
LNR (-1)	0.024863	0.136806	0.181737	0.8567
LNR (-2)	0.271825	0.135482	2.006364	0.0516
LNV	0.040858	0.007035	5.807675	0.0000
LNV (-1)	0.008647	0.008628	1.002145	0.3223
LNV (-2)	0.015054	0.008447	1.782212	0.0823
C	1.280412	0.352513	3.632242	0.0008
R-square	0.516969	Mean Dependent Var		2.005677
Adjusted R-squared.	0.456590	S.D. Dependent Var		0.033776
S.E. of regression	0.024898	Akaike info criterion		-4.426941
Sum square resid	0.024797	Schwarz criterion		-4.188423
Log-likelihood	107.8196	Hannan-Quinn Criter		-4.337591
F-statistic	8.562079	Durbin-Watson stat		2.079047
Prob(F-statistic)	0.000014			

ARDL Bound Test

The F-statistic from the ARDL bounds tests is compared with the critical values of the lower as well as the upper bounds to ascertain any long-term relationship between the variables. Table 4 displays the computed F-statistic, critical values, and significance thresholds. The value of F-statistic 6.755 exceeds the upper bound critical values for all three significant levels. Hence, accepting the alternative hypothesis, the rejection of the null hypothesis H_0 clearly states a long-term relationship between the return of the and the volume of the trade during the study period.

Table 4

Dependent Variable: LnR				
Test-statistic	Value	Sigif.	I (0)	I (1)
F-statistic	6.755449	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

ARDL Bound Test Result

Short-Run Estimates

Table 5 shows the lagged period coefficient of the return -0.272, and a P-value of 0.032 indicates that the return in the lag one period has a negative and significant impact on the index. The volume has a nominal positive association with the return in the current period. The coefficient of volume 0.041, a 0.0000 P-value infers that a 1 per cent rise in current volume will increase the return by 0.041 per cent. However, the lagged period volume does not impact the returns since the P-value is 0.06.

Table 5

Dependent Variable: LnR				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (LNR (-1))	-0.271825	0.122729	-2.214836	0.0325
D(LNV)	0.040858	0.005621	7.268986	0.0000
D (LNV (-1))	-0.015054	0.007878	-1.910814	0.0632

Short Run Estimates

Coefficient of the Error Correction Term

The Coint Eq (-1) * in Table 6 is -0.703, which implies that towards the long-term adjustment equilibrium, the speed is 70.33 per cent, which means its previous period's disequilibrium that the system corrects at a speed of 70.33 per cent within one period. The t-statistic value is -4.613, and the 0.000 p-value indicates that the coefficient is significant. The fact that CointEq (-1) * is less than 1, negative, and significant shows that the model will adjust monotonically.

Table 6

Coefficient of the Error Correction Term

Dependent Variable: LnR				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq (-1) *	-0.703312	0.152463	-4.612989	0.0000

Long Run Estimates

The ARDL model offers a comprehensive framework by exploring cointegration and the long-term connection between the variables. Table 7 exhibits the result of the study.

Table 7

Dependent Variable: LnR				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNV	0.091792	0.025505	3.598992	0.0009
C	1.820546	0.051584	35.29265	0.0000
EC = LNR – (0.0918*LNV +1.8205)				

Long Run Cointegration Test

Table 7 reflects that the coefficient of volume is 0.092, the P-value is 0.0009, and the t-statistics of 3.599 state a positive and significant association of the returns with trading volume. It implies that a 1 per cent rise in volume will increase returns by 0.092 per cent in the long term. Though this connection is positive and significant, it is minimal.

Granger Causality Test

This test examines the effects of one variable on another to determine the direction of causality between the variables. Table 8 depicts the result of the test.

Table 8

Granger Causality Test

Null Hypothesis	F-Statistic	Prob
LNV does not Granger Cause LNR	0.32090	0.7273
LNR does not Granger Cause LNV	0.20459	0.8158

The results in Table 8 confirm no Granger cause from LnV to LnR and vice versa since both the P-value of 0.727 and the t-statistics of 0.321 for the null hypothesis that LnV does not cause LnR and the P-value of 0.816 and the t-statistics of 0.205 for LnR do not cause LnV are greater than 5% level. This outcome is consistent with that of the Fama (1970) and Clark (1973) models MDH and EMH, which Epps and Epps (1976) further generalised.

Diagnostic Tests

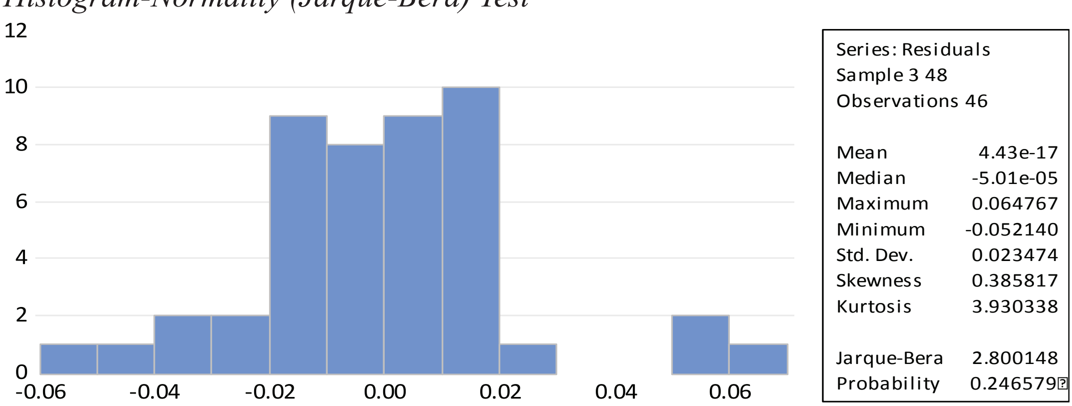
The subsequent diagnostic procedures are performed to assess the model's reliability and goodness of fit.

Histogram-Normality Test

This test ensures that the residuals in the ARDL model are normal and establishes the model's goodness of fit. It is a good fit if the Jarque-Bera P-value in the Histogram-Normality test exceeds 5 per cent.

Figure 1

Histogram-Normality (Jarque-Bera) Test



Serial Correlation LM Test

This test clears whether the model error is serially correlated. If the observed *R-square value is insignificant at the 5% level, the null hypothesis with no serial correlation in the residual of the applied ARDL models cannot be rejected. Table 9 depicts the test result.

Table 9

Breusch-Godfrey Serial Correlation LM Test

Null hypothesis: No serial correlation up to 2 lags			
F-statistics	0.732332	Prob. F (2,38)	0.4874
Obs *R-square	1.707211	Prob. Chi-Square (2)	0.4259

Heteroskedasticity Test

The residual from the model is free of heteroskedasticity when observed *R-square's P-value is more than 5%. Table 10 displays the test results.

Table 10

Heteroskedasticity Test: (Breusch-Pagan-Godfrey)

F-statistics	0.74048	Prob. F (5,40)	0.5966
Obs *R-square	3.904603	Prob. Chi-Square (5)	0.5632
Scaled explained SS	4.325825	Prob. Chi-Square (25)	0.5035

The Jarque-Bera P-value in the test is 0.246579 in Figure 1, the Obs *R-square is 1.707, and the P-value is 0.426 in the Serial Correlation LM Test in Table 9. The Obs*R-square 3.905 and P-value 0.563 of the Heteroskedasticity test in Table 10 indicate that the model is well fit, free from serial correlation, and heteroscedastic. Hence, it confirms that the model is well-fitting and trustworthy.

Stability Diagnostic Test

The following tests are conducted to test the stability of the model.

Ramsey RESET Test

This test traces the appropriate functional form of the model. The P-value of the F-statistic should be greater than 5 per cent to indicate that the model is well specified. Table 11 shows that the P-value of the F-statistic is 0.067 per cent, proving that the model is well-specified.

Table 11

Ramsey RESET Test

	Value	df	Probability
t-statistic	1.887052	39	0.0666
F-statistics	3.560965	(1, 39)	0.0666

CUSUM Test and CUSUM of square Test

The parameter stability of the model is evaluated by use of the CUSUM and CUSUM of Squares. Figure 2 the CUSUM plots and Figure 3 CUSUM of Squares are within the 5% significance limits, concluding the model's stability.

Figure 2

CUSUM Test

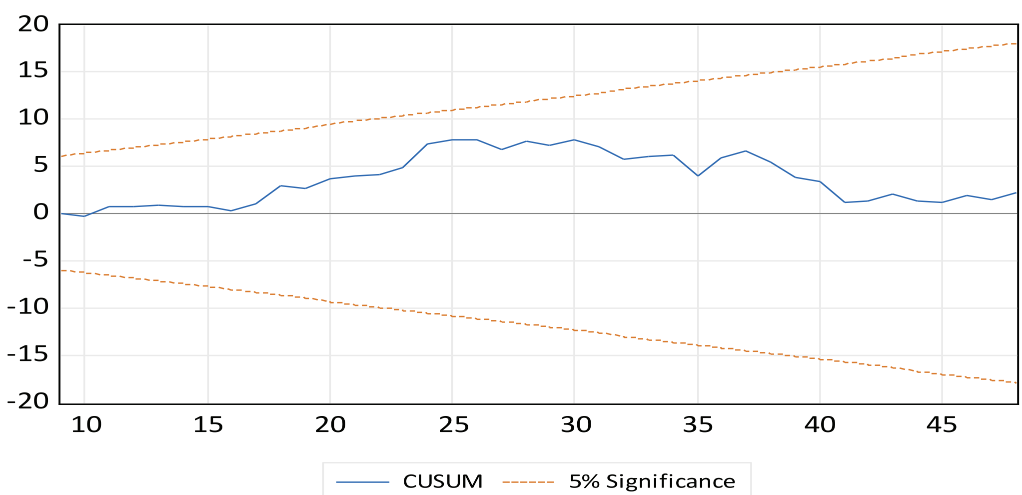
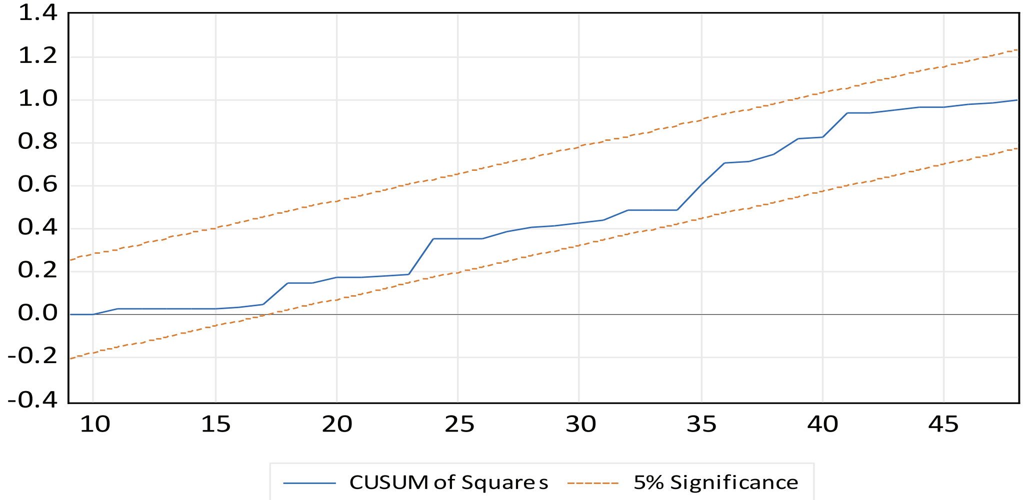


Figure 3

CUSUM of Squares



Conclusion

This study explores the dynamic link between the Nepal Stock Exchange's stock index, as a dependent variable, and volume, as an independent variable. The outcomes of the two procedures differ. The ARDL model lead to a short-term and long-term positive association between the index and the current period's volume, implying that a change in volume positively impacts the return in both the long and short term, and such an impact is minimal. Similarly, the lagged-period index impacts negatively on the present index. Contrarily, the Granger causality confirms no Granger cause is connecting from volume to return or vice versa, suggesting that a change in volume has no impact on the index and vice versa, which is consistent with the findings of Adhikari (2020). The ARDL suggests a negligible impact of volume on the index, indicating a poor signal of a change to the index due to a change in volume. However, Granger causality suggests no effect of volume on the index and vice versa. The link between returns and volume is essential for market participants and investors to make appropriate decisions for trading and forecasting in the Nepali stock market. This study relies on monthly data for a short period and suggests future researchers use daily or weekly data for a longer period to acquire additional insight into the relationship between the index and volume.

References

Adhikari, P. L. (2020). The dynamic relationship between stock returns and trading volumes in the Nepalese stock market. *Management Dynamics*, *23*(2), 161-172. https://doi.org/10.3126/md.v23i2.35819

Alhussayen, H. (2022). The Relationship Between Trading Volume and Market Returns: A VAR/Granger Causality Testing Approach in the Context of Saudi Arabia. *Organisations and Markets in Emerging Economies*, *13*(1), 260-276. https://doi.org/10.15388/omee.2022.13.79

Chandrapala, P. (2011). The relationship between trading volume and stock returns. *Journal of Competitiveness*.

Chen et al. (2004). The price-volume relationship in China's commodity futures markets. Chinese Economy, 37(3), 87–122. https://doi.org/10.1080/10971475.2004.11033497

Chen, S. S. (2012). Revisiting the empirical linkages between stock returns and trading volume. *Journal of Banking & Finance*, *36*(6), 1781-1788. https://doi.org/10.1016/j.jbankfin.2012.02.003

Clark, P. K. (1973). A subordinated stochastic process model with finite variance for speculative prices. Econometrica: *Journal of the Econometric Society, 41(1)*, 135–155. https://doi.org/10.2307/1913889

Copeland, T. E. (1976). A model of asset trading under the assumption of sequential information arrival. *The Journal of Finance, 31(4)*, 1149-1168. https://doi.org/10.2307/2326280

Creswell, J. W. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage publications.

Epps, T. W., & Epps, M. L. (1976). The stochastic dependence of security price changes and transaction volumes: Implications for the mixture-of-distributions hypothesis. Econometrica: *Journal of the Econometric Society, 44(2)*, 305-321. https://doi.org/10.2307/1912726

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. The Journal of Finance, 25(2), 383–417. https://doi.org/10.2307/2325486

Granger, C., & Morgenstern, O. (1963). Spectral analysis of New York market prices. *Kyklos International Review of Social Science, 16(1), 1–27.* https://doi.org/10.1111/j.1467-6435.1963.tb00270.x

Granger, C. W.J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: journal of the Econometric Society*, 424-438.

Gueyie et al. (2022). Relationship between Stock Returns and Trading Volume at the Bourse Régionale des Valeurs Mobilières, West Africa. *International Journal of Financial Studies*, *10*(4), 113. https://doi.org/10.3390/ijfs10040113

Habib, N. M. (2011). The Egyptian market is an empirical study of trade volume and returnsin emerging stock markets. International Journal of Humanities and Social Science, 1(19), 302–312. https://doi.org/10.1080/1540496X.2005.11052599

Jennings, et al. (1981). An equilibrium model of asset trading with sequential informationarrival. *Journal of Finance 36*: 143–61. https://doi.org/10.1111/j.1540-6261.1981.tb03540.x

Jennings, R. H., & Barry, C. B. (1983). Information dissemination and portfolio choice. *Journal of Financial and Quantitative Analysis, 18(1)*, 1–19. https://doi.org/10.2307/2330801

Karpoff, J. M. (1987). The relation between price changes and trading volume: A survey. *Journal of Financial and Quantitative Analysis*, *22*(1), 109-126. https://doi.org/10.2307/2330874

Lee, B. S., & Rui, O. M. (2002). The dynamic relationship between stock returns and trading volume: Domestic and cross-country evidence. *Journal of Banking & Finance*, *26*(1), 51-78.https://doi.org/10.1016/S0378-4266(00)00173-4

Mahajan, S., & Singh, B. (2009). The empirical investigation of the relationship between return, volume, and volatility dynamics in the Indian stock market. *Eurasian Journal of Business and Economics, 2*, 113-137.

Moyo et al. (2018). Modelling the Effects of Trading Volume on Stock Return Volatility Using Conditional Heteroskedastic Models. Journal of Finance and Economics, 6(5), 193–200. DOI: 10.12691/jfe-6-5-5

Nepal Stock Exchange Limited. https://nepsealpha.com/nepse-data

Poudel, R. B., & Shrestha, S. R. (2019). Stock return and trading volume relation in Nepalese stock market: An ARDL approach. *SEBON JOURNAL 46,* 47-56. https://core.ac.uk/download/pdf/234695925.pdf

Ravi Kant (2011). Testing of the relationship between stock return and trading volume in India. *International Journal of Multidisciplinary Research, 1(6)*,371–393.

Tapa, A. & Hussin, M. (2016). The relationship between stock return and trading volume in the Malaysian ACE Market. *International Journal of Economics and Financial Issues, 6(7)*, 271-278. https://dergipark.org.tr/en/download/article-file/364053