Original Research Article

Distribution Nature of Trade Volume and Number of Trades at NEPSE Floor

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Abstract

Investors are concerned with market fluctuation. At NEPSE, market fluctuation is linked to the trade volume and number of shares traded during a specific day. A change in the benchmark index, NEPSE, in the Nepalese stock market depends on the market capitalization. Hence, to estimate the market pattern, a better understanding of the distribution nature of the trade volume and number of trades is beneficial to Nepalese investors. This ultimately helps an investor understand the market mechanism. The paper has followed basic descriptive statistics and a graphical presentation of the PP Plot, QQ Plot, and PDF Plot to test the normality and distribution nature of the NEPSE yearly trade volume and number of trades. Finally, the Sharpio-Wilk test, Jarque-Bera test, Kolmogorov-Smirnov test, and Anderson-Darling (A2) test are applied to test the goodness of fit for the observed and the respective NEPSE yearly trade volume and number of trades. The paper found that the NEPSE's yearly trade volume and number of trades from the year of its establishment to the fiscal year 2021–22 have a leptokurtic distribution. Similarly, the paper shows the distribution of trade volume and the number of trades toward non-normality. The probability distribution function reflects the log-normal (3P) distribution, also known as Galton's distribution, for both sets of data. The distribution of the NEPSE's yearly trade volume and number of trades is best fitted by Galton's distribution. The fitting of this specific distribution reflects a compounding effect on the transactions taped during the last two decades and more . Hence, an investor who enters in a NEPSE floor with a small numbers of scrips would multiply the numbers in a period of times.

Keywords: *NEPSE, trade volume, number of trades, distribution nature.*

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Introduction

Apart from stock price and index fluctuations, one can also measure market activities by looking at the trading volume viz; the number of shares traded and the number of trades. To obtain the corresponding distributions, one can normalize these variables by subtracting the mean and dividing by their standard deviation. As is evident, the distribution is remarkably similar for the different stocks, and the nature of the decay is significantly different from the power law (Sinha et al. 2011).

To get better information about the stock market; the market depth should be aware with the investor. It mainly involves information related to the number of stocks traded for a respective listed company and trade volume that are highly relevant in determining the market price of the listed securities. Therefore, microscopic interpretation and mechanism of price fluctuation are feasible with the help of information related to the trade volumes and number of trades conducted on the stock market floor.

There has been a long debate about whether the distribution nature of trading volume and the number of trades in the stock market have a universal characteristic. A study on the Indian stock market, it was found that the distribution for the trade volume and number of trades were not better fitted on power law but moved better towards the Gaussian distribution or either to Lévy stable, which ultimately rejected the universality of the volume distribution (Vijayaraghavan & Sinha, 2011).

Weber and Rosenow (2006) argued that a large trade volume alone is not a sufficient explanation for the fluctuation of stock prices. Mpofu (2012) revealed the stock returns at Johannesburg Stock Exchange were influenced by the change in the trade volume of stocks. In context to Sri Lanka, Pathirawasam (2011) disclosed that the stock returns are positively related to the contemporary changes in trading volumes. However, in the context of the Nepalese stock market, the benchmark index, NEPSE, is calculated based on market capitalization. The trade volume and number of trades that take place on the NEPSE floor closely determine the movement of the NEPSE Index. Shrestha (2016) found positive contemporaneous relationship between the trade volume of stocks and the return from NEPSE, further stating that trading volume have important information relate to the fluctuation in at the market. Similarly, contradictory to earlier result, Adhikari (2020) found no causal relationship between the trading volume and the return from NEPSE. Hence, the trade volume fluctuation

directly or indirectly influences the stock price fluctuation. Therefore, the information on trading size or volume and number of trades at the NEPSE floor reflects the dynamic of the price formation. Against this backdrop, the paper tries to find the distribution nature of the trade volume and number of shares traded at the Nepalese stock market.

Literature Review

Ajinkya and Jain (1989) studied an empirical distribution for the daily trading volume of the NYSE and found that the natural log transformation of the measured volume was approximately normally distributed.

Gopikrishnan et al. (2000) revealed that the determination of the distribution nature of the return from US stock markets could be done by going through the distribution nature of the number of shares traded and transaction data.

Tuncay and Stauffer (2006) found the daily trade volume of the NYSE was closer to power-law distribution, which was not matched with the return from the market.

Qiu et al. (2009) revealed that the trading volume in the Chinese stock market was well-fitted by a stretched exponential function, also known as complementary cumulative Weibull distribution. Similarly, Mu et al. (2009) discovered that the tail exponent of trading size and trade volume at the Shenzhen Stock Exchange best fit a power-law distribution, while the data from a small number of trades fit a q-Gama distribution.

Sun et al. (2010) discovered power-law tails for the total number of transactions and trading volume of each trader for the Chinese manipulated trading in the stock market published by the China Securities Regulatory Commission over a period. Kaizoji (2013), while studying the trading volume of the Tokyo Stock Exchange, found a better power law.

Halder and Das (2016) studied the distribution nature of trade volume for the developed nations and the developing nation's stock markets, concluding that the generalized Pareto distribution is the best fit for both types of stock markets. Similarly, Ahmad (2016) fitted the bivariate normal distribution for the monthly trade volume of the Muscat Securities Market.

In the context of Nepal, K.C. (2018) applied the support vector regression and fitted a general kernel for the daily trade volume at NEPSE, which helped with trend pattern tracking for portfolio optimization. Ran et al. (2019) investigated minute-by-

minute trade data from the Shanghai Stock Exchange, concluding that trade volume patterns follow the monetary policy cycle. Nirei et al. (2020) went through the daily trade volume of the Nikkei and found that the trade volume distribution was influenced by asymmetric information and the herd behavior of investors.

Research Methodology

To determine the distribution nature of the yearly trade volume and number of trades from NEPSE, the paper used descriptive statistics and the probability distribution function. Hence, the paper followed the descriptive research design. This paper used the Sharpio-Wilk test and Jarque-Bera test to test the normality of the trade volume and number of trades. In addition to these tests, a graphical presentation of the PP Plot, QQ Plot, and theoretical probability distribution (PDF) plotting are applied in the paper. The paper has also adopted the Kolmogorov-Smirnov test and the Anderson-Darling (A2) test to test the goodness of fit for the observed and the respective NEPSE yearly trade volume and number of trades.

The paper has used the yearly trade volume and number of trades' data from the establishment year (1994) of the Nepalese stock market, NEPSE, up to the fiscal year of 2021–22. Hence, the yearly trade volume and number of trades' data for the period of 29 years is used in the paper. Hence, the required data has been collected from the official website of the only secondary market of Nepal, Nepal Stock Exchange Limited.

Results and Discussions

The NEPSE yearly trade volume distribution is positively skewed (+3.57). The kurtosis (+12.38) shows leptokurtic distributions that are more peaked than the normal distribution.

Similarly, the NEPSE yearly number of trades distribution is positively skewed (+1.37). The kurtosis (+0.30) shows leptokurtic, which shows the distribution as more peaked than the normal distribution.

As the NEPSE yearly trade volume and the number of trades have a positive skewness, the curve for their frequency distribution has a longer tail on the right. The mean and median also reflect a similar nature, i.e., the mean value is greater than the median value.

Table 1

Descriptive Statistics for NEPSE Yearly Trade Volume and Number of Trades

Statistics	Trade Volume (v)	Number of Trades (n)
Mean	290049724.1	471797276.0
Median	26231000	150800000
Standard Deviation	758566484.1	628879946.4
Variance	575423110000	14620188000000
Skewness	+3.57	+1.37
Kurtosis	+12.38	+0.30
Range	3403520000	1839416002
No. of observation	29	29

Normality Test for NEPSE Yearly Trade Volume and Number of Trades

The statistical results and graphical presentation of the NEPSE yearly trade volume and number of trades reflect the distribution nature and normality test for the respective data.

Table 2

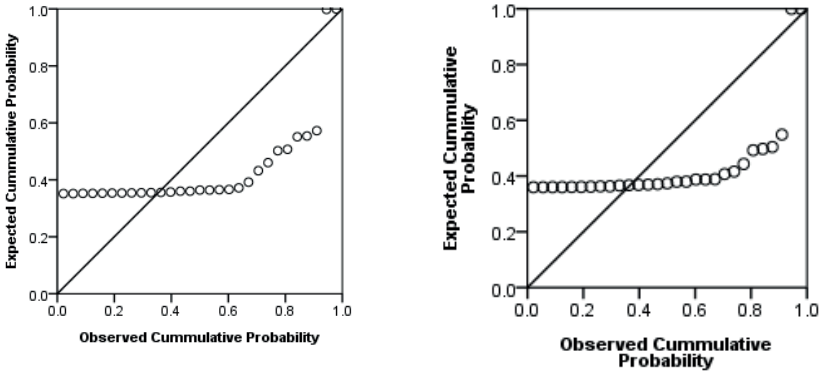
Normality Statistics for NEPSE Yearly Trade Volume and Number of Trades

Statistics	Trade Volume (v)	Number of Trades (n)
Shapiro-Wilk	0.4195 (0.000)	0.7179 (0.000)
Jarque-Bera	179.3883 (0.000)	8.1208 (0.0172)

The p-value is less than 0.01, hence; as per the Sharpio-Wilk test, the distribution for trade volume and number of trades are non-normality. Similarly, the Jarque-Bera Statistics are not closer to zero with a significant value, and the trade volume and number of trades distribution are non-normality.

Figure 1

PP Plot for Trade Volume and Number of Trades

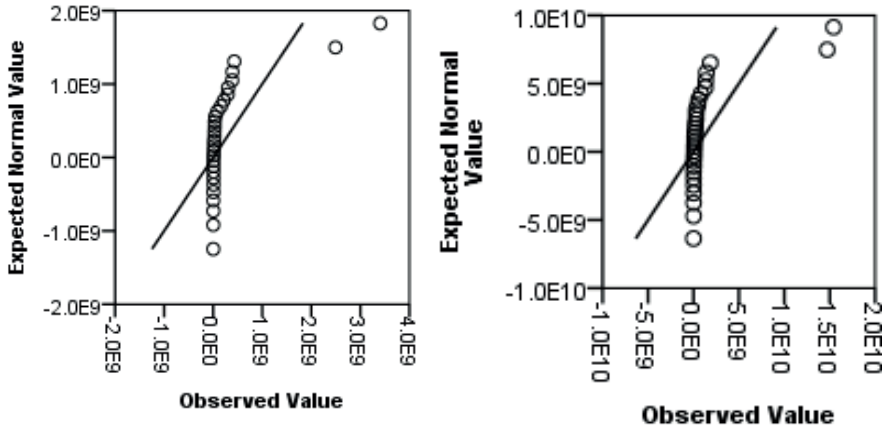


The PP Plot for both the NEPSE yearly trade volume and a number of trades is not in a perfect 'S-shaped' lying around the 45-degree straight line. The Plot is scattered away from the straight line; hence, the NEPSE yearly trade volume and number of trades followed non-normality.

As seen in Figure 1, the QQ Plot for both the NEPSE yearly trade volume and number of trades are scattered away from the 45-degree straight line. Hence, both the yearly trade volume and the number of trades are far from normal distribution.

Figure 2

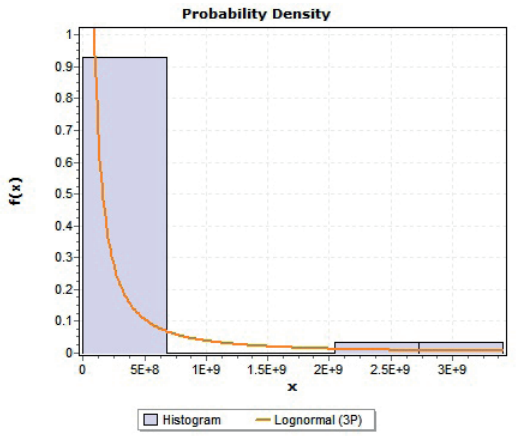
QQ Plot for Trade Volume and Number of Trades



As seen in Figure 2, the QQ Plot for both the NEPSE yearly trade volume and number of trades are scattered away from the 45-degree straight line. Hence, both the yearly trade volume and the number of trades are far from normal distribution.

Figure 3

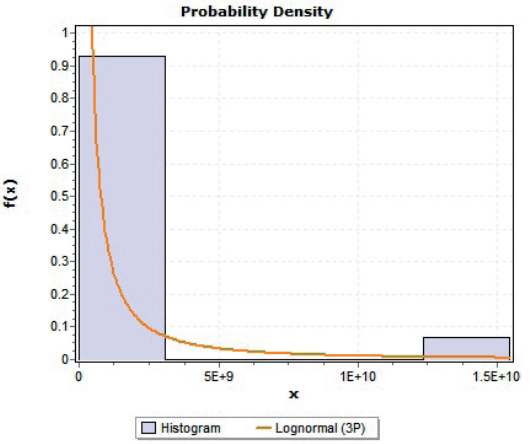
Probability Distribution Function (PDF) Plot for Trade Volume



The distribution for the NEPSE yearly trade volume is best-fitted on log-normal (3P), which shows that the logarithm of the trade volume will turn into the normal distribution and is a general skew distribution.

Figure 4

Probability Distribution Function (PDF) Plot for Numbers of Trades



As of yearly NEPSE trade volume, the plotted probability distribution function (PDF) plot clearly picture out log-normal (3P) distribution for the NEPSE yearly number of trades. The three parameters log-normal distribution is a general skew distribution.

Table 3

Best-Fitted Distribution for NEPSE Yearly Trade Volume and Number of Trades

Description	Distribution	K-S Statistics	A2 Statistics	Parameters
Trade Volume	Log-normal (3P)	0.08617	0.32372	=2.647, =16.973, =9.7856E+5
Number of Trades	Log-normal (3P)	0.06814	0.20055	=2.4458, =18.659, =9.1796E+6

The best-fit distribution for the NEPSE yearly trade volume and number of trades is log-normal (3P), also known as Galton's distribution (1889). The small change in the parameters of the log-normal distribution changes the nature of the distribution to normality. However, the study in the stock trade volumes in the developed nations found to best fitted on power-law. Tuncay and Stauffer (2006) saw the trade volume of US stock market fitted on power-law, as well as Sun et al. (2020) for Chinese stock market or Kaizoji (2013) for Japanese stock market, the trade volume was seen closer to power-law distribution. Halder and Das (2016) fitted on generalized Pareto distribution, while Ahmad (2016) fitted on bivariate normal distribution for the trade volumes of developed nations as well as for the developing nations and for the Muscat Securities market respectively. Nevertheless, the log-normal distribution shows the NEPSE yearly trade volume and number of trades are positively skewed and will have a compound effect on the distribution over time . Therefore, a peculiar nature of distribution for the yearly trade volume and number of trades are seen for the Nepalese stock market, NEPSE.

Conclusion and Implication

A piece of information regarding the trade volumes and number of trades on the stock market floor is valuable to investors. Investors attach great importance to the

return information from the stock market; the information regarding the trade volume and number of trades helps to give an insight into the pattern of stock market movement and fluctuation.

The distribution nature of the yearly trade volumes and number of trades for the Nepalese stock market was found to be away from normality and better fitted on a log-normal distribution, according to the paper. The NEPSE yearly trade volume and number of trades distribution is more peaked than the normal distribution.

If Nepalese investors follow the yearly trade volume and number of trade patterns, the compound effect of a transaction might lead to the formation of a stock portfolio.

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