Paradigm Academic Press
Frontiers in Management Science
ISSN 2788-8592
FEB. 2023 VOL.2, NO.1

Distribution Nature of Month-Wise Return from Nepalese Stock Market (NEPSE)

Rashesh Vaidya[1], Dilli Raj Sharma[2] & Jeetendra Dangol[3]

[1] PhD Scholar, Faculty of Management, Tribhuvan University, Kathmandu, Nepal

[2] Dean, Faculty of Management, Tribhuvan University, Kathmandu, Nepal

[3] Associate Professor, Public Youth Campus, Faculty of Management, Tribhuvan University, Kathmandu, Nepal

Correspondence: Rashesh Vaidya, PhD Scholar, Faculty of Management, Tribhuvan University, Kathmandu, Nepal.

doi:10.56397/FMS.2023.02.01

Abstract

The returns' distribution nature from the stock market is a concern for investors to determine the future trend of the market. An assumption of normality for the stock market returns concerned the academician and investors. Nevertheless, the random walk theory assumes randomness in the market return. In this context, the paper studied the distribution nature of the month-wise returns from the Nepalese Stock Market (NEPSE). The paper revealed month-wise returns far away from normality. Similarly, going through each month-wise return, an extreme value theory (EVT) based distribution better fitted for most of the month-wise returns from NEPSE. Nevertheless, the return distribution for the month of mid-December, mid-July, and mid-November was predictable in nature.

Keywords: distribution nature, stock market, return, month-wise, EVT, NEPSE

1. Background

Interest in the market return distribution nature started from the paper of Mandelbrot (1963), where the tails for changing monthly spot cotton price distribution fitted on a Pareto distribution. Opinions vary among scientists as to the shape of the distribution of returns' tails. While there is general agreement that the distribution of returns and volatility has fat tails for large values of returns and volatility, there is still room for a considerable measure of the return distribution. The evolution of the theory of Efficient Market Hypothesis (EMH) by Fama (1965) also brought the importance of historical data on the stock market to predict the future trend of the market under the weak form of EMH. Hence, Hagerman and Richmond (1973) also studied the monthly return pattern of NYSE on an assumption of the random walk theory as stated under the EMH.

The monthly effect on the stock market also shows an influence of information in the market, reflecting the monthly anomalies in the market return as well. Hence, the distribution nature of the month-wise return from the market also helps to determine the randomness of the return and test an assumption of normality of the return from the stock market. Thus, the paper has tested the normality for the month-wise return from the Nepalese stock market (NEPSE).

The paper also tries to find out the statistical distribution nature of the month-wise return from the NEPSE.

2. Literature Review

Hagerman and Richmond (1973) studied the monthly returns of OTC traded securities of NYSE, where the returns were consistent with a random walk with the non-normal symmetric stable distribution.

Praetz and Wilson (1978) found the stable Paretian and Student's t-distribution best fitted for the monthly return

from the Melbourne Stock Exchange. Similarly, Beedles (1979) stated that using log-return instead of simple return for the monthly returns of NYSE did not show any conformity of the theory but let to make confirmation with mathematical aspects only. Stokie (1982) also revealed that monthly log returns of major Australian securities lead to compatibility with normal distribution.

A study on monthly returns from the Swedish stock market by Frennberg and Hansson (1993) found a peaked and fat-tailed distribution, with positive first-order autocorrelation, strong seasonality, and changing volatility over time was observed for return.

Odabasi et al. (2004) revealed from the monthly return distribution nature of the Istanbul stock exchange that when the market return moves closer to the normality the information from the market was seen efficient.

Saini and Dhankar (2011) tested the normality of the monthly return from Sensex, BSE 100, and BSE 500, where the paper found symmetric distribution for the respective returns. At the same time, Zheng (2012) found GARCH-Student's t-distribution and GARCHSGED better prediction results for the monthly returns from S&P/ASX 200 Index and ASX All Ordinaries Index. In the context of the Nepalese stock market, Dangol (2012) found normality in the monthly return during the study period.

Similarly, Adu et al. (2015) studied the monthly return from BRICS nations, where the return distribution peakedness exhibited fatter and longer tails. Eke (2016) revealed that logistics distribution better help to predict the monthly return from the Nigerian stock market than a normal distribution. Ahmad (2016) saw the bi-variate normal distribution better fitted for the monthly return from Muscat Security Market. As per Naumoski et al. (2017), the time factor was seen as a major factor that determined the return distribution for the monthly return from the stock market.

Viswanathan and Maheswaran (2017) developed a K-month analysis to determine the distribution pattern of the monthly return from the stock market, where it was found a mixture of normal distribution was suitable to predict the market.

Borowski (2018) studied the return patterns of 65 equity indices where the monthly closing to closing, opening to opening, and opening to closing from nine stock markets was fitted in a normal distribution.

Jakata and Chikobvu (2019) revealed that the upside risk of the South African Financial Index (J580) out-weighted the downside risks, which would help investors in the hedging and investment decision-making process.

3. Data and Sample

The paper has used the month-wise return from the Nepalese stock market from the fiscal year 1999 to 2022. The fiscal year in Nepal ends in the month of mid-July. Therefore, the 24 years of monthly returns are considered in the paper for determining the distribution nature of the monthly return from NEPSE.

4. Methods of Analysis

The paper followed descriptive statistics and the probability distribution function to determine the distribution nature of the month-wise returns from NEPSE. The paper has also adopted Kolmogorov-Smirnov Test and Anderson-Darling Test to test the goodness of fit for the observed and theoretical probability distribution (PDF) for the respective month-wise returns.

5. Data Analysis

The sections cover the analysis of month-wise return from NEPSE to determine the distribution nature.

Table 1. Descriptive Statistics of the Month-wise returns from NEPSE

Month	Mean	S.E.	Range	Variance	S.D.	Sk.	Ku.	Median
Mid-Aug.	+1.94	1.41	33.29	48.143	6.94	+0.36	+1.41	1.34
Mid-Sept.	+1.04	1.60	33.10	61.339	7.83	+0.87	+0.91	0.40
Mid-Oct.	-0.05	1.02	17.75	25.096	5.00	-0.43	-0.24	0.12
Mid-Nov.	+0.26	1.22	25.46	35.917	5.99	-0.49	+0.41	0.48
Mid-Dec.	-2.23	1.65	36.22	65.003	8.06	+0.31	+0.77	-1.69
Mid-Jan.	+2.08	1.46	28.73	51.417	7.17	+0.82	+0.30	1.01
Mid-Feb.	+2.07	1.59	34.50	61.049	7.81	+0.62	+0.57	0.76
Mid-Mar.	+0.75	1.42	29.52	48.175	6.94	+0.44	+0.68	0.44

Mid-Apr.	+5.88	1.73	34.36	71.418	8.45	+0.57	+0.44	4.09
Mid-May	+2.07	1.58	39.77	60.051	7.75	-0.24	+2.19	1.17
Mid-Jun.*	-0.85	1.77	27.63	71.845	8.48	+0.56	-0.67	-2.23
Mid-Jul.	+1.28	0.93	20.96	20.904	4.57	+0.76	+1.86	1.69

Note: S.E. is standard error, S.D. is standard deviation, Sk. is skewness, Ku. is kurtosis, and number of observations. For mid-Jun. One-month is less due to COVID-19 lockdown for the year of 2019. The trading was halted for a whole one-month at NEPSE.

The highest average month-wise return is seen for mid-April with +5.88 percent. The basic logic behind the highest return is an expectation of Nepalese investors to generate better returns by looking at the third quarter's financial report published by the listed companies. The fourth quarter of the fiscal year of the Nepalese financial calendar ends in the month of mid-July.

The highest level of variance and standard deviation were seen for the month of mid-Jun. with 71.845 and 8.48 respectively, just before the closing month of the fiscal year.

Looking at the measure of dispersion, the month-wise return during the months of mid-Oct., mid-Nov. and mid-May are skewed negatively.

Overall results from the descriptive statistics for the month-wise returns from NEPSE reflect significant departure from a normal distribution.

Table 2. Distribution Nature and Parameters of the Month-wise returns from NEPSE

Month	**Distribution**	**KS Statistics**	**A2 Statistics**	**Parameters**
Mid-Aug.	GEV	0.11051	0.43314	k=-0.16702, μ=0.77873
Mid-Sept.	Rayleigh (2P)	0.0849	0.19123	σ= 11.228, γ = -12.812
Mid-Oct.	GEV	0.135	0.36933	k=-0.146331, σ= 5.4355, μ=1.3878
Mid-Nov.	Log-normal (3P)	0.05701	0.20069	σ= 0.029, μ=5.3137, γ = -202.97
Mid-Dec.	Logistic	0.1078	0.22292	σ=-4.445, μ=-2.2308
Mid-Jan.	GEV	0.10306	0.19132	k= 0.0323, σ= 5.6616, μ=-1.3715
Mid-Feb.	Chi-square (2P)	0.08358	0.30709	v=28, γ = -26.392
Mid-Mar.	Gumbel Max	0.07624	0.412	σ=5.4117 μ=-2.3725
Mid-Apr.	Gumbel Max	0.07624	0.412	σ=6.5892 μ=2.0746
Mid-May	Gumbel Max	0.07138	0.95611	σ=6.0421 μ=-1.4172
Mid-Jun.	General Pareto	0.07775	0.18656	k= -0.47698, σ= 17.887,

Mid-Jul.	Logistic	0.07592	0.209	μ=-12.956 σ= 2.5207, μ=-1.28

The month-wise returns for the months of mid-Aug., mid-Oct. and mid-Jan. fitted on Generalized Extreme Value (GEV) distribution, also known as Fisher-Tippett distribution. The returns during these months occurred due to certain extreme events or rare events. Therefore, unprecedented events let the return from the market highly unpredictable.

Gumbel Max distribution is best-fitted for the month-wise returns from the months of mid-Mar., mid-Apr. And mid-May. It is also a type of Extreme Value Theory (EVT)-based distribution. Hence, certain extreme events normally hamper the regular returns from the stock market.

The NEPSE monthly returns for the month of mid-Dec. and mid-Jul. resemble normal distribution with heavier tails, i.e., having higher kurtosis. Hence, the nature of the logistic distribution is best-fitted for these months' returns. This reflects that the Nepalese investors could predict expected returns from the trading during the months of mid-Dec. and mid-Jul. with the help of two parameters mean and standard deviation of the market return.

Rayleigh (2P) distribution is bets-fitted for the month-wise return for the month of mid-Sept. This reflects the return reflects randomness with components independently and identically distributed Gaussian with equal variance and zero mean.

Galton distribution or log-normal (3P) distribution is best-fitted for the month-wise return for the month of mid-Nov. This distribution has a short lower tail and a fatter upper tail, skewed to the right. The return is continuously compounded during the period.

Chi-square distribution, a special case of the gamma distribution is best-fitted for the month-wise return for the month of mid-Feb. This distribution shape depends on the degree of freedom. When the degree of freedom, i.e., 'ν' is small, the shape of the curve tends to be skewed to the right, and as the 'ν' gets larger, the shape becomes more symmetrical and can be approximated by the normal distribution.

The month-wise return for the month of mid-Jun. best fitted on General Pareto distribution. The distribution is determined based on three parameters, namely, locations (μ), scale (σ), and shape (k). Hence, a power behavior can determine for mid-Jun. return with the help of Hill estimator. The month of mid-Jun is just before the closing of the fiscal year in the context of the Nepalese economy. Most listed companies publish the notice for the Annual General Meeting and propose the final dividend and bonus to the shareholders. In this context, speculation rises among the investor, which ultimately leads to power behavior during this month.

6. Conclusion and Implications

An assumption of normal distribution for the return from the stock market is irrelevant. Randomness in return from the stock market does not let the return distribution best fit a normal distribution. In the context of the Nepalese stock market, investors use a return to estimate the future trend of the market. The Nepalese fiscal year ends in mid-July, and financial reports of the listed companies come public quarterly. Hence, a specific concern among the investors goes on the quarter-end months of the Nepalese calendar. The specific distribution nature of the month-wise return for the specific month also reflects the sentiments of Nepalese investors in general. Looking at the return distribution nature for the month of mid-Jul., the General Pareto distribution is best-fitted, which shows a high level of return where the high-level threshold exceeds due to the occurrence of extreme events.

The distribution nature for twelve month-wise returns from NEPSE varies differently. In most cases, the return distribution is reflected with extreme value theory (EVT). Most of the time, there is a high level of randomness during the twelve months periods in NEPSE. Nevertheless, it is to be noted that the nature of the return distribution does not remain the same and should not be assumed to remain the same in coming periods, as well as for the NEPSE monthly return, as a high level of randomness is seen for most of the month-wise returns.

Fund Project

The Ph.D. scholar acknowledges University Grant Commission, Nepal, for providing a research grant [Award No.: PhD-75/76-Mgmt-8] to conduct this part of the research work.

References

Adu, G., Alagidede, P., & Karima, A. (2015). Stock return distribution in the BRICS. *Review of Development*

Finance, 5(2), 98-109. https://doi.org/10.1016/j.rdf.2015.09.002.

Ahmad, M.I. (2016). Joint distribution of stock market returns and trading volume. *Review of Integrative Business & Economics Research, 5*(3), 110-116.

Borowski, K. (2018). Testing 65 equity indexed for normal distribution of returns. *Journal of Economics and Management, 34*(4), 5-38. https://doi.org/10.22367/jem.2018.34-01.

Dangol, J. (2012). Testing distribution of risk and return in Nepalese stock market. *PYC Journal of Management, 5*(1), 77-85.

Eke, C.N. (2016). Comparative analysis of normal and logistic distributions modeling of stock exchange monthly returns in Nigeria (1995-2014). *International Journal of Business & Law Research, 4*(4), 58-66.

Fama, E.F. (1965). The behavior of stock-market price. *Journal of Finance, 38*(1), 34-105. https://doi.org/10.1086/294743.

Fisher, R.A., & Tippett, L.H.C. (1928). Limiting forms of the frequency distribution of the largest and smallest member of a sample, *Mathematical Proceedings of the Cambridge Philosophical Society*, *24*(2), 180-190. https://doi.org/10.1017/s0305004100015681.

Frennberg, P., & Hansson, B. (1993). Some distributional properties of monthly stock returns in Sweden 1919-1990. *Finnish Economic Papers, 6*(2), 108-122.

Galton, F. (1914). *Hereditary genius: An inquiry into its laws and consequences*. Macmillan.

Gumbel, E.J. (1935). Les valeurs extrêmes des distributions statistiques [The extreme values of statistical distributions]. *Annales de l'Institut Henri Poincaré [Annals of the Henri Poincaré Institute]*, *5*(2), 115-158.

Gumbel, E.J. (1958). *Statistics of extremes.* Columbia University Press.

Jakata, O., & Chikobvu, D. (2019). Modeling extreme risk of the South African Financial Index (J580) using the generalized Pareto distribution. *Journal of Economic and Financial Science, 12*(1), 1-7. https://doi.org/10.4102/jef.v12il.407.

Mandelbrot, B.B. (1963). The variation of certain speculative price. *Journal of Business, 36*(4), 394-419. https://doi.org/10.1086/294632.

Naumoski, A., Gaber, S., & Gaber-Naumoska, V. (2017). Empirical distribution of stock returns of Southeast European emerging markets. *UTMS Journal of Economics, 8*(2), 67-77. https://handle.net/20.500.12188/5257.

Odabasi, A., Aksu, C., & Akgiray, V. (2004). The statistical evolution of prices on the Istanbul stock exchange. *The European Journal of Finance, 19*(6), 510-525. https://doi.org/10.1080/1351847032000166931.

Praetz, P., & Wilson, E.J.G. (1978). The distribution of stock market returns: 1958-1973. *Australian Journal of Management, 3*(1), 79-90. https://doi.org/10.1177/031289627800300106.

Rayleigh, L. (1880). On the resultant of a large number of vibrations of the same pitch and of arbitrary phase. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, 10*(60), 73-78. https://doi.org/10.1080/4786448008626893.

Saini, R.K., & Dhankar, R.S. (2011). Distribution of risk and return: A test of normality in Indian stock market. *South Asian Journal of Management: SAJM, 18*(1). 109-118.

Viswanathan, L., & Maheswaran, S. (2017). An investigation into non-normality of stock returns. *Asian Journal of Empirical Research, 7*(2), 19-27. https://doi.org/10.18488/journal.1007/2017.7.2/1007.2.19.27.

Zheng, X. (2012). Empirical analysis of stock return distribution's impact upon market volatility: Experiences from Australia. *International Review of Business Research Papers, 3*(5), 157-176. https://doi.org/10.2139/ssrn.1972916.

Copyrights