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Optimum Portfolio Construction Using Single Index Model: An Empirical Study of Nepal Stock Exchange

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Abstract

Purpose: The purpose of this paper is to construct the optimum portfolio of eight sectors listed in NEPSE applying the Sharpe's single index model.

Design/Methodology/Approach: Adopting the judgement sampling method, eight sectors were selected for the study. The study period was taken from august 2018 to august 2021 for the three years period as this time frame is the recent bull period. During this period the market index increased from around 1100 to an all-time high index 3200. To construct the optimum portfolio, daily returns of the market and sectors were used. Cut off rate (C*) was calculated in order to form the optimum portfolio using daily basis data. Those sectors whose excess return to beta ratio is higher than cut off rate were included in the optimum portfolio.

Findings: The study revealed five sectors- non-life insurance, hydro power, finance, microfinance, and development bank- form the optimum portfolio. In terms of ratio of investment in the optimum portfolio, the proportion of investment is found higher in the finance sector (36.6%) and lower in the development bank sector (11%). Furthermore, in terms of unsystematic risk, non-life insurance (3.681) and hydro power sector (3.508) are found as risky sectors compared to other sectors. This study exclusively used the bull period data to form the optimum portfolio applying the Sharpe's single index model in a daily basis data.

Implications: The finding can help the investors to make informed decisions aligned with their risk tolerance, return expectation and overall investment objectives.

Keywords: Single index model, optimum portfolio, expected risk and return, sectorial stock index, investment, and NEPSE.

Introduction

Investors are characterized into different categories based on their risk-taking attitude, such as high-risk avoiders, medium risk avoiders and low risk avoiders. In the stock market, investment in individual security always seems riskier. So, there is a saying that "Do not Put all your eggs in One Basket" (Afik, 2015). Thus, investors want to diversify their risk investing in more than one security or a group of securities, which is known as a "Portfolio". Portfolio helps in diversifying the risk, higher the number of securities in the portfolio; lower the risk. One of the main challenges for the investor is to form the optimum portfolio - optimum portfolio is the combination of different stocks with the highest expected return at the lowest risk for a given level of expected return.

Thus, using the daily return of the sectorial index and NEPSE index, the paper constructed the optimum portfolio in terms of sector wise investment applying the Sharpe's single index model.

Securities risk and return relationship is taken as one of the key indicators in determining the investment alternative to gain high return at the same or low level of risk. In the today's world, different financial models are developed to determine the optimum portfolio. The development of the sophisticated data analysis software broadens the scope of testing the financial models in large scale data and helps to implement these models in real market using the real time data. One of them is the Sharpe Single Index Model which is more frequently used to determine the optimum portfolio of securities listed under stock exchange taking the market index as the major indicator for determining the return of the security and portfolio.

Stock market is one of the main platforms for investment. Even an investor having small capital can enter into the market with those who have huge availability of capital. Thus, stock market provides the opportunities to all types of investors. It is the back bone of the country for the financial growth and overall development of the country as this opens avenues for business establishment and business growth. The provision of stock market in the country facilitates the public company to generate funds through initial public offering (IPO) for the growth of the company in terms of size and equity. Investors are interested to invest in the company whose financial indicator and future prospect for the growth are good. Oli (2018) revealed that Nepalese people are lacking the sufficient financial literacy as it should be. This suggest that, in the developing country like Nepal, most of the time, investors invest in the security via secondary market without having proper financial knowledge of the market. Thus, people invest seeking the suggesting from other rather than using their own knowledge. Consequently, these people are more likely to face the loss in the market due to insufficient knowledge.

When it comes to financially related decisions, normally people tend to follow others' actions and behaviors to optimize their portfolio return or to minimize the risk of their own portfolio. One of the unavoidable characteristics of human being is their habit of herding, which suggest that rather than making the decisions on the basis of proper analysis, they follow the group and consensus. According to strong form of efficient market hypothesis, stock price reflects the all-available information. But in the presence of herding behavior among the investors, stock price deviates from their true value. Thus, it is important for the investor to form the optimum portfolio for the better return using the well-established financial model. Thus, this paper aims to form the sector-wise optimum portfolio by using single index model.

The main objective of NEPSE is to impart free marketability and liquidity to the government and corporate securities by facilitating transactions in its trading floor through market intermediaries,

such as broker, market makers etc. NEPSE started its trading floor from the month of January 1994. Those companies who want to convert their company into public company, NEPSE is the only one option till date to issue the public shares in Nepal. The companies which are listed in NEPSE has been divided into 13 sectors namely banking, trading, hotels and tourism, development banks, hydro power, finance, non-life insurance, life insurance, manufacturing and production, microfinance, mutual fund, investment, and others. NEPSE index is the representative of these 13 sectorial indices. It is calculated on the basis of market capitalization. Since its establishment, the highest NEPSE index was recorded 3198.6, on August 2021 and total market capitalizations of that day was Rs. 4,216,001.62 million (Annul report 2021 published by NEPSE). In terms of share of market capitalization, more than one third of the share of market capitalization is concentrated to banking sector with around 38% points according to annual report of fiscal year 2021 published by NEPSE and remaining share of market capitalizations is distributed to the remaining 12 sectors. This suggest the NEPSE index is very sensitive to price change of banking sector.

Table 1: Sectorial Index with the Market Capitalization based on August 2021

NEPSE Index	3,180.78	Share of market capitalization
Sectorial Indices		
Banking	2,081.6	37.72
Development Bank	6,130.4	4.20
Finance	3,125.8	2.10
Hotels And Tourism	3,606.6	1.53
Hydro Power	3,751.1	8.40
Investment	118.4	8.07
Life Insurance	18,222.0	8.64
Manufacturing And Processing	7,455.4	3.68
Microfinance	5,991.0	9.53
Non-Life Insurance	14,775.8	6.69
Others	2,074.2	8.89

Rational investor invests looking at the return and risk combination of different securities and they diversify their investment portfolio by forming the optimal portfolio to reduce the risk and increase the return. Different models and methods are developed to construct the optimal portfolio.

Literature Review

Markowitz developed the portfolio theory to determine the optimal portfolio using the concept of rate of return and risk measured in term of variance and covariance of portfolio with the fundamental assumption that the investors are risk-averse (Markowitz & Todd, 2000). He showed that the variance of the rate of return is a significant measure of portfolio risk under the several set of assumptions. One cumbersome of this theory is that it requires calculation of large number of rates of return, variance and covariance if the number of securities increases. For example, for "n" securities, it requires the calculation of "n" number of rate of return, "n" number of variance and n (n-1)/2 covariances. Sharpe developed the simplified model for the construction of optimal portfolio called Sharpe Singe Index Model (SIM). This

model takes the market index as the main variable to find the optimal portfolio as some security or portfolio move with market index and some move in opposite direction of market index.

A rational investor always makes decision to form the optimum portfolio based on the scientific research findings. However, in general, investors can minimize the risk by diversifying their own portfolio. In the determination of optimum portfolio, Markowitz devoted his time in the construction of optimum portfolio between 1952 and 1959, and become the pioneer by developing model to determine the optimum portfolio taking the variance of the return as the major indicator of risk parameter with regard to return. But this model is difficult in application as it requires large number of calculations.

The single index model which was developed by William Sharpe (1964) taking the reference of Markowitz model is very simplified and effective model in the construction of optimum portfolio when short data histories are available. Thus, single index model plays a significant role in the construction of optimum portfolio and its structure is very simple and useful (Sarita & Meenakshi, 2012). Dutt (1998), Singh &Gautam,(2014), Saravanan & Natarajan (2012) have applied this method to form the optimum portfolio. (e.g.,).

Gautam et al. (2014) used the CAMEL Model to evaluate six Indian banks. HDFC Bank Ltd. ranked first, and Bank of India ranked third, requiring supervisory attention. The study employed discriminant analysis to predict financially unstable banks. Although effective, it did not consider share prices and volatility in sectorial indices. The researcher suggested applying the single index model for future evaluations of HDFC Bank and Bank of India stocks, using the Nifty Bank Index as the market index.

Kumar et al. (2014) also applied the single index model on securities with the highest and lowest market capitalization of banking sector companies in India namely HDFC Bank and Bank of India (BOI) taking the monthly data of five years from 2011 to 2016 taking the sector index- Nifty Bank Index as the market index. They found that the security with low market capitalization is more volatile to sectorial index i.e. index of bank of India (bank with lowest market capitalization) is more volatile to sectorial Nifty Bank Index in comparisons to HDFC bank (bank with a highest market capitalization).

Singh and Gautam (2014) applied the single index model to determine the optimum portfolio using cut off point taking 10 companies listed at National Stock Exchange (NSE) of India in the sample. The sectorial CNX Bank price index is taken as the proxy of the market index for this study taking a sample of 5 years data in monthly basis from January 2009 to December 2013. This study revealed that out of 10 companies which are listed in NSE, portfolio of two companies-Federal Bank and Yes Bank- are better for the investments as compared to portfolio of remaining 8 companies.

Kamil (2015) used the single index model on portfolio analysis taking a sample of 10 companies listed in the Kuala Lumpur Stock Exchange (KLSE) of Malaysia. Two types of data were collected for these 10 companies – one analysis was based on daily basis data and second analysis was based on weekly basis data. The data were collected during the period of 15, October 2002 to 18 march 2003 for 100 trading days. This study showed that 5 companies formed the optimum portfolio in daily basis data while two companies formed the optimum portfolio in weekly basis data out of total 10 companies selected in the sample. Furthermore, the study revealed that weekly analysis provided a portfolio having a higher profit level and lower risk level compared to analysis based on daily basis data.

Mahmud (2019) used the single index model on 178 companies listed on the Dhaka Stock Exchange (DSE), to construct the optimum portfolio and revealed 54 companies were selected for optimum portfolio construction out of 178 companies taking the month-ended closing price of the securities for

the period starting from January 2013 to February 2018. Nalini (2014) applied the single index model on the different 15 companies listed in S&P BSE Sensed index to construct an optimum portfolio. This study concluded that among the sampled 15 companies, only four companies belong to the optimum portfolio. Rout and Panda (2020) also applied the single index model on 25 stocks of S&P BSE of Indian stock market taking the data for the period from January 2009 to December 2019. This study showed that out of 25 companies taken for the study, 7 companies shown negative returns and the other 18 companies shown positive returns. Among the 25 companies, the findings shown 10 companies outperformed the market.

Rabha and Singh (2021) used the single index model on optimal portfolio construction using Indian blue-chips stocks for the study both weekly and monthly securities return performance, beta values, market risk and company risk. Weekly data analysis showed that out of the 27 NSE blue-chips securities, only one security was eligible for the optimal portfolio, however while using monthly data, 18 securities were found eligible for the optimal portfolio. This suggests that monthly data is more suitable for this model due to lower volatility and better predictability returns.

Chandra and Bagrecha (2022) applied the single index model to study of BSE Sensex constituent companies' study was able to determine that there are few stocks that are negatively co-related to the market. The study found that 12 companies' stock have beta greater than 1. Indusland bank's stock is the most volatile stock containing beta value 2.31 among the 30 stocks in Sensex index. The cut off point is 2.0943.

Purpose of the Study

The main purpose of this study is to construct the optimum portfolio and ratio of investment in the optimum portfolio to inform the investor for their investment strategy across the different sectors of NEPSE using the Single Index Model (SIM) developed by Sharpe. Out the 13 different sectors for the investments as categorized by Nepal Stock Exchange (NEPSE), 8 sectors- commercial bank, development bank, finance, hydro power, life insurance, non-life insurance, micro finance, and manufacturing sectors are included in the sample taking the data of last three years from August 2018 to August 2021 for 674 trading days. In the developed country, investor invest in the market making optimum portfolio. Dozens of research are available in the area of optimum portfolio construction, the findings of these paper helps the investor to optimum portfolio. However, in the developing country like Nepal, most of the time, investors invest in the stock market without having access to study which are focused on developing the optimum portfolio. Thus, this paper aims to fill this gap by constructing the optimum portfolio in terms of sectors of NEPSE.

Methods

Sampling method:

The study employed a judgment sampling method to determine the study's time frame and to select specific sectors, taking into account factors such as market dynamics, market capitalization, data availability, and the number of securities within each sector. Out of the 13 sectors listed on the NEPSE, eight were chosen for optimal portfolio construction. The excluded sectors were Investment, Others, Mutual Fund, Hotel, and Tourism. The research focused on constructing the optimum portfolio during the recent bull cycle, initiated in August 2018, when the market index was around 1,100 and reached an all-time high of approximately 3,200 in August 2021. The study specifically covers the three-year period from August 2018 to August 2021, reflecting the duration of the recent bull cycle. The exclusion of the Hotel and Tourism sector is attributed to the lack of price movement during this bull cycle due to the impact of COVID-19. The Investment sector was omitted because it was a newly created sector on the NEPSE, resulting in a lack of available data. The Other sector was excluded due to its limited

composition, consisting only of two high-cap stocks, NTC and NRIC, which had a significant impact on market movements. Similarly, the Trading sector, comprising only STC and BBC with small market capitalization and minimal market impact, was not included in the study. Finally, Mutual Fund was excluded as it was deemed incomparable to other sectors as their prices are not volatile.

To determine the optimum portfolio in terms of sector wise investment of NEPSE applying the Sharpe's Single Index Model on daily basis data of market return and sector wise return. This model considers the market index and sectorial indices. The market index is considered as cause of the systematic risk which affects sectorial return. Mathematically this model is expressed as

$$R_{it} = \propto_{it} + \beta_{it} R_{mt} + e_{it} - - - - - - - - (1)$$

Where

R_{it} is the return of sectorial index "i" at time "t"

β_{it} is the slope of regressions for the sectorial index "i" at time "t"

$\propto_{it}$ is the intercept of the regression for the sectorial index "i" at time "t"

R_{mt} is the market return at time "t"

e_{it} is the error terms for the sectorial index "i" at time "t"

Daily return of the sector-wise index is calculated with the following equation (2)

$$R_{it} = \frac{P_{it}}{P_{i(t-1)}} - 1 \text{ ---------- (2)}$$

Where Pit and Pi (t-1) are the sector-wise index "i" at time t and t-1 respectively and Rit is the return of sector 'i' at time't'.

In the Sharpe's single index model, the average rate of return of individual stock or portfolio are adjusted with risk free return. The following formula is used to calculate the excess return of the sectorial index. In this study, the government Treasury bill rate of 3.18% is taken as risk free rate of return from NRB website.

$$\text{Excess return} = \overline{R_i} - R_f \text{-------- (3)}$$

Furthermore, the ratio of excess return to beta is determined, which measures the additional return on a security (excess of the riskless assets return) per unit of systematic risk or non-diversifiable risk. This ratio provides a relationship between potential risk and reward. The selection of any stock is directly related to its excess return- beta ratio which is expressed as

$$\text{Excess return-beta ratio} = \frac{\overline{R_i} - R_f}{\beta_i} \text{ ---------- (4)}$$

Where Ri and Rf are the expected return for the sectorial index 'i' and risk free return respectively and βi is the slope of line for sectorial index "i"

Method of Selecting the Optimum Portfolio When Short Sales are not allowed

Ranking of the sectorial index is done on the basis of their excess return-beta ratio. Investor would like to include those stocks which have higher excess return to beta ratio for the better gain or return from the portfolio. The selection of the sector depends on a unique cut-off value such that all sectors which have higher excess return-beta ratio than the cut-off value are included in the optimum portfolio where as those sectors which have lower excess return-beta ratio are ignored from the optimum portfolio. The cut-off value (C*) is calculated using the following formula. Before using this formula to calculate the cut-off value or point, sectors were ranked on the basis of excess return to beta ratio value from higher to lower order; the sector with the highest excess return to beta ratio value get the rank 1, and second highest get the rank 2and so on.

$$c = \frac{\sigma_m^2 \sum_{i=1}^{i} \frac{(\overline{R_i} - R_f)\beta_i}{\sigma_{ei}^2}}{1+\sigma_m^2 \sum_{i=1}^{i} \frac{\beta_i^2}{\sigma_{ei}^2}} \text{---------- (5)}$$

Where σ_m^2 is the variance of market index and σ_{ei}^2 is the variance of a sector index movement which is not associated with the movement of the market index i.e. the sector's unsystematic risk. The value of σ_{ei}^2 is calculated using the following equation and this is the indication of unsystematic risk associated with sectorial index.

$$\sigma_{ei}^2 = \sigma_i^2 - \beta_i^2 \sigma_m^2 \text{ ---------- (6)}$$

The sector belongs to the optimum portfolio if the value of excess return- beta ratio is greater than C* i.e. Excess return-beta ratio> C*. Where C* is the maximum value of 'C'

Under the assumption that the short sales are not allowed and unlimited lending and borrowing can take place at the risk-free rate of return, the proportion of investment in each sector is estimated using the following formula (7).

$$X_i = \frac{z_i}{\sum_{i=1} z_i} \text{ ---------- (7)}$$

Xi represent the proportion to be invested in the sector 'i'

$$\text{Where, } z_i = \frac{\beta_i}{\sigma_{ei}^2}\left(\frac{\overline{R_i} - R_f}{\beta_i} - C*\right) \text{---------- (8)}$$

Data

In NEPSE, companies are listed under 13 different sectors and index of each sectors represent aggregated market movement of the securities and market index is the composite index which represent the aggregated movement of all the securities listed in NEPSE. Overall NEPSE index is taken as the market index for this paper. To construct the optimum portfolio, last three-year daily basis index value of overall market and eight sub-sectors were taken for the period from 29 July 2018 to 29 August 2021. The total

number of observations included in the sample is 674. The data were taken from the official website of NEPSE

Findings and Analysis

Risk and Return

The findings revealed that finance sector had the highest average rate of return (0.238) whereas manufacturing sector had least average rate of return (0.038). Furthermore, during these three years period, all sectors have the positive average rate of return. The main reason behind positive average rate of return for all the sector is the market was in bull cycle since last three years. Beta coefficient indicates the sensitivity of the sectorial index with market index value. The value of beta coefficient less than minus one or more than plus one indicates that the sector index is more volatile or sensitive with the market index. Positive value of beta coefficient indicates that sector index and market index are in the same direction i.e. either both are moving up or both are moving down. While negative value indicates that the market index and sector index are in opposite direction i.e. as the market index gone up; the sector index gone down and vice-versa. In terms of sensitivity of the sectorial index with market index value, life insurance sector index (1.216) has the largest beta value and non-life insurance (0.034) has the least beta value compared to other sectors which are taken in the study. Non-life insurance (3.681) and hydro power sector (3.501) have the high unsystematic risk value whereas commercial banking (0.410) have low unsystematic risk. The variance of the return of sector represents the risk of the sector. In terms of the risk; non-life insurance and hydro powers sectors seem riskier sector for investment compared to other. Moreover, finance, micro finance, life insurance and development banks have higher average rate of return with less unsystematic risk.

Table 2: *Market Return and Sub-Sector Return, Excess Return, Beta, Excess Return to Beta Ratio, Market Risk, Security Risk and Unsystematic Risk of Sectorial Index*

Risk free rate 3.8% per year									Augmented Dickey-Fuller Test for Unit root P-value
Sectorial Stock	Rank	$(\overline{R_i})$	$\overline{R_i}$ -R_f	Beta (β_i)	$\frac{\overline{R_i} - R_f}{\beta_i}$	σ^2_m	σ^2_i	$\sigma^2_{ei} = \sigma_i^2 - \beta_i^2\sigma_m^2$	0.0000
Non-Life Insurance	1	0.165	0.092	0.034	2.732	1.820	3.683	3.681	0.0000
Hydro Power	2	0.146	0.073	0.042	1.737	1.820	3.511	3.508	0.0000
Finance	3	0.238	0.165	0.611	0.270	1.820	2.421	1.742	0.0000
Micro Finance	4	0.227	0.154	0.931	0.165	1.820	2.770	1.194	0.0000
Development banking	5	0.201	0.128	0.845	0.151	1.820	2.546	1.247	0.0000
Life Insurance	6	0.201	0.128	1.216	0.106	1.820	3.973	1.282	0.0000
Banking	7	0.124	0.051	1.000	0.051	1.820	2.228	0.410	0.0000
Manufacturing	8	0.038	-0.035	0.795	-0.044	1.820	3.006	1.856	0.0000

Optimum Portfolio

Table 3 and 4 shows the value of cut off ratio and excess return to beta ratio for each sector. The cut off value to determine the optimum sector is C*= 0.129. This is the largest value among the value obtained using the formula (5), so, it is taken as the benchmark or cut off ratio value to select sector to form the optimum portfolio. Out of eight sectors, five sectors belong to optimum portfolio as they have the higher excess return to beta ratio than cut off value of 0.129. Thus, non-life insurance (2.732), Microfinance (0.154), hydro power (1.737), finance(0.270) and development bank (0.151) have the higher excess return to beta ratio than cut-off value (0.129). The remaining three sector- life insurance (0.106), banking sector (0.051), and manufacturing sector (-0.044) does not belong to optimum portfolio as their excess return to beta ratio value is less than cut-off value (0.129). (See table 2 and table 4).

Table 3: *Cut Off Ratio and Optimum Sectorial Index*

Risk free rate 3.8% per year taken from NRB website					
Sub-sectors	Rank	$\frac{(\bar{R}_i - R_f)\beta_i}{\sigma_{ei}^2}$	$\frac{\beta_i^2}{\sigma_{ei}^2}$	$\sum_{i=1}^{i} \frac{(\bar{R}_i - R_f)\beta_i}{\sigma_{ei}^2}$	$\sum_{i=1}^{i} \frac{\beta_i^2}{\sigma_{ei}^2}$
Non-Life Insurance	1	0.001	0.000	0.001	0.0003
Hydro Power	2	0.001	0.001	0.002	0.0008
Finance	3	0.058	0.214	0.060	0.2149
Micro Finance	4	0.120	0.725	0.179	0.9401
Development banking	5	0.087	0.572	0.266	1.5123
Life Insurance	6	0.122	1.153	0.388	2.6652
Banking	7	0.125	2.439	0.512	5.1042
Manufacturing	8	-0.015	0.340	0.497	5.4447

Table 4: *Cut Off Ratio and Optimum Sectorial Stock Index (cont.)*

Risk free rate 3.8% per year				
Sectorial Stock	Rank	$\sigma^2_m \sum_{i=1}^{i} \frac{(\bar{R}_i - R_f)\beta_i}{\sigma_{ei}^2}$	$1+ \sigma^2_m \sum_{i=1}^{i} \frac{\beta_i^2}{\sigma_{ei}^2}$	$c = \frac{\sigma_m^2 \sum_{i=1}^{i} \frac{(\bar{R}_i - R_f)\beta_i}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum_{i=1}^{i} \frac{\beta_i^2}{\sigma_{ei}^2}}$
Non-Life Insurance	1	0.002	1.001	0.002
Hydro Power	2	0.004	1.001	0.004
Finance	3	0.109	1.391	0.078
Micro Finance	4	0.326	2.711	0.120
Development banking	5	0.484	3.752	C*= 0.129
Life Insurance	6	0.706	5.850	0.121
Banking	7	0.932	10.288	0.091
Manufacturing	8	0.904	10.908	0.083

The table 5 shows the optimum portfolio combination of sectors which belong to optimum portfolio, which is the main objective of this paper.All the sectors which have the excess return to beta ratio is higher than cut off ratio are belong to the optimum portfolio. Five sectors- non-life insurance, finance, micro finance, development bank and hydro power sectors belong to optimum portfolio as they have higher value of excess return to beta ratio than cut off ratio value. With regard to the total investment in the optimum portfolio in terms of sectors, the proportion of investment is seen higher for finance (36.6%) followed by micro finance (20.8%), non-life insurance (17.6%), hydro power (14.3%), development bank (11%). The findings suggests that for the better return from the portfolio, the investment needs to be made higher in finance sector and less in development bank sectors in comparison to other sectors.

Table 5: *Construction of Optimum Portfolio*

Sectorial Stock	$(\overline{R_i})$	Beta (β_i)	$\frac{\overline{R_i} - R_f}{\beta_i} - C*$	σ_{ei}^2	$z_i = \frac{\beta_i}{\sigma_{ei}^2}\left(\frac{\overline{R_i} - R_f}{\beta_i} - C*\right)$	$X_i = \frac{z_i}{\sum_{i=1} z_i} x100$
Non-Life Insurance	0.165	0.034	2.603	3.681	0.024	17.6
Hydro Power	0.146	0.042	1.608	3.508	0.019	14.3
Finance	0.238	0.611	0.141	1.742	0.049	36.6
Micro Finance	0.227	0.931	0.036	1.194	0.028	20.8
Developmen t banking	0.201	0.845	0.022	1.247	0.015	11.0

Conclusion and Discussion

The study identifies five sectors: non-life insurance, microfinance, finance, hydro power, and development banks—as constituting the optimum portfolio. This suggests that, based on the criteria and parameters utilized in the study, these sectors provide a favorable balance between risk and return for investors. The research also uncovers variations in the allocation of investments across sectors. Notably, the finance sector attracts a greater proportion of investment compared to the development bank sector, indicating a potential higher confidence or preference among investors for the finance sector, possibly due to perceived better returns.

Despite the finance sector having a lower average rate of return compared to the development bank sector, the magnitude of investment in the finance sector is three times higher. This prompts questions about investor behavior and preferences, indicating that factors beyond the rate of return play a role in investment decisions. The study offers insights into the performance of specific sectors, highlighting significant investment portions in non-life insurance, hydro power, and microfinance for better returns based on daily stock returns. This information can guide investors in making informed decisions based on sector-wise performance.

Similarly, concerning unsystematic risk, commercial banking, although not part of the optimum portfolio, is identified as a low-risk sector. This suggests that investors may be willing to accept lower returns in exchange for lower risk, emphasizing the importance of risk management in investment decisions. The non-life insurance and hydro power sectors exhibit high unsystematic risk, while commercial banking has a lower unsystematic risk. Understanding these risk profiles can assist investors in making risk-adjusted decisions.

In conclusion, the study offers valuable insights into portfolio composition, investment patterns, and risk profiles across different sectors. Investors can leverage this information to make informed decisions aligned with their risk tolerance, return expectations, and overall investment objectives. It's noteworthy that this study excludes five sectors, as well as took the sample of only recent bull period. Thus, the future researchers can include these omitted sectors and time frame for a more comprehensive analysis. This research could be groundbreaking in constructing the optimum portfolio using daily returns of NEPSE data through the single index model, as no previous studies have undertaken such an analysis with NEPSE data to date.

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