Asset Allocation Analysis of Investment Portfolio Performance (Taspen Case Study of Life Insurance)

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Abstract

This study aims to analyze asset allocation on the investment portfolio performance of the Taspen Life Insurance company. Taspen Life Insurance Company is a traditional life insurance which focuses on group life insurance. The method used in this research is Sharpe ratio, Treynor ratio, Jensen alpha, Tangency portfolio and Global Minimum Variance (GMV). The Sharpe ratio ranges from 0.42 to 6.89. Taspen Life's Sharpe ratio is lower than the Sharpe ratio produced by the tangency portfolio and global minimum variance. Companies could use the portfolio generated by the tangency portfolio as a solution to achieve the highest degree of profit, if the portfolio formed by the tangency portfolio has a composition that corresponds to the company's investment orientation.

Keywords: Asset allocation, Global Minimum Variance, Insurance Company, Jensen alpha, Sharpe ratio, Tangency portfolio, Treynor ratio.

1. Introduction

In national economic development, especially to create a decent life, making the need for economic development that continues to provide welfare for employees, one of which is by providing income in old age as a form of care and fulfillment of constitutional obligations. Insurance is one of the financial institutions that are commonly used to improve the welfare, where participants who participate in the insurance program will be given the development of the funds, they provide to insurance to be managed which when they later retire, can be used to improve the welfare of their participants.

The management of funds entrusted by participants is one of the mandates that must be carried out by insurance, which is prudent, transparent, and accountable. The magnitude of the role of insurance in national economy is also shown in insurance contributions, especially life insurance for the national economy. Based on data from the Financial Services Authority (www.ojk.go.id) in the insurance statistics book in 2019 showed the growth contribution of insurance companies showed a significant contribution to the amount of life insurance assets compared to gross domestic products of 3.37%.

Taspen life insurance itself is a traditional life insurance that focuses on group life insurance. The premium entrusted by the participant to Taspen Life makes the need for investment management on the right instrument so that the guaranteed return that has been promised to the participant can be paid in the form of a claim that will occur when the contract period expires where the return reached must be higher than the actuarial interest of the company which on average Taspen Life products guaranteed return at a rate of 7.5%.

Each company's investment according to Mulyono & Saraswati (2020) has the ability to accept investment risk, where the category is divided into three, namely conservative where the ability to accept relatively low risk, moderate where the ability to accept relatively low risk, moderate where the ability to accept high risk.

Portfolio analysis is critical for both institutional and individual investors to create an optimal portfolio. According to research (Ezugwu et al., 2014), there is a clear association between the size of assets in a portfolio and portfolio performance. (Amalia, 2012) did research on improving portfolio performance in pension fund companies using the mean-variance model, stating that the average portfolio performance of pension fund firms is still below portfolio tangency.

Investment fund management can be done by forming an investment portfolio. An optimal portfolio is one that provides the greatest rate of return with a certain level of risk. According to Markowitz method
(Zanjirdar, 2020) in his research proves that combining several investment instruments in a portfolio can reduce the risk of investing. Markowitz's method proves that financial assets in a portfolio if the correlation of returns is smaller than one, the overall portfolio risk can be lowered.

This study examines the composition of the portfolio which has been built to achieve the best portfolio performance as a suggestion to Taspen Life management. The study's distinctiveness stems from the fact that Taspen Life Company is undergoing rapid growth, allowing it to make a significant contribution to the insurance business.

2. Literature Review

The need to optimize returns and minimize risk then required analytical tools in forming an optimal portfolio, there are some that are used are portfolio tangency and global minimum variance. The optimal portfolio that has been formed by some analytical tools earlier, then conducted performance testing using several ratios where there is a Sharpe ratio, Treynor ratio, and Jensen Alpha (Bodie, Kane, and Marcus, 2018).

Existing portfolios based on historical data; calculations are carried out to get the return of each portfolio where the return analysis is done to find out the level of return obtained by Taspen Life during the research period. The calculation of return for each type of investment asset is done using the rate of return on the total investment allocation. Performance measurements relative to risk are performed to determine the performance results (return) compared to certain risks. Sharpe ratio employs completely assessed risk (systematic and unsystematic risk) as shown by the standard deviation of investment assets, as shown below.

\[
S_i = \frac{\bar{r}_i - r_f}{\sigma_i}
\]

Information:
- \( S_i \): Sharpe ratio of investment assets i
- \( \bar{r}_i \): average return on investment assets
- \( r_f \): average return of risk-free asset
- \( \sigma_i \): risk of investment assets i

Treynor's measurements are based on premium risk (same with Sharpe \( \bar{r}_i - r_f \)) ratio. This measurement is formulated as follows.

\[
T_i = \frac{\bar{r}_i - r_f}{\beta_i}
\]

Information:
- \( T_i \): Treynor ratio of investment assets i
- \( \bar{r}_i \): average return on investment assets
- \( r_f \): average return of risk-free asset
- \( \beta_i \): beta investment assets i

Jensen's measurements are formulated as follows.

\[
\alpha_{pi} = \bar{r}_i - [r_f + \beta_i (\bar{r}_{mi} - r_f)]
\]

Information:
\( \alpha_{pi} \) : Jensen \( \text{alpha} \) investment asset \( i \)

\( \bar{r}_i \) : average return on investment assets

\( \bar{r}_f \) : average return of risk-free asset

\( \beta_i \) : beta investment assets \( i \)

\( \bar{r}_{mi} \) : average return on investment asset market

In determining systemic and unsystematic risk in each investment instrument, both bonds, deposits, stocks, mutual funds, and asset-bearing securities, here uses regression analysis \( y \) to find out whether in the model there is an influence simultaneously between independent variables with dependent variables. The results of regression analysis in this study were limited to the use of Variable values as systemic risk and the value of residual ss shared with the total df resulted in unsystematic risk.

By utilizing information on Taspen Life's investment assets, an analysis will be conducted aimed at determining the optimal portfolio. Research conducted by Nandan and Srivastava (2017) on Nifty 50 stocks using Sharpe's single index model shows that investors can lower risk using Sharpe's Single index model as well as Markowitz's model.

According to Bilir (2016), the tangency of the portfolio and Sharpe ratio has a return of approximately three times when compared to the same portfolio after reviewing investments that are objective functions, maximizing the value of the tan can be used to find portfolio tangency.

The Global Minimum Variance (GMV) approach is one of the most widely used techniques for optimizing portfolio risk and return on portfolio investment. In the GMV portfolio approach, the portfolio builds on the variance of past returns, and weights are allocated based on the average relationship of individual securities returns and covariance (Raiysat, 2020).

3. Research Methods

This research aims to conduct an analysis on asset allocation so that it can be known its effect on the performance of investment portfolios. In the first step, the return of each investment instrument has been calculated and obtained the number.

1. After getting the amount of return from each instrument, then the next step:
   a. Return and risk. After the return of each instrument has been obtained, then each instrument will be calculated risk.
   b. Covariance and correlation between investment assets (calculation of covariance and correlation of each investment asset so that the direction of the relationship of each asset) is carried out
   c. Systematic and unsystematic risk of each investment asset (this calculation looks at systematic and unsystematic risk of each investment's assets)

2. After the return and risk of the historical portfolio has been obtained, then the performance is calculated using Sharpe ratio, Treynor ratio, Jensen alpha.
   a. Sharpe ratio is a measure used to measure excess returns, or risk premiums, per unit deviation in an investment asset or trading strategy. The measure is used to check the performance of an investment by adjusting the risk. Sharpe Ratio uses standard deviation for its portfolio measurements. Another use in historical portfolios to look at outperform and underperform portfolios and incoming ones as consideration of new assets is only the outperform category.
   b. Treynor ratio is a ratio used to measure the performance of a portfolio or mutual fund that considers systematic returns and risks. The Treynor Ratio uses Beta as a measure to determine
risk. Another use in historical portfolios is to look at outperform and underperform portfolios and incoming ones as consideration of new assets is only the outperform category.

c. Jensen Alpha calculates the excess return (difference in return with Risk Free) obtained by a portfolio exceeds the expected results. This measurement is known as alpha. Other uses see superior and inferior and superior assets as considerations for new assets.

After the analysis and testing process carried out on historical portfolios, asset data that fall into the category of outperform and superior can be considered in the formation of a new portfolio, as well as be an input to the company's management.

3. Optimal portfolio formation (new portfolio) uses 2 approach methods:
   a. Tangency Portfolio
      Choosing an Optimal Portfolio with the most minimal risk-free and/or risk-free assets
      It is an optimal portfolio in general because it does not depend on the preferences of certain investors (Amalia, 2012). This method determines the portfolio with the least risk.

Up to this step, the return, covariance, correlation, of the returns that have been formed have been obtained. The next step is to perform performance testing using the Sharpe ratio. Sharpe ratio is a measure used to check investment performance by adjusting the risk. Sharpe Ratio uses standard deviation for portfolio measurement. The use of only Sharpe ratios is because testing with Sharpe ratios can be carried out on future portfolio candidates, while it is not possible for Treynor ratios that require Beta numbers. The term Beta refers to the sensitivity of the movement of the results or return of a stock or mutual fund relative to the movement of overall market results. In other words, beta numbers are derived from historical portfolios, not future portfolio candidates.

4. It is also not possible in Jensen Alpha because Alpha is the difference between the return of a mutual fund and the expected return for the mutual fund based on the level of results from the market. So, Alpha is a measure of an investment manager's ability to outperform or beat the market. In other words, Alpha numbers are obtained from historical portfolios, not future portfolio candidates. Performance testing looks for the highest Sharpe ratio test results as a reference for the formation of the best investment portfolio as management materials to perform optimal portfolio placement.

4. Research Results

Investment allocation by Taspen Life Insurance is carried out on several types of investment instruments, including deposits, stocks, bonds, and mutual funds. Investment management carried out by Taspen Life Insurance should conduct planned, systematic, and intensive investment management and monitoring. During 2016 to 2019 investment placement of Taspen Life Insurance on average in bonds (26.57%), deposits (34.07%), shares (2.24%), mutual funds (36.63) and KIK EBA (0.49%).

![Figure 1. Allocation of investments in each type of invest asset](http://www.ijmsbr.com/)
Needham (2012) argues that risk and return trade-offs are the most important steps to determine the appropriate investment strategy. The calculation of the expected return of the investor requires the calculation of the risks associated with the investment in question. From the management of Taspen Life Insurance financial statement data during the period 2016 to 2019, it looks at figure 2 for the recapitulation of the individual return and risk calculations of each investment asset that makes up Taspen Life's investment portfolio and the Individual risk of each investment asset that makes up Taspen Life's investment portfolio.

![Figure 2. Risk and return on investment assets](image)

The bond yield in Taspen Life's four-year investment portfolio continued to increase. In 2019, Taspen Life added the portion of state securities in its investment portfolio from 27.78% to 36.70%, which is inseparable from the increase in the rate of return on state securities in 2016. Taspen Life Bonds return is around 7.29% to 8.25% per year. The decline in returns in 2018 and 2019 is inseparable from the less conducive global market conditions. Some of the dominant factors that suppress the performance of the bond market are the normalization of the Fed's monetary policy through the increase in the FFR (Fed funds rate) and the global economic slowdown due to the prolonged U.S.-China trade war.

Return on deposits ranges from 5% to 9.54% per annum. This rate of yield relates to the average rate on deposit rates from the current year since deposit yields come only from interest income. It is seen that annual placements for deposit instruments from existing portfolios also experience fluctuations that on average decrease every year. In 2019, Taspen Life Insurance reduced the portion of deposits to 12.21% from the 2016 figure of 36.70%, this was done because in 2019 deposits were no longer able to provide returns of 9.54% or lower 3.844%. The reduction in the portion of deposit allocation carried out by Taspen Life Insurance is a preventive step where the decrease in investment return on deposit investment assets.

The shares in the portfolio range from 1.90% to 3.35%. In 2019, the share portion of shares in the presentation decreased by 0.48% from the total investment portfolio. The decline was mainly due to a decrease in the market value of stocks in the portfolio due to the correction of the Jakarta Composite Index (JCI) by 0.47%. In 2019, stocks in the industrial, utilities, and transportation sectors declined.

Allocation of investment in mutual funds is the largest allocation after bonds and deposits in the investment portfolio owned by Taspen Life, which ranges from 43.41% to 48.79%. Taspen Life's investment portfolio is dominated by limited participation mutual funds and protected mutual funds that have a fixed yield each month. During the research period, it was seen that mutual fund returns experienced quite high growth at certain times, this was inseparable from the strategy run by Taspen Life, namely tactical strategy. Tactical strategy management of mutual funds is carried out on the types of stock mutual funds and mixed mutual funds. The management of mutual funds is done to get capital gains that can be used to meet the target investment results that have been set.

An investment location on the Asset is 5.55%. Taspen Life began to diversify assets that add new assets, namely asset-related securities. The useful effect of this asset has a return of 6.99% this is due to the
placement on the new asset-holding securities carried out in September 2019. Asset-backed securities portfolio can improve Taspen Life's investment performance.

Measurement of investment asset performance according to Sharpe ratio requires information on return-on-investment assets, risk-free assets and standard deviation. A summary of the results of Sharpe ratio calculations to measure the performance of each investment asset can be seen in table 1. Benchmarks used are Indonesia Government Bond Index (IGBI), Bank Indonesia Reverse Repo Rate (Reverse RR), Jakarta Composite Index (JCI), Indonesia Bond Fund Index (IBFI).

Table 1. Sharpe investment asset ratio of Taspen Life and benchmark

<table>
<thead>
<tr>
<th>Types of Investment Assets</th>
<th>Benchmark</th>
<th>Sharpe Ratio</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond</td>
<td>IGBI</td>
<td>1,130</td>
<td>1,508</td>
</tr>
<tr>
<td>Term Deposits</td>
<td>Reverse RR</td>
<td>0,446</td>
<td>-3,129</td>
</tr>
<tr>
<td>Stock</td>
<td>JCI</td>
<td>1,090</td>
<td>0,908</td>
</tr>
<tr>
<td>Mutual funds</td>
<td>IBFI</td>
<td>0,226</td>
<td>0,256</td>
</tr>
<tr>
<td>Asset-Matching Securities</td>
<td>IBFI</td>
<td>-5,329</td>
<td>0,256</td>
</tr>
</tbody>
</table>

Source: Processed Results

According to Table 1 bonds have the greatest Sharpe ratio value, implying that bonds can generate higher investment returns than other investment instruments. Stocks, term deposits, and mutual funds are the next investment assets with a high Sharpe ratio value, whereas asset-bearing securities have a negative Sharpe ratio. On the other hand, Sharpe ratio estimates show that bonds, mutual funds, and asset-fighting securities perform worse than other assets; this is inextricably linked to risk considerations.

When the Sharpe ratio is calculated for each type of investment asset and compared to each benchmark, the result is that three investment assets, namely bonds, mutual funds, and asset-fighting securities, cannot match market performance (underperform). Other investment assets, on the other hand, can match the market's performance. This means that, when risk variables are accounted, only two of those financial assets can outperform the market (outperformed).

Treynor's size performance measurements are not much different from Sharpe's. The difference is in the denominator of the equation that is beta. Beta is a measure of the volatility of an investment asset with the market. For that, regression is done to the return of each type of investment asset with their respective market returns. Beta indicates the sensitivity of an investment asset to market changes. The higher the expected return, the higher the beta. The negative sign on the beta indicates the opposite direction to the market movement. In contrast to bonds, term deposits, stocks, and mutual funds that have a positive beta value, which means that the movement is in line with the market. Each investment asset according to the Treynor equation is as follows.

Table 2. Treynor ratio of Taspen Life investment assets and benchmark

<table>
<thead>
<tr>
<th>Types of Investment Assets</th>
<th>Benchmark</th>
<th>Treynor Ratio</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond</td>
<td>IGBI</td>
<td>0,052</td>
<td>1,5076</td>
</tr>
<tr>
<td>Term Deposits</td>
<td>BI Reverse RR</td>
<td>0,004</td>
<td>-3,129</td>
</tr>
<tr>
<td>Stock</td>
<td>JCI</td>
<td>3,137</td>
<td>0,908</td>
</tr>
<tr>
<td>Mutual Funds</td>
<td>IBFI</td>
<td>-0,024</td>
<td>0,2563</td>
</tr>
<tr>
<td>Asset-Matching Securities</td>
<td>IBFI</td>
<td>14,98</td>
<td>0,2563</td>
</tr>
</tbody>
</table>

Source: Processed Results

http://www.ijmsbr.com/
Based on Table 2, investment bonds, term deposits, equities, and have a positive Treynor ratio value. Mutual funds, on the other hand, have a negative Treynor ratio value. The beta possessed by negatively marked mutual funds accounts for the negative Treynor value on mutual funds. As a result, the value considered in decision-making is an absolute value. This is consistent with Aprilia's (2014) research, which found that the negative Treynor ratio in sukuk is caused by beta owned by negatively marked sukuk. According to the findings of Treynor ratio computations, asset-matching securities outperform other investment assets. Stocks, bonds, and term deposits are the next investment assets with a high Treynor ratio value. This series differs from the Sharpe ratio sequence, in which bonds perform best and asset-held securities perform worst.

Ratio Treynor Mutual funds and bonds, when compared to each benchmark for each investment instrument, cannot meet a market performance (underperform). In contrast, the results of Sharpe ratio computations show that bonds, mutual funds, and asset-held securities cannot match market performance. While other investment assets could be able to compare market performance (outperformed).

Performance measurements using Jensen alpha are based on the Capital Asset Pricing Model (CAPM) theory by comparing excess return with the required rate predicted of CAPM. Performance using Jensen alpha will indicate whether the fund management has superior or inferior performance against the return of the market. Due to market excess returns, investment assets with a positive Jensen alpha value will perform better. While investment assets with a negative Jensen alpha value will perform worse, this is because the actual return of each investment asset is less than the CAPM's predicted return. A summary of the results of calculating the value of Jensen alpha each type of investment asset in Taspen Life can be seen as follows.

Table 3. Jensen alpha investment assets Taspen Life and projected CAPM return

<table>
<thead>
<tr>
<th>Types of Investment Assets</th>
<th>Return (1)</th>
<th>Expected Return (CAPM) (2)</th>
<th>Jensen Alpha (1)-(2)</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond</td>
<td>0.090</td>
<td>0.059</td>
<td>0.032</td>
<td>Superior</td>
</tr>
<tr>
<td>Term Deposits</td>
<td>0.086</td>
<td>0.056</td>
<td>0.030</td>
<td>Superior</td>
</tr>
<tr>
<td>Stock</td>
<td>0.085</td>
<td>0.058</td>
<td>0.027</td>
<td>Superior</td>
</tr>
<tr>
<td>Mutual funds</td>
<td>0.097</td>
<td>0.057</td>
<td>0.040</td>
<td>Superior</td>
</tr>
<tr>
<td>Asset-matching securities</td>
<td>0.030</td>
<td>0.056</td>
<td>-0.025</td>
<td>Inferior</td>
</tr>
</tbody>
</table>

Source: Processed Results

Based on Table 3, mutual funds have the greatest Alpha Jensen value, which is distinct from the Sharpe performance measurement ratio and the Treynor ratio. Bonds, term deposits, and equities are the next investment assets with a high Jensen alpha value. On the other hand, there are four investment assets with a positive Alpha Jensen value. This implies that fund managers can select undervalued securities, forecast the market, and react to market developments. The presence of a positive alpha Jensen also indicates that the investment asset has selectivity. The Alpha Jensen value of asset-matching securities investment assets is negative, indicating poor performance. This underperformance can be attributed to several factors, including the duration of a fund manager's asset portfolio, inability to foresee market moves, and inability to adjust to portfolio composition in line with market fluctuations (Sutawisena, 2011). This is consistent with performance metrics such as the Sharpe ratio and Treynor ratio, which show mutual funds underperform other investment assets.

Insurance as an investor who has long-term payment obligations is expected to balance portfolio conditions with the concept of a pension fund (Campbell & Viceira 2005). Determination of optimal portfolio in this research is expected to be a consideration in the rebalancing strategy so that the investment results obtained are more optimal. In this study, there were five investment assets owned by Taspen Life in determining the optimal portfolio. Prior to portfolio optimization, the return owned by Taspen Life Fund was 7.22% with a risk level of 1.38%.
In the formation of a portfolio, all investment assets used are risk assets. If entered the investment asset element of a risk-free asset to get the optimal portfolio, a new optimal portfolio will be obtained. The intended risk-free asset is the BI Reverse Repo Rate. The BI Reverse Repo Rate will be linked to a risky portfolio and form a straight line called the Capital Allocation Line (CAL). The result of a straight-line intersection of the point that has the largest angle or slope with efficient curve set is an optimal portfolio with risk-free assets.

Maximizing the value of tan-α can be used to determine the portfolio's tangency. The maximum tan-alpha value will be 2.916 when considering Taspen Life's portfolio return and risk data, as well as the risk-free asset value, which is the average BI Reverse Repo Rate for the period 2016 to 2019 of 3.8 percent. With the help of the solver function in Microsoft excels, the composition of the portfolio is obtained with the weight of each investment asset as follows.

Table 4. Weight of each investment asset based on portfolio tangency

<table>
<thead>
<tr>
<th>Types of Investment Assets</th>
<th>Wi (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond</td>
<td>18</td>
</tr>
<tr>
<td>Term Deposits</td>
<td>8.18</td>
</tr>
<tr>
<td>Stock</td>
<td>11.01</td>
</tr>
<tr>
<td>Mutual funds</td>
<td>45.32</td>
</tr>
<tr>
<td>Asset-Matching Securities</td>
<td>16.61</td>
</tr>
<tr>
<td>Total Investment</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Processed Results

According to Table 4, mutual funds have the largest weighting compared to other investment assets at 45.32% in the portfolio. Then the bond weighting of 18%, securities with assets 16.6%, shares 11.01%. While the smallest amounted to 8.18% on term deposits. When compared to the optimal portfolio generated by the tangency portfolio provides a higher portfolio return. This is in line when compared to the portfolio formed in Taspen Life. In addition, tangency portfolios also provide less risk. Reduced risk in the portfolio is due to the inclusion of risk-free assets in the form of BI Reverse Repo Rate in the portfolio formed. The optimal portfolio consists of state securities assets, term deposits, stocks, and bonds. Portfolio return of 8.55% with portfolio risk rate of 0.39%. As for the limit of the return rate of Taspen Life's portfolio will be in the upper range below 8.15% and the upper above 8.94%.

Behind the frontier set of risky portfolios is for any level of risk. Investors are interested in portfolios that provide the highest returns among all portfolio compositions with the level of return drawn between the arrangement of risk levels and the level of return depicted in the arrangement of efficient frontier of risky asset points. From that arrangement the Global Minimum Variance (GMV) portfolio is determined by the minimum variant level (minimum variance) with the maximum return rate.

Table 5 Portfolio GMV

<table>
<thead>
<tr>
<th>INSTRUMENTS</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Deposit (W1)</td>
<td>54,41%</td>
</tr>
<tr>
<td>2 Bonds (W2)</td>
<td>11,40%</td>
</tr>
<tr>
<td>3 Mutual funds (W3)</td>
<td>33,20%</td>
</tr>
<tr>
<td>4 Shares (W4)</td>
<td>0,99%</td>
</tr>
<tr>
<td>5 KIK EBA (W5)</td>
<td>0 %</td>
</tr>
<tr>
<td>6 Standard Deviation</td>
<td>0,19%</td>
</tr>
<tr>
<td>E (Rp)</td>
<td>8,89%</td>
</tr>
</tbody>
</table>
Source: Processed Results

The composition of W1, W2, W3, W4, W5 instruments is the portfolio that has the lowest risk composition of all existing diversification opportunities. The composition of the existing portfolio resulted in a risk or standard deviation of 0.54% and an expected return of 8.89%. Of the composition of the existing portfolio, the most dominating is the deposit portfolio where b is worth 54.41%, followed by mutual funds 33.20%, Bonds 11.40%, shares 0.99% and KIK EBA 0%. The limit for the portfolio's GMV profit rate is the upper limit of 9.08% and the lower limit is 8.7%.

5. Conclusion
The formation of an optimal portfolio is intended so that investors get optimal results in accordance with the expected placement of a number of investments. An optimal outcome is a portfolio that provides a higher rate of return at a certain level of risk, or with a certain level of profit but lower risk. To assess the performance of portfolios formed on Taspen Life and portfolios produced by tangency portfolios can be used Sharpe ratio. This ratio is used to find out how much the ratio between rewards to the variability of a portfolio. The Sharpe ratio is a measure of how well a portfolio performs. The higher the Sharpe ratio, the better the portfolio’s performance. According to Lin and Chou (2003), Sharpe ratio computations are supposed to make it easier for investors with varying risk attitudes to determine each investor's investment choices. Here are the results of performance calculations based on Sharpe ratio of historical portfolios and those formed on tangency portfolio and Global Minimum Variance (GMV).

Table 6. Sharpe comparison of proposed and historical portfolio ratios

<table>
<thead>
<tr>
<th>Information</th>
<th>Taspen Life</th>
<th>Proposal</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Tangency</td>
<td>GMV</td>
<td></td>
</tr>
<tr>
<td>Portfolio Return (%)</td>
<td>7.15</td>
<td>8.55</td>
<td>8.89</td>
<td></td>
</tr>
<tr>
<td>Risk Free Assets (%)</td>
<td>5.88</td>
<td>5.88</td>
<td>5.88</td>
<td></td>
</tr>
<tr>
<td>Excess Return (%)</td>
<td>1.27</td>
<td>2.67</td>
<td>3.01</td>
<td></td>
</tr>
<tr>
<td>Portfolio Risk (%)</td>
<td>3.04</td>
<td>0.39</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.42</td>
<td>6.89</td>
<td>0.68</td>
<td></td>
</tr>
</tbody>
</table>

Source: Processed Results
Based on Table 6 it is seen that portfolio returns generated by tangency portfolios, and global minimum variance have a greater value than historical portfolio returns. This is aligned with the level of portfolio risk, where the projected portfolio's risk level is lower than the historical portfolios. The Sharpe ratio ranges between 0.42 and 6.89. The Sharpe portfolio ratio of Taspen Life has a lower value than Sharpe ratio produced by tangency portfolio and global minimum variance.

Taspen Life can consider portfolios formed by tangency portfolios as an alternative to get maximum profit rates where the portfolio formed by the tangency portfolio has the highest Sharpe ratio value and has the portfolio composition in accordance with Taspen Life's investment direction. Taspen Life can examine tangency portfolio portfolios as an alternative to get maximum profit rates if the tangency portfolio has the greatest Sharpe ratio value and the portfolio composition is in line with Taspen Life's investment direction. This is indicative of the fact by Amelia (2012) and Vincent et al. (2019), which found that the tangency portfolio is the optimal portfolio shaper for institutional investors. Additionally, according to Nielsen and Vassalou (2004), investments with a greater Sharpe ratio help investors to earn larger investment returns.

References:

i. Amalia (2012), Analisis mean variance portofolio investasi (studi kasus pada dana pensiun X) [Tesis]. Jakarta, Universitas Indonesia.


