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Case Study

Optimization of Investment Portfolio Performance (Case Study of PT Asuransi Jiwa Taspen)

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ABSTRACT

This study aims to find the best combination for fund management, especially investment funds that exist in Taspen life insurance companies. The current portfolio company based on historical data has not produced the best return as expected. This study analyzes several alternatives to produce the best allocation assets where portfolios that use global minimum variance, efficiency frontier, and tangency in which the composition of tangency in the portfolio produces optimal returns with lower standard deviation. The portfolio assessed using the Sharpe ratio, where tangency has the highest Sharpe ratio. The portfolio that uses portfolio tangency is the best combination portfolio. AsuransiJiwa Taspen is a subsidiary of PT TASPEN (PERSERO) which was established February 26, 2014. The ownership of PT Asuransi Jiwa Taspen in the amount of 99.97% is held by PT TASPEN (PERSERO) as the holding company, and 0.03 shares owned by Taspen Cooperative. The products managed by Taspen Life Insurance are mostly to provide great benefits in terms of employee welfare programs, old age planning, group life insurance, credit life insurance, and pension programs. The result proposed changes in asset allocation that can be considered by management are the GMV portfolio and Tangency Portfolio. In moderate strategic, the management can choose GMV portfolio with a standard deviation of 0.54% and return of 8.89%. In aggressive strategic management can be used portfolio tangency portfolio with a standard deviation of1.27% and the return of 18.64%

Keywords: Optimization, Global minimum variance, Efficient Frontier, Tangency Portfolio, Sharpe ratio.

INTRODUCTION

Taspen life is one of the insurances that offer pension plans where this product is a product that guarantees a return at the end of its insurance contract. Insurance company products that offer pension plans at the end of the insurance contract period with guaranteed returns are not too many, because in the insurance industry there are more unit link insurance products.

The promised return to the participants requires Taspen Life to manage the funds above the promised return to the participants. Returns to participants where the deposited contributions are accumulated with the results of their development. In addition to managing existing funds, Taspen Life must maintain a fund adequacy ratio exceeding 120% where each investment placement instrument that has a portion of risk and has different returns.

Combining several investment instruments in a portfolio can reduce the investment risk Markowitz (1952). The Markowitz method proves the financial assets in the portfolio if the return correlation is smaller than one, then the overall portfolio risk can be lowered. In investing, each company can accept the risk of investment, where the category is into

three, namely conservative (ability to accept relatively low risk), moderate (ability to accept the risk of suffering) and aggressive (ability to accept high risk) this theory can be said Global Minimum Variance (GMV). Hakan (2016) Combining Markowitz, with risk-free asset where is Tangency portfolio analysis and Sharpe ratio. Tangency portfolio provides nearly three times more return compared with a portfolio with equal shares of ten stocks. The investment portfolio of Taspen life, consist of Time Deposits, Bonds, Shares and Mutual Funds. The table shows that the average portfolio returns from 2014 to 2018 on an average investment return (return) investment are still below overall life insurance.

Table 1: Comparison of return on investment in Life Insurance vs. Taspen Life

Information	Bonds	Equity	Mutual Fund	Deposit
Life Insurance	8.26%	11.53%	12.89%	9.07%
Taspen life	4.46%	9.64%	2.81%	7.59%
Processed Data Sources OJK & Taspen Life 2014 -2018				

The target of the RKAP is given by shareholders in 2016, 8.09% in 2017, 7.74% in 2018 while the achievement of this RKAP is only achieved in 2 2016 until 2018 has not been achieved where the realization is 7.38% in 2016, 7.46% in 2017 and 7.64% in the year 2018.

Table 2: Comparison of return on investment in Taspen Life Insurance vs. Corporate Budget Work Plan

Information	2014	2015	2016	2017	2018
Corporate Budget Work Plan (RKAP)	3.37%	8.65%	8.80%	8.09%	7.74%
Investment Realization	4.55%	10.84%	7.38%	7.46%	7.64%
Source: Processed Data					

Management of investment funds can be done by forming an investment portfolio. Investors formed portfolios based on company directives and policies, which have a return target which has been set by shareholders. Shareholders have hopes to get maximum results with the desired level of risk. An optimal portfolio is a portfolio that provides the greatest rate of return with a certain level of risk.

Jogiyanto (2017) suggests that investment in financial assets divided into types, namely direct investment, and indirect investment. Direct investment is done by buying direct financial assets from a company either through intermediaries or by other means. Conversely, indirect investment is done by buying assets from investment companies that have financial asset portfolios from other companies. Weston (1991) argues that portfolios can be interpreted as a combination or combination of various assets where these assets can be interpreted as investments in financial securities such as deposits, stocks, bonds, mutual funds, and other investments.

This research is focused on Life insurance which requires the pursuit of optimal returns but also obliged to maintain the continuity of the insurance program. Therefore, an evaluation in the investment management of a life insurance company is needed that aims to determine whether the portfolio diversification strategy and asset allocation carried out should have been or need improvement so that it can achieve an optimal level of portfolio performance in the future. Performance evaluation is needed to find out the performance produced reaches a predetermined target, either a combined portfolio return or each investment asset class or fund manager used. In addition to this, it can also be taken into consideration in determining subsequent investment policies and as controls. Based on the description above, the author will analyze the Taspen Life Insurance investment portfolio in the last three years and try to provide the most optimal investment asset allocation advice. The author conducts research on Taspen life insurance because the writer is one of the portfolio managers on Taspen life insurance

The research objectives of this study are:
1) Analyzing risk-return characteristics, of each portfolio asset formed in Taspen Life during the period 2016 - 2018.
2) Analyzing the proposal of composition and portfolio characteristics of an efficient and optimal portfolio that is formed based on the historical data of Taspen Life Insurance using the Global Minimum Variance method and the Tangency Portfolio and which method has the best investment portfolio performance according to the Sharpe Ratio method.

RESEARCH METHODS

Types and Data Sources

This research is a case study approach at PT Taspen Life. This study is limited to only the investment portfolio of Taspen Life in the period of January 2016 to December 2018 which includes deposits, bonds, stocks, and mutual funds.
This study used secondary data from internal Taspen Life. The data includes monthly return data for each type of investment instrument, the monthly allocation for each type of investment instrument, annual investment target, and others. Selection of Investment Instruments Data processing and investment analysis of Taspen Life portfolio is carried out with the following scope:

a. Data used by Taspen Life financial report data for 2016 up to 2018.
b. The probability of occurrence is an arithmetic average assuming that the probability is the same for each period.
c. In data management and analysis, costs and tax calculations are assumed not excluded.

Literature Review

Optimal Portfolio Selection and Sharpe Ratio

Hakan (2016) conducted a study using the mean-variance (Markowitz) approach, Sharpe Ratio, and Tangency Portfolio which were tested on ten stock data that had the same weight with different sectors. In the results of his research, that of the three comparisons made from ten stocks, portfolio tangency and Sharpe ratio has returned almost three times compared to the same portfolio.Stanislas (2017) conducted a study of testing the optimal portfolio structure by comparing mean vectors, covariance, and portfolio tangency wherein the S & P 500 index found that portfolio tangency could provide optimal portfolio size and reduce transaction costs. Kazan (2014) found that Markowitz's portfolio theory where financing risk can be mitigated and this was not obtained from the classical risk measurement method which only measures risk without providing solutions how to reduce it. Suganda (2006) conducted research on optimizing portfolio performance at the Ramayana insurance company which used the Markowitz method with the results of research in the form of 65 combinations of productive assets from investment instruments that became efficient portfolios on the efficient frontier line. Padma (2017) conducted a study on NSE shares which made a comparison between Markowitz and Sharpe Models in Portfolios where Sharpe models were better than Markowitz models in better stock portfolio returns and risks were almost the same. Because taking into account alpha, beta systematic, unsystematic risk. Elton and Gruber's analysis (1997) states that Portfolio Tangency is an optimization of the Sharpe ratio.

Theory

Diversification according to Markowitz

Tandelilin (2001) argues that in order to obtain optimal risk reduction benefits from diversification, important information relating to assets to be included in the portfolio cannot be ignored, which is different from random diversification. Asset characteristics such as the expected rate of return and the asset industry classification are things to be considered by an investor. Investors have the opportunity to be more selective in choosing assets that can provide the most optimal diversification benefits.

The diversification of Harry Markowitz's model is more efficient diversification than random diversification because Markowitz states that in investment management it is very important to diversify the portfolio. "Do not put all eggs in one basket", the meaning is that the funds owned should not be invested in just one asset, because if there is a failure in these assets then all the funds that have been invested will be lost.

Markowitz found that the return of an asset is correlated with other assets so it is not independent. Therefore, portfolio risk cannot be calculated from the sum of all risk assets in the portfolio but considers the relationship between the return of assets in the portfolio. The contribution of risk is the result of the existence of a relationship between asset returns represented by the value of covariance and correlation.

Return

Jones (2010) believes that returns received by investors consist of two components, namely:

a. The yield (yield) in which income or cash flow from investments is periodically received by investors, both dividends and interest.
b. Capital gains/losses in which profits or losses must be borne by investors due to changes in the price of security either due to an increase or decrease in the value of existing securities.

Tandelilin (2010) states that from the two components of returns above, investors can calculate the total return (total return) and the rate of return of the investment made.

The return meant for each type of investment instrument is carried out using the following methods:

1. Return deposit on call and certificate of deposit
   Returns meant for deposits on call and certificates of deposit are in the form of interest or profit-sharing on deposit placements made by Taspen Life.
2. Return of bonds, rates, and state securities
   Bond returns referred to bonds, rates, and government securities are using the monthly yield received from the investment.
3. Stock returns and direct placement on shares
   The intended return on shares is in the form of dividend payments received and capital gains/losses for changes in the share price.
4. Return of limited investment mutual funds, protected mutual funds, stock mutual funds. The return referred to in mutual funds is a monthly yield

Asset Class Individual Risk Analysis

Tandelilin (2010) argues that calculating the return of a portfolio is different, portfolio risk cannot be calculated only by summing the risks of each asset in the portfolio because portfolio risk is not a weighted average risk of each individual security in a portfolio.

Jones (2010) states that covariance, portfolio risk consisting of assets can be calculated. There are 3 things to calculate portfolio risk, which are:

a. The variance of each security
b. Covariance between one security and another
c. Portfolio Weights for each security

The three things above, there are 2 important factors in calculating portfolio risk, these factors are:

1. The risk weights of the securities of each asset individually
2. The weight of the relationship between the return of assets contained in the portfolio.

$$\sigma^2 = \sum_{i=1}^{n} [R_i - E(R)]^2$$

The calculation for individual risk for each asset is as follows:

1) Calculation of expected return and variance uses historical data using the mean return of the portfolio.

2) The expected return is sought by using average arithmetic so that it is assumed that every event/period of probabilities is the same

3) Calculation of variance using averages of historical data with a modified divisor used (n-1) to avoid being able to from observational data which is sample data

Portfolio Risk Analysis

$$\sigma^{2P} = \sum_{i=1}^{n} W_{i^2}\,\sigma^2 + \sum_{i=1}^{n}\sum_{j=1}^{n} W_i\,W_j\,\sigma_{ij}$$

From the matrix above, portfolio variance consisting of n-assets can be calculated easily by adding up the cells in the matrix.

Covariance Analysis & Correlation of Investment Asset

Covariance and correlation analysis is used to determine the relationship between an asset and other assets. Both of this information, investors can allocate an optimal composition of assets to minimize risk and maximize return.

Tandelilin (2001) argues that covariance is an absolute measure that shows how far the two variables have a tendency to move together. In the context of portfolio management, covariance shows the extent to which returns from two assets have a tendency to move together. Covariance can be positive if two assets move in the opposite direction and if the covariance is zero, then the movement of two variables are independent of each other.

Covariance and Correlation analysis is used to determine the relationship between an asset and other assets. With both of this information, investors can optimally allocate the composition of assets to minimize risk and maximize returns.

Jones (2011) states that the correlation coefficient or abbreviated correlation is a statistical measure used to see the consistency or tendency of two securities to move together. In the context of diversification, this measure explains the extent to which returns from an asset are related to other assets. This size is usually denoted by ρ.

$$\boldsymbol{Cov}\,(\boldsymbol{R_A}, \boldsymbol{R_B}) = \boldsymbol{\sigma_{AB}} = \sum_{i=1}^{n} \frac{[(\boldsymbol{R_{A,i}} - \boldsymbol{E}(\boldsymbol{R_A})).(\boldsymbol{R_{B,i}} - \boldsymbol{E}(\boldsymbol{R_B}))}{\boldsymbol{n-1}}$$

In calculating to get the covariance of each investment asset, it can use Microsoft Excel where the function used is covar (argument 1, argument 2) where argument 1 contains the 1st return instrument and argument1 contains the 2nd return instrument data during the research period. Each argument column is adjusted to the calculated instrument position.

After getting covariance, the next step is to calculate the correlation coefficient between instruments. The correlation coefficient can be calculated using Microsoft Excel which uses the correl function (argument1, argument 2) where argument1 contains investment return instrument data both deposits, bonds, mutual funds, stocks which are tested alternately and entered into argument1 and argument 2.

CFA Institute (2010) states that calculating the correlation with the formula mentioned above will result in a value between +1.0 to -1.0 here is an explanation of the correlation value:

1. If ρ = +1.0 returns from two securities are positively correlated which means that the two securities have a tendency to move in the same direction by 100% at the same time.
2. If ρ = -1.0 returns from two securities are negatively correlated perfectly. Which means that the two securities have a tendency to move in the opposite direction by 100% at the same time.
3. If ρ = 0 returns of two securities do not correlate at all, meaning that the volatility of one security does not affect the return of the other securities, and vice versa.

Jones (2010) states that there are several things related to the use of correlation coefficients in the context of diversification, namely:

1. Merging two assets that have a perfect positive correlation (+1.0) will not provide the risk reduction benefits that are desired from the diversification strategy
2. Merging two assets that have a correlation of 0, it will reduce the risk significantly. This is in line with the purpose of portfolio diversification, where more and more uncorrelated

portfolios (0) are included in the portfolio, the risk that must be borne by investors will be smaller.

3. Merging two assets with perfect negative correlation (-1.0) will eliminate the risk of both assets, which will provide an opportunity for investors to get a positive return.

In practice, the possibility for all three types of extreme correlations to occur is very small. Assets usually have a correlation between these extreme values, so it is very unlikely if investors want to eliminate risk. portfolio, what investors might do is reduce portfolio risk.

Weight, Portfolio Return

Selecting the Global Minimum Variance Optimal Portfolio (GMV Portfolio)

Amalia (2012) said if there are the steps to look for the GMV portfolio

a. Minimize portfolio variance

A decrease in portfolio variance function as follows:

$$VAR(R_P) = \sigma^{2_P} \sum_{i=1}^{n} \sum_{i=1}^{n} W_i . W_j . \sigma_i \sigma_J$$

Where W_i is greater than zero (W_i≥0) then:

$$VARE(R_P) = W_1 W_1 \sigma_{11} + W_2 W_2 \sigma_{22} + W_3 W_3 \sigma_{33} + W_3 W_4 \sigma_{34} + W_4 W_4 \sigma_{44} + 2\, W_1 W_2 \sigma_{12} + {}^2 W_1 W_3 \sigma_{13} + 2 W_1 W_4 \sigma_{14} + 2 W_2 W_3 \sigma_{23} + 2 W_2 W_4 \sigma_{24} + 2 W_3 W_4 \sigma_{34}$$

With value restrictions

$$W_1 + W_2 + W_3 + W_4 = 1$$

Selection of Optimal portfolios with Risk-Free Assets(Tangency Portfolio)

To find the optimal portfolio, it can be solved by the following equation Stannilas (2017)

$$\psi . (W_i . {\sigma_1}^2 + W_i . \sigma_{12} + \cdots + W_i . \sigma_{1n} = [E(R_i) - R_f]$$
$$\psi . (W_i . \sigma_{21} + W_2 . {\sigma_2}^2 + \cdots + W_n . \sigma_{2n} = [E(R_2) - R_f]$$
$$\psi . (W_i . \sigma_{n1} + W_2 . \sigma_{n2} + \cdots + W_n . \sigma_{mn} = [E(R_n) - R_f]$$

By substituting Z_i = ψ.W_imaka simultaneous equations in the form:

$$Z_i . {\sigma_1}^2 + Z_2 . \sigma_{12} + \cdots + Z_n . \sigma_{1n} = [E(R_i) - R_f]$$
$$Z_i . \sigma_{21} + Z_i + . {\sigma_2}^2 + \cdots + Z_n . \sigma_{2n} = [E(R_2) - R_f]$$
$$Z_i . \sigma_{n1} + Z_2 . \sigma_{n2} + \cdots + Z_n . \sigma_{mn} = [E(R_n) - R_f]$$

With a weight value of each asset of

$$W_i = \frac{Z_i}{\sum_{i=1}^{n} Z_i}$$

Measuring Portfolio Performance

This Sharpe ratio method is based on the concept of a capital allocation line (capital allocation line) as a benchmark where the risk premium is divided portfolio by its standard deviation. The formulation of the calculations is as follows:

$$S_p = \frac{\overline{E(R_p)} - \overline{(R_f)}}{\sigma_p}$$

RESULT AND DISCUSSION

Establishment Policy in the Context Of Lenders

Taspen Life Insurance adheres to full funding, where the implementation of funding is done since active participants work. The source of funding is a form of contributions that must be paid by participants and employers. Employee contributions based on the actuarial calculation

Preparation of the Annual Investment Plan

The Taspen Life Insurance investment guidelines formed by the management must prepare an annual investment plan that at least contains:

a. Plan for the composition of investment types
b. Estimated level of investment returns for each type of investment
c. Considerations that underlie the planned composition of the type of investment chosen.

An annual investment plan is a description of investment guidelines which reflects the application of the principles of risk distribution and objective investment decisions. The annual investment plan must be submitted to the Shareholders and the Supervisory Board no later than October and can only be implemented after at least approval from the Supervisory Board. Approval can be given in the form of Minutes of General Meeting of Shareholders, no later than December before the current fiscal year.

Performance Analysis of Each Type of Investment

The investment allocation by Taspen Life Insurance is carried out on several

types of investment instruments, including deposits, stocks, bonds, and mutual funds. The table shows the total number of types of investment instruments in the past three years. The investment management carried out by Taspen Life Insurance should carry out planned and systematic and intensive investment management and monitoring (Siagian 2003).The results of the table show that during 2016, 2018 the placement of Taspen Life Insurance investments on average was mostly placed on deposits, bonds, and mutual funds, while a small portion was in stocks. In percentage terms, investment placements carried out by Taspen Life Insurance during 2016-2018 on average on deposits (40.94%), mutual funds (33.40%) and bonds amounting to (23.33%) while for stocks (2.33%). Placement of the above three instruments reached 96.67%, the remaining 2.33% in shares. Aborori (2013) states that insurance placement is the most in state securities followed by deposits.

Table 3: Average Return, risk, and the average allocation of investment in Taspen Life Insurance 2016 until 2018

Types of Assets	*Average Return*	*Benchmark Average Return*	*Risk*	*Allocation of Investment*	*Investment POJK Limit*
Deposit	7.26%	5.02%	2.15%	40.94%	100%
Bonds	7.35%	25.20%	1.72%	23.33%	50%
Mutual Funds	6.29%	12.69%	2.93%	33.40%	50%
Stock	18.41%	35.79%	13.97%	2.33%	40%

Covariance Analysis and Correlation

In relation to diversification, the measure of correlation will explain how the relationship returns one instrument to another. The size is denoted by ρ and correlates between +1.0 to -1.0.

It can be seen that the correlation between assets ranges from -0.89 <ρ 0.69. All assets have different correlations, where deposits have a negative correlation with all these assets, indicating that any changes in deposit returns will be in contrast to stocks, bonds, and mutual funds. Stocks have a positive correlation with stocks, bonds, and mutual funds so that if there is a stock return movement, other assets will move in the same direction, except for deposits that have opposite movements.

Correlation of bonds with stocks, bonds, and mutual funds has a positive correlation where bond return movements will move other assets except deposits which have a negative correlation, which is the opposite. Correlation of mutual funds with stocks, bonds, and mutual funds has a positive correlation so that changes in mutual fund returns will move together except with deposits that have a negative correlation.After knowing the characteristics above, Taspen Life Insurance can develop a strategy to diversify its asset portfolio to reduce risk when compared to the risk of each individual asset.

Analysis of Weight, Risk, and Return Portfolio

Taspen Life Insurance in carrying out its investment activities from 2016-2018 has allocated assets with the following composition.

Table 4: Risk and Return Portfolio Asuransi Jiwa Taspen

Assets	2016	2017	2018	Average
Deposit	78.27%	29.47%	15.09%	40.94%
Bonds	11.13%	24.81%	34.04%	23.33%
Mutual Funds	9.87%	42.61%	47.71%	33.40%
Stock	0.73%	3.11%	3.16%	2.33%
Variance	0.02%	0.01%	0.03%	0.02%
Portfolio Standard Deviation	1.30%	1.22%	1.69%	1.40%
Portfolio Return	7.25%	7.22%	7.18%	7.22%

The results of the calculation of risk and return on company portfolios are presented in Table that the composition of the Taspen Life Insurance portfolio during 2016-2018 has an expected return of 7.22% with a standard deviation of 1.40%. The average yield of the Taspen Life Insurance portfolio does not meet the investment yield provisions that must be met by the management of Taspen Life Insurance. The return of the Taspen Life Insurance portfolio itself is in the following ranges:

Lower Limit = 7.22% - 1.40% = 5.82%

Upper Limit = 7.22% + 1.40% = 8.62%

With an average level of risk that is not too high, then the probability of occurrence of

the level for the next period becomes very wide, which is 5.82% to 8.62%. Nevertheless, the rate of return that a portfolio can provide is still positive.

Global Minimum Variance Portfolio (GMV)

Behind the frontier set of risky portfolios is for all levels of risk. Investors are interested in portfolios that provide the highest returns among all portfolio compositions with a level of return illustrated between the risk level arrangement and the level of return reflected in the arrangement at the point of the efficient frontier of risky assets. From that arrangement, the GMV portfolio is determined to be the minimum variance level (minimum variance) with the maximum rate of return.

The completion of the functions discussed in chapter 3, has a complex equation, so we need help with the function solver in Microsoft Excel with the following results:

Table 5: Global Minimum Variance Portfolio

	INSTRUMEN	Weight
1	*Deposit*	54,41%
2	*Bonds*	11,40%
3	*Mutual Funds*	33,20%
4	*Stock*	0,99%
5	*Standard Deviation*	0,54%
6	E(Rp)	8,89%

The composition of the instruments W1, W2, W3, W4 is a portfolio that has the lowest risk composition of which all available diversification opportunities. The existing portfolio composition produces a risk or standard deviation of 0.54% and an expected return of 8.89%. From the composition of existing portfolios, the most dominating ones are deposit portfolios where the value is 54.41%, followed by mutual funds 33.20%, Bonds 11.40%, and shares 0.99%.

As for the limits for the GMV portfolio profit level are:

Upper Limit = 8.89% + 0.54% = 9.43%

Lower Limit = 8.89% - 0.54% = 8.35%

Optimal Portfolio With Risk-Free Assets (Tangency portfolio)

To find portfolio tangency can be used by maximizing the tan value α on the curve of the efficient frontier. By using table and the value of risk-free assets, namely the average SBI value per 2016-2018 of 4.91%, the max tan result is α = 10.84 with the following composition:

Table 6: Asset Tangency Versus Global Minimum Variance

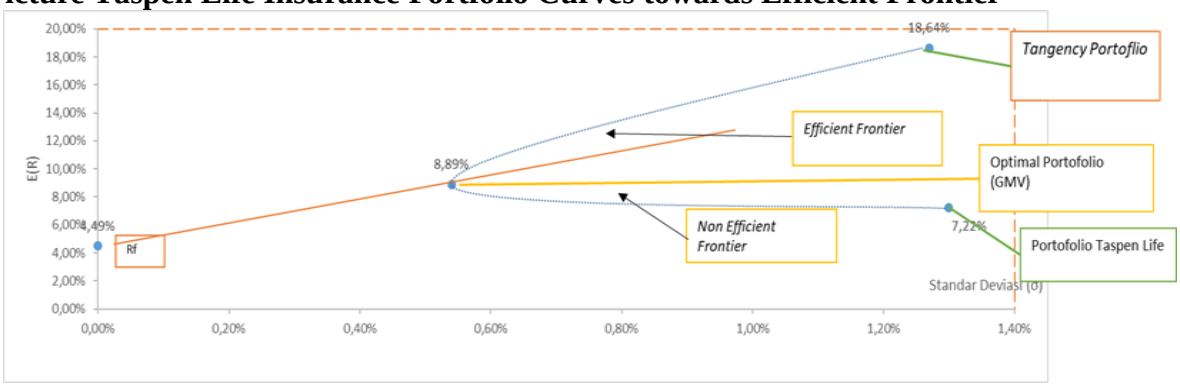
Asset	GMV	*Tangency Portfolio*
Deposit	54,41%	21,42%
Bonds	11,40%	77,39%
Mutual Funds	33,20%	0,00%
Stock	0,99%	1,19%
SBI	0,0%	0,00%
Risk	0,54%	1,27%
Return	8,89%	18,64%
Tangency	7,40%	10,84%

When compared with the GMV portfolio, tangency portfolios provide a greater return than the GMV portfolio, and tangency portfolios provide a greater return with greater risk. But when compared with the Taspen Life Insurance 3-year average, in addition to providing lower risk, tangency portfolios also provide greater returns. This happens because of the risk reduction in the tangency portfolio.

Taspen Life Insurance Portfolio Analysis of Efficient Frontier

The following is an analysis regarding the performance of the Taspen Life Insurance portfolio.

Picture Taspen Life Insurance Portfolio Curves towards Efficient Frontier



a. The results of the 2016-2018 Taspen Life Insurance portfolio are located below the efficient frontier curve. This illustrates that portfolio performance during the period has not been efficient and optimal. To get an optimal portfolio, Taspen Life Insurance can take advantage of the efficient frontier curve to get less risk with a certain expected return or get a higher return with a certain risk value
b. The risk range of the Taspen Life Insurance portfolio is at 1.22% -1.69% with the composition dominantly in deposits.
c. Portfolio risk for 2016, 2017, 2018 Taspen Life Insurance is far lower than the rate of return.

Sharpe Ratio

After looking for a Sharpe ratio, which is risk-free used is SBI data. The composition of the portfolio as in

Table 7: Sharpe Ratio

	Historical Price				**Proposed**	
	2016	**2017**	**2018**	**Average**	**GMV**	***Tangency Portofolio***
Rp	7.5%	7.22%	7.18%	7,22%	8.89%	18.64%
Rf	5.11%	4.56%	5.06%	4,91%	4.91%	4.91%
Excess Return	2.14%	2.65%	212%	2.1%	3.98%	13.73%
Standard Deviation	1.30%	1.22%	1,69%	1.40%	0.54%	1.27%
Sharpe Ratio	1.803	2.182	1.258	1.748	7.404	10.842

a. From the calculations that have been done, the value of Sharpe is in the range of 1,258 to 10,842. Looking at Table 7 above, the Sharpe ratio of Taspen Life Insurance from 2016 to 2018 is lower than the Sharpe portfolio tangency ratio of Sharpe ratio calculation results can provide different returns and risks Dowd (2000). The Sharpe ratio can also facilitate investors in determining investment choices Lin and Chou,(2003). The greater the Sharpe ratio, the better the portfolio performance (Ritia 2017)
b. Sharpe Ratio 2018 is the lowest during the 2016-2018 period. This is due to the condition of the world economy, trade wars that have occurred between China and America, and also the recession of the American economy, and a decline in interest rates so that the Sharpe reduction in the 2018 ratio is very significant.
c. The results of the Taspen Life Insurance portfolio performance have a lower Sharpe ratio compared to portfolio tangency so that Taspen Life Insurance can consider portfolio tangency as one of the alternatives to get maximum return where the Sharpe ratio is the highest compared to other portfolios, this is supported by Amalia (2012) research portfolio tangency is the best portfolio for PT X Pension Fund.

Managerial implications that can be considered include:

1. Changes in this composition have costs where changes in composition, Where the composition of the previous return 2018 is 7.78% compared to portfolio tangency of 18.64%, the excess return obtained after reducing switching costs is 184,812 billion Rupiah
2. This change in asset allocation will be a study for companies which will be taken to the investment committee meeting to get approval for changes in the allocation of Taspen Life's investment assets.
3. The efficient Proposal portfolio alternative that can be taken into consideration for the next period by Taspen Life Insurance is as follows:
   a. Conservative strategy, management can use the Global Minimum Variance portfolio, giving the lowest risk compared to the expected returned portfolio above the minimum investment return, and

having a Sharpe ratio performance above the Sharpe ratio in 2016-2018

b. Aggressive strategy, management can use a portfolio to provide a greater level of risk with a higher return than the Minimum Global portfolio Variance dan has Sharpe ratio performance above the Sharpe ratio of 2016-2018 and Sharpe ratio GMV portfolio

CONCLUSION

1. The average return of the Taspen Life Insurance portfolio was not optimal because based on the efficient frontier results it was still below the efficient frontier curve.
2. Tangency Portfolio has the highest portfolio return with the highest Sharpe ratio compared to the global minimum variance.

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