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Strategic Asset Allocation for Optimize Return & Risk

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Abstract:- The strategy to get the best investment results is the goal of every company. Wrong techniques may create the return is not reached and a lot of failure of the portfolio that faced. The right strategies can be done if we know what method is best for our investment portfolio. In this study, researchers tested historical data on the return and risk of each Taspen Life investment asset and assessed a new model using two model tests, in which the formation of a new portfolio using a single index model and portfolio tangency then performed performance testing using the Sharpe ratio, treynor ratio. , and the jensen ratio. The recommendation from the test results is that for a moderate strategy the company can use a single index model for a moderate strategy with a return of 7.64 and a standard deviation of 0.41, while for an aggressive strategy the company can use a portfolio tangency with a return of 8.55 and a standard deviation of 0.39.

Keywords:- *Jensen Ratio, Treynor Ratio, Standard Deviation, Single Index Model.*

I. 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 there are more unit link insurance products in the insurance industry.

The promised return to the participants requires Taspen Life to manage the funds above the participants' promised return. 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 has a portion of risk and has different returns.

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%	9.07%
Taspen life	4.46%	9.64%	2.81%	7.59%	0.28%
Processed Data Sources OJK & Taspen Life 2014 -2019					

In the Corporate Budget Work Plan (RKAP), the yield on investment (return on investment) set by the company from 2014 to 2019 is below the shareholders' target set. The RKAP target given by shareholders in 2016 is 8.80 percent pa, 2017 is 8.09 percent pa, 2018 is 7.78 percent pa, and 2019 is 7.50 percent pa. Achievement of the RKAP was only achieved in the second year, namely 2016, while the following years have not been achieved where the realization is 7.38% in 2016, 7.46% in 2017, 7.64%, and 7.15% in 2019.

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

Information	2014	2015	2016	2017	2018	2019
Corporate Budget Work Plan (RKAP)	3.37%	8.65%	8.80%	8.09%	7.74%	7.50%
Investment Realization	4.55%	10.84%	7.38%	7.46%	7.64%	7.15%
Source: Processed Data						

Portfolio analysis is very important for institutional investors and individual investors so that the portfolio that is formed can be optimal. (Ezugwu et al., 2014) states that there is a direct relationship between the size of assets in the portfolio and portfolio returns. Research on portfolio performance optimization has been conducted by (Amalia, 2012) whose research uses the mean-variance model of pension funds x, argues that the average portfolio performance of pension funds x is still lower than the portfolio tangency (Herry, 2015). (Reski, 2019), but the object of the study is pension fund companies. The lack of research on portfolio performance optimization for life insurance companies, the existence of the Taspen Life

RKAP target that has not been achieved in 2016-2019 makes this research necessary to compare several research methods that have been carried out so far regarding portfolio optimization. Seeing the composition of the portfolio performance that has been formed so far, and how the best composition that produces the best portfolio performance is used as a recommendation material for Taspen Life management for future management. The uniqueness of the research carried out at the Taspen life company is because this company is experiencing rapid growth so that it can significantly contribute to new knowledge in the insurance company industry in general and in the investment sector in particular. 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 researches Taspen life insurance because the writer is one of the portfolio managers on Taspen life insurance.

The research objectives of this study are:
1) What are the characteristics of return, risk, and each investment portfolio asset formed in Taspen Life from 2016 to 2019?
2) How to suggest the composition and characteristics of an efficient investment portfolio (asset allocation) alternative based on the single-index model and the portfolio tangency method?

II. 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 2019, which includes deposits, bonds, stocks, mutual funds and Asset-Backed 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 2019.
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.

➢ *Return*

Before an investment portfolio analysis is performed, a return calculation is required for each asset. The return types used for each asset are as follows.

Table 3. Types of returns for each Taspen Life asset

Types of Asset	Return
Government Securities	Coupon and Capital Gain
Time Deposits	Interest
Bonds	Coupon and Capital Gain
Stocks	Dividend and Capital Gain
Mutual Funds	Coupon and Capital Gain
Asset-Backed Mutual Funds	Coupon and Capital Gain

➢ *Risk*

The calculation of risk for each asset is carried out using the standard deviation indicator. The formula used to calculate the standard deviation according to Bodie et al. (2013)[8].

$$\sigma^2{}_i = \frac{1}{n}\sum_{i=1}^{n}[r_{it} - \bar{r}_i]^2$$

Historical beta (systematic risk) is calculated by comparing the covariance of assets and markets with the market variance. Elton and Gruber (1991)[9] state that historical beta can be searched by the equation.

$$\beta_i = \frac{\sigma_{mi}}{\sigma^2{}_m} = \frac{\sum_{t=1}^{n}[(r_{it} - \bar{r}_i)(r_{mit} - \bar{r}_{mi})]}{\sum_{t=1}^{n}[(r_{mit} - \bar{r}_{mi})^2}$$

➢ *Covariance and Correlation*

Covariance in the context of portfolio management shows the extent to which returns from two assets tend to move together. According to Bodie et al. (2013)[8], covariance is expressed by equations.

$$\mathrm{Cov}(r_i, r_j) = E\{[w_i r_i - w_i E(r_i)][w_j r_j - w_j E(r_j)]$$

To simplify calculations, the covar function (argument1, argument2) is used where argument1 contains the 1st asset return data and argument2 contains the 2nd asset return data during the research period in Microsoft Excel software. Then for other columns adjusted to the position of the instrument being calculated. While the correlation coefficient can be stated in the following equation (Bodie et al. 2013)[8].

$$\mathrm{corr}(r_i, r_j) = \frac{\mathrm{Cov}(r_i, r_j)}{\sigma_i \sigma_j}$$

➢ *Return and Risk Portfolio*

Portfolio returns can be calculated by accumulating the return of each asset multiplied by the weight of each asset. While portfolio variance are obtained by multiplying the covariance between assets by the weight of each asset in the

portfolio. According to Bodie et al. (2013)[8], variance can be expressed by equations.

$$\sigma_p{}^2 = \sum_{i=1}^{n} w^2{}_i\sigma^2{}_i + \sum_{i=1}^{n} \sum_{i=1}^{n} w_i w_j \ \mathrm{Cov}(r_i, r_j)$$

➢ *Performance Analyses of Each Asset*

1. Sharpe ratio

Sharpe ratio uses total measured risk (systematic and unsystematic risk) as indicated by the standard deviation of assets (Arugaslan et al. 2008)[10]. Sharpe measurements were formulated according to Bodie et al. (2010)[8].

$$S_i = \frac{\bar{r}_i - \bar{r}_f}{\sigma_i}$$

2. Treynor ratio

Treynor measurement is based on risk premium $(\bar{r}_i - \bar{r}_f)$ as well as the Sharpe ratio. This measurement was formulated according to Bodie et al. (2013)[8].

$$T_i = \frac{\bar{r}_i - \bar{r}_f}{\beta_i}$$

3. Jensen ratio

Jensen's measurements were formulated according to Bodie et al. (2010)[8].

$$\alpha_{pi} = \bar{r}_i - [\bar{r}_f + \beta_i\,(\bar{r}_{mi} - \bar{r}_f)$$

➢ *Selecting the Optimal Investment Portfolios*

1. Single-Index Model

According to Elton and Gruber (1991)[10], the rules in calculating which assets will be included in the optimal portfolio are as follows.

a. Look for the ERB ratio for each asset included in the consideration and rank it from the largest to the smallest. ERB (excess return to beta) can be obtained by reducing the rate of return of each instrument with the risk-free asset. After the excess return value is obtained, then the excess return is divided by beta so that the ERB is obtained.
b. The optimal portfolio contains assets whose ERB value is greater than the cut-off C^*. Calculation of cut-off rate (C_i) aims to determine the unique cut-off C^*. Elton and Gruber (1991)[10] provide equations regarding assets that enter the portfolio, ie assets that have an ERB above the cut-off rate.

$$C_i = \frac{\sigma^2{}_m \sum_{i=1}^{n} \frac{(\bar{r}_i - r_f)\beta_i}{\sigma_e{}^2{}_i}}{1 + \sigma_m{}^2 \sum_{i=1}^{n} (\frac{\beta^2{}_i}{\sigma_e{}^2{}_i})}$$

$$C^* = \max C_i$$

Optimal portfolio selection is meant by comparing the value of ERB and C_i then the formation of the portfolio can be determined as follows.

ERB > C^*, the assets concerned are included in the portfolio. ERB < C^*, the assets concerned are not included in the portfolio.

According to Fischer and Jordan (1999)[11], after it is known which assets are included in the optimal portfolio, then the percentage of investment in each asset must be taken into account.

$$w_i = \frac{Z_i}{\sum_{j=1}^{n} Z_j}$$

with,

$$Z_i = \frac{\beta_i}{\sigma^2{}_i}\left[\frac{r - r_f}{\beta_i} - C^*\right]$$

2. Tangency Portfolio

Tangency portfolio can be sought by maximizing the value of tan α by calculation (Bodie et al, 2013)[8].

$$\tan\alpha = \frac{E(r_p) - r_f}{\sigma_p}$$

This optimal portfolio can be completed using the MS Excel Solver program or can be completed manually with simultaneous equations.

$$Z_i\sigma^2{}_1 + Z_2\sigma_{12} + \cdots + Z_i\sigma_{1i}) = [\,E(R_1) - R_f]$$
$$Z_1\sigma_{21} + Z_2\sigma^2{}_2 + \cdots + Z_i\sigma_{2i}) = [\,E(R_2) - R_f]$$
$$Z_1\sigma_{i1} + Z_2\sigma_{i2} + \cdots + Z_i\sigma_{ii}) = [\,E(R_i) - R_f]$$

The simultaneous equation can be simplified to get (Z_1) which is the weighing scale of an asset that will be used to get the proportion of funds to be invested in each asset in the portfolio by a formula.

$$Z_i = (E(R_i) - R_f)\,\frac{1}{\sigma^2{}_i}$$

➢ *Analysis of Investment Portfolio Performance*

Lin and Chou (2003)[12] states that the Sharpe ratio calculation is expected to facilitate investors with different risk attitudes in determining investment choices for each investor. Furthermore, Nielsen and Vassalou (2004)[13] say that investments that have a higher Sharpe ratio allow investors to get additional higher investment returns. Sharpe ratio can be obtained by reducing the portfolio return rate with the risk-free rate of return. After the excess return value is obtained, then the excess return is divided by the standard deviation of the portfolio.

III. RESULTS AND DISCUSSION

➢ *Return and Risk Analysis of Taspen Life Portfolio*

In carrying out investment activities during the study period, the Taspen Life makes an investment allocation with the following composition.

Table 4. Weigh Portofolio Taspen Life

Types of Assets	Weight	2016 (%)	2017 (%)	2018 (%)	2019 (%)	Average (%)
Bonds	w_1	27,78	23.42	38.25	36,70	31,54
Time Deposits	w_2	36,70	24,43	10,49	12,21	20.96
Stocks	w_3	1,98	3,35	2,38	1,90	2.40
Mutual Funds	w_4	9,87	48,79	48,88	43,41	37.74
Asset-Backed Mutual Funds	w_5	-	-	-	5.55	5.55
Portfolio Return		7,38	7,46	6,90	7,15	7,22
Portfolio Risk		1,36	1,74	0,84	1,59	1,38

The portfolio return owned by the Taspen Life Fund is a fairly large return, but also has a large risk. The level of return on the Taspen Life portfolio ranges from:

Lower limit = 7,22% - 1,38% = 5,84%

Upper limit = 7,22% + 1,38% = 8,6%

➢ *Performance Analyses of Each Taspen Life Asset*

1. Sharpe ratio

Table 5. The Sharpe ratio for each Taspen Life assets and its benchmarks

Sharpe Ratio				Performance
Assets		Benchmark		
Bonds	1,130	IGBI	1,508	*Underperformed*
Time Deposits	0,446	BI Reverse RR	-3,129	*Outperformed*
Stocks	1,090	IHSG	0,908	*Outperformed*
Mutual Funds	0,226	ICBI	0,256	*Underperformed*
Asset-Backed Mutual Funds	-5,329	IBFI	0,256	*Underperformed*

Based on the Table, bonds provide the highest Sharpe ratio value so that bonds can provide greater investment returns than other investment assets. Then the investment assets that have the next high Sharpe ratio are stocks, time deposits, and mutual funds, while the asset-backed securities have a negative Sharpe ratio. This sequence is in line with the table based on returns, where bonds provide a higher return than other investment assets other than stocks. On the other hand, based on the Sharpe ratio calculation, it can be seen that bonds, mutual funds, and asset-backed securities provide worse performance than other assets. This cannot be separated from the consideration of risk factors.

When compared to each benchmark for each type of investment asset, the Sharpe ratio calculation result is that there are three investment assets that cannot match market performance (underperformed), namely bonds, mutual funds, and asset-backed securities. Meanwhile, other investment assets can match market performance. This means that after considering risk factors, only the two investment assets can outperform the market.

2. Treynor ratio

Tabel 6. The Treynor ratio for each Taspen Life Fund assets and its benchmarks

Treynor Ratio				Performance
Assets		Benchmark		
Government Securities	0,052	IGBI	1,5076	*Underperform*
Time Deposits	0,004	BI *Reverse* RR	-3,129	*Outperformed*
Bonds	3,137	IHSG	0,908	*Outperformed*
Stocks	-0,024	ICBI	0,2563	*underperfomed*
Mutual Funds	14,98	IBFI	0,2563	*outperformed*

Based on the Table, it can be seen that investment in bonds, time deposits, stocks, and has a positive Treynor ratio value. Meanwhile, mutual fund investments have a negative Treynor ratio. Negative Treynor value in mutual funds is due to the negative sign of the mutual fund's beta. So that the value considered in making decisions is the absolute value, this is in line with the research conducted by Aprilia et al. (2014) where the beta owned by the sukuk causes the negative Treynor ratio value in the sukuk is negative. Based on the Treynor ratio calculation, asset-backed securities provide better performance than other investment assets. The investment assets with the next high Treynor ratio value are

stocks, bonds, and time deposits. This order is different from that produced by the Sharpe ratio where the best performing bonds and asset-backed securities have the worst performance.

The Treynor ratio calculation results when compared with each investment asset benchmark, two investment assets cannot match market performance (underperformed), namely mutual funds and bonds. This differs from the Sharpe ratio results, where the performance of bonds, mutual funds, and asset-backed securities cannot match market performance. Meanwhile, other investment assets can match market performance (outperformed).

3. Jensen ratio

Table 7. The Jensen ratio for each Taspen Life assets and expected CAPM return

Assets	Average Return (1)	Expected Return (CAPM) (2)	Jensen alpha (1)-(2)	Performance
Government Securities	0,090	0,059	0,032	*Superior*
Time Deposits	0,086	0,056	0,030	*Superior*
Bonds	0,085	0,058	0,027	*Superior*
Stocks	0,097	0,057	0,040	*Superior*
Mutual Funds	0,030	0,056	-0,025	*Inferior*

Based on Table, it can be seen that mutual funds provide the highest Jensen alpha value, this is different from the measurement of the performance of the Sharpe ratio and the Treynor ratio. Then the investment assets that have the next high Jensen alpha value are bonds, time deposits, and stocks. On the other hand, there are four investment assets that have a positive Jensen alpha value. This means that fund managers have the ability to choose undervalued securities, the ability to predict the market, and the ability to respond to changes in the market. A positive Jensen alpha also means that the investment asset has the ability to selectivity.

Asset-backed securities investment assets have a negative Jensen alpha value, which means they have inferior performance. This inferior performance can be caused by several things, namely the period of time the fund manager has a portfolio of asset-backed securities in selecting undervalued assets, the inability to predict market movements, and the inability to respond to portfolio composition in accordance with market movements (Sutawisena 2011). This is in line with the measurement of the performance of the Sharpe ratio and Treynor ratio, where mutual funds have poor performance compared to other investment assets.

- *Analysis of Optimal Portfolio*

The weight calculation results for each asset (Wi) in the portfolio use a single-index model and tangency portfolio compared to the historical weights as follows.

Table 8. Comparison of the composition, risk, and return of the Taspen Life portfolio with the single-index model and portfolio tangency

Types of Assets	Weight	Taspen Life	Single-Index Model (%)	Tangency Portfolio (%)
Government Securities	w_1	26.57%	60,80	18.87%
Time Deposits	w_2	34.07%	36,57	8.18%
Stocks	w_3	2.24%	2,63	11.01%
Bonds	w_4	36.63%	0.00%	45.32%
Mutual Funds	w_5	0.49%	0.00%	16.61%
Portfolio Return		7.15%	7.64%	8.55%
Portfolio Risk		3.04%	0.41%	0.39%

Based on the portfolio composition in Table, the limit on the return on a single-index model portfolio will depend on the range:
Lower limit = 7.64% - 0.41% = 7.23%
Upper limit = 7.64% + 0.41% = 8.05%
While the limits on the return on the tangency portfolio will depend on the range:
Lower limit = 8.55% - 0.39% = 8.16%
Upper limit = 8.55% + 0.39% = 8.94%

- *Performance Analysis of Optimal Portfolio*

Assessment on the performance of the Taspen Life portfolio and the portfolio produced by the single-index model and tangency portfolio using the Sharpe ratio as follows

Tabel 9. Comparison of the Sharpe ratio of historical and proposed portfolio

	Taspen Life	Proposed	
		Single-index model	Tangency Portfolio
Portfolio Return (%)	7,15	7,64	8,55
Risk-Free Aset (%)	5,88	5,88	5,88
Excess Return (%)	1,27	1,76	2,67
Portfolio Risk (%)	3,04	0,41	0,39
Sharpe Ratio	0,42	4,29	6,89

Based on the Table, the Sharpe portfolio from the Taspen Life Fund ratio has a lower value than the Sharpe ratio generated from the single-index model and the tangency portfolio. On the other hand, portfolio performance results formed by the Tangency and Single Index Model portfolio are model look better than the Taspen Life Fund portfolio. The Taspen Life can consider the tangency portfolio as an alternative to get the maximum profit level where the portfolio formed by the tangency portfolio has the highest Sharpe ratio value and has a portfolio composition based on the Taspen Life Fund investment direction.

IV. CONCLUSION

Taspen life can use the Tangency Portfolio to form an optimal portfolio in 2020.

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