

Assessment Of Investment Strategy With A Utility-Based Approach

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Abstract:

The purpose of this study is to analyze the assessment of investment strategies with a utility-based approach. The rise of investment at this time has the aim of increasing welfare in the present and in the future. Investing is expected to have the best investment strategy and be supported by investment knowledge. Investment strategy requires consideration of economic factors, business intuition, experience. Approaching retirement age, investments are made more determined by psychological factors, therefore, it is necessary to manage the financial portfolio of retirement income with the right strategy. How to manage investments in a retirement portfolio. People who have entered retirement age always want to get the maximum utility from the pension money they have earned so far. When money has been invested in certain assets, under which conditions are formed: (1) the safest investment withdrawal rate (2) can be used in the possibility of running out of money which is considered to have failed to plan as the main measure of investment performance in a pension fund portfolio.

Keywords: Investment strategy, utility, pension, portfolio, loss aversion

I. INTRODUCTION

Investment strategies are often influenced by various factors, such as economic conditions, the person's business intuition, experience, and age. Age is one of the factors that influence the investment strategy, which often occurs in the period leading up to retirement. Retirement age has a tendency to change psychological factors that influence behavior changes to plan finances or funds owned. Various phenomena of life for people who are approaching retirement or have Retirement people often face concerns about managing their finances, on the other hand, the finances they have can provide utility in their lives. For this reason, it is necessary to manage finances in the retirement income portfolio with the right strategy. The strategy in question is how to manage investments in a retirement portfolio. People who have reached retirement age want to get maximum utility of the pension he earns.

When money has been invested in certain assets, under which conditions are formed: (1) the safest level of withdrawal, (2) Funds can be used when there is a possibility of running out of money which is considered to have failed to plan as the main measure of performance in the pension fund portfolio investment program. The focus of this study is to shift the allocation of assets and consider the decision steps for a better pension plan, namely: (1) the magnitude of the failure plan; (2) the number of expected results. The development of utility-based assessments can be done by combining financial measures. The most important problem is, how to measure the expected utility when someone prepares a financial plan from retirement income and can be used to make an assessment with various appropriate investment strategies.

II. ANALYSIS METHOD

The analysis in this study aims to measure asset allocation and make steps to measure the performance of a pension plan, namely: 1) the magnitude of failure, plans and expectati [1] The Influence of Debt Policy, Investment Decisions, and Profitability on the Value of Food and Beverage Companies Listed on the Indonesia Stock Exchange, 4 (1): 1369-1380.ons, the number of grants received. The main focus is the development of a utility measure by combining the three financial measures: (1) Income returns with

different assets using an annuity based on an initial investment of \$100 at age 60; (2) Estimating utility on different assets with initial 60 year old investment annuity; (3) Estimated utility with return on real stock at the lowest interest rate of 4.5%, initial investment of \$100 at age 60.

The design of this analysis shows how to measure utility in evaluating investment with various strategies and scales as follows: (1) Using the stochastic maturity date in managing assets to a fixed time measure; (2) Directly adjusted inflation-adjusted annuities as a third group of assets other than conventional stocks, investments and bonds; (3) Include specific loss aversion acknowledgments for varying utility measures. The scope of the analysis study uses the example of people retiring at the age of 60 years with initial investment. How the concept of utility is developed and applied to retirees on a variety of available assets such as: stocks, bonds, and inflation-adjusted annuities. This analysis is based on early retirement individuals, with the following assumptions: (1) Longevity: Life span Variable with a 25-year life expectancy; (2) Costs: year-on-year average basic living costs in real terms (increases with inflation); (3) Annuity Options: Inflation-indexed as an immediate annuity with an initial payout rate of 5.05% per annum (paid monthly); (4) Return on Stock Investment, 6.5% real return, 20% annual standard deviation; risk-free bonds; real return 1%, 0% standard deviation.

Assumptions of longevity were adjusted at age 60 for males in good health based on the Union of Actuaries (SOA) RP-2000 mortality table and SOA improvement scale. Annuity rates for men aged 60 years from Income Solutions via the website www.vanguard.com (rates as of 9/25/11). Estimates of stock returns are based on a study by [2], [3] based on a worldwide survey of estimated risk premiums, with the views of 6,000 economists and investment professionals. Standard deviation estimates are sourced from the S&P 500 years 1926-2010. The risk-free bond rate is based on historical averages for the Treasury Inflation Protected Securities (TIPS) grouped at the most recent lowest recognized rate. The variable used in the analysis is the estimated future stock earnings. The real return of 6.5% is reduced by [2] to 5.5% risk premium forecast with a risk-free rate of 1% for bonds. The risk-free rates are 1% and 2% lower than the average real return on US stocks over the period 1926-2010. Individuals sampled are assumed to have only sufficient assets to purchase an annuity with payments in accordance with their daily living expenses not met by the annuity such as payments such as: benefits Social Security). Analysis of various asset allocations uses an inflation-adjusted withdrawal rate of 5.05% which corresponds to the annuity. To evaluate the project results, a Monte Carlo simulation was used.

III. RESULTS AND DISCUSSION ADVANTAGES AND DISADVANTAGES

Thinking about retirement results means focusing on the end of life. It also means using the profits and one doesn't spend money and has money left over for a grant/inheritance. The amount of profit is the amount of the inheritance. "Loss is used in this concept to refer to a failed plan in which the individual runs out of money before death. Losses are calculated as negative inheritance, and are measured by looking at the failure of the plan. For example, running out of money at 75, but living to be 95, would result in a sizeable or negative loss of inheritance. The development of utility-based approach measures is to implement financial results in satisfaction measures. The concept of loss aversion, because every human being does not want to lose, was applied to develop a utility measure to recognize that "losses" (negative inheritance) have a greater welfare impact than gains (positive inheritance) of the same amount. The decision on the type of investment is often associated with strategic planning that is achieved within a certain period of time as the company's annual program. Investment decisions are taken as an alternative for companies to spend their funds outside of operational activities that will provide benefits to the company in the future. Capital investment is said to be the main aspect in financial management policies because investment is a form of capital allocation whose realization must produce benefits in the future [4].

[3] Practical Guidelines for Risk Management in OHS Perspective. In investing there is always a risk that we get, but there are also benefits that we get in the. Jakarta: Dian Rakyat. understand the investment policies of financial aspects based on risk management and to know that the investment studies are

appropriate[4] Rustam, B.R. (2017). Risk Management: Principles, Application, and Research. The desire not to lose is applied somewhat differently to the way other economies work. When [6]and [7] won the Nobel Prize with “prospect theory and loss aversion”, they explained how a choice can lead to loss aversion in irrational decision making. In this context, the rational decision to recognize a very different impact of positive retirement outcomes than negative retirement outcomes.

Financial Return

Table 1 shows the estimated financial results based on various mixed stocks/bonds and mixed stocks/annuities. The present value (PV) of the inheritance column shows the present value of the remaining funds expected at death per \$100 of the initial investment—after taking systematic lifetime withdrawals or annuity payments. The present value is calculated using the 1% risk-free rate, and the amount is in current dollars (\$). "% Failure" is the probability that strategy to run out of money before death time. The "mean loss" is the mean negative mean PV of the negative inheritance (to measure the magnitude of the loss) for the set of failed cases.

Table 1. Financial Outcomes for Different Asset and Annuity Mixes Based on \$100 Initial Investment at Age 60

	Loss	Aversion	Ratio
Asset Allocation	PV Bequest	Failure Percent	Average Loss
100% Stocks	-\$124.26	23%	-\$50.20
60%/40% Stocks/Bonds	\$66.44	20%	-\$33.76
40%/60% Stocks/Bonds	\$32.60	23%	-\$23.61
100% Bonds	\$9.53	45%	-\$23.31
60%/40% Stocks/Bonds	\$80.77	23%	-\$32.63
40%/60% Stocks/Bonds	\$43.49	23%	-\$17.57
100 Annuity	\$0.00	0%	\$0.00
Source: Author's estimates based on Monte Carlo			Simulation

Note: PV bequest (present value inheritance), failure %t (%failures), Average loss (average loss).

These results were calculated using the VBA program developed to perform projections of the **Monte Carlo simulation**

The program runs 1,000 40 year investment scenarios for each asset location. Each run of the program starts with an initial investment of \$100 at age 60, with monthly increases (or decreases) based on random real investment returns and monthly withdrawals of \$5.05/12. Projected inheritance values (positive or negative) are calculated at the end of each month. The outcome-weighted mortality variable with the probability of death in each month. The results shown in Table 1 are the averages for the 1000 investment scenarios that can be generated for each asset allocation.

Some things that can be explained from Table 1 are: (1) Inflation index annuities do not show PV inheritance or failure. This annuity takes into account the inflation-indexed cost, the last payment for life; (2) Generate 100% of the highest inheritance PV share allocation due to the allocation that has the highest expected return; (3) The failure percentage reflects both the longevity risk and the volatility of the investment. Special note, the highest failure rate (45%) for 100% bond allocation. Even though investments are risk-free, those that outlive the average make a loss; (3) The failure rate for all strategies except the 100% annuity was above 20%, reflecting that the drawdown rate was somewhat aggressive (5.05%) compared to more typical planning guidelines such as the 4% rule; (4) A mixed stock annuity can be thought of as a smaller version of the case of 100% shares basically the yield for 100% shares multiplied by the percentage of shares (65% or 35%). The failure percentage remains the same as 100% because the mixed strategy will

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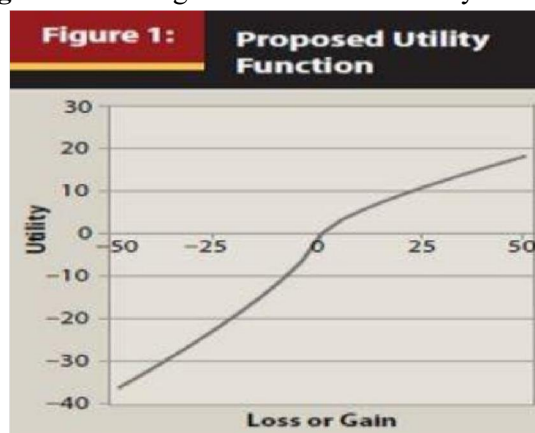
still fail frequently, but results in smaller loss dollars. The benefits of annuities are seen from several aspects: (1) losses for people who die early and benefits for people who live long, while there are advantages or disadvantages regardless of the length of life. Profit and loss consider both retirement income and retirement expenses. Generally people think of annuities as providing income to meet basic living expenses, both income and expenses will end in death. Inheritance is considered no possibility of the plan failing. For this reason, a more precise income and cost analysis is needed to evaluate the pension asset allocation strategy only.

Table 1 can be used to make recommendations on asset allocation and when to buy shares with annuities. There are several different variables that need to be included in the decision, namely: (1) more informative decision-making tools can be developed; (2) it is necessary to shift the focus to purely financial results with the concept of "fuzzier" satisfaction related to these results, so it is necessary to develop measures utility.

Utility function form

The purpose of constructing a utility function is to interpret Table 1 of financial results in terms of utility.

Fig 1. shows the general form of the utility function.



The form of the utility function is more important than the actual number. A utility function designed to rank preferences rather than unique numbers. First, the utility curve has a positive slope as long as profits are preferable to losses; more is better for gains and less good for losses. Second, the curve passes through the center point of an arbitration choice (arbitrary), so that losses are scored negatively and gains are scored positively. Third, there is a kink at the origin indicating that individuals perceive the losses outweigh the gains. Fourth, in the profit region, the slope of which decreases as profit increases (a mathematician calls the concave shape) reflecting a decreasing marginal utility or risk aversion (individuals are assumed to prefer a \$100 profit until opportunity equals zero or \$200). In the loss region, curvature is the shadow image amplified the curvature in the gain region, which creates equal weight between all gains and losses.

The third point is a very important process for assigning utility to financial results. [6] as pioneers in behavioral economic theory, introduced the concept of "loss aversion", with the hypothesis that individuals place more weight on losses than gains. [6] conducted an experiment in which they tested participants' subjective trade-offs between hypothetical gains and losses, and found an approximately 2:1 weighting of losses versus gains. The gain from loss situation for analysis differs in research with experiments conducted by [6]. The stakes are higher, and the nature of the losses differs from the gains. A "loss" in this case means the failure of the plan (out of money during retirement), and a "gain" means being able to leave the grant. Loss aversion in this particular analysis can be thought of as a combination of [6] loss aversion and inherited motivational loss. For example, someone who is average in their aversion to financial loss, but lacks the motivation to leave a legacy, will be given a higher-than-average score on the measure of loss aversion used. Given the impact and difference on personal well-being of gains versus losses in this analysis, it seems acceptable for loss aversion to be weighted 2:1.

Informal Survey Results

To get an idea of how individuals subjectively assess the trade-off between a hypothetical small dollar gain and a loss, a short survey was developed and used with 36 participants. Those surveyed said to assume they were retiring at age 60 and had earned a \$25,000-a-year, inflation-adjusted job pension. Pension plus Social Security of \$15,000 per year is just enough to live comfortably, but not luxury, in retirement. Further informed that, instead of a pension, their employer is willing to offer a cash payment at the time of their retirement, can invest and use for systematic withdrawals an amount equal to a pension of \$25,000 per year, increasing according to inflation. The risks of taking cash payments are described in a simple way, namely: (1) 50% chance of the plan failing and receiving social security for the last two years of life, but there are disruptions in life. (2) 50% chance of investing well, providing sufficient funds to adjust pension payments and generate additional legacy funds. The total number of respondents was 36 people regarding pension cash payments, 12 people received \$250,000 (5:1), 11 people received \$500,000 (10:1), so they often get together. Seven respondents to the \$500,000 ranged from \$760,878 to \$2 million. Of the six respondents under \$250,000 "that's not enough" there were three willing to accept a trade at \$50,000, one respondent at 2:1 (\$100,000), and two at \$200,000.

Twelve of the 36 survey respondents were then asked questions. They were told the same situation applied as the first question, except assuming they were rich and would leave a \$500,000 inheritance, if they took a pension. Another alternative is to take a cash payment where the outcome is described as a 50% chance of leaving an inheritance for \$450,000 (a \$50,000 loss) of effort and a 50% chance of leaving an inheritance (X plus \$500,000). Question, "How much does X need to make worth taking a cash payment? In this scenario, the loss will only affect the inheritance amount and have no impact on the survival state. Unsurprisingly, the selected Xs clustered around a smaller number than before. One hundred thousand dollars was voted on by 8 out of 12, with three higher (up to \$250,000) and one at \$50,000. This result is approximately consistent with [7] findings of a 2:1 loss aversion ratio estimate. Funding decisions are decisions concerning the company's financial structure (financial structure). [9] the increase in company assets carried out through investment policies must be financed by capital increases.

Utility Function Form

This survey provides preliminary data on the loss aversion ratio (2:1) used in constructing the utility function. For this reason, it is necessary to construct a profit and loss utility curve. For profit, it seems reasonable that a utility function should be a function increasing with decreasing slope (concave). Various mathematical functions can be used to describe this form. [6] used a simple satisfaction function only. [7] on loss aversion suggest a risk seeking strategy rather than risk aversion, so that the curve becomes a convex mirror image of the profit curve.

They refer to the general form the utility function shows the sensitivity decreasing as one moves from the zero reference point. The utility difference from no plan failure at all and one year without income will be greater than the difference between 9 years without income and 10 years without income. Research by [8] used a questionnaire on a group of 25 graduate students with an alpha value of 0.89. The findings show that respondents expect the same profit and loss in investing. Possibility of testing investment strategies with lower alpha. [11] findings are more reflective of retirement decisions. his study set investment opportunities in the range of 25/75, 50/50, and 75/25 and developed an estimated alpha of 0.74. This gives a 50/50 good fit test. This value can be used to estimate the utility alpha value.

Results Utility

Table 2 shows the results of asset allocation and the same stock/mixed annuity shown in Table 1: 100% annuity strategy serves as the base case, and various asset allocation strategies. A positive value indicates that the use of a systematic withdrawal strategy in the allocation of mixed stock annuity assets produces the expected utility compared to an annuity strategy of 100%, and a negative value supports the annuity strategy.

Table 2. Utility for Different Asset and Annuity Mixes Based on \$100 Initial Investment at Age 60

Asset Allocation	Loss Aversion Ratio			
	2 to 1	5 to 1	10 to 1	20 to 1
100% Stocks	\$22.60	\$14.45	-\$6.30	-\$34.92
60%/40% Stocks/Bonds	\$16.24	\$7.89	-\$3.85	-\$27.36
40%/60% Stocks/Bonds	\$8.68	\$2.03	\$7.98	-\$30.86
100% Bonds	-\$0.87	\$12.98	-\$33.16	-\$73.53
60%/40% Stocks/Bonds	\$14.69	\$9.39	-\$4.10	-\$22.70
40%/60% Stocks/Bonds	\$7.91	\$5.06	-\$2.21	-\$12.22
100 Annuity	\$0.00	\$0.00	\$0.00	\$0.00
Source: Author's estimates based On Monte Carlo simulstion				

The results of the additional steps in the Monte Carlo projection are used to generate Table 1 of the legacy dollar values translated into utility units. Negative results, this value is calculated multiplied by the loss aversion ratio. Before discussing the numbers, these are shedding light between Table 2 and Table 1. Using the 100% share allocation as an example, the legacy EPV in Table 1 is \$124.26. With 2:1 loss aversion, utility is expected to be 100% stake at \$22.60, which can be considered a new measure of legacy PV in "value for money utilities" where losses have twice the weight of gains. In Table 2, the numbers get smaller (or negative values) as successively higher weights are applied to losses.

The results are shown in Table 2 through the commonse test- negative values on the far right indicate an annuity strategy for individuals with strong financial loss aversion. Positive numbers on the left suggest systematic draws with high share allocations on low individual-loss rejections. Because 5:1 and 10:1 represent the average loss aversion from this survey, we have used 20:1 to represent a particularly loss-averse individual and 2:1 for an individual who has sufficient wealth to allay concerns about running out of funds.

Based on Table 2, the limited test of investment strategy shows several findings, namely: 1) Loss aversion affects the choice of strategy. The choice to buy an annuity over withdrawing from a savings account is a function of loss aversion. 2) There is no clear winner over withdrawing from savings. Slicing the utility values from positive to negative down to the range of loss aversion median values, namely: 5:1 and 10:1 is the most popular choice of values. It may come as a surprise that the annuity strategy is no better, since the design of this example leans somewhat towards annuities. The disadvantage of choosing an annuity is that expenses are assumed to be predictable and closely match the inflation-adjusted annuity payments. 3) The strategy of maximizing stock utility 100% depends on annuity loss aversion. For that level of loss aversion that doesn't support annuities, 100% stock allocation beats out any mixed stock with bonds or annuities. It should come as no surprise that 100% of stocks yield the best financial returns as shown in Table 1. However, it may seem strange that it can produce the best utility returns. Other studies on investment strategies on the safest withdrawal of shares such as [12], [13]and [14] all recommend a 50% greater share allocation, but none encourage all strategies to 100%. However, his research studies focus only on the probability of running out of money, while the utility measure considers inheritance values.

At a higher level of loss aversion may favor an annuity, it is necessary to record 65% or 35 stocks/bonds no better than 100% stake. An investment strategy related to loss aversion is a more conservative allocation of choosing 100% stocks if the annuity does not provide options. The benefit that can be used as a reference is if one is looking for safety with fixed income investments, annuities with long life guarantees, then working options are better than choosing bonds. 4) The entire Bond Investment Strategy looks like a big loser. Most retirees did not own any stock, as [9] point out, even before the financial crisis. Investing in bonds may seem like a safer strategy when fixed life expectancy is assumed. However, the picture changes completely when the mortality variable is introduced. Table 1 shows the level failure of 45% of each strategy, and Table 2 of utility measurements shows that the 100% bond strategy is much worse than

the other strategies. Table 2 also shows that conservative allocations, such as 35% shares//65% bonds, yield mediocre expected returns. 5) Uncertainty of the equity premium. The use of consensus estimates of the return advantage of stocks over bonds (equity premiums). However, there are cases that the stock premium in the future will be lower than expected. Market valuation is also a concern. The PE/10 measure, popularized by Robert Shiller, is currently around 20, based on the S&P 500 at 1,200, compared to the longer-term average of 16.4. There are three different estimates of the actual future yield on the American stock market ranging from 0.6% to 4.5%. It turns out that the choice of the equity premium assumption is very important for this type of analysis.

Low Equity Premium

The repetition of utility calculations with stock returns was significantly reduced from 6.5% to 4.5%. Systematic loss withdrawal mostly maximizes profit utility assuming lower stock returns, except for individual loss rejections as shown in Table 3.

Table 3. Utility for Different Asset and Annuity Mixes Based on \$ 100 Initial Investment at Age 60

Loss Aversion Ratio				
Asset Allocation	2 to 1	5 to 1	10 to 1	20 to 1
100% Stocks	\$10.49	\$5.30	-\$29.09	-\$81.19
60%/40% Stocks/Bonds	\$8.04	\$1.88	-\$19.68	-\$51.82
40%/60% Stocks/Bonds	\$4.57	-\$4.74	-\$29.09	-\$81.19
100% Bonds	-\$0.87	\$12.98	-\$33.16	-\$73.53
60%/40% Stocks/Bonds	\$6.82	-\$3.45	-\$18.91	-\$52.77
40%/60% Stocks/Bonds	\$3.67	-\$1.86	-\$10.18	-\$28.42
100 Annuity	\$0.00	\$0.00	\$0.00	\$0.00
Source: Author's estimates based On Monte Carlo simulsion				

The most important concern from the comparison of Tables 2 and 3 is that the selection of the equity premium assumption can be indicated by a scale point to make annuity choice recommendations. Uncertainty often creates dilemmas for planners, especially when advising clients with limited finances. To avoid this dilemma it is necessary to find a way to provide weakness protection to a systematic withdrawal strategy. Accurate information about the product has been designed to provide guaranteed lifetime benefits, thus emerging a popular choice for annuity "rider" as a variable. Information is urgent for riders, because they do not know the function in their work to determine prices. However, the information is very useful, if available in a low-cost, index-funded, inflation-guaranteed, free of charge commission and management fee.

Other Considerations in Investment

Behavioral Considerations. Although 100% stocks yield a high utility value of the stock/bond mix for a disclaimer-loss case. It is not to be expected that advisors would rush to make such a recommendation. The best long-term retirement strategies have proven to be unworkable given the human tendency to salvage the lower-end market. Given behavioral considerations, it may make sense to determine the optimal strategy and then conduct consultation, training, accompanied by an advisor, so as to maintain fluctuations in market values.

The meaning of stock reversion. Stock returns are projected using Monte Carlo analysis, it is assumed that the return dependencies from year to year and stock returns follow the Random Walk. Stock returns have historically shown average returns [17] and that long-term return variability has been significantly less than the estimated random walk value. If this average return continues into the future, the quotient of the portfolio drawdown will increase systematically concentrated in stocks compared to the projected returns.

IV. CONCLUSION

The results show the importance of the individual's loss aversion characteristics in determining the asset allocation strategy. In addition, assumptions about future stock returns are very important. The optimal

allocation tends towards 100% shares or 100% depending on the annuity loss aversion and stock return assumptions. Mixed stock allocation and bond investments tend to perform worse on a utility-based approach. Determining the best investment strategy and then to resell shares is a challenging strategy for “stock riders”. There is a role to play in an immediate annuity, and how much of that role depends on the characteristics of the client and economic assumptions. The disadvantages of an annuity investment strategy are: Lack of liquidity and flexibility; interest rates are currently low which may affect the rate of annuity payments; the potential for regret occurs if the interest rate annuity purchased is high; the price margin is formed on the spread annuity based on the length of healthy life; high costs of adjusting for inflation compared to market size with inflation expectations.

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