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Research on the Pension Investment and Asset Management

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Abstract: The study explored how to develop a pension investment portfolio and analyzed solutions for special cases. We first reviewed the global context of pension investment and emphasized the crucial role of pension in financial planning. Subsequently, we specifically analyzed the "firefighter case" and decided whether to choose "one-time payment" or "fixed benefits". Finally, specific results were provided and some suggestions were given. In addition, we emphasize the importance of individual risk tolerance and investment goals in formulating investment strategies to ensure that investment portfolios match individual needs. Through the guidance of this study, investors can learn how to manage their pension investments and achieve long-term financial security and robust retirement plans. The diversity and effective management of pension investment portfolios are crucial for the success of pensions, and this is worthy of careful consideration and action by every investor.

Keywords: Pension, Investment Portfolio, Risk Management

1. Introduction

Pension is a financial arrangement used to support retirement life, and in different countries, retirees with different identities will have different forms of pension. With the profound changes in the global population structure, pension issues have become an urgent challenge facing the world today. The aging population, economic uncertainty, and the evolution of the social security system all constitute a realistic background that cannot be ignored in the field of pension [1]. Many countries are facing the challenge of population aging, which means that the proportion of the elderly population is increasing while the relatively young workforce is decreasing. This puts greater payment pressure on pension plans as they need to support more retired populations. The financial sustainability of pension plans has also become an important issue. With the aging population and increasing life expectancy, governments and private institutions need to ensure sufficient funds to pay for future pensions [2]. This may require reassessing payment rules, raising retirement age, or improving investment strategies. The performance of pension funds is influenced by the financial market and economic conditions. Financial crises or economic downturns may lead to losses in pension funds, which in turn pose a threat to the sustainability of the plan. Many countries are considering pension reforms to address these challenges [3]. These reforms may include raising the retirement age, modifying the financial management of pension plans, increasing contribution requirements, or improving social safety nets. The impact on individual retirees is that some may choose to postpone retirement to accumulate more pension [4], while others may retire early, which may lead to different labor market dynamics [4]. For individuals, properly arranging pension plans is the wiser and more effective solution. For individuals, they cannot change the world landscape or national policies, and the best response is to make their pensions more "valuable". There are many ways to arrange a pension, such as a 401k plan (if you have a 401k plan with your employer, you can automatically save through your monthly salary, and the employer will usually match the payment. This is a type of pre tax savings, investment appreciation is usually tax-free, and you don't need to pay tax until you withdraw [5].), setting up a personal retirement account (IRA) [6], investing in a pension account, apply for social security benefits (social security benefits are a social security plan provided by the government to eligible retirees. Your eligibility and amount for social security benefits depend on your work history and receiving time [7].), diversified investment portfolio, and more. In the past few decades, pension plans have evolved from a relatively simple personal savings tool to a complex and serious socio-economic issue [8]. This paper will focus on the investment and asset management of pension funds in the current world state, explore individual strategies in certain policies or situations, and focus on potential trends and challenges in the future. Understanding how to effectively manage pension assets to ensure long-term stable performance is crucial for ensuring the economic safety of the retired population.

2. Portfolio Analysis Based on Mean Variance Model

2.1. Case Introduction

Client X, a dedicated firefighter and paramedic with 25 years of service across various fire departments in Florida, is on the verge of a well-deserved retirement at the age of 55, a common milestone for hazardous occupations like his. In his upcoming retirement, he envisions leisurely days fishing in the Florida Keys and embarking on exciting travels.

This retired gentleman leads a simple life, living in a modest two-bedroom lakefront rental, unburdened by marriage or children. His health is robust, and he anticipates a long and fulfilling retirement. Alongside his anticipated pension income, Client X has amassed a substantial nest egg, approximately $600,000, which is currently invested in certificates of deposit (CDs) set to mature upon his retirement.

Client X's diligent years of service have earned him a substantial pension benefit from the State of Florida. Upon retirement, he has the choice of receiving an annual pension of $100,000, complemented by a 3% annual cost-of-living increase, guaranteed for the entirety of his life. However, the state also extends the option for pensioners to opt for a lump sum payment at retirement, with his estimated lump sum being $1.450 million, calculated based on life expectancy and the pension plan's discount rates.

At this juncture, Client X stands at a crossroads, facing two distinct financial decisions. Firstly, he must determine whether to accept the lump sum or opt for the traditional pension payments. Secondly, he needs to strategize how best to invest his savings, encompassing both his nest egg and the potential lump sum, or solely his nest egg as a supplementary source of income alongside his pension.

2.2. Problem Analysis

Lump sum or defined pension benefit comparisonLump sum or defined pension benefit comparisonLump sum or defined pension benefit comparisonLump sum or defined pension benefit comparison

First, we need to compare the pros and cons of a lump sum versus a defined pension benefit. The state provided a one-time payment of $1.45 million Yuan, which will be a one-time revenue for the customer. And the fixed pension benefit is $100,000 per year, which will grow at a rate of 3% per year over time increase. To compare the two options, we need to consider factors such as life expectancy, return on investment, and inflation.

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Life expectancy

Data provided by the Social Security Administration website shows that the average life expectancy of European and American men is 75-80 years old. This customer is in good physical condition and has “impeccable health.” Let’s set the customer’s life expectancy to 80 years old. Judging from life expectancy alone, it seems that the fixed pension plan is more cost-effective. Because the one-time amount received is approximately equal to the fixed pension payment for twelve years.

Compare profit margins

The state claims the lump-sum payment amounts to an annual return of 7.75%, while the defined pension benefit pays $100,000 a year. We can pass compare the two by calculating ROI. If we assume that the client's investment portfolio can achieve a higher rate of return, the fixed pension. Benefits could be more attractive. However, this involves portfolio selection and investment risk. After comparing several stocks, it seems that there are not a few plans with annualized returns greater than 8%.(The use of the 8% data here is because the discount rate for pension funds in most states in the United States is approximately 8%[9].) However, high returns are accompanied by high risks. Moreover, the client is a retiree and has limited risk-taking ability, so the plan to pursue higher returns cannot be realized. Let's use 8% income as an anchor to see whether it is difficult to achieve this level of income and how much risk we have to bear.

3. Results

Firstly, randomly select four stocks (Target, NIKE, Chase, BAC) on the yahoo finance website, then download their trends and data in the past five years, and then calculate their return average and variance. After obtaining the mean and variance (table 1), the mean variance model can be used to construct investment portfolios (table 2).

Table 1: Covariance matrix of returns

	TGT	NIKE	Chase	BAC
TGT	1	91.197	30.3333	14.1742
NIKE	91.197	1	40.5996	12.3171
Chase	30.3333	40.5996	1	24.9858
BAC	14.1742	12.3171	24.9858	1

It can be concluded from the calculation results that the client should choose the investment portfolio with the lowest risk and the largest Sharpe ratio. The annualized return of this investment portfolio is about 14%. This figure is much greater than 8%, and the risk is not high.

Some other ways-----Actuarial assumptions and present value calculations

We can also use the present value formula to compare the value between a defined pension benefit and a lump sum payment. This needs to consider ROI, annual growth rates and expected years of receipt. At the same time, make sure that the government's life expectancy data is accurate so that it can be calculated.

Investment Strategy Advice

Whether a client chooses a lump sum payment or a pension benefit, an appropriate investment strategy needs to be developed. The customer raised two situations: one-time payment Pay and invest, as well as receive a pension and invest your savings to top it off. In either case, we can take the following steps: Formulate an asset allocation strategy: suggest an asset allocation strategy based on the client's risk tolerance and investment objectives. Suppose the customer wants to pursue the most

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with a large Sharpe ratio portfolio, we can select a group of assets that achieves an optimal balance between risk and expected return.

Risk Management: Ensure portfolio diversification, including different asset classes and industries, to reduce risk. Also, consider investing in a portfolio Florida bonds are included, to match the pension's risk profile. Periodic Review and Rebalancing: Portfolios require regular review and rebalancing to ensure that they remain aligned with the client's goals. With market conditions as conditions change, asset allocation may need to be fine-tuned.

Compare the investment strategies in the two scenarios

When comparing the investment strategies of Scenario 1 and Scenario 2, the fixed cash flows of pension benefits need to be considered. In Scenario 1, the one-time payment will be for the customer provides initial capital, but needs to ensure that the investment strategy will support him throughout his retirement. In Scenario 2, pension benefits provide customers with a stable cash flow, but we need complementary investment strategies to meet the rest of our financial needs.

Table 2: Return average and portfolio

		TGT	NIKE	Chase	BAC
annualized return		70.21%	32.30%	37.95%	36.34%
		40.73%	31.80%	-7.95%	-16.12%
		24.88%	3.65%	16.55%	51.48%
		-25.50%	-24.00%	-12.45%	-21.31%
average		27.58%	10.94%	8.53%	12.60%
portfolio(MAX Sharp Ratio)					
TGT	19.34%				
NIKE	32.78%				
Chase	25.14%				
BAC	22.74%				
portfolio(MIN variance)					
TGT	13.98%				
NIKE	35.33%				
Chase	36.52%				
BAC	14.17%				

4. Discussion

Taking into account the client's risk tolerance, investment objectives and retirement planning, it is recommend that the client choose to receive a fixed pension benefit rather than a lump sum payment. This can provide him with a stable cash flow to accommodate his retirement needs. In terms of investment strategy, research has shown that choosing a diversified portfolio can ensure risk diversification and maximization of expected returns [10]. Florida bonds can serve as a proxy for the pension's risk characteristics, but ensure that the entire portfolio meets the client's needs in all aspects. The final decision should be based on the client's specific circumstances and preferences, while ensuring that the investment strategy achieves his retirement goals and manages risk.

5. Conclusion

This study delves into the key factors and strategies of pension investment portfolios, and draws the following conclusions by analyzing data and literature from multiple dimensions. Firstly, diversification is the cornerstone of the success of pension investment portfolios, which can reduce

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risk and improve returns through extensive diversification across different asset classes and geographical regions. The advantages of long-term investment are also evident, allowing us to consider more high-risk and high return assets to achieve long-term capital appreciation.

In terms of asset allocation, reasonable strategic allocation is crucial for achieving long-term investment goals, and should be formulated based on risk tolerance and expected returns. Finally, risk management should run through the entire investment process to protect pension funds from the adverse effects of market fluctuations.

In summary, a successful pension investment portfolio requires careful planning and strategy to balance risk and return, and to be formulated based on specific plan objectives. This field is still full of challenges and opportunities, and continuous supervision and adjustment are needed to ensure the sustainable growth of pension funds and the economic safety of elderly care.

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