

## 摘要

確定提撥制是現今退休金制度潮流的趨勢，而在這個制度下，勞工最後所能累積的退休金總額及每月所能領到的月退休金額度和個人帳戶的投資結果有很大的關係，所以個人帳戶的投資績效成為勞工退休生活安全性最重要的因素。

本研究的目的是提供一個方法以評量投資績效，使得在每月提撥一定金額到個人帳戶的情形下，對於投資期間的經濟環境以隨機投資模型或情境分析模型加以考量後，可以在不同的投資策略及起始資產配置下，找到適合投資人的最佳投資策略及起始資產配置。在本研究中考慮了股票和長期債券兩種投資標的，而投資標的之投資報酬率變化則以隨機投資模型(Stochastic Investment Model)及情境分析(Scenario Analysis)兩種模擬方式為之，其中在隨機投資模型模擬的部分，不同的隨機投資模型對於經濟環境有不同的設定，也因此將得到不同的投資結果，本研究採用在英國學術上廣為研究的Wilkie投資模型(1986)及黃泓智等人於2005年證券市場發展季刊所推導之台灣投資模型，並利用蒙地卡羅模擬的方式來建構投資標的之報酬率。而在情境分析模擬的部分，則設定三種基本的投資報酬率趨勢，並假設三種投資報酬率趨勢服從均勻分配，而後考慮投資期間分成前後兩個時期，搭配而得九種情境。

本文將觀察不同的起始資產配置(股票資產配置之權重考慮由0%~100%，間隔

為1%，共101組；債券資產的權重則為1-股票資產配置之權重，也就是100%~0%)，並以投資組合保險中三種常見的投資策略：買入持有(Buy & Hold；BH)、固定比例混合法(Constant Mixture；CM)及時間不變性投資組合保護(Time-invariant Portfolio Protection；TIPP)，作為投資策略。

在三種投資策略及每種投資策略有101個起始資產配置下，將可以得到303組不同的投資結果，而每一組投資結果中，都可找到個人帳戶於退休時的累積金額、在一定目標所得替代率下之破產機率，以及平均投資報酬率和投資報酬率之標準差，並將所得之投資組合報酬率之平均值為縱軸，標準差為橫軸作圖，找出效率前緣；也就是說，可以依個人帳戶持有人的風險，在其所能忍受的風險下，找到最適的起始資產配置及投資策略，及依這樣的起始資產配置和投資策略下所能得到的平均報酬。另外，更進一步以Sharpe ratio及Reward-to-VaR ratio、Reward-to-CTE ratio三個指標來衡量投資表現，找出在這三個指標下的最適起始資產配置和投資策略。

在前述中，都未考慮到交易成本對於投資結果的影響，但在現實的環境中，交易成本對於投資結果是有影響的，所以本研究也會在考慮交易成本下，找到情境分析和隨機模型下的投資結果及效率前緣，並找出三個投資指標的值來衡量投資表現。

關鍵詞：

Wilkie 投資模型(Wilkie Model)、投資組合保險(Portfolio Insurance)、效率前緣(Efficient Frontier)、交易成本(Transaction Cost)。

## Abstract

The defined contribution plan is the trend of retirement pension funds management, but under this plan, the total account values accumulated and the retirement benefits paid each month that labors can get are great related to the investment results of the individual accounts. That's why we said that the investment result of the individual accounts is the most important factor the labors care about.

In this article, we will focus on the measure of investment results. We consider bond and stock as our holding assets, and set the investment rate of return in two methods, including scenario analysis and stochastic model. In the scenario analysis method, we set fourteen scenarios to reflect the changes of the investment returns of stocks. In the stochastic model method, we take use of Wilkie investment model to set the investment return rate of stocks and bonds and simulate enormous data to find the average investment rate of return.

In each method, we will consider 101 different initial ratio of stock value and three different investment strategies: Buy & Hold(BH)、Constant Mixture(CM) and Time-invariant Portfolio Protection(TIPP).

After setting the investment rate of return and investment strategies, we can find 303 different investment results under three investment strategies and 101 initial ratios of stock values. In each result, we can get the accumulated amounts, the income substitute rate and the average rate of return, and use the average rate of return as y-axis, standard deviation as x-axis to find the efficient frontier. That is, we can find the optimal investment strategies and initial ratio of stock value under the risk we can tolerant. We will also use Sharpe Ratio、Reward-to-VaR ratio and Reward-to-CTE ratio to measure the investment results, and find the optimal investment strategies and initial ratio of stock value basic on the three ratios.

In practice, the transaction cost is an important factor that will affect the investment results, so we also find the investment results under different situations which had considered the transaction cost.

Key words: Wilkie Model, Portfolio Insurance, Efficient Frontier, Transaction Cost.