Plan Overview

A Data Management Plan created using HKUL DMPTool

Title: Constrained Portfolio Optimisation in the Defined Contribution Pension Management

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Template: HKU Template

Project abstract:

This project examines a constrained portfolio optimization problem in the context of defined contribution (DC) pension management. We address two primary risks: financial risk stemming from stochastic interest and inflation rates, and mortality risk associated with the possibility of an individual passing away before reaching retirement age. Throughout the accumulation period, individuals dynamically allocate their wealth across a stock index, two nominal bonds, an inflation-linked bond, and a life insurance policy in order to maximize both their death benefit and terminal wealth. Simultaneously, they must follow a convex-set trading constraints, which encompasses non-tradeable asset constraints, no short-selling constraints, and no borrowing constraints as special cases. To tackle this problem, we construct an artificial market to derive the dual problem and introduce a dual control neural network approach to compute tight lower and upper bounds for the initial problem. Our proposed algorithm demonstrates greater applicability in comparison to the simulation of artificial markets strategies (SAMS) approach presented by Bick et al. (2013). In conclusion, our findings suggest that when taking trading constraints into account, individuals tend to decrease their demand for life insurance.

Start date: 09-01-2024

End date: 08-31-2027

Last modified: 03-13-2025

Constrained Portfolio Optimisation in the Defined Contribution Pension Management

Data Collection

What data will you collect or create?

In this project, simulated data is used. The data is not going to be stored or shared, but the code for simulation will be stored

How will the data be collected or created?

We use python Monte Carlo simulation. The folders will be named by project and date, the files will be named by key variables and usage. No quality assurance is needed.

Documentation and Metadata

What documentation and metadata will accompany the data?

Key variables, method and structure is needed. They will be stored in a general log file.

Ethics and Legal Compliance

How will you manage any ethical issues?

No ethical issues related because the data is simulated

How will you manage copyright and Intellectual Property Rights (IP/IPR) issues?

No copyright issue related

Storage and Backup

How will the data be stored and backed up during the research? i. e. until stored in the final location (e.g. on your password protected laptop)?

Only the original code needs to be stored and backed up. All files will be saved on my password protected laptop.

How will you manage access and security?

Only I have the password, no collaborator expect my supervisor. All files will be shared when necessary

Selection and Preservation

Which data are of long-term value and should be retained, shared, and/or preserved?

All code files are going to be stored. It will be retained until the project is published.

What is the long-term preservation plan for the dataset?

No long-term preservation is needed

Data Sharing

How will you share the data?

By email upon request.

Are any restrictions on data sharing? If yes, Why?

No

Responsibilities and Resources

Who will be responsible for data management?

Me only

What resources will you require to deliver your plan?

No resource needed
