Project
Demo

BMD5302 Financial Modelling for Fintech Professionals: RoboAdvisor Project

https://bmd5302.streamlit.app/

Group 4

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Problem Statement & Motivation

- Many retail investors lack tools to construct optimal portfolios.
- Financial literacy gaps hinder informed decision-making.
- Our goal: Create a user-friendly robo-advisor that:
  - Assesses risk tolerance
  - Builds an optimal fund portfolio
  - Simulates future returns

Methodology

- Combines:
  - Modern Portfolio Theory (MPT)
  - Utility-based optimization
  - Questionnaire-driven personalization
  - Streamlit Web App
- Outputs: Personalized portfolios, projections, and visuals

Theoretical Framework - MPT

- Modern Portfolio Theory (MPT):
  - Diversification reduces risk
  - Efficient frontier = optimal risk-return tradeoff
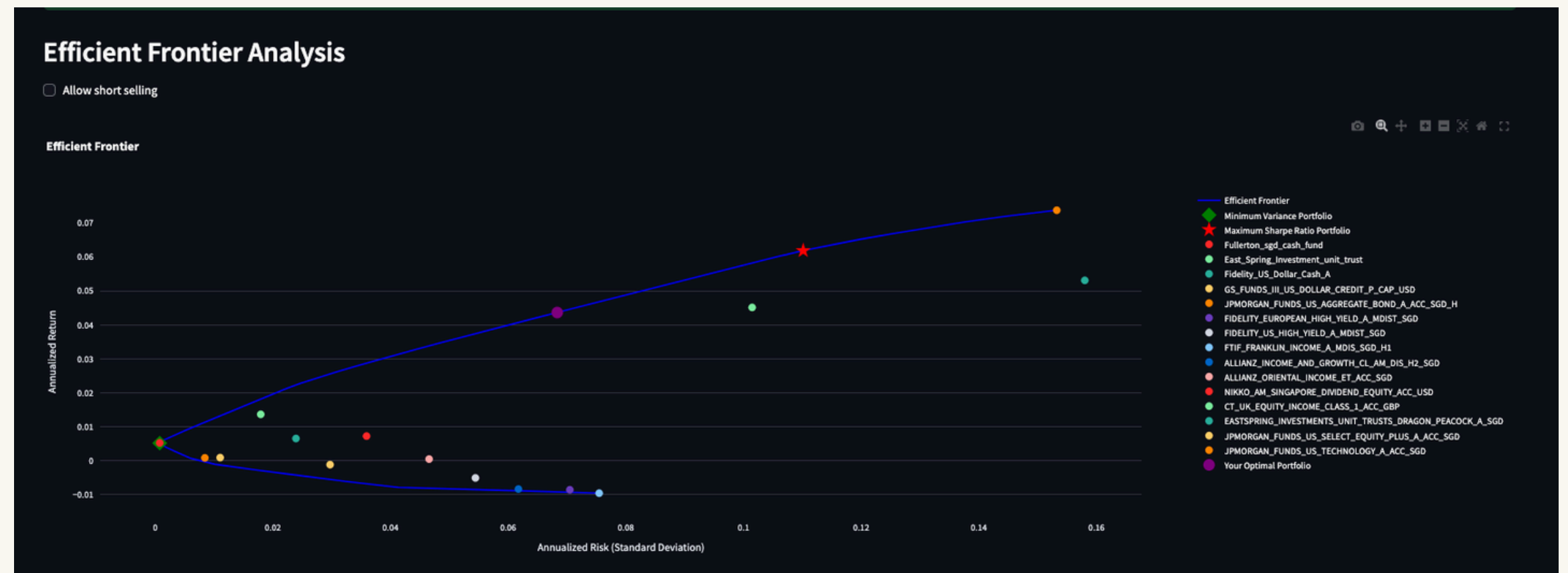
Efficient Frontier Analysis

Theoretical Framework - Utility Function

- Utility Function:

$$U = r - \sigma^2 * \frac{A}{2}$$

  - U - Utility to be maximised
  - r - expected return of the portfolio
  - sigma - std dev(risk) of the portfolio
  - A - risk aversion from user questionnaire

Risk Questionnaire Design

- 7 questions measuring:
  - Age, investment amount, time horizon, risk tolerance
- Score range: 1 (aggressive) to 10 (conservative)
- Used as coefficient A in utility optimization

$$U = r - \sigma^2 * \frac{A}{2}$$

Risk Aversion Questionnaire

Answer the following questions to determine your investor profile and risk aversion level.

Question 1: Is this for yourself or for someone else?

Your answer
- For myself
- For someone else

Question 2: What is the person's age?

Your answer

35

18

Question 3: What is the gender?

Your answer
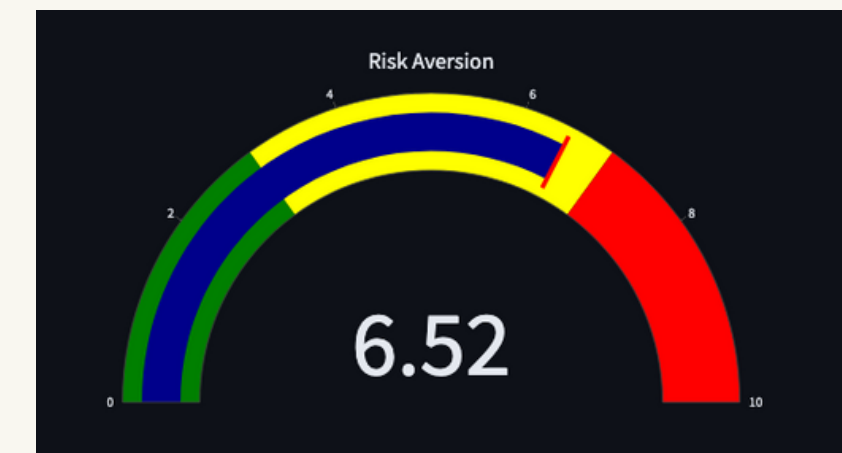- Male
- Female
- Other

Question 4: Where does the person live?

Your answer
- North America
- Europe
- Asia
- Other

Risk Aversion

6.52

Your Investor Profile 🔗

Risk Aversion Score

6.52/10

Investor Profile: Balanced

You seek a balance between growth and security in your investments.

Fund Selection

- 15 funds from FundSupermart:
  - Asset classes: equity, bonds, balanced, cash
  - Geographies: US, Europe, Asia, Global
  - Risk spectrum: conservative to aggressive
  - NAV data collected, cleaned, standardized

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1. Problem Statement & Motivation

2. Methodology

3. Theoretical Framework
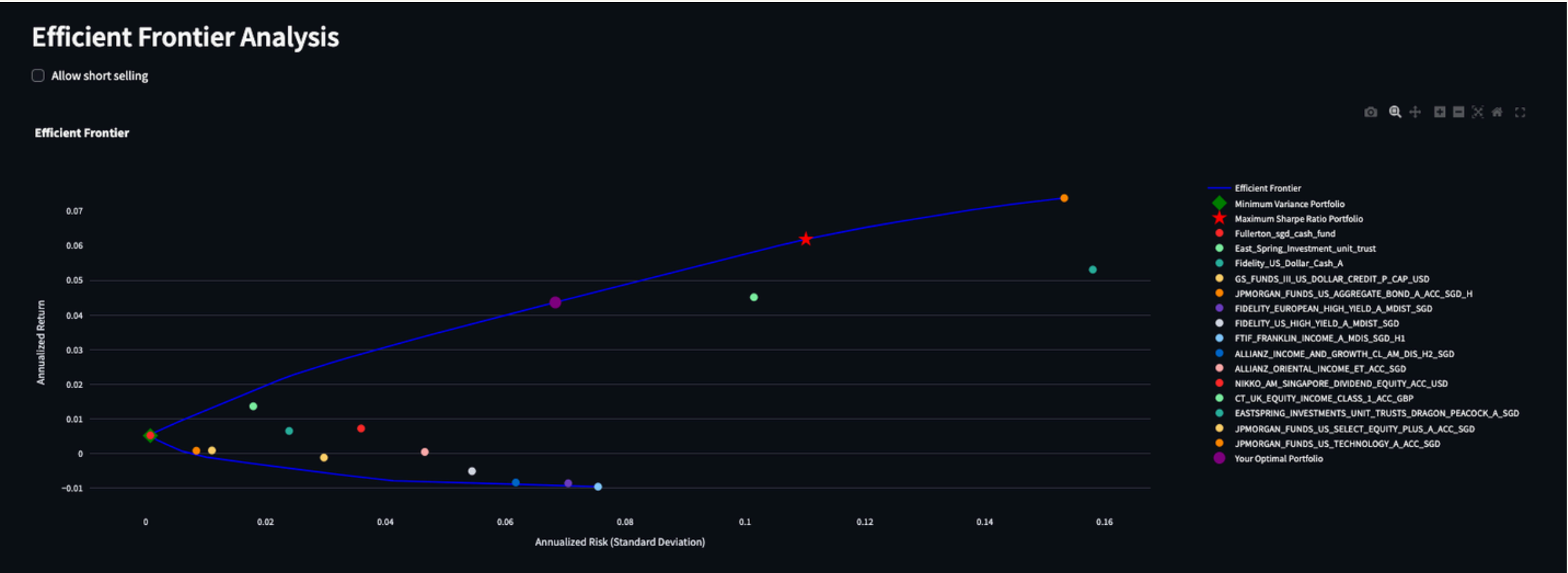   - MPT
   - Utility Function

4. Risk Questionnaire
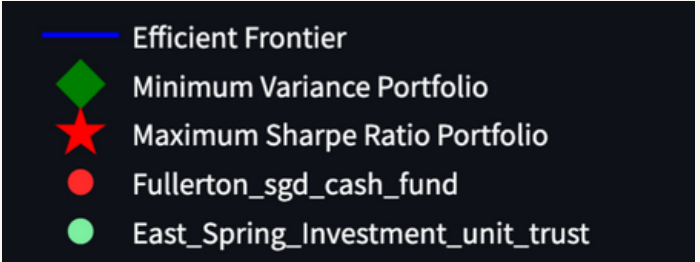
5. Fund Selection

Fund Selection

Category	Fund Name	Description
Cash / Money Market	Fullerton SGD Cash Fund	Low-risk SGD money market fund
	Fidelity US Dollar Cash A	USD cash fund for liquidity
Fixed Income	GS Funds III - US Dollar Credit P Cap USD	Investment-grade US corporate bonds
	JPMorgan Funds - US Aggregate Bond A (Acc) SGD-H	Hedged US aggregate bonds
	Fidelity European High Yield A-MDIST-SGD	European high-yield exposure
	Fidelity US High Yield A-MDIST-SGD	US high-yield bonds
Mixed / Balanced	FTIF - Franklin Income A MDIS SGD-H1	Income-focused balanced fund
	Allianz Income and Growth CL AM DIS H2-SGD	Growth and income balanced fund
Equity	Allianz Oriental Income ET Acc SGD	Asian equity income
	Nikko AM Singapore Dividend Equity Acc USD	Singapore dividend focus
	CT UK Equity Income Class 1 Acc GBP	UK equity exposure
	Eastspring Investments Unit Trusts - Dragon Peacock A SGD	China and India exposure
	JPMorgan Funds - US Select Equity Plus A (Acc) SGD	US broad market
	JPMorgan Funds - US Technology A (Acc) SGD	US technology sector for growth
	Eastspring Investment Unit Trust	Broad diversifier

Efficient Frontier Construction

- Without Short Selling

Efficient Frontier Construction

- With Short Selling

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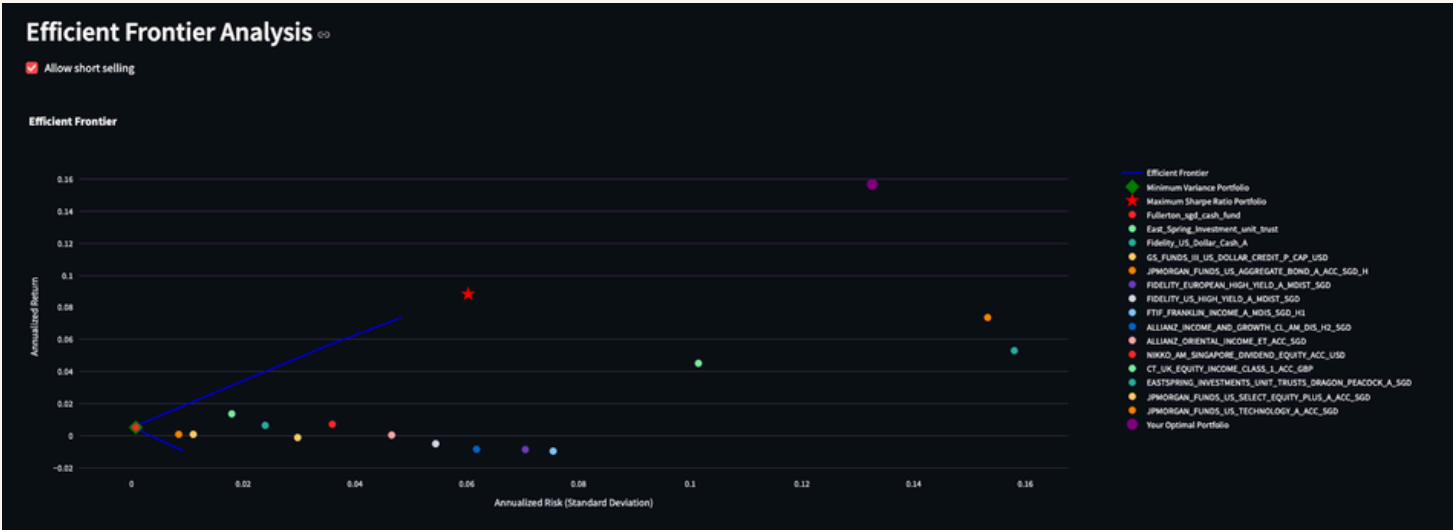# Financial Modelling for Fintech Professionals: RoboAdvisor Project

1. Problem Statement & Motivation

2. Methodology

3. Theoretical Framework
   - MPT
   - Utility Function

4. Risk Questionnaire
5. Fund Selection
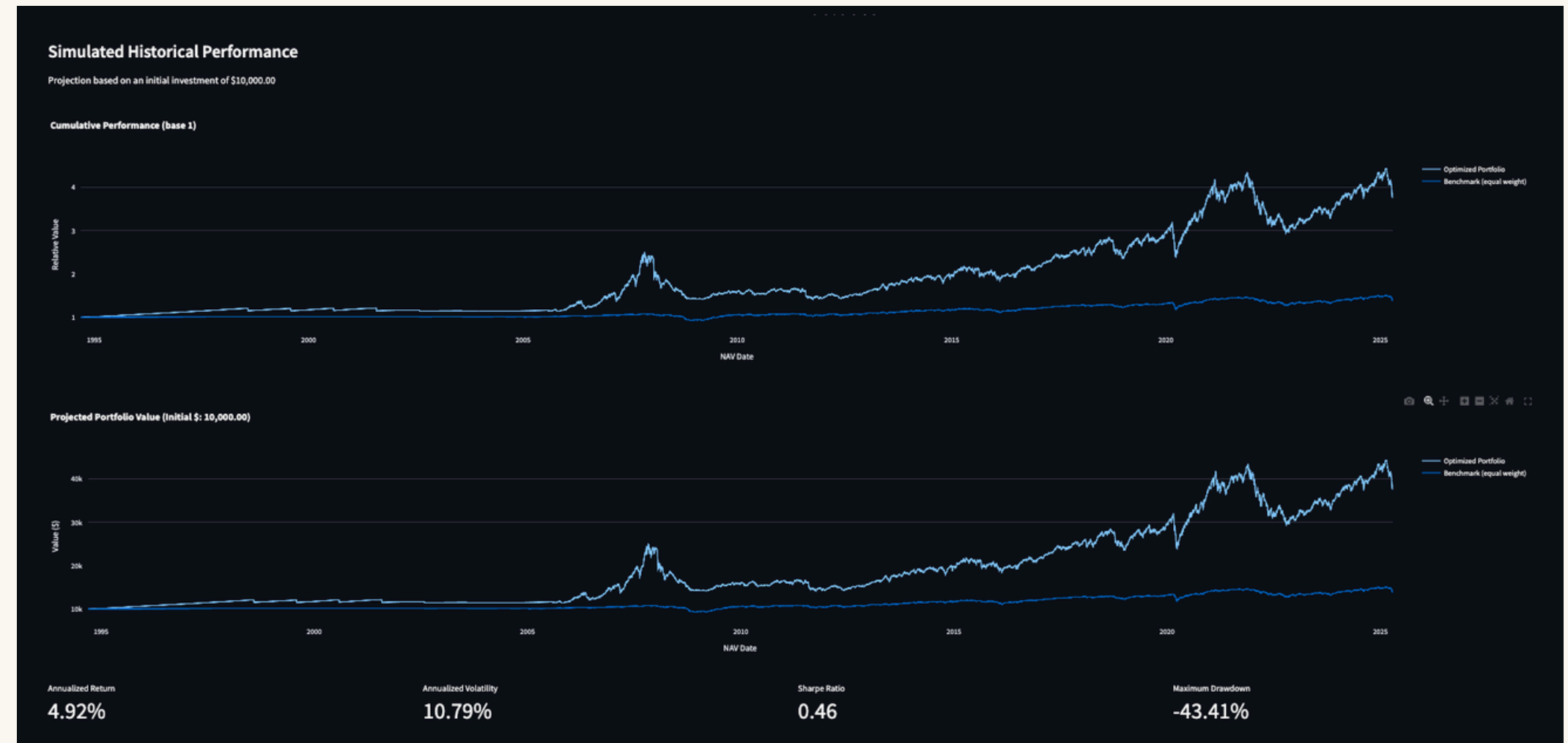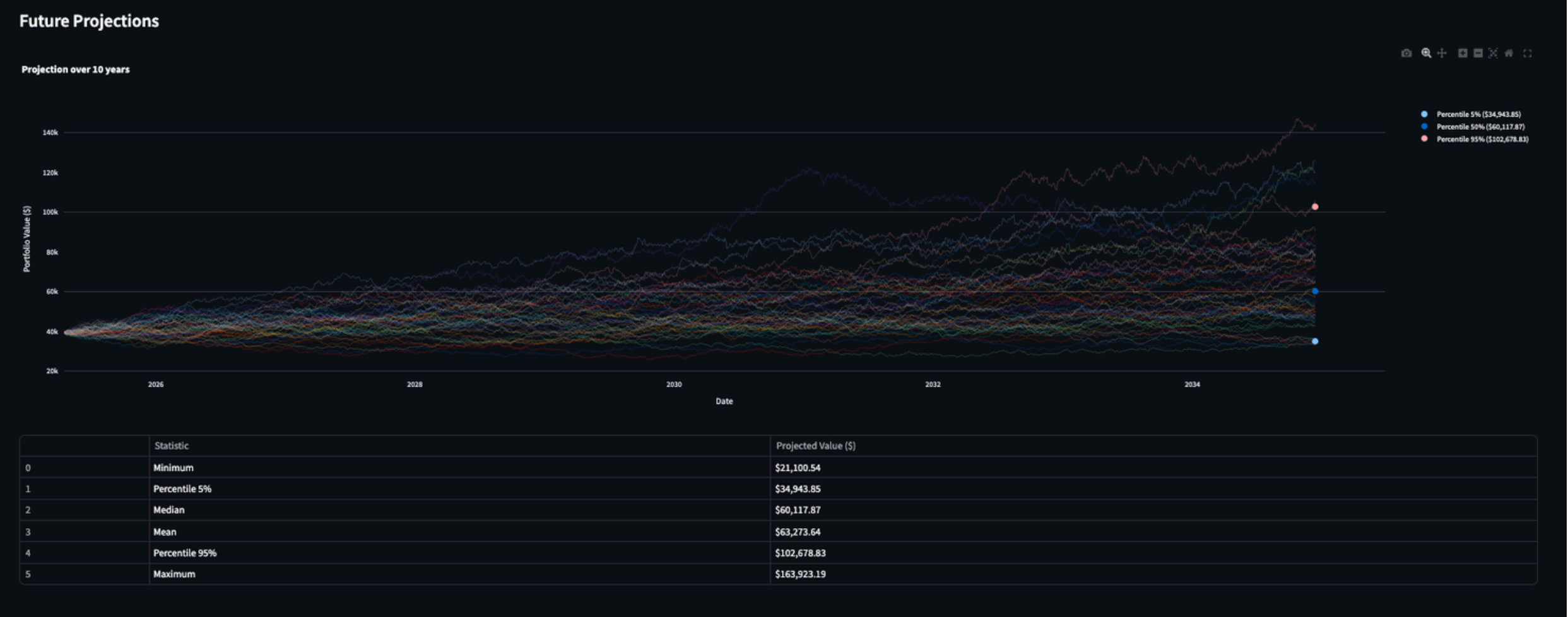6. Efficient Frontier
7. Demo

Demo

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Backtesting & Benchmarking

Simulated Historical Performance

Projection based on an initial investment of $10,000.00

Cumulative Performance (base 1)

Projected Portfolio Value (Initial $: 10,000.00)

Annualized Return	Annualized Volatility	Sharpe Ratio	Maximum Drawdown
4.92%	10.79%	0.46	-43.41%

- Expanding window approach
- Benchmarked against equal weighted portfolio of same funds

Monte Carlo Simulation

Future Projections

Projection over 10 years

	Statistic	Projected Value ($)
0	Minimum	$21,100.54
1	Percentile 5%	$34,943.85
2	Median	$60,117.87
3	Mean	$63,273.64
4	Percentile 95%	$102,678.83
5	Maximum	$163,923.19

- 5th 50th and 95th percentile scenarios
- Portfolios generally are aligned to investors expectations

Limitations & Future Work

- Limitations:
  - static weights
  - No tax/transaction cost modeling
- Future Enhancements:
  - Dynamic rebalancing
  - VaR, CVaR measures
  - ML-based forecasting
  - Mobile UI

Conclusion

- Combines academic theory and tech execution
- Delivers personalized and realistic investment recommendations
- A complete solution for non-expert retail investors

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Group 6

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