

Digital Finance 3: Technology in Finance

Lesson 33: Robo-Advisors ML Aspects

FHGR

January 3, 2026

Robo-advisors democratize portfolio management through automation.

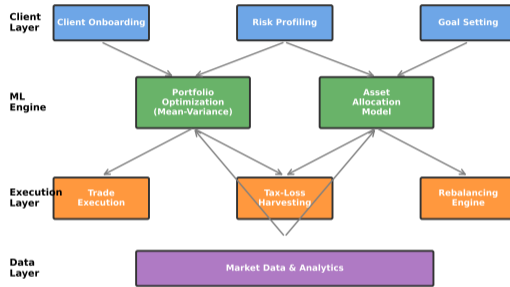
Learning Objectives

By the end of this lesson, you will be able to:

- Explain robo-advisor system architecture
- Apply ML to risk profiling and portfolio construction
- Understand automated rebalancing algorithms
- Compare robo-advisors with human advisors
- Evaluate portfolio optimization using ML techniques
- Recognize regulatory requirements for automated advice

Risk profiling questionnaires map investor preferences to portfolio allocations.

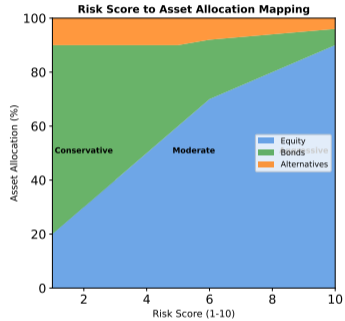
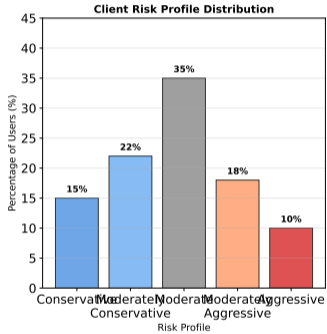
Robo-Advisor ML Architecture



Source: [betterment.com](https://www.betterment.com), [wealthfront.com](https://www.wealthfront.com) (Investment Methodology)

Robo-advisors combine risk profiling, portfolio optimization, and automated rebalancing in one platform.

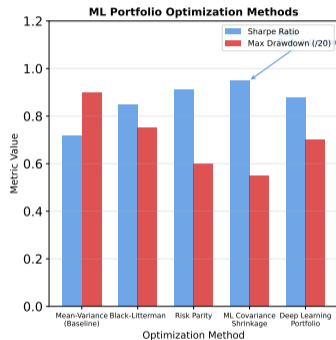
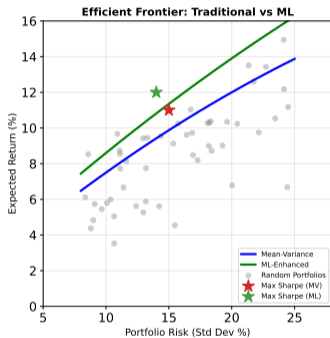
Robo-Advisor Risk Profiling System



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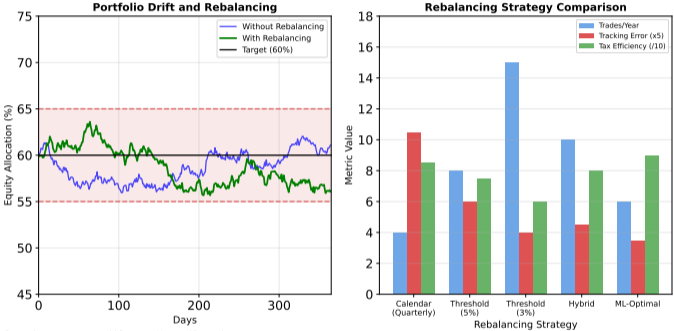
ML models extract risk tolerance from questionnaire responses, replacing subjective human assessment.

ML-Enhanced Portfolio Optimization



Modern portfolio optimization incorporates ML-predicted returns, risks, and alternative data sources.

Automated Portfolio Rebalancing

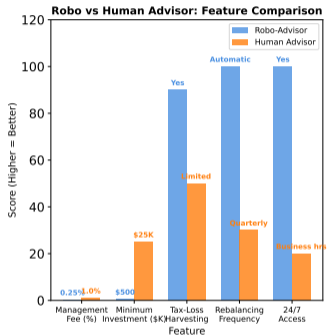


Source: betterment.com, wealthfront.com, Vanguard Research

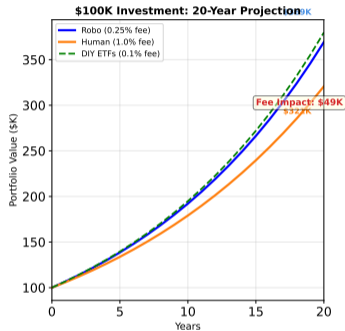
Automated rebalancing maintains target allocations while minimizing transaction costs and taxes.

Robo-Advisors vs. Human Advisors

Robo-Advisor vs Human Advisor Analysis

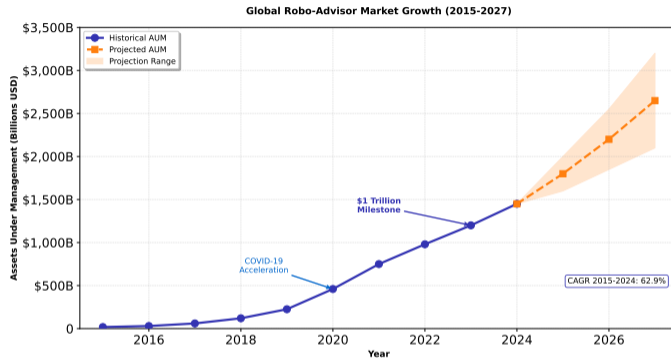


Source: betterment.com, vanguard.com, Kitces Research



Robo-advisors excel in cost and consistency; humans in complex planning and behavioral coaching.

Robo-Advisor Market Growth



Source: statista.com, Backend Benchmarking, Deloitte

Assets under management by robo-advisors continue to grow rapidly.

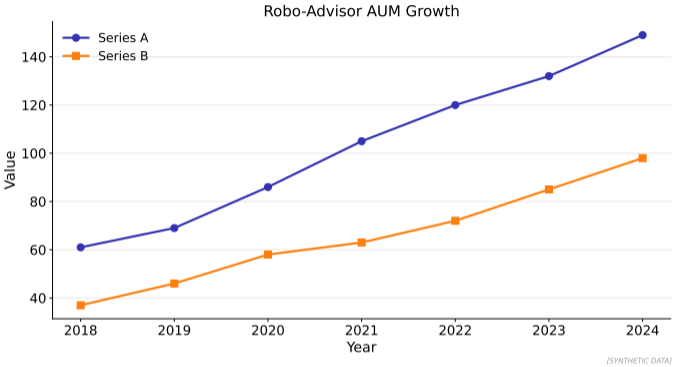
Key Takeaways:

- Robo-advisors democratize professional wealth management
- ML improves risk profiling and portfolio construction
- Automated rebalancing reduces costs and tax drag
- Fee compression: 0.25-0.50% vs. 1.0-1.5% for humans
- AUM: USD 1+ trillion globally (2024)
- Hybrid models combining robo + human gaining traction

Next Lesson: Market Prediction Limitations

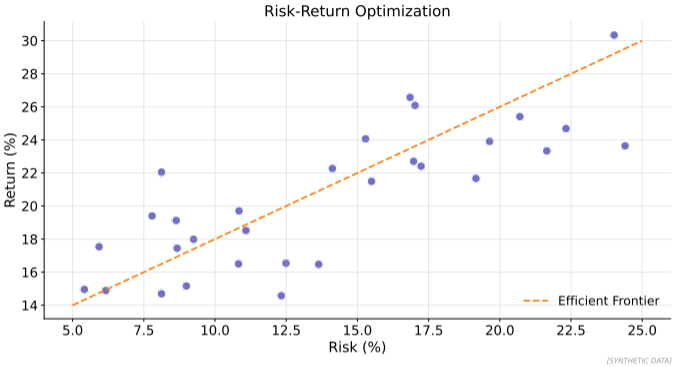
Risk profiling questionnaires map investor preferences to portfolio allocations.

Robo-Advisor Asset Growth



Steady growth reflects increasing retail adoption.

Portfolio Risk-Return Analysis



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Efficient frontier guides optimal asset allocation.