WISER Quantum Project

Womanium & WISER Quantum Program 2025

Quantum solvers: algorithms for the world's hardest problems

Quantum-Enhanced Portfolio Optimization

A Hybrid Approach for Complex Asset Selection

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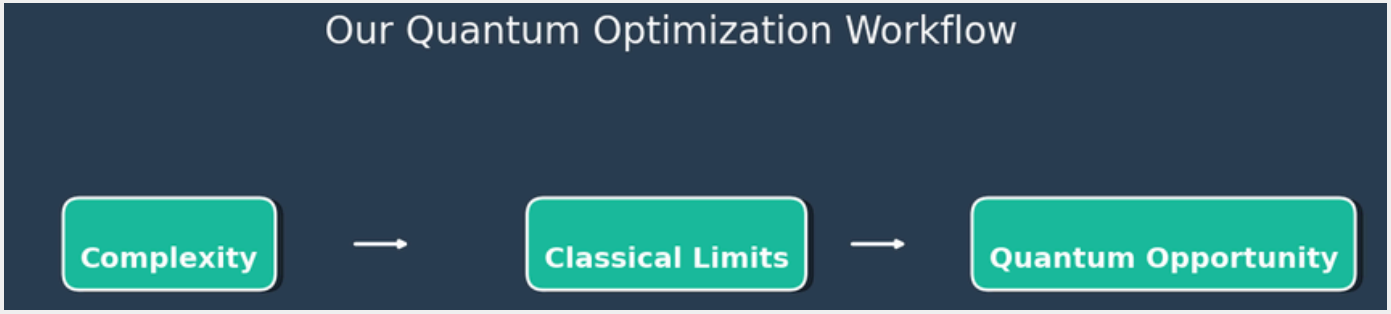
The Challenge: **Optimizing Complex Portfolios**

The Challenge: Modern financial portfolios are immensely complex.

Classical Limits: Traditional computers struggle to efficiently find the optimal asset mix under multiple business rules.

The Opportunity: Quantum computing offers a new path to solve these hard optimization problems.



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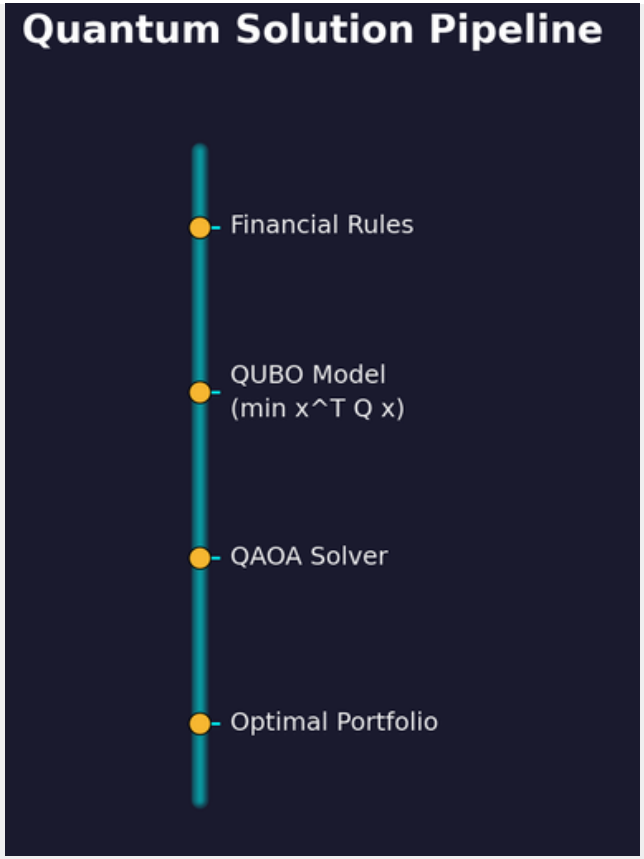
OUR SOLUTION: **A HYBRID QUANTUM APPROACH**

- **Goal:** Select the best 10 of 31 bonds to meet risk targets.
- **Step 1 (Formulation):** Converted financial rules into a QUBO model.
- **Step 2 (Solver):** Used QAOA (via Qiskit) to find the optimal portfolio.
- **Step 3 (Validation):** Compared results against a classical Modern Portfolio Theory (MPT) benchmark.



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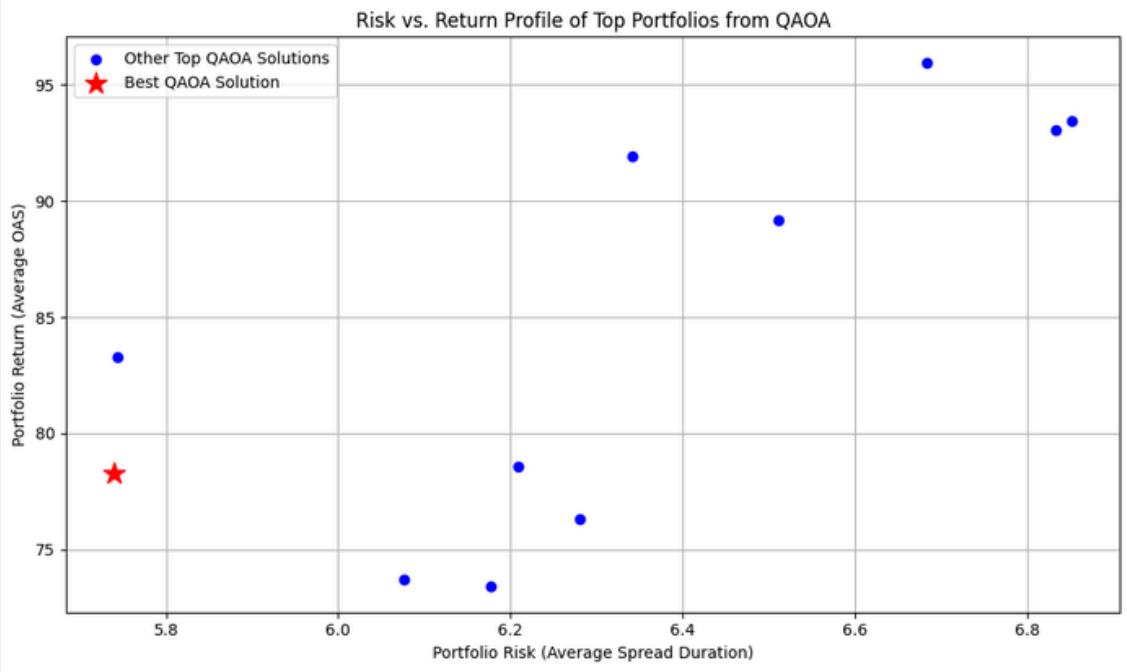
Results: **Finding the Optimal Portfolio**



- **Goal Achieved:** Yes, our QAOA solver identified an optimal portfolio of 10 bonds.
- **Success Metric:** The final objective value, which our quantum algorithm efficiently minimized.
- **Impact:** This work validates quantum algorithms as a powerful tool for real-world financial optimization.

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Future Scope & Next Steps

- **Next Step:** Test the algorithm on real quantum hardware to assess its performance against noise.
- **Expansion:** Scale the model to include more assets and more complex financial constraints.
- **Requirements:** To advance, we need access to larger quantum processors and better error mitigation techniques.

Thank You!