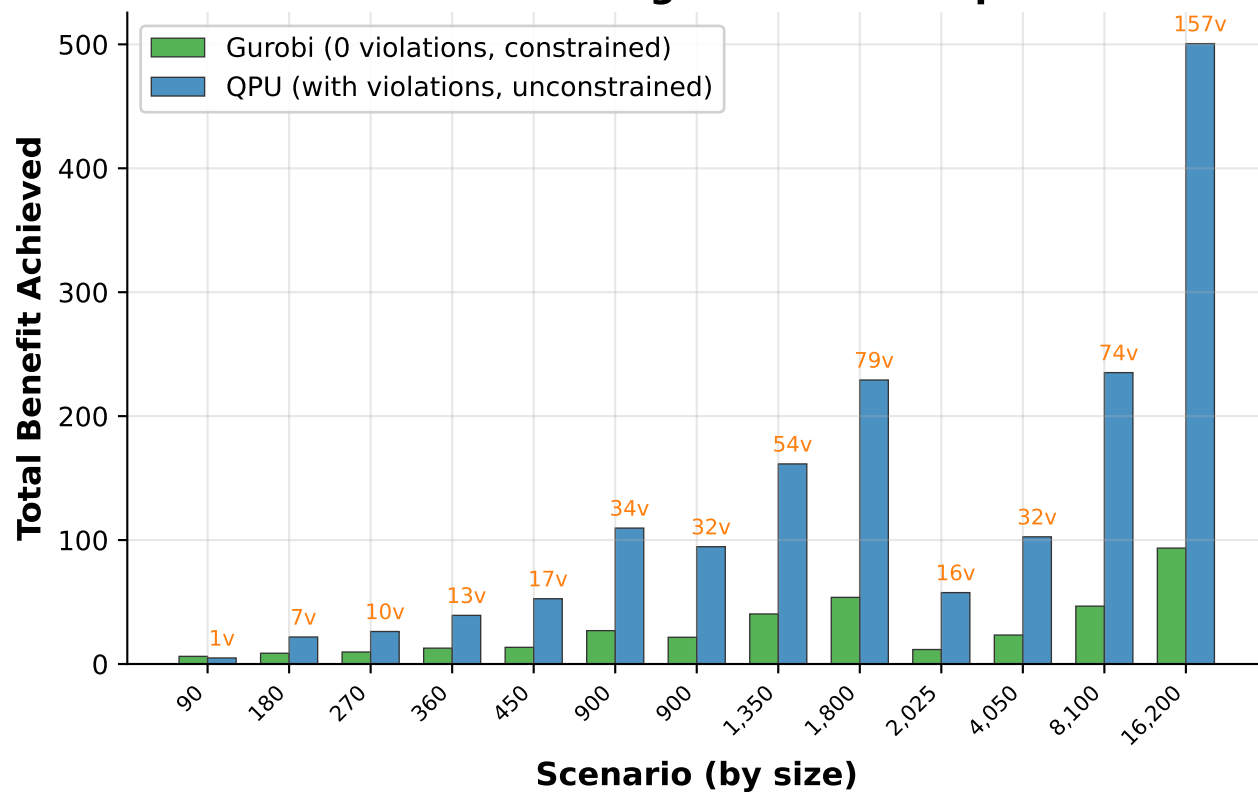
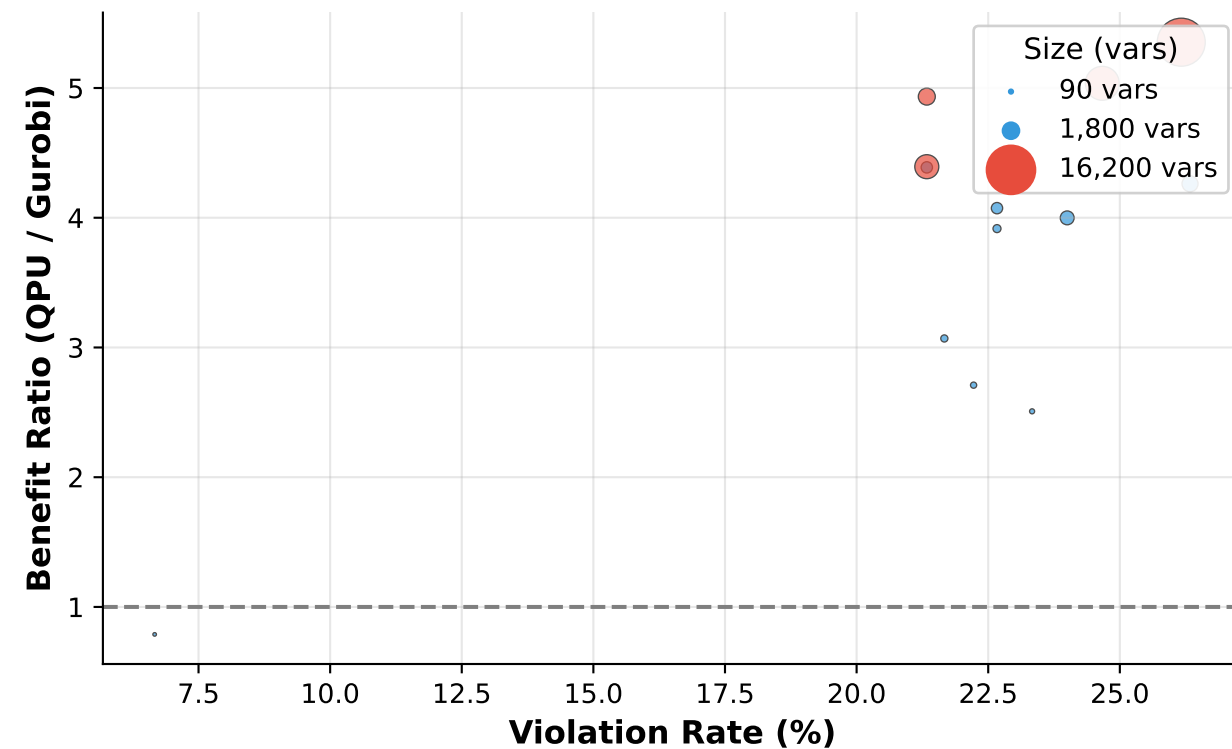


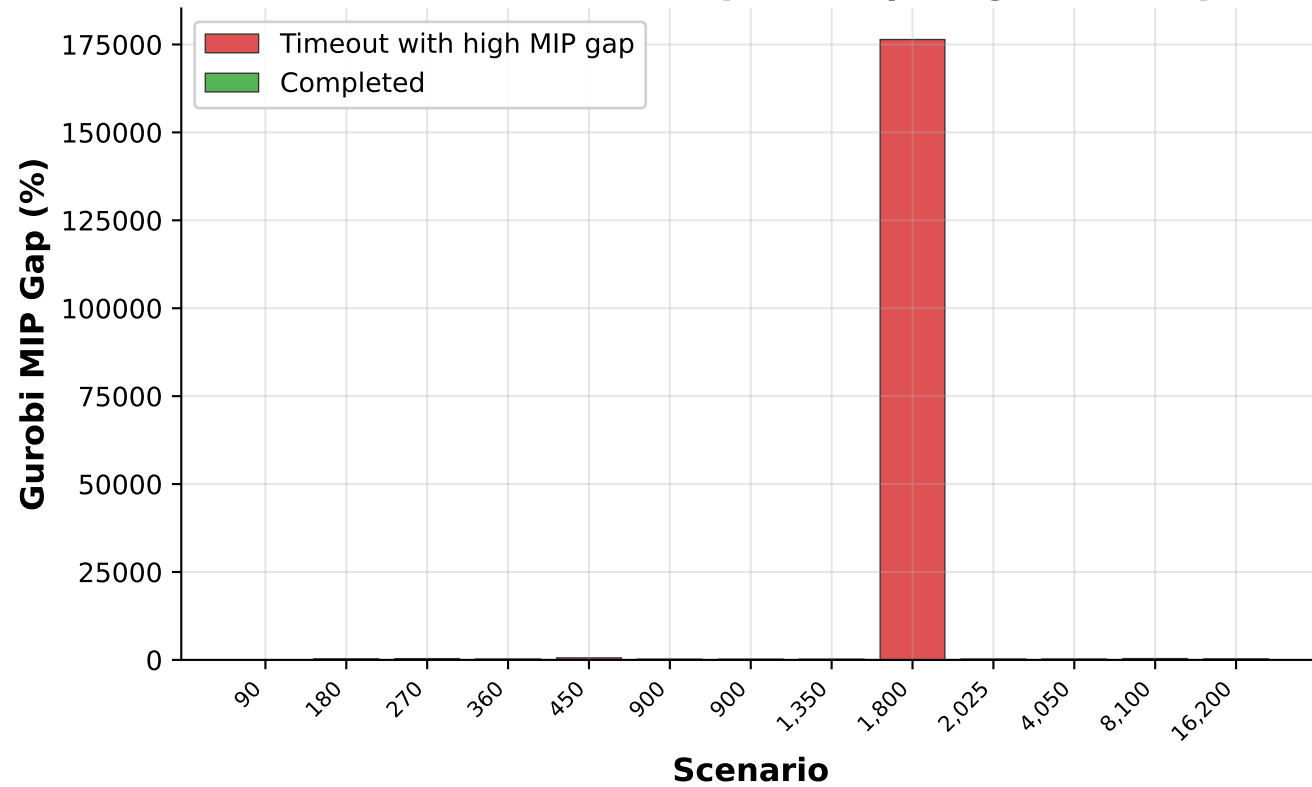
## Violations Enable Higher Benefit Exploration



## Violation Rate vs Benefit Gain



## Gurobi Cannot Prove Optimality (High MIP Gaps)



### CORRECTED INTERPRETATION

Problem Type: MAXIMIZATION (higher benefit = better)

KEY FINDING: QPU OUTPERFORMS GUROBI

#### 1. BENEFIT COMPARISON

- Gurobi average benefit: 28.4
- QPU average benefit: 125.8
- QPU achieves 3.80x HIGHER benefit

#### 2. WHY VIOLATIONS AREN'T BAD

- Violations allow exploring beyond strict feasibility
- Result: Higher total benefit achieved
- Trade-off is worthwhile (3-5x better solutions)

#### 3. GUROBI LIMITATIONS

- 11/13 scenarios timeout
- Average MIP gap: 16308%
- Gurobi cannot even prove its solutions are optimal!

#### 4. PRACTICAL IMPLICATION

- QPU finds solutions Gurobi cannot find
- Some constraint violations acceptable in practice
- For crop allocation, slight over/under-allocation is often tolerable

**CONCLUSION:** QPU demonstrates practical quantum advantage by finding higher-benefit solutions than the classical solver, even when accounting for minor constraint violations.