Intellectual Merit Justification:
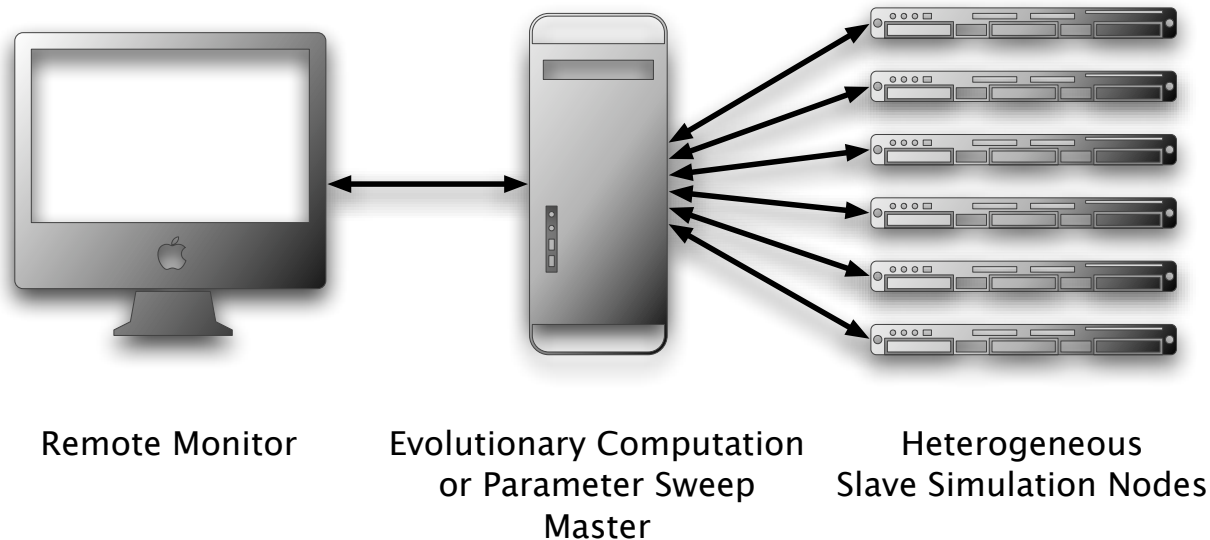# Massive Optimization of Multiagent Models

The Experimenter provides an untuned model.

ECJ "fills in the gaps" to produce model matching expected results and insensitive to crucial parameter settings.

MASON evaluates candidate models as ECJ generates them. Computer clusters test many candidate models in parallel.

Remote Monitor   Evolutionary Computation   Heterogeneous
or Parameter Sweep   Slave Simulation Nodes
Master

Test Case: Optimizing the Rebeland Model

Rebeland
Model of country stability developed on MASON at the Center

Objectives to Maximize   *(multiobjective optimization problem)*
Population satisfaction
Amount of money skimmed from the populace through corruption

Free Parameters to Set   *(all scaled to 0...1)*
State Corruption Rate   State Tax Rate
Maximum State Reserve   Minimum State Reserve
Minimum Spending on Populace   Maximum Police Per Capita
Initial Reserve Army Ratio   Standing Army Size
State Attack Interval

Test Case: Optimizing the Rebeland Model
Details You Don't Care About

Optimization Algorithm
NSGA-II, 6,000 evaluations

Testing
An individual is tested by running Rebeland with those parameters. Individuals are tested by running Rebeland on MASON 8 times using those parameters and taking the mean result.
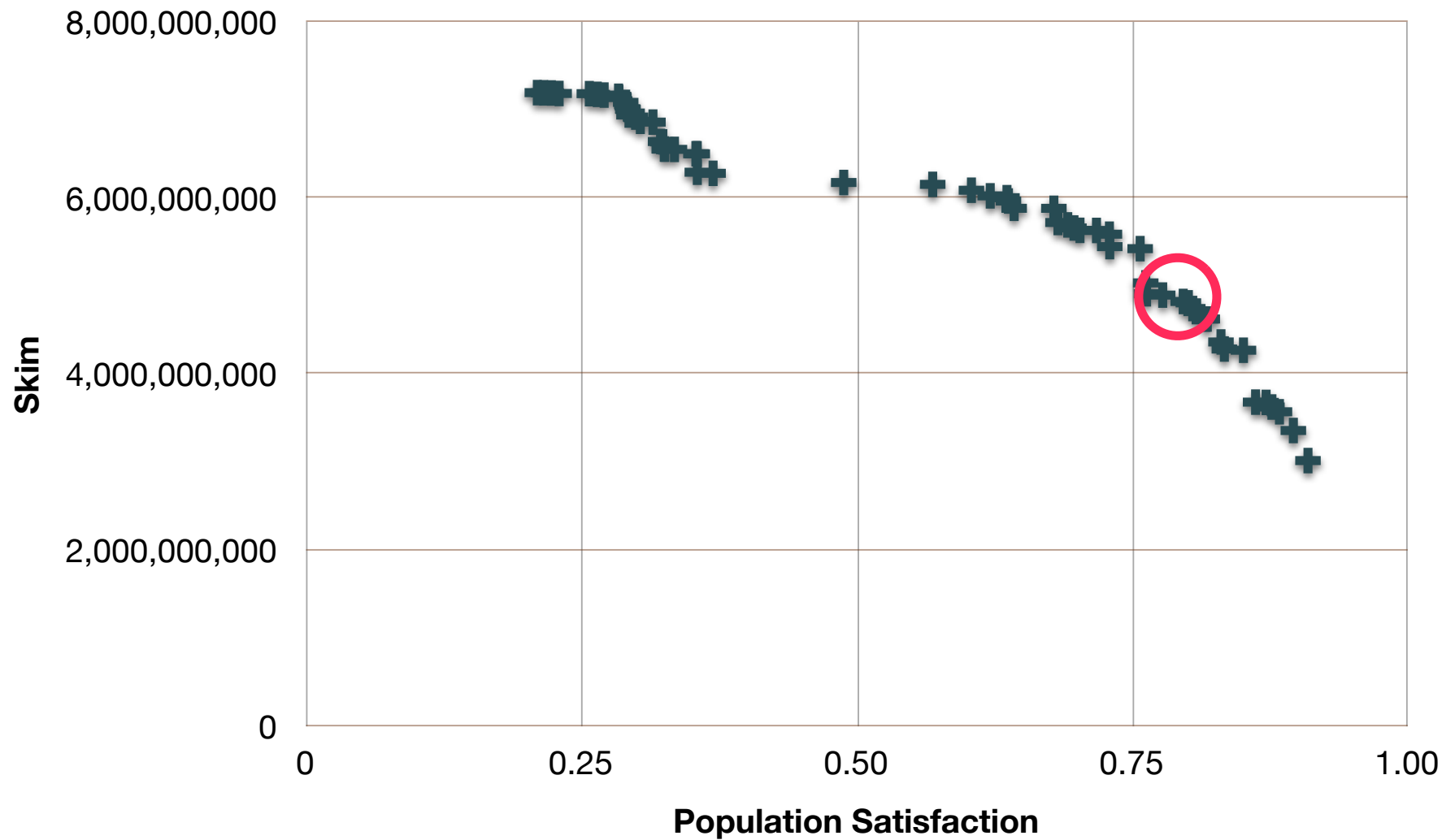
Parallelization
Master-Slave Evaluation, 30 Slave Units on Hydra
Total evaluation time: about 1 hour

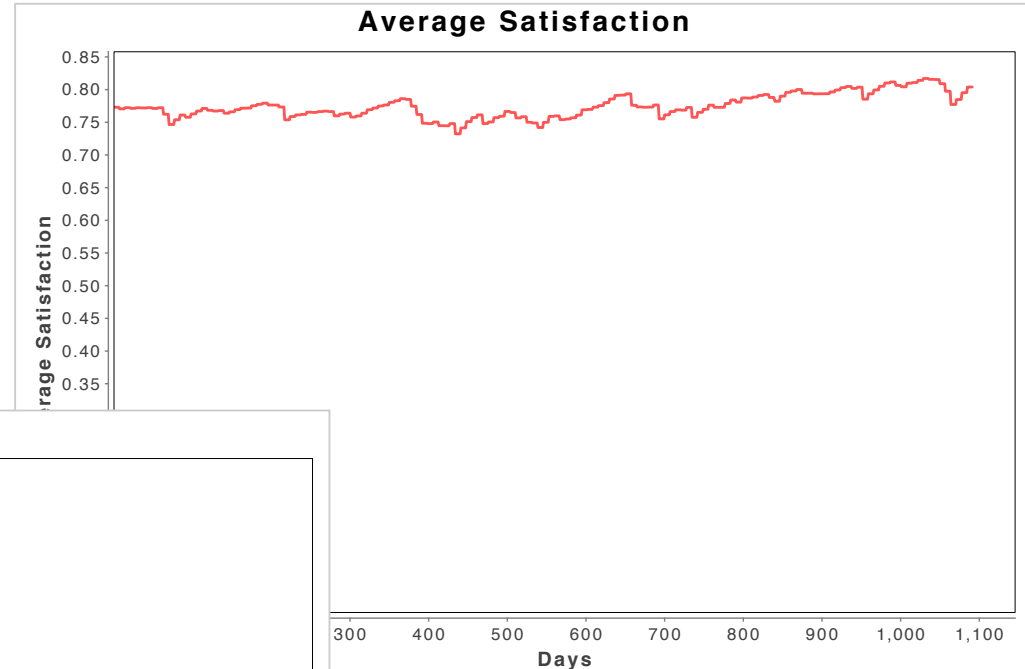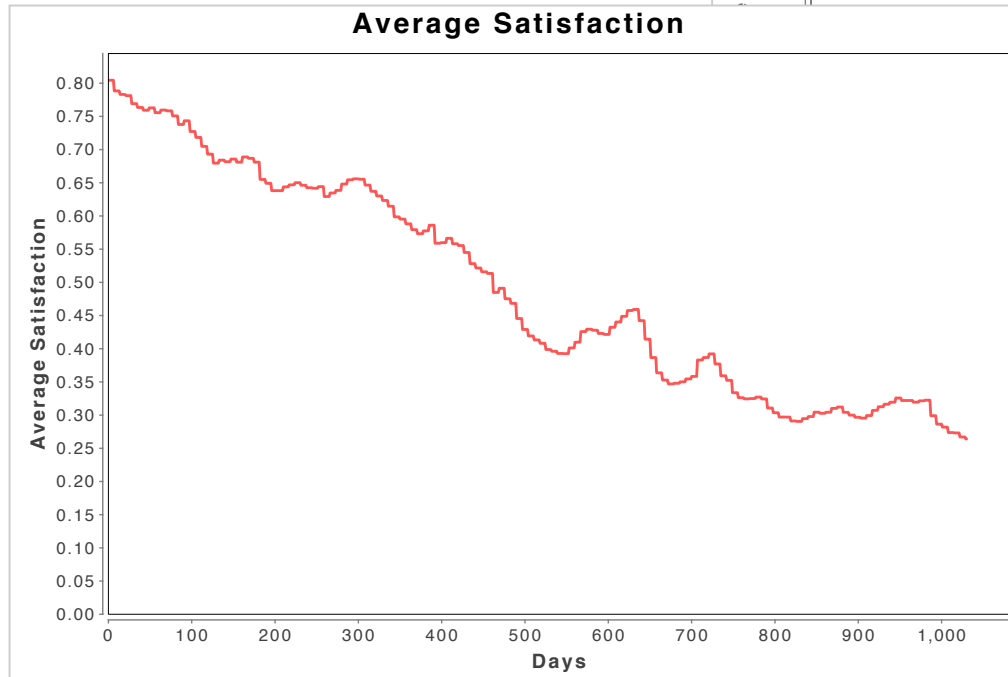# Test Case: *Optimizing the Rebeland Model*
The Pareto Front

Test Case: Optimizing the Rebeland Model
Before and After: Population Satisfaction

**Default Parameters
(Before Optimization)**
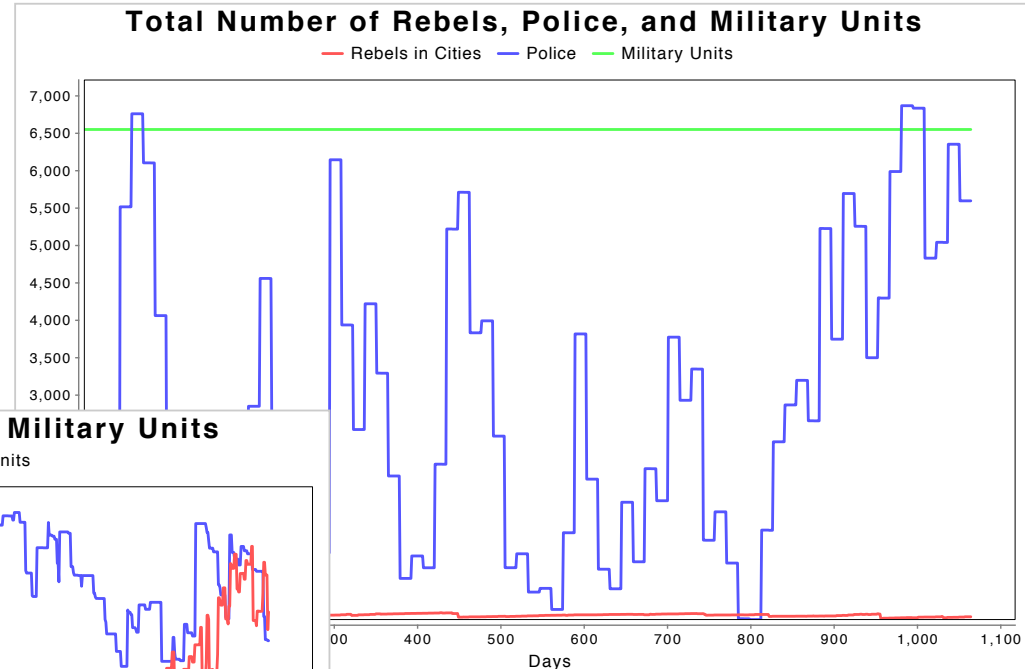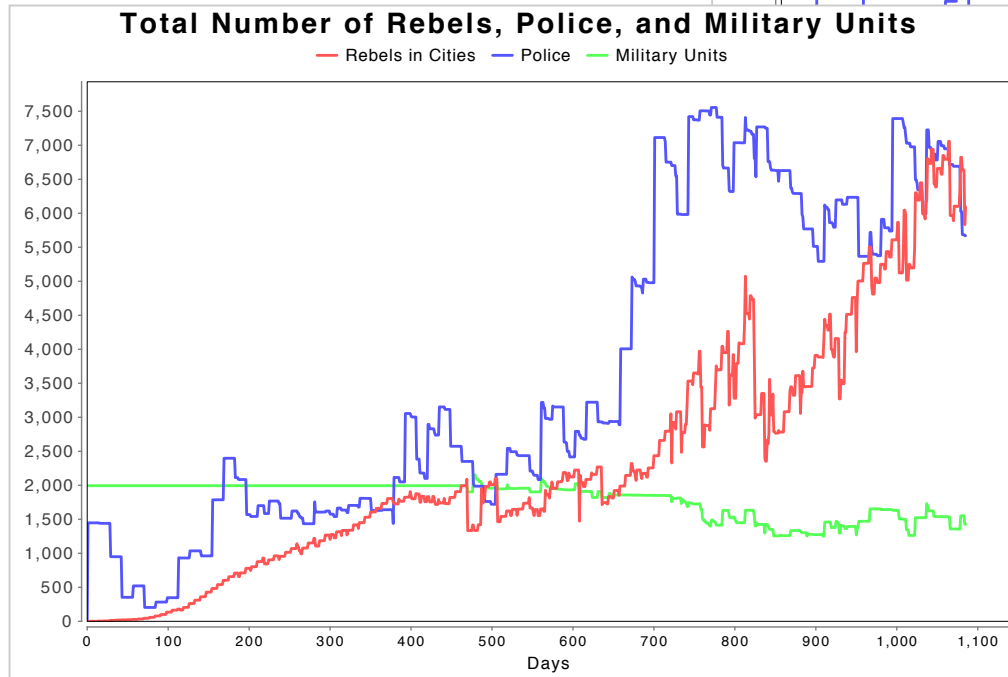
After Optimization

Test Case: Optimizing the Rebeland Model
Before and After: Population Satisfaction

**Default Parameters
(Before Optimization)**

After Optimization

What does this say?

A very satisfied population and *lots* of money skimmed off when:
1. Unusually large police force
2. Very large state reserve (of money)
3. High degree of benefits (services) to population

These results are **"interesting"**.   (as in "communist dictatorship")

Does this reveal cracks in the Rebeland model semantics?
Or a bug in the code?