Soft constraint simulation results

November 1, 2022

1 Summary

The soft threshold approach seems to work very well. Conditional on getting bounds, the results are always optimal.

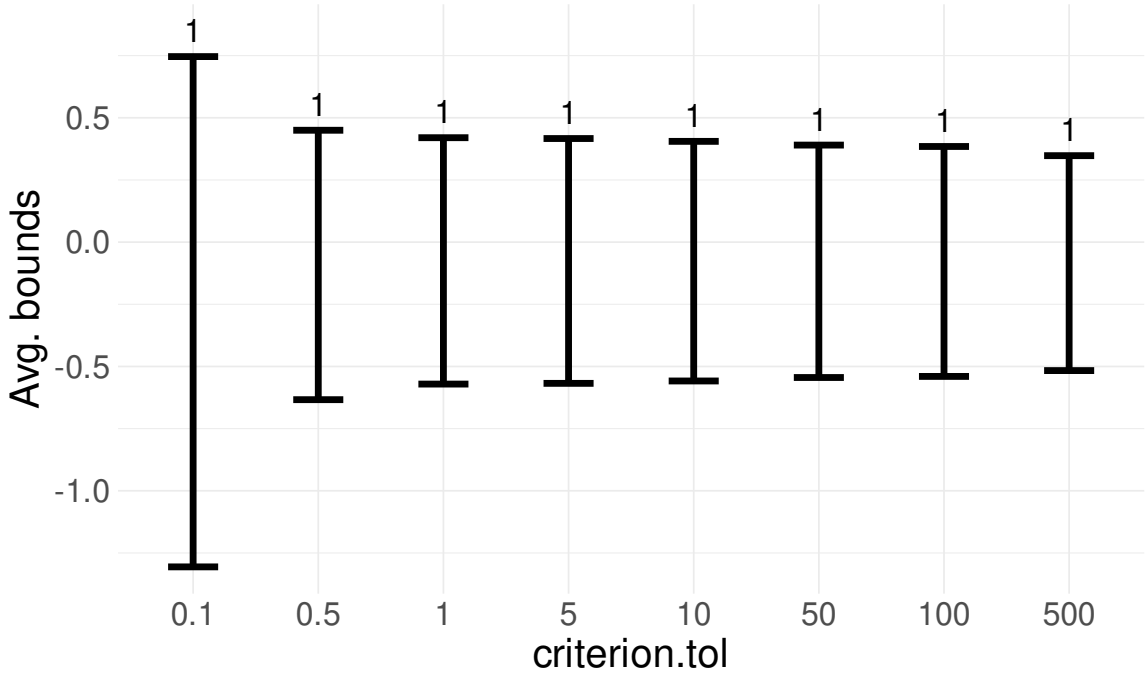
Notes:

1. I flagged a case where the bounds did not shrink when I increased the size of the penalty. This case seemed peculiar to me.

2. The cases where we do not get bounds correspond to when we use a quadratic loss function for the criterion. Gurobi minimizes the criterion without issue. However, when the criterion is included into the objective function as a soft constraint, Gurobi (incorrectly) determines that the quadratic matrix is not PSD. Gurobi thus complains that the optimization problem is nonconvex and requests the user set the option `nonconvex = 2`, but this didn't work.

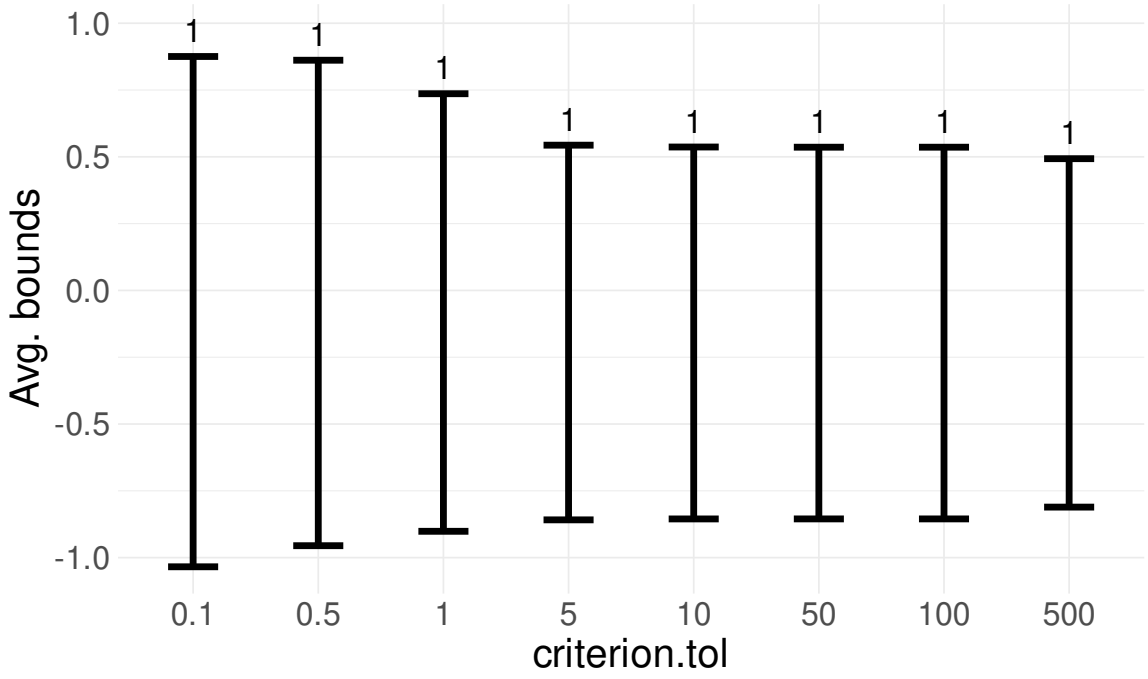
2 Simulation results for LP problem

2.1 Case 1



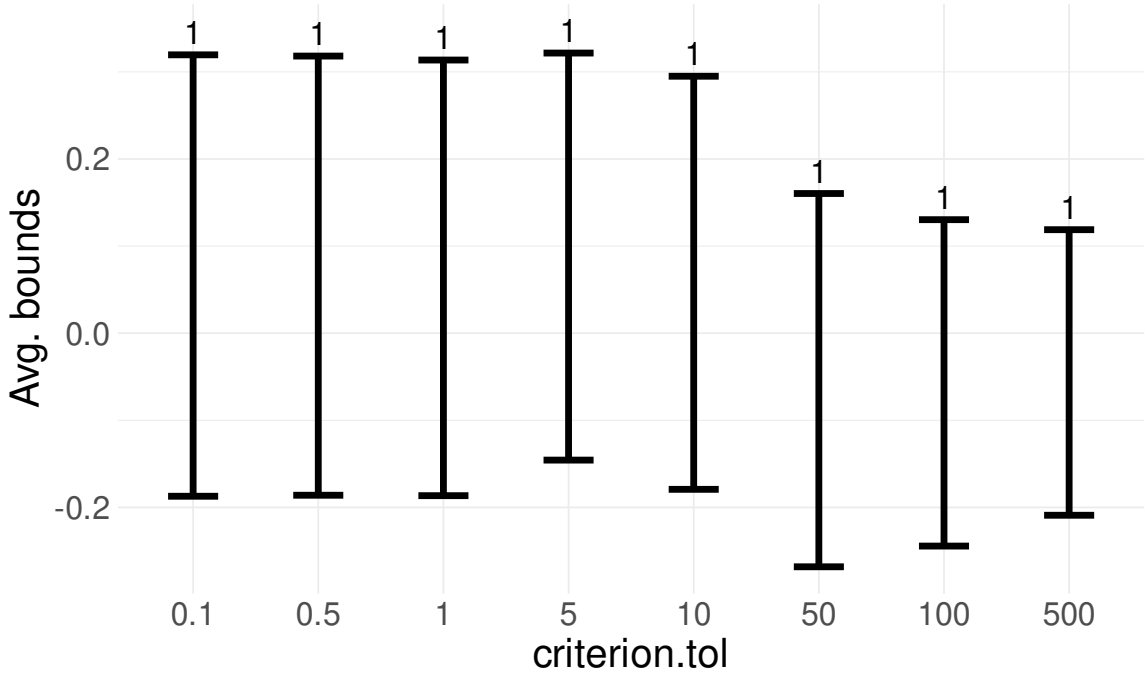
Note: The bars display the average lower and upper bounds for simulations where both bounds were optimal. The number above each bar indicates the fraction of the 200 simulations for which the both bounds were optimal.

2.2 Case 2



Note: The bars display the average lower and upper bounds for simulations where both bounds were optimal. The number above each bar indicates the fraction of the 200 simulations for which the both bounds were optimal.

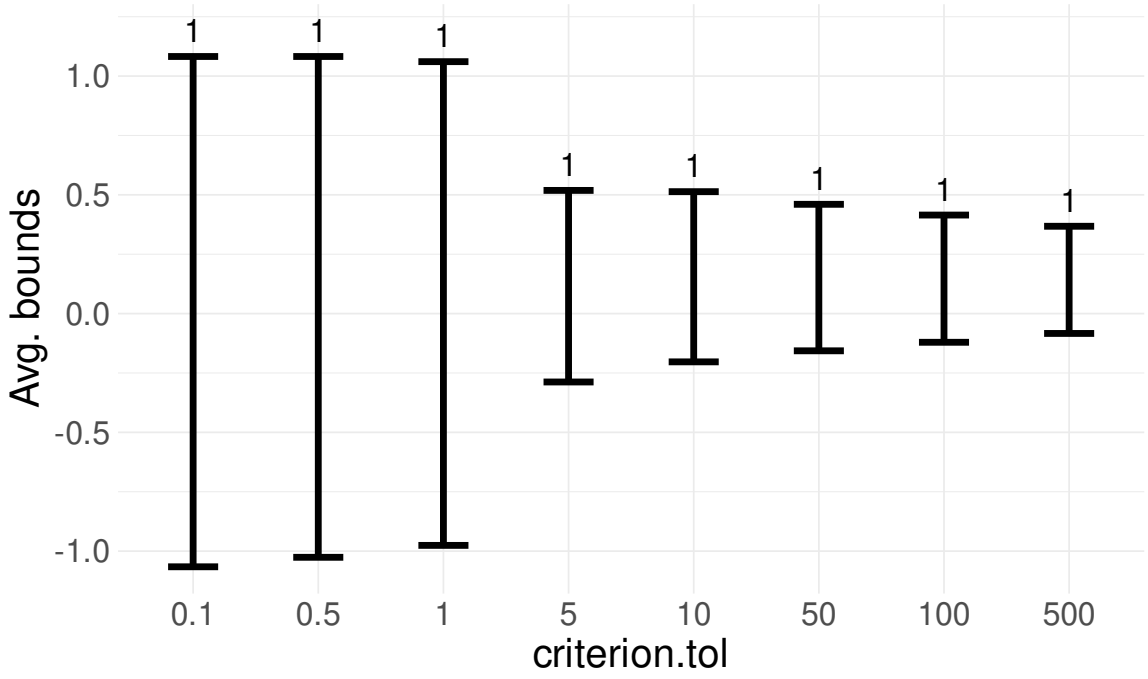
2.3 Case 3



Note: The bars display the average lower and upper bounds for simulations where both bounds were optimal. The number above each bar indicates the fraction of the 200 simulations for which the both bounds were optimal.

Shouldn't the bounds be getting tighter, as in all the other examples?

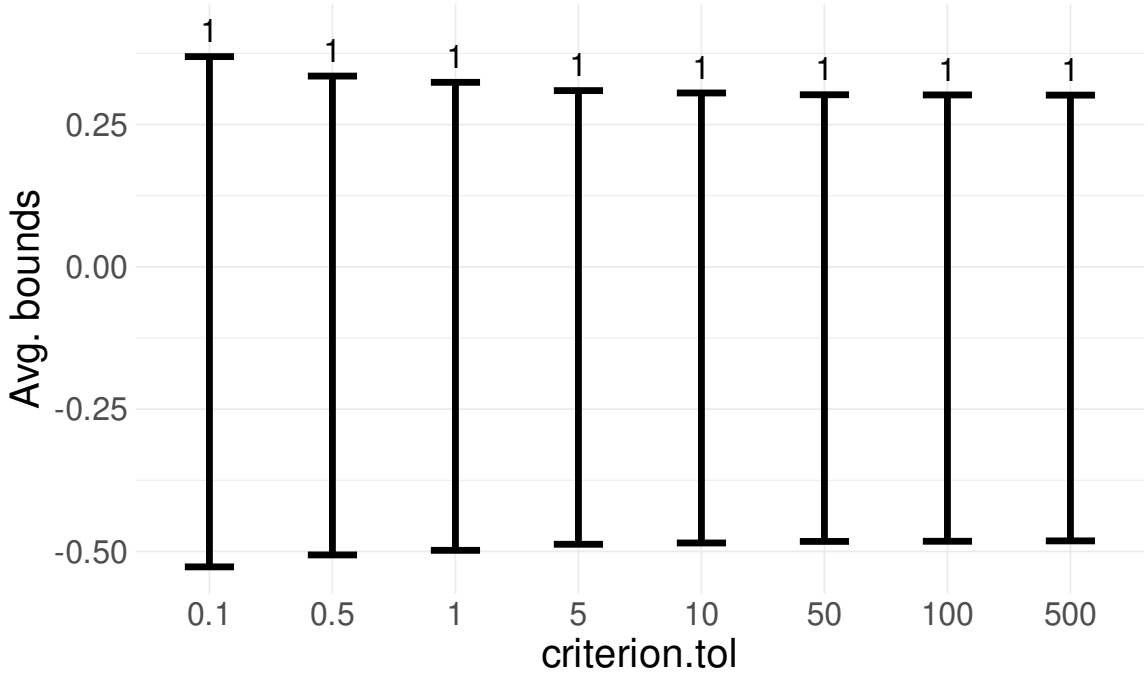
2.4 Case 4



Note: The bars display the average lower and upper bounds for simulations where both bounds were optimal. The number above each bar indicates the fraction of the 200 simulations for which the both bounds were optimal.

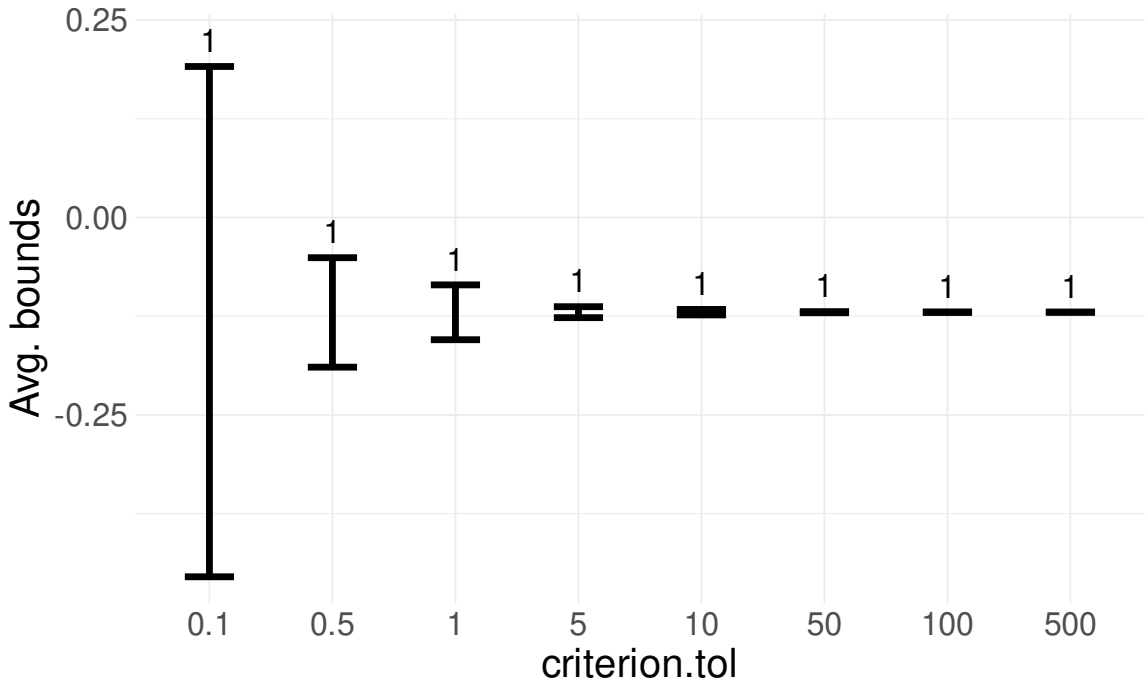
3 Simulation results for QP problem

3.1 Case 1



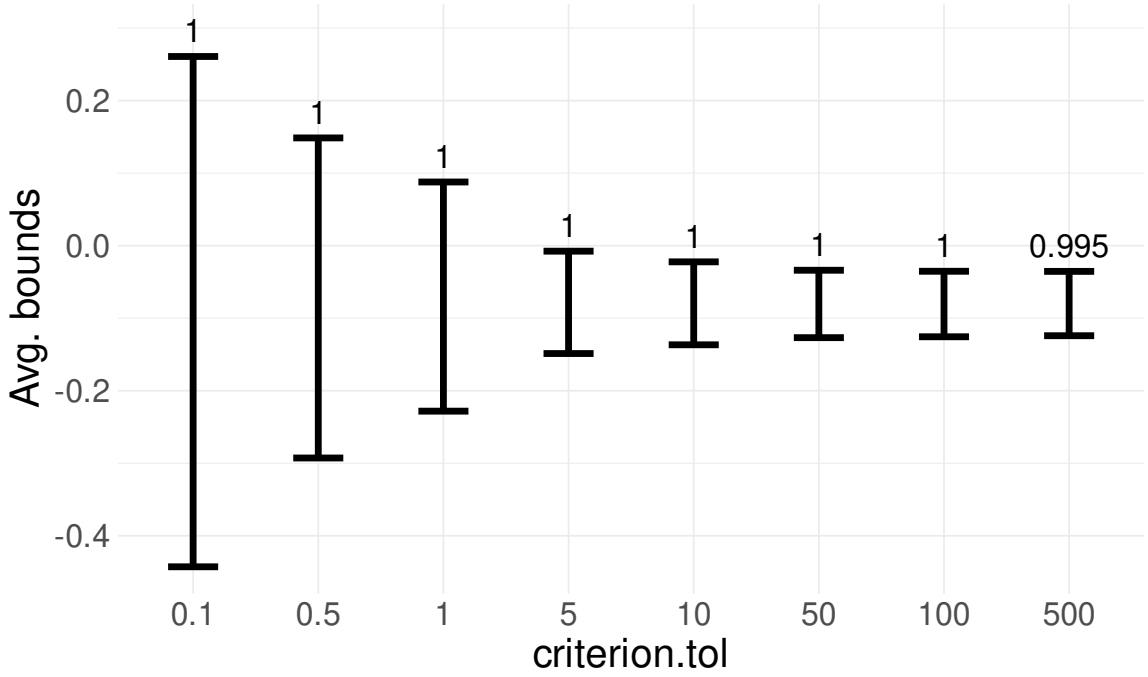
Note: The bars display the average lower and upper bounds for simulations where both bounds were optimal. The number above each bar indicates the fraction of the 200 simulations for which the both bounds were optimal.

3.2 Case 2



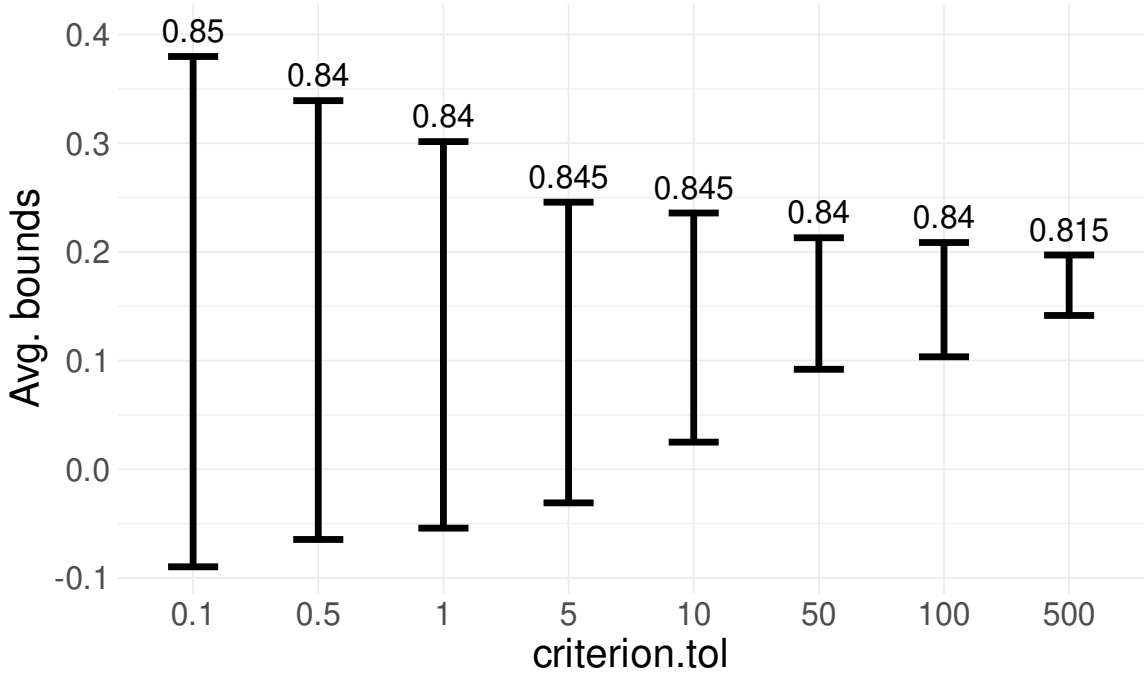
Note: The bars display the average lower and upper bounds for simulations where both bounds were optimal. The number above each bar indicates the fraction of the 200 simulations for which the both bounds were optimal.

3.3 Case 3



Note: The bars display the average lower and upper bounds for simulations where both bounds were optimal. The number above each bar indicates the fraction of the 200 simulations for which the both bounds were optimal.

3.4 Case 4



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