

Backtesting

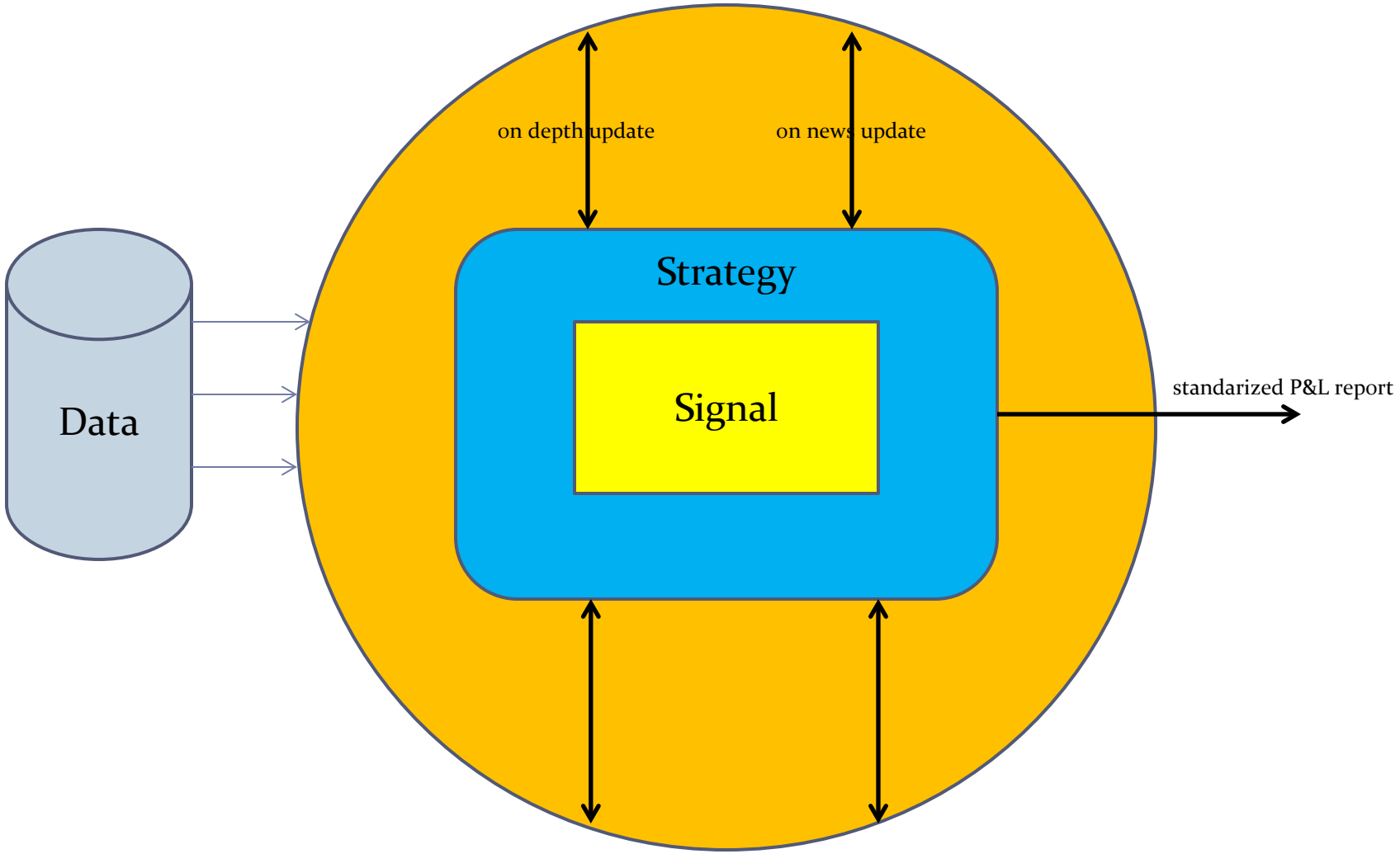
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Speaker Profile



- Dr. Haksun Li
- CEO, Numerical Method Inc.
- (Ex-)Adjunct Professors, Industry Fellow, Advisor, Consultant with the National University of Singapore, Nanyang Technological University, Fudan University, the Hong Kong University of Science and Technology.
- Quantitative Trader/Analyst, BNPP, UBS
- PhD, Computer Sci, University of Michigan Ann Arbor
- M.S., Financial Mathematics, University of Chicago
- B.S., Mathematics, University of Chicago

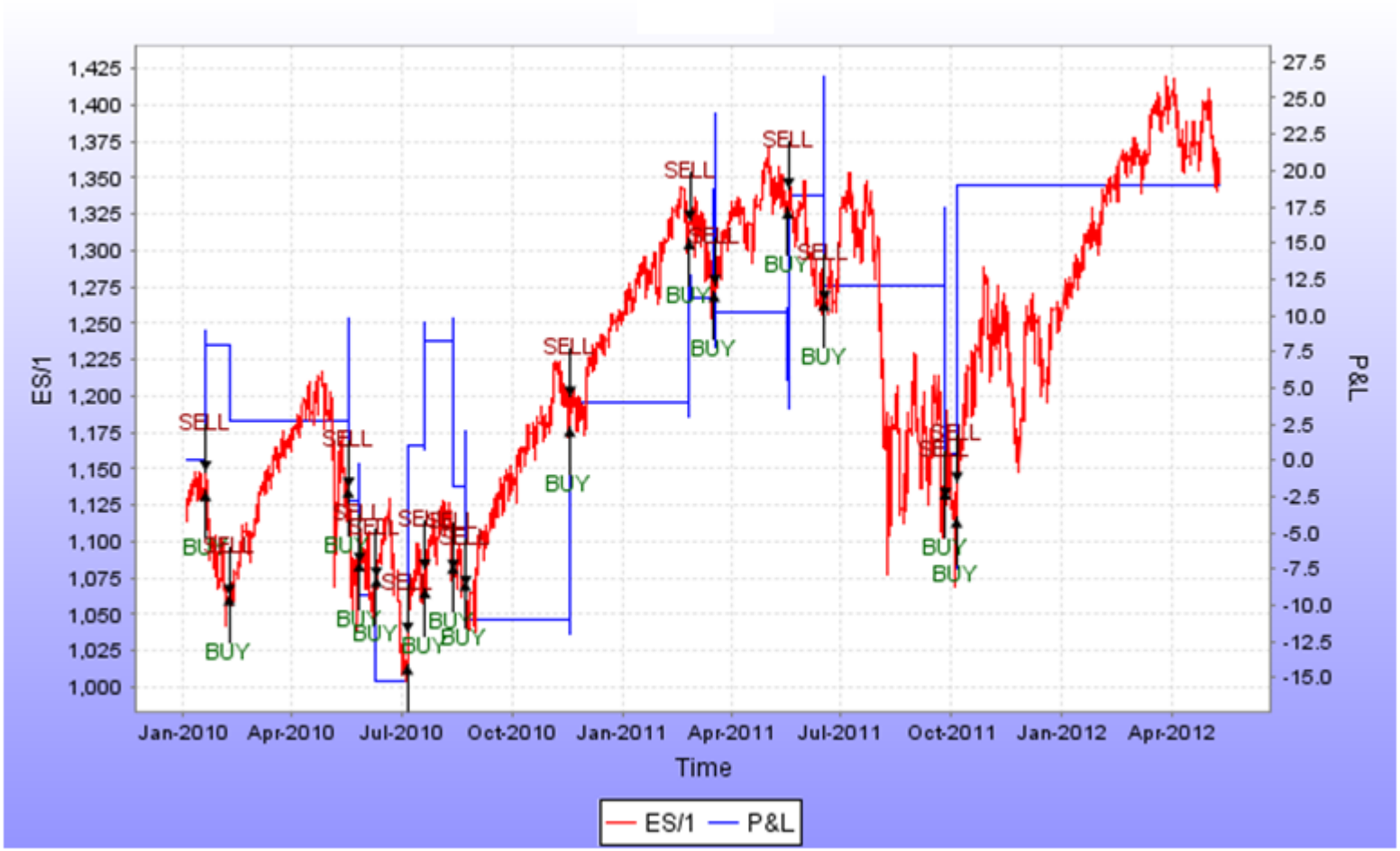
AlgoQuant Framework



Backtesting

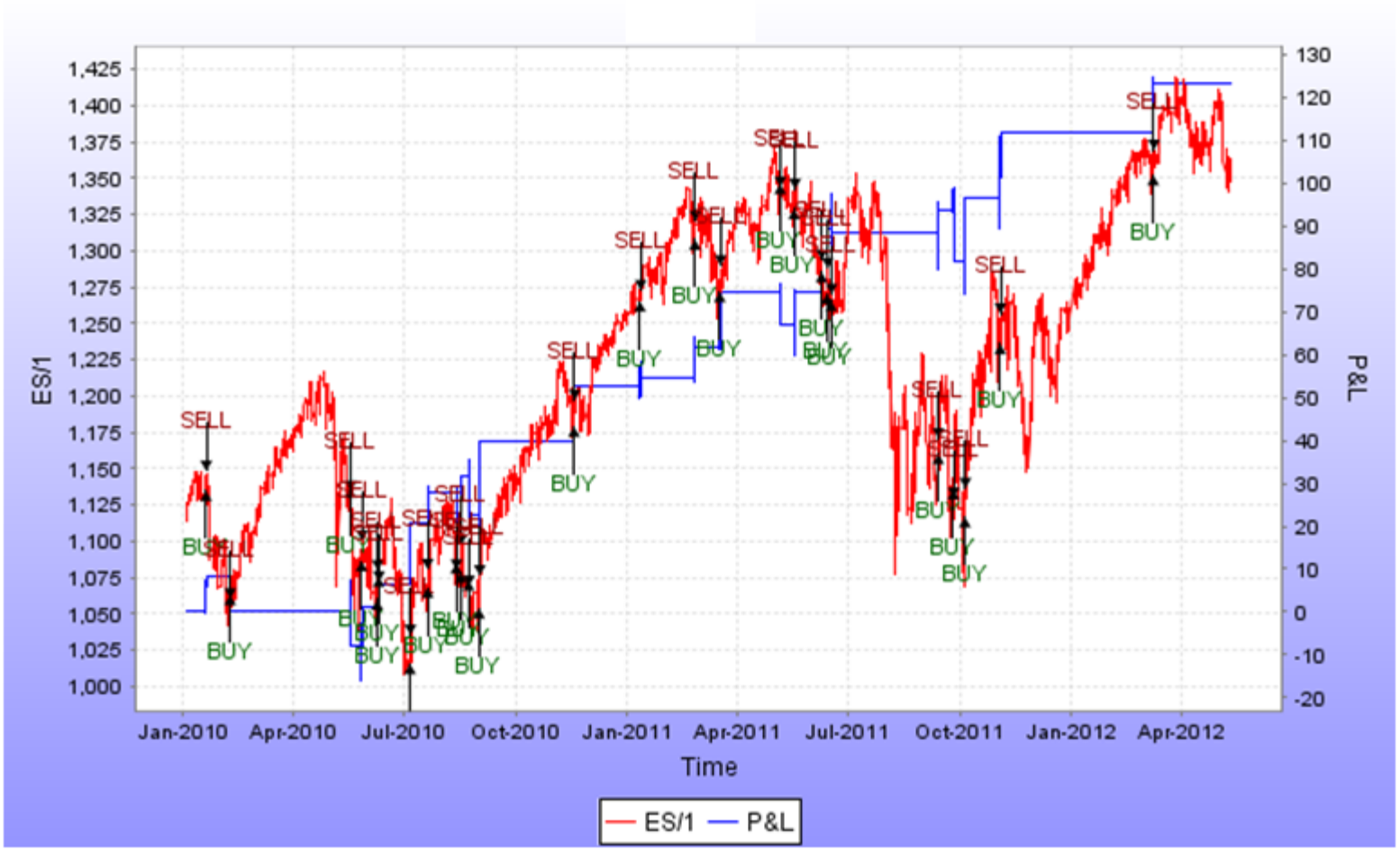
- Backtesting with historical data.
- Backtesting with optimized parameters.
- Sensitivity analysis for all parameters.
- Backtesting with carefully chosen parameters.
- Identify the P&L sources.
- Backtesting with bootstrapped data.

Historical P&L



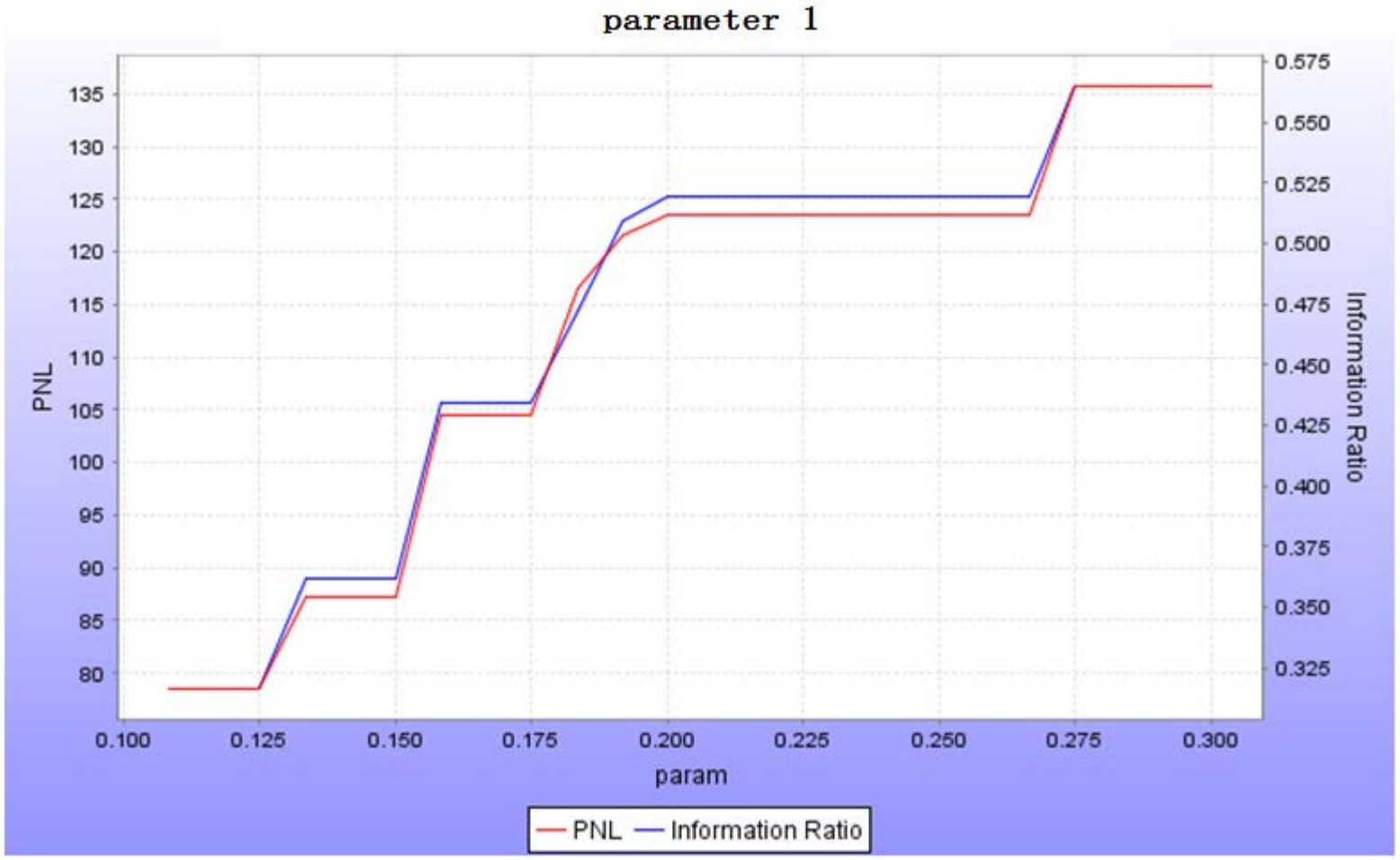
P&L = 19.00; IR = 0.076794

Optimized P&L



P&L = 123.5; IR = 0.519504

Sensitivity Analysis of Parameters (1)



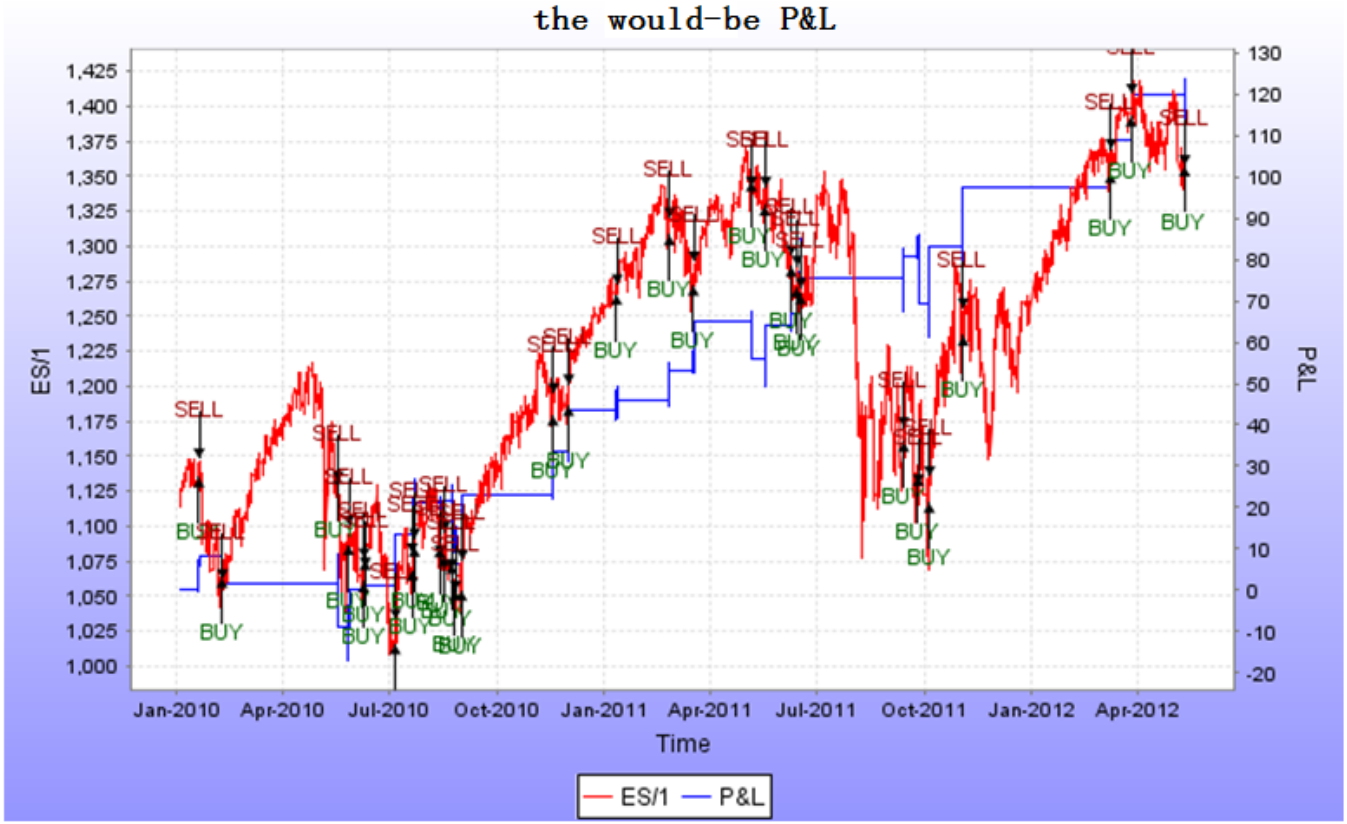
Sensitivity Analysis of Parameters (2)



Sensitivity Analysis of Parameters (3)



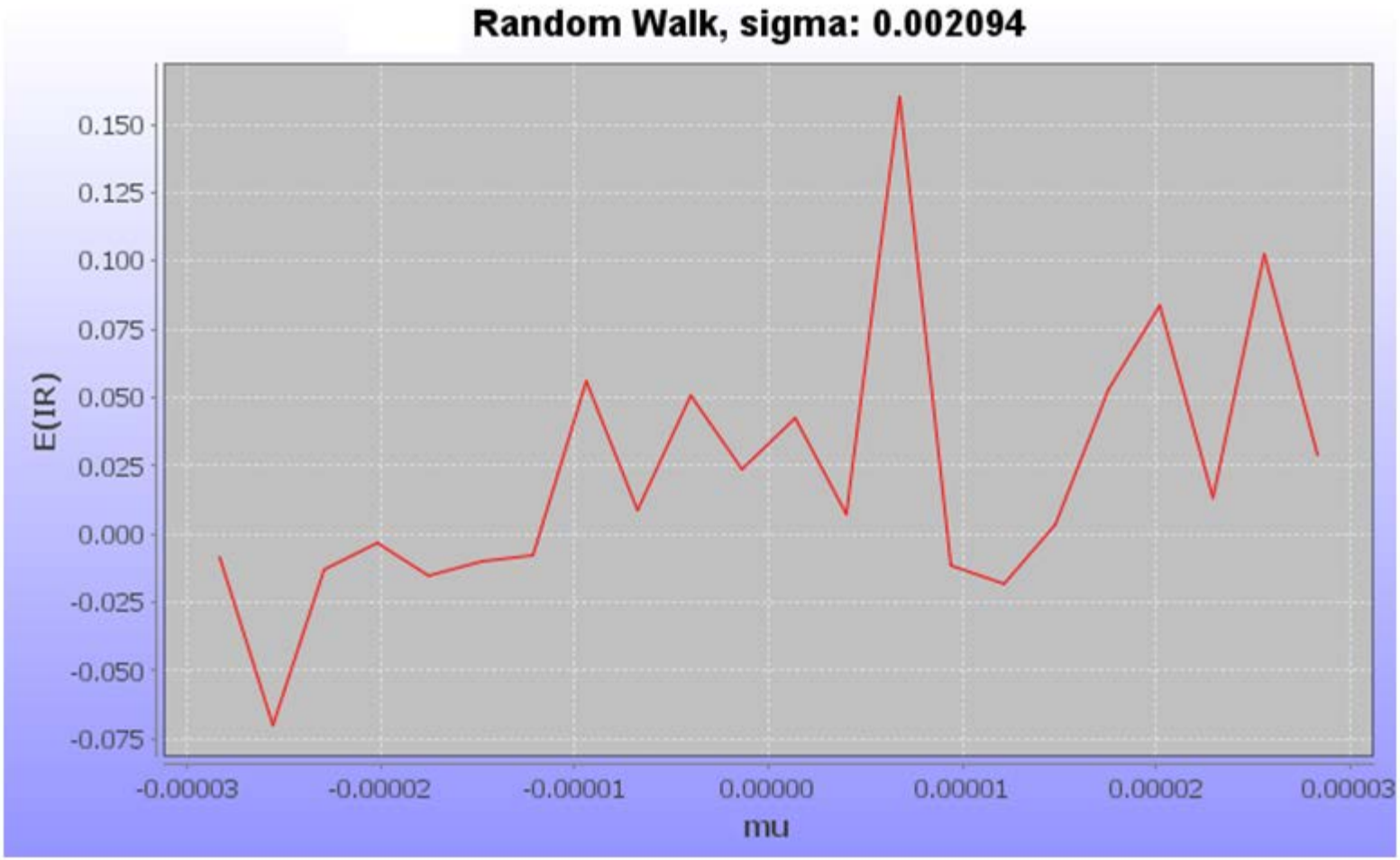
Backtesting Using Recommended Parameters



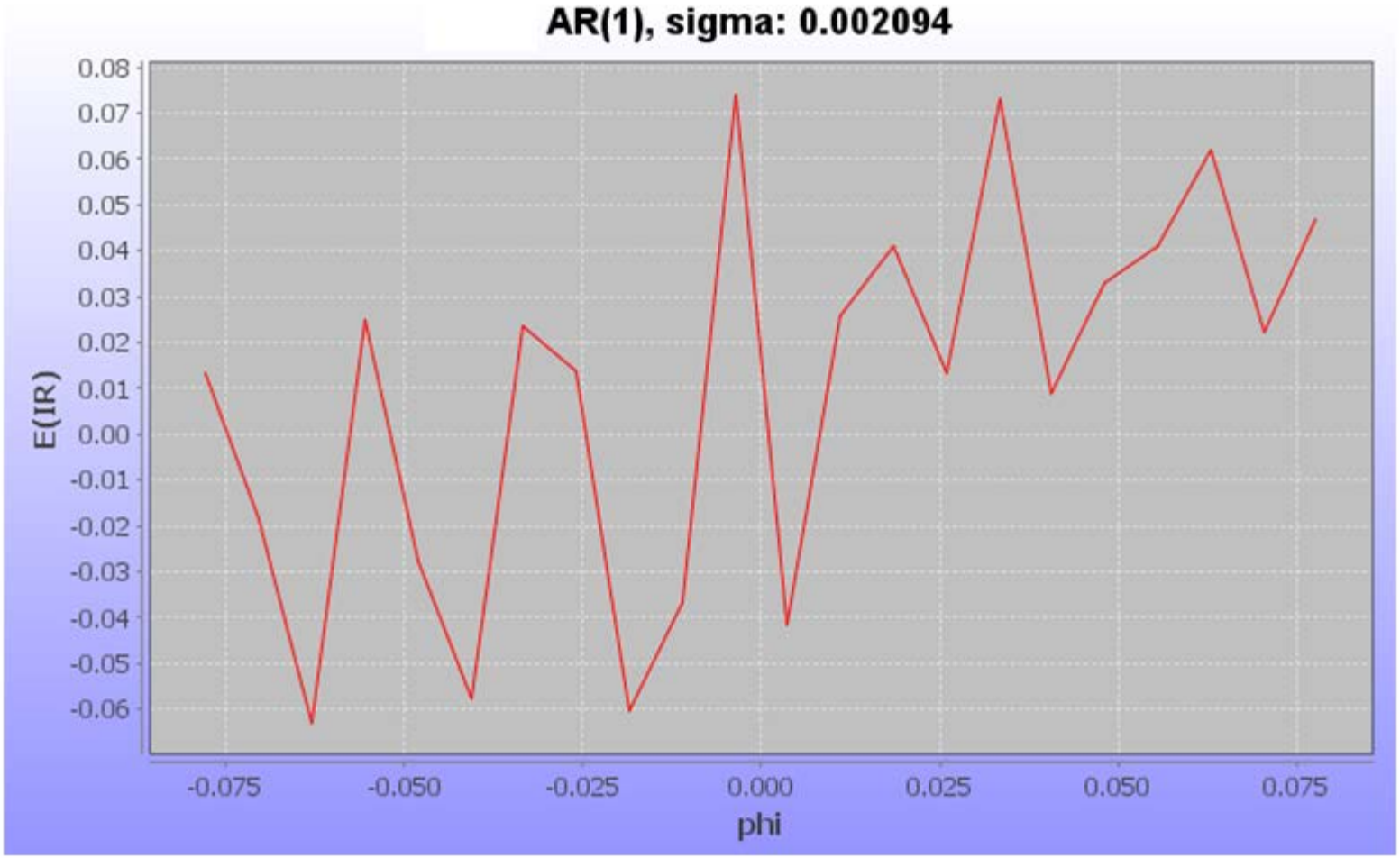
P&L = 115.50; IR = 0.450072

The performance increase is 486.08%.

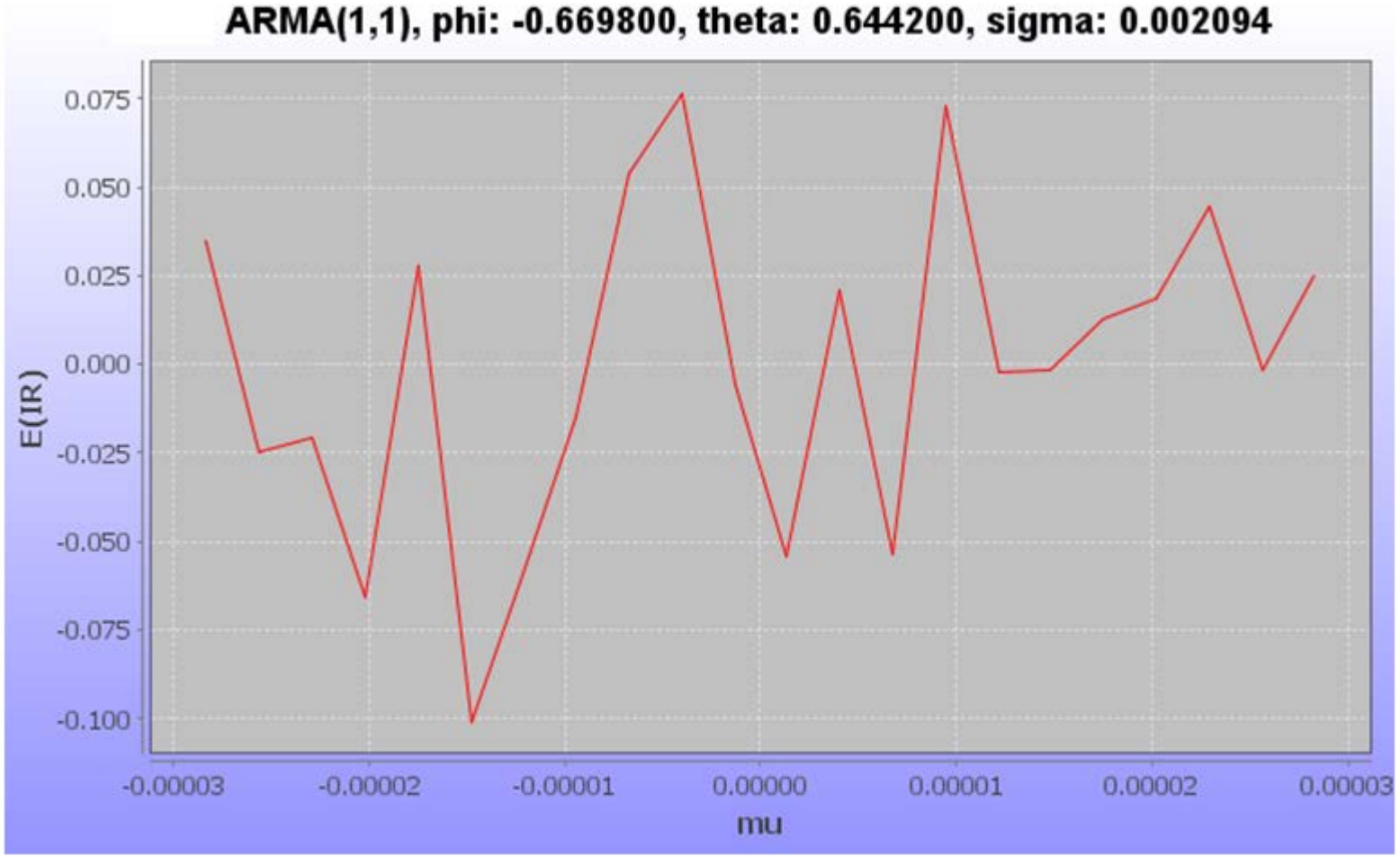
Monte Carlo Simulation – Random Walk with Drift



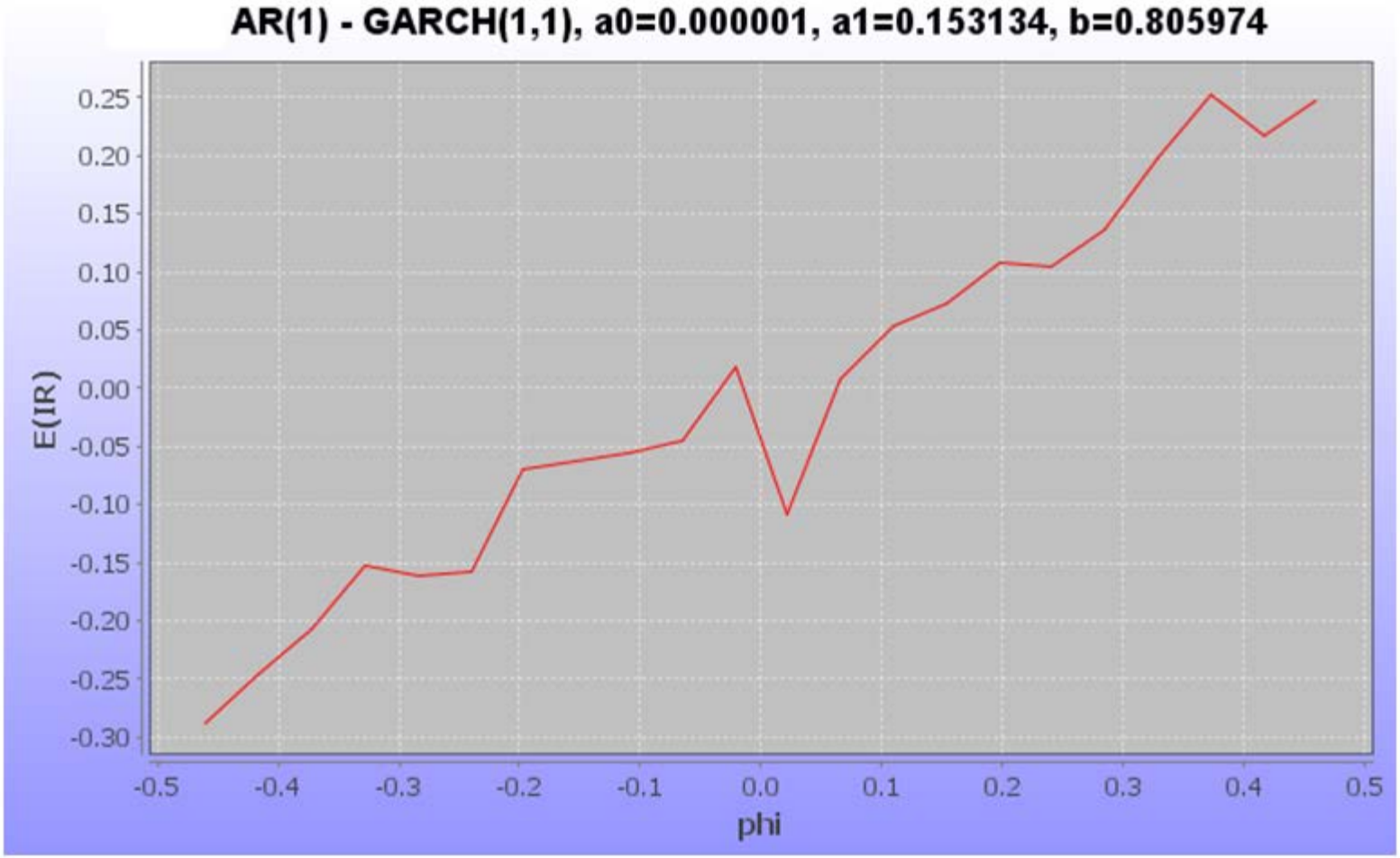
Monte Carlo Simulation – AR(1)



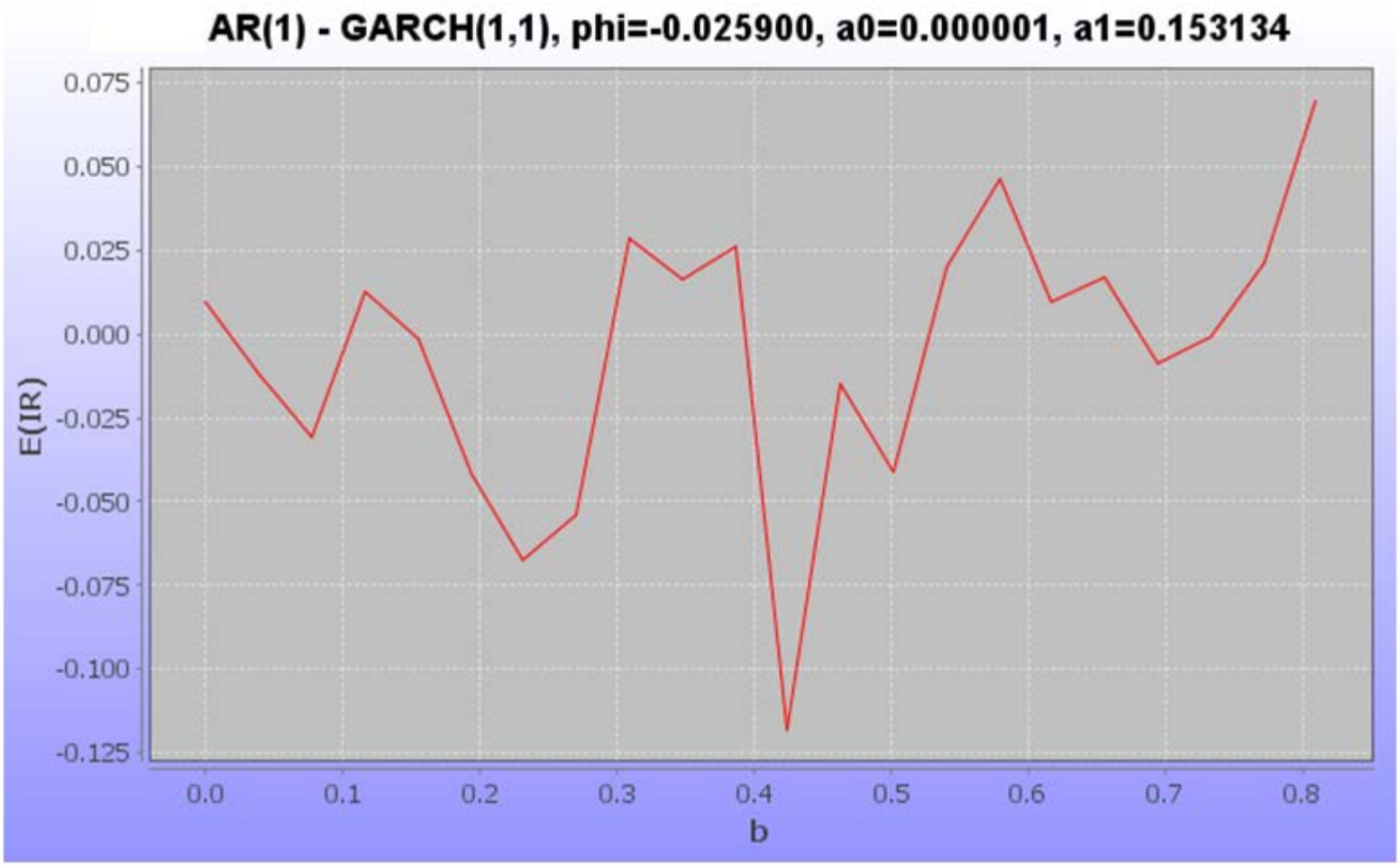
Monte Carlo Simulation – ARMA(1,1)



Monte Carlo Simulation – AR(1)+GARCH(1,1), ϕ



Monte Carlo Simulation – AR(1)+GARCH(1,1), b



Bootstrapping

- Expected P&L and Variance of P&L
- Politis, N. Dimitris, White Halbert, "Automatic Block-Length Selection for the Dependent Bootstrap", Econometric Reviews , 2004.
- Politis, D., White, H., Patton Andrew,"CORRECTION TO 'Automatic Block-Length Selection for the Dependent Bootstrap'", Econometric Reviews, 28(4):372–375, 2009.

Computing Power

- Very demanding!
- Need to run all different types of backtesting in parallel on a grid.