Limit Order Book Dynamics

Our goal is to use the dynamics of the Limit Order Book (LOB) as an indicator for high-frequency stock price movement, thus enabling statistical arbitrage. Formally, we will the study limit order book imbalance process, $I(t)$, and the stock price process, $S(t)$, and attempt to establish a stochastic relationship $\dot{S} = f(S, I, t)$. We will then attempt to derive an optimal trading strategy based on the observed relationship.

Roadmap and Timeline of Next Steps

TABLE 1 Timeline

end of 2014	Complete CTMC calibration
end of 2014	Backtest naive strategies based on CTMC
Jan-Feb 2015	Study stochastic controls and MDPs / POMDPs, specifically in ECE1639H or STA2006H
Feb 2015	Formulate the LOB dynamics and trade strategy in the stochastic control framework
Mar 2015	Use dynamic programming to solve the stochastic control problem
Mar 2015	Backtest optimal controller as trading strategy; compare with naive strategy
Apr-May 2015	Revisit HMM to model the underlying dynamics
?	Write thesis report