Utility maximization, Market Efficiency and Optimal Distributional Trading Gain

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This talk is divided into three parts. In the first part, using optimal distributional trading gain problem, we determine utility maximizing portfolio which maximizes the benefit an agent may received by trading the difference between his perceived future distribution of a security price and the risk neutral density provided by the associated option market. For practical application we show how one can fit the risk neutral density directly from option market data using the SVI parameterization and use integer programming with kernel search heuristics to statically replicate the optimal payoff.

In the second part we show that during the weeks following the initiation of the COVID-19 pandemic, the United States equity market was inefficient. This is demonstrated by showing that utility maximizing agents over the time period ranging from mid-February to late March 2020 can generate statistically significant profits by utilizing only historical price and virus related data to forecast future equity ETF returns. These strategies are shown to have statistically significant profitability and strong risk and performance statistics during the COVID-19 time-frame.

Finally, we study hypothetical market where different model opinions can be traded in a setting that trades their differences. Using a utility maximization technique, we describe such a market for any general random variable X and any utility function U. We show analytical formulas for market equilibrium and demand functions for random variables from the exponential family. Finally, we show that the matching algorithm naturally generates a closing auction similar to NASDAQ's opening and closing cross.