CITY UNIVERSITY OF HONG KONG
香港城市大學

Strategies of Algorithmic Trading and High Frequency: Analysis, Modeling and Applications in Financial Markets
演算法交易和高頻交易策略在金融市場上的分析，建模和應用

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CHEN Chao Teng
陳朝燈

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Abstract

In this paper, we use specific volume weight average price (VWAP) strategy, time weighted average price (TWAP) strategy and implementation shortfall (IS) strategy to trade intraday COMEX gold future, commodity futures and equity index futures. It turns out that these can track the market price of gold futures very well, especially VWAP strategy. And the tracking performance is better when price moves on days with no trend. Market impact cost and timing risk cost turn out to be negatively correlated. Moreover, we get the result that the timing risk cost of VWAP strategy is the highest and timing risk cost of IS strategy is the lowest, while the situation of market impact cost is opposite. At last, based on the moving properties of price for each asset class, a mixed strategy with not only relatively low market impact cost and timing risk cost but also good tracking performance of futures market price is obtained.

Then we construct a simple data-driven trend following strategy for gold from a contrarian view. The artificial neural network (ANN) is adopted to determine two parameters: the price trend signal and the degree of tightness. The latter is adjusted by the trend signal generated directly by the ANN. We attempt to capture the small profits when the price deviates from the Bollinger band in the gold future market during intraday trading. High frequency data of prices, such as commodity futures and equity index futures, are used to train and test the strategy. Despite the trading cost, the back-tests show that our strategy has delivered positive returns and is adaptive to different price trends. Finally, we evaluate the profitability with the consideration of cost, revealing that the strategy is applicable in practice. We attempt to capture the small profits when the price deviates from the Bollinger band in the gold futures market during intraday trading. High frequency data of gold future is used to train and test the strategy.

Keyword: VWAP; TWAP; IS; gold futures; equity index futures; Market impact; Timing risk; Mixed strategy; trend following; neural network; algorithmic trading, high frequency trading