

## Summary

**Keywords:** correlation, co-integration, high frequency trading (HFT), pairs-trading, Bollinger Bands

In this paper, a pairs-trading strategy for trading is proposed based on statistical arbitrage concepts. The proposed strategy is applied to futures trading in Japan markets. The index futures used in this paper are (i) Nikkei 225 Mini Index Future; (ii) JPX-Nikkei Index 400 Future and (iii) TOPIX (Tokyo Stock Price) Index Future. Pairs-trading is important in volatile markets as its aim is to hedge loss risk. Hence, this paper will study the three futures contracts individually as well as their log return series. More importantly, this paper will find spreads between co-integrated futures and make use of the most suitable pair to fit in the proposed trading strategy. In addition, the strategy yields cumulative profits up to 12,762.80 yen (about 129,295.16 SGD) for this pairs trading with 20-min simple moving average and 2 standard deviations, well exceeding other strategies' profitability by 11 million yen (137 thousands SGD) over the trading period from 25/11/2014 to 28/04/2015.

### **Author's contributions:**

1. I have implemented the statistical time series models to model and study the trends of three Japanese index futures as well as their log returns. The models I used are: (i) Autoregressive model (AR); (ii) Moving-average model (MA); (iii) ARIMA model and (iv) Vector error correction model (VECM). The data in this paper are: TOPIX, JPX-Nikkei Index 400 and Nikkei 225 Mini Index futures.
2. I have developed a pair of futures for trading the spread by using the Bollinger Bands strategy. I have also proposed several trading strategies for pairs trading and studied their profitability.