>> UBS Investment Research

>> Understanding Pairs Trading

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This paper is a great tutorial for understanding pairs trading. It first introduces the history and evolution of pairs trading. Then give out the fundamental concept for pairs trading:

1. Select 2 stocks with stationary price ratio as a pair
2. Monitor price ratio for divergence, then long underperforms stock and short same amount of the other outperform stocks.
3. Expect the price ratio will converge eventually, and close the previous position. Capture the profit from the spread.

In general, pairs trading base on the premise that the price ratio of a good pair of stock will be stable in the long run.

Next the paper analysis pairs trading from following aspects:

1. Identifying a good pair using statistical tests. (Sum of squares and ADF test works best)
2. The trigger to open and close a trade (open when price ratio is 2-sd away from mean and close when it comes back into 1-sd away)
3. Measuring return by comparing to indiscriminate pairs trading strategy (randomly selected pairs).

Then the paper provides the evaluation from various aspects:

1. By analyzing 6 different pair identification statistical method, found out ADF test works best. (Which makes sense, because ADF is designed to find out cointegration of 2 time series)
2. Performance of the pairs trading (choosing pair matters!)
3. Timing of open/close pairs trading (> 25% trade last within 5 days, with 6% last only for a day)
4. Risk analysis: pairs trading is not a risk-free strategy, because diverged price ratio might never converge again…And the market volatility could significantly impact the performance of pairs trading (low volatility decrease draw back the performance).

The paper then provides a “dynamic leverage adjustment” method to try to make pairs trading still profitable during low volatility period.

In addition, the paper provides the mathematics analysis to explain the theory that supports pairs trading. Which supports the conclusion of optimal trading rules:

The size of the position open should increase with:

1. The speed of mean reversion
2. The distance from the equilibrium point

And decrease with:

1. The volatility of the spread
2. The risk free interest rate
3. Risk aversion