

---

## Designing Long-Short Equity Market Neutral Strategies: Co integration Approach

---

### Introduction

This paper offers a market neutral long-short "double alpha" strategy based on enhanced index tracking and co integration based portfolio optimization. The strategy is illustrated using daily returns data on Dow Jones Industrial Averages and its components.

*Our methodology produces pairs of long and short portfolios which individually track enhanced indices and on combining in certain fashion produce higher risk adjusted returns which are neutral to market movements. There are many advantages of combining long and short strategies. For example, independence of the market direction, more efficient use of information as compared to long-only strategies, "double alpha" and its potential portability through derivatives.*

### Long-short market neutral strategy

Co integration technique is used to form long and short portfolios which replicate the artificially enhanced 'plus' indices and artificially suppressed 'minus' indices respectively. Long-short strategies can be set up with portfolios tracking different 'plus' and 'minus' benchmarks. This type of long-short strategy is expected to generate returns according to the 'plus'/minus' spread with a fairly low volatility. Moreover, since the 'plus' and 'minus' portfolios are both highly correlated with the original benchmark, a low correlation of their difference with the benchmark is observed.

### Portfolio size and constitution of portfolios

Apart from portfolio weights there are two more decision variables to be taken care of, namely portfolio size and portfolio weights. As we have stated earlier, selection of constituents of tracking portfolios is a flexible process. They can be selected according to their market capitalization or the price hierarchy or on the basis of thorough fundamental research or any other proprietary model one might have.

In this work, to make the model as generally applicable as possible, for every portfolio size, we generate every possible combination of stocks as portfolios from our universe. We solve the problem of selection of portfolio size empirically. We construct long and short portfolios of various feasible sizes.

---

\* This work draws inspiration from Alexander C. and Anca Dimitriu (2002), "The Co integration Alpha: Enhanced Index Tracking and Long-Short Equity Market Neutral Strategies", ISMA Discussion Papers in Finance 2002-08, ISMA Centre, University of Reading, UK

## The results

For the six artificial indices that we have created, we identified different portfolios, to be longed and shorted. We combine each long portfolio with each of the short portfolio in order to identify the best long-short combination. This way we generate several long short combinations or strategies.

The results are in terms of some portfolio attributes: Annualized Returns, Annualized Volatility, Correlation with Market index (DJIA), Information Ratio and Sharpe Ratio. The best long-short combination is expected to give above-market returns, volatility not exceeding that of the market and low correlation with market index ensuring market neutrality.

## In-sample results:

Within the sample all the strategies (long and short combinations) yield better returns than DJIA in absolute terms as well as risk adjusted terms. Except for some combinations, volatility of the strategies is lower than that of DJIA. All the strategies, without exception, are almost uncorrelated with the index vindicating market neutrality.

## Out-of-sample results:

Out-of-sample testing of the strategy is performed on a period adjacent to our in sample. Market returns in this period are very low and our portfolios far outdo the market. Their volatility is higher than the DJIA over this period. But the returns more than compensate for this rise in risk. Therefore on risk adjusted basis, they prove superi

## Disclaimer

The trading strategy described in this paper is intended as an exhibit of capabilities available at Epitome Global Services Ltd. and does not constitute professional advice. No person should act upon the information contained in this paper without obtaining specific professional advice. Further information and assistance may be obtained from Epitome Global Services Ltd. No representation or warranty (express or implied) is given as to the accuracy or completeness of the information contained in this paper or for the performance, merchantability and fitness for a particular purpose.

The expected performance of the strategy is based purely on historical data and does not guarantee success in future, which by nature is vulnerable to market circumstances then prevalent.

Epitome Global Services, its members, employees and agents accept no liability, and disclaim all responsibility, for the consequences of any person using information in this paper or the technique therein or acting, or refraining to act, in reliance on the information contained in this paper or for any decision based on