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# Pairs trading in the UK equity market: risk and return

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## Abstract

In this paper, we provide the first comprehensive UK evidence on the profitability of the pairs trading strategy. Evidence suggests that the strategy performs well in crisis periods, so we control for both risk and liquidity to assess performance. To evaluate the effect of market frictions on the strategy, we use several estimates of transaction costs. We also present evidence on the performance of the strategy in different economic and market states. Our results show that pairs trading portfolios typically have little exposure to known equity risk factors such as market, size, value, momentum and reversal. However, a model controlling for risk and liquidity explains a far larger proportion of returns. Incorporating different assumptions about bid-ask spreads leads to reductions in performance estimates. When we allow for time-varying risk exposures, conditioned on the contemporaneous equity market return, risk-adjusted returns are generally not significantly different from zero.

Keywords:

pairs trading | statistical arbitrage | hedge funds | asset allocation

# Notes

1. For example, Chordia, Sarkar, and Subrahmanyam (2011) model the effect of liquidity on the cross-autocorrelation of stocks.

2. Gatev, Goetzmann, and Rouwenhorst (2006) argue that where a trade is triggered when the price of the long position at the opening of a trade is the bid price and the short position is the ask price, and the next day prices are equally likely to be at bid or ask, then delaying trades by one day will reduce the excess returns on average by half the sum of the spread of the long and short positions. Likewise, at convergence if the short is trading at bid, and the long is trading at ask, then delaying the closing by one day should lower the excess returns on average by half the sum of the spread of winner and loser. By waiting one day in opening and closing pairs, it should effectively reduce the excess returns by one round trip transaction cost.

3. In addition to bid-ask spreads, investors will incur stamp duty, commission charges and charges for borrowing stock. Due to data unavailability we do not model these direct transaction costs, but we caution the reader that incorporating these costs will lower returns.

4. The concerns which have been raised by Ince and Porter (2006) amongst others about data errors in Datastream are mainly concentrated amongst small stocks and/or low price stocks. Focusing our sample on the FTSE All-Share Index provides a natural control for any remaining errors as constituents of this index are selected based upon size and liquidity constraints.

5. Prior to the introduction of SETS, the London Stock Exchange operated a market maker quote-based system (SEAQ) for all stocks. SETS was introduced initially for FTSE100 stocks on October 27th 1997. Selected FTSE250 constituents began trading on SETS on January 11th 2000, and on October 9th 2003 a new order book system supported by market maker liquidity, SETSmm, was introduced for all other stocks. Our subsample results are consistent using any of these dates to divide the sample.

6. Hendershott, Jones, and Menkveld (2011) identify the move to an automated trading system on the NYSE in 2003 with a large effect on the liquidity.

7. Examining the long and short portfolios reveals that approximately 70% and 42% of the monthly returns are positive, respectively, but the short portfolio reduces systematic risk in negative market return months. For example, in October 1987, there is a negative return of −12.5% for the long portfolio; however, it is accompanied by a short portfolio return of +23.1%. By investing in a hedged portfolio, investors are protected from large equity market shocks, which are unavoidable with either the long or short portfolio in isolation.

8. For the sake of brevity, we concentrate our discussion on the more conservative Committed Capital portfolios.

9. Khandani and Lo (2011) present evidence of the effect of the financial crisis on the returns of EMN funds in the USA.

10. We are grateful to Alan Gregory for providing the UK Fama and French factors.

11. Related evidence by Petkova (2006) shows that having incorporated innovations in four macroeconomic predictive variables alongside the Fama and French (1993) factors computed from a vector autoregression (VAR) process, the SMB and HML factors lose explanatory power. However, subsequent research has cast doubt over the ability of macroeconomic state variables to predict returns (Lewellen, Nagel, and Shanken 2010) and highlights the limitations in the methodologies used to create orthogonal factors, which reduce the explanatory power of the Fama and French (1993) factors (Lioui and Poncet 2012).

12. We thank the anonymous reviewers for encouraging us to include a liquidity variable in our regression model. In unreported results we also construct liquidity variables using only data on liquidity for the stocks in the pairs portfolios. As the portfolios are made up of relatively few stocks, these measures are relatively noisy and have lower explanatory power than the market-wide liquidity variables.

13. In order for the intercept of model (4) to be considered a risk-adjusted measure of abnormal return, from a market-based factor model, all of the right-hand side variables must be tradable assets. Hence, in the remainder of the paper we exclude the non-tradable liquidity factors, instead directly incorporating estimates of bid-ask spreads in the left-hand side variable.

14. While the aforementioned results clearly demonstrate the performance of pairs trading portfolios formed using daily data, we are also interested in how these results relate to trading at higher frequencies and whether there is a high correlation between an identical strategy being pursued at different frequencies. Using data from Bowen, Hutchinson, and O'Sullivan (2010), we provide a comparison between pairs trading at different frequencies for a one-year subset of the database. Results, available from the authors on request, show that the returns of the portfolios, estimated using hourly and daily data, are not correlated and provide very different return characteristics.

15. We thank the anonymous reviewer for highlighting this point.

# Additional information

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