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A Note on the Effectiveness of Pairs Trading For Individual Investors

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ABSTRACT: We investigated the profitability of a simple and easily implementable pairs trading strategy that included trading costs and restrictions to short selling so as to replicate an effective strategy exploitable by an individual investor. Notwithstanding the limitations embodied in our model, pairs trading still works. However, the constraints significantly affect the profitability of the strategy. We found evidence that restrictions to the number of shares that are allowed to be shorted have a relevant impact on the risk profile of the pairs portfolios. Our results support the hypothesis that pairs trading is an equity market neutral investment strategy.

Keywords: Pairs trading; market neutral; Italian stock market; trading strategy; statistical arbitrage; short selling; personal finance
JEL Classifications: G11

1. Introduction

The idea behind pairs trading is that when the prices of two shares move together there could be short term deviations that can be arbitraged. The strategy calls for finding two stocks whose prices have shown similar patterns in the past and to arbitrage them when prices diverge widely enough. This is done by simultaneously buying the share whose price has negatively deviated from the long term relationship and shorting the other, thereby betting on a future convergence of prices while minimizing the risk. The strategy is rewarded by being profitable and simple to implement, even for individual investors.

Our study is motivated by the acknowledgement that an individual investor faces significant limitations in conducting a pairs arbitrage, namely: a) trading fees are not insignificant; b) going short requires the payment of interest to the lender; c) when a short position is opened a cash guarantee is required; d) the strategy is not self-funding (that is, the proceeds of the short sales are not available); and e) it is not always possible to go short on all listed shares.

Do these shortcomings affect the success of a pairs trading strategy? Our study deals with this issue. We considered the Italian stock market, which is a market where all the above-mentioned restrictions apply, and we employed an arbitrage strategy that can be easily implemented by an individual investor. Our pairs model is conceptually similar to the ones reflected in the majority of the existent literature but adds all the limitations set out in a) to e) above.

Our results show that after considering the above restrictions pairs trading still works. However, the profitability of the strategy is significantly affected, but not to the extent that it generates a negative net excess return if the pairs traded are restricted to the first in the selection range. Furthermore, restriction e) has a relevant negative impact on the diversification profile of the strategy.

The remainder of the paper is as follows. The next section reviews the relevant literature. Section 3 describes the methodology and the data. Section 4 shows the results and the last section presents our conclusions.

2. Literature Review

The concept of pairs trading is relatively old. It was codified and translated into a rigid quant framework in the mid-1980s by a leading United States investment bank that formed a dedicated team of professionals and scientists who developed a computer based trading algorithm. After a very

positive start, the strategy began to show contradictory results and the team was dismantled. Nevertheless, pairs trading continues to fascinate academics and practitioners.

In their pioneering paper, Gatev et al., (1999) documented statistically significant profits for a simple pairs trading strategy in the U.S. equity market for the period 1962-1997. They concluded that their results were robust with conservative estimates of transaction costs and that pairs payoffs were not strictly linked to a classical mean reversion effect. The same authors (2006) subsequently extended and updated their analysis to 2002, recording average annualized excess returns of up to 11%. They suggested that the abnormal returns to pairs strategies were a compensation to arbitrageurs for enforcing the law of one price. Elliott et al., (2004) assumed that the pairs followed a mean reverting Gaussian Markov chain model and proposed a trading strategy based on the predictions of the spread and calibrated from market observations. Perlin (2009) concluded that pairs trading performed well when applied to the Brazilian financial market and that the positive excess return achieved was not the result of chance. Do and Faff (2010) replicated Gatev's et al. (1999) methodology and extended their original sample to include the years 2000-2009. They found that the strategy was still profitable but with a continuous declining trend attributable to a worsening of arbitrage risks and, to a lesser extent, to increasing market efficiency. The same authors (2010) examined the impact of trading costs on pairs trading profitability in the U.S. equity market and documented that after 2002 pairs trading strategies were largely unprofitable. Bowen et al., (2010) focused on high frequency pairs trading. They concluded that the excess returns of the strategy are extremely sensitive to transaction costs and speed of execution. They also showed that the majority of returns occur in the first and last hour of trading. Mori and Ziobrowski (2011) compared the performance of pairs trading in the U.S. REIT market and the U.S. equity market over the period 1987-2008. They concluded that the REIT market provided superior profit opportunities between 1993 and 2000 and these disappeared in the new millennium. Alsayed and McGroarty (2012) revealed that pairs trading is an important price correcting mechanism of the American depository receipt (ADR) market. Their analysis of a sample of UK stocks –ADR pairs showed that pairs trading accounts for a 1.45% annual return in excess of the risk free rate. Broussard and Vaihekoski (2012) tested the profitability of pairs trading under different weighting structures and trade initiation conditions using data from the Finnish stock market. They found that the returns from a pairs arbitrage are not related to market risk and that lowering the threshold for opening a pair increases the profits from the trading. A recent stream of literature on pairs trading focuses on the optimization of the different phases of the strategy and on the control of the variables that affect its performance. In this field of research interesting models have been proposed by Huck (2010) and Xie and Wu (2013).

3. Methodology and Data

Pairs trading requires: 1) selection of the pairs, and 2) definition of the trading rule. Although phases 1 and 2 can be designed in almost infinite ways, the most common, in practice and in the literature involves: a) selecting the pairs that have minimized the normalized historical closing price series during a predefined selection period; b) during a subsequent trading period of a predefined length, opening the arbitrage when the difference between normalized prices diverges by more than a predefined threshold defined in terms of the historical standard deviation; and c) closing the positions when normalized prices converge or the trading period ends. In our study, we employed a pairs strategy that makes use of this common device but does this in a way that can be effectively undertaken by an individual investor and that takes into consideration restrictions a) to e) introduced in section 1.

As in the majority of the previous research, in this study the pairs selection period coincides with the 12 months that ends at the beginning of the trading period. The pairs selected are those that have minimized the sum of squared differences between their normalized closing price series in the pairs selection period. As in most of the previous studies in the literature, pairs are traded in the next six months (trading period). In the following six months new pairs will be traded; that is, those that have minimized the sum of squared differences between their normalized closing prices in the preceding 12 months, and so on. During the trading period from January 20xx to June 20xx, the pairs that will be traded are those that have been selected based on their normalized closing price series for the period January 20xx to December 20xx. During the trading period July 20xx to December 20xx the pairs that will be traded have been selected based on their normalized closing price series for the

period July20xx-1 to June 20xx, and so on. To control for data snooping and to check for robustness of the results, we replicated our model starting from six different first trading periods staggered by one month. We thereby mimicked six different hypothetical individual investors who follow the same pairs strategy but start their pairs trading at different times so that the selection and trading periods do not overlap. We refer to these different analyses as studies a) to f).Consistent with other studies in the literature, for each analysis a) to f), we traded portfolios composed respectively of the first 5, 10, 15 and 20 pairs, that is the 5, 10, 15 and 20 pairs that have recorded the lowest squared deviation between their normalized closing price series in the selection period.

In this research, a pair is opened during the trading period at the opening prices of the trading day following the day when the absolute difference between the normalized closing prices is higher than two standard deviations measured in the selection period. The long and the short positions are opened for the same value; this value is conventionally set at 100. Operatively, this means we assume that the strategy provides for the long position to buy a number of shares of the value of 100 and for the short position to sell a number of shares of the same market value. Such an approach involves an approximation in our results as it is not possible to trade fractions of shares. The law of large numbers comforts us when we conclude that this approximation does not bias our results in a significant way. The pairs are closed: a) at the opening prices of the trading day following the day when normalized closing prices crossed, or b) at the end of the trading period if a) does not happen first. Considering the opening prices of the day following the trading signal is coherent with an effective trading rule implementable by an individual investor. This approach is also useful to reduce the upward bias that can be induced by the bid-ask effect documented by, among others, Jegadeesh (1990). Since we are considering a pairs strategy implemented by a single individual investor, it is safe to assume that the investor's pairs activity is not so large as to have an influence on the opening prices.

Not all the shares listed on the Italian stock exchange are actually able to be shorted by individual investors. The stock exchange rules require that for a person to go short, someone else must lend that person the shares. Thus for individual investors to go short: a) their broker has to lend the shares; and b) they will be asked to pay for the loan of the shares. In the past decade, the main brokers have expanded the shares listed on the Italian stock exchange that can be borrowed by individual investors. Nevertheless, nowadays they are less than one-third of the listed shares. Thus, in the pairs selection phase, we only considered the shares that were effectively able to be borrowed. We referred to the list of shares shortable in the Italian market by a primary individual investor broker, updated at the beginning of each trading period in order to take into account new borrowable shares and shares that have been delisted. In the case of delisting during the trading period, an opened pair was closed at the closing price of the delisting day. We considered in our model the actual rate of interest for share borrowing and the trading fees that the broker would have charged to a standard customer in each trading period. We also considered the taxes in force in the period of trading[1].

Brokers who allow an individual investor to go short retain the whole proceeds of the short sale as a guarantee for the borrowing, require a cash margin to cover possible losses, and automatically open a stop loss on the short position. The investor can choose the level of the margin; the corresponding stop loss is defined by the broker and is different from share to share according to each share's historical volatility. The higher the margin, the higher the stop loss, and the higher the volatility of the share shorted, the lower the stop loss. In our model we considered all these restrictions. As our trading strategy implies that a pair can stay open for six months, we set the margin at 40%,which involved an automatic multiday stop loss ranging from 25% to 32.5% according to the volatility of the share. These settings are read by our model in this way: a) an individual investor invests in the opened pair the value paid for the long position (100) plus the margin (40) plus the trading fees, whilst the proceeds of the short selling are not credited to their account but are retained by the broker (that is, for an individual investor, pairs trading is not a zero net cash exposure game); and, b) if the stop loss occurs, a new short position is immediately opened at the price of the initial stop loss. Condition b) assumes that the investor had already set another short order for the eventuality that the stop loss occurs and it is executed at the same price as the closed initial position. However, in the real trading world, condition b) cannot be fully respected. This shortcoming of our model is

[1] Until 2011, the Italian tax system for individual investors taxed capital gains at 12.5% after deducting losses incurred in previous transactions. From 2012 the taxation rate is 20%.

deemed to not be significant to the result of the analysis. Of course the model takes into consideration the trading fees for the automatic stop loss trade and for the following short trade.

The losses or gains of such a trading strategy depend on the success of the investment's strategy, rather than on the performance of the market. If the prices really tend in the short run to converge, then the pairs trading will be successful independent of whether the market is bullish or bearish and a pure alpha profit will be delivered. The trading strategy set here can thus be viewed as market neutral. All the gains or losses will derive from the strategy and not from the movements of the market. In order to assess the profitability of the strategy we compared the returns of the pairs to the risk free rate (using as a proxy of this value the net annual rate of interest for 6 month Italian government bills as settled in the first bill auctions of each trading period).The returns of the trading were calculated as a yearly rate of return on the fully invested capital, calculated as the cash guarantee plus the initial trading fees plus the margin, which is the actual investment in each pairs trading. To check for robustness of market neutrality, we also tested whether the beta of our four pairs portfolios were significantly different from zero. As a proxy of the market return, we employed the FTSE MIB40 index, the blue chips index for the Italian stock exchange.

The most important Italian equity market brokers started to allow individual investors to go short in 2003. Accordingly, in our model we considered calendar year 2002 as the first pairs selection period and the first semester of 2003 as the first trading period for study a). Consequently, February 2002 to January 2003 and February 2003 to July 2003 are respectively the first selection period and the first trading period for study b) and so on for studies c) to f).

Our data comprised the daily opening, closing and maximum prices, corrected for dividends and corporate actions, of all the shares listed on the Milan Stock Exchange that, at the beginning of each trading period, were allowed to be shorted by individual investors by the Italian broker that has historically offered them the widest portfolio of shortable Italian equities. New listed shares were added 12 months after the IPO, that is, after the first selection period could be observed.

4. Results

Notwithstanding the limitations considered in our model, the strategy gives a positive net excess return. However, the limitations significantly affect the profitability of the strategy.

Table I shows the average results for studies a) to f). The table is divided into 4 sections; these show the results: A) at the level of a single trade; B) at the level of single pairs; C) at the level of a single trading period; and D) at the level of the yearly return. The columns illustrate the results: 1) as gross results (specified here as the proceeds of the strategy without deducting trading fees, interest on the short position, and taxes); 2) as gross results minus trading fees; 3) as gross results minus trading fees and interest on the short positions; and 4) as net excess returns (defined here as gross results minus trading fees, minus interest on short positions, minus taxes and minus the return on the free risk investment). To reduce concerns that outliers might have biased the mean, minimum values, maximum values and standard deviations of the results in studies a) to f) are reported.

When the gross results are considered, the strategy seems to be very appealing. For a 10 pairs portfolio, more than 70% of trades give a positive gross result; on average, 67.37%of pairs achieve a positive gross result; and roughly 95% of trading periods are profitable. On average, the six different hypothetical investors would have gained 11.84% on their fully invested capital if they had traded a portfolio of 10 pairs. These figures are slightly better if the portfolio was composed of only 5 stocks and slightly worse if their portfolio was composed of a higher number of shares. A higher variability of the results among studies a) to f) is also observable if portfolios of more than 10 pairs are inspected. Trading fees and interest charges on short selling significantly reduce the profitability of the strategy (see columns 2 and 3, table 1). For the strategy that trades a portfolio of five pairs, returns on the fully invested capital remain positive and near 10% per annum on average. However, the volatility in studies a) to f) increases and the results for portfolios with more than 10 pairs are significantly affected by the costs of the trades. When trading fees and interest charges on short selling are considered, more than half of the trading period reports for 15 and 20 pairs portfolios show negative returns and the average return on the fully invested capital of the 20 pairs strategy is not significantly different from 0 at the usual 95% confidence level.

Table 1. Trading statistics

	1) Gross Result					2) G.R. minus Trading Fees			
	5 pairs	10 Pairs	15 Pairs	20 Pairs		5 pairs	10 Pairs	15 Pairs	20 Pairs
A) Positive trades									
Mean	72,78%	70,81%	66,18%	64,31%		70,56%	68,50%	63,49%	62,22%
Min	70,71%	68,77%	62,86%	60,18%		68,44%	66,29%	59,80%	58,21%
Max	75,09%	73,03%	69,21%	68,72%		72,87%	70,24%	65,82%	64,80%
St. dev.	1,597	1,444	2,148	2,668		1,412	1,501	1,945	2,431
B) Positive pairs									
Mean	72,63%	67,37%	61,05%	57,63%		71,58%	66,32%	58,60%	55,79%
Min	71,58%	65,26%	58,95%	55,00%		70,52%	64,21%	56,84%	52,63%
Max	74,74%	68,95%	62,81%	60,26%		73,68%	68,42%	60,70%	57,89%
St. dev.	1,053	1,253	1,344	1,778		1,215	1,392	1,313	1,848
C) Positive trad.periods									
Mean	99,12%	98,24%	96,49%	90,35%		99,12%	96,49%	79,82%	75,43%
Min	94,74%	94,74%	89,47%	78,95%		94,74%	94,74%	73,68%	68,42%
Max	100,00%	100,00%	100,00%	94,74%		100,00%	100,00%	84,21%	78,94%
St. dev.	1,960	2,479	3,923	5,617		1,960	2,500	3,619	3,921
D) Yearly return									
Mean	14,07%	11,84%	7,00%	4,18%		11,99%	9,85%	5,14%	2,37%
Min	13,22%	11,28%	5,68%	2,36%		11,12%	9,02%	3,45%	0,43%
Max	15,13%	12,81%	8,54%	5,65%		12,99%	10,77%	6,93%	3,96%
St. dev.	0,628	0,572	0,926	1,253		0,639	0,617	1,278	1,35
	3) G.R. minus T.F. minus Interests					4) Net Excess Return			
	5 pairs	10 Pairs	15 Pairs	20 Pairs		5 pairs	10 Pairs	15 Pairs	20 Pairs
A) Positive trades									
Mean	70,00%	67,63%	61,62%	60,61%		68,89%	66,47%	60,58%	59,00%
Min	67,53%	65,23%	58,81%	56,33%		66,05%	64,22%	56,63%	54,87%
Max	72,65%	70,07%	63,74%	62,47%		70,99%	69,49%	63,17%	62,38%
St. dev.	1,599	1,85	2,013	2,739		1,734	1,994	2,228	3,015
B) Positive pairs									
Mean	67,37%	63,68%	55,79%	52,89%		66,32%	62,11%	54,39%	50,79%
Min	64,21%	61,05%	52,98%	49,73%		64,21%	58,42%	50,87%	47,37%
Max	69,47%	66,84%	58,60%	55,26%		69,47%	65,79%	56,49%	53,68%
St. dev.	2,015	2,083	2,115	2,072		1,922	2,273	2,265	2,578
C) Positive trad.periods									
Mean	79,82%	75,45%	47,37%	35,96%		73,68%	71,04%	40,35%	35,96%
Min	73,68%	73,68%	42,11%	31,58%		68,42%	63,15%	36,84%	31,58%
Max	84,21%	84,21%	52,63%	42,11%		78,95%	73,68%	47,36%	42,11%
St. dev.	3,617	3,924	3,003	3,617		3,040	4,021	3,922	3,617
D) Yearly return									
Mean	9,81%	7,65%	2,82%	0,09%*		6,69%	4,77%	0,45%*	-1,90%*
Min	8,53%	6,82%	0,84%	-1,46%		5,94%	4,08%	-1,02%	-3,51%
Max	11,04%	8,45%	3,86%	2,34%		8,12%	5,79%	2,97%	0,31%
St. dev.	0,854	0,541	1,061	1,448		0,779	0,572	1,258	1,46

* not significantly different from 0 at 95% confidence level

Net excess returns are positive only for portfolios of 5 and 10 pairs. On average, for the 15 pairs portfolio, the yearly net excess return is not statistically significantly different from 0, and 2 out of 6 studies showed negative yearly net excess returns. Only 1of the 6 studies a) to f) recorded a positive net excess return in the 20 pairs portfolios. On the other hand, none of the studies showed negative net excess returns for the 5 and 10 pairs portfolios. For these portfolios, the number of trades with positive net excess return, the number of pairs with positive net excess returns and the number of trading periods with positive net excess returns remained safely above the 50% level.

Beta analysis confirms that the strategy can be considered a market neutral one. The betas for 5 years and 3 years for studies a) to f) are always not significantly different from 0 at a 95% confidence level. To reduce back testing bias, 5 years betas were calculated with a 1 year rolling window (that is, beta 200x to 200x+5, beta 200x+1 to 200x+6, and so on) and 3 years betas were calculated with a 6 months rolling window. This involved a total of 6 x 4 portfolios x 6 studies 5 years betas, and 14 x 4 portfolio x 6 studies 3 years betas that were not significantly different from 0 at a 95% confidence level. Trading period betas (that is betas calculated with respect to any single 19 x 6 studies for trading periods of 6 months) are not significantly different from 0 at the usual 95% confidence level in 86.32%, 84.21%, 83.51% and 79.74% of the cases, respectively, for portfolios of 5, 10, 15 and 20 pairs.

Gatev et al., (2006) found that as the number of pairs comprising the portfolio to be traded increases, the portfolio standard deviation falls. In their analysis, the returns from portfolios composed of 20 pairs also performed better than those of 5 pairs. They explained this outcome in terms of a higher degree of diversification being achieved by expanding the number of pairs traded in each trading period, suggesting that diversification benefits arose from combining multiple pairs in a portfolio. Contrary to our study, their sample was composed of a much larger set of stocks (on average, more than 2000 shares).Our results are straightforwardly different. Portfolios with 20 pairs show worse performance levels than those from 5 pairs. Moreover, the volatility of the results increases as the number of pairs traded increases. Indeed, the standard deviations of daily gross returns for portfolios of 5, 10, 15 and 20 pairs were, on average, 0.048, 0.081, 0.105 and 0.126, respectively, for the 6 studies a) to f).Consistent with portfolio theory, the diversification benefits suggested by Gatev et al., (2006) seem to narrow in a world where the pairs can be selected in a restricted number of shares, as is the case with the one in our study. Table 2 shows the marginal contribution to the profitability of including in the strategy the next 5 pairs (that is the marginal contribution of trading 10 pairs instead of 5, 15 instead of 10 and 20 instead of 15).Noteworthy also are the differences in the number of trades opened and the average duration of a single round trip (table 3). For pairs ranked over the first 10, a significantly lesser number of arbitrage opportunities arose and a much higher duration of an opened position is to be expected.

Table 2. Marginal yearly returns

	1) Gross Result				2) G.R. minus Trading Fees		
	5 to 10	11 to 15	16 to 20		5 to 10	11 to 15	16 to 20
Mean	9,62%	-2,68%	-4,29%		7,71%	-4,28%	-5,93%
Min	9,34%	-5,52%	-7,60%		6,92%	-7,69%	-8,63%
Max	10,49%	0,00%	-3,02%		8,55%	-0,75%	-4,95%
St. dev.	0,516	1,63	2,234		0,595	2,60	1,566
	3) G.R. minus T.F. minus Interests				4) Net Excess Return		
	5 to 10	11 to 15	16 to 20		5 to 10	11 to 15	16 to 20
Mean	5,50%	-6,83%	-8,10%		2,85%	-8,18%	-8,97%
Min	5,11%	-11,12%	-8,36%		2,22%	-11,22%	-10,98%
Max	5,86%	-5,32%	-2,22%		3,46%	-2,67%	-7,67%
St. dev.	0,228	2,10	2,609		0,365	2,63	2,066

Table 3. Open interests

A) Absolute	5 pairs	10 Pairs	15 Pairs	20 Pairs
Mean No. of open interests per pair	1,895	1,821	1,691	1,637
Min No. of open interests per pair	1,851	1,764	1,579	1,555
Max No. of open interests per pair	1,960	1,882	1,745	1,703
St. dev.	0,034	0,040	0,057	0,057
Pairs with 1 trading at least	100,00%	99,47%	98,67%	98,42%
Average duration per opened pairs (days)	59,77	62,48	70,87	72,07
B) Marginal		5 to 10	11 to 15	16 to 20
Mean No. of open interests per pair		1,747	1,358	1,140
Min No. of open interests per pair		1,677	1,122	1,026
Max No. of open interests per pair		1,804	1,393	1,225
St. dev.		0,045	0,100	0,335
Pairs with 1 open at least		98,95%	98,95%	95,79%
Average duration opened pairs (days)		65,42	92,23	76,20

During the years analyzed, the number of shares actually tradable by an individual investor in the Italian market ranged from a minimum of 44 at the beginning of 2003 to a maximum of 63 recorded during 2012. To ascertain whether the increase in the number of shares actually employable for pairs trading is a variable that affects the diversification features of the strategy, the following regression model was employed:

$$Excess\_St.Dev._i = \beta_0 + \beta_1(Ln\_Pairs_i) + \varepsilon_i \qquad (1)$$

where: Excess_St.Dev.$_i$ is the difference between the standard deviation of daily gross results in trading period i and the daily standard deviation of the FTSE MIB 40 index during the same period, Ln_Pairs$_i$ is the natural logarithm of possible pairs from which we can select the ones to trade during trading period i (that is, the half of the permutation of the number of shares that is allowed to go short in each trading period), ε_i is the error term.

The number of possible pairs has been preferred to the number of shares as explanatory variable because in the pairs trading framework adding a new share to a basket of x shares means having x-1 new pairs to choose from. Logarithms of the explanatory variable were used because, according to portfolio theory, it is the scale variation in the securities that forms the portfolio rather than the absolute number of new shares added that is related to the risk/return improvements from the diversification (that is, adding 1 more share to a portfolio of 3 shares is expected, all other things being equal, to give more diversification benefits than adding the same share to a portfolio of 30 shares). The standard deviation was preferred to the beta since, as shown earlier; the beta of the pairs trading is not statistically different from 0. The excess standard deviation was preferred to the standard deviation of the pairs so that the influence of market conditions does not bias the results. The standard deviation of the gross result was preferred to the standard deviation of net excess returns so as to avoid the effect of the fees, interest, taxes and risk free rate bias on the results. Table 4 shows the key figures of the regression. The parameters were estimated through the method of ordinary least squares (OLS).The regression statistics lead to the conclusion that higher diversification benefits are achievable when pairs are selected amongst a wider number of shares. Portfolios with a higher number of pairs have benefitted highly from the extension of the list of shortable shares.

Table 4. Regression statistics

	5 pairs		10 Pairs		15 Pairs		20 Pairs	
Intercept	-0,1858	*	-0,3549	*	-0,4076	*	-0,4684	*
Coefficient	-0,0301	**	-0,0578	**	-0,0682	**	-0,0794	**
F Stat	5,1771		5,7073		4,7391		5,2161	
p-value	0,0361		0,0288		0,0439		0,0355	
Adj Rsquared	0,1884		0,2073		0,1720		0,1898	
AIC	-107,84		-107,84		-75,14		-71,17	

* Significant at 90% confidence level
** Significant at 95% confidence level

5. Conclusions

We considered a simple pairs trading strategy and included in our model transaction costs, initial margins, interest costs, cash guarantees and limitations to short selling to replicate an effective strategy easily implementable by an individual investor. We found that these restrictions significantly affect the payoffs from pairs trading even though net excess returns remain largely positive for portfolios composed by a not large number of shares. We found evidence that restrictions to the number of shares that are allowed to be shorted have a relevant impact on the risk profile of the strategy. This implies that fewer diversification opportunities can be exploited when the investor has a small number of shares from which to select pairs to trade. Betas for 5 years and 3 years are found to be not statistically different from 0 at the usual confidence level, thus supporting the hypothesis that pairs trading is an equity market neutral investment strategy.

The purpose of this study was not to suggest the optimal (ex-post) equity pairs trading strategy but to determine its profitability for an individual investor who faces effective restrictions to its implementation. A calibration of the variables that influence the results (length of the selection period, subset of equities to pair, the metric to choose the pairs, the entry and exit rules, the length of the trading period, etc.) would have certainly produced better results but it would have been a back-testing exercise.

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