Comparative Economic Research. Central and Eastern Europe
Volume 28, Number 3, 2025
https://doi.org/10.18778/1508-2008.28.20

Evaluating the Suitability of the Simplified Pairs Trading Strategy for Short-term Equity Market Trading

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Abstract

Pairs trading has been a successful tool for traders since its inception in the 1980s and has evolved significantly with the introduction of algorithmic, machine, and AI trading. This evolution has complicated the implementation of this strategy that traditionally benefits institutional or specialized investors. Despite this, the simplicity of pairs trading remains accessible, indicating potential benefits for ordinary traders. By focusing on the strategy's fundamental principles and employing a real-time market test on a popular trading platform, the study aims to reveal its applicability and efficacy for short-term equity trading. Utilizing basic trading platform tools and Excel functions, the research aims to demonstrate a simplified approach to pairs trading. The findings will provide insights into the strategy's effectiveness, providing non-expert traders with a viable approach to navigate today's volatile markets through a simplified yet effective pairs trading model. The experiment's findings highlight varying performances across different stock pairs, with notable differences in volatility. While five out of 11 pairs achieved positive returns, only two met the closure criteria within the short-term horizon, suggesting that a longer trading period and a more diversified pair's portfolio may be necessary to fully capture expected price convergence.

Keywords: pairs trading, market-neutral strategy, investment strategy, short-term equity trading

JEL: G10, G11, G17

Received: 30.05.2024. Verified: 3.03.2025. Accepted: 27.06.2025

Introduction

In financial markets, which are highly dynamic and volatile, investors and traders constantly seek strategies to help them achieve stable profits while minimizing risk. In this context, market-neutral trading strategies, such as pairs trading, open opportunities to seek profit regardless of the overall market movements. Research studies on pairs trading reveal a continuous pursuit to find more efficient pairs trading strategies and methodologies that would allow for higher profitability and lower risk.

The existing literature has predominantly emphasized the development and optimization of advanced pairs trading methodologies, typically characterized by complex statistical analyses and algorithmic implementations suited for institutional investors. However, the effectiveness of pairs trading strategies over short-term horizons remains comparatively underexplored. Furthermore, there is a notable scarcity of studies examining simplified pairs trading methodologies specifically tailored to retail investors' practical needs and constraints. This study addresses these gaps by empirically evaluating a simplified pairs trading strategy designed explicitly for short-term trading conditions commonly encountered by retail investors. Such an approach may offer retail traders rapid trading results, frequent reinvestment opportunities, and increased cumulative profitability achievable through multiple trading cycles within a single year. Unlike previous studies that largely depend on historical backtesting or computationally intensive methods, the novelty of this research lies in the real-time market testing of an accessible and simplified methodology. By emphasizing practicality and accessibility, the paper contributes valuable insights to the existing literature and supports retail traders in navigating today's volatile financial markets.

The problem of the research – is it efficient to apply the simplified pairs trading strategy for short-term trading in stock markets?

The object of the research – the simplified pairs trading strategy.

The aim of the research – to evaluate the suitability of the simplified pairs trading strategy for short-term trading in stock markets.

Tasks of the research:

- to describe the concept and principles of the pairs trading strategy, review the results of research studies conducted by academics;
- to prepare a methodology for testing the simplified short-term pairs trading strategy under real market conditions in stock markets;
- to test the suitability of the simplified pairs trading strategy for short-term trading in stock markets under real market conditions.

Research methods: scientific literature analysis, information systematization, quantitative analysis, correlation analysis.

In this study, the term "simplified" specifically refers to an approach that focuses solely on the fundamental procedures of pairs trading that retail investors can execute without specialized knowledge, substantial computational resources, or advanced analytical tools. Unlike

traditional or algorithmic methods, this simplified strategy intentionally avoids extensive stock selection criteria, such as screening based on market capitalization or historical volatility, to save resources and ensure accessibility. By testing this approach under real-time market conditions using a trading simulator, the study reveals critical insights into market dynamics and potential risks faced by retail investors. While large-scale research typically implies that pairs trading is generally profitable due to built-in diversification, this perception can be misleading for retail investors who trade smaller sets of stock pairs, making them vulnerable to risks and fluctuations often overlooked in studies relying on large historical samples. Thus, real-time testing is essential, accurately highlighting the challenges and risks involved in trading under realistic conditions, enabling practical recommendations for strategy improvement, and offering retail investors a clearer perspective on profitability and effective risk management.

The expected results of the research and their practical benefit include a deeper understanding of the effectiveness of the pairs trading strategy in the context of short-term trading, suggestions on how to optimize the strategy for better results, and a contribution to the existing base of academic research in this field.

This paper is structured as follows: Section 2 contains the theoretical part, which introduces the concept, historical background, and market-neutral principles of pairs trading. It also explores the evolution, phases, methods, and previous research on pairs trading strategies. Section 3 describes the research methodology, detailing the simplified pairs trading approach used for the short-term trading experiment. Section 4 contains the research data and results, outlining the data selected, specific steps followed, and providing analysis of the trading performance. Section 5 contains the conclusion. It summarizes key insights, practical implications, and overall suitability of the simplified strategy while also discussing the limitations of the study's constraints. Finally, there are recommendations for future research, identifying directions for extending and optimizing the pairs trading strategy further.

Theoretical analysis of pairs trading strategy

The concept of the pairs trading strategy

Pairs trading is a market-neutral strategy that involves simultaneously buying and selling two highly correlated stocks to profit from the convergence of their price differences (Brunetti and Luca 2023). The concept of this strategy lies in exploiting the fluctuations in the price ratio or difference between the processes of two stocks. The primary objective is to identify two stocks that have historically exhibited a strong positive correlation but have temporarily diverged due to certain reasons. Temporary fluctuations in demand and supply, individual large buy or sell orders, or reactions to company announcements can create price discrepancies between similar financial instruments. Thus, traders seek opportunities when the price ratio of these stocks deviates from the average, anticipating that the ratio will revert to its historical average, allowing for profit from both positions by buying the "undervalued" stock and selling the "overvalued" stock. The primary goal of pairs trading is to generate stable profits while reducing overall market risk. This is achieved

by diversifying investments and using statistical and mathematical analyses to identify the optimal pair for trading.

This strategy differs from traditional investment methods since the profits depend not on the general direction of the market but on the relative performance of specific financial instruments. This means that even in market downturns, this strategy can yield profits if the ratio of the selected stock pair reverts to its average (Gatev, Goetzmann, and Rouwenhorst 2006). This approach to investing helps mitigate specific market risks and offers traders additional protection. For instance, Keshavarz Haddad and Talebi (2023) discovered that even under extreme market conditions, such as the financial markets crisis triggered by the COVID-19 pandemic, the pairs trading strategy was able to maintain its profitability, thereby confirming its characteristic of market neutrality. The ability of such strategies to shield investments from market fluctuations is especially valuable to investors seeking ways to diversify their portfolios and mitigate the negative impact of macroeconomic events.

Pairs trading can also be regarded as a mechanism to hedge not only against market but also sector-specific risks. During sector crises, when the values of both stocks decrease, pairs trading allows for profit generation from the short position and the offsetting of losses from the long position. This implies that profits can be made even in the face of significant market movements, although they may be minimal. The preserved capital from the short position can be utilized to establish a long-term position in the same sector by buying stocks at a lower price (Tenyakov 2017).

The evolution of the pairs trading strategy

The origins and evolution of the pairs trading strategy are one of the earliest forms of algorithmic trading. Its inception is linked to statistical arbitrage strategies, which are extensively utilized by employees of investment banks and hedge funds (Yu and Xie 2021). One of the first and most widely known instances of pairs trading applications is associated with Morgan Stanley in the 1980s, when a group of analysts, led by Gerry Bamberger, began to widely implement this strategy. Bamberger later shared the results with Nunzio Tartaglia and his team of analysts and mathematicians, who developed a mathematical model that enabled the identification and trading of stock pairs based on their historical price correlation. The strategy was based on the assumption that if two companies operate in a similar industry or sector and their stock prices have historically shown a strong correlation, but this correlation is temporarily disrupted due to certain factors, the price ratio of these stocks should eventually return to its historical norm (Gatev, Goetzmann, and Rouwenhorst 2006).

Initially considered complex and accessible only to institutional investors with advanced computational resources, pairs trading evolved with technological advancements and became available to a broader audience. The internet, trading platforms, and data analysis tools have made this strategy accessible not only to professional traders but also to experienced individual investors.

Today, pairs trading is one of the market-neutral strategies employed across various financial markets globally. It may be applied not only in the stock market but also to a wide range of other

financial instruments. For example, in the bond market, it employs two similar-maturity and risk bonds from different issuers yet with comparable credit ratings; within the Forex market, it involves trading pairs of currencies that might be linked by similar economic indicators or regions, like CAD and SEK, AUD and MYR (a high degree of cointegration has been observed among 39 currency pairs out of 139 global currencies) (Moulya, Mohammadi, and Thathaiah 2019); in the commodities market, the strategy employs pairs of similar commodities, such as two precious metals whose price movements could be correlated, crude oil and gasoline, or sugar and coffee (Mohandas 2023).

In the derivatives market, pairs are formed with diverse derivative instruments, such as futures and options, which may be linked to various underlying assets or market indices. For instance, this can include futures contracts on metals or gold or even futures contracts on cryptocurrencies (Soputro, Imron, and Saiban 2023), illustrating the strategy's adaptability to leverage correlations across a broad spectrum of financial instruments for potential gain (Fernández-Pérez et al. 2020). In the cryptocurrency market, algorithmic pairs trading is commonly employed and usually clusters of cryptocurrencies are traded, enabling trades across multiple digital assets at once (Figà-Talamanca, Focardi, and Patacca 2021).

The phases of pairs trading strategy

In pairs trading, the strategy's execution is divided into two primary phases: the formation period and the trading period. This division facilitates the effective implementation of the pairs trading strategy, ensuring the selection of the most optimal stock pairs and the application of the most effective trading tactics (Diao, Liu, and Zhu 2020).

Stage I – formation period. The formation period involves selecting the stocks and determining the historical stock price interval for analysis based on a predetermined stock pairing strategy. This stage involves analyzing historical data to identify stocks with similar price movement characteristics suitable for pair matching. The main objective is to select stock pairs that historically exhibited a strong correlation level.

Stage II – trading period. The trading period is the interval during which actual trading of selected stock pairs occurs. Strategies implemented at this stage aim to capitalize on changes in the price differences of the stock pairs. The trading strategy involves opening positions when the stock price difference is lower or higher than a certain historically established level and closing positions when the price difference reverts to its average. That means estimating trading signals for the opening and closing of the trading positions (Diao, Liu, and Zhu 2020).

A professional approach to planning and executing these phases ensures stable profitability, reducing risk, and maintaining discipline throughout the trading process. Risk management is critically important in pairs trading, as in any other trading strategy. Traders should establish clear risk management rules, including the maximum allowable loss per trade, overall portfolio risk, and strategies for diversifying trading positions. One risk mitigation measure commonly employed in algorithmic trading is setting predetermined stop-loss and take-profit levels, as well as defining capital allocation (He et al. 2023).

The methods in pairs trading strategy

In implementing the pairs trading strategy, several key methods are distinguished for pair selection and trading signal generation. For instance, pair selection commonly utilizes correlation analysis, cointegration analysis, time series analysis, and the copula method; signal generation uses the distance method, stochastic control, as well as various other complex methods, including machine learning (Keshavarz Haddad and Talebi 2023). Each of these methods offers a unique approach to the development and implementation of pairs trading strategies, allowing traders to utilize comprehensive market data analysis techniques to maximize the efficiency of their trading actions under different scenarios. The main difference between these methods lies in the ways they measure the synergy of stock price movements and the speed they revert to the mean. All strategies are based on the assumption that the price difference follows a mean reversion model, where any deviation from long-term equilibrium will be corrected unless the relationship between the two stocks changes and a new equilibrium level of price difference is established (Keshavarz Haddad and Talebi 2023).

Researchers are also combining various methods to create complex approaches aimed at optimizing pairs trading algorithms. For instance, one of the latest ideas involves expanding from a "one-to-one" pairs trading model (which involves two stocks in a pair) to a "many-to-many" pairs trading approach (using clusters of stocks) by utilizing clustering methods. Experimental results indicate that this trading model provides more trading opportunities compared to the traditional pairs trading model (Wang et al. 2023). Various adapted methods and complex approaches employed by researchers will be discussed in Section 2.5. The descriptions of several classic methods are presented below.

The methods of stock pair formation

Correlation. Correlation is a mathematical indicator that reflects how the price movement of one security is related to another. In pairs trading, determining the correlation coefficient between two stocks helps to identify those whose price movements are interrelated. The correlation coefficient ranges from –1 to 1, where –1 indicates a perfect negative correlation, 0 indicates no correlation, and 1 indicates a perfect positive correlation. Pairs trading seeks a high positive correlation between two stocks, suggesting that their prices move similarly. Ideal pairs for pairs trading should historically exhibit a high positive correlation, typically above 0.8 (Liew and Wu 2013).

Cointegration. Unlike correlation, cointegration suggests that despite short-term price fluctuations, the price difference between two stocks eventually reverts to its mean value. This allows traders to identify pairs that, despite temporary divergences, are expected to converge over time, offering profitable trading opportunities. The cointegration method is implemented using regression analysis and vector autoregression models to establish a long-term relationship between the price movements of two stocks, as well as cointegration tests (e.g., Dickey-Fuller test or Johansen's cointegration testing procedure, when determining more than one cointegration event) (Huck and Afawubo 2015; Tadi and Witzany 2023). The application of cointegration tests in pair selection has undoubtedly received significant attention due to its advantage in terms of profitability

(Brunetti and Luca 2023). However, according to Huck and Afawubo (2015), applying the cointegration method to large datasets carries a significant computational burden. For instance, a dataset of 500 assets would require conducting 124,750 cointegration tests to identify all pairs potentially suitable for trading. To overcome this obstacle, they limited their empirical work to cointegration analysis on a pre-selected set of assets based on the determination of the correlation coefficient (Huck and Afawubo 2015). Of course, algorithmic trading and the application of artificial intelligence (AI) can significantly enhance efficiency in large-scale data analysis, including cointegration tests and, theoretically, they could help address the computational burden issue. However, it is essential to consider the associated technological, methodological, and infrastructural costs.

The copula method. In pairs trading, this method represents an innovative strategy for determining the interrelationship of returns between two stocks using an optimal copula. This method facilitates the identification of the relative position of stock pairs based on the statistical dependence between the stocks. The primary goal of the strategy is to ascertain how the return of one stock is related to the return of another and apply this knowledge in trading to profit from stock price movements (Krauss 2015).

The time series analysis method. This method is a multifaceted analysis that encompasses various aspects, including correlation, cointegration, volatility, potential return, and risk assessment. It is particularly valuable because it goes beyond merely monitoring one or a few parameters, evaluating a wide range of variables that could influence trading decisions. Time series analysis is an effective tool for selecting stock pairs in pairs trading, as it reveals and examines stock price behavior over time. Based on the analysis of historical price data sequences, it aims to identify specific patterns, trends, and possible directions of price movement. By employing time series analysis, the behavior of stock pairs under various market conditions can be thoroughly analyzed, assessing their mutual correlation and cointegration and predicting the potential volatility of the stock pairs. Traders gain valuable insights into risk levels and potential returns using this strategy, typically implementing it using various statistical models and machine learning algorithms.

Divergence. Generation of trading signals

Divergence arises when the price ratio of strongly correlated securities deviates from their usual behavior, providing traders with an opportunity to enter the trade. It is crucial to understand and correctly interpret divergence as a signal for buying or selling (Keshavarz Haddad and Talebi 2023).

Figure 1 abstractly illustrates the essence of the pairs trading strategy. It shows two lines, A and B, which reflect the price changes of two stocks over time. At the green point, where lines A and B are furthest apart, the investor initiates positions: selling stock B (opens a "short" position) and buying stock A (opens a "long" position). The investor anticipates and expects that the price of stock B will decrease relative to A, and the price of stock A will increase relative to B. Positions are closed at the red point, where the price ratio of both stocks intersects again, indicating that the ratio has returned to its previous level or historical average. At this point, the investor closes both positions, hoping to profit from the price ratio returning to the mean (Keshavarz Haddad and Talebi 2023).

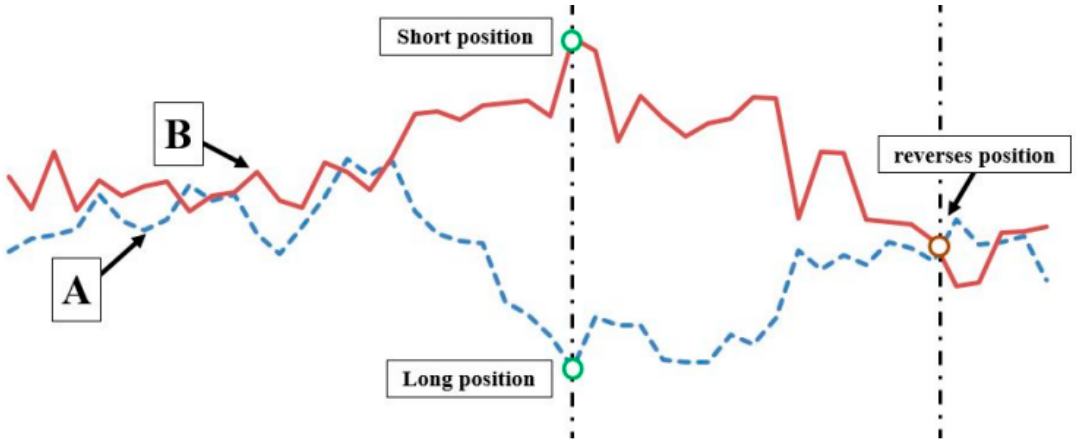

Figure 1. Graphical representation of taking positions in pairs trading strategy
Source: Keshavarz Haddad and Talebi, 2023.

It is important to note that Figure 1 depicts normalized stock prices rather than the individual prices of stocks. This provides a clearer view of the changes in the price ratio of two stocks over time, as normalization reduces the impact of different price scales, making it easier to compare stocks that may have very different starting prices.

Generation of trading signals. Trading signals are essential for effective pairs trading management. These signals can be identified using technical analysis based on charts, trend lines, and technical indicators, as well as mathematical methods – various divergence measurements, with one of the simplest being the distance method, where the price ratio of stocks exceeds the average by two or more standard deviations.

The classic distance method, as thoroughly outlined by Gatev, Goetzmann, and Rouwenhorst (2006), represents a pivotal approach in pairs trading strategies. This method signals the initiation of a trade when the relationship between the prices of two stocks diverges beyond two historical standard deviations.

Another commonly employed method for generating trading signals in pairs trading is the stochastic method. It helps identify "oversold" or "overbought" assets based on their price movement speed and direction over a specific period. In pairs trading, it can be applied to individual assets to identify potential trade entry and exit points when two assets' prices deviate from their usual correlation or cointegration relationship. The stochastic method relies on probabilistic processes, utilizing mathematical and statistical theories to define and predict the behavior of random events, such as stock prices, over time. The core idea of this method is based on the Ornstein-Uhlenbeck process (Lee, Leung, and Ning 2023).

The particularly straightforward price-to-price ratio method involves establishing the ratios of two correlating assets' prices over a chosen period. Then, on a trading day, if this ratio significantly exceeds the average (e.g., by 10–20%), the more expensive stock is sold, and the cheaper is bought; if the price ratio is below average, then the more expensive is bought, and the cheaper is sold. It is crucial to define how much the current ratio exceeds the average – this requires assessing the average's fluctuation range throughout the period. The end-of-trade signal is typically determined when the price difference reverts to its historical average value or reaches a predetermined profit level.

Machine learning and artificial intelligence. Various machine learning techniques, such as artificial neural networks, random forest algorithms, and support vector machines, can be applied to both pair selection and trading signal generation by learning from historical data and identifying complex patterns and relationships between assets. These advanced methods can help traders in pairs trading to more efficiently identify trading opportunities, enhance the profitability of the strategy, and reduce risk. Hedge funds actively employ these technologies for pairs trading (Wang et al. 2023).

Review of pairs trading strategies analyzed and tested by researchers

Researchers and practitioners are continually exploring ways to enhance and optimize the efficiency of pairs trading strategies through various methodologies and analyses. In this section, we will comprehensively review the studies that examine various aspects of pairs trading strategies. We will highlight the methods applied, the conclusions drawn, and the insights provided by researchers regarding the effectiveness of their strategies and the challenges encountered.

One of the earliest studies to examine the long-term success of pairs trading was conducted in 2006 by Evan Gatev, William N. Goetzmann, and K. Geert Rouwenhorst, who decided to explore a strategy often employed on Wall Street, where pairs of historically correlated stocks could offer profitable trading opportunities when their price ratio deviates from the norm. They paired stocks based on the minimal distance between their normalized historical prices from 1962 to 2002. A trading signal was established when the price ratio of a stock pair deviated by 4.76% or more from its historical average, a percentage considered a relatively narrow price difference. This threshold also matched the two-standard deviation signal used in the study for opening pairs' positions. Positions were closed to capture profits when the ratio returned to its average value. They concluded that the pairs trading strategy could generate significant profits, with average annual returns of up to 11%. It was also found that the effectiveness of trading strategies could vary based on factors such as bid-ask spread, significant fees for short positions, company size, and stock type (growth vs. value stocks).

On average, trades were initiated with almost all selected pairs within a six-month trading period, and the average duration of an open position was 3.75 months, suggesting that, as per the rules chosen for this study, pairs trading is suitable as a medium-term investment strategy. It is also noteworthy that despite current recommendations for pairs trading to select stocks from the same industry sectors, Gatev, Goetzmann, and Rouwenhorst (2006) demonstrated profitability even with pairs from different sectors. They paired stocks from computer firms with steel industry companies and utility companies with banks and still achieved positive returns. This indicates that pairs trading can be profitable across each broad sector category, not limited to a specific narrow sector.

Caneo and Kristjanpoller (2020) published a study notable for its analysis of pairs trading over a relatively long period. They examined the profitability of pairs trading strategies in Latin American stock markets, utilizing a multicriteria evaluation method. The methodology was applied across six Latin American countries, testing trades with a total of 338 stocks between 2013 and 2017. They revealed that this strategy outperformed the markets' Sharpe ratio by

an average of 1.55 points. Furthermore, correlation analysis showed that the stock pairs moved in conjunction with the market, while the number of dominating components was inversely related to market volatility. This finding once again highlights the uniqueness of the pairs trading strategy as a market-neutral strategy (Caneo and Kristjanpoller 2020).

Miao and Laws (2016) also analyzed the profitability of pairs trading strategies across various countries. They investigated whether pairs trading yields consistent results through periods of stock market growth and decline, including recent market shocks experienced in the countries studied. The findings indicated that in most countries, this strategy produces positive returns, even during downturns. The pairs trading strategy yielded positive returns even when transaction costs were considered, though returns significantly decreased with higher transaction costs. They also found that the return correlation between pairs trading portfolios and the respective stock market indices is low, confirming its role as an effective diversification tool for traditional long-term investment portfolios (Miao and Laws 2016).

In 2023, Keshavarz Haddad and Talebi investigated the profitability of the pairs trading strategy using data from stocks listed on the Toronto Stock Exchange (TSX). The objective was to create portfolios of stock pairs, explore their price relationships, and compare the efficacy of cointegration and copula method as pair selection tools. The researchers managed three portfolios consisting of five, ten, and twenty stock pairs, thereby distributing risk. They implemented the pairs trading strategy over three consecutive half-year periods: from January to June 2018, January to June 2019, and January to June 2020. The results indicated that the copula method consistently outperformed the cointegration method in terms of profitability across all three analyzed periods (Keshavarz Haddad and Talebi 2023). Interestingly, this study encompassed two unique periods before and after the COVID-19 pandemic, yet it was found that the financial market crisis triggered by the pandemic did not affect the methodologies' effectiveness. Thus, the results of this study affirm that the pairs trading strategy indeed operates as a market-neutral strategy.

In 2023, Sahu et al. analyzed historical prices over a four-year period and selected pairs of stocks from 10 different sectors, each with a Pearson correlation coefficient exceeding 0.5. The sectors analyzed included the automotive industry, information technologies, public enterprises, banking, consumer goods (FMCG), media, metal, oil and gas, and pharmaceuticals. From each sector, ten leading stocks were selected based on market capitalization. While most stock pairs showed positive investment returns, some exhibited negative returns. The metal sector, for example, had several pairs with negative returns. Four areas – oil and gas, pharmaceuticals, media, and information technology – distinctly featured positive return indicators. In order to select the most suitable stock pairs for the study, Sahu et al. applied the cointegration method. However, it was observed that even cointegrated stock pairs could experience negative returns, further confirming the unpredictability of the stock market. The study also revealed that the number of trading signals was limited, offering, on average, one investment opportunity per month.

In 2020, Wu et al. examined the performance of pairs trading strategy based on a specific differential model. The distinctiveness of this research lies in the implementation of the pairs trading strategy using a Lévy-driven Ornstein-Uhlenbeck (OU) process with two-sided jumps,

considering empirical evidence of mean reversion and jumps between the differences in stock pairs. Jumps, modeled using Lévy processes, account for rare but significant market or price changes, such as crises or speculative bubbles. The Lévy-driven OU process is a stochastic process commonly used in financial mathematics to model the dynamics of certain random quantities like stock prices and is a modification of the classic OU process (Wu, Zang, and Zhao 2020).

Lee and Leung (2020) investigated how an optimized position-closing rule impacts pairs trading. They optimized the positions of each asset pair to maximize daily portfolio value adjustment to the OU process, based on the maximum likelihood estimation. Analyzing various asset pairs, they assessed pairs trading strategies with and without the application of the optimized exit rule, evaluating their risks and returns. The study provided empirical evidence that applying optimized trading exit rules enhances the profitability of transactions and reduces turnover.

Diao, Liu, and Zhu (2020) also examined the strategy of an optimized exit rule from trading to enhance the profitability of the strategy. They utilized convex quadratic programming with quadratic constraints (the BQQ model) and analyzed various asset pairs, optimizing positions according to the OU process. The results demonstrated that applying the BQQ model could achieve a higher return rate compared to the traditional pairs trading strategy.

Platania et al. (2023) introduced an innovative study focusing on the application of neural networks in pairs trading. Neural networks are particularly effective at incorporating and analyzing dynamic and nonlinear relationships influenced by numerous factors. As a result, they can identify patterns that may be overlooked using traditional statistical techniques. Given that neural networks have the ability to learn from historical data and adjust their internal parameters accordingly, they can be trained to recognize complex patterns and market dynamics, making them well-suited for predicting trading signals. Once trained, the network can process real-time market data and generate signals indicating optimal buying or selling decisions. The researchers presented a comprehensive multi-dimensional study of the pairs trading strategy, utilizing multi-objective programming and neural networks to optimize the performance of the trading strategy. By incorporating multiple objectives, including maximizing returns and minimizing risk, the multi-objective programming system allowed the researchers to explore various optimal trading options.

In 2023, He et al. investigated three different pairs trading strategies: the conventional linear method, the copula method, and a machine learning technique method, trading two stock indices: Russell 2000 (RUT) and S&P400 (SP400). The primary evaluation criteria were the cumulative returns and Sharpe ratio of each strategy, which were later compared to a long-term investment strategy ("buy and hold") and the overall market return. They demonstrated the durability of pairs trading as a market-neutral strategy using conventional and copula models, which showed consistent and increasing return growth. A more advanced machine learning model was also tested, which confirmed potential profitability and stability in the pairs trading strategy. The only limitation of the study mentioned by He et al. was the overly strict criteria for pair selection, recommending further research with a larger dataset to identify pairs generating potentially higher returns. Consistent with previous research, He et al. emphasized that financial

companies often applied pairs trading due to its stability or profitability. Moreover, during recessions, such as the COVID-19 pandemic period, the cumulative return of pairs trading surpassed the conventional buy-and-hold strategy and even the market.

Overall, the research on pairs trading reveals a continuous effort to find more efficient strategies and methodologies to produce higher profitability and lower risk. And it is possible to identify common trends in the research – the copula method is one of the most effective for pair selection, the cointegration tests increase the probability of selecting more suitable pairs, multi-criteria data evaluation methods have advantages, and machine learning offers opportunities to use complex methods that optimize trading. However, none of these methods can be applied by single retail investors who don't have access to such tools and strategies. Thus, our study examines a simplified pairs trading strategy that emphasizes accessibility for retail investors without requiring advanced technical knowledge or algorithmic models.

Research methodology

In this section, we describe the methodology of the simplified short-term pairs trading strategy for real-time market tests on a popular trading platform.

General guidelines

Trading time horizon. Short-term trading involves strategies that take advantage of market price fluctuations over a relatively short period. The five-week period we set for this study to analyze pairs trading allowed us to identify and exploit short-term price fluctuations between highly correlated stocks, hoping that positions would return to their historical average, enabling profit from these fluctuations.

The trading horizon of five weeks was selected based on evidence in the existing literature on pairs trading, particularly regarding the typical duration for mean reversion among correlated stocks. Prior studies suggest that the time needed for stock pairs to revert to their historical mean price ratio ranges significantly – from as short as one week to several months. Engelberg, Gao, and Jagannathan (2009) demonstrated that after divergence, most stock pairs tend to converge relatively quickly, frequently within approximately eight trading days, indicating that shorter periods can effectively capture mean-reversion profits. Their findings also highlight that if pairs do not revert within the first week, the probability of subsequent convergence declines significantly, although some convergence may still occur over longer durations, albeit with increased risk.

Supporting shorter horizons, Schizas, Thomakos, and Wang (2011) found that roughly 50% of stock pairs reverted within about 40 trading days, while Broussard and Vaihekoski (2012) observed profitable results averaging around 5% monthly, further supporting short-term effectiveness. Similarly, Jacobs and Weber (2015) indicated an average holding period for pairs of about one month, and Buda (2011) underscored significant short-term fluctuations in correlations occurring within 20 trading days, potentially exploitable by investors. Conversely, some researchers, such as Gatev, Goetzmann, and Rouwenhorst (2006), have noted average position-holding periods extending up to three months.

Nevertheless, a notable gap remains in the literature specifically exploring intermediate periods such as one to two months, making the chosen timeframe particularly relevant. Considering this evidence, a five-week trading horizon was chosen as optimal, balancing the potential for capitalizing on short-term price deviations with adequate time allowance for convergence, thus aiming to optimize returns while minimizing systematic market and sector-specific risks.

Allocation of investment funds. An equal amount of money was allocated to each position to ensure positions were balanced, allowing for a more accurate evaluation of data testing.

The choice of trading platform. During the trading period, positions were opened under real-time market conditions on a trading platform, specifically a real-time trading simulator. A reliable trading simulation platform was selected, capable of modelling pairs trading, including order execution, position management, and risk management. Data on all executed transactions, including entry and exit prices, profit or loss, and the duration of positions, were collected during the trading simulation.

Phase I – formation period

Step 1 – selection of stocks for analysis. To ensure diversification and reduce the risk associated with a specific sector, the stocks were selected randomly from seven different economic sectors, avoiding extensive stock selection criteria, such as screening based on market capitalization or historical volatility, to save resources and ensure accessibility. Although different researchers have employed varying industry classifications to choose stocks, there is no fundamental reason to prioritize one sector over another. The critical consideration is to select stocks from industries or business areas whose companies exhibit similar reactions to market conditions, resulting in historically correlated price movements. Consequently, any sector that meets this condition could be suitable for pairs trading, and thus, the particular sectors included in this study were selected randomly rather than based on perceived suitability. In each sector, ten stocks were chosen, all from the two leading exchanges: NYSE and Nasdaq. These exchanges were chosen for their liquidity, accessibility, and diversity of stocks.

Step 2 – collection of historical stock prices. Daily closing price data of the selected stocks covering a three-month period was obtained from publicly available financial data sources, such as "Yahoo Finance" (Yahoo Finance, 2024). For testing short-term strategies, historical daily price data for three months provided relevant information on market movements and stock price correlation. The data were obtained in the following way: the data were exported from "Yahoo Finance" to MS Excel and were then prepared in a suitable format for further processing.

Step 3 – calculation of the correlation coefficients. The correlation coefficient between the prices of the stocks in the same industry branches/business sectors was calculated, and correlation matrices were created, allowing for a visual assessment of which stock pairs had a strong positive correlation. The correlation data were evaluated to select stock pairs that were potentially suitable for strategy implementation. Stock pairs with a correlation coefficient exceeding 0.8 were selected for the experiment. The following equation was used to calculate the correlation (Vakrina 2007):

$$r = \frac{\Sigma\left(X_i - \bar{X}\right)\left(Y_i - \bar{Y}\right)}{\sqrt{\Sigma\left(X_i - \bar{X}\right)^2 \Sigma\left(Y_i - \bar{Y}\right)^2}}, \tag{1}$$

where: r – the correlation coefficient between two stock prices, indicating how strongly the prices of the two stocks move in relation to each other; X_i – the price of stock X at time i within the specific period; Y_i – the price of stock Y at time i within the specific period; $\bar{X}$ and $\bar{Y}$ – the average prices of stock X and Y correspondingly over the specific period. The following equations were used to calculate $\bar{X}$ and $\bar{Y}$

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i, \tag{2}$$

$$\bar{Y} = \frac{1}{n}\sum_{i=1}^{n} Y_i, \tag{3}$$

where: $\bar{X}$ and $\bar{Y}$ – the average prices of stock X and Y, respectively, over the specific period; X_i – the price of stock X at time i within the specific period; Y_i – the price of stock Y at time i within the specific period; n – the total number of observations for stock X and Y, respectively.

While this study focuses on a manual approach to pairs trading, there are websites that allow users to easily determine historical correlations between selected stocks.

Phase II – trading period

Step 1 – Trade signal generation and position opening. For the generation of the trade signal, we relied on the classical two standard deviations method. According to this method, if the price ratio of a stock pair deviated from the average by more than two standard deviations, it was treated as a trading opportunity – as a signal for trading.

In this step, we performed several actions:

a) We calculated the price ratio of each selected stock pair for every day of the historical period according to the formula:

$$PR_{xy} = X_i / Y_i, \tag{4}$$

where: PR_{xy} – the price ratio of the stock pair being analyzed, with x and y representing the two different stocks; X_i – the price of stock X at time i within the specific period; Y_i – the price of stock Y at time i within the specific period; $X > Y$ (the numerator and the denominators here are determined according to which price is higher on the day before the first trading date).

b) We calculated the daily deviation of each stock pair's ratio from the average using the formula:

$$D_i = PR_{xy_i} - \frac{1}{n}\sum_{i=1}^{n} PR_{xy_i}, \tag{5}$$

where: D_i – the deviation of the price ratio on day i from the average price ratio; PR_{xy_i} – the price ratio of the stock pair on day i; n – the total number of observations within the selected period.

c) We calculated the standard deviation for each stock pair using the formula (Vakrina 2007):

$$\sigma = \sqrt{\sum_{i=1}^{n} D_i^2 \mathbb{I}(n-1)}, \tag{6}$$

where: σ – the standard deviation of the price ratios over the period; D_i – the deviation of the price ratio on day i from the average price ratio; n – the total number of observations within the selected period.

d) We calculated how many standard deviations the last day's (before the trading period) stock ratio deviated from the average. This was done by dividing the ratio's deviation from the average by the standard deviation using the formula (compiled by the authors according to Gatev, Goetzmann, and Rouwenhorst (2006) method):

$$Z = D_{last} / \sigma, \tag{7}$$

where: Z – the number of standard deviations the last day's stock price ratio of each stock in the pair deviated from the mean; D_{last} – the deviation of the stock pair's price ratio from the mean on the last day; σ – the standard deviation of the price ratios over the period;

If the resulting value of Z was greater than 2 or less than –2 (i.e., the deviation was greater than two standard deviations), it was considered to be a signal to open a position. If the value was more than 2, the stock with the higher price was sold (a "short" position was opened), and the stock with the lower price was bought (a "long" position was opened). If it was less than –2, then the stock with the higher price was bought (a "long" position was opened), and the stock with the lower price was sold (a "short" position was opened).

Step 2 – evaluation of trading results and position closing. During the trading simulation, data were collected on all executed transactions, including entry and exit prices, as well as the duration of the positions. The return of each stock position was calculated using the formula:

$$Ret = (P_{t+1} - P_t) / P_t, \tag{8}$$

where: Ret – is the return on the investment; P_{t+1} – the value of the investment at the end of the period; P_t – the initial value of the investment.

The return for each stock pair, as well as for the cluster of stock pairs, was calculated using the formula (Zivot 2015):

$$Ret_{total} = \frac{1}{n}\sum_{i=1}^{n} Ret_i, \quad (9)$$

where: Ret_{total} – the total return of the stock pair or of the set of all pairs; Ret_i – the return of the i-th position; n – the number of pairs for which the return is calculated.

Positions were planned to be closed when the return reached 0.07 or higher, or –0.11 or lower. This setup introduces an asymmetrical risk-to-reward ratio, where the potential loss exceeds the potential gain. The rationale behind this allows for short-term adverse movements in the price spread while anticipating a longer-term convergence.

Research results

General guidelines

Trading time horizon. According to the methodology, a five-week term was chosen for the experiment. All positions were opened on February 20, 2024, and the trading results were observed until March 26, 2024. The return was calculated twice a week. The positions were closed hypothetically but remained open in the trading simulator for further observation since the testing was conducted under real-time market conditions within the simulator.

Allocation of investment funds. Equal amounts of money were allocated to each position – $100 per position – to ensure the positions were balanced and to allow for a more accurate assessment of data testing.

Platform choice for trading. The eToro platform was chosen for its user-friendly interface and extensive selection of securities. It is a reliable trading simulation platform that enables accurate modeling of pairs trading, including order execution, position management, and risk management under real-time market conditions. A very important feature of the platform is the ability to simultaneously open both buy and sell positions for the same stock, as well as the ability to purchase fractions of stocks, giving us the opportunity to allocate $100 for each stock position.

Phase I – formation period

Step 1 – selection of stocks for analysis. The list of the stocks selected for the analysis is presented in Appendix 1.

Step 2 – collection of historical stock prices. Daily closing price data of the selected stocks covering the period from November 17, 2023, to February 19, 2024, were exported from "Yahoo Finance" to MS Excel for further processing (Yahoo Finance, 2024).

Step 3 – calculation of the correlation coefficients. The correlation coefficients were calculated for the stocks that corresponded to each selected sector. For the correlation analysis, historical stock prices were used, covering the period from November 17, 2023, to February 19, 2024. Stock pairs with a correlation coefficient that exceeded the 0.8 threshold – indicating a strong mutual relationship – were selected for further investigation. In total, 45 stock pairs were selected.

Phase II – trading period

Step 1 – Trade signals generation and position opening. Based on the research methodology, the following calculations were performed for each selected stock pair: the daily price ratio of the historical period was calculated, the daily deviation of this ratio from its average was calculated, and the standard deviation was calculated. Additionally, it was determined how many standard deviations the last day's (before the trading period) stock ratio deviated from its average. The trading signals were identified for the following pairs (results of calculated trading signals according to **Section 3, Phase II Step 1, action d** are presented in brackets).

- Non-energy metals and Online software applications: no trading signals.
- Finance sector: JPM/IBKR (–2.5), MS/WFC (–2.55), GS/WFC (–2.59), GS/JPM (–2.03).
- Automobiles industry: REVG/F (3.45), GM/REVG (–3.19).
- Apparel and retail trading: RL/TGT (2.61), ANF/TJX (2.14), LR/ LEVI (2.37).
- Health industry: HCA/AZTA (2.19).
- Restaurants, food service networks: SHAK/EAT (4.21), SHAK/FWRG (2.82), SHAK/SG (3.73).

The stock pairs REVG/F and GM/REVG were eliminated from the study because the option to open a "short" position was deactivated on the trading platform. In total, 11 pairs were selected for the study.

Step 2 – evaluation of trading results and position closing. During the trading period, the trading results were observed and based on the methodology, the return was calculated twice a week. The return on each observation date is presented in Table 1. All service costs were included in the bid-ask spread, and at the time of the experiment, no additional commissions were applied on eToro. Thus, trading costs, specifically bid-ask spreads, were integrated directly into the recorded entry and exit prices. Therefore, all reported profitability figures already reflect net returns after transaction costs. The applied average bid-ask spreads correspond to realistic market conditions, as identified in prior research, where transaction costs typically range from 0.2% (Broussard and Vaihekoski 2012) to 1% per transaction (Mashele, Terblanche, and Venter 2013). Consistent with existing findings (Gatev, Goetzmann, and Rouwenhorst 2006; Bowen and Hutchinson 2016; Miao and Laws 2016), our results confirm that transaction costs are crucial for accurately evaluating pairs trading profitability.

We summarize the results from the experiment below.

Table 1. Returns on each pair of stocks observed on the specific dates

Pairs of stocks	Return on 2024-02-23	Return on 2024-02-27	Return on 2024-03-01	Return on 2024-03-05	Return on 2024-03-08	Return on 2024-03-12	Return on 2024-03-15	Return on 2024-03-19	Return on 2024-03-22	Return on 2024-03-26
MS/WFC	–0.02	–0.04	–0.03	–0.03	–0.05	–0.06	–0.05	–0.04	–0.02	–0.02
JPM/IBKR	0.00	0.00	–0.02	0.00	0.01	0.01	0.01	0.02	0.03	0.02
GS/WFC	–0.02	–0.02	–0.03	–0.04	–0.05	–0.05	–0.06	–0.05	–0.03	–0.02

Pairs of stocks	Return on 2024-02-23	Return on 2024-02-27	Return on 2024-03-01	Return on 2024-03-05	Return on 2024-03-08	Return on 2024-03-12	Return on 2024-03-15	Return on 2024-03-19	Return on 2024-03-22	Return on 2024-03-26
GS/JPM	0.00	0.00	–0.01	–0.02	–0.02	–0.02	–0.03	–0.03	–0.02	*–0.02*
RL/TGT	–0.03	–0.01	0.00	0.05	***0.07***					
ANF/TJX	–0.01	–0.01	–0.05	–0.09	–0.01	–0.01	–0.01	–0.04	–0.06	*0.00*
RL/LEVI	–0.02	0.00	–0.01	0.00	0.01	0.01	0.00	0.01	–0.01	*0.01*
HCA/AZTA	–0.02	0.00	0.02	0.00	–0.02	–0.02	–0.06	–0.08	–0.07	*–0.07*
SHAK/EAT	0.01	0.00	–0.03	0.02	0.02	0.02	0.00	–0.02	–0.05	*0.01*
SHAK/FWRG	–0.01	–0.01	–0.03	–0.01	–0.02	–0.02	–0.03	–0.05	–0.07	*–0.03*
SHAK/SG	–0.02	0.00	***0.13***							

Sources: compiled by the authors.

Varying performance across pairs: the returns for each pair fluctuate across the dates, with some pairs showing more stability and others displaying significant swings. JPM/IBKR and GS/WFC appear to have more consistent performances, while SHAK/SG shows a more volatile pattern. Although five out of the eleven pairs achieved positive returns by March 26, the best result was largely driven by an extreme price movement involving the SHAK/SG pair. Specifically, between February 23 and March 1, 2024, the SHAK/SG pair generated a notable 13% return primarily due to the stock price surge of Sweet Green (SG). This rapid increase occurred following Sweet Green's quarterly earnings announcement, which significantly exceeded market expectations and included an optimistic revenue forecast for 2024, alongside plans for new restaurant openings (Hurťák 2024).

Such substantial price movements highlight the importance of diversifying the portfolio by increasing the number of stock pairs. This is because unfavorable movements can occur at any time. Diversification can mitigate the risk associated with extreme price movements affecting individual pairs, thereby distributing potential gains or losses more evenly across the entire portfolio.

Profitability thresholds: there are instances where the return on investment reaches or exceeds the 0.07 threshold, such as SHAK/SG on 2024-03-01, and RL/TGT on 2024-03-08, suggesting that setting a profit closure at +7% could be a reasonable target for this strategy under certain conditions.

Loss thresholds: reviewing the data, the returns do not reach a –0.11 loss on any given day. The closest is a –0.09 (or –9%) loss, suggesting that the market did not move unfavorably enough to reach the –11% loss threshold according to the strategy parameters. Consequently, positions had more room to move without being prematurely stopped out. The conservative threshold prevented early exits, allowing for potential recovery in the pairs' spread. This approach can be beneficial in avoiding significant losses, provided that the pairs eventually revert to the mean.

The fact that only two out of the eleven positions reached the closure threshold within the five-week trading period suggests that the short-term horizon may need to be extended. This longer duration could provide the pairs with additional time to converge or diverge sufficiently to meet the profit or loss thresholds. While short-term horizons can capture quick mean reversions, this particular set of trades indicates that the chosen pairs may require a longer period to realize the expected returns or to hit the stop-loss conditions. Adjusting the time horizon could potentially improve the chances of more positions reaching the closure criteria, assuming that the underlying assumptions about the pairs' correlations remain valid over the extended period.

In the simulated environment of this experiment, the impact of dividend payments on short positions was not considered, as the focus was on price movements and spread convergence. However, it is important to highlight that in a real-world application, special attention must be given to dividend-paying stocks when shorting. Shorting dividend stocks prior to the ex-dividend date, if the positions remain open through the dividend payment day, will result in the dividend amount being charged from the trader's account, thereby diminishing potential profits.

Conclusions

After analyzing various pairs trading strategies described in the scientific literature, it is evident that there is no single universally best method – effectiveness depends on market conditions, data quality, and the trader's ability to apply complex analyses. While more sophisticated methods may offer better understanding and greater accuracy, non-professional traders can still apply basic methods and benefit from this market-neutral strategy. Thus, this study employs a fundamental pairs trading method with trade signals determined by the two-standard deviation rule, focusing on its core principles to evaluate the strategy's effectiveness for short-term equity market trading. The goal is to offer non-expert traders a practical approach to navigating today's volatile markets.

The study included a formation period during which highly correlating stocks were selected and a trading period during which trading signals were calculated and trades were executed. The methodology introduced an asymmetrical risk-to-reward ratio, where positions are set to close upon achieving a 0.07 or higher return in a stock pair or a –0.11 or lower return. This allowed more room for the trades to move against the position in the short term in anticipation of long-term price convergence.

The experiment's findings highlight varying performances in pairs trading, with different pairs showing varying levels of volatility. Instances where returns exceeded the +7% profit threshold validated the potential of this target. However, the limited number of positions (only two out of the 11) that met the closure criteria within the short-term horizon suggests the need for a longer trading period to capture the expected convergence of price spreads and a more diversified portfolio of pairs.

The experiment also suggests that employing the strategy for a cluster of stock pairs, rather than individual pairs, could yield promising results. This is concluded by the observed total return of 4% across all 11 pairs if the pairs were traded as a unified cluster (see Appendix 1).

Research limitations

The study is limited by the specific market conditions during the testing period. Future research should explore different market environments to further validate the findings.

Recommendations for future research

We recommend additional research to clarify whether the described simplified method would be justified for a medium or long-term strategy. Future research should also further validate these findings across varied market conditions. We also recommend conducting additional research applying the described simplified pairs trading method to trading with clusters of stock pairs. By spreading exposure across multiple pairs within the same cluster, the strategy may reduce the impact of adverse movements in any single pair, thereby stabilizing overall returns. This diversification could be beneficial when dealing with the short-term volatility observed in individual stocks. Setting a cumulative profit target for all open pairs, rather than individual targets, could facilitate faster realization of overall profit goals. Closing all trades when the aggregate profit target is reached simplifies the exit strategy. It avoids the need to continuously monitor individual pairs for convergence, potentially saving time and reducing execution delay.

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Appendix 1

Table 1. The list of the stocks selected for the analysis

Sector	Company
Non-energy metals	Southern Copper Corporation (SCCO), MP Materials Corp. (MP), Hecla Mining Company (HL), Newmont Corporation (NEM), Rio Tinto Group (RIO), Franco-Nevada Corporation (FNV), Agnico Eagle Mines Limited (AEM), Commercial Metals Company (CMC), Martin Marietta Materials, Inc. (MLM), Ternium S.A. (TX).
Finance sector	JPMorgan Chase & Co. (JPM), Bank of America Corporation (BAC), Morgan Stanley (MS), The Goldman Sachs Group (GS), HDFC Bank Limited (HDB), ICICI Bank Limited (IBN), Barclays PLC (BCS), Interactive Brokers Group (IBKR), UBS Group AG (UBS), Wells Fargo & Co (WFC).
Automobiles industry	Ford Motor Company (F), General Motors Company (GM), Mullen Automotive, Inc. (MULN), Tesla, Inc. (TSLA), Rivian Automotive, Inc. (RIVN), Stellantis N.V. (STLA), Toyota Motor Corporation (TM), REV Group, Inc. (REVG), Blue Bird Corporation (BLBD), Ferrari N.V. (RACE).
Apparel and retail trading	NIKE, Inc. (NKE), Target Corporation (TGT), TJX Companies, Inc. (TJX), Levi Strauss & Co. (LEVI), Deckers Outdoor Corporation (DECK), Estée Lauder Companies Inc. (EL), Abercrombie & Fitch Co. (ANF), Under Armour (UA), Ralph Lauren Corporation (RL), The Gap, Inc. (GPS).
Health care	Medpace Holdings, Inc. (MEDP), Option Care Health, Inc. (OPCH), Teladoc Health, Inc. (TDOC), Amedisys, Inc. (AMED), Azenta, Inc. (AZTA), Community Health Systems, Inc. (CYH), HCA Healthcare, Inc. (HCA), Laboratory Corporation of America Holdings (LH), Elevance Health, Inc. (ELV), Alkermes plc (ALKS).
Restaurants and food service	McDonald's Corporation (MCD), Yum! Brands, Inc. (YUM), Shake Shack, Inc. (SHAK), Brinker International, Inc. (EAT), Kura Sushi USA, Inc. (KRUS), First Watch Restaurant Group, Inc. (FWRG), Papa John's International, Inc. (PZZA), Sweetgreen, Inc. (SG), Dine Brands Global (DIN), Darden Restaurants, Inc. (DRI).
On-line software	Salesforce, Inc. (CRM), Uber Technologies, Inc. (UBER), ServiceNow, Inc. (NOW), Shopify, Inc. (SHOP), Snowflake, Inc. (SNOW), Datadog, Inc. (DDOG), Dynatrace, Inc. (DT), HubSpot, Inc. (HUBS), Tyler Technologies, Inc. (TYL), Dayforce, Inc. (DAY).

Sources: compiled by the authors.

Table 2. Totals of returns observed during the trading period

Stock pairs	Return 2024–02–23	Return 2024–02–27	Return 2024–03–01	Return 2024–03–05	Return 2024–03–08	Return 2024–03–12	Return 2024–03–15	Return 2024–03–19	Return 2024–03–22	Return 2024–03–26
MS/WFC	–0.02	–0.04	–0.03	–0.03	–0.05	–0.06	–0.05	–0.04	–0.02	–0.02
JPM/IBKR	0.00	0.00	–0.02	0.00	0.01	0.01	0.01	0.02	0.03	0.02
GS/WFC	–0.02	–0.02	–0.03	–0.04	–0.05	–0.05	–0.06	–0.05	–0.03	–0.02
GS/JPM	0.00	0.00	–0.01	–0.02	–0.02	–0.02	–0.03	–0.03	–0.02	–0.02
RL/TGT	–0.03	–0.01	0.00	0.05	0.07	0.05	0.07	0.04	0.03	0.06
ANF/TJX	–0.01	–0.01	–0.05	–0.09	–0.01	–0.01	–0.01	–0.04	–0.06	0.00
RL/LEVI	–0.02	0.00	–0.01	0.00	0.01	0.01	0.00	0.01	–0.01	0.01
HCA/AZTA	–0.02	0.00	0.02	0.00	–0.02	–0.02	–0.06	–0.08	–0.07	–0.07
SHAK/EAT	0.01	0.00	–0.03	0.02	0.02	0.02	0.00	–0.02	–0.05	0.01

Stock pairs	Return 2024-02-23	Return 2024-02-27	Return 2024-03-01	Return 2024-03-05	Return 2024-03-08	Return 2024-03-12	Return 2024-03-15	Return 2024-03-19	Return 2024-03-22	Return 2024-03-26
SHAK/FWRG	−0.01	−0.01	−0.03	−0.01	−0.02	−0.02	−0.03	−0.05	−0.07	−0.03
SHAK/SG	−0.02	0.00	0.13	0.23	0.25	0.30	0.40	0.42	0.49	0.50
Total return	**−0.01**	**−0.01**	**−0.01**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**−0.02**	**0.04**

Sources: compiled by the authors.

Ocena przydatności uproszczonej strategii pary handlowej do krótkoterminowego handlu na rynku akcji

Handel parami od czasu swojego powstania w latach osiemdziesiątych XX wieku był skutecznym narzędziem dla traderów i znacznie ewoluował wraz z wprowadzeniem handlu algorytmicznego, maszynowego i AI. Ta ewolucja skomplikowała implementację tej strategii, tradycyjnie przynoszącej korzyści instytucjonalnym lub wyspecjalizowanym inwestorom. Pomimo tego prostota handlu parami pozostaje dostępna, co wskazuje na potencjalne korzyści dla zwykłych traderów. Koncentrując się na podstawowych zasadach strategii i przeprowadzając test rynku w czasie rzeczywistym na popularnej platformie handlowej, badanie ma na celu ujawnienie jej przydatności i skuteczności w krótkoterminowym handlu akcjami. Wykorzystując podstawowe narzędzia platformy handlowej i funkcje Excela, badanie ma na celu również pokazanie uproszczonego podejścia w handlu parami. Wyniki mają dostarczyć wgląd w skuteczność strategii, oferując nieeksperckim traderom realne podejście do poruszania się po dzisiejszych zmiennych rynkach za pomocą uproszczonego, ale skutecznego modelu handlu parami.

Słowa kluczowe: handel parami, strategia rynkowo-neutralna, strategia inwestycyjna, krótkoterminowy handel akcjami