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Does technical analysis work in the Russian market? Insights from MICEX (MOEX Russia) Index component stocks

Abstract. Emerging markets are generally considered less information efficient as compared to their more developed counterparts. This suggests potential arbitrage opportunities through the use of some forms of trading rules which emit buy/sell signals. In this paper, we explore the hybrid rule of two popular oscillators, Chaikin Oscillator and Relative Strength Index, in the emerging market of Russia. Data include constituents of the market barometer for the period 26/11/2011 to 31/07/2019.

The whole sample is divided into three non-overlapping subperiods to distinguish each phase for the likelihood that the market is becoming more efficient in recent times. These subperiods also represent significant developments in the market such as unified trading platform, initial public offering of the Moscow Exchange, corporate governance reforms and rebranding of the benchmark index from MICEX to MOEX Russia Index.

We find that the combined rule can yield positive returns and dominate the buy-and-hold rule especially at the start, although this outperformance diminishes. Further, from subperiod II onwards, passive strategy surpasses the hybrid rule in risk-return sense (Sharpe and Sortino measures) and this outcome intensifies. The results suggest that the Russian stock market progressively moves towards efficiency.

Keywords: Technical Analysis; Chaikin Oscillator; Relative Strength Index; Hybrid Rule; Market Efficiency; Trading Strategy; Moscow Exchange; MICEX; MOEX Russia Index

JEL Classifications: G11; G14; G17

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Технічний аналіз на російському ринку: аналіз індексу ММВБ (МосБіржі)
Анотація. Існує думка, що ринки, що формуються, є менш ефективними в інформаційному плані, ніж ті ринки, які вважаються сформованими. Це передбачає можливість арбітражу за допомогою застосування правил ведення торгівлі, що дають сигнали щодо купівлі/продажу. Статтю присвячено аналізу гібридного правила двох осциляторів: осцилятора Чайкіна та індексу відносної сили на

ринку Росії, що розвивається. Дослідження охоплює дані за період з 26 листопада 2011 року до 31 липня 2019 року.

Зазначений період розподілено на три субперіоди з метою визначення для кожного з них імовірності того, що ринок стає більш ефективним. В основу визначення покладено ключові події, що відбулися на ринку, такі як поява єдиної торгової платформи, первинне публічне розміщення акцій Московської біржі, реформа корпоративного управління й перейменування еталонного індексу ММВБ на індекс МосБіржі.

Було встановлено, що назване вище правило може давати позитивний ефект, маючи перевагу відносно стратегії купівлі-продажу, зокрема на початковому етапі. Починаючи з другого субперіоду, пасивна стратегія починає переважати над гібридним правилом у контексті ризику й прибутковості (коефіцієнти Шарпа та Сортіно). Результати проведеного дослідження показують, що російський фондовий ринок поступово стає все більш ефективним.

Ключові слова: технічний аналіз; осцилятор Чайкіна; індекс відносної сили; гібридне правило; ефективність ринку; стратегія трейдингу; ММВБ; МосБіржа.

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Технический анализ на российском рынке: анализ индекса ММВБ (МосБиржи)

Аннотация. Существует мнение, что формирующиеся рынки являются менее эффективными в информационном плане, чем те рынки, которые считаются сформированными. Это предполагает возможность арбитража посредством применения торговых правил, дающих сигналы относительно покупки/продажи. Данная статья посвящена анализу гибридного правила двух осцилляторов: осциллятора Чайкина и индекса относительной силы на развивающемся рынке России. Исследование охватывает данные за период с 26 ноября 2011 года по 31 июля 2019 года.

Указанный период разделен на три субпериода с целью определения вероятности для каждого из них того, что рынок становится более эффективным. В основу определения обозначенных субпериодов положены ключевые события, которые произошли на рынке, такие как появление единой торговой платформы, первичное публичное размещение акций Московской Биржи, реформа корпоративного управления и переименование эталонного индекса ММВБ в индекс МосБиржи.

Было установлено, что названное правило может давать положительный эффект, имея преимущество по отношению к стратегии купли-продажи, в частности на начальном этапе. Начиная со второго субпериода, пассивная стратегия начинает превосходить гибридное правило в контексте риска и доходности (коэффициенты Шарпа и Сортино). Результаты проведенного исследования показывают, что российский фондовый рынок постепенно становится всё более эффективным.

Ключевые слова: технический анализ; осциллятор Чайкина; индекс относительной силы; гибридное правило; эффективность рынка; стратегия трейдинга; ММВБ; МосБиржа.

1. Introduction

Elementary form of forecasting prices through some historical patterns can be traced back to ancient Babylonians almost three millennia ago. Modern technical analysis, though, arrived more recently and it is generally attributed to the work of Charles Dow in 1884. Unlike fundamental analysis (which is a stock selection policy mainly for long-term investments), technical analysis focuses on studying the market for short-term investment decisions. Briefly stated, this strategy relies on historical market data, namely prices and/or volume to discern some underlying patterns in order to forecast future trends or returns.

Studies in technical analysis have so far endured the test of time and remain an absorbing topic among practitioners and academic researchers. The use of technical indicators among real-life investors and market professionals for investment decision-making is prevalent and thus it has significant practical implications. Although technical analysis has been met with scepticism in the past [1], its value in today's financial practice is pronounced [2-3]. Moreover, formal technical qualifications such as Certified Financial Technician (CFTe) and Chartered Market Technician (CMT) also receive professional and/or regulatory recognitions.

Despite the widespread use of technical analysis, its basic idea goes against the principle of efficient market hypothesis (EMH) at its weakest form as postulated by Fama (1965, 1970) [4-5]. To explicate, if the market already captures historical market data, one cannot expect to find any pattern

that can outperform the passive buy-and-hold policy on a consistent basis, after adjusting for the relevant costs and risk. The extensive use of many forms of technical trading rules, however, would suggest that some financial markets might not be fully efficient. This is normally the case for emerging economies where market infrastructures, lack of analysts' coverage and the state of financial technology would suggest information may not be available quickly to market participants as compared to the developed nations. For this reason, emerging markets may still offer potential abnormal returns for short-term traders that rely on algorithmic trading and buy/sell rules which capitalize on the use of technical information.

To test this generalization, we consider the Russian capital market to predict the returns resulted from specific technical analysis. In addition, Russia has a unique corporate governance (CG) characteristic where most of the listed firms are closely held, so conflict between the majority and minority shareholders is the main issue that warrant further investigations. As asserted by International Monetary Fund (IMF), good CG practices can improve company valuations, while nations with weak CG frameworks typically suffer from greater stock returns volatility [6]. In turn, this can lead to weaker trading performance in terms of risk-return trade-off. Nonetheless, several factors such as developments in the financial markets, rapid technological advancements and CG reforms can promote market efficiency, thus attenuates arbitrage opportunities.

In this article, we provide some insights into the profitability of technical analysis in the Russian stock market. Building upon prior literature, this study contributes as follows. Firstly, this paper adds to the technical trading studies in major emerging national economies which appears lacking in the literature [7]. At the same time, we mitigate data mining bias associated with the use of financial markets which have been explored exhaustively. Secondly, we combine two oscillators to derive buy signals. Instead of relying inadequately on individual indicators in isolation, the hybrid rule can theoretically reinforce long position signals in the market. Thirdly, research to date tends to focus on the benchmark indices (ASX200, DJIA, S&P500, FTSE100 and KLCI, to name a few) rather than individual stocks. Appropriately, this paper explores the latter, specifically MICEX (MOEX Russia) constituent stocks, which is deemed more practical since investors buy and sell individual (or portfolio of) stocks instead of an index. Fourthly, by exploring trading rule performance over time, we can assess its efficacy through reflections of transformation and progress in the capital market and CG reforms, among others, in inferring market (in)efficiency. Finally, we utilize several measures such as the Sharpe criterion, Sortino ratio and maximum drawdown to allow for a greater dimension of trading performance assessments in the Russian equity market.

The rest of this paper is structured as follows. Section 2 highlights some related literature. We outline the purpose in Section 3. This is followed by the results in Section 4 and conclusions in Section 5.

2. Brief Literature Review

In essence, technical analysis violates the central tenets of weak-form EMH. However, the controversy about scientific evidence for the profitability of technical trading rules has raged unabated for decades. A myriad of studies exploring different indicators across different financial markets and time shows various outcomes and hence implications to market efficiency [8-15]. State of the economies and financial markets (developed vs developing) and/or periods under study (over time) are generally regarded as having influences on returns from following signals by technical rules [13-14]. All things considered, existing research about the profitability or lack thereof of technical analysis remains inconclusive, and the topic is continuously and extensively explored in the finance literature.

3. The purpose of this article is to investigate the efficacies of trading using technical analysis in the Russian stock market. More specific, we examine MICEX Index (later known as MOEX Russia Index) component stocks for the period 26/11/2011 to 31/07/2019 based on several trading performance measures.

4. Results

MICEX (MOEX Russia) Index data (Open, High, Low, Close and Volume) are obtained from Yahoo Finance [16]. Based on the classification group available from the database, we include a total of 46 individual stocks for analysis. We separate the period into three non-overlapping subsamples where the starting point for each subperiod represents significant development

in the Russian stock market: (I) 26/12/2011 to 14/02/2013, (II) 15/02/2013 to 26/11/2017 and (III) 27/11/2017 to 31/07/2019. In short, the first period commences when MICEX and RTS (i.e. two main exchanges in Russia) began trading on a unified platform. Second phase starts when Moscow Exchange began trading its own stocks - the largest initial public offering in the country since the 2008 global financial crisis. During this phase, the market also sees many OECD Russia Corporate Governance Roundtable sessions and more importantly the approval of the new and refined Corporate Governance Code by the Moscow Exchange. Such code complies with the OECD Corporate Governance Principles, and as discussed earlier, the importance of good CG also has significant implications to investors. Finally, the third subperiod starts when the MICEX index was rebranded as the MOEX Russia Index. These partitions make it possible to evaluate Russian market (in)efficiency over time.

To explore the efficacies of technical trading rules, we utilize and complement outputs from two popular indicators to emanate buy signals, namely the Chaikin Oscillator *(CO)* and the Relative Strength Index *(RSI)*. The former was developed by Marc Chaikin in the 1970s. It is a third-derivative technical analysis indicator, specifically a moving average oscillator built upon the Accumulation/Distribution Line *(ADL)*. The indicator exhibits momentum implied by the line and it can be mathematically presented as:

$$CO = (EMA_3 \text{ of } ADL) - (EMA_{10} \text{ of } ADL), \tag{1}$$

where:
EMA_3 (EMA_{10}) refers to the 3-day (10-day) exponential moving average.

In general, buying pressure is greater when the *CO* is within the positive region i.e. above the zero line. Similar to other indicators, however, it may generate false signals and should not be used independently. Instead, to verify trends, experts and financial houses generally recommend it to be used in conjunction with other price oscillators, such as the *RSI*.

The *RSI* indicator, invented by Wilder in 1978 [17], indicates the magnitudes of recent gains and losses. Mathematically, it is shown as:

$$RSI = 100 - \left[\frac{100}{1 + RS} \right], \tag{2}$$

where:
RS denotes average up index value / average down index value over the 14-day period, as advised by Wilder. The oscillator ranges from 0 to 100 where *RSI* > 70 (< 30) suggests a stock is overbought (oversold).

By combining the outputs of both *CO* and *RSI* indicators, a buy signal is thus emitted when *CO* is above 0 and *RSI* crosses over 30. Finally, this study utilizes elementary money management to enable trading simulation.

In line with prior research [9-10; 12], we explore 10-day returns following the buy signals and ignore all other signals that are emitted within this holding period. Returns are calculated as:

$$r_t^{10} = \log(P_{t+10}) - \log(P_t). \tag{3}$$

Note that because of the short selling restrictions, only long trading simulation is explored. Following [18], we consider a one-way trading cost of 1%. Several performance metrics as described earlier are employed to measure risk and return outcomes of the combined trading strategy.

Having outlined the methods, Table 1 exhibits unconditional 10-day returns which also correspond to the returns of buy-and-hold policy during the three subperiods.

Some descriptive outlooks can be said. Firstly, mean 10-day returns throughout the three subperiods are positive, with the highest figure in the second phase with 0.46%, but it diminishes in the most recent subperiod. As expected from an emerging market, the returns are very volatile. Then, the second subperiod is quite striking where investment in the portfolio of component stocks from MICEX (MOEX Russia) Index can earn traders up to 83.64% or lose them as much as -69.31% within a fortnight. With the exception of the first subsample (moderate), distributions are approximately symmetric. Returns are leptokurtic which suggest possibility of extreme low or high 10-day holding period returns in the market.

Table 1:
Descriptive Statistics for 10-Day Returns of MICEX / MOEX Russia Index Components

	I	II	III
Minimum	-0.4055	-0.6931	-0.4055
Maximum	0.4055	0.8364	0.2877
Mean	0.0034	0.0046	0.0029
Standard Deviation	0.0778	0.0792	0.0518
Skewness	0.0571	0.3813	-0.1346
Kurtosis	10.9323	21.5831	7.5174

Note: Summary statistics for the three subperiods:
I (26/12/2011 - 14/02/2013),
II (15/02/2013 - 26/11/2017),
III (27/11/2017 - 31/07/2019).
Log returns are based on non-overlapping 10-day periods which correspond to the returns of the buy-and-hold policy.

Source: Computed by the authors

Table 2 shows the results of trading using the combined CO-RSI against the buy-and-hold (BH) policy across the three subsamples. Mean returns of trading utilizing the merged oscillators out-perform the unconditional rule in all periods, although noticeably these returns diminish over time from 2.99% in the first subsample to only 0.66% in the most recent one. The tested technical oscillators also produce greater winning trades and mean returns from those trades for the first two subsamples, but not the last one. Looking at the losing trades, BH policy suffers worse only for the second subperiod. Throughout all subperiods, CO-RSI experiences lower risk as measured by the greatest peak to valley decline in the curve. When considering risk-return trade-off, however, Sharpe and Sortino ratios indicate that (other than the first subperiod) the returns from CO-RSI are attributed to higher volatility and downside volatility as compared to the BH rule.

To illustrate how CO-RSI trading positions fluctuate during their lifetimes, Figure 1 shows the 10-day holding period returns for each trade for each subperiod. Most trades occur in the second period, which is not surprising given that it spans the longest. Open positions fluctuate on a day-to-day basis, although the profit (or loss) status typically remain constant. Stated differently, with small exceptions, winning trades generally fluctuate within the profit region and vice versa.

Figure 2 exhibits the mean returns of each company traded by implementing the hybrid CO-RSI rule. Throughout each period, it can be seen that some companies contributed the largest positive returns to the overall portfolio, while negative returns tend to be distributed more

Table 2:
Trading Outcome for CO-RSI and BH

	I		II		III	
	CO-RSI	BH	CO-RSI	BH	CO-RSI	BH
Mean Returns	0.0299*	0.0034	0.0158*	0.0046	0.0066*	0.0029
Win Rate	0.5455*	0.4889	0.5962*	0.5202	0.4286	0.5149*
Mean Returns (Wins)	0.0618*	0.0471	0.0754*	0.0392	0.0293	0.0340*
Mean Returns (Losses)	-0.0181*	-0.0411	-0.0579	-0.0305*	-0.0161*	-0.0316
Maximum Drawdown	-0.0133*	-0.1589	-0.0142*	-0.2000	-0.0029*	-0.0692
Sharpe Ratio	1.77*	0.35	0.63	0.96*	0.09	0.91*
Sortino ratio	1.61*	0.15	1.07	1.49*	0.26	2.9*

Note: Performance of the combined technical indicator of Chaikin Oscillator with Relative Strength Index (CO-RSI) against the passive buy-and-hold (BH) rule for the three subperiods:
I (26/12/2011 - 14/02/2013),
II (15/02/2013 - 26/11/2017),
III (27/11/2017 - 31/07/2019).
Mean returns refer to the log returns of non-overlapping 10-day periods. Win rate refers to the portion of trades which provide positive returns. Mean returns (wins) refer to those of profitable trades and vice versa for mean returns (losses). Maximum drawdown indicates the largest peak to valley decline during the period. Sharpe ratio measure return to variability while Sortino ratio focuses on downside risk only.
* indicates better performance outcome.
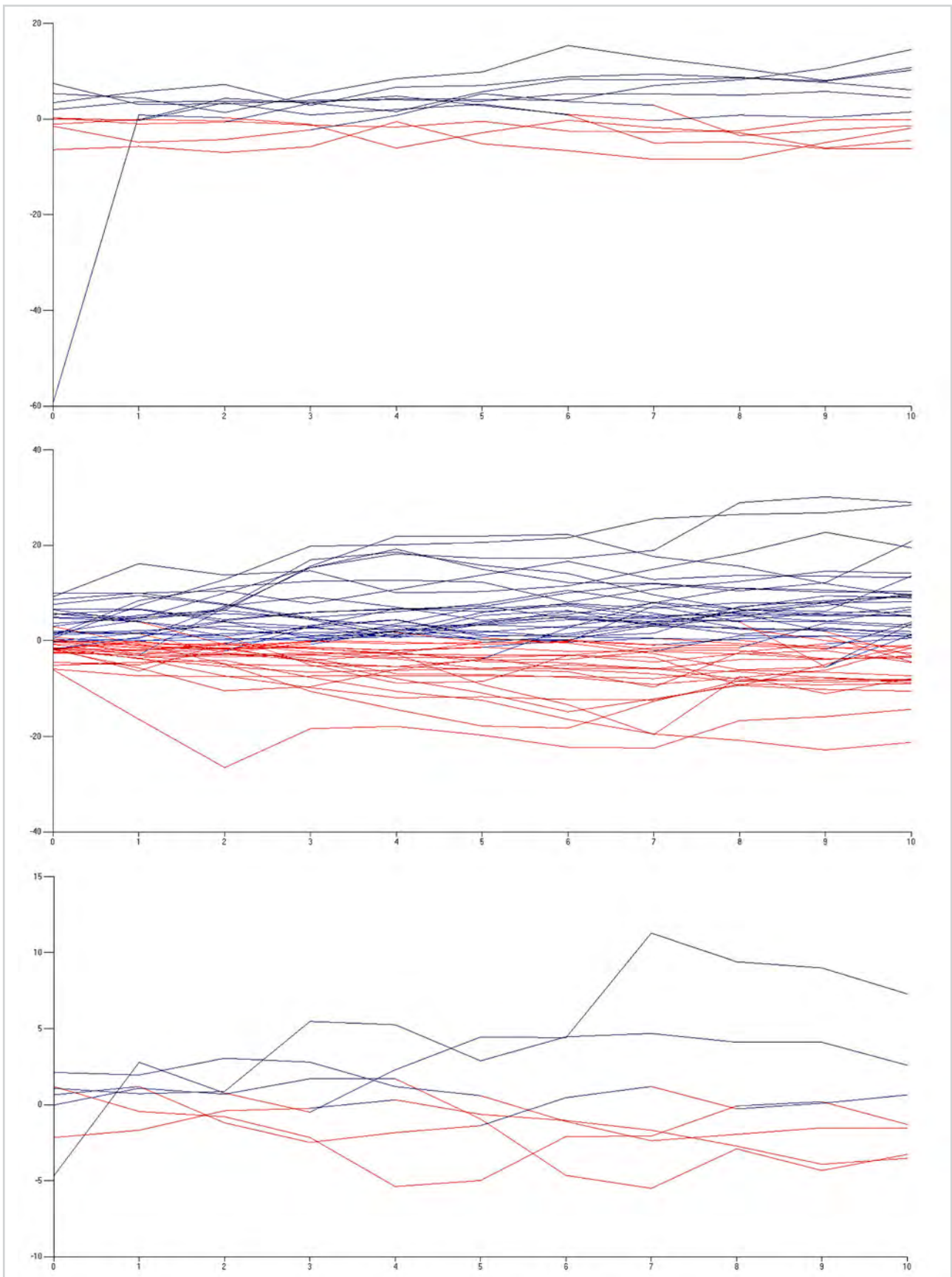
Source: Computed by the authors

Figure 1:
CO-RSI Holding Period Returns
Source: Analysed by the author. The charts denote 10-day log returns of each trade for the CO-RSI strategy for the three subperiods: top (26/12/2011 - 14/02/2013), middle (15/02/2013 - 26/11/2017) and bottom (27/11/2017 - 31/07/2019). The y-axis represents profit or loss level, while x-axis denotes holding period (in days). Blue (red) colour shows each position that is closed at a profit (loss).
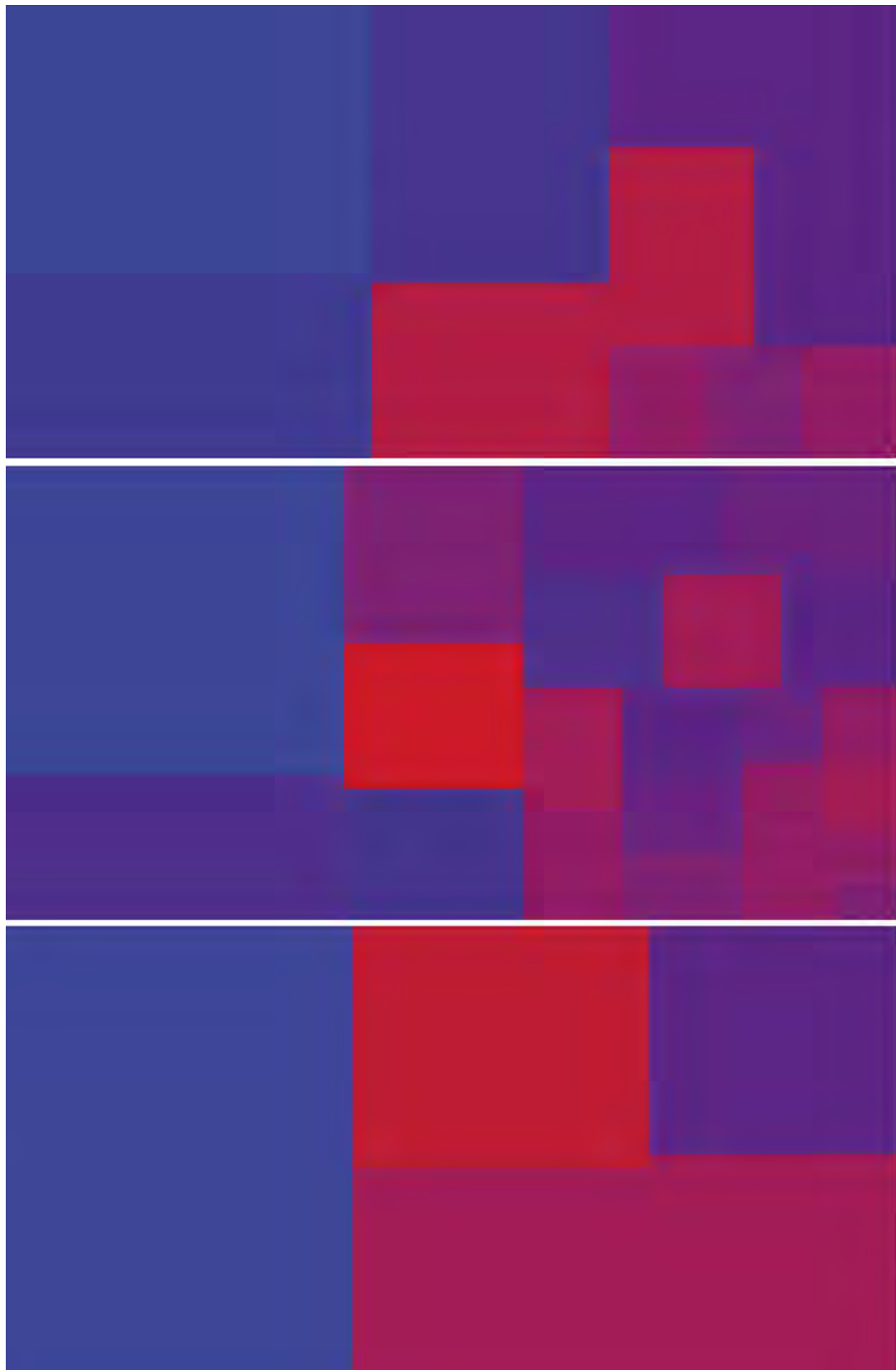
Figure 2:
Profit/Loss for CO-RSI across Different Subperiods
Note: The charts denote the mean returns of each company traded using the combined CO-RSI strategy
for the three subperiods: top (26/12/2011 - 14/02/2013), middle (15/02/2013 - 26/11/2017) and
bottom (27/11/2017 - 31/07/2019). Blue (red) colour shows mean profit (loss) of each company.
Larger size indicates greater profit (or loss).

Source: Computed and elaborated by the authors

evenlyamong the rest. These findings indicate that while the combined indicators can yield positive returns for the portfolio of MICEX (MOEX Russia) component stocks, the profits from some individual stocks are instrumental in achieving overall results. On the basis of trading profits, the results confirm superiority of active rule (technical analysis) over the passive policy (buy-and-hold) throughout all periods, although such dominance diminishes over time, where the differences of mean returns supporting CO-RSI against BH decline from over 8 times (for the first period) to only around twice in the most recent period.

5. Conclusion

This paper has given an account of the trading performance of technical analysis against the benchmark buy-and-hold policy in the Russian stock market, specifically the constituent stocks of the main market barometer. Returning to the objective posed at the beginning of this study, it is now possible to state that technical trading rule has the potential to outperform the passive investment rule in return sense within an emerging market context, although in our case we see a gradual reduction of its power. Nonetheless, when all things considered, inferring market inefficiency would be premature. Although risk-return trade-off favours the technical strategy in the first subperiod, recent subperiods show that simply buying and holding the portfolio of MICEX (MOEX Russia) Index component stocks actually deliver greater returns over risks, both in terms of volatility and downside volatility.

Overall, our findings suggest that the Russian stock market has been moving progressively towards market efficiency, similar to some other findings in emerging and developed markets such as Malaysia and New Zealand, respectively [13-14]. Although previous study for MICEX component stocks (sample year ends 2012) shows positive but low significance returns [18], our results suggest that significant developments and reforms in the market in recent years including the unified trading platform and the new Corporate Governance Code can partly explain the transition towards efficiency. Similarly, better access to information technology among market participants as well as technical knowhow of standard indicators, including those applied by prior literature, can inhibit these rules from identifying profitable patterns.

Despite the apparent weak-form EMH, a number of caveats need to be noted regarding the current study. Firstly, this paper employs the hybrid of just two oscillators and because sophisticated parameter optimization technique is ignored, it does not capture market dynamics which can lead to inaccurate entry signals. Secondly, as this paper is primarily concerned with technical indicators, we utilize rudimentary money management rule. Thirdly, this study ignores any risk management policy.

Accordingly, this research has thrown up many issues in need of further investigations and experimentations into the efficacies of technical trading rules. Firstly, future studies can explore different forms of technical indicators and optimization techniques. One interesting direction is the use of fractals as a signal or enhancement for buy/sell indications from technical analysis [19]. More specific, this technique allows determining trending or reversal stage in the market and consequently appropriate signals or indicators to complement entry/exit points. Secondly, sophisticated money management rules [20] such as the Martingale approach, among others, can be employed to facilitate allocation of funds based on a given criteria. Thirdly, to protect against adverse outcomes, applications of trading risk management policies can be explored. These include stop-loss and take-profit strategies as quantitative measures to minimize loss and seize opportunities for gains. Finally, different financial markets including crude oil [8] and cryptocurrencies [11] as well as other performance measurements also offer interesting directions for further research.

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