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Active portfolio management on the Romanian stock market

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Abstract

The homogeneity of expectations and rationality of decisions in the neo-classical portfolio theory imply the existence of an efficient market – meaning a market where assets' prices coincide with their fundamental value. The efficient market hypothesis, stating that efforts to find over / under valued assets are unnecessary and will not produce results superior to a passive strategy, is clearly contrary to the active portfolio management strategy and its proponents sustain that investing in a tracking portfolio (that is a portfolio that closely tracks a composite stock index) will bring the maximum possible return. In this research we aim to assess the individual Romanian portfolios performance (real individual investment accounts on Bucharest Stock Exchange) in comparison with the international stock markets' evolution (proxied by the multinational equity index MSCI World Index) and also with the overall evolution of the Romanian Stock Market (proxied by its composite index BET-C). We construct a so-called "Individual Portfolios Index" or IPI from the average daily returns weighted with the market value for 30 real individual portfolios. The comparative analysis reveals that the most efficient portfolio is the one tracking the multinational MSCI World Index, and also that IPI has a slightly lower risk and return than the Romanian composite index. Next, we evaluate the risk-adjusted portfolio performance for the index IPI, the composite Romanian index BET-C, and for each of the 30 individual accounts. We conclude that the overall value of an active portfolio management strategy on the Romanian equity market is inferior to the value of a passive strategy tracking the market index over the analyzed period.

Keywords: active portfolio management, tracking strategy, risk-adjusted performance measures, Romanian equity market

1. Introduction

Academic research in the field of evaluation, modelling and forecasting of portfolio risk and return has been stimulated to a large extent by the ever increased interest of capital market practitioners. The legislation of the financial markets, including the Basle Accords, has an important impact on institutional investors' portfolio strategy, which allocate more and more time and resources in order to evaluate portfolio performance, measure and monitor risk or rebalance their portfolios. Given the important role of institutional investors on international equity markets, especially on small developing markets as the ones in Eastern Europe and their impact on individual portfolios and on

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the overall evolution of the market, individual portfolios have also been affected by these financial markets developments.

The starting point for the majority of the portfolio risk adjusted performance evaluation methods is the CAPM model of Sharpe-Lintner-Mossin (see Sharpe (1964), Lintner (1965) and Mossin (1965)). The model brought for the first time a valid benchmark, in the sense that it provided an expected return with which the realized return can be compared. Before the CAPM became a reference, this function was allocated to the so-called tracking portfolios, which are portfolios that follow some indices considered relevant for the investment strategy. However, the moment the CAPM model was born, the comparison of the portfolios performance with this benchmark was nothing but the next natural step, as the expected return of the portfolio itself was undoubtly a superior reference point.

Further, even if the performance appraisal measures have evolved, and various authors have proposed other benchmarks against which portfolio performance to be studied, we must not forget that everything began with the model of William Sharpe published in 1964. Its main merit, even more important than its indisputable benchmark function which has not yet been taken away, is to have sparked discussions that have created a distinctive part of the capital market theory, namely portfolio performance appraisal and evaluation.

The efficient market hypothesis, stating that efforts to find over / under valued assets are unnecessary and will not produce results superior to a passive strategy, is clearly contrary to the active portfolio management strategy. Proponents of the efficient market hypothesis sustain that investing in a tracking portfolio (that is a portfolio that closely tracks a composite stock index) will bring the maximum possible return. If they are right, this would mean that investment funds would never "beat the market" and the active portfolio management would be pointless. In this paper we aim to assess the individual Romanian portfolio performance (real individual investment accounts on Bucharest Stock Exchange) in comparison with the international stock markets evolution (proxied by the multinational equity index MSCI World Index) and also with the overall evolution of the Romanian Stock Market (as represented by its composite index BET-C). We employ an unique dataset (real investors' transactions on Bucharest Stock Exchange) which allows us to provide answers to questions related to the efficiency of the Romanian equity market and the effectiveness of different portfolio management strategies that could not be answered before. In addition, the construction of an index which reflects the evolution of real investors' portfolios (called IPI) is also a novelty in the Romanian financial literature. We find a number of interesting empirical results, which suggest that the overall value of an active portfolio management strategy on the Romanian equity market is inferior to the value of a passive strategy tracking the market index.

The rest of the paper is organized as follows. Section 2 gives an overview of the related literature and explains why understanding investor behavior is an important endeavor in the context of portfolio management. Section 3 presents the data, methodology and also some preliminary statistics related to the dataset, while Section 4 discusses the empirical results. Finally, some conclusions are briefly summarized in Section 5.

2. Literature Review

The research conducted in this paper is part of a newly-developed field in the international financial literature – the quantitative behavioural finance. This field of study lies at the crossing of three directions of research regarding the subject of portfolio management. The first direction is the neo-classical portfolio theory, based on hypotheses such as the homogeneity of investors' expectations, the rationality of investment decisions, and the efficiency of financial markets. The second direction is represented by behavioural finance, which identifies and explains biases and investment preferences. The third direction is the mathematical modelling of the financial universe, including the modelling of financial variables in times of crisis and the phenomenon of financial contagion.

The neo-classical portfolio theory recognizes the existence of a single, representative investor type, who only takes investment decisions based on reason. The homogeneity of expectations and rationality of decisions imply the existence of an efficient market – meaning a market where assets' prices coincide with their fundamental value. The most famous models based on the hypothesis of a representative and rational investor with homogenous expectations are the Modern Portfolio Theory developed by Markowitz (1952), the CAPM model of Sharpe (1964), Lintner (1965) and Mossin (1965) and the Capital Structure Theory developed by Modigliani and Miller (1958). In the late '70s the financial literature saw the first models that recognized the asymmetry of information. Some of the early works belong to Grossman (1976) and Holmström (1979). However, even though the asymmetry of information was in clear conflict with the hypotheses of the traditional theory, the latter kept its statute of dominant paradigm, according to Kuhn

(1970). It was only in the mid '80s when a new paradigm – behavioural finance – gains momentum. The theoretical and experimental footing on which behavioural finance later developed was already gathered in the literature concerning psychology, in articles written in the '70s by Kahneman and Tversky (1972, 1973, and 1979). Among the first notorious papers in the financial literature are the works of Shefrin and Statman (1985) which introduced the prospect theory (a theory based on empirical evidence describing the way investors evaluate potential winnings and losses), and that of Kahneman and Tversky (1979) explaining the so-called disposition effect. Towards the end of the century behavioral finance has already gained its place in the financial literature, as many theoretical and empirical studies have been published in some of the most prestigious financial academic journals. The winning of the Nobel Prize for Economy by the Princeton University professor Daniel Kahneman validated the importance of the field in the financial literature. The behavioral finance literature followed three major paths, as Shefrin explains in his 2000 Greed and Fear book: 1. Heuristic-driven biases; 2. Frame dependence; 3. Market inefficiencies. The first two themes deal with the investors' decision process, while the third theme acknowledges the impact of investors' behavior on the financial markets. The concept of heuristic-driven bias was introduced by Shefrin to describe those strategies developed by learning through trial and error, or so-called rules of thumb. Those strategies have the potential to create systemic departures from rationality in the investment process. Goldberg and von Nitzsch (2001) define the heuristic driven biases as mechanisms for processing information that lead to a result (not necessarily the best) rapidly and almost effortlessly. Some of the main heuristics upon which financial practitioners rely and which have been documented in the financial literature are: representativeness, overconfidence, anchoring-and-adjustment, availability bias, aversion to ambiguity, the illusion of validity, the illusion of control etc. On the other hand, Frame dependence deals with the difference between substance and form, and asserts that the way the problem is presented to investor has a major importance in the decision finally adopted by the same investor. In this category of behavioural biases we find: risk aversion, concurrent decisions, hedonic editing, regret, self-control and the money illusion. The third theme of behavioural finance- inefficient markets – is connected with the earlier two themes by cause and effect. In other words, heuristic-driven biases and frame dependence cause prices to stray from fundamental values and this causality relation was attested in many empirical studies. Nevertheless, investor's behaviour according to neo-classical theory remains however a benchmark used for comparing the actual investors' behaviour and for identifying behavioural biases.

3. Methodology

3.1. Research Goal

In this survey we aim to assess the individual Romanian portfolio performance (real individual investment accounts on Bucharest Stock Exchange) in comparison with the international stock markets evolution (proxied by the multinational equity index MSCI World Index) and also with the overall evolution of the Romanian Stock Market (proxied by the composite index BET-C).

3.2. Data and Method

In order to achieve our objective, we construct a so-called "Individual Portfolios Index" – IPI as follows. First, we select the top 100 individual portfolios based on the actual (real) value of transactions during the course of 2011. Out of these portfolios, 30 individual accounts are randomly selected and for each of them we take the daily value and daily return. Next, IPI is calculated by computing the average daily return weighted with the market value from the daily logarithmic returns of the 30 portfolios included in this study. The weight of the individual portfolios in the index IPI is dynamic, being updated daily with the change in market value of the portfolio. In calculating individual portfolio returns, we exclude the "ins" and "outs" of cash and stocks into portfolios. Thus, the days when "ins" and "outs" of cash or stocks occurred have been identified and isolated; therefore these events have no impact on daily returns. In addition, two extreme returns which occurred for the index IPI have been excluded from the data sample (0.64% and 0.50% respectively). In this way, we have removed a total of 5% of all observations from the data sample.

The index was initiated on January 1, 2007 and was set to be equal to 1000 at that time. Further, for each of following days its value is calculated as follows:

$$IPI_t = 1000 * \prod_{i=1}^{t} (1 + r_i) \quad (1)$$

The analysis period ends on November 25, 2011, therefore we have 1256 daily observations for both the individual portfolios market values which were then transformed into daily returns (logarithmic) and for the time series IPI. The time series of daily log-return for the stock indices MSCI WI and BET-C have also been constructed for the same time period. The data sources are the MSCI web-site for the multinational index and the company Smart Trade for the Romanian composite index BET-C and for the actual individual portfolios from the Bucharest Stock Exchange.

Next, we evaluate the risk-adjusted portfolio performance by comparatively computing for each of the three time series (IPI, MSCI WI and BET-C) the following ratios: Sharpe's ratio, Treynor's measure, Jensen's measure, Appraisal ratio and the M squared ratio.

The Sharpe ratio is calculated by subtracting the risk-free rate – in this case we employ the reference rate ROBOR (Romanian Interbank Offer Rate) transformed in daily data using the 360 convention - from the portfolio's rate of return and dividing the result by the standard deviation of the portfolio returns. The higher the Sharpe ratio, the better the portfolio's risk-adjusted performance has been. A negative Sharpe ratio indicates that a risk-free asset would constitute a better investment.

The Treynor ratio is similar to the Sharpe ratio, with the difference that the Treynor ratio uses beta (the systematic risk) as the measurement of volatility. In other words, Treynor ratio measures returns earned in excess of that which could have been earned on a riskless investment per each unit of market risk.

Jensen's Alpha represents the difference between a portfolio's actual return and the return which could have been made by a benchmark portfolio with the same market risk- i.e. beta. In other words, the measure reflects the ability of active management to increase returns above those that are purely a reward for bearing market risk.

The Information Ratio, also known as Appraisal ratio is defined as the expected active return divided by tracking risk, where the numerator (the active return) is the difference between the return of the security and the return of a benchmark index (in our case the Romanian composite index BET-C), and the denominator – the tracking risk - is the standard deviation of the active return

The Modigliani risk-adjusted performance measure or M-squared (developed by Franco Modigliani and Leah Modigliani, 1997) contains the same information as the Sharpe Ratio, but, being a percentage return, is easier to interpret. M-squared measure is equivalent to the return a portfolio would have achieved if it had the same risk as the market index. Thus, the portfolio with the highest M2 measure, like the portfolio with the highest Sharpe ratio, would have the highest return for any level of risk.

3.3. Preliminary exploratory analysis of data

The comparative analysis of the three indices (IPI, BET-C and MSCI World) reveals that the most efficient portfolio is the one tracking the multinational MSCI World Index, as it has the highest average return (mean daily return of -0.02%) and the lowest standard deviation (1.41%) of the three analyzed indices (See Table 1). Somewhat surprisingly, IPI has a slightly lower risk than the Romanian composite index BET-C (daily standard deviation of 1.87% as compared to 1.92% for BET-C), although we would have expected the weaker portfolio diversification relative to the composite index to bring a slightly higher risk than the overall market. Figure 1 shows the higher volatility of the Romanian composite index BET-C, even though one outlier is found for IPI (17.22% daily return), while Figure 2 reveals that the three indices seem to move in the same direction and also that the Romanian composite index has been the most affected by the global economic crisis of 2007-2009.

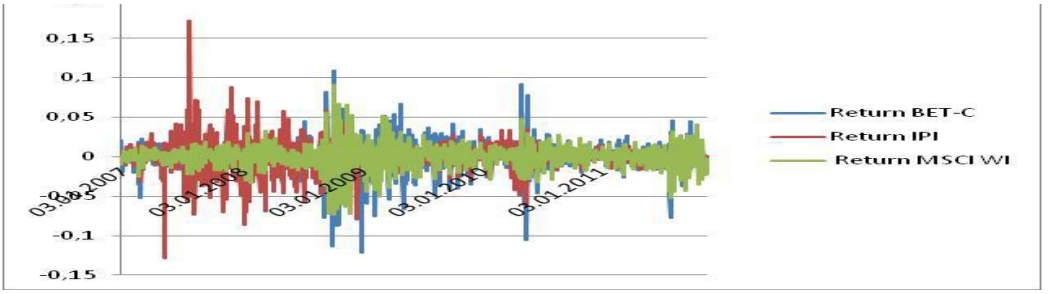

Fig. 1 Evolution of daily returns (2007 -2012)

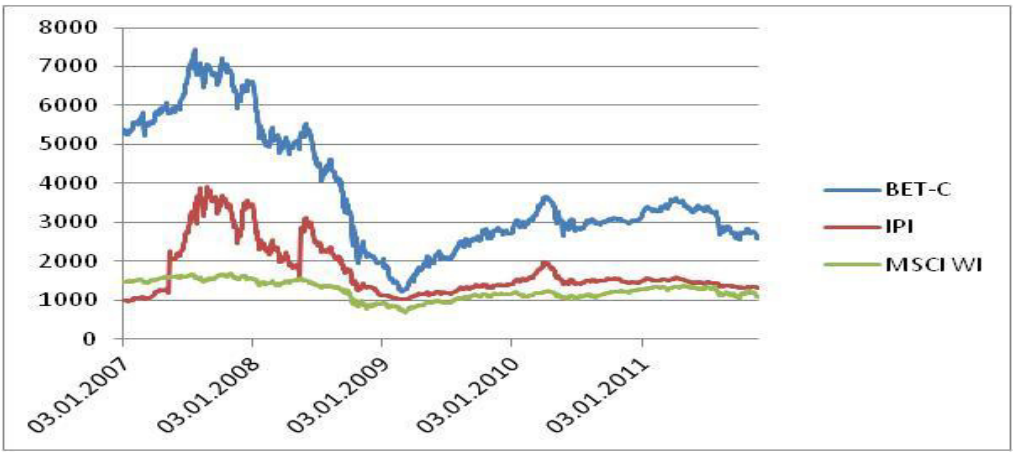

Fig. 2 Evolution of daily price series (2007 -2012)

The average return of the individual portfolios as represented by IPI is very close but still lower (-0.07% and -0.06% respectively) than the benchmark return (BET-C), which reveals that the overall value of an active portfolio management strategy on the Romanian equity market is inferior to the value of a passive strategy tracking the market index. Results seem to be contrary to the ones reached by Tudor (2009), which showed that an active portfolio strategy on the Bucharest Stock Exchange based on fundamental analysis is superior to the passive strategy for the period 2002-2008.

As expected, both risk and return of individual portfolios have a much wider variability than the risk and return of the three indices: among the 30 randomly selected individual accounts, the best performance in terms of average daily return equals +0.09%, while for the same period the best performing index - MSCI WORLD, lost on average 0.02% per day. The best individual performance in terms of risk among the 30 portfolios is 1.85% daily standard deviation, which is very close to the average standard deviation of the IPI index.

When computing the simple arithmetic mean return and risk of the 30 individual portfolios a very interesting finding stands out: the risk is extremely high (3.68%) or about double than the standard deviation of the three indices, while the return performance is also inferior (the negative return of -0.13% is also almost double than the average daily loss recorded by the least performing index, IPI). Active portfolio management by individual investors proved to be a very difficult task during the selected period and a passive strategy would have been more rewarding both in terms of return and risk.

Table 1 Risk and return for the three indices and 30 individual portfolios

Portfolio	Std Deviation (daily)	Average Return (daily)
BET-C	1.92%	-0.06%
IPI	1.87%	-0.07%
MSCI-WI	1.41%	-0.02%
Mean value (30 individual portfolios)	3.68%	-0.13%
30 Portfolios (Max)	10.81%	0.09%
30 Portfolios (Min)	1.85%	-0.81%
Individual Portfolios:		

1	3.87%	-0.20%
2	3.61%	-0.20%
3	3.64%	-0.23%
4	2.58%	-0.20%
5	2.35%	-0.15%
6	2.81%	-0.13%
7	2.79%	-0.08%
8	6.23%	-0.08%
9	3.04%	0.03%
10	10.81%	-0.81%
11	2.37%	-0.06%
12	8.30%	-0.05%
13	4.03%	-0.30%
14	2.89%	-0.08%
15	2.57%	-0.06%
16	2.89%	-0.08%
17	2.45%	-0.12%
18	2.54%	-0.13%
19	5.31%	-0.29%
20	2.49%	0.02%
21	2.87%	-0.12%
22	4.45%	-0.01%
23	5.69%	0.09%
24	3.22%	0.09%
25	2.93%	-0.26%
26	1.85%	0.07%
27	2.17%	-0.09%
28	1.87%	-0.03%
29	3.10%	-0.12%
30	4.68%	-0.22%

4. Results

Table 2 shows the computation of the five risk-adjusted performance measures for the individual portfolios index IPI, for the Romanian composite index BET-C and also for each of the 30 individual portfolios on its own. When looking at the Sharpe ratio, we notice that IPI has a risk-adjusted performance inferior to the overall Romanian equity market as represented by BET-C (negative numbers are in parentheses). Only 20% of investors included in the index managed to achieve a better performance than they would have achieved by investing in the risk-free asset (the same conclusion in reached when interpreting the results of the M squared measure). The information ratio also reveals that overall investors were unable to obtain a better risk adjusted performance than the market, but a relatively large number of investors managed to accomplish this: 33% of them managed to obtain a better return than the benchmark (the composite index), and the degree to which they realized this in a consistent manner is reflected by the larger Information Ratio. As mentioned before, the Treynor ratio is calculated similar to the Sharpe ratio, but the risk that is taken into account in this case is the non-diversifiable, or systemic risk, represented by the Beta coefficient (calculated as the slope of the regression equation between daily returns of the portfolios taken into account and the market index). The index IPI had a weaker performance than the market index over the period analyzed in terms of this indicator, but almost 40% of the individual investors had better risk-adjusted performance than IPI (due to different weights in the index) and over 20% (as with the Sharpe ratio) obtained a higher return than the return on the risk-free asset. Finally, Jensen's Alpha calculates the return in excess of the expected return (which is calculated ex post, usually by using the Capital Asset Pricing Model). Results in Table 2 reveal that about 40% of the individual investors managed to achieve a return above the “normal” benchmark ("abnormal return") determined using the market risk of the portfolio and the risk-free rate.

Table 2 Risk-adjusted portfolio performance measure

Index	StDev (R-Rf)	E(R-Rf)	Sharpe Ratio	Beta	Treynor Ratio	Jensen's Alpha	StDev (R-Rb)	E(R-Rb)	Info Ratio	Modigliani Ratio
BET-C	1.92%	-0.07%	(0.0389)	1.0000	(0.0007)	0.00%	0.00%	0.00%	0.0000	-0.07%
IPI	1.87%	-0.09%	(0.0466)	0.6176	(0.0014)	-0.03%	1.62%	-0.01%	(0.0075)	-0.08%
Portfolios:										
1	3.58%	-0.19%	(0.0521)	0.6139	(0.0030)	-0.08%	3.54%	-0.11%	(0.0315)	-0.09%
2	3.56%	-0.22%	(0.0608)	1.2092	(0.0018)	0.04%	2.81%	-0.14%	(0.0504)	-0.11%
3	3.52%	-0.24%	(0.0669)	0.9348	(0.0025)	-0.02%	3.19%	-0.16%	(0.0503)	-0.12%
4	2.49%	-0.20%	(0.0820)	1.0696	(0.0019)	0.01%	1.58%	-0.13%	(0.0819)	-0.15%
5	2.29%	-0.16%	(0.0717)	0.8569	(0.0019)	-0.02%	1.67%	-0.09%	(0.0537)	-0.13%
6	2.78%	-0.14%	(0.0519)	0.9262	(0.0016)	-0.01%	2.16%	-0.07%	(0.0322)	-0.09%
7	2.62%	-0.09%	(0.0352)	0.8819	(0.0010)	-0.01%	2.36%	-0.02%	(0.0073)	-0.06%
8	5.47%	-0.08%	(0.0148)	0.9963	(0.0008)	0.00%	5.31%	-0.01%	(0.0011)	-0.02%
9	3.00%	0.01%	0.0036	0.7401	0.0001	0.01%	2.73%	0.09%	0.0315	0.02%
10	8.44%	-0.51%	(0.0609)	(0.1073)	0.0479	-0.91%	8.67%	-0.44%	(0.0506)	-0.11%
11	2.30%	-0.07%	(0.0308)	0.7669	(0.0009)	-0.02%	1.93%	0.00%	0.0020	-0.05%
12	8.00%	-0.07%	(0.0086)	0.4049	(0.0017)	-0.04%	8.06%	0.01%	0.0008	-0.01%
13	3.63%	-0.26%	(0.0722)	1.2344	(0.0021)	0.07%	3.15%	-0.19%	(0.0596)	-0.13%
14	2.58%	-0.08%	(0.0302)	0.5572	(0.0014)	-0.04%	2.77%	0.00%	(0.0011)	-0.05%
15	2.42%	-0.07%	(0.0291)	0.9574	(0.0007)	0.00%	1.78%	0.00%	0.0025	-0.05%
16	2.83%	-0.09%	(0.0319)	1.0744	(0.0008)	0.01%	2.02%	-0.02%	(0.0076)	-0.05%
17	2.39%	-0.13%	(0.0564)	0.9416	(0.0014)	-0.01%	1.73%	-0.06%	(0.0346)	-0.10%
18	2.42%	-0.14%	(0.0580)	0.9338	(0.0015)	-0.01%	1.71%	-0.07%	(0.0382)	-0.10%
19	5.24%	-0.30%	(0.0565)	0.8395	(0.0035)	-0.05%	5.00%	-0.22%	(0.0442)	-0.10%
20	2.05%	-0.01%	(0.0033)	0.2334	(0.0003)	0.01%	2.62%	0.07%	0.0260	0.00%
21	2.72%	-0.13%	(0.0463)	0.9573	(0.0013)	-0.01%	2.27%	-0.05%	(0.0224)	-0.08%
22	4.39%	-0.02%	(0.0054)	0.3772	(0.0006)	-0.01%	4.50%	0.05%	0.0114	0.00%
23	5.63%	0.07%	0.0124	0.5025	0.0014	0.04%	5.63%	0.14%	0.0257	0.03%
24	3.14%	0.07%	0.0224	0.8215	0.0009	0.01%	2.78%	0.15%	0.0523	0.05%
25	2.71%	-0.24%	(0.0886)	0.6991	(0.0034)	-0.08%	2.55%	-0.16%	(0.0646)	-0.16%
26	1.76%	0.04%	0.0237	0.5304	0.0008	0.03%	1.84%	0.12%	0.0632	0.05%
27	2.09%	-0.10%	(0.0480)	0.6320	(0.0016)	-0.04%	1.99%	-0.03%	(0.0128)	-0.08%
28	1.78%	-0.05%	(0.0263)	0.7138	(0.0007)	-0.01%	1.65%	0.03%	0.0170	-0.04%
29	3.08%	-0.14%	(0.0457)	1.2616	(0.0011)	0.04%	1.97%	-0.07%	(0.0334)	-0.08%
30	4.61%	-0.23%	(0.0505)	0.6769	(0.0034)	-0.07%	4.47%	-0.16%	(0.0352)	-0.09%

5. Conclusions

The main contribution of this study is to show how real investors' trading activity on Bucharest stock exchange relates to the overall evolution of the equity market (both Romanian and international) during a period which comprises the recent global economic crisis. We measure trading activity using a self-constructed Individual Portfolios Index (IPI) which comprises 30 randomly selected individual accounts weighted with their market value. The paper then proceeds by analyzing how investors' trading activity relates to the evolution of equity indices and find that the most efficient portfolio is the one tracking the multinational MSCI World Index, and also that selected individual portfolios as represented by the index IPI had a slightly lower risk and return than the Romanian composite index. Next, the risk-adjusted portfolio performance for the index IPI, the composite Romanian index BET-C, and for each of the 30 individual accounts included in the index is evaluated. All risk-adjusted portfolio performance measures agree that the index of real individual portfolios on the Romanian equity market registered a weaker performance than the composite market index over the period analyzed, suggesting that the overall value of an active portfolio management strategy on the Romanian equity market is inferior to the value of a passive strategy tracking the market index over the analyzed period.

Ultimately, this research seeks to offer a comparative perspective into the efficacy of active and passive portfolio management strategies on the Romanian stock market by employing an unique dataset in the Romanian financial literature.

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