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Performance of Social Pillar-Based Portfolio in Developing Capital Market

——————— **Abstract:** ———————

Research Question: This study examined the preconditions and efficiency of socially responsible investing (SRI) in the developing capital market, specifically the Belgrade Stock Exchange (BSE). **Motivation**: Considering the increasing trend of SRI (GSIA, 2020) and importance of information on corporate social responsibility (CSR) to investors (Miralles-Quiros, Miralles-Quiros, & Arraiano, 2017), especially on social issues (Giese, Nagy, & Lee, 2021), we explored the influence of applying the social criteria in asset selection on investment portfolio performance at the BSE. This study builds on the existing literature that is mostly focused on developed capital markets of Europe, the United States and Canada (Von Wallis & Klein, 2015) by analysing the issue of SRI in the developing market. The provided setup for socially driven portfolio structuring based on market trends and social performance disclosure proved to be efficient in the long-term. **Idea**: The core idea of this paper was to analyse the terms for SRI and empirically evaluate the performance of social pillar-based portfolio on the BSE in order to provide evidence to support the trend of SRI in developing markets. The structure of the portfolios was set using the best-in-class strategy, while the classes were determined on the basis of the stocks' return trends. **Data**: The analysis was conducted using trading data and information from financial and non-financial reports of the companies listed on the BSE. **Tools**: Cluster analysis was used for classification of stocks, while performances of portfolios were evaluated implementing return, volatility and risk-adjusted measures. **Findings**: The social pillar-based portfolio outperformed the conventional one and benchmarking indices in the observed five-year period. However, mixed results were obtained in the short-term indicating that specific effects of CSR practice on financial performance of the companies in observed developing market could still be obscured. **Contribution**: This paper expands the existing research related to SRI in the developing markets and offers practical recommendations for potential socially conscious investors.

Keywords: socially responsible investing, social performance disclosure index, social pillar, portfolio diversification, emerging markets, data mining, clustering

JEL Classification: G32, G11, M14, C38, O16, Q56

1. Introduction

The socially responsible investing (SRI) is becoming increasingly important in financial markets. Conceding the consequences of unethical behaviours, especially after the 2008-09 financial crisis, the growing number of investors have adopted the SRI principles enlarging the global sustainable investments up to $35.3 trillion (GSIA, 2020). There are various investment strategies that socially conscious investors use, but their implementation depends on numerous factors. A practical approach to defining an SRI-based investment portfolio, includes both screening criteria used to identify stocks of socially responsible companies and methods of selection employed to determine the portfolio structure. In the selection of financial assets and the formulation of an optimal SRI strategy, investors have been dominantly using the enhanced Markowitz mean-variance optimization framework that incorporates the financial, social and environmental criteria in the portfolio selection process (Oikonomou, Platanakis, & Sutcliffe, 2018). However, integrating the information

on environmental, social and corporate governance (ESG) issues in the portfolio optimization may be complex due to several reasons (Davis, Balkissoon, & Heaps, 2017): (1) incompleteness and inaccuracy of the data accompanied by a low transparency in small and medium sized companies, as well as on the emerging and frontier markets; (2) increased risk of benchmark underperformance due to reduction in an investable set; (3) a challenge related to materiality management. Moreover, not all ESG pillars contribute to the corporate financial performance. Observed over a longer period of time, social pillar drives firm value (Bajic & Yurtoglu, 2018), so the use of specific pillar score may influence significantly the structure of the portfolio and its performance.

Mature financial markets provide the most favourable environment for the development of SRI due to their supporting institutional setting (Adamska, Dabrowski, & Grygiel-Tomaszewska, 2016). Although investments in emerging markets can be sound (Stankovic, Markovic, & Stojanovic, 2015) and contribute significantly to international portfolio risk diversification, a highly volatile nature of these markets and lack of affirmative set of institutional determinants prevent the accurate analysis, making SRI highly unfeasible. Therefore, the problem of diversification, when creating SRI-based portfolios, requires the application of alternative data-driven methods based on artificial intelligence (Bartram, Branke, & Motahari, 2020).

In this paper, we follow the approach of incorporating the social criteria in the equity selection process based on the Social Performance Disclosure Index (SPDI) and implement cluster analysis as a method for determining portfolio structure. Under the assumption that employee related information is financially material to investment decision-makers, we explore the influence of integrating SPDI in investment portfolio selection at the BSE on its performance. Therefore, the objectives of this study are twofold. By implementing content analysis of financial and non-financial reports of the companies listed on the BSE and systemizing the gathered information on social issues we attempt to assess social pillar scores of the companies at the Serbian capital market. Moreover, we aim to create an efficient SRI framework for the BSE using data mining algorithms. To our knowledge, this is the first study applying SRI principles to an available investment set at the Serbian capital market, while simultaneously considering social dimension of sustainable business practice.

This paper is structured as follows: the introductory part is followed by a brief review of the literature raising the issues of the effects of integration of sustainability criteria into portfolio analysis. Subsequently, we present the used data set and methodology employed for the construction of SPDI and portfolio structure. In the fourth part of the paper, we analyse the empirical results, while the final section provides the main conclusions.

2. Literature Review

In order to achieve sustainable development goals (SDG), the economic development should be supported by the well-regulated and ethically oriented financial system, which will foster SRI, on one hand, and facilitate sustainable and socially responsible business practice on the other (Busch, Bauer, & Orlitzky, 2016; Sciarelli et al., 2021). Although there is a lack of uniform definition of SRI, as well as heterogeneity of terms on terminological, strategic and practical levels (Sandberg et al., 2009; Talan & Sharma, 2019), in a broad sense SRI can be defined as an investment approach that use ESG criteria to analyze potential investments that are commonly financially driven (Migliorelli & Dessertine, 2019, p. 65). Depending on the investor's preferences and availability of data, the ESG criteria can be integrated differently into the investment analysis. Most of the research in this area is based on overall ESG-indicators. However, since the financial materiality of ESG issues varies (Amel-Zadeh & Serafeim, 2018), some studies differentiate environmental, social and governance indicators in separate groups of indices (Jedynak, 2017). Thus, the European investors consider information on corporate social responsibility (CSR) as value-increasing (Miralles-Quiros, Miralles-Quiros, & Arraiano, 2017), especially the ones concerning customers and employees, while the American investors find corporate governance issues material for their investment decisions and are more interested in development of new investment products (Amel-Zadeh & Serafeim, 2018).

Investors have developed numerous approaches to integrate ESG considerations in their investment strategies, but the main ones are (Migliorelli & Dessertine, 2019, pp. 19-20): sustainability themed strategies, best-in-class, norms-based, exclusion and engagement and voting strategies. Usually, they employ more than one strategy in defining SRI-based portfolio, as well as different methods to construct portfolio. Passive investors may realize acceptable equity risk premium by examining the shares of companies encompassed by some of social responsibility rankings and attempting to mimic cap-weighted benchmarks with superior ESG characteristics (e.g., Melas, Nagy, & Kulkarni, 2017). Active investors, however, integrate ESG criteria

into their strategies implementing divergent screening criteria and optimization methods to determine the structure of the portfolio. Despite the growing interest in SRI, a small variety of studies investigates manners in which SRI-based portfolio is determined. The common practice in empirical research regarding portfolio optimization is the usage of Markowitz optimization framework and varieties of modern portfolio construction methods, which proved to be more efficient in comparison with simplistic techniques (Oikonomou, Platanakis, & Sutclifee, 2018).

Numerous studies identified positive, negative, and neutral results regarding SRI performance (for a literature review see: Whelan et al., 2021). A number of studies that analysed single-pillar investment strategies showed that a social pillar investment strategy contributed to stock-price performance (Edmans, 2011; Edmans, Li, & Zhang, 2014; Giese, Nagy, & Lee, 2021). The heterogeneity of SRI performance can be explained by numerous factors: geographical areas, size of the sample, methodologies used to construct SRI-based portfolio and to measure its financial effects, analysis period and comparative benchmarks. A majority of the SRI-related studies focuses on developed capital markets of Europe, United States and Canada studying the SRI performance mostly on the smaller samples of shares, and neglecting the developing markets, especially Eastern European ones (Von Wallis & Klein, 2015). The studied observation period is usually short- and medium-term, while only few studies consider a long-term period of more than 10 years (Talan & Sharma, 2019). Therefore, different SRI performances in empirical studies could be explained by used methodologies for portfolio optimisation (Oikonomou, Platanakis, & Sutcliffe, 2018) and the evaluation of its financial performance (Revelli & Viviani, 2015).

During the global disruption due to the COVID-19 pandemic, SRI brought increased attention of investors to social issues (UBS Global, 2020). Although the impact of ESG scores and its pillars varied across industries, sustainable business practice, especially environmental and social pillars of ESG, significantly explained the returns of industry portfolios during the pandemic (Diaz, Ibrushi, & Zhao, 2021). In such a specific investment environment emerging market could be considered as socially conscious investors' new centre of interest (Sherwood & Pollard, 2018; Sharma et al., 2021). Therefore, this study attempts to address a research gap by analysing the implications of socially driven asset selection on portfolio performance in an emerging capital market. Considering that the practice of sustainability reporting on the BSE is recent (Dencic-Mihajlov & Spasic, 2016) and that the most developed aspect is reporting on social responsibility (Dencic-Mihajlov et al., 2020), a social pillar-based portfolio will be determined based on the social criteria measured by SPDI. The composition of the portfolio will be determined using soft data mining techniques since modern portfolio optimization framework suffers from significant drawbacks, especially on the emerging markets. Therefore, focusing on the market characteristics and return trends may improve shares segmentation acquired from cluster analysis and may also provide efficiency superior basis for implementation of SRI strategies on the observed emerging market (Markovic et al., 2019). The typical investor tends to improve the ESG quality of its portfolio by maximizing the ESG score without diverging too much from the selected benchmark performance. Accordingly, the straightforward objective function for the selection of the best-in-class shares from the BSE is derived from the approach offered by the European Sustainable Investment Forum (Eurosif, 2018).

3. Data and Research Methodology

3.1 Sample description

This study examines the possibility of constructing social pillar-based (SP-based) portfolio on the Serbian capital market considering that this market can be investment-grade, mostly because it provides significant diversification benefits for international investors due to the low correlation with developed and South East European markets (Zaimovic, Arnaut-Berilo, & Mustafic, 2017). Moreover, the increased turnover realized by the smaller number of transactions indicates that participation of large, institutional investors has been increasing, which confirms the increased economic importance of developing markets, especially in the period after the financial crisis (Melas, 2019).

In order to form a SP-based portfolio, a selection algorithm is applied to a group of stocks, which are continuously being traded on the regulated market and officially constituted the basket of BELEX 15 and BELEX-*line* index on September 16, 2019. An evaluation of the social responsibility of the stocks issuers is performed on the sample consisting of 32 stocks (Table 1), for which data on ESG issues can be provided. Considering the requirements for inclusion in BELEX 15 and BELEX*line* index, we assume that selected stocks are the most liquid securities on the BSE.

Table 1: The structure of the selected group of stocks according to the company's sector

Sector	Number of stocks	Symbol
Manufacturing	11	ALFA, FITO, IMPL, KOPB, SJPT, TGAS, VBSE, VDAV, GMON, SVRL, AVEN,
Construction	4	JESV, TRBG, PPVA, VPDU
Mining	1	NIIS
Real estate activities	1	AERO
Transportation and storage	3	LSTA, STUP, INEU
Professional, Scientific and Technical Activities	2	EPIN, IRTL
Financial and insurance activities	7	ENHL, MTLC, TIGR, KMBN, JMBN, DNOS, GLOS
Administrative and support service activities	1	NSSJ
Accommodation and food service activities	1	RMKS
Wholesale and retail trade	1	TRGOM

Source: Belgrade Stock Exchange (www.belex.rs)

The trading and reporting data used in this study were taken from the website of the BSE (www.belex.rs). Considering the fact that annual financial and non-financial reports for the previous year are publicly published till the end of April the following year, the period in which we test the efficiency of SRI principles implementation is from May 2015 to May 2020 relying on the data in the reporting period 2014-2018. Selection algorithms are executed using 32 assets observation, each of which with approximately 250 in-sample trading data, and repeated in four subsequent years. In the cluster algorithm we use the logarithmic daily returns of the selected stocks' values.

3.2 The structure of the Social Performance Disclosure Index

Considering the positive effect of reporting on social issues on financial performance of BSE companies (Pavlovic, Dencic-Mihajlov, & Stankovic, 2021), this study is focused on the social dimension of sustainable business practice. In this regard, SPDI describes how company impacts the social system the part of which it is, i.e. the relationship of business with its stakeholders. By presenting information on the influence of corporate operations on society, social reporting is considered as the first added feature to long-established financial reporting. The orientation towards single-pillar-based approach derives from two facts. First, weak institutions, social poverty, limited consumer protection, human rights abuse or employee exploitation are at the heart of social debate in almost all emerging countries (Odell & Ali, 2016). Second, most of the Serbian companies have for a long time been applying different systems and accountability methods for their key stakeholders - shareholders and customers. This relates historically to the workers' self-management system that was a prevailing governance model during the period of Yugoslav socialism.

A special challenge "is to identify performance indicators related to impact on other stakeholders, such as communities, employees, suppliers, by including topics of business ethics" (see Dencic-Mihajlov & Zeranski, 2018). For the purposes of this study, we observed information on the social issues available in the annual financial and non-financial reports, which have the character of both mandatory and non-mandatory disclosure, in accordance with the regulatory framework for financial reporting in the Republic of Serbia. Taking into account the Global Reporting Initiative (GRI) Guidelines (GRI, 2016), the social dimension of CSR report is covered by four reporting standards (*GRI 401*: Employment, *GRI 403*: Occupational Health and Safety, *GRI 404*: Training and Education and *GRI 413*: Local Communities), and composed of 11 indicators: *Qualification structure, Gender structure, Age structure, Number of employees, Termination of employment, Volunteer activities, Employee training, Support for employees, Internal and external communication capabilities, Injuries at work and Work days lost due to work injuries*. In line with Dencic-Mihajlov et al. (2020), using content analysis we identify the abovementioned indicators and assign them the following scores: (1) 0 if the information about indicators is not disclosed, (2) 1 if the information in the report is descriptive, and (3) 2 in the situation where the information is disclosed and of a quantitative nature. The SPDI is a composite indicator calculated for each company in the sample as the sum of equally weighted indicators using the following formula:

$$SPDI_t = \sum_{n=1}^{11} w_{n,t} Ind_{n,t}$$

(1)

where $SPDI_t$ represents the value of the SPDI in year t, $t = 1,2,...,5$, $Ind_{n,t}$ is the value of the n indicator in year t and $w_{n,t}$ are positive weighting coefficients satisfying: $\sum_{n=1}^{11} w_n = 1$.

Determining the weights of the indicators may have great impact on the composite indicator for measuring performance of corporate sustainable and socially responsible business practice (Docekalova & Kocmanova, 2016). In this study we treat all eleven indicators equally important for the assessment of the corporate commitment to the social aspect of sustainable business practice, and assign positive, equal weights to all of them.

3.3 Stock selection strategy and portfolio performance measures

In order to determine the structure of the SP-based portfolio and its conventional peer, in this study we use a data mining approach for classification of stocks into clusters. Clustering can be considered an unsupervised machine learning technique because the class label information is not present and "clustering is a form of learning by observation, rather than learning by examples" (Han, Pei, & Kamber, 2011). The selection of clustering algorithm is determined by the characteristics of analysed data and the concrete purpose and application. In financial time series classification hierarchical clustering using Dynamic Time Warping (DTW) distance may provide improvement regarding portfolio diversification (Lim & Ong, 2021). Therefore, DTW distance measure, which allows comparison of one-to-many points and belong to elastic measures, has been used increasingly as a similarity measurement due to its superiority in sequence-alignment flexibility (Wang et al., 2013).

The definition of the DTW distance is given by (Kate, 2016):

$$d_{DTW}(Q,R) = \min_{W=w1,w2,...,wK} \sqrt{\sum_{k=1, w_k=(i,j)}^{K}(q_i - r_j)^2} \tag{2}$$

where Q and R represent two time series, W is the warping path, while $max(m,n) \leq K \leq m+n-1$ represents a group of matrix elements which define the mapping between Q and R, with the k-th element $w_k=(i_k, j_k)$.

Thus, we have used financial time series clustering on daily logarithmic stock returns, which incorporates complete linkage hierarchical clustering and DTW distance measure, in order to classify the stocks for the purpose of determining the classes of stocks.

After classification, we distribute the stocks inside each cluster for building portfolios relying on the best-in-class strategy. This SRI strategy is one of the main alternatives for investors in the EU with positive compound annual growth rate of 20% in the previous years (Eurosif, 2018). Moreover, this strategy is used in determining the structure of the benchmarking SRI index. The constituents of conventional portfolio are selected relying on the Omega ratio as the criteria for selecting best performing stocks. With no restricting assumptions regarding the underlying distribution of returns, the Omega ratio allows us to compare between risk and return at different threshold return levels. Assuming that $F(x)$ is a cumulative probability distribution function of returns on investment and r_m is the minimum acceptable return, the Omega ratio in this study is determined in the following manner (Keating & Shandwick, 2002):

$$\Omega_H = \frac{\int_{r_m}^{\infty}(1-F(x))dx}{\int_{-\infty}^{r_m}F(x)dx} \tag{3}$$

Therefore, the stocks with the highest Omega ratio from each cluster are selected in order to form a conventional portfolio. To form an SP-based portfolio, we select the stocks according to their Omega ratio and SPDI. For that purpose, we calculate composite OSPDI score as a sum of equally weighted normalized values of Omega ratio and SPDI for each stock. The stock with the highest OSPDI score from each cluster is selected for the SP-based portfolio. The portfolios' weights are determined according to 1/N asset allocation rule and rebalanced once in a year, specifically in May, since the annual financial and non-financial reports are publicly published till the end of April.

Following Oikonomou, Platanakis and Sutcliffe (2018), as a general measure for the evaluation of the quality of the obtained portfolios, in this study we use the following different performance measures: the holding period return r_H, the holding period risk σ_H, the Sharpe ratio SR, the Sortino ratio StR and the Maximum Drawdown MDD, which are calculated according to the following equations:

$$r_H = \sum_{t=2}^{n} logCP_t - logCP_{t-1} \tag{4}$$

$$\sigma_H = \sqrt{\frac{\sum_{t=1}^{n}(r_t-\bar{r})^2}{n-1}} \times \sqrt{n} \tag{5}$$

$$SR_H = \frac{r_H}{\sigma_H} \qquad (6)$$

$$StR_H = \frac{r_H}{\sigma_{dH}} \qquad (7)$$

$$MDD_H = \max_{t \in [1,n]} D_t \qquad (8)$$

where *CP* represents the closing price of the stock at t, $t = 1, 2, …, n$, while n is the number of trading days within the observed holding period, and D is a drawdown of stock return from its running maximum over a period of time H.

4. Research Results and Discussion

Socially driven allocation of financial means on the BSE presented in this study results in twofold outcomes. First, the SPDI of the most traded companies on the Serbian capital market is defined using content analysis of annual reports of the companies. Considering the fact that there are no rating agencies that rated the CSR practices of the Serbian companies, as well as proposed methodology for CSR assessment, we can conclude that this research provides an objective rating of the socially responsible behaviour of the constituents of the market indices BELEX 15 and BELEX*line.*

The descriptive statistics of SPDIs and Omega ratios in the period 2014-2018 are presented in Table 2. Having in mind that the value of SPDI ranges from 0 to 2, it can be noted that the level of SPDI of the companies at the BSE is rather low. During the observed period, the minimum value of the SPDI remained 0.18, while the maximum value increased from 1.55 to 1.91. These results show that companies that do not practice reporting on social issues, have remained at the same low level of reporting during the observed period. However, companies that found engaging in social issues important, enhanced reporting and disclosed more information on this issue. The value of standard deviation, which is rather high, also indicate that values of SPDIs are spread from the mean. In 2014 the average value of SPDI was 0.5 and remained at that level until 2017. In 2017 and 2018 we can observe the slight increase in the average value of SPDI, which indicate an upward trend. Moreover, the value of median also increased during this period and in 2018 was close to the value of mean, so we can conclude that the distribution of SPDI was becoming symmetrical. The change of average value of Omega ratios in the observed period also indicates an increasing trend and consequently a more favourable investment environment. From 2014 to 2017 the average value of Omega ratio increased from 0.97 to 1.84, while in 2018 the average value was slightly lower (1.40). In the period 2014 – 2016 the value of median was close to the value of mean and followed the upward trend. However, the value of median in 2017 and 2018 departed from the mean value evidencing the asymmetrical distribution of the Omega ratio. Moreover, the wide range of the Omega ratio values as well as the high variability show diversity of probability distribution of returns on selected stocks.

Table 2: Descriptive statistics of SPDIs and Omega ratios of the sample companies during the observed reporting years

	2014		2015		2016		2017		2018	
	SPDI	Omega	SPDI	Omega	SPDI	Omega	SPDI	Omega	SPDI	Omega
Mean	0.50	0.97	0.49	1.06	0.50	1.10	0.53	1.84	0.56	1.40
Median	0.23	1.07	0.36	0.98	0.27	1.06	0.36	1.04	0.45	1.07
StDev	0.42	0.63	0.39	0.95	0.43	1.19	0.47	2.81	0.47	1.51
Min	0.18	0.00	0.18	0.00	0.18	0.00	0.18	0.00	0.18	0.00
Max	1.55	2.37	1.55	5.27	1.91	6.86	1.91	14.05	1.91	7.47

Source: Authors' calculation

Relaying on the proposed methodology, we construct two portfolios and rebalance them in the same periods in order to compare their performance. Thus, in the observed period we have analysed five differently structured SP-based and conventional portfolios (Figure 1), as well as the overall performance of the SP-based investing strategy on the BSE (Table 3).
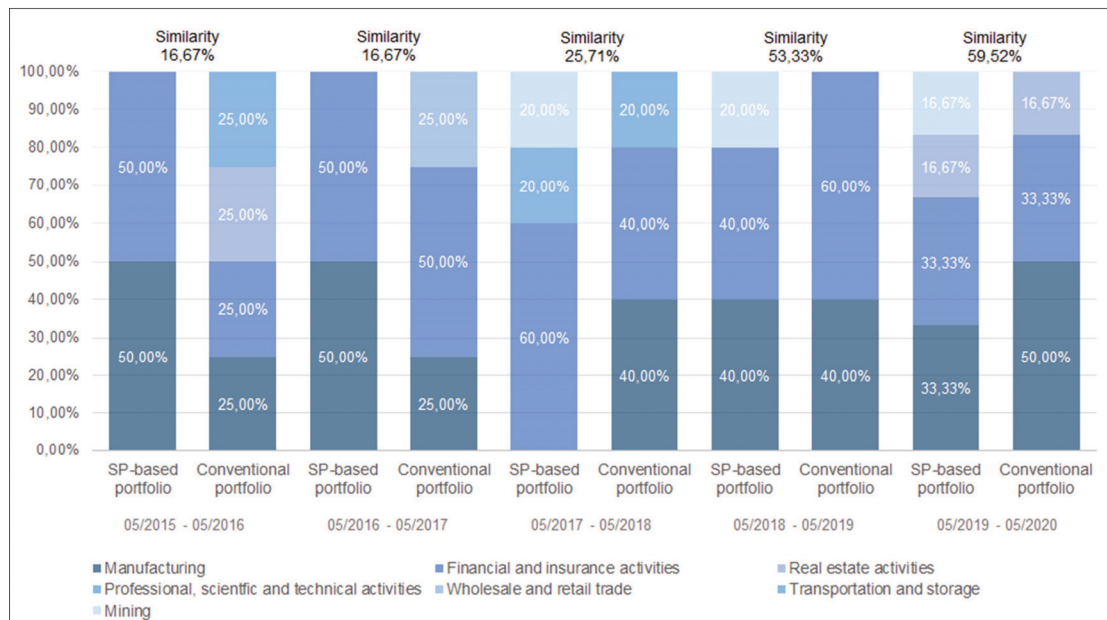
Figure 1: The similarity of portfolios' structures in the observed investment periods

Following Byrne and Lee (2004) we calculate portfolio similarity index of SP-based and conventional portfolios in order to assess similarity in terms of portfolios' compositions, as well as similarity between the weights attached to stocks in analyzed portfolios. Comparing the structures of observed two types of portfolios, it can be concluded that the structures are changing and becoming more similar as disclosure on social issues improved. In the first two subperiods the similarity between the SP-based and the conventional portfolio was 16.67%, but in the following periods it increased, so in the last sub-period the structure of these two portfolios overlapped by 59.52%. In the line with the Sharma et al. (2021), these results indicate that returns on the conventional and the SP-based portfolio in the BSE became more synchronized both in frequency and in time. Such results reveal that the investors on the BSE, as investors on developed European market according to Amel-Zadeh and Serafeim (2018), consider social aspects of companies' businesses practice material for their investment decisions. According to the increasing trend of SPDI, it is obvious that managers are aware of these positive signalling effects that create a stimulating framework for the improved CSR disclosing practice on this market, which is in line with evidence from other emerging markets (Odell & Ali, 2016). Moreover, contrary to the study of Giese, Nagy and Lee (2021), the structures of the SP-based portfolios during this period show that stock-price performance of manufacturing companies and financial and insurance institutions are more exposed to the influence of social pillar score, and therefore more devoted to sustainable and socially responsible business practice in comparison with the companies from other industries.

In order to provide a reliable comparative analysis of the investment performance we study the effects of conventional investment practice and socially driven asset allocation in the same manner. Moreover, we compare the performance of the SP-based portfolio with the stock market performance represented by BELEX 15 and BELEX-*line* indices, as well as with the CECE SRI index, which is composed of the leading sustainability-driven companies traded on the stock exchanges from the Central, Eastern and South-Eastern Europe, including BSE. The achieved performance of various types of observed investment possibilities is presented in Table 3.

Table 3: Performance of SP-based portfolio and benchmarking portfolios during the observed period – from May 2015 to May 2020

Indicators	SP-based portfolio	Conventional portfolio	BELEX 15	BELEX*line*	CECE SRI
Number of stocks	4 – 6	4 – 6	7 – 15	≤ 34	10
Holding period return	30.22%[*]	-16.68%	-5.49%	2.39%	11.04%
Holding period risk	49.54%	52.90%	25.74%	20.08%	33.19%
Sharpe ratio	0.61003	-0.31522	-0.21334	0.11927	0.33249
Sortino ratio	0.01712	-0.00885	-0.00601	0.00182	0.00864
Maximum drawdown	-22.94%	-25.14%	-25.81%	-20.43%	-29.82%

[*]Statistically different results of SP-based investment portfolio compared to its conventional peer according to one-tailed *t*-test (p<0.10)

Confirming the results of the majority of investment studies that relied on the market-based measures of financial performance (Whelan et al., 2021), we observe that the SP-based portfolio provides investors with higher returns up to 36% than BELEX 15 and approximately 28% higher than BELEX*line* in the long run. Furthermore, socially driven investments in the BSE provide superior returns in comparison with regional benchmark, since the SP-based portfolio return in the observed holding period are higher by up to 19.18% than CECE SRI index. The SP-based portfolios, however, did not show a lower level of volatility than observed market indices. Risk diversification in this case may not be optimal due to the reduced number of stocks that constitute the SP-based portfolio and its conventional peer, as noted by Davis, Balkissoon and Heaps (2017), compared to the BSE indices and the CECE SRI index[1]. Despite the volatility, the potential drop in SP-based portfolio return is lower than the magnitude of substantial drops in returns on the BELEX 15 and the CECE SRI index. Due to the higher returns that socially conscious investors can achieve, the risk-return trade off, concerning SP-based portfolios, is higher in comparison with the conventional ones. Proving the potential for risk-adjusted return on ESG integration in emerging markets observed by Sherwood and Pollard (2018), the overall performance measured by the Sharpe and Sortino ratio for the complete five-year period evidences that long-term oriented socially responsible investors can diversify their portfolios on the BSE. The socially driven strategy of investing in companies with high social pillar score outperformed conventional peers, as showed by Edmans (2011) and Edmans, Li and Zhang (2014).
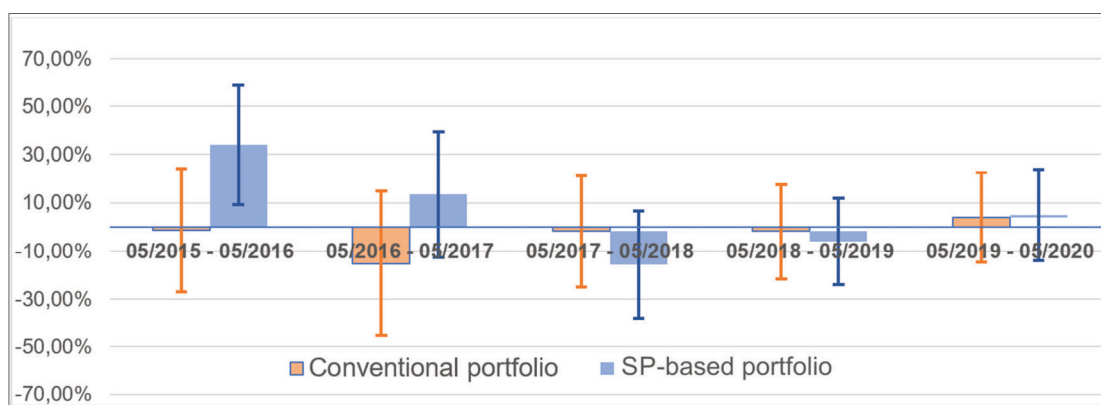

Figure 2: Holding period return and standard deviation of conventional and SP-based portfolios during the observed sub-periods

However, during the observed sub-periods, socially driven portfolios showed mixed performance compared to the benchmarking conventional ones (Figure 2). Although we cannot confirm the results of previous studies (Revelli & Viviani, 2015; Oikonomou, Platanakis, & Sutcliffe, 2018) regarding benefits of applying quantitatively sophisticated optimization models in SRI, we consider the obtained results encouraging for both investors and academics. The approach that is implemented in stocks segmentation as well as a relatively short period of analysis, although revealing important information for investors, has obscured the specific effect of CSR on financial performance, as shown by Revelli and Viviani (2015). There were periods of downturn and upturn on the BSE, which clearly affected the returns on selected stocks more than CSR practice of their issuers. In line with Davis, Balkisson and Heaps (2017) considering the low transparency of ESG data, as well as Adamska, Dabrowski and Grygiel-Tomaszewska (2016) when it comes to insufficiently supportive institutional setting in the Serbian developing market, we can conclude that there are various obstacles to defining the optimal SRI strategy. Nevertheless, it can be observed that disclosure on CSR practice is a signal of the company's capabilities that may create value for the investors in developing markets such as is the case in developed ones demonstrated by Miralles-Quiros, Miralles-Quiros and Arraiano (2017). The period of unusual global economic uncertainty caused by Covid-19 pandemic, shows now more than ever that long term orientation and resilience are critical components of portfolio construction, especially at emerging markets. In addition, this study suggests that the achievement of these components requires both the improvement of the quality and quantity of sustainability disclosure practice and the enhancement of the models used in SRI-based portfolio construction.

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[1] The official methodology for BELEX15 and BELEXline calculation can be found at the website of the Belgrade stock exchange: www.belex.rs, while the methodology for CECE SRI index is presented at the website of the Vienna stock exchange: https://www.wienerborse.at.

Conslusion

Considering the aforementioned gap in the literature on SRI strategies in developing markets (Talan & Sharma, 2019), the present study aims to contribute to contemporary research by increasing the level of understanding of disclosure on CSR practices and their impact on investment performance using the case of the BSE. The analysis of investment practice on the Serbian capital market provides no sound evidence that investors implement SRI principles. Therefore, the results of this study which indicate the possibility of achieving favourable performances on SP-based portfolios, should support socially responsible behaviour of investors on the BSE. The analysis of the effects of socially driven asset allocation in this market evidences that in the long term investors can do good while improving risk-return trade off. This conclusion is in line with contemporary research conducted on the developed markets.

The findings of this study offer important implications for policymakers and corporate managers as well.

This study provides a comprehensive framework for measuring the level of CSR performance of Serbian listed companies on the basis of publicly available information. This should help policymakers to introduce an effective CSR reporting system and promote the CSR reporting in order to produce clear information necessary for the evaluation of the corporate social performance of companies listed on the BSE and SRI decision making. The new version of the Law on Accounting, which came into force on 1 January 2020, envisages, in accordance with EU Directive 2014/95/EU, the introduction of a non-financial reporting obligation for large legal entities that should disclose information necessary to understand how the entity was coping with ESG issues (Official Gazette of the RS, No. 73/2019). This is certainly a shift in regulation, but it does not precisely define the content of disclosure on social and, generally speaking, sustainability indicators. The next step can be to standardize information towards creating a minimally acceptable set of quantitative indicators, or a broader set of predefined qualitative and quantitative indicators (modelled according to the GRI and forthcoming EU sustainability reporting standards).

A moderate increasing trend of SPDIs of the sample companies listed on the BSE indicates that corporate managers have become aware of the positive signalling on the market trends. Certain similarities between the composition of SP-based portfolios and conventional portfolios show that the best performing stocks become more suitable for socially responsible investors. However, the potential of these effects is relatively diminished due to insufficient development of the institutional framework that will facilitate the comprehensive high-quality information on companies' CSR practice.

Having in mind the level of voluntary disclosure on sustainable and socially responsible business practice in developing markets, additional improvements of the proposed study should consider wider information on ESG issues (e.g., environmental and governance issues) provided by various communication channels. Second, the lack of availability of data has limited the sample size, so the future research should tend to present a basis for more generalized results by widening the analysed sample, preferably with the stocks traded on the similar neighbouring markets.

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