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Random Walk of Socially Responsible Investment in Emerging Market

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Abstract: Emerging markets offer some of the world's most impactful investment possibilities for investors concerned with addressing global climate and socioeconomic issues. Sophisticated investors conjectured that socially responsible investment (SRI) or environmental social and governance (ESG) might give greater returns than investing in conventional stocks in an emerging market. At the same time, the investors favour conserving the environment while generating long-term economic growth. Being able to earn greater returns is an indication of an inefficient market. This paper investigates the random walk (weak-form of the efficient market) of SRI/ESG indices in the emerging market (based on IMF emerging market criteria). We use the daily data as a sample. Random walk is tested using an Augmented Dickey–Fuller (ADF) Unit Root test, Variance ratio test and Hurst exponent test. The findings report that all the indices are not following a random walk. Lack of ESG disclosure, inadequate corporate governance regulation and behavioural bias might be reasons for market inefficiency. Its implications for investors to reap abnormal market returns by identifying the undervalued stock in the emerging economies. The regulator's approval of operational guidelines and the licensing of exchanges and clearing houses help maintain the markets' fairness. Then, the regulator should intensify corporate governance enhancement, implementation and enforcement continuously; enhance the market and institutional infrastructure, and focus policy on encouraging a more significant and more diverse investor base.

Keywords: random walk; ESG; SRI; emerging market; sustainability

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1. Introduction

In the United States, assets managed using ESG principles increased to $17.1 trillion at the start of 2020, from $12 trillion at the beginning of 2018, which is a 42% growth, according to the US SIF Foundation's 2020 trends report. As in the United States, funding emphasizing sustainability is desperately required in emerging markets (EMs). EMs offer some of the world's most impactful investment possibilities for investors concerned with addressing global climate and socioeconomic issues. Emerging market corporations are currently rivalling their developed market counterparts regarding sustainability practice sophistication and development potential. As the quantity of institutional investors who consider environmental, social and governance (ESG) criteria in making a financial decision has increased, then socially responsible investment (SRI) has integrated ESG criteria into investment decision-making [1–3].

Thus far, extensive research attention has been focused on ESG. For example, Chegut et al. [4] suggest that socially responsible investment (SRI) imposes higher costs and lower diversification than counterpart investments, leading firms to be less efficient and less profitable. Furthermore, European investors favour compensating more for SRI investments because of the higher cost. As result, their investments are underperformed compared to non-SRI portfolios [5,6]. On the other hand, using a new dataset of ESG scores for European companies provided by the rating agency Sustainalytics, Auer [7] suggested that investors in the European market achieve financial and social benefits. When the cut-off rates are

not excessively high, he claimed that negative filters based on environmental and social ratings neither increase nor decrease portfolio values. In contrast, governance screens can considerably improve portfolio performance under comparable circumstances.

Regarding market efficiency, Ang and Weber [8] suggested that SRI in Korea is not following the weak-form efficient market hypothesis, which means that investors will efficiently predict the stock price movement in the future to capture abnormal returns. Gregory [9] has the same conclusion that 16 ESG index returns show no difference in market efficiency from the standard indexes. In other words, there is evidence of weak and semi-strong forms of market efficiency violation. In addition, Mynhardt et al. [10] stated that Dow Jones Sustainability Index exhibits a lower efficiency than the traditional stock market indices.

From the elaboration above, however, studies on addressing random walk in emerging market SRI (ESG) indices have not been conducted. Do the emerging market's SRI (ESG) indices follow the random walk? Do the investors in the emerging market gain alphas for investing in SRI (ESG) indices? In this study, we hypothesize that ESG/SRI indices in emerging markets are not following the random walk. The samples are based on the International Monetary Fund (IMF) criteria for an emerging market. We use two approaches for the analysis. The first approach is a non-parametric Augmented Dickey–Fuller (ADF) unit root test, and the second uses the variance ratio test and the Hurst exponent test. Aumeboonsuke and Dryver [11] suggested that the variance test [12] is the most common method researchers use. Further, the Hurst exponent has been used in many research fields for a long time; the finance field is one of them [13].

The importance of the studies is twofold: (a) due to a lack of knowledge (or a lack of ESG disclosure) and inadequate corporate governance regulations in emerging economies, fund managers employ sustainability criteria to make better investment decisions. Furthermore, in emerging markets, knowing qualitative aspects such as a company's management strength may be advantageous in identifying undervalued companies. In addition, emerging-market governments and regulators play a critical role in developing and implementing ESG norms in the financial markets. (b) The capacity of a stock market to transfer resources from capital providers to their most optimal use defines its efficiency. Prices, the primary tool for allocating resources, must fairly represent all available information in order to do this. Under an efficient market, no investor, regardless of whatever group they belong to, would be able to consistently beat the market by employing a technique that is common to everyone. It can have negative consequences for various investing methods and other behaviours commonly taken for granted. Both the equities research and the valuation tasks will be expensive and will not give any benefits. As a result, the portfolio manager and investment strategist would contribute no value. It indicates that obtaining an undervalued stock is a completely random event. At the bottom line, market efficiency is the capacity of the markets to acquire data that will give an optimum opportunity to both the seller and the buyer [14]. As a result, our notion of looking at the efficiency market in emerging markets is crucial.

By doing so, our contribution is to shed new light and enrich the existing literature by providing evidence of random walk violations in emerging markets, which are not different from their developed market counterparts. Its implications for investors to reap abnormal market returns by identifying the undervalued stock in the emerging economies. The regulator's approval of operational guidelines and the licensing of exchanges and clearing houses help maintain markets' fairness.

The remainder of the study proceeds as follows. In Section 2, we provide the literature review. The data and methodology used for the study are described in Section 3. Section 4 elaborates the discussion and recommendation based on the analysis of data. Finally, Section 5 presents the conclusion that indicates the relevance of our findings.

2. Literature Review

Environmental, social and governance are the non-financial factors that the investors use to measure company sustainability. They have been the criteria in the investment process recently. Environmental factors, such as carbon emissions, air and water pollution, green energy projects, waste management, and water consumption, are concerned with preserving the environment. Social variables, such as employee gender and diversity, data security, customer happiness, and fair labour practices, are used to analyse how a company treats its employees and consumers. Governance indicators, such as the diversity of the board of directors, political donations, CEO salaries, significant litigation, and internal corruption, analyse how a firm is run [15]. According to Chatzitheodorou et al. [16], there are two types of investors in the socially responsible investment (SRI) field. The first category includes investors that switch to SRIs primarily to take advantage of new financial possibilities or to minimize risks related to sustainability's social and environmental components. Value-based investors fall under the second type and are ready to invest money into companies emphasizing the environment, society, and ethics.

Interestingly, Ghosh et al. [17] proved that, unlike conventional bubbles, the effects of green (Green finance refers to "the flow of financial investments into sustainable development projects and initiatives, environmental products, and policies that encourage the development of a more sustainable economy" [17]) bubbles are not detrimental since they boost infrastructure expenditure and economic activity, which is good for overall growth. Moreover, Umar et al. [18] reported that markets adhering to ESG criteria are interconnected, with their connectivity significantly increasing during unrest such as the European sovereign debt crisis, the systemic Greek difficulties, and the coronavirus pandemic. Significant spillover contributors to other markets are the US, Europe, the UK, and Canada, while net recipients include India, Japan, and China.

Sophisticated investors conjectured that SRI might give greater returns than investing in conventional stocks in an emerging market. At the same time, the investors favour conserving the environment while generating long-term economic growth. Being able to earn greater returns is an indication of an inefficient market. As Malkiel and Fama [19] and Fama [20] proposed, the efficient market hypothesis has three forms—weak, semi-strong, and strong. Random walk, which refers to a weak-form efficient market, stated that a market where sequent price changes in individual securities are uncorrelated, as we acknowledge that many researchers have been working on the behaviour of conventional stock markets, results in two folds. Some markets show evidence of efficient markets, such as Borges [21]; Ito et al. [22]; Narayan [23]; and Narayan and Smyth [24,25]. In comparison, other studies suggest that the market is not efficient, for example, Abraham et al. [26]; Al-Faryan and Dockery [27]; Aumeboonsuke and Dryver [11]; Bley [28]; Ngene et al. [29]; and Worthington and Higgs [30].

Moving on to the SRI (ESG) indices, studies on SRI revealed the same inferences of market inefficiency [8,9]. Moreover, Caporale et al. [31] argued that ESG and conventional stock market indices show no substantial differences in persistence and dynamic behaviour. Nevertheless, the emerging markets indices are less efficient due to higher persistence, which leads to more advantages in reaping profitable trading. Using a different set of data, de Dios-Alija et al. [32] found the same result, with no significant differences between ESG and traditional stock markets indices. The volatility behaviour is predictable in some way. In terms of SRI indices performance, Managi et al. [33] argued that SRI of UK, US and Japan market indices do not underperform conventional indices.

Furthermore, the results show that investors can pursue environmental and social goals without making substantial trade-offs between risk and reward. However, Weber and Rong Ang [34] argued that the performances of the SRI index and its benchmark are not different. Furthermore, there is evidence of the persistent performance of the SRI index during the investigation period. The leverage effect is also shown in the conditional volatility of the SRI index. The leverage effect suggested that the SRI index outperformed the conventional indices under a bearish period. Hence, during bearish emerging markets,

the SRI index can be an alternative investment. In the same line, Tripathi and Kaur [35], who compared the performance of SRI indices in developing and developed markets, found no significant difference in the performance in both markets.

Further, they suggested that investors might use SRI investment in developing markets as a diversification tool during the bearish condition. This finding is supported by Saci et al. [36]. They suggested no significant difference in returns for SRI investment funds and traditional funds in China from 2016 to 2019. On the other hand, Cunha and Samanez [37] compared the Corporate Sustainability Index (ISE) with the market portfolio and other sectoral indices of the Brazilian market using return and risk indicators, level of liquidity as well as other performance measures, such as Omega, Sortino, Treynor, and Sharpe. The authors argued that ISE did not reach a satisfactory level of financial performance, even though the liquidity level was increased and the risk of diversification was low. Some restrictions on the allocation of capital for ISE might be the reason for being less performed. Other studies also suggest that SRI portfolios are under-performed by their traditional counterparts, to mention a few such as Auer and Schuhmacher [5]; Cakici and Zaremba [38]; Chegut et al. [4]; Lean and Nguyen [2]; and Ortas et al. [6].

To conclude, substantial research assesses the performance of SRI/ESG stock indexes, and substantial literature examines the market efficiency of conventional stock market indices in a developed market. However, none of the existing research performs random walk testing for SRI/ESG stock indexes in developing economies. The current research aims to fill a gap in the existing literature.

3. Data and Methodology

We obtained all the daily data of the SRI or ESG indexes of available emerging countries' SRI/ESG indexes from Bloomberg and the Investing.com financial website. Table 1 shows the details of the data and periods. Rt = $(P_t - P_{t-1}/P_{t-1})$*100% is the daily rate of return calculated from the index.

Table 1. Data and periods *.

Index	Period
MSCI Brazil ESG	29 March 2017–15 April 2022
MSCI China Carbon SRI leaders	1 September 2020–18 April 2022
S&P/ESG Egypt	26 July 2018–21 April 2022
SRI Kehati (Indonesia SRI)	29 March 2017–18 April 2022
MSCI India ESG	29 March 2020–15 April 2022
MSCI Malaysia ESG Leaders	29 March 2017–15 April 2022
MSCI Philippines ESG	29 March 2017–15 April 2022
MSCI Thailand ESG	29 March 2017–15 April 2022
MSCI Taiwan ESG Leaders	29 March 2017–15 April 2022
MSCI South Africa ESG Leaders	29 March 2017–15 April 2022
MSCI ACWI SRI	29 March 2017–15 April 2022
MSCI EM ESG Leaders	29 March 2017–15 April 2022
DJSEM	30 September 2012–12 April 2022
MCSI Latin America ESG Leaders	30 March 2017–15 April 2022

* The data is based on the availability, not all emerging markets (based on IMF criteria) have ESG/SRI index. The sample period is not same based on the data availability.

We use two approaches for the analysis. The first approach is a non-parametric Augmented Dickey–Fuller unit root test, and the second approach uses a variance ratio test and the Hurst exponent test. Aumeboonsuke and Dryver [11] suggested that the variance test [12] is the most common method used among researchers.

Augmented Dickey–Fuller (ADF) test is to detect the unit root problem. If the series has unit root problems, it means that it follows a random walk [39,40]. The equations of the ADF test are as follows:

$$\Delta Y_t = \delta Y_{t-1} + \mu_t \quad (1)$$

$$Y_t = \rho Y_{t-1} + \mu_t \tag{2}$$

where: Y = the index price; μ = term of error.

H_0 = the index follows random walk (has unit root problem).

The next approach is a Variance ratio test (VR), which is developed by Lo and Mackinlay [12]. VR is defined as below:

$$VR = \frac{\sigma^2(q)}{\sigma^1(1)} \tag{3}$$

where $\sigma^2(q)$ is $1/q$ variance of the q-differences and $\sigma^1(1)$ is the variance of the first differences.

$$\sigma^2(q) = \frac{1}{m}\sum_{i=q}^{nq}(X_i - X_i - q - q\hat{\mu})^2 \tag{4}$$

where: $m = q(nq - q + 1)\left(1 - \frac{1}{n}\right)$

$$\sigma^2(1) = \frac{1}{(nq-1)}\sum_{i=1}^{nq}(X_i - X_i - 1 - \hat{\mu}) \tag{5}$$

where: $\hat{\mu} = \frac{1}{nq}$.

The robust heteroscedastic test statistic with overlapping intervals is as follows:

$$z^*(q) = \frac{VR(q) - 1}{\varphi^*(q)^{1/2}} \sim N(0,1) \tag{6}$$

where: $\varphi^*(q) = \sum_{j=1}^{q-1}\left[\frac{2(q-j)^2}{q}\right]\hat{\theta}(j)$

Where: $\hat{\theta}(j) = \frac{\sum_{i=j+1}^{nq}(X_i - X_i - 1 - \hat{\mu})^2(X_i - j - X_i - j - 1 - \hat{\mu})^2}{\sum_{i=1}^{nq}\left[(X_i - X_i - 1 - \hat{\mu})^2\right]^2}$

H_0: the index follows random walk.

The last approach is the Hurst exponent, which has been used in many research fields for a long time; the finance field is one of them [13]. The Hurst exponent (H) assesses a long-term memory of time series or the degree to which it deviates from a random walk. The scalar denotes a pattern of time series, either a mean-reverting or trending pattern. The Hurst exponent has a range of values from 0 to 1. Any time series may be categorized into one of three types based on the H's value:

$H < 0.5$—A mean-reverting series. The mean-reversion process gets stronger when the value is close to 0. In actual practice, a low value is followed by a high value and vice versa.
$H = 0.5$—A geometric random walk.
$H > 0.5$—A trending (persistent) series. The trend gets stronger when the value is close to 1. It means, in reality, that a high value is followed by a higher one.

The Hurst exponent (H) is defined in terms of the Rescaled Range (R/S) below:

$$E\left[\frac{R(n)}{S(n)}\right] = Cn^H as n \to \infty \tag{7}$$

where:

$R_{(n)}$: the range of the first n accumulative deviations from the mean.
$S_{(n)}$: the series of the first n standard deviations.
$E[x]$: the expected value.
n: the period of the observation (number of data points in a time series).
C: constant.

The biased regression coefficient due to the autocorrelation is the problem of the Hurst exponent estimation with regression analysis. Therefore, Lo [41] developed a modified R/S statistic, where S_n is adjusted for short term dependence.

$$S_{(n)(q)} = \frac{1}{n}\sum_{j=1}^{n}(X_j - \overline{X}_n)2 + \frac{2}{n}\sum_{j=1}^{q} W_{j(q)}\left[\sum_{i=j+1}^{n}(X_i - \overline{X}_n)(X_{i-j} - \overline{X}_n)\right]^{1/2} \quad (8)$$

where $j_{(q)} = 1 - \left|\frac{j}{q+1}\right|, q < n$

$$V_n = \frac{1}{\sqrt{n}}\frac{R_n}{S_n} \quad (9)$$

$$V_{n(q)} = \frac{1}{\sqrt{n}}\frac{R_n}{S_{n(q)}} \quad (10)$$

If q is equal to 0, then V_n of the traditional R/S statistic is equivalent to the [41] modified R/S statistic.

H_0: short-range memory.
H_1: long-range memory.

4. Empirical Findings

Table 2 below reports the summary statistics of the indices. The mean values for all series are close to zero, and the China SRI index places the lowest mean value (approximately −0.03). Figure 1 confirms the negative mean return value of the index by the downtrend movement of the China SRI series. The standard deviations of the series are in the range of 0.0097–0.0526. Again, the China SRI index possesses the highest standard deviation. Overall, we notice that all the indices' prices are volatile and show the trend from the figure. Therefore, we may suggest that all the indices are not following the random walk hypotheses.

Moreover, the indices' skewness indicates deviating from the normal distribution curve. Most of the series are either moderately negatively skewed or highly negatively skewed. Only SRI Kehati is moderately positive; India ESG and Malaysia ESG are relatively symmetrical. This statistic implies that more index returns are valued more than the average. Leptokurtic distributions are shown in the data, indicating that the data have significant outliers.

Table 2. Summary statistics.

Index	Mean	SD	Skewness	Ex. Kurtosis
MSCI Brazil ESG	0.00020112	0.022487	−0.71589	8.8025
MSCI China Carbon SRI leaders	−0.0029664	0.052699	−15.947	300.94
S&P/ESG Egypt	−0.00040675	0.016173	−1.9007	13.867
SRI Kehati (Indonesia)	0.00026876	0.013912	0.81852	16.733
MSCI India ESG	0.00068048	0.010658	−0.33566	1.7098
MSCI Malaysia ESG Leaders	9.5293×10^{-5}	0.0083611	−0.21852	8.2689
MSCI Philippines ESG	4.1337×10^{-5}	0.014115	−0.52522	9.6239
MSCI Thailand ESG	0.00010335	0.010569	−1.1540	21.741
MSCI Taiwan ESG Leaders	0.00080415	0.012164	−0.068071	4.3237
MSCI South Africa ESG Leaders	0.00030479	0.018786	−0.48501	3.3680
MSCI ACWI SRI	0.00051574	0.0098140	−1.0297	21.429
MSCI EM ESG Leaders	0.00027887	0.010798	−0.55117	5.4930
DJSEM	0.00014293	0.0097747	−0.65990	7.2092
MCSI Latin America ESG Leaders	0.00010546	0.017985	−0.90443	10.837

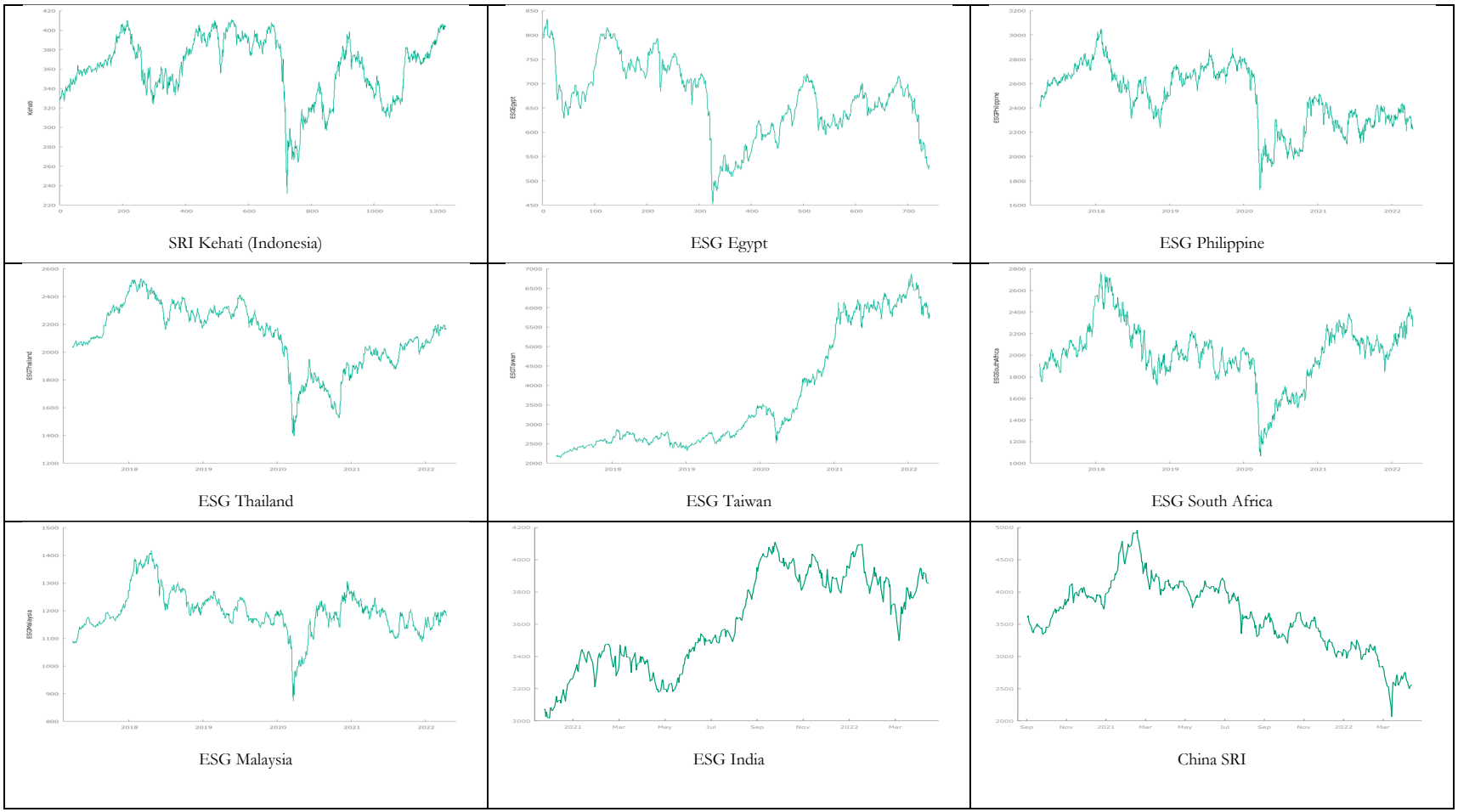
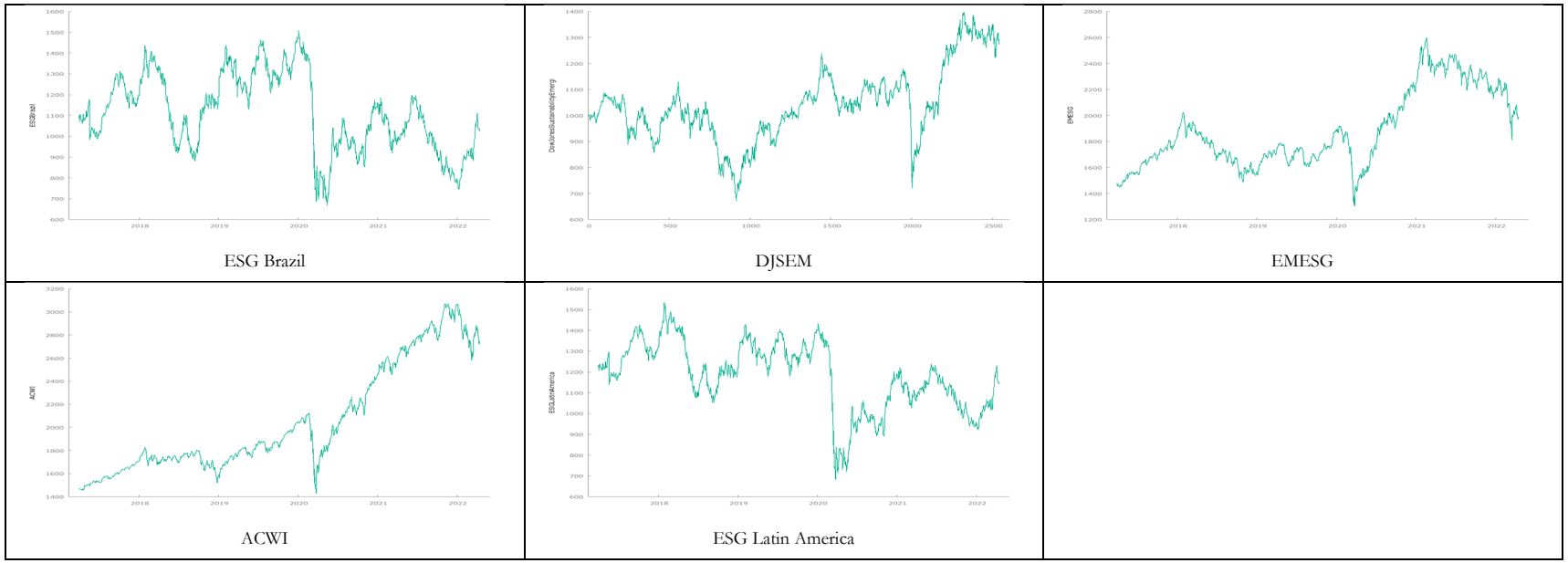


Figure 1. *Cont.*



Note: All the figures show volatility with the trend–the markets do not follow a random walk, and the markets are not efficient (weak-form efficiency)

Figure 1. Price volatility.

Moving on to the formal test for the random walk (weak-form market efficiency) of the ESG/SRI indices, the first test uses the Augmented Dickey–Fuller (ADF) test. As mentioned above, the null hypothesis is that the series has a unit root problem or follows the random walk. Then, the significance of the p-value means that the indices do not follow a random walk, i.e., the markets are not efficient. Table 3 reports the results of the ADF test. We observe that all the ESG/SRI indices are stationary or not following a random walk. The ADF test concludes that the emerging ESG or SRI stock index is not efficient.

Table 3. Augmented Dickey–Fuller test.

Index	Statistic (τ)	Asymptotic *p*-Value	Result
MSCI Brazil ESG	−12.7833	2.999×10^{-28} ***	no unit root problem (no random walk)
MSCI China Carbon SRI leaders	−7.04928	6.962×10^{-10} ***	no unit root problem (no random walk)
S&P/ESG Egypt	−8.67311	4.834×10^{-15} ***	no unit root problem (no random walk)
SRI Kehati (Indonesia)	−8.1309	2.059×10^{-13} ***	no unit root problem (no random walk)
MSCI India ESG	−13.1661	1.767×10^{-29} ***	no unit root problem (no random walk)
MSCI Malaysia ESG Leaders	−13.9945	4.267×10^{-32} ***	no unit root problem (no random walk)
MSCI Philippines ESG	−20.2898	6.749×10^{-48} ***	no unit root problem (no random walk)
MSCI Thailand ESG	−13.6947	3.71×10^{-31} ***	no unit root problem (no random walk)
MSCI Taiwan ESG Leaders	−24.3104	4.307×10^{-52} ***	no unit root problem (no random walk)
MSCI South Africa ESG Leaders	−13.9669	5.204×10^{-32} ***	no unit root problem (no random walk)
MSCI ACWI SRI	−9.37127	3.308×10^{-17} ***	no unit root problem (no random walk)
MSCI EM ESG Leaders	−14.7341	2.292×10^{-34} ***	no unit root problem (no random walk)
DJSEM	−18.2548	8.009×10^{-44} ***	no unit root problem (no random walk)
MCSI Latin America ESG Leaders	−12.7981	2.686×10^{-28} ***	no unit root problem (no random walk)

*** 1% level of significant. H_0 = the series follows random walk.

The variance ratio test is conducted as a second test for detecting the random walk series. We set 2-, 4-, 8-, and 16-day intervals for the test (Table 4). Again, all the interval tests show that the markets are not efficient (weak-form efficiency) since the results are statistically significant.

Table 4. Variance ratio test.

Index	q-2 (Two Tailed *p*-Value)	q-4 (Two Tailed *p*-Value)	q-8 (Two Tailed *p*-Value)	q-16 (Two Tailed *p*-Value)
MSCI Brazil ESG	6.5599×10^{-9} ***	6.3137×10^{-6} ***	0.00027697 ***	0.0028438 ***
MSCI China Carbon SRI leaders	1.4627×10^{-5} ***	1.2368×10^{-6} ***	0.0001713 ***	0.002054 ***
S&P/ESG Egypt	4.4487×10^{-8} ***	1.352×10^{-7} ***	2.0302×10^{-5} ***	0.00083756 ***
SRI Kehati (Indonesia)	2.0167×10^{-12} ***	6.5918×10^{-10} ***	7.4641×10^{-7} ***	0.00011646 ***
MSCI India ESG	2.8202×10^{-10} ***	1.0233×10^{-9} ***	1.6372×10^{-6} ***	0.00051029 ***
MSCI Malaysia ESG Leaders	1.1111×10^{-8} ***	1.2355×10^{-7} ***	3.0788×10^{-6} ***	6.6265×10^{-5} ***
MSCI Philippines ESG	6.0149×10^{-18} ***	2.7688×10^{-13} ***	1.884×10^{-8} ***	2.3462×10^{-5} ***
MSCI Thailand ESG	5.6383×10^{-8} ***	1.2715×10^{-5} ***	0.00032194 ***	0.007479 ***
MSCI Taiwan ESG Leaders	7.4268×10^{-14} ***	1.5896×10^{-10} ***	9.8773×10^{-9} ***	9.0766×10^{-7} ***
MSCI South Africa ESG Leaders	6.3824×10^{-26} ***	2.7957×10^{-18} ***	7.874×10^{-11} ***	9.1682×10^{-7} ***
MSCI ACWI SRI	6.8367×10^{-6} ***	0.0013198 ***	0.011651 ***	0.042038 ***
MSCI EM ESG Leaders	1.5825×10^{-12} ***	7.4753×10^{-10} ***	9.4272×10^{-7} ***	0.00014272 ***
DJSEM	2.0747×10^{-14} ***	1.7397×10^{-11} ***	8.9392×10^{-9} ***	7.0157×10^{-6} ***
MCSI Latin America ESG Leaders	1.2472×10^{-7} ***	3.2503×10^{-5} ***	0.0008831 ***	0.0066745 ***

*** 1% level of significant. We test the data with intervals (q) 2, 4, 8 and 16 days. H0 = the index follows random walk.

Lo [41] Modified R/S (Hurst) test is the third test conducted to confirm the two previous tests. From Table 5, the results confirm the previous two tests. The emerging markets ESG or SRI are not efficient.

Table 5. Lo (1991) Modified *R*/*S* (Hurst) test.

Index	Lo's Modified *R*/*S* Statistic	Critical Values for 1 Percent	Result–H0
MSCI Brazil ESG	40.404	0.721 and 2.098 ***	rejected
MSCI China Carbon SRI leaders	19.243	0.721 and 2.098 ***	rejected
S&P/ESG Egypt	73.788	0.721 and 2.098 ***	rejected
SRI Kehati (Indonesia)	97.327	0.721 and 2.098 ***	rejected
MSCI India ESG	131.29	0.721 and 2.098 ***	rejected
MSCI Malaysia ESG Leaders	167.99	0.721 and 2.098 ***	rejected
MSCI Philippines ESG	83.062	0.721 and 2.098 ***	rejected
MSCI Thailand ESG	137.69	0.721 and 2.098 ***	rejected
MSCI Taiwan ESG Leaders	131.16	0.721 and 2.098 ***	rejected
MSCI South Africa ESG Leaders	80.528	0.721 and 2.098 ***	rejected
MSCI ACWI SRI	143.06	0.721 and 2.098 ***	rejected
MSCI EM ESG Leaders	123.62	0.721 and 2.098 ***	rejected
DJSEM	98.337	0.721 and 2.098 ***	rejected
MCSI Latin America ESG Leaders	63.037	0.721 and 2.098 ***	rejected

*** 1% level of significant. H0 = short-range memory (random walk).

The findings are supported by Ang and Weber [8], who suggested that random walk is not justifiable in DJSI Korea due to the herding behaviour of the investors during the 2008 financial crisis. Moreover, our findings are consistent with the previous studies on conventional stock indices market efficiency, such as Ngene et al. [29], who argued that 18 emerging markets do not follow random walk. Using eight major stock market indices of the world, Aumeboonsuke and Dryver [11] also found that the markets reject a random walk hypothesis. Worthington and Higgs [30] concluded the same results that Asian emerging markets are not efficient, while three developed markets—Japan, Hong Kong, and New Zealand—are consistent with weak-form efficient market hypothesis criteria.

Further empirical findings on market inefficiency are investigated by Bley [28]. However, Arshad et al. [42] argued that OIC member stock markets indicate the improvement of market efficiency during different business cycles over the past decade. In addition, Lekhal and El Oubani [43] suggested that the behaviour of the emerging markets is following the Adaptive Market Hypothesis (AMH) framework rather than EMH.

Among other reasons for SRI (ESG) stock market inefficiency are a lack of knowledge, a lack of ESG disclosure and inadequate corporate governance regulations in emerging economies. Coupled with a delayed reaction to the market's news creates an opportunity for particular investors to make a profit. Moreover, as suggested by Barberis and Thaler [44], humans are vulnerable to making mistakes and are occasionally illogical. They are based on a behavioural bias. As a result, a market is not always efficient. Paul Woolley of the London School of Economics argued a different reason, as stated by Authers [45], that the issue stems from the distinction between principals and agents. Most money is invested in markets by agents operating on behalf of the owners rather than by the owners themselves. Agents—various fund managers—have their motivations, which may differ from their principals', and they may have access to more information. Principal-agent interactions in funds drive the market to flow into and out of large institutions.

Moreover, it is pointed out that the fund managers are paid to beat the stock indices as a benchmark and are compared to their peers. The low-performance fund managers will suffer from outflows, which is the reason behind a momentum effect. Hence, the benchmark should be replaced by growth in nominal GDP.

The next question is how to improve the efficiency of the market. The government plays a critical role in improving market efficiency. Literature indicates that corporate

governance—such as ESG criteria, shareholder rights, creditor rights, disclosure standards & practices, accounting and auditing director liability—is the most significant stock market efficiency determinant. Mainly, it plays a significant role in determining how much the values of individual stocks change in reaction to information about a particular company. Thus, the regulator should continuously intensify corporate governance enhancement, implementation and enforcement. In addition, the market and institutional infrastructures, such as derivatives, short selling, stock lending and repurchase agreement, must be enhanced due to lower transaction costs. Low transaction costs influence the efficiency of the market. Lastly, focusing policy on encouraging a more significant and diverse investor base, such as pensions, the insurance industry and cross-border investment. More diversified investor base and preferences induce portfolio equity inflows, which reduce the transaction costs [46].

5. Conclusions

Emerging markets offer some of the world's most impactful investment possibilities for investors concerned with addressing global climate and socioeconomic issues. Sophisticated investors conjectured that socially responsible investment (SRI) or environmental social and governance (ESG) might give greater returns than investing in conventional stocks in an emerging market. At the same time, the investors favour conserving the environment while generating long-term economic growth. Being able to earn greater returns is an indication of an inefficient market. This paper investigates the random walk of SRI (ESG) using the emerging market SRI (ESG) indices (based on IMF emerging market criteria). The findings report that all the indices are not following a random walk. Lack of ESG disclosure, inadequate corporate governance regulation and behavioural bias might be reasons for market inefficiency. Its implications for investors to reap abnormal market returns by identifying the undervalued stock in the emerging economies. In addition, as regulators, emerging-market governments play a critical role in developing and implementing ESG norms in the financial markets. The regulator's approval of operational guidelines and the licensing of exchanges and clearing houses help maintain markets' fairness. Then, the regulator should continuously intensify corporate governance enhancement, implementation and enforcement, enhance the market and institutional infrastructure, and focus policy on encouraging a more extensive and diverse investor base.

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References

1. Koellner, T.; Suh, S.; Weber, O.; Moser, C.; Scholz, R.W. Environmental impacts of conventional and sustainable investment funds compared using input-output life-cycle assessment. *J. Ind. Ecol.* **2007**, *11*, 41–60. [CrossRef]
2. Lean, H.H.; Nguyen, D.K. Policy uncertainty and performance characteristics of sustainable investments across regions around the global financial crisis. *Appl. Financ. Econ.* **2014**, *24*, 1367–1373. [CrossRef]
3. US SIF US SIF foundation releases 2016 biennial report on US sustainable, responsible and impact investing trends. *Forum Sustain. Responsible Invest.* **2016**. Available online: https://gsgii.org/reports/us-sustainable-responsible-and-impact-investing-trends-2016/ (accessed on 16 August 2022).
4. Chegut, A.; Schenk, H.; Scholtens, B. Assessing SRI fund performance research: Best practices in empirical analysis. *Sustain. Dev.* **2011**, *19*, 77–94. [CrossRef]
5. Auer, B.R.; Schuhmacher, F. Do socially (ir)responsible investments pay? New evidence from international ESG data. *Q. Rev. Econ. Financ.* **2016**, *59*, 51–62. [CrossRef]

6. Ortas, E.; Moneva, J.M.; Salvador, M. Does socially responsible investment equity indexes in emerging markets pay off? Evidence from Brazil. *Emerg. Mark. Rev.* **2012**, *13*, 581–597. [CrossRef]
7. Auer, B.R. Do Socially Responsible Investment Policies Add or Destroy European Stock Portfolio Value? *J. Bus. Ethics* **2016**, *135*, 381–397. [CrossRef]
8. Ang, W.R.; Weber, O. The market efficiency of socially responsible investment in Korea. *J. Glob. Responsib.* **2018**, *9*, 96–110. [CrossRef]
9. Gregory, R.P. Market Efficiency in ESG Indexes: Trading Opportunities. *J. Impact ESG Invest.* **2021**, *1*, 72–82. [CrossRef]
10. Mynhardt, H.; Makarenko, I.; Plastun, A. Market efficiency of traditional stock market indices and social responsible indices: The role of sustainability reporting. *Invest. Manag. Financ. Innov.* **2017**, *14*, 94–106. [CrossRef]
11. Aumeboonsuke, V.; Dryver, A.L. The importance of using a test of weak-form market efficiency that does not require investigating the data first. *Int. Rev. Econ. Financ.* **2014**, *33*, 350–357. [CrossRef]
12. Lo, A.W.; MacKinlay, A.C. Stock Market Prices Do Not Follow Random Walks: Evidence from a Simple Specification Test. *Rev. Financ. Stud.* **1988**, *1*, 41–66. [CrossRef]
13. Campos, C.A.S.; Cantú, L.S.; Veleros, Z.H. Dynamic Hurst Exponent in Time Series. March 2019. Available online: http://arxiv.org/abs/1903.07809 (accessed on 9 June 2022).
14. Bhasin, H. What is Market Efficiency? Importance of Market Efficiency. 27 May 2019. Available online: https://www.marketing91.com/what-is-market-efficiency/ (accessed on 27 May 2022).
15. Benson, A. Environmental, Social and Governance (ESG) Investing and How to Get Started. 22 August 2022. Available online: https://www.nerdwallet.com/article/investing/esg-investing (accessed on 23 August 2022).
16. Chatzitheodorou, K.; Skouloudis, A.; Evangelinos, K.; Nikolaou, I. Exploring socially responsible investment perspectives: A literature mapping and an investor classification. *Sustain. Prod. Consum.* **2019**, *19*, 117–129. [CrossRef]
17. Ghosh, B.; Papathanasiou, S.; Dar, V.; Kenourgios, D. Deconstruction of the Green Bubble during COVID-19 International Evidence. *Sustainability* **2022**, *14*, 3466. [CrossRef]
18. Umar, Z.; Kenourgios, D.; Papathanasiou, S. The static and dynamic connectedness of environmental, social, and governance investments: International evidence. *Econ. Model.* **2020**, *93*, 112–124. [CrossRef]
19. Malkiel, B.G.; Fama, E.F. Efficient Capital Markets: A Review of Theory and Empirical Work*. *J. Financ.* **1970**, *25*, 383–417. [CrossRef]
20. Fama, E.F. Random Walks in Stock Market Prices. *Financ. Anal. J.* **1995**, *51*, 75–80. [CrossRef]
21. Borges, M.R. Efficient market hypothesis in European stock markets. *Eur. J. Financ.* **2009**, *16*, 711–726. [CrossRef]
22. Ito, M.; Noda, A.; Wada, T. The evolution of stock market efficiency in the US: A non-Bayesian time-varying model approach. *Appl. Econ.* **2016**, *48*, 621–635. [CrossRef]
23. Narayan, P.K. Are the Australian and New Zealand stock prices nonlinear with a unit root? *Appl. Econ.* **2005**, *37*, 2161–2166. [CrossRef]
24. Narayan, P.K.; Smyth, R. Is South Korea's stock market efficient? *Appl. Econ. Lett.* **2004**, *11*, 707–710. [CrossRef]
25. Narayan, P.K.; Smyth, R. Are OECD stock prices characterized by a random walk? Evidence from sequential trend break and panel data models. *Appl. Financ. Econ.* **2005**, *15*, 547–556. [CrossRef]
26. Abraham, A.; Seyyed, F.J.; Alsakran, S.A. Testing the random walk behavior and efficiency of the gulf stock markets. *Financ. Rev.* **2002**, *37*, 469–480. [CrossRef]
27. Al-Faryan, M.A.S.; Dockery, E. Testing for efficiency in the Saudi stock market: Does corporate governance change matter? *Rev. Quant. Financ. Account.* **2021**, *57*, 61–90. [CrossRef]
28. Bley, J. Are GCC stock markets predictable? *Emerg. Mark. Rev.* **2011**, *12*, 217–237. [CrossRef]
29. Ngene, G.; Tah, K.A.; Darrat, A.F. The random-walk hypothesis revisited: New evidence on multiple structural breaks in emerging markets. *Macroecon. Financ. Emerg. Mark. Econ.* **2017**, *10*, 88–106. [CrossRef]
30. Worthington, A.C.; Higgs, H. Weak-Form Market Efficiency in Asian Emerging and Developed Equity Markets: Comparative Tests of Random Walk Behaviour. *Account. Res. J.* **2006**, *19*, 54–63.
31. Caporale, G.M.; Gil-Alana, L.A.; You, K. Global and Regional Financial Integration in Emerging Asia: Evidence from Stock Markets. *SSRN Electron. J.* **2021**, *36*, 185–202. [CrossRef]
32. de Dios-Alija, T.; del Río Caballero, M.; Gil-Alana, L.A.; Martin-Valmayor, M. Stock market indices and sustainability: A comparison between them. *J. Sustain. Financ. Invest.* **2021**. [CrossRef]
33. Managi, S.; Okimoto, T.; Matsuda, A. Do socially responsible investment indexes outperform conventional indexes? *Appl. Financ. Econ.* **2012**, *22*, 1511–1527. [CrossRef]
34. Weber, O.; Rong Ang, W. The Performance, Volatility, Persistence and Downside Risk Characteristics of Sustainable Investments in Emerging Market. *ACRN Oxf. J. Financ. Risk Perspect.* **2016**, *5*, 1–12.
35. Tripathi, V.; Kaur, A. Does Socially Responsible Investing Pay in Developing Countries? A Comparative Study Across Select Developed and Developing Markets. *FIIB Bus. Rev.* **2021**, *11*, 189–205. [CrossRef]
36. Saci, F.; Jasimuddin, S.M.; Hasan, M. Performance of Socially Responsible Investment Funds in China: A Comparison with Traditional Funds. *Sustainability* **2022**, *14*, 1476. [CrossRef]
37. de Cunha, F.A.F.S.C.; Samanez, C.P. Performance Analysis of Sustainable Investments in the Brazilian Stock Market: A Study about the Corporate Sustainability Index (ISE). *J. Bus. Ethics* **2013**, *117*, 19–36. [CrossRef]

38. Cakici, N.; Zaremba, A. Liquidity and the cross-section of international stock returns. *J. Bank. Financ.* **2021**, *127*, 106123. [CrossRef]
39. Khan, W.; Vieito, J.P. Stock exchange mergers and weak form of market efficiency: The case of Euronext Lisbon. *Int. Rev. Econ. Financ.* **2012**, *22*, 173–189. [CrossRef]
40. Stakić, N.; Jovancai, A.; Kapor, P. The efficiency of the stock market in Serbia. *J. Policy Model.* **2016**, *38*, 156–165. [CrossRef]
41. Lo, A.W. Long-Term Memory in Stock Market Prices. *Econometrica* **1991**, *59*, 1279. [CrossRef]
42. Arshad, S.; Rizvi, S.A.R.; Ghani, G.M.; Duasa, J. Investigating stock market efficiency: A look at OIC member countries. *Res. Int. Bus. Financ.* **2016**, *36*, 402–413. [CrossRef]
43. Lekhal, M.; El Oubani, A. Does the Adaptive Market Hypothesis explain the evolution of emerging markets efficiency? Evidence from the Moroccan financial market. *Heliyon* **2020**, *6*, e04429. [CrossRef]
44. Barberis, N.; Thaler, R. Chapter 18 A Survey of Behavioral Financ. *Handb. Econ. Financ.* **2003**, *IB*, 1053–1128. [CrossRef]
45. Authers, J. Why Are Markets Inefficient and What Can Be Done About It? Available online: https://www.ft.com/content/d9f70604-a611-11e3-8a2a-00144feab7de (accessed on 16 August 2022).
46. Ghosh, S.; Revilla, E. Enhancing the efficiency of securities markets in East Asia. *Macroecon. Financ. Emerg. Mark. Econ.* **2008**, *1*, 249–268. [CrossRef]