


Sustainable Investing Based on Momentum Strategies in Emerging Stock Markets: A Case Study for Bombay Stock Exchange (BSE) of India

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Abstract

This research article examines the profitability on the momentum portfolios in the case of the emerging stock market of India, i.e. Bombay Stock Exchange (BSE). Sustainable investing integrates environmental, social and governance (ESG) characteristics into investment decisions. Risk management is one of the most significant ranking factors determining the adoption of corporate strategies based on sustainable investing. A sustainable stock market provides a transparent and effective solution to inherent challenges related to environmental, social, economic and corporate governance issues. The theoretical and empirical analysis conducted in this research article reveals the status of BSE of India in this regard. A company's sustainable market orientation is very important for future developments. The practical significance of this research paper is to investigate the profitability of momentum strategies in Bombay Stock Exchange of India, which is an emergent market. Moreover, the presence of short term momentum effect on Indian stock market is basically an anomaly caused by behavioral and risk-based portfolio construction factors. On the other hand, momentum strategies is a reliable alternative with strong empirical evidence to both fundamental approaches of classical finance, namely efficient market hypothesis (EMH) and behavioral finance paradigm.

Keywords: momentum strategy; winner stock; loser stock; profitability; Emerging Market; momentum portfolio; sustainable development.

JEL classification: C22; G11; G17; O16; Q01.

1. INTRODUCTION

An emergent market is a complex concept particularly characteristic of developing economies (middle and low-income countries) facing high volatility, transition challenges

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and severe changes in economic, political, social and demographic environment. The main features of an emerging market include fragile economic and financial structure, the existence of pro-cyclical policies, a high rate of economic growth based mainly on consumption, vulnerability to foreign currency volatility movements, lower per-capita incomes, lack of fiscal transparency and socio-political instability. Moreover, according to internationally recognized criteria such as FTSE Annual Country Classification Review data provided on September 2018, the following classification of equity markets is provided, i.e.: developed, advanced emerging, secondary emerging and frontier. Moreover, Standard & Poor's Financial Services recommended the following subcategories: developed, emerging and frontier stock markets. Furthermore, MSCI Country Classification has a similar approach considering the following conceptual pillars regarding stock markets, i.e.: developed, emerging and frontier. Momentum effect is a global phenomenon, which contributes to the sustainable development of stock markets all around the world, and especially in the case of emerging markets. [Jegadeesh and Titman \(1993\)](#), which first revealed this phenomenon, examined the behaviour of AMEX & NYSE stocks from 1965 to 1989 based on 32 strategies with the formation and holding period from 3 months to 12 months, and revealed the existence of momentum effect US stock market considering an average monthly returns of 0.095 (t-statistics .0307) in 6/6 strategy. Momentum strategy suggests that stocks which have performed well in the recent past will continue to rise and vice versa, stocks which have performed poorly will continue to decline in the short term. Practically, past winners will remain winners and past losers will remain losers in the short term. This short term is a period with limited-duration from 3 months to 12 months. [Jegadeesh and Titman \(1993\)](#) suggested that past winners will continue to be winners and past losers will continue to be losers in the short-run which is exactly the range between 3 months to 12 months.

This empirical study also provides a theoretical analysis of two diametrically opposed theories of the financial field, respectively Efficient Market Hypothesis (EMH) and behavioral finance paradigm. Traditional financial theory can not explain a variety of abnormalities in stock market behavior. Moreover, [Dhankar and Maheshwari \(2016\)](#) suggested that neither the rational approach based on Efficient Market Hypothesis nor the behavioural finance explanation attempts have reached a level of performance in highlighting the sources of stock price momentum effect. The classic paradigm of Efficient Market Hypothesis (EMH) of Fama (1965, 1970) was widely accepted since the early 1970s and is based on three essential pillars such as: investor rationality, uncorrelated errors, and the assumption that there are no limits to arbitrage. On the other hand, behavioral finance paradigm theory argues that the investment decision making process is significantly influenced by the impact of psychological and emotional factors. The behavioral finance approach is based on cognitive and psychological based theories and suggests that the behavior of investors is influenced in a certain measure by certain factors such as : overconfidence, conservatism, herding complex, overreaction, preconceived ideas, representativeness, optimism bias, irrational thoughts/decisions or rational way of thinking, the psychological profile of the investor (socio-economic background, financial context, culture, religion, race, age, sex, ethnicity, education, duration of unemployment, marital status), as well as the impact of internet, social networks, and media channels. Information asymmetry and illiquidity of stock markets cause perturbations on investment behavior. For

example, efficient market theory completely ignores the concept of liquidity despite the fact that the lack of liquidity causes investors to accept almost any price, whether it is fair or not.

The remainder of the research paper is organized as follows: in [Section 2](#), a literature review is presented regarding momentum effect theory and its relevance for applied finance in order to provide the framework to deliver sustainable profits, particularly in emerging markets, and other relevant aspects on the research topic. [Section 3](#) presents the databases and applied econometric methodology used, while [Section 4](#) presents the empirical results, data analysis and discussion so that the results of our research study are explained and discussed. Finally, we present a conclusion [Section](#), and the references come at the end of the research paper. Our research paper contributes to the literature by providing an original empirical study on Bombay Stock Exchange (BSE) of India.

2. LITERATURE REVIEW

Previously conducted empirical studies have demonstrated the existence of a strong evidence of momentum effect in stock markets. [Kido \(2009\)](#) suggested that over a short-term period there exists a reversal effect by which stocks that exhibited positive (negative) returns in the past will experience negative (positive) returns in the near future, and thus over an intermediate-term period there exists a momentum effect whereby stocks that exhibited positive (negative) returns in the past will experience positive (negative) returns in the future. [Rouwenhorst \(2002\)](#) argued that international equity markets exhibit medium-term return continuation considering return continuation is negatively related to firm size, but is not limited to small firms. [Zaremba \(2018\)](#) studied the momentum effect in country-level anomalies in global equity markets by using a sample of 78 countries for the period from 1995 to 2015 and concluded that returns on individual country-level strategies are weakly correlated. [Ejaz and Polak \(2015\)](#) investigated the existence of short term momentum effect in the stock market of Turkey and the authors concluded that strong short term momentum effect is presented in the stock market of Turkey and all momentum strategies are statistically significant and profitable. In addition, [Cremers and Pareek \(2015\)](#) investigated how the extent of short-term trading relates to the efficiency of stock prices and suggested that momentum returns and subsequent returns reversal are in most cases much more intense for stock assets held primarily by short-term investors, particularly if these investors have achieved high performance in the last period which could generate overconfidence.

[Ejaz and Polak \(2014\)](#) have conducted an empirical research study on short-term momentum effect in stock markets of the Middle East countries, ie UAE (United Arab Emirates), Egypt, Jordan, Morocco, Oman and Saudi Arabia and have identified the presence of short-term momentum effect which reveals the fact that selected stock markets of Middle East have a more similar behaviour to the other developed or emerging economies. [Nguyen \(2012\)](#) analyzed relevant issues regarding short-term momentum effect in the Vietnamese stock market and concluded that momentum strategy which is held for one week produces a significant profit of 0.69 percent per week for the whole sample. [Sehgal and Jain \(2011\)](#) examined the existence of short-term momentum patterns in stock and sectoral returns on Indian stock market and concluded that momentum profits for prior return portfolios are stronger for 6-6 compared to 12-12 strategies. [Rastogi et al. \(2009\)](#) investigated short term momentum effect and overreaction phenomena in the Indian equity

markets and have revealed strong evidence for the presence of short term momentum with a positive influence on stock returns. A variety of empirical research studies have been conducted on various emerging stock markets. [Zeng and Liu \(2016\)](#) provided an empirical study of the momentum effect and the reversal effect on the Chinese stock market based on [Jegadeesh and Titman \(1993\)](#) methods and concluded that there exist the short term momentum and mid-term reversal effect. [Henker et al. \(2010\)](#) examined momentum effect in Australian equity market and concluded that there is no evidence for a consistent momentum effect in the Australian equity market since the late 1970s.

[Barberis et al. \(1998\)](#) examined the complex implications of under-reaction and over-reaction on the behaviour of stock market investors and suggested that under-reaction is a feature of conservatism because in most cases investors consider that earnings are more stationary than they are actually in reality. [Hirshleifer and Shumway \(2003\)](#) contributed to literature by providing an original interpretation for momentum in individual stock returns and suggesting that low returns on a stock put the investor clientele of that stock in a negative, critical mood. On the other hand, [Daniel et al. \(1998\)](#) continuing over-reaction causes momentum in security prices because biased self-attribution implies short-run momentum and long-term reversals. [Svolka et al. \(2011\)](#) provided an empirical comparative study on momentum effect by analyzing the differences between developed and emerging stock markets and the authors emphasized the importance of country selection for the profitability of momentum strategies. [Lishenga et al. \(2011\)](#) examined the profitability of momentum strategies in the case of emerging stock market of Kenya for the period 1995 to 2007 and concluded that momentum is influenced by continuation in the idiosyncratic component of individual-security, rather than by cross-sectional differences in expected return and risks. Moreover, [Muga and Santamaria \(2007\)](#) examined the impact of momentum effect in Latin American emerging markets and suggested that risk-averse investor consider that winner portfolios stochastically dominate loser portfolios in these markets.

3. DATA AND APPLIED METHODOLOGY

3.1 General features of S&P BSE SENSEX index

According to the official website of [Bombay Stock Exchange \(BSE\)](#), S&P BSE SENSEX index is a free-float market-weighted stock market index and India's most tracked bellwether index. The S&P BSE SENSEX index has been officially launched on January 1, 1986. Moreover, it is designed to measure the performance of the 31 largest, most liquid and financially sound companies across key sectors of the Indian economy that are listed at BSE Ltd.

The following [table](#) includes relevant data on S&P BSE SENSEX Sectorwise Market Capitalization, such as:

Table no.1 – S&P BSE SENSEX Sectorwise Market Capitalization

Sl. No	SENSEX/Sectors	Free Float Market Capitalization (%)
	S&P BSE SENSEX index	100
1	Finance	42.98
2	Information Technology	14.37
3	Oil & Gas	11.46
4	FMCG	10.08

Sl. No	SENSEX/Sectors	Free Float Market Capitalization (%)
5	Transport Equipments	7.55
6	Capital Goods	4.35
7	Metal, Metal Products & Mining	2.82
8	Power	2.43
9	Chemical & Petrochemical	1.71
10	Healthcare	1.14
11	Telecom	1.11

Source: authors computation based on data provided by the official website of Bombay Stock Exchange (BSE)

3.2 The concept of sustainability and its impact on Indian stock exchange

Is Bombay Stock Exchange (BSE) of India a sustainable stock market? For a well-founded answer, we need to provide an adequate theoretical framework for the concept of sustainability and its global implications. Sustainable development is a great challenge for the global economy considering both local and global prospects for humanity. A sustainability initiative is a significant challenge for low-and middle-income countries considering their main characteristic features such as: demographic dynamics, high degree of poverty, poor quality education, migration, environmental degradation, social inequality, high levels of urbanization, health system deficiencies, rapid technological change and unsustainable economic growth.

A sustainable stock market provides a transparent and effective solution to sensitive issues related to environmental, social, economic and corporate governance aspects. Moreover, a sustainable stock market encourages sustainable investments and responsible corporate performance. A sustainable stock market provides a transparent and effective solution to sensitive issues related to environmental, social, economic and corporate governance aspects. Moreover, a sustainable stock market is publicly committed to follow a disclosure agreement which shall respect the legal directives stated by the United Nations 2030 Agenda and 17 Sustainable Development Goals (SDGs).

Environmental, social and governance (ESG) characteristics provide an essential contribution to sustainability. ESG investing, also known as sustainable investing started in the 1960s just as a socially responsible investing process. The ESG risks, vulnerabilities and opportunities depend on the sector of activity of the company listed on the stock exchange. ESG investing relies on 3 essential pillars regarding environmental (such as : climate change, biodiversity, natural resources use, environmental pollution, waste management focused on commercial and industrial waste, environmental opportunities), social (such as: human capital, product safety, data security, consumer protection, stakeholder opposition and social opportunities) and governance (such as: corporate behaviour, corporate governance, financial portfolio investment management) issues.

BSE has a responsible behaviour and has released relevant sustainability indices, such as S&P BSE Carbonex and S&P BSE Greenex. Moreover, this Indian stock exchange is very involved in promoting initiatives in the field of sustainability and corporate social responsibility. As a global approach, Bombay Stock Exchange of India joined the Sustainable Stock Exchanges (SSE) initiative which provides an effective platform for dialogue between the United Nations, stock exchanges, investors, companies and regulators. The official approach of BSE management highlighted the fact that BSE with more than 5,200 listed companies is one of the largest Exchanges in the World and the first Exchange

from Asia to join United Nations Sustainable Stock Exchanges (SSE) initiative while its main purpose for Indian Companies is to reach an understanding level which overcomes shareholder value and make sustainability a core driver of their strategy.

3.3 Empirical analysis

The empirical analysis focuses on an emerging capital market, namely Bombay Stock Exchange (BSE) of India. Moreover, S&P BSE SENSEX index represents the sample stock index selected in order to investigate the presence of short term momentum effect. The sample period includes monthly data from October 2007 to January 2019. BSE SENSEX index includes and measures performance of 31 well-established companies listed on Bombay Stock Exchange of India. According to Bombay Stock Exchange (BSE) statistics included on the official website, the major stock index S&P BSE SENSEX includes the following companies: Asian Paints Ltd, Axis Bank Ltd, Bajaj Auto Ltd, Bajaj Finance Ltd, Bharti Airtel Ltd, Coal India Ltd, HCL Technologies Ltd, HDFC Bank Ltd, Hero MotoCorp Ltd, Hindustan Unilever Ltd, Housing Development Finance Corp, ICICI Bank Ltd, IndusInd Bank Ltd, Infosys Ltd, ITC Ltd, Kotak Mahindra Bank Ltd, Larsen & Toubro Ltd, Mahindra & Mahindra Ltd, Maruti Suzuki India Ltd, NTPC Ltd, Oil & Natural Gas Corp Ltd, Power Grid Corp of India Ltd, Reliance Industries Ltd, State Bank of India, Sun Pharmaceutical Industries Ltd, Tata Consultancy Services Ltd, Tata Motors Ltd, Tata Motors Ltd DVR, Tata Steel Ltd, Vedanta Ltd and Yes Bank Ltd. However, from this list of companies, there are certain cases that do not present data available for the entire analysis period, such as: Bajaj Auto Ltd, Coal India Ltd, Tata Motors Ltd and HCL Technologies Ltd. Consequently, in order not to compromise the accuracy of the empirical research results, the 4 companies mentioned above were eliminated from the sample. The investment strategies based on momentum effect have a dynamic that oscillates between two main pillars, namely winner portfolios (noted with the capital letter W) and loser portfolios (noted with the capital letter L).

We used the subsequent mathematical equation for calculating stock returns based on monthly prices, i.e. :

$$Returns = (Price_t - Price_{t-1}) / Price_{t-1} \times 100$$

where as

$$\begin{aligned} Price_t &= \text{Closing Price}_t \\ Price_{t-1} &= \text{Opening Price} \end{aligned}$$

The specific notation of investment strategies based on momentum effect includes the so-called “formation period” which is noted with the capital letter J and “holding period” which is noted with the capital letter K. it is important to highlight the fact that J and K acquire only the values of 3, 6, 9 or 12 months, as the case may be. Technically, all constituents of S&P BSE SENSEX index will be classified into categories (deciles) using certain ranks due to past J-monthly returns. By default, 4 different categories of individual portfolios will be used, because J equals 3 months, 6 months, 9 months, and 12 months. The first ten most advantageous stocks will be selected as winner portfolios (W) while, on the contrary, the least profitable 10 stocks will be selected as loser portfolios (L). Furthermore, the new investment portfolios will be maintained for K subsequent months, considering that

sequence k takes the following values 3 months, 6 months, 9 months, and 12 months since are equally weighted. As a result, a total number of 16 momentum strategies are obtained using the applied methodology $4J \times 4K$ plus zero cost portfolio or momentum portfolio. It is important to highlight the opportunity for long position in case of winner portfolios (W) and on the contrary for short position in case of loser portfolios (L).

4. EMPIRICAL RESULTS, DATA ANALYSIS AND DISCUSSIONS

This section discusses the existence of short-term momentum effect in the S&P BSE SENSEX index of India and analyzes, interprets and converses the stock returns for monthly price momentum investment strategies. The following Table no. 2 entitled Stock returns of monthly price momentum effect strategies shows the returns of monthly price momentum strategies. 7 columns in total can be found in the table. First column from the right, shows the formation period (J) and winner (w), losers (l) and zero-cost momentum or w-l portfolios. Second column shows number of months of formation period which is 3 months, 6 months, 9 months and 12 months. Second row from the top shows holding period (k) also equals for 3 months, 6 months, 9 months and 12 months. Column number 3, 4, 5 and 6 shows the returns for w, l and w-l portfolios. In the table, no. of months for formation periods are written vertically whereas no. of months for holding period are written horizontally. Table no. 2 presents the returns of 16 monthly price momentum strategies. It is evident from the table that returns of all monthly price momentum strategies are positive and statistically significant which leads to a finding that short term momentum effect exists in BSE 30 index.

Table no. 2 – Stock returns of monthly price momentum effect strategies

The Formation period (J)		The Holding period (K)				
		3	6	9	12	
Winner (w)		5.53816	5.55655	4.781197	4.805488	
Loser (l)		-4.11816	-4.07898	-4.03481	-3.9664	
Winner- Loser (w-l)	3	9.656322	9.635525	8.816009	8.771888	9.219936
(t-stat)		35.6783	43.8075	48.1971	52.2711	
Winner (w)		4.321565	4.351979	4.385043	4.420079	
Loser (l)		-2.85406	-2.81479	-2.75983	-2.68632	
Winner- Loser (w-l)	6	7.175627	7.16677	7.144874	7.106396	7.148417
(t-stat)		34.9178	38.71509	42.2712	45.134	
Winner (w)		3.804811	3.850507	3.894268	3.923996	
Loser (l)		-2.22409	-2.18051	-2.11961	-2.07367	
Winner- Loser (w-l)	9	6.0289	6.031014	6.013882	5.997661	6.017864
(t-stat)		34.9523	37.9138	41.0312	43.3093	
Winner (w)		3.512689	3.566068	3.602231	3.609251	
Loser (l)		-1.78922	-1.73603	-1.70072	-1.69952	
Winner- Loser (w-l)	12	5.301913	5.302099	5.302952	5.308773	5.303934
(t-stat)		35.9891	37.8289	39.7614	41.3865	

Source: Authors computation based on selected databases

All momentum returns are positive and statistically significant. It is clear from the table that short-term momentum effect is very strong in S&P BSE SENSEX index. As

discussed above, the cornerstone of price momentum investment strategies is to sell winners portfolios long and sell losers portfolios short. It is the short sale of losers portfolios that boosts the returns of price momentum strategies. For instance, [Chui *et al.* \(2000\)](#), [Conrad and Kaul \(1998\)](#), [de Groot *et al.* \(2012\)](#) implemented the same price momentum strategies to examine short-term momentum effect phenomenon in their respective papers.

Moreover, the [Table no. 2](#) highlights the fact that monthly price momentum strategy J3K3 is posting highest return of 9.65%. On the other hand, the same table suggests that winner portfolios of J3K3 posted a return of 5.53% whereas loser portfolio boasted the returns of J3K3 by 4.11 % which leads to the total return of 9.65% by J3K3. It is clear from the returns' result that highest returns are posted by J3 family of price momentum strategies whereas lowest returns are posted by J12 family of price momentum strategies. Lowest return is posted by J12K3 price momentum strategy which is 5.30%. The empirical results incorporated in [Table no. 1](#) revealed that short term momentum effect is strong at the start of table, however, as time period increases from 3 to 12 months, momentum returns gets lower and weaker and ultimately disappears after J12K12. This empirical findings is suitable with the definition of short-term momentum effect in existing literature which states that in short run, winners will outperform losers and winners will remain winners and losers will remain losers for 3 months to 12 months – see [Jegadeesh and Titman \(1993\)](#), [Jegadeesh and Titman \(2001\)](#), [Hurn and Pavlov \(2003\)](#).

[Table no. 1](#) provide relevant information regarding the fact that J3K12 monthly price momentum strategies is posting a return of 8.77%. This return is boasted by loser portfolio which is 3.96%. It can be seen from the table that momentum returns have been drastically decrease from 9.65% (J3K3) to 5.30% (J12K12). It can be observed that J6 family is posting a return of 7%. For instance, J6K3 posts a return of 7.17%. The return of J6K3 is boasted by 2.85% of loser portfolios. Similarly, the return of J6K12 strategy is 7.10%, which is also achieved by selling winner portfolios long and selling loser portfolios short. J9 family of monthly price momentum strategies are posting a return of 6%. J9K3 family is posting a return of 6.02% in which winner portfolios contributed 3.8% and loser portfolios contributed 2.22% toward the return. J9K12 posted a return of 5.99%. In this strategy, loser portfolios have contributed 2.07% towards the return of J9K12 monthly price momentum strategy. However, J12 portfolios are posting lowest returns for monthly price momentum strategies. Loser portfolios of J12 monthly price momentum strategies are posting lowest returns. For instance, for J12K12 monthly price momentum strategy, loser portfolios have posted a lowest return i.e. 1.69%. Average returns of J12 family for price momentum strategies are 5.30% which is lowest returns among 16 monthly price momentum strategies.

These empirical results are very fruitful for investors of India and financial fraternity. Success of monthly price momentum strategies are a success in S&P BSE SENSEX index and provide an opportunity to potential domestic and international investors to earn handsome returns. For instance, an investor has an opportunity to earn on average 9% returns by using a long position in winner portfolios and selling short position in loser portfolios. The S&P BSE SENSEX index is a significant investment opportunity provided by the emerging market of India, which proves its worth by offering handsome momentum returns to its investors.

5. CONCLUSIONS

This research paper examines the existence of short-term momentum effect in S&P BSE SENSEX index of India. It also examines the returns' magnitude of monthly price momentum strategies. Short term momentum effect is an anomaly to efficient market hypothesis which states that winners will outperform losers in short run or winner will remain winners and losers will remain losers in short run. This short run period lasts for 3 to 12 months so "Winners" is a portfolio that consists of stocks that have performed really in short run whereas "losers" is a portfolio consisting of stocks that have performed words in recent past. Short term momentum effect produces handsome returns for the stock market which attracts more investment from investors which leads to high profits.

In other words, stock that have performed best in recent past will continue performing good in short run and stocks that have performed worst in recent past will continue performing worst in short run. Short term momentum investment strategy has been proven to be profitable for developed stock markets in general and for emerging stock markets in particular. However, emerging stock market is complex phenomenon due high degree of volatility and abrupt changes in political and socio-economical environment. The main features that which characterizes an emerging stock market include a fragile financial structure, a vulnerable economic system, presence of pro-cyclical polices in financial system, higher growth rate due to higher consumption, high foreign currency risk, low incomes, and high rate instability in social and political area.

Actually, this phenomenon was first introduced by Jegadeesh and Titman in their research paper in 1993, and from that point onward, it has been the subject of extensive research in financial literature. Rouwenhorst (2002) have confirmed the presence of momentum phenomenon in the stock markets of Europe and Asia. Hurn and Pavlov (2003) found its presence in Australian stock market. It also examines the magnitude of returns of price momentum strategies and finds that momentum returns are stronger at the start, however, as time period gets longer, momentum effect gets weaker. This is exactly the behavior of price momentum strategy which states that in short-run, winner portfolios will outperform losers' portfolios. For instance, return of J3K3 price momentum strategy is 9.65% which is the highest return out of the returns posted by all 16 monthly price momentum strategies, however, lowest momentum return is on average 5%. BSE 30 index is a strong and promising index which is offering good return on investment to the investors. Potential domestic and international investors have the chance to earn average 9% returns in short run. Future research should examine shorter run period and focus on weekly and intra-day price momentum strategy.

On the other hand, this research paper provides a detailed approach on the concept of sustainable investing. Furthermore, the theoretical and empirical analysis lead to the conclusion that [Bombay Stock Exchange \(BSE\)](#) of India is a sustainable stock market. Sustainable investing, also known as environmentally and socially responsible investing integrates environmental, social and governance (ESG) characteristics into investment decisions. The advantages of sustainable investment include competitive portfolio returns, low operating costs, limited risk, strong financial performance, economic efficiency, ethical asset management, new market value opportunities, security management practices. Moreover, ESG initiative significantly improves business reputation for companies listed on Bombay Stock Exchange (BSE) of India. Considering emerging global challenges, consumers are willing to

pay higher prices for environmentally and socially responsible products. The risk management is an essential variable in the systemic process of implementing strategies based on sustainable investing. In addition, sustainable investment process takes into account the long time horizon in order to maximizing risk-adjusted returns.

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