A Comparative Study of Performance of ESG Indices with Parent Index in Indian Stock Market

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Abstract

The companies screened on the basis of their superior performance in environmental, social, and governance (ESG) parameters comprise the social responsible indices which are introduced at global and national stock exchanges.

This study compares the performance of Nifty100 ESG Index and Nifty100 Enhanced ESG Index with the parent index of NSE. Using the daily index data for the period of 10 years, the statistical tools like descriptive statistics and standard deviation were applied for the analysis. In addition, the autoregressive conditional heteroscedasticity models like ARCH and GARCH models were used for analyzing the inherent conditional volatility of the indices. The results indicated that the returns of both the ESG indices are not statistically different from those of Nifty. Further, no significant difference in volatility has been observed among the indices. Thus, the ESG investment by the investors prove to be a win -win situation in both the terms, i.e getting expected returns and fulfilling the social responsibility as an individual. The results imply to focus corporates and individual investors on ESG parameters to get benefitted from its sensitivity in stock markets.

It also highlights upon the growth of socially responsible investment and the investors acceptance for such investments in India. The study is limited up to the Indian ESG indices. The future study can be extended for the performance of ESG indices at the global level.

Keywords: Socially responsible investing, Environmental, Social, Governance (ESG) Index (Nifty100 ESG Index, Nifty100 Enhanced ESG Index), Risk-return analysis, Volatility, ARCH and GARCH models.

Introduction

With the awareness towards environment pollution and social ill deeds now a day's investors are inclined towards social responsible investments, the return through which gives a feeling of satisfaction of fulfilling the individual responsibilities towards the society. Broadening the vision , some of the companies by taking initiative publish their sustainability performance reports by following the ESG principles (Hoti et al., 2005) and such investors who wish to invest responsibly are provided a platform to invest according to their desires. Some of the investors while deciding the investment portfolio doesn't include the companies that reflects a detrimental effect directly or

indirectly on the society through its manufacturing products, or hindering the social and the governance laws respectively (for eg: manufacturing narcotics, practicing child labour, taking or giving bribe). This process of selection and rejection of companies is known as screening. Screening through selection is known as positive screening while screening through rejection is called negative screening. S. Sudha (2014) defined Socially responsible investing (SRI) as: "Investing in such companies that exhibit 'ethical' corporate behaviour towards all stakeholders, viz., shareholders, society, employees, customers, government and also the natural environment." In other words, socially responsible (SR) investment means investments that screen ESG parameters positively to form a measure of corporate sustainability level of a firm.

Indian stock market, being a strong important part of emerging market economy, it becomes imperative for the entire stakeholders to know if the investment in such socially responsible companies (that comprise the ESG indices market) is according to their expectations. Whether such indices provide returns that are similar, in the positive direction or negative as compared with the returns of the conventional traditional indices.

Also, the stake holders have equal right to know the level of risk; they indulge in while investing in ESG indices in comparison to the broad market.

Since its inception in the field of investment, SRI has been a controversial topic which has been divided the investment experts in two groups: Advocates and Opponents. The economic viability of SRI has been always argued by the two groups with difference of perception. S.Sudha (2014). The advocates believe that SRI gains wealth for an investor by satisfying the personal values, ethical beliefs and achieving the expected returns through diversification of portfolio. Hoti et al. (2005) stated that the diversification reduces the portfolio risk according to the modern portfolio theory.

Whereas, the opponents of SRI (Sauer 1997) argue that SRI limits the investment universe which might result in negative screening of the large cap companies and keeping the investor far from its expected returns. Further the potential increase in volatility, lowering returns, and additional screening and monitoring costs are to be borne by the investors in SRI.

Literature Review and Research Gap

The research question majorly addressed by most of the studies is whether socially responsible investments meets investors expectations better than the conventional traditional investments in stock market or vice versa? The researchers came out with three different results relating to different countries and difference in time span of research. Taking the countries and time span as the factors for the difference in results.

Some researchers concluded that SRI's outperformed the conventional benchmarks and vice versa. Some researchers' conclusions were neutral.

Researchers (Hamilton et al. 1993; Goldreyer and Diltz 1999; and Bello 2005) compared the SRI funds performance with that of non SRI's and stated that there was no difference in the performance between the two. The same results were supported by (Mallin, Saadouni, & Briston 1995; Fogler and Nutt 1975; Alexander and Buchholz 1978; Abbott and Monsen 1979 and Gregory, Matatko, & Luther, 1997) by analyzing the financial performance of ethical investment funds, and comparing their performance with that of non-ethical investment funds and with benchmark portfolios. The above results once again were strongly supported by Kreander et al. (2000) who investigated 40 investment funds of seven European countries and found that SRI and conventional funds exhibit a very similar performance.

With the inception of SRI indices at global level as well as country levels, the scholars (Hoti et al. 2005; Benson et al. 2010) have used them for analyzing the risk, return and performance comparison with the conventional parent index. Most of the studies have concluded that SRI does not outperform the conventional financial investment. Schroder (2007) analyzed 29 SRI stock indices and stated that SRI stock indices do not exhibit a different level of risk adjusted return than Conventional benchmarks. But many SRI indices have a higher risk relative to the benchmarks.

Risalvato et.al.(2018), pointed that after the financial crisis of 2007, ethical or sustainable indices have generally performed better than traditional indices(Comparing the MSCI World and the MSCI World SRI in the period Sep 2007 – Oct 2017). Maria Cristina Muise (2009) examined the difference between the resulting index values across the three groups of SRCs, non-SRCs and S&P500 performance and stated that when an index of SRC firms was compared to the performance of the S&P500 index, the SRCs outperformed the S&P500 index under both screening methodologies. In all cases of analysis of mean returns and market valuation, SRCs outperformed non-SRCs in their market performance over the +five year period of the study.

In the Indian as well as in international contexts, the empirical studies of volatility analysis of SRI indices are very few (Hott et al. 2005; Ortas et al. 2010) Scholars

(Vasal, 2009; Gupta 2011; and Ghosh 2013) has used S&P ESG India Index for their study. Researchers (S.Sudha, 2014 and Hariharan and Babu, 2018) compared the performance of ESG India indices with their benchmark indices and also analyzed the volatility of Indian ESG indices with their conventional indices and concluded that the ESG India indices are less volatile compared to the benchmark parent index.

An investor who has his main focus on earning higher returns would solely build his profile based on the financial potential of financial assets and therefore will stand to get better returns.

Research Methodology

Different investors have different levels of risk that they are willing to take. Volatility is perceived as a measure of risk. There are several de?nitions for volatility. It is the risk of change in an asset value. A number of studies have been conducted on the impact of volatility of ?nancial assets in the economy. The ability to forecast ?nancial market volatility is important for portfolio selection and asset management as well as for the pricing of primary and derivative assets (Engle and Ng, 1993). Volatility cannot be observed therefore its di cult to assess which models are better in terms of the estimation of volatility itself. Different models were applied for conducting research on forecasting volatility. Kim et al. (1998), Bollerslev et al. (1992), West and Cho (1995) and Andersen and Bollerslev (1998) carried the studies on the volatility forecasting. introduced the GARCH model was introduced by Bollerslev and Taylor (1986) , which is an extension on the ARCH model introduced by Engle (1982), in order to produce better forecasts of conditional volatility and since then several authors introduced additional characteristics to the" traditional" GARCH model with the objective to capture di erent attributes of returns that have strong impudence in the estimation of the conditional volatility. GARCH family models has been used by a number of researchers to forecast volatility. Pagan and Schwert (1990), Franses and Dijk (1996), Brailsford and Fa (1996), Corrado and Miller (2005) had carried on this particular study.

ARCH and GARCH models bear some di erences. Andersen and Bollerslev (1998) pointed out that good volatility forecasts are provided by ARCH and stochastic volatility models.

However, GARCH models tend to outperform autoregressive conditional heteroscedasticity models (Akgiray, 1989) due to the fact that they are less likely to breach negativity constraints. GARCH models also tend to be more parsimonious meaning that it accomplishes a better prediction with fewer variables, and avoids overfitting (Brooks, 2014). Because of these, GARCH model is used to predict volatility in this study..

Data Analysis and Interpretation

Table 1. Descriptive Statistics

	NIFTY 50	100 ESG	100 ENESG
Mean	0.039259	0.048067	0.056582
Standard Error	0.022188	0.022639	0.048499
Median	0.056706	0.076833	0.125231
Mode	0	#N/A	0.230037
Standard Deviation	1.104074	1.112533	1.343162
Sample Variance	1.218978	1.237729	1.804084
Kurtosis	13.72208	12.42999	18.34936
Skewness	-0.81207	-0.69061	-0.90333
Range	21.74367	21.67156	21.67509
Minimum	-12.9805	-12.5822	-12.6083
Maximum	8.763205	9.089331	9.06677
Sum	97.20488	116.0817	43.39804

Table 1. Presents the descriptive statistics of the daily return series of all the three indexes. The average during the period considered for the study, the ESG index returns are more than that of parent index Nifty. Whereas in terms of risk the results are just opposite. Thus ESG indices will prove to be good for risk taker investors.

Fig. 1. (From January 3, 2011to December 31, 2020)

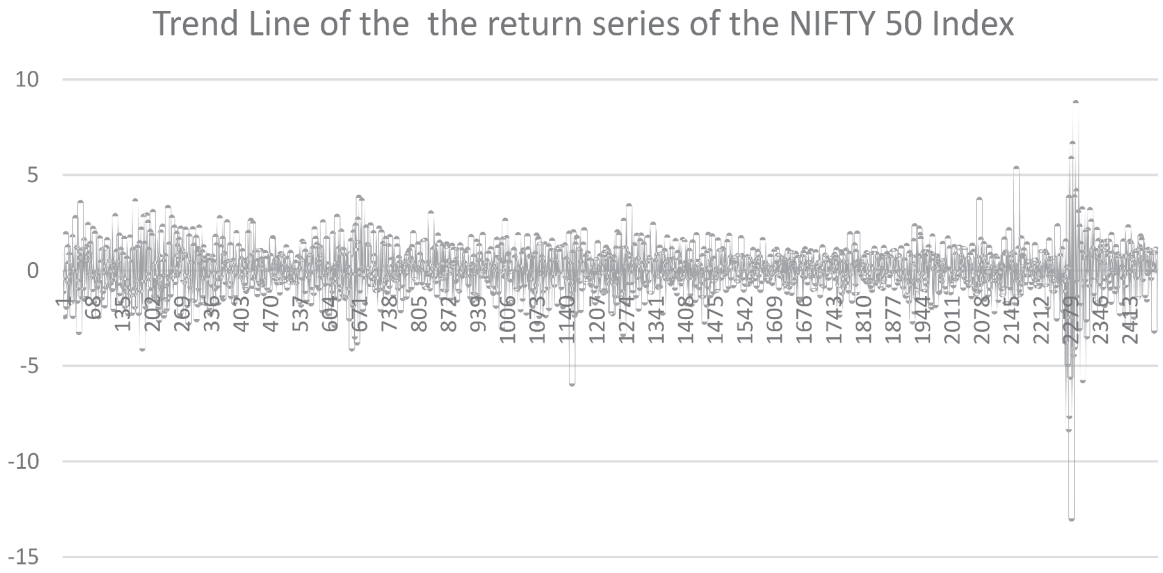

Fig. 2 (From April 1, 2011 to December 31, 2020)

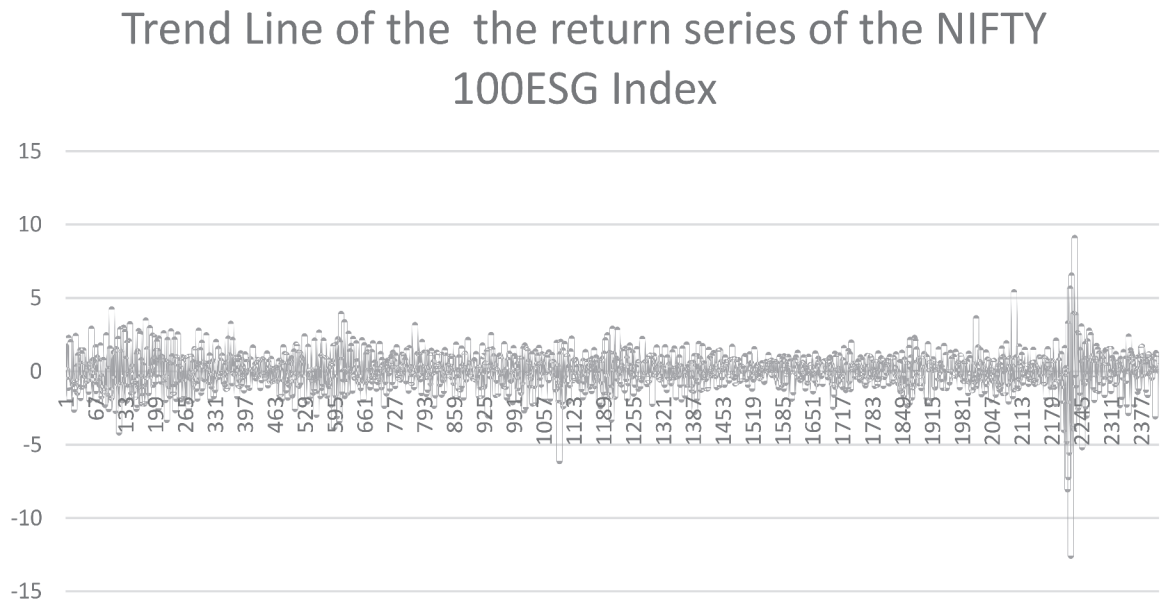

Fig. 3. (From April 2, 2018 to December 31, 2020)

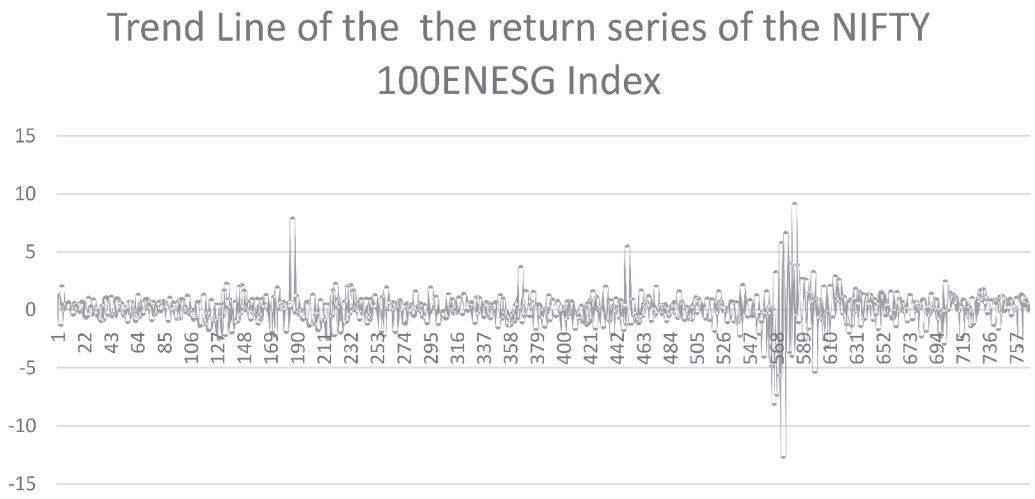

Figure 1, 2 and3 shows the return series(log differences) of Nifty50, Nifty 100 ESG and NIFTY 100 Enhanced ESG respectively. They seem to be stationary. The Augmented Dickey-Fuller (ADF) unit root test is performed to rule out the unit root stationary test.

Table 2. Stationary test for Nifty

tationary Test					
est	Score	P-Value	C.V.	Stationary?	5.0%
DF					
No Const	-14.9	0.1%	-1.9	TRUE	
Const-Only	-15.0	0.1%	-2.9	TRUE	
Const + Trend	-15.0	0.0%	-1.6	TRUE	
Const+Trend+Trend^2	-15.0	0.0%	-1.6	TRUE	

Table 3. Stationary test for Nifty 100 ESG

Stationary Test					
Test	Score	P-Value	C.V.	Stationary?	5.0%
ADF					
No Const	-14.6	0.1%	-1.9	TRUE	
Const-Only	-14.8	0.1%	-2.9	TRUE	
Const + Trend	-14.8	0.0%	-1.6	TRUE	
Const+Trend+Trend^2	-14.8	0.0%	-1.6	TRUE	

Table 4. Stationary test for Nifty100 Enhanced ESG.

Stationary Test					
Test	Score	P-Value	C.V.	Stationary?	5.0%
ADF					
No Const	-7.3	0.1%	-1.9	TRUE	
Const-Only	-7.4	0.1%	-2.9	TRUE	
Const + Trend	-7.4	0.0%	-1.6	TRUE	
Const+Trend+Trend^2	-7.5	0.0%	-1.6	TRUE	

The ADF test for all the three indices (Table 2, 3 and 4) shows that the return series is stationary.

So in order to check the volatility we can now apply the Garch Model.

Table 5. Garch Values.

NIFTY 50		100 ESG		100 ENESG	
GARCH(1,1)		**GARCH(1,1)**		**GARCH(1,1)**	
Parameter	Value	Parameter	Value	Parameter	Value
μ	0.04	**μ**	0.05	**μ**	0.06
α0	0.98	**α0**	1.01	**α0**	1.47
α1	0.10	**α1**	0.09	**α1**	0.09
β1	0.10	**β1**	0.09	**β1**	0.09

GARCH	Models Parameters
μ	Long-run mean (mu) of the process
α_0	Constant in the conditional volatility equation
α_1	Coefficient of the ARCH Component Model
β_1	Coefficient of the GARCH Component Model

GARCH family

The GARCH model was introduced by Bollerslev (1986) and Taylor (1986). The model allows the conditional variance to depend on the previous lags.

In a GARCH (1, 1) model,

$\sigma^2_t = \alpha_0 + \alpha_1 a^2_{t-1} + \beta_1 \sigma^2_{t-1}$

where $\alpha_0>0$, $\alpha_1>0$, $\beta_1>0$, and $\alpha_1 + \beta_1<1$.

Further we test the goodness-of-fit for this model

Goodness of fit	**LLF**	**AIC**	CHECK
Nifty	**-3617.75**	**7241.5**	1
Nifty100ESG	**-3559.35**	**7124.7**	**1**
Nifty100EnhancedESG	**-1244.75**	**2495.5**	**1**

Table6: Goodness-of-fit

We observe that the values of LLF and AIC are completely contradictory, according to the following table.

Goodness-of-fit		
LLF	log-likelihood method to measure goodness of fit	largest is good
AIC	Akaike-Information Criterion (AIC) method to measure goodness of fit	as small is good
CHECK	Examines the model for stability (stationary and positive variance)	Positive

The results indicate that the model is not fitting good in long run as the variation is not fully explained by the model.

Summary and Conclusion

This study was carried out for the performance comparision of risk, return and volatility of the ESG Indices V/S their parent conventional index. Study was conducted on the Indian Indices. The research period for the Nifty and Nifty 100 ESG was taken from 2011-2020 for 10 years whereas Nifty 100 Enhanced ESG was taken for 2018 to 2020 i.e. 3 years (as per the availability of the data).

Since Garch model is the univariate analysis technique so the time difference doesn't impact the results. The descriptive statistics show that risk taker investors will be good gainers if invest in ESG Indices while risk averse investors will like to invest in the conventional index.

Then before applying the Garch Model we check if the log return series of the three indices are stationary.

This is proved by ADF (Augmented Dickey Filler) test. The Garch model model results show that both short term persistence of volatility (α) and long term persistence of volatility (β) are same in all the three cases so it is difficult to draw result from the model. Further Goodness of fit test is applied to check the reliability of model for this particular study. It is found that this model doesn't fit well and no exact conclusion can be drawn on the volatility of indices on basis of this model.

Limitations and future scope of the study

Study is Limited to the Indian Indices. Further the factors due to which the model doesn't fit the study could be explored in future study and the same study can be carried out by applying some other volatility measuring models.

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