



## The Effects of Environment, Society and Governance Scores on Investment Returns and Stock Market Volatility

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### ABSTRACT

Sustainability reporting and disclosure in India have received a significant attention over the most recent few years propelled to a large extent by investors and policy makers. The sustainable business leadership forum (SBLF) has been closely working with many firms, owners of the companies and policy makers to single out the relationship between investment and environmental, social and governance (ESG) disclosure. Besides that, SBLF has had a coordinated conversation about the anticipations, concerns, difficulties and realities surrounding ESG estimation. This ESG criteria refers to three important elements which are considered by investors with regards to an ethical impact of firms and sustainable practices. As per the literature companies with higher ESG scores are better investment picks. This paper attempts to assess the volatility and returns of Indian companies and to measure the impact of ESG scores on returns and volatility with the help of panel regression.

**Keywords:** Environmental, Social and Governance, Environmental, Social and Governance Scores, Sustainability, Panel Regression, Investment Returns  
**JEL Classifications:** D22, G11, G14, G32

### 1. INTRODUCTION

The concept of sustainable investing has been in existence in the financial world since 1980s. In current era sustainable investment is coined as environmental, social and governance (ESG) investing where ESG refers to Environment, Society and Governance. “The story of ESG investing in capital market started in January 2004, UN secretary General Kofi Annan had written over 50 CEOs of major financial institution, encouraging them to participate in a joint initiative under the patronage of the UN global compact and with the assistance of Swiss Government and International Finance Corporation. He tried to inculcate ESG into capital markets” (Duuren et al., 2016). “The share market is a brawny indication for economic conditions of a country” (Schneider et al., 2010). The concept of sustainable investment is very challenging, especially in

the context of global economy. Moreover, it is pivotal to promote economic, social, and environmental advancement in order to accomplish sustainable investment. Presently ESG investing is gaining more importance due to its long-term sustainability investing strategy. Investors have now amplified their epicentre on ESG, and it is ostensible by the expansion in ESG assets globally. Some researchers argued that “ESG rating agencies, acting as pertinent financial market troupers, should take a stand on operating towards achieving a more sustainable development” (Kumar et al., 2016). However, “knowledge related to financial impact of ESG criteria remains fragmented” (Khatrri, 2016).

A sustainable stock market (Hawaldar, 2016; Mallikarjunappa and Iqbal, 2003) should be able to guarantee an optimal level of transparency and effective solutions to sensitive issues related to

society, environment, economic and corporate governance aspects. Besides that, a sustainable stock market encourages sustainable investments and responsible corporate performance. Various academicians and researchers are now studying the different aspects of ESG. For instance, one study has explained how composition of directors' board can affect the ESG performance of a company (Barberis et al., 1998) (Iqbal and Mallikarjunappa, 2011), while other studies focus on ESG scores implications on CSR scores and value of firms (Yoon, Lee and Byun, 2018), Iqbal and Mallikarjunappa, 2010), (Birindelli et al., 2018) Different research studies have explained how investors could take ESG elements into their consideration while taking decisions related to investments (Cao et al., 2019), (Friede et al., 2015), (Humphrey et al., 2012). Other researchers have made a comparative analysis of European SRI Indices based on ESG scores (De and Clayman, 2015). Empirical studies also examined the effect of ESG scores on UK Firms (Doyle, 2018). Another study has conducted on US sample to examine whether portfolio comprising of high ranked ESG scored firms outperform low ranked ESG scored firms (Gocejina, 2018), (Iqbal and Mallikarjunappa, 2010). Other researchers suggested that most underpriced stocks with poor ESG performance have the highest risk adjusted returns, while most overpriced stocks with good ESG performance have the lowest risk adjusted returns (Cao et al., 2019).

Some empirical studies reveal that "higher ESG scores are allied to higher profitability, higher values of stock (and consequently greater general collateral value) and more favourable returns from mergers and acquisitions activity and lower risk" (Loof and Stephan, 2019). Independent specialized organizations and agencies classify world's countries in several main categories based on internationally agreed standards. It is relevant for our research study to identify the correct place of Indian market in the global hierarchy (Iqbal and Mallikarjunappa, 2007). "A first classification divides the world's countries into three main categories i.e. developed markets, emerging markets, and frontier and standalone markets, and India is included in the second category of emerging markets" (Iqbal and Mallikarjunappa, 2011), (Khan et al., 2018). Another recognized international classification uses quantitative data to initially assess market eligibility for the three major country classifications: developed, emerging and frontier and India is one of the most representative emerging countries with a global weight of 12.78% (Kell, 2018). Moreover, another main stock markets classification is internationally recognized based on the following main categories: developed, advanced emerging, secondary emerging and frontier (Khan et al., 2018). This time India is being included in the category of advanced emerging, being part of the BRICS along with Brazil, Russia, China and South Africa.

## 2. LITERATURE REVIEW

In literature, a stock market is perceived as an effective barometer indicating the economic health of a country. A wide deliberation continues the futuristic effects of stock markets for the purpose of sustainable economic development. Economic sustainability represents the capacity of an economy to assist a certain level of economic production and long-term economic growth without

creating any adverse impact on the environmental, cultural or social factors for an infinite period. Practically, "the maintenance of the stock of natural resources must be an important segment of economic policymaking, particularly in underdeveloped and less developed countries because the reverse of this situation implies facing inadequacy of wealth invoked by depreciating of their environment" (Verheyden et al., 2016). However, "many different opinions in the literature suggesting, expecting of win-win, sustainable growth through new technology and improvements in efficiency, have not been satisfied thus generating the desire for an optimal option, respectively the new concept of sustainable de-growth which reflects an equitable de-escalating of consumption and production that uplifts human wellbeing and improves ecological conditions at domestic and international level, in case of short as well as long term" ((Salih, 2003 and Sneddon et al., 2006). Nevertheless, "alarming levels of ecological degradation, colossal inequalities in economic juncture both intra and inter societies, and a disrupted set of institutional arrangements for international environmental governance all reveal seemingly insurmountable hindrances to follow the path of sustainability" (Siew et al., 2016).

In India, ESG has not yet grasped the importance as it has gained worldwide. In order to popularize the concept of ESG, the Ministry of Corporate Affairs published the "National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business" in 2011. From 2012, the top 100 listed companies according to market capitalization are depicting business responsibility reports in their final reports. This paper is an attempt to single out the relationship between the scores of ESG elements, returns on stock and volatility of stock. Moreover, this study is also an attempt to know the scores of each element of ESG given in the sustainability reports could become significant explanatory variables in predicting the volatility and returns of the stocks of companies in NIFTY 100 Enhanced ESG. For asset managers the application of ESG measures to reflect corporate social performance has received a growing attention and is currently demanded by most financial investors (Lee et al., 2013).

Certain research studies indicated that "both high ESG scores and low volatility positively affect returns on stock, but the ESG effect is independent of the low-volatility effect, and ESG is a positive contributor in its own right" (Raza, 2018). There are high expectations on the stability of ESG scores during the period in which they are reported. "The market placed a more stabilized pricing penalty on firms with lower ESG scores than it awarded firms with higher ESG scores" (Kjerstenson and Nygren, 2019). Other researchers suggested that "companies that incorporate ESG factors reflects lower volatility in their stock performances than their competitors in the same industry, that each industry is stimulated differently by factors of ESG, and that ESG companies bring higher returns" (Friede et al., 2015).

On the other hand, certain researchers suggested that "the presence of institutional investors decreases market information asymmetry because there is a propensity for institutional owners to unfairly use the private information related to ESG gained through their position" (Siew et al., 2016). Moreover, other empirical studies stated that "public sentiment affects investor opinion about the

value of corporate sustainability activities and thereby both the price paid for sustainability of corporate and the returns on investments of portfolios that consider ESG data” (Nagy et al., 2013). Emerging stock markets like India are featured by some attributes, such as systemic vulnerability, lofty volatility, embryonic trading mechanisms, problems related to financial regulation, non-liquidity, inadequate transparency, challenging task to access all information that are available, meagre volume trading, opportunities of diversification, different risk categories and unpredictable situations. However, some researchers argued that “modern investors can earn more returns by taking advantage of over and under reaction without bearing extra risk” (Verheyden et al., 2016). The objectives of this paper - is to examine whether the scores given to the various elements of ESG mentioned in the sustainability reports of Indian Companies could become significant variables that affects the volatility and returns of stocks, to determine whether a reliable model could be developed to predict the volatility and returns with the help of ESG Scores and to validate whether the companies with better ESG Scores should become the investment picks for investors.

### 3. RESEARCH METHODOLOGY

This research study is analytical in nature. The data used in this study are basically from secondary source i.e. from NSE India and Yahoo Finance. The scope of study is limited to Companies in the NIFTY100 Enhanced ESG. The study is based on 43 companies out of 48 companies in NIFTY 100 Enhanced ESG. The sample period for this research study covers the period from April 2014 to December 2018. All the Environment, Society and Governance scores of each company are taken from Yahoo Finance, Returns are calculated by using capital assets pricing model (CAPM) i.e. capital asset pricing model and the volatility is calculated on yearly basis. E-views software is used to apply Panel Regression in order to investigate the impact of environment, society and governance scores on the historical volatility and returns, and to know whether a reliable model could be developed to predict the expected historical volatility and returns for future.

The study is a realistic approach to include ESG as a major factor in taking investment decisions in Indian stock market. This research highlights whether the scores of ESG mentioned in the sustainability reports can become a major factor that affects the returns and volatility. This will help the investors to know the importance of ESG while making investing decisions in this present era. This study can also depict whether the promotion of sustainable investing in India is creating an impact among investors.

#### Limitations of the Study

- ESG scores related to five companies of few years are missing due to which these companies are not taken into consideration in formulating the model
- In this study only those companies are taken into consideration which is under NIFTY100 enhanced ESG. Moreover, the results of this study could only be more reliable for Indian stock market if the ESG scores of every company in daily basis will be disclosed
- The data related to ESG is available on year wise, due to which historical volatility or moving average volatility has

been used to frame the model. If data related to ESG will be available on daily basis then day wise volatility could be used with the help of ARCH or GARCH, which could make the model more authentic.

### 4. EMPIRICAL ANALYSIS AND RESULTS

The study considers the hypothesis that the companies with better ESG scores should become the investment picks for investors. As per many reports, in India, now the investors are more interested in sustainable investing. This sustainable investing has emerged as a major trend over the last few years. It focuses on how companies handle their ESG risks, which is particularly important for emerging markets like India (Escrig-Olmedo et al., 2019). The theory says Companies with higher ESG score are better investment picks. “There is good evidence in research depicting that more sustainable companies and funds can assist to manage risk without making any compromise to returns” (Dorflleitner et al., 2015). In order to validate the theory taking the Indian stock market as an area of study, an attempt has been made to find out the relationship between the scores of environments, social and governance with the returns and historical volatility. Such relationship is being studied because investment on stocks having high ESG scores can be considered as better investment, if there is direct relationship between scores of ESG elements with the returns and an inverse relationship between scores of ESG elements with historical volatility. Hence two models have been formulated. In the first model the scores of environment, society and governance are independent variable and returns of 43 companies are dependent variable and in the second model again the scores of environment, society and governance are independent variable and historical volatilities of 43 companies are dependent variable. The scores of every element of ESG are collected from the sustainability reports and compiled as panel data. The stock returns of 43 companies over the period of 4 years 9 months (from April 1, 2014 to December 31, 2018) are assessed based on CAPM, by applying the following formula:

$$R_i = R_j + \beta(R_m - R_j)$$

Similarly, historical volatility of 43 companies over the period of 4 years 9 months (April 1, 2014–December 31, 2018) are assessed with the help of the following variance formula:

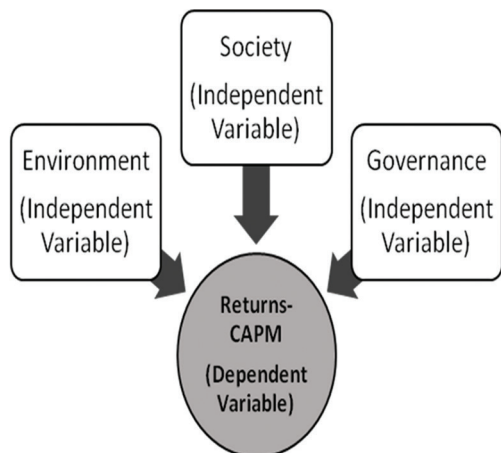
$$\sigma^2 n = \frac{1}{m} \sum_{i=1}^m un - 1^2$$

For the purpose of representing the relationship between the elements of ESG with returns and historical volatility of 43 companies over the period of last 5 years, panel regression will be used. In panel regression there are two models i.e. fixed effect model (least squares dummy variable model) and random effect model. In order to decide which model is more suitable it is necessary to run Hausman test (Figure 1).

In the model formulated above, Returns calculated with the help of capital asset pricing model is the dependent variable and scores mentioned in the sustainability reports of each element of ESG

i.e. environment, social and governance are independent variables. The Table 1 shows the co-efficient, standard error, t-statistics and

**Figure 1:** Model A: Formulation of panel regression model between environmental, social and governance elements and stock returns



**Table 1: Application and results of random effect model**

Dependent variable: Returns (capital assets pricing model)				
Method: Panel EGLS (cross-section random effects)				
Sample (adjusted): 4 January, 2014-4 January, 2018				
Periods included: 5				
Cross-sections included: 43				
Total panel (balanced) observations: 215				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-statistic	Prob.
C	0.079314	0.225946	0.35103	0.7259
Environment	-0.00149	0.003709	-0.40198	0.6881
Social	-0.00252	0.003657	-0.68938	0.4913
Governance	0.001957	0.004278	0.457486	0.6478
Effects specification		S.D.	Rho	
Cross-section random		0.106711	0.0335	
Idiosyncratic random		0.57297	0.9665	
Weighted statistics				
R-squared	0.004691	Mean dependent var.	-0.02973	
Adjusted R-squared	-0.00946	S.D. dependent var.	0.572304	
S.E. of regression	0.575005	Sum squared resid	69.76302	
F-statistic	0.331498	Durbin-Watson stat	2.533198	
Prob(F-statistic)	0.802582			

Source: Researchers' own computation using E-views 10 software

**Table 2: Results of Hausman test**

Correlated random effects - Hausman test				
Equation: Untitled				
Test cross-section random effects				
Test summary	Chi-sq. Statistic	Chi-sq. d.f.	Prob.	
Cross-section random	4.501225	3	0.2122	
Cross-section random effects test comparisons				
Variable	Fixed	Random	Var (Diff.) Prob.	
Environment	-0.00724	-0.00149	0.000035	0.3308
Social	-0.01064	-0.00252	0.000043	0.2166
Governance	0.010722	0.001957	0.000048	0.2079

Source: Researchers' own computation using E-views 10 software

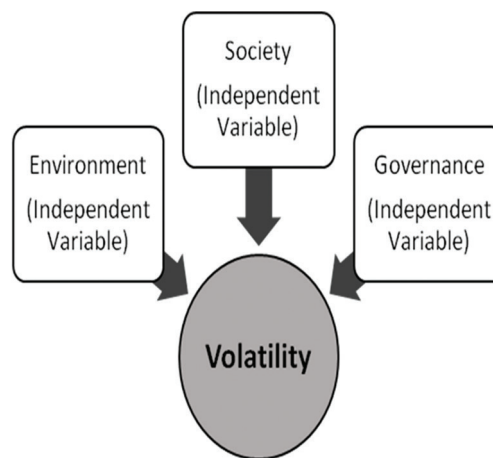
probability values of intercept and independent variables through Swamy and Arora estimator of component variances. The intercept is 0.0793 whereas the co-efficient of environment and social are negative which shows a negative relationship between stock returns and those two ESG elements. Moreover, the probability values of the independent variables are not statistically significant as the values are more than 0.05, which could give provide enough evidence that ESG scores of Indian Companies cannot become appropriate explanatory variables for determining returns. The value of Rho in cross-section random is low i.e., 0.0335 which shows there is a lack of relationship between the variables of different companies. The R-squared and adjusted R-squared are also very less.

In order to select the suitable panel regression model i.e. whether random effect model or fixed effect model, Hausman test has been applied the results of which is given in the Table 2.

In the above table showing the empirical results of Hausman test, the value of probability of cross-section random Chi-square statistic is 0.2122 which is more than 0.05, hence it can be inferred that random effect model is more suitable to show the relationship between the returns and elements of ESG (Figure 2).

It is also necessary to test the presence of serial correlation in panel data which can be determined with the help of Arellano-Bond serial correlation test. The results of the serial correlation test are mentioned in Table 3.

**Figure 2:** Model B: Formulation of panel regression model between environmental, social and governance elements and historical volatility



**Table 3: Application and results of Arellano-Bond serial correlation test**

Arellano-Bond serial correlation test				
Equation: Untitled				
Sample: 4 January, 2014-4 January, 2018				
Included observations: 129				
Test order	m-statistic	Rho	SE (rho)	Prob.
AR (1)	-0.95217	-24.8301	26.07748	0.341
AR (2)	-1.29753	-0.07006	0.053993	0.1944

Source: Researchers' own computation using E-views 10 software

**Table 4: Application of random effect model**

Dependent variable: Historical volatility				
Method: Panel EGLS (cross-section random effects)				
Sample (adjusted): 4 January, 2014-4 January, 2018				
Periods included: 5				
Cross-sections included: 43				
Total panel (balanced) observations: 215				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-statistic	Prob.
C	0.46367	0.147153	3.150942	0.0019
Environment	-0.0000477	0.002427	-0.01964	0.9844
Social	0.002564	0.002384	1.075358	0.2834
Governance	-0.00362	0.002798	-1.29294	0.1974
Effects specification		S.D.		Rho
Cross-section random		0.037849		0.0093
Idiosyncratic random		0.390166		0.9907
Weighted statistics				
R-squared	0.013117	Mean dependent var.		0.370203
Adjusted R-squared	-0.00091	S.D. dependent var.		0.391069
S.E. of regression	0.391248	Sum squared resid		32.29881
F-statistic	0.934839	Durbin-Watson stat		2.120454
Prob. (F-statistic)	0.424716			

Source: Researchers' own computation using E-views 10 software

The above Arellano-Bond serial correlation test is two separate statistics, one for the first order correlation and one for second. Both order statistics are significant as there is no existence of serial correlation because the probability values are more than 0.5.

In the model formulated above, historical volatility is the dependent variable and scores mentioned in the sustainability reports of each element of ESG i.e. environment, social and governance are independent variables. The Table 4 shows the co-efficient, standard error, t-statistics and probability values of intercept and independent variables through Swamy and Arora estimator of component variances. The intercept is 0.46367 whereas the co-efficient of environment and governance are negative which shows a negative relationship between returns and these two ESG elements. Such negative relationship could support the theory that higher the ESG the lower would be volatility. But, the probability values of the variables are not significant as the values are more than 0.05. So, it not possible to frame a reliable model in which, volatility could be predicted based on ESG scores. In other words, the ESG elements cannot be considered as appropriate explanatory variables for predicting volatility. The value of Rho in cross-section random is low i.e. 0.0093 which shows there is a lack of relationship between the variables of different companies. The R-squared and adjusted R-squared are also very less. In order to determine the suitable panel regression model i.e. whether random effect model or fixed effect model, Hausman test has been used the results of which is given in the Table 5.

In the above table showing the results of Hausman test, the value of probability of cross-section random Chi-square statistic is 0.2122 which is more than 0.05, hence it can be inferred that random effect model is more suitable to show the relationship between historical volatility and ESG components.

It is also necessary to test the presence of serial correlation in panel data which can be determined with the help of Arellano-Bond

**Table 5: Results of Hausman test**

Correlated random effects - Hausman test				
Equation: Untitled				
Test cross-section random effects				
Test summary	Chi-sq. statistic	Chi-sq. d. f.	Prob.	
Cross-section random	4.172212	3	0.2435	
Cross-section random effects test comparisons				
Variable	Fixed	Random	Var. (Diff.)	Prob.
Environment	-0.00156	-0.000048	0.000017	0.7116
Social	0.000588	0.002564	0.000021	0.6627
Governance	-0.00969	-0.00362	0.000023	0.2069

Source: Researchers' own computation using E-views 10 software

**Table 6: Application and results of Arellano-Bond serial correlation test**

Arellano-Bond serial correlation test				
Equation: Untitled				
Sample: 4 January, 2014-4 January, 2018				
Included observations: 129				
Test order	m-statistic	Rho	SE (rho)	Prob.
AR (1)	-1.33762	-42.3559	31.66515	0.181
AR (2)	-0.76092	-1.29733	1.704952	0.4467

Source: Researchers' own computation using E-views 10 software

serial correlation test. The results of the serial correlation test are included in Table 6.

The above Arellano-Bond serial correlation test is two separate statistics, one for the first order correlation and another for second order. Both order statistics are significant as there is no existence of serial correlation because the probability values are more than 0.5.

## 5. CONCLUSIONS

From the above observation it can be inferred that reliable model cannot be formulated by considering the elements of ESG as independent variables, to predict returns and volatility. As there is a negative correlation between two ESG elements and returns, it can be said that either the ESG scores in the sustainability reports of Indian companies are not appropriate or it could also be possible that investors are not considering the ESG scores while investing. But on the other hand, the negative correlation between the scores of environment and governance with historical volatility supports the theory but the scores of ESG elements are having less significant P-values which are weakening the model formulated latter. As per a survey by Natixis, "ESG analysis is playing a higher role in institutional strategy, with more institutions finding that this approach can help navigate a path to potential profits" (Gorte, 2019). Though many economists support the direct relationship between the ESG scores and returns but applying this theory in Indian context is difficult. But taking into consideration the results from the data taken from 43 companies in NIFTY 100 enhanced ESG, does not support the theory that the companies having better ESG scores could become a good investment picks for the investors which implies that the data considered for this study does not fit into this economic theory.

The American Council for Capital Formation found a system that is fraught with problems, from inconsistent metrics, to ratings with continually fail to account for different regulatory regimes across distinct geographies. Perhaps of greatest concern it is found that each of the four agencies uses their own proprietary methodologies, metrics, weighting, and even definitions of what constitutes ESG” (Bruno, 2018). To make ESG an important factor for taking investment decisions, certain steps should be taken by the agencies in order to provide authentic reports on sustainability and the activities related to ESG should be reflected on the ESG scores immediately.

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