Performance Evaluation SRI Indices in Developing Countries: Study of India and China

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Abstract

Socially Responsible Investing is a catalyst towards a sustainable development. It is aligned to a growth that serves financial objectives along with the pursuit personal-social motives and mitigates a risky investment environment of developing countries. With more and more investors and the CSR policies of countries with development potential influencing corporate to align their business models with environmental, social, governance and ethical values, socially responsible Investing has been rising in popularity and becoming mainstream at a quicker pace in emerging economies. The paper examines performance of select developing countries' SRI and market indices during different economic conditions of boom and recession during study period extending from January 2010 - December 2018 using traditional and risk adjusted measures of performance. Conditional volatility of the stochastic index series is measured graphically and using ARCH-GARCH analysis. SRI Indices of China and India outperform the markets. Fama Decomposition Model to select which index premiumly ranks SRI index of China during boom periods, whereas India is top ranker during recessionary periods. SRI index India also exhibited some long-run volatility in return series. With evidence of out performance by SRI indices of both the counties, our study adds to the positive viewpoint of existing literature on socially responsible investing.

Keywords: SRI Indices, Developing countries, Sustainable Development, Ethical values, ARCH-GARCH

INTRODUCTION

Socially responsible investing (SRI), as a phenomenon, has prospered to its maturity in the developed countries such as the US, Australia, UK, Japan and countries of Europe. These countries have extensive policies and guidelines for companies' ESG disclosures, Sustainable Forums,

wide network of signatories to sustainable principles, SRI-ESG indices, Innovative SRI products and portfolios and regulatory authorities as watchdogs to compliance of all policy directions. Consequently, a wide literature has been contributed to identifying SRI characteristics and motives, carrying out a comparison of performance of SRI funds to conventional instruments, composition and

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performance of SRI Indices and SRI performance during various economic and market conditions.

In developing countries, socially responsible Investing holds critical importance as a tool to serve the bottom of pyramid population and contribute to ESG concerns. Delivery of social services through community organisations, charities, non-profit organisations or by government often faces challenges of accountability, effectiveness and innovation (SIITF, 2014a). Socially responsible investment provides private organisations with the capital and motivation to align their business models to sustainable and responsible goals along with financial goals.

Though accepted with much enthusiasm, SRI as a concept is at an evolutionary stage in emerging economies. It has gained momentum in last decade with a more investors seeking to invest in a sustainable and socially responsible manner,

following a personal values system and ethics. UN Principles of Responsible Investment (UNPRI) defines Responsible investment to be an investing approach to investing that objectively includes environmental, social and governance (ESG) factors in the investment decision making process, allowing for better management of risk while generating sustainable, long-term returns. The rise in popularity of SRI in developing countries can be attributed to rising participation of signatory members of United Nations Principles for Responsible Investment (Table 1), introduction of sustainable Indices(ISE of Brazil, SSE-SRI of China, SETTHSI Index of Thailand etc.) and primarily, implementation of regulatory policies by the government. These recent developments in emerging economies, thus, support only little data. And while only few studies have carried out a comparative performance analysis, a positive return on SRI investments has encouraged investors in developing countries to look beyond conventional and beat the market, ethically.

Table 1: Signatories to UNPRI principles from some notable Developing Countries

Notable Developing Countries	Number of signatories to UNPRI
Brazil	50
India	7
South Africa	58
China	22
Mauritius	7
Russia	1
Malaysia	5
Indonesia	5
Mexico	7
Nigeria	2

Source: UNPRI Report 2018

Our study objectively adds to the literature by examining and comparing the performance of two of the fastest growing economies of the world, India and China, having well developed stock markets and stock exchanges. While 59.1 million retail investors are estimated to have invested in equities in India only, China has the world's second largest equity market, evaluated in terms of equity value. Even

with growing sustainable concern, Little contribution has been made to SRI literature in these countries considering lack of data. This Paper aims to fill in the gaps and present an overview of sustainable performance of SRI Indices of the two developing countries and carry out a comparison based on various risk adjusted performance measures and volatility. The paper is unique with

regard to the sample countries chosen representing developing nations and the use of index data for performance evaluation. According to Schröder (2004), using Index return values for SRI evaluation eliminates the need to consider the transaction costs of the funds, to include the management skills or the need to time the activities of the fund management.

LITERATURE REVIEW

SRI may be called as a follow-up to the corporate governance movement. According to the Social Investment Forum, the following is a general description of socially responsible investing (SRI):

"The process of Incorporating personal values and societal concerns with investment decisions, can be called as Socially Responsible Investing (SRI). SRI considers both the investor's financial needs and an investment's impact on society. With SRI, investors can put their money to work to build a better tomorrow while earning competitive returns today." It emphasises many of the same traits previously encouraged by proponents of corporate governance and corporate responsibility such as transparency, reporting and codes. Hence socially responsible investing has evolved as a tool for CSR engagement. Tripathi and Bhandari (2014) focus on the importance of SRI by stating "Unless the investors turn socially responsible, CSR principle cannot be enforced in practice".

Gregory, Matatko & Luther (1997) used multi factor analysis for analysing SRI fund performance with the help of Fama French model. The authors acknowledged that in previous literature, the investments of ethical funds are skewed towards companies with smaller capitalisation. So the authors controlled for such factor, as Fama & French(1993), and proved that small cap funds outperformed large cap funds. A matched pair fund approach was then used to compare data of 18 UK SRI funds with 18 conventional non screened funds based on age, fund size, fund type, and investment focus of respective funds. Data on returns was collected from EIRIS

database for period 1986-94. Data was then regressed against the FTASA Index and the size factor, to find the adjusted Jensen's alpha measure. Regression analysis of the various factors showed SRI funds under performance compared to both the conventional funds as well as one market benchmark index. Impact of Ethical factor was observed on performance to show that no significant impact was found. SRI funds had more exposure to small cap stocks.

Statman (2000) seeks a solution to this issue by comparing the performance of SRI indices with respect to conventional indices, based on the argument that indices are immune to biases associated with specific funds, such as management quality, operating costs, size, age, etc. Statman (2000) compared the performance of the Domini Social Index with the S&P 500. He used the Sharpe ratio and the CAPM to estimate Jensen's alpha measure for the comparison to find the existence of no significant difference in the performance of the two indices.

Baur, Otten and Rad (2004) continued with the study analysed 25 retail SRI fund performance in Australia using four factor model. Results showed that while in domestic market SRI portfolios (1.42%) underperformed more than conventional portfolio (.61%) relative to market index, it was found that in international context, SRI under performance relative to market index was less than conventional funds. Performance of SRI portfolio manifested difference with respect to time, such that from 1992-96 SRI funds underperformed conventional stock. And during 1996-2003 SRI funds performance matched conventional performance

Statman (2006) extended his earlier (2000) study and increased the sample size to the evaluation of four different indices. He compared the performance of four popular SRI indices with the S&P 500 index. The four SRI indices used were responsible indices of USA: Domini Social Index, Calvert's Social Index, Citizen's Index and Dow Jones Sustainability US

Index. This study also had a larger time horizon extending to 2004, but, as with his previous paper, was limited to the country of US. The main questions to be addressed were - how are ethical companies different from general companies; is there significant difference in returns of SRI versus conventional stocks and studying the tracking errors of SRI portfolios in comparison to conventional benchmarks. He found evidence that the returns of the SRI indices exceeded the returns of the S&P 500, but the results were not statistically significant.

Mill (2006) analysed the performance of unit trust that started as unit trust but converted to a SRI fund and compared it with three other funds with conventional objectives of investment. While the mean risk adjusted return was not found to be significantly different after switching to SRI model, with temporary increase in variability of returns that returned to previous levels after 4 years. The return to initial levels could be attributed to CSR activities undertaken by the trust. Results showed rise in variability as attributed to SRI model than change in fund management.

Stenström & Thorell (2007) evaluated the performance of SRI investment mutual funds in comparison to conventional funds from a period extending from 2001 to 2007. In addition to comparing conventional and SRI funds, replicating portfolios were constructed by eliminating unethical constituent of the funds according to socially responsible norm based screening. These 'artificial funds' were compared with the performance of control group 'regular funds' as if they had invested socially responsible. The results highlighted the under performance of SRI funds when compared to the conventional funds. The paper also found that the socially responsible practices have a favourable impact on firm's performance.

Blancard & Monjon (2010) examined the growth of SRI funds using the content analysis and concluded that the share of SRI indices constituents, in the entire market, is low but rising. The growth of SRI

funds was observed to be at a relatively higher pace in the Europe than the USA. The paper also credited lower performance of SRI in USA to the delayed prevalence of USA financial crisis.

Renneboog, Hors and Zhang (2011) found that while ethical screening in SRI funds implied lower relative returns, shareholder activism as a tool of SRI had a positive impact on the returns of US funds. An expected rise of 4% returns could be predicted from such funds that included shareholder activism policy. SRI money flows were found to be less sensitive to past fund returns and tended to minimally impacting them, especially when SRI funds used just the negative or sin/ethical screens.

Schröder (2014) in his paper evaluated the performance of SRI funds and Indices wherein they he includes major SRI funds from USA, Germany and Switzerland and SRI indices using regression analysis and found the performance of SRI indices at par with conventional indices. Same results apply in case of SRI funds.

Stefan, Christensson, & Skagestad (2017) in their thesis examines the performance and risk exposure of conventional and SRI funds during steady development, recession and recovery phase from 2012 to 2017 using CAPM, Fama-French and Carhart model by retrieving the data from Morningstar website and found no statistically significance between the two funds. However, the study highlighted the out performance of conventional funds during recovery phase. Thus, there is no additional cost of investing in sustainable funds except during the recovery phase.

Slivinsky and Lobza (2017) The paper analyzed 3 sets of Socially responsible indices with their conventional counterparts in countries namely - US, Korea and Poland from the year of inception to December 2015, computing a relative growth chart and sectoral share in each of the SRI index. The entire period study showed Poland SRI index beating its counterpart based on various Risk

adjusted ratios of performance evaluation. Paper indicated good news for socially responsible investors as investing in SRI indices did not diminish investment returns or increase investment risk. Authors conclude that since SRIs do not deliver systematically better results in comparison to their respective conventional indices in terms of Risk and Return, there must be other behavioural- practical, rational and theoretical reasons for growing SRI trends that should be examined.

Extensive Literature has been contributed to the field of SRI prominently with regard to developed countries. Emerging countries provide us potential for up-scaling responsible investing as well as scope further research in development and analysis of socially responsible investments.

Following Objectives of the paper have been studied:

1. To examine the performance of socially responsible indices and market indices of select developing countries.
2. To compare the performance of socially responsible indices in select developing countries using various risk adjusted measures.
3. To study the impact of economic conditions of boom and recession on socially responsible indices and market indices of select countries.
4. To study the volatility in returns using ARCH-GARCH models of socially responsible and market indices in the select countries

Socially Responsible Investment Indices in India and China

MSCI ESG Leaders India Index- The index is an ESG index under the MSCI group of Indices and employs negative screening along with best-in-class approach to include in the index. It represents large and mid cap companies, based on free float market cap, who meet the MSCI ESG screening cut off. The top 10 constituents of the index hold almost 70% of the market cap of the index composition.

The Shanghai Stock Exchange- Social responsibility Index (SSE-SRI) comprises of top 100 companies, weighted by free float market capitalization, whose scored highest on social value creation per share and meet the social responsibility reporting criteria. The scores are provided on the social responsibility guidelines taken up by the Shanghai Stock Exchange. The constituents are regularly checked for meeting the turnover cut-off as well as Social Responsibility Norms and Criteria of SSE.

DATA AND METHODOLOGY

The paper examines the performance of socially responsible investing indices in India and China, for the period extending 9 years (1st January, 2010 - 31st December, 2018). SRI Indices used for the performance Evaluation are MSCI ESG Leaders India Index for India and SSE Socially Responsibility Index for China as proxies for social Responsibility Investing in the countries. Closing monthly index values of SSE-SRI were taken from the CEIC website. Closing Monthly values of MSCI ESG leaders were accessed from MSCI website, www.msci.com. CNX 500 and Shanghai Composite Stock Index have been taken as proxies for market Index in India and China respectively. We took 91 days t-bills Indian government bond rates and Chinese bonds from the Bloomberg website as proxies for Risk-Free rates. Natural log of returns were calculated to avoid impact of outliers and to get a linear error distribution. Given monthly closing Index Values (X) $X_1, X_2, X_3 \dots X_t$, the return at time t is calculated as $R_t = \ln(X_t/X_{t-1})$. The evaluation is done for the 9 year period and sub periods of boom and recession as identified by Federal Reserve Bank of St. Louis. Different periods of market conditions for India and China Markets and total months of prevalence are exhibited below (Table 2). We use these fractions of months out of total study period as the weights for our analysis and index performance evaluation.

Table 2 : Different economic conditions in Chinese and Indian markets

	China		India	
	Recession	Boom	Recession	Boom
	Aug 2011-Nov2012	March 2009-July 2011	Jan 2011-July 2013	April 2009-Dec 2010
	Jan 2014-Sept 2016	Dec 2012-Dec 2013	April 2016-July 2017	Aug 2013-March 2016
	Feb 2018- Dec 2018	Oct 2016-Jan 2018	June 2018-Dec 2018	Aug 2017-May 2018
Total	60 months	48 months	54 months	54 months

Source: Federal Reserve Bank of St. Louis Website

The paper starts with presenting descriptive statistics of all the SRI and market Indices. Mean and variance of the index values are insightful for return and risks associated with the index. We also calculate third and fourth moments of distribution as they are also considered by investors, hence, preferring a higher skewness but a lower kurtosis.

Performance Evaluation of sustainable Indices vis-à-vis market indices:

Portfolio alphas and betas and various risk adjusted measures of the financial performance are evaluated for all the indices.

Traditional measures of performance evaluation: Simple Percentage Return and Standard Deviation-

$$\text{Simple \% Return} = \frac{P_t - P_{t-1}}{P_{t-1}}$$

$$\text{Standard Deviation} = \frac{\sqrt{\sum (x - \mu)^2}}{N}$$

Beta: While above measures exhibit risk, this calculates sensitivity of portfolio return with respect to market return. Beta below 1 indicates that portfolio is not highly correlated with the market, whereas beta above 1 tells about volatility of portfolio and tendency to move in tandem with market. Formula to calculate portfolio:

$$R_p - R_f = \alpha + \beta(R_M - R_f)$$

Systematic Risk & unsystematic risk : Systematic risk occurs due to prevalence of broad macro factors affecting all securities and hence cannot be completely eliminated with the help of diversification. Unsystematic is that part of the risk

that can be eliminated by doiversification.

$$\text{Systematic Risk} = \sqrt{\beta^2 \times \sigma_M^2}$$

$$\text{Unsystematic Risk} = \sqrt{(\sigma_P^2) - (\beta^2 \times \sigma_M^2)}$$

Risk Adjusted Methods of Performance Evaluation:

Sharpe ratio: This index standardises the returns in excess of risk free rate dividing it by the variability of return.

$$\text{Sharpe Ratio} = \frac{AR_P - R_f}{\sigma_P}$$

Treynor's Ratio: Beta used in this ratio assumes well diversified portfolio and standardizes the return in excess of risk-free rate dividing it by the volatility of return.

$$\text{Treynor Ratio} = \frac{AR_P - R_f}{\beta_P}$$

Jensen's Alpha: This measure is used to determine excess or abnormal return of security or portfolio above the projected expected return. The expected return is theoretical as it is calculated using a market model, usually(CAPM). The results could be inferred to be positive where the portfolio with positive returns will have a positive alpha, and conversely, a negative alpha will indicate negative returns.

$$\alpha = R_M - [R_f + (R_M - R_f)\beta_P]$$

Fama's Decomposition Measure: Fama proposed that excess return arises due to various factors including risk accepted for the security and stock selection. This can be decomposed into two components- risk premium (return for incurring

risk) and for stock selectivity (reward for stock selection). The risk premium be called to be composed by the synthesis of systematic and unsystematic risk. The reward from only stock selectivity (R3) is the difference between the actual return and the sum of the other three components of the security's return.

- Reward for Systematic Risk, represented by $R1 = \beta_p (R_M - R_f)$
- Reward for Unsystematic Risk, represented by $R2 = [(\sigma_p / \sigma_M) - \beta_p] \times (R_M - R_f)$
- Fama's net selectivity = $R_p - [R_f + (\sigma_p / \sigma_M) \times (R_M - R_f)]$
- Total return on Portfolio = Risk-Free return (R_f) + Return for bearing Systematic risk + Reward for incurring Unsystematic risk + Reward for pure Stock Selectivity

Comparison of conditional volatility of socially responsible indices vis-à-vis Market Indices

While variance captures risk in the index series return, our next objective is to observe volatility clustering, a phenomenon observed in financial time series, where "large changes in return tend to be followed by large changes for a longer span, of either sign, and small changes in returns tend to be followed by small changes for longer period" Mandelbrot (1963). This observation requires the financial series to be stationary which is tested by Augmented Dickey-Fuller test which identifies Unit root in the series. A unit root is said to exist when the series' mean and variance are constant over time, the auto-covariance between the two time periods depends only on the gap or lag between the two time periods, and is time invariant (Gujarati, 2003). It is imperative to identify unit-root and make the data stationary; otherwise the dependent variable may just act as a function of non-stationary, giving rise to spurious regression. The trend line of return series of the Chinese Indices (Fig.1) an Indian sustainable and Market Indices (Fig.2) exhibits the series are level stationary. ADF tests are employed to test the variability mathematically, the equation being as follows:

$$\Delta y_t = \alpha_1 + \gamma y_{t-1} + \alpha_2 t + \sum a_s \Delta y_{t-s} + v_t,$$

where s is the lag order of the autoregressive process and v is the error term in time t .

Volatility clustering observed graphically is reinforced using ARCH LM test to in the series; the null hypothesis of the test being there is an ARCH effect. Variance of elements of a series with an ARCH effect (observed with optimal lags) are, thus, impacted by variance of elements of previous term. This pattern can be used to GARCH modelling of the series. A GARCH (P, Q) model is objectively equivalent to an ARCH($P + Q$) model. Thus for an ARCH(2) equation, corresponding GARCH (1,1) variance equation is:

$$\sigma_t^2 = \alpha_1 + \alpha_2 \varepsilon_{t-1} + \alpha_3 \varepsilon_{t-1}^2$$

Where, σ_t^2 is a measure of variance in time t , α_2 captures the short-run persistence of shocks, also known as ARCH Effect and α_3 is the GARCH coefficient representing the long-run persistence of shocks.

Regression Analysis using Dummy Variable

We use CAPM factor model to calculate risk-adjusted abnormal return performance of SRI index relative to Market indices in the select developing countries during different economic conditions. We average the various boom and recessionary periods over the study period from 2010-2018, and observe the performance of alphas during these sub-periods. Betas are also noted for their variation during boom and bust conditions. We estimate following single factor regression equation : M

$$R_p - R_f = \alpha_0 + \alpha_1 D + \beta_0 (R_M - R_f) + \beta_1 D (R_M - R_f)$$

R_p is the monthly log return of socially responsible index in select developing countries for the select period, R_f is the 91 day t-bills return of respective country and R_M represents monthly log return from Market index. We use Dummy variable D to test the impact of economic conditions on alphas and betas of indices, that takes value 0 for recession and 1 for boom. In the equation,

α_0 = Excess return for recessionary period in respect of R_p

$\alpha_0 + \alpha_1$ = Excess return for Boom period in respect of R_p

β_0 = Slope of R_p in Recessionary period in select countries

$\beta_0 + \beta_1$ = slope of R_p in Boom period in select countries

EMPIRICAL RESULTS

Table 3: Descriptive statistics of Index series returns of China and India Markets, in percentage terms

	Shanghai Composite Index	SSE-Social Responsibility Index	CNX 500 Index	MSCI ESG Leaders India Index
Mean	-0.25	0.07	0.69	0.44
Std. Deviation	6.46	7.01	4.61	5.85
Skewness	-24.09	41.11	-0.13	-5.42
Kurtosis	2.3800	2.4065	0.98	24.67
Range	44.39	48.11	23.69	30.43
Minimum	-25.68	-21.40	11.04	15.28
Maximum	18.71	26.72	12.65	15.15

Source: Index data from Bloomberg.com and MSCI website

The descriptive statistics of the series shows mean returns of CNX 500 market index to be highest followed by MSCI ESG India Index performance, and while SSE-SRI underperforms Indian Indices in terms of lower return and higher risk, market index of china has a negative mean. According to Belghitar, Clark and Deshmukh (2014) investors also consider higher moments and prefer higher

skewness, but lower kurtosis while investing. Skewness of SSE-SRI is highest, while lowest kurtosis is provided by CNX 500. In (Table 3) while SRI indices provide high means and skewness, this is accompanied with slightly higher variances as well as kurtosis, indicative of a probable apprehension among investors towards SRI stocks.

Table 4 : Pearson's Correlation Matrix among Indian and Chinese markets Indices

	SCI	SSE-SRI	CNX 500	MSCI ESG India
SCI	1	.954**	.229*	.183
SSE-SRI	.954**	1	.223*	.169
CNX 500	.229*	.223*	1	.892**
MSCI ESG India	.183	.169	.892**	1

***significant at 0.00, **significant at 0.05, * significant at 0.10; (t values in parentheses)

Source: Authors' compiled

The correlation matrix (Table 4) indicates SSE-SRI and Shanghai Composite Index to be highly correlated. MSCI ESG India is significantly

correlated with the market Index of India. The markets of India and China are also significantly correlated at significance level of 10%.

Table 5 : Performance Evaluation of market index and SRI index using risk adjusted measures in China

China								
	Overall		Boom			Recession		
	<i>Shanghai Composite</i>	<i>SSE-SRI</i>	<i>weight boom</i>	<i>SCI Adjusted</i>	<i>SSE-SRI Adjusted</i>	<i>weight recession</i>	<i>SCI Adjusted</i>	<i>SSE-SRI adjusted</i>
Average Return	-0.0025	0.0007	0.4444	0.0002	0.0019	0.5556	-0.0027	-0.0015
Average excess return	-0.0042	-0.0024	0.4444	-0.0047	-0.0021	0.5556	0.0069	0.0081
SD of Excess return	0.0953	0.0983	0.4444	0.0410	0.0182	0.5556	0.0533	0.0521
Beta	1.0000	1.0070	0.4444	0.4444	0.1975	0.5556	0.5556	0.5298
Systematic Risk	0.0953	0.0960	0.4444	0.0410	0.0182	0.5556	0.0533	0.0508
Unsystematic Risk		0.0211	0.4444		0.0000	0.5556		0.0116
Sharpe Ratio	-0.0451	-0.0110	0.4444	-0.1253	-0.0557	0.5556	0.0613	0.0756
Treynor's Ratio	-0.0043	-0.0011	0.4444	-0.0115	-0.0051	0.5556	0.0059	0.0074
Jensen's Alpha	0.0000	0.0032	0.4444	0.0000	0.0029	0.5556	0.0000	0.0015

Source: Authors' compiled

In the China, Socially responsible index was able to outperform the market index in the entire period and sub-periods in terms of average returns and average excess returns accompanied with lower risk measured in terms of SD (Table 5). The beta varied with economic condition, and SRI index appeared to be more sensitive to market movements during aggregate period than in boom, recession

individually. On the risk adjusted measures of performance, SRI portfolio beat the market index portfolio by earning more return per unit of risk incurred, both in terms of Standard deviation and beta. It also earned positive abnormal returns in the entire period and continued to earn excess return during recession.

Table 6 : Performance Evaluation of market index and SRI index using risk adjusted measures in China

India								
	Overall		Boom			Recession		
	CNX 500	MSCI ESG Leaders India	Weight Boom	CNX500 adjusted	MSCI ESG India Adjusted	Weight Recession	CNX500 Adjusted	MSCI ESG India Adjusted
Average Return	0.0069	0.0044	0.5000	0.0053	0.0046	0.5000	0.0012	-0.0006
Average excess return	0.0013	-0.0011	0.5000	0.0021	0.0028	0.5000	-0.0033	-0.0014
SD of Excess return	0.0783	0.0843	0.5000	0.0410	0.0373	0.5000	0.0434	0.0412
Beta	1.0000	1.0188	0.5000	0.5000	0.4980	0.5000	0.5000	0.4994
Systematic Risk	0.0798	0.0783	0.5000	0.0410	0.0349	0.5000	0.0434	0.0388
Unsystematic Risk	-	0.0271	0.5000		0.0132	0.5000		0.0139
Sharpe Ratio	0.0175	-0.0149	0.5000	0.0260	0.0373	0.5000	-0.0382	-0.0172
Treynor's Ratio	0.0014	-0.0012	0.5000	0.0021	0.0027	0.5000	-0.0033	0.0007
Jensen's alpha	0.0000	0.0026	0.5000	0.0000	0.0008	0.5000	0.0000	0.0019

Source: Authors' own calculations

MSCI ESG index, though underperformed market in terms of average returns, it beat the market with regard to average excess returns. A look at risk adjusted performance tells us that, ESG index earned more returns for every marginal unit of risk undertaken. The SRI index of India had lower

Standard Deviation and Beta as well as lower systematic risk indicating a lower risk of the investments. The ESG index earned positive excess returns during the overall period, as well as both sub-periods. Performance of SRI investments index is noteworthy during the crisis period.

Table 7 : Two-sample mean comparison test (t test for difference of mean returns)

p-value	SCI-SSE SRI	SCI-CNX 500	CNX 500-MSCI ESG India	SSE SRI-MSCI ESG India
Overall Period	0.7261	0.2163	0.7224	0.6733
Boom Period	0.6834	0.4051	0.9265	0.4073
Recessionary Period	0.9114	0.2897	0.8261	0.3070

Source: Authors' compilation

Significance of differences in mean return performance of various pairs of indices is calculated using independent sample t-tests. A p-value greater

than 5% indicates there is no significant difference in the mean returns of pairs of indices (Table 7).

Table 8 : Abnormal returns and slope beta of SRI indices during boom and recession

Indices	Recession		Boom	
	α_0	β_0	$\alpha_0 + \alpha_1$	$\beta_0 + \beta_1$
SSESRI	0.0028*	0.9536**	0.0066**	1.0876**
MSCI ESG India	0.0035*	1.0018**	0.0015	1.0413**

***significant at 0.99, **significant at 0.95, * significant at 0.90; (t values in parentheses)

Table 8 exhibits the significance of alpha and slope betas in a single index equation. The alpha in recession period is positive and significant for the China socially responsible Index as well as ESG India index. What is to be noted, though, is that both the betas are significant at 5% level suggesting that recession is positively and significantly impacting the movement in returns of the two indices. During

Boom Periods, again, the SSE-SRI of China to earn positive and significant returns, whereas India ESG index continues to insignificantly earn positive abnormal returns. The economic condition again has a positive and significant impact on the returns of the both index series, suggesting strong market effect on index performance.

Table 9 : Ranking on basis of Fama's Decomposition Net Selectivity Measure

		Risk Premium Due to				Ranking On Basis of Net Selectivity
Overall period	Risk prem%	Systematic Risk	Selectivity	Unsystematic Risk	Net Selectivity	
SSE SRI	-0.11%	-0.43%	0.32%	-0.01%	0.33%	1
MSCI-ESG India	-0.12%	0.14%	-0.26%	0.01%	-0.27%	2
Boom Period						
SSE SRI	-1.98%	-2.64%	0.65%	-0.05%	0.70%	1
MSCI-ESG India	0.56%	0.44%	0.11%	-0.06%	0.17%	2
Recession Period						
SSE SRI	1.45%	0.02%	1.43%	0.03%	0.25%	2
MSCI-ESG India	-0.28%	0.00%	-0.28%	0.03%	0.35%	1

Source: Authors' own calculations

The above Table 9 ranks the SRI Indices of the two countries on basis of Net Selectivity Measure of Fama's Decomposition Method of performance evaluation. This is an absolute measure and unlike other risk adjusted measures such as Sharpe, Treynor's ratio, Jensens's alpha, it takes account of downside risk evaluation in performance measurement. Looking at the overall period, Indian SRI Investors have a reason to rejoice, as the ESG index beat the Chinese SRI market by compensating investors for non-diversification. The Chinese counterpart managers could in fact, perform better by higher diversification. In sub-periods, SSE-SRI benefits from non-diversification, whereas both the indices earn positive and equal non-diversification benefits during their respective Recessionary

periods. A rank 1, on the basis of net selectivity, further indicates that socially responsible investors can infact perform better during the recessionary periods by investing in an ESG index inspired portfolio.

Comparing the SRI indices of the two countries, China and India, we observe a similar performance of the two, which were able to beat the market indices. Closer observation reveals, ESG India index had lower risk during overall period as well as the recession period. On the other hand, while SSE-SRI earned abnormal return more than ESG India during overall and boom sub-periods, it is SRI index of India that earned better returns. The Net selectivity measure is able to rank performances

Table 10 : Results of Augmented Dickey-Fuller (ADF) unit root test on level form of index series

Index Series	Test Statistics	5 % critical value	P value for Z(t)
SCI	-8.9357	-2.8886	0.0000
SSE-SRI	-9.5102	-2.8886	0.0000
CNX 500	-10.2723	-2.8886	0.0000
MSCI ESG India	-10.3832	-2.8886	0.0000

Source: Authors' compilation, the hypothesis of the test being, H_0 = There exists a Unit Root, H_1 = There exists no Unit Root

In Table 10, we test presence of unit root in the series data. The stationarity is presented graphically in Fig. 1 and Fig. 2. and also tested using the ADF test, popular in literature. The return series of all the four indices suggests stationarity of the series graphically

as the values cross their mean repeatedly, and stationarity is proved in the ADF tests, with $p=0$, rejecting the null that there exists a unit root in the seri

Fig. 1 Trend line of the return series of the Shanghai Composite Index and SSE- Socially Responsible Index

Fig. 2 Trend line of the return series of the CNX 500 and MSCI ESG India Index

Source: Index data from Investing.com and MSCI website

Graphical trend line of the indices exhibited regular fluctuation of returns, and time-varying volatility was not observed from mere inspection (Fig.1, Fig.2). We, therefore employ Lagrange Multiplier test with ARCH(1), an ARCH test in Eviews on each index series with the null that there is no arch effect. The LM test indicates that while there is no arch effect in the return series of SSE-SRI, arch effect is observed for ESG India Index at lag (2). We proceed to define a GARCH (1,1) for the ESG India Index as a GARCH (P,Q) model is locally equivalent to an ARCH(P + Q) model. The Model goodness is verified using AIC (-4.295) and adjusted R squared (.9087) measure is used to choose a GARCH (1,1) from ARCH models family.

We check for volatility of the indices over periods of

various economic conditions, as Campbell et al. (1997, p. 481) argue “it is both logically inconsistent and statistically inefficient to use volatility measures that are based on the assumptions of constant volatility over some period when the resulting series moves through time”. Thus we go on to test the series on ARCH and GARCH to derive a risk return relationship in the indices series. The arch model helps model variance, where variance of error depends on the lagged squared error terms. GARCH, a computational improvement over ARCH, takes into account conditional variance of error in previous term, along with lagged squared error terms. We tested our model on adjusted R squared and AIC measures and GARCH was preferred with higher R2 and a lower AIC.

Table 11 : Coefficients and significance of volatility measured using ARCH-GARCH

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.000360	0.000587	0.612975	0.5399
ARCH(1)	0.075256	0.082043	0.917275	0.3590
GARCH(1)	0.819619	0.232523	3.524889	0.0004

Source: Eviews Output

Variance equation so formulated from the ARCH/GARCH output is as follows:

$$\sigma_t^2 = 0.0003 + 0.0753\alpha^2_{t-1} + 0.8196\sigma^2_{t-1}$$

An insignificant ARCH coefficient suggests that volatility is not affected by previous days' lagged squared innovation; whereas a significant GARCH coefficient suggests that the return series' conditional variance is affected by previous days' variance (Table 11). The coefficient of $\alpha_0 + \alpha_1$ approximates to 0.89 or 89% indicative of weak short and long run persistence of volatility in ESG India Index, whereas a higher coefficient of GARCH (1,1) suggests some amount of long run volatility of the return series of the index.

CONCLUSION

With more and more nations adopting Sustainable Development Goals (SDGs), the world is striving towards growth and progress that is sustainable, inclusive, accountable and innovative. Socially Responsible Investing is just the catalyst that is aligned to a growth that serves financial as well as social motives and mitigating a risky investment environment. Our study evaluated and compared the performance of SRI indices of two such important developing economies to trace the potential an opportunity using various econometric tools.

Our analysis revealed that returns from SSE-SRI Index as well as MSCI ESG India Index fared well on first and third moment of distribution analysis whereas performed relatively negative on the second and fourth moment indicating higher risk than Market indices. This implies that SRI indices attract with positive and high mean returns and long positive tails of return distributions, they may be apprehensive to relatively more risky responsible investments.

While SRI indices were highly and significantly correlated with the market indices, SSE-SRI and ESG India index were also significantly correlated among themselves, indicating a similar movement of SRI investments returns and movements across countries. All the market indices as well as SRI indices were noted to be level stationary, ruling out

any spurious relationship, and infact, indicating a weak form EMH in the series.

We proceeded to evaluate and compare the performance of SRI Indices based on various traditional and risk adjusted measures of performance and noted that SRI Indices of China and India outperformed the market, but insignificantly. Comparing the SRI indices of the two countries we could not draw any conclusive results as to better performance. Further test of Net Selectivity, though, ranked the SRI indices on their systematic and unsystematic risk returns and preferred SSE-SRI of China over ESG India Index in the overall and boom periods, but credited ESG India better during recessionary times. Dummy Variable Regression was run to test significance of excess returns during boom and recession and to study impact of market in explaining the performance of SRI indices' excess returns. In this test too, ESG India Index managed to beat SSE-SRI Index during recessionary times implying socially responsible investing is rewarding during low periods in India.

Volatility clustering is a common phenomenon of financial time series and was determined volatility for each index using ARCH LM test and graphically, both, which indicated low volatility of the series. As we applied an ARCH-GARCH model on series, impact of lagged returns and some long run volatility was observed in ESG Index Series.

The analysis is imperative for the rational investor to shift to sustainable investing in an uncertain investment environment. There are some hurdles to the transition, especially, in emerging economies. Lack of domestic sustainable policy, SRI reporting and most importantly apprehension to this style of investment perceived to be lower diversified, more risky and less rewarding. Coordination, between government, corporation and fund houses, is the key to this problem.

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